DATA REGISTRATION CODE

(DRC)

CONTENTS

(This contents page does not form part of the Grid Code)

Paragraph No/Title Page Number

DRC.1 INTRODUCTION 3

DRC.2 OBJECTIVE 3

DRC.3 SCOPE 3

DRC.4 DATA CATEGORIES AND STAGES IN REGISTRATION 4

DRC.4.2 Standard Planning Data 4

DRC.4.3 Detailed Planning Data 4

DRC.4.4 Operational Data 4

DRC.5 PROCEDURES AND RESPONSIBILITIES 4

DRC.5.1 Responsibility For Submission And Updating Of Data 4

DRC.5.2 Methods Of Submitting Data 4

DRC.5.3 Changes To Users Data 6

DRC.5.4 Data Not Supplied 6

DRC.5.5 Substituted Data 6

DRC.6 DATA TO BE REGISTERED 6

SCHEDULE 1 - POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA 10

SCHEDULE 2 - GENERATION PLANNING PARAMETERS 37

SCHEDULE 3 - LARGE POWER STATION OUTAGE PROGRAMMES, OUTPUT USABLE AND INFLEXIBILITY INFORMATION 41

SCHEDULE 4 - LARGE POWER STATION DROOP AND RESPONSE DATA 42

SCHEDULE 5 - USERS SYSTEM DATA 44

SCHEDULE 6 - USERS OUTAGE INFORMATION 55

SCHEDULE 7 - LOAD CHARACTERISTICS AT GRID SUPPLY POINTS 60

SCHEDULE 8 - DATA SUPPLIED BY BM PARTICIPANTS 61

SCHEDULE 9 - DATA SUPPLIED BY THE COMPANY TO USERS 62

SCHEDULE 10 - DEMAND PROFILES AND ACTIVE ENERGY DATA 64

SCHEDULE 11 - CONNECTION POINT DATA 66

SCHEDULE 12 - DEMAND CONTROL 73

SCHEDULE 13 - FAULT INFEED DATA 77

SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS) 79

SCHEDULE 15 - MOTHBALLED POWER GENERATING MODULE, MOTHBALLED GENERATING UNIT, MOTHBALLED POWER PARK MODULE (INCLUDING MOTHBALLED DC CONNECTED POWER PARK MODULES), MOTHBALLED HVDC SYSTEMS, MOTHBALLED HVDC CONVERTERS, MOTHBALLED DC CONVERTERS AT A DC CONVERTER STATION AND ALTERNATIVE FUEL DATA 85

SCHEDULE 16 - SYSTEM RESTORATION INFORMATION 88

SCHEDULE 17 - ACCESS PERIOD DATA 94

SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA 95

SCHEDULE 19 - USER DATA FILE STRUCTURE 126

SCHEDULE 20 - GRID FORMING PLANT CAPABILITY DATA 128

DRC.1 INTRODUCTION

DRC.1.1 The **Data Registration Code** ("**DRC**") presents a unified listing of all data required by **The Company** from **Users** (including **Restoration Contractors** where they are not a **User**) and by **Users** (including **Restoration Contractors** where they are not a **User**) from **The Company**, from time to time under the **Grid Code**. The data which is specified in each section of the **Grid Code** is collated here in the **DRC**. Where there is any inconsistency in the data requirements under any particular section of the **Grid Code** and the **Data Registration Code** the provisions of the particular section of the **Grid Code** shall prevail.

DRC.1.2 The **DRC** identifies the section of the **Grid Code** under which each item of data is required.

DRC.1.3 The Code under which any item of data is required specifies procedures and timings for the supply of that data, for routine updating and for recording temporary or permanent changes to that data. All timetables for the provision of data are repeated in the **DRC**.

DRC.1.4 Various sections of the **Grid Code** also specify information which **Users** will receive from **The Company**. This information is summarised in a single schedule in the **DRC** (Schedule 9).

DRC.1.5 The categorisation of data into **DPD I** and **DPD II** is indicated in the **DRC** below.

DRC.1.6 For the purposes of this **DRC**, if a **User** is also a **Restoration Contractor**, they shall only need to submit the data once stating on their data submission they are also a **Restoration Contractor**. If a **Restoration Contractor** does not have a **CUSC Contract** then the data required to be submitted shall be pursuant to the terms of the **Anchor Plant Contract** or **Top Up Restoration Contract**.

DRC.2 OBJECTIVE

The objective of the **DRC** is to:

DRC.2.1 List and collate all the data to be provided by each category of **User** to **The Company** under the **Grid Code**.

DRC.2.2 List all the data to be provided by **The Company** to each category of **User** under the **Grid Code**.

DRC.3 SCOPE

DRC.3.1 The **DRC** applies to **The Company**, **Users** and **Restoration Contractors**, which in this **DRC** means:-

(a) **Generators** (including those undertaking **OTSDUW** and/or those who own and/or operate **DC Connected Power Park Modules**);

(b) **Network Operators**;

(c) **DC Converter Station** owners and **HVDC System Owners**;

(d) **Suppliers**;

(e) **Non-Embedded Customers**;

(f) **Externally Interconnected System Operators**;

(g) **Interconnector Users**;

(h) **BM Participants**; and

(i) **Pumped Storage Generators** and **Generators** in respect of Electricity **Storage Modules**.

(j) **Restoration Contractors** (which would be pursuant to the requirements of their **Anchor Restoration Contract** or **Top Up Restoration Contract**).

DRC.3.2 For the avoidance of doubt, the **DRC** applies to both **GB Code Users** and **EU Code Users**.

DRC.4 DATA CATEGORIES AND STAGES IN REGISTRATION

DRC.4.1.1 Within the **DRC** each data item is allocated to one of the following three categories:

(a) **Standard Planning Data** (**SPD**)

(b) **Detailed Planning Data** (**DPD**)

(c) **Operational Data**

DRC.4.2 Standard Planning Data (SPD)

DRC.4.2.1 The **Standard Planning Data** listed and collated in this **DRC** is that data listed in Part 1 of the Appendix to the **PC**.

DRC.4.2.2 **Standard Planning Data** will be provided to **The Company** in accordance with PC.4.4 and PC.A.1.2.

DRC.4.3 Detailed Planning Data (DPD)

DRC.4.3.1 The **Detailed Planning Data** listed and collated in this **DRC** is categorised as **DPD I** and **DPD II** and isthat data listed in Part 2 of the Appendix to the **PC**.

DRC.4.3.2 **Detailed Planning Data** will be provided to **The Company** in accordance with PC.4.4, PC.4.5 and PC.A.1.2.

DRC.4.4 Operational Data

DRC.4.4.1 **Operational Data** is data which is required by the **Operating Codes** and the **Balancing Codes**. Within the **DRC**, **Operational Data** is sub-categorised according to the Code under which it is required, namely **OC1**, **OC2**, **BC1** or **BC2**.

DRC.4.4.2 **Operational Data** is to be supplied in accordance with timetables set down in the relevant **Operating Codes** and **Balancing Codes** and repeated in tabular form in the schedules to the **DRC**.

DRC.5 PROCEDURES AND RESPONSIBILITIES

DRC.5.1 Responsibility For Submission And Updating Of Data

In accordance with the provisions of the various sections of the **Grid Code**, each **User** must submit data as summarised in DRC.6 and listed and collated in the attached schedules.

DRC.5.2 Methods Of Submitting Data

DRC.5.2.1 Wherever possible, the data schedules to the **DRC** are structured to serve as standard formats for data submission and such format must be used for the written submission of data to **The Company**.

DRC.5.2.2 Data must be submitted to the **Transmission** **Control Centre** notified by **The Company**,or to such other department or address as **The Company** may from time to time advise. The name of the person at the **User** **Site** who is submitting each schedule of data must be included.

DRC.5.2.3 Where a computer data link exists between a **User** and **The Company**, data may be submitted via this link. **The Company** will, in this situation, provide computer files for completion by the **User** containing all the data in the corresponding **DRC** schedule.

Data submitted can be in an electronic format using a proforma to be supplied by **The Company** or other format to be agreed annually in advance with **The Company**.In all cases the data must be complete and relate to, and relate only to, what is required by the relevant section of the **Grid Code**.

DRC.5.2.4 Other modes of data transfer, such as magnetic tape, may be utilised if **The Company** gives its prior written consent.

DRC.5.2.5 **Generators**, **HVDC System Owners** and **DC Converter Station** owners submitting data for a **Power Generating Module**, **Generating Unit**, **DC Converter**, **HVDC System**, **Power Park Module** (including **DC Connected Power Park Modules**) or **CCGT Module** before the issue of a **Final Operational Notification** should submit the **DRC** data schedules and compliance information required under the **CP** electronically using the **User Data File** **Structure** unless otherwise agreed with **The Company**. Data required from **Restoration Contractors** where not provided would be pursuant to the the terms of their **Anchor Restoration Contract** or **Top Up Restoration Contract**.

DRC.5.3 Changes To User’s Data

DRC.5.3.1 Whenever a **User** becomes aware of a change to an item of data which is registered with **The Company**, the **User** must notify **The Company** in accordance with each section of the Grid Code. The method and timing of the notification to **The Company** is set out in each section of the Grid Code. Data required from **Restoration Contractors** where not provided would be pursuant to the the terms of their **Anchor Restoration Contract** or **Top Up Restoration Contract**.

DRC.5.4 Data Not Supplied

DRC.5.4.1 **Users** and **The Company** are obliged to supply data as set out in the individual sections of the **Grid Code** and repeated in the **DRC**. If a **User** fails to supply data when required by any section of the **Grid Code**, **The Company** will estimate such data if and when, in **The Company's** view, it is necessary to do so. If **The Company** fails to supply data when required by any section of the **Grid Code**, the **User** to whom that data ought to have been supplied, will estimate such data if and when, in that **User's** view, it is necessary to do so. Such estimates will, in each case, be based upon data supplied previously for the same **Plant** or **Apparatus** or upon corresponding data for similar **Plant** or **Apparatus** or upon such other information as **The Company** or that **User**, as the case may be, deems appropriate.

DRC.5.4.2 **The Company** will advise a **User** in writing of any estimated data it intends to use pursuant to DRC.5.4.1 relating directly to that **User's Plant** or **Apparatus** in the event of data not being supplied.

DRC.5.4.3 A **User** will advise **The Company** in writing of any estimated data it intends to use pursuant to DRC.5.4.1 in the event of data not being supplied.

DRC.5.4.4 Data requirements defined in DRC5.4.1 – DRC5.4.3 as applicable to a **Restoration Contractor** where that **Restoration Contractor** is a not a **User**, would be pursuantto the the terms of the **Anchor Restoration Contract** or **Top Up Restoration Contract**.

DRC.5.5 Substituted Data

DRC.5.5.1 In the case of PC.A.4 only, if the data supplied by a **User** does not in **The Company’s** reasonable opinion reflect the equivalent data recorded by **The Company**, **The Company** may estimate such data if and when, in the view of **The Company**, it is necessary to do so. Such estimates will, in each case, be based upon data supplied previously for the same **Plant** or **Apparatus** or upon corresponding data for similar **Plant** or **Apparatus** or upon such other information as **The Company** deems appropriate.

DRC.5.5.2 **The Company** will advise a **User** in writing of any estimated data it intends to use pursuant to DRC.5.5.1 relating directly to that **User's Plant** or **Apparatus** where it does not in **The Company’s** reasonable opinion reflect the equivalent data recorded by **The Company**. Such estimated data will be used by **The Company** in place of the appropriate data submitted by the **User** pursuant to PC.A.4 and as such shall be deemed to accurately represent the **User’s** submission until such time as the **User** provides data to **The Company’s** reasonable satisfaction.

DRC.6 DATA TO BE REGISTERED

DRC.6.1 Schedules 1 to 20 attached cover the following data areas.

DRC.6.1.1 Schedule 1 – Power Generating Module, Generating Unit (or CCGT Module), Power Park Module (including DC Connected Power Park Module and Power Park Unit), HVDC System and DC Converter Technical Data.

Comprising **Power Generating Module**, **Generating Unit** (and **CCGT Module**), **Power Park Module** (including **DC Connected Power Park Module** and **Power Park Unit**) and **DC Converter** fixed electrical parameters. Any data required under **DRC** Schedule 1 from **Restoration Contractors** where not provided, would be pursuant to the terms of their **Anchor Restoration Contract** or **Top Up Restoration Contract**.

DRC.6.1.2 Schedule 2 - Generation Planning Parameters

Comprising **Genset** parameters and **Restoration Contractors** parameters required for **Operational Planning** studies.

DRC.6.1.3 Schedule 3 - Power Station Outage Programmes, Output Usable and Inflexibility Information.

Comprising generation and storage outage planning in respect of **Large Power Stations**, **Output Usable** and inflexibility information at timescales down to the daily **BM Unit Data** submission. In the case of **Restoration Contractors**, this data needs to only to be provided where such a **Resoration Contractor** has an **Anchor Restoration Contract** or **Top Up Restoration Contract** other than in respect of **Large Power Stations** where the data will already be required.

DRC.6.1.4 Schedule 4 - Large Power Station Droop and Response Data.

Comprising data on governor **Droop** settings and **Primary**, **Secondary** and **High Frequency Response** data for **Large Power Stations**.

DRC.6.1.5 Schedule 5 – User's System Data.

Comprising electrical parameters relating to **Plant** and **Apparatus** connected to the **National Electricity Transmission System**.

DRC.6.1.6 Schedule 6 – Users Outage and Restoration Service Provider Outage Information.

Comprising the information required by **The Company** for outages on the **User’s System**, including outages at **Power Stations** other than outages of **Gensets**.Outages of **Plant** and **Apparatus** of **Restoration Contractors** and key **Plant** and **Apparatus** of a **Network Operator’s** **System** associated with a **Distribution Restoration Zone Plan** also need to be co-ordinated withoutages on the **National Electricity Transmission System**. The data submitted should therefore also include outages on **Restoration Contractors Plant** and **Apparatus** and **Network Operator’s Plant** and **Apparatus** which would prevent the operation of a **Local Joint Restoration Plan** or **Distribution Restoration Zone Plan**.

DRC.6.1.7 Schedule 7 - Load Characteristics.

Comprising the estimated parameters of load groups in respect of, for example, harmonic content and response to frequency.

DRC.6.1.8 Schedule 8 - BM Unit Data.

DRC.6.1.9 Schedule 9 - Data Supplied by The Company to Users.

DRC.6.1.10 Schedule 10 - Demand Profiles and Active Energy Data

Comprising information relating to the **Network Operators’** and **Non-Embedded** **Customers’** total **Demand** and **Active Energy** taken from the **National Electricity** **Transmission System**

DRC.6.1.11 Schedule 11 - Connection Point Data

Comprising information relating to **Demand**, demand transfer capability and the **Small Power Station**, **Medium Power Station** and **Customer** generation connected to the **Connection Point**

DRC.6.1.12 Schedule 12 - Demand Control Data

Comprising information related to **Demand Control**

DRC.6.1.13 Schedule 13 - Fault Infeed Data

Comprising information relating to the short circuit contribution to the **National Electricity Transmission System** from **Users** other than **Generators**, **HVDC System Owners**  and **DC Converter Station** owners.

DRC.6.1.14 Schedule 14 - Fault Infeed Data (Generators Including Unit and Station Transformers)

Comprising information relating to the Short Circuit contribution to the **National Electricity Transmission System** from **Generators**, **HVDC System Owners** and **DC Converter Station** owners.

DRC.6.1.15 Schedule 15 – Mothballed Power Generating Module, Mothballed Generating Unit, Mothballed Power Park Module (including Mothballed DC Connected Power Park Modules), Mothballed HVDC Systems, Mothballed HVDC Converters, Mothballed DC Converters at a DC Converter Station and Alternative Fuel Data

Comprising information relating to estimated return to service times for **Mothballed Power Generating Modules**, **Mothballed Generating Units**, **Mothballed Power Park Modules** (including **Mothballed DC Connected Power Park Modules**), **Mothballed HVDC Systems**, **Mothballed HVDC Converters** and **Mothballed DC Converters at a** **DC Converter Station** and the capability of gas-fired **Generating Units** to operate using alternative fuels.

DRC.6.1.16 Schedule 16 – System Restoration Information

Comprising information relating to **System Restoration**.

DRC.6.1.17 Schedule 17 – Access Period Schedule

Comprising **Access Period** information for **Transmission Interface Circuits** within an **Access Group**.

DRC.6.1.18 Schedule 18 – Generators Undertaking OTSDUW Arrangements

Comprising electrical parameters relating to **OTSDUW Plant and Apparatus** between the **Offshore Grid Entry Point** and **Transmission Interface Point**.

DRC.6.1.19 Schedule 19 – User Data File Structure

Comprising information relating to the **User Data File Structure**.

DRC.6.1.20 Schedule 20 – Grid Forming Plant Data

Comprising information relating to **Grid Forming Plant**

DRC.6.2 The **Schedules** applicable to each class of **User** are as follows:

|  |  |
| --- | --- |
| User | Schedule |
| **Generators** with **Large Power Stations** | 1, 2, 3, 4, 9, 14,  15, 16, 19 |
| **Generators** with **Medium Power Stations**  (see notes 2, 3, 4) | 1, 2 (part), 9,  14, 15, 19 |
| **Generators** with **Small Power Stations** directly connected to the **National Electricity Transmission** **System** | 1, 6, 14, 15, 19 |
| **Generators** undertaking **OTSDUW**  (see note 5) | 18, 19 |
| All **Users** connected directly to the **National Electricity** **Transmission System** | 5, 6, 9 |
| All **Users** connected directly to the **National Electricity** **Transmission System** other than **Generators** | 10,11,13,17 |
| All **Users** connected directly to the **National Electricity** **Transmission System** with **Demand** | 7, 9 |
| A **Pumped Storage Generator**, a **Generator** in respect of one or more **Electricity Storage Modules** and an **Externally** **Interconnected System Operator** and **Interconnector** **Users** | 12  (as marked) |
| All **Suppliers** | 12 |
| All **Network Operators** | 12, 16 |
| All **BM Participants** | 8 |
| All **DC Converter Station** owners | 1, 4, 9, 14, 15, 19 |
| **Restoration Contractors** | 2, 3, 6, 16 |

Notes:

(1) **Network Operators** must provide data relating to **Small Power Stations** and/or **Customer Generating Plant** **Embedded** in their **Systems** when such data is requested by **The Company** pursuant to PC.A.3.1.4 or PC.A.5.1.4.

(2) The data in schedules 1, 14 and 15 need not be supplied in relation to **Medium Power Stations** connected at a voltage level below the voltage level of the **Subtransmission System** except in connection with a **CUSC Contract** or unless specifically requested by **The Company**.

(3) Each **Network Operator** within whose **System** an **Embedded Medium Power Station** not subject to a **Bilateral Agreement** or **Embedded DC Converter Station** not subject to a **Bilateral Agreement** is situated shall provide the data to **The Company** in respect of each such **Embedded Medium Power Station** or **Embedded DC Converter Station** or **HVDC System**.

(4) In the case of Schedule 2, **Generators**, **HVDC System Owners**, **DC Converter Station** owners or **Network Operators** in the case of **Embedded Medium Power Stations** not subject to a **Bilateral Agreement** or **Embedded DC Converter Stations** not subject to a **Bilateral Agreement**, would only be expected to submit data in relation to **Standard Planning Data** as required by the **Planning Code**.

(5) In the case of **Generators** undertaking **OTSDUW**, the **Generator** will need to supply **User** data in accordance with the requirements of **Large** or **Small Power Stations** (as defined in DRC.6.2) up to the **Offshore Grid Entry Point**. In addition, the **User** will also need to submit **Offshore Transmission System** data in between the **Interface Point** and its **Connection Points** in accordance with the requirements of Schedule 18.

(6) In the case of **Restoration Contractors**, data only needs to be provided by a **Restoration Contractor** where such a **Restoration Contractor** is not a **CUSC Party** and the data has not been submitted. In this case the data to be submitted would be would be pursuant to the the terms of the **Anchor Restoration Contract** or **Top Up Restoration Contract**.

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 1 OF 19**

ABBREVIATIONS:

|  |  |
| --- | --- |
| **SPD** = **Standard Planning Data** | **DPD** = **Detailed Planning Data** |
| % on MVA = % on Rated MVA | **RC** = **Registered Capacity**  **MC = Maximum Capacity** |
| % on 100 = % on 100 MVA | **OC1**, **BC1**, etc = Grid Code  for which data is required |
| **CUSC** **Contract** = **User** data which may be submitted to the **Relevant** **Transmission** **Licensees** by **The Company**, following the acceptance by a **User** of a **CUSC** **Contract**. | CUSC App. Form = **User** data which may be submitted to the **Relevant** **Transmission** **Licensees** by **The Company**, following an application by a **User** for a **CUSC** **Contract**. |

Note:

All parameters, where applicable, are to be measured at nominal **System Frequency**

+ these **SPD** items should only be given in the data supplied with the application for a **CUSC Contract**.

\* Asterisk items are not required for **Small Power Stations** and **Medium Power Stations**

Information is to be given on a **Unit** basis, unless otherwise stated. Where references to **CCGT Modules** are made, the columns "G1" etc should be amended to read "M1" etc, as appropriate

□ These data items may be submitted to the **Relevant Transmission Licensees** from **The Company** in respect of the **National Electricity Transmission System**. The data may be submitted to the **Relevant Transmission Licensees** in a summarised form e.g. network model; the data transferred will have been originally derived from data submitted by **Users** to **The Company**.

■ these data items may be submitted to the **Relevant Transmission Licensee** from **The Company** in respect to **Relevant Units** only. The data may be submitted to the **Relevant Transmission Licensee** in a summarised form e.g. network model; the data transferred will have been originally derived from data submitted by **Users** to **The Company**.

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 2 OF 19**

**POWER STATION** NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | |
|  |  | CUSC Cont ract | CUSC App. Form |  | F.Yr.  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 |
| GENERATING STATION DEMANDS: |  |  |  |  |  |  |  |  |  |  |  |
| **Demand** associated with the **Power Station** supplied through the **National Electricity Transmission System** or the **Generator's User System** *(PC.A.5.2)* |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| - The maximum **Demand** that could occur. | MW  MVAr | □  □ |  | **DPD I**  **DPD I** |  |  |  |  |  |  |  |
| * **Demand** at specified time of annual peak half hour of **National Electricity Transmission System Demand** at **Annual ACS Conditions**. | MW  MVAr | □  □ |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| - **Demand** at specified time of annual minimum half-hour of **National Electricity Transmission System Demand**. | MW  MVAr | □  □ |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| (Additional **Demand** supplied through the unit transformers to be provided below) |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| INDIVIDUAL **GENERATING UNIT** (OR AS THE CASE MAY BE**, SYNCHRONOUS POWER GENERATING MODULE** OR **CCGT MODULE**) DATA |  |  |  |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Point of connection to the **National Electricity Transmission System** (or the **Total** **System** if embedded) of the **Generating Unit** or **Synchronous Power Generating Module** (other than a **CCGT Unit**) or the **CCGT Module**, as the case may be in terms of geographical and electrical location and system voltage *(PC.A.3.4.1)* | Text | □ | ■ | **SPD** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| If the busbars at the **Connection** **Point** are normally run in separate sections identify the section to which the **Generating** **Unit** (other than a **CCGT Unit**) or **Synchronous** **Power Generating Module** or **CCGT Module**, as the case may be is connected *(PC.A.3.1.5)* | Section Number | □ | ■ | **SPD** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Type of **Unit** (steam, **Gas Turbine Combined Cycle Gas Turbine Unit**, tidal, wind, storage type etc.)  *(PC.A.3.2.2 (h)*, *PC.A.3.4.4)* |  | □ |  |  |  |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 3 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| INDIVIDUAL **SYNCHRONOUS POWER GENERATING MODULE** **GENERATING UNIT** (OR AS THE CASE MAY BE, **CCGT MODULE**) DATA |  |  |  |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
|  |  |  |  |  |  |  |  |  |  |  |  |
| A list of the Generating Units and **CCGT Units** within a **Synchronous Power Generating Module** or **CCGT Module**, identifying each **CCGT Unit**, and the **Power Generating Module** or **CCGT Module** of which it forms part, unambiguously. In the case of a **Range CCGT Module**, details of the possible configurations should also be submitted.  *(PC.A.3.2.2 (g))* |  | □ | ■ | **SPD** |  |  |  |  |  |  |  |

.

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 4 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CAT. | **GENERATING UNIT** (OR CCGT MODULE, AS THE CASE MAY BE) | | | | | | |
|  |  | CUSC Cont ract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
| Rated MVA *(PC.A.3.3.1)* | MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Rated MW *(PC.A.3.3.1)* | MW | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Rated terminal voltage *(PC.A.5.3.2.(a) & PC.A.5.4.2 (b))* | kV | □ |  | **DPD I** |  |  |  |  |  |  |  |
| \*Performance Chart at **Onshore Synchronous Generating Unit** stator terminals *(PC.A.3.2.2(f)(i))*  \* Performance Chart of the **Offshore Synchronous Generating Unit** at the **Offshore Grid Entry Point** *(PC.A.3.2.2(f)(ii))*  *\* Synchronous Generating Unit Performance Chart (PC.A.3.2.2(f))*  *\* Power Generating Module Performance Chart of the Synchronous Power Generating Module (PC.A.3.2.2(f))*  \* Maximum terminal voltage set point *(PC.A.5.3.2.(a) & PC.A.5.4.2 (b))*  \* Terminal voltage set point step resolution – if not continuous *(PC.A.5.3.2.(a) & PC.A.5.4.2 (b))* | kV  kV | □  □ |  | **SPD**  **DPD I**  **DPD I** | (see **OC2** for specification) | | | | | | |
| \***Output Usable** (on a monthly basis)  *(PC.A.3.2.2(b))* | MW |  |  | **SPD** | (except in relation to **CCGT Modules** when required on a unit basis under the **Grid Code**, this data item may be supplied under Schedule 3) | | | | | | |
| Turbo-Generator inertia constant (for synchronous machines) *(PC.A.5.3.2(a))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Short circuit ratio (synchronous machines)  *(PC.A.5.3.2(a))* |  | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Normal auxiliary load supplied by the **Generating Unit** at rated MW output  *(PC.A.5.2.1)* | MW  MVAr | □  □ |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| Rated field current at rated MW and MVAr output and at rated terminal voltage *(PC.A.5.3.2 (a))* | A | □ |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Field current open circuit saturation curve (as derived from appropriate manufacturers' test certificates): (*PC.A.5.3.2 (a))*  120% rated terminal volts  110% rated terminal volts  100% rated terminal volts  90% rated terminal volts  80% rated terminal volts  70% rated terminal volts  60% rated terminal volts  50% rated terminal volts | A  A  A  A  A  A  A  A | □  □  □  □  □  □  □  □ |  | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| IMPEDANCES:  (Unsaturated) |  |  |  |  |  |  |  |  |  |  |  |
| Direct axis synchronous reactance *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Direct axis transient reactance *(PC.A.3.3.1(a)& PC.A.5.3.2(a)* | % on MVA | □ | ■ | **SPD**+ |  |  |  |  |  |  |  |
| Direct axis sub-transient reactance *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Quad axis synch reactance *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Quad axis sub-transient reactance *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Stator leakage reactance *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Armature winding direct current  resistance. *(PC.A.5.3.2(a))* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
| In Scotland, negative sequence resistance  *(PC.A.2.5.6 (a) (iv)* | % on MVA | □ |  | **DPD I** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Note:- the above data item relating to armature winding direct-current resistance need only be provided by **Generators** in relation to **Generating Units** or **Synchronous Generating Units** within **Power Generating Modules** commissioned after 1st March 1996 and in cases where, for whatever reason, the **Generator** is aware of the value of the data item. | | | | | | | | | | | |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 5 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
|  |  |  |  |  |  |  |  |  |  |  |  |
| TIME CONSTANTS  (Short-circuit and Unsaturated) |  |  |  |  |  |  |  |  |  |  |  |
| Direct axis transient time constant *(PC.A.5.3.2(a))* | S | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Direct axis sub-transient time constant  *(PC.A.5.3.2(a))* | S | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Quadrature axis sub-transient time constant  *(PC.A.5.3.2(a))* | S | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Stator time constant *(PC.A.5.3.2(a))* | S | □ |  | **DPD I** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| MECHANICAL PARAMETERS  *(PC.A.5.3.2(a))* |  |  |  |  |  |  |  |  |  |  |  |
| The number of turbine generator masses |  | □ |  | DPD II |  |  |  |  |  |  |  |
| Diagram showing the Inertia and parameters for each turbine generator mass for the complete drive train | Kgm2 | □ |  | DPD II  DPD II |  |  |  |  |  |  |  |
| Diagram showing Stiffness constants and parameters between each turbine generator mass for the complete drive train | Nm/rad | □ |  | DPD II  DPD II |  |  |  |  |  |  |  |
| Number of poles  Relative power applied to different parts of the turbine | % | □  □ |  | DPD II  DPD II |  |  |  |  |  |  |  |
| Torsional mode frequencies  Modal damping decrement factors for the different mechanical modes | Hz | □  □ |  | DPD II  DPD II |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **GENERATING UNIT** STEP-UP TRANSFORMER |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Rated MVA *(PC.A.3.3.1 & PC.A.5.3.2)* | MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Voltage Ratio *(PC.A.5.3.2)* | - | □ |  | **DPD I** |  |  |  |  |  |  |  |
| Positive sequence reactance: *(PC.A.5.3.2)* |  |  |  |  |  |  |  |  |  |  |  |
| Max tap | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Min tap | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Nominal tap | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Positive sequence resistance: *(PC.A.5.3.2)* |  |  |  |  |  |  |  |  |  |  |  |
| Max tap | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Min tap | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Nominal tap | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Zero phase sequence reactance *(PC.A.5.3.2)* | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Tap change range *(PC.A.5.3.2)* | +% / -% | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Tap change step size *(PC.A.5.3.2)* | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Tap changer type: on-load or off-circuit *(PC.A.5.3.2)* | On/Off | □ |  | **DPD II** |  |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 6 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | | | | | | | |
|  |  | | CUSC Contract | CUSC App. Form |  | G1 | | | G2 | | G3 | | G4 | G5 | | G6 | | STN |
| EXCITATION: |  | |  |  |  |  | | |  | |  | |  |  | |  | |  |
|  |  | |  |  |  |  | | |  | |  | |  |  | |  | |  |
| Note: The data items requested under Option 1 below may continue to be provided by **Generators** in relation to **Generating Units** on the **System** at 9 January 1995 (in this paragraph, the "relevant date") or they may provide the new data items set out under Option 2. **Generators** must supply the data as set out under Option 2 (and not those under Option 1) for **Generating Unit** and **Synchronous** **Power Generating Unit** excitation control systems commissioned after the relevant date, those **Generating Unit** or **Synchronous Power Generating Unit** excitation control systems recommissioned for any reason such as refurbishment after the relevant date and **Generating Unit** or **Synchronous Power Generating Unit** excitation control systems where, as a result of testing or other process, the **Generator** is aware of the data items listed under Option 2 in relation to that **Generating Unit** or **Synchronous Power Generating Unit**. | | | | | | | | | | | | | | | | | | |
|  | |  |  |  |  |  |  | | |  | |  | |  |  | |  | |
| Option 1 | |  |  |  |  |  |  | | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  |  | | |  | |  | |  |  | |  | |
| DC gain of **Excitation Loop** *(PC.A.5.3.2(c))* | |  | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
| Max field voltage *(PC.A.5.3.2(c))* | | V | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
| Min field voltage *(PC.A.5.3.2(c))* | | V | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
| Rated field voltage *(PC.A.5.3.2(c))* | | V | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
| Max rate of change of field volts: *(PC.A.5.3.2(c))* | |  |  |  |  |  |  | | |  | |  | |  |  | |  | |
| Rising | | V/Sec | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
| Falling | | V/Sec | □ |  | **DPD II** |  |  | | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  |  | | |  | |  | |  |  | |  | |
| Details of **Excitation Loop** *(PC.A.5.3.2(c))*  Described in block diagram form showing transfer functions of individual elements | | Diagram | □ |  | **DPD II** | (please attach) | | | | | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
| Dynamic characteristics of over- excitation limiter *(PC.A.5.3.2(c))* | |  | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| Dynamic characteristics of under-excitation limiter *(PC.A.5.3.2(c))* | |  | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
| Option 2 | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
| **Exciter** category, e.g. **Rotating Exciter**, or **Static Exciter** etc *(PC.A.5.3.2(c))* | | Text | □ | ■ | **SPD** |  | |  | |  | |  | |  |  | |  | |
| **Excitation System Nominal** *(PC.A.5.3.2(c))* **Response** VE | | Sec-1 | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **Rated Field Voltage** *(PC.A.5.3.2(c))* UfN | | V | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **No-load Field Voltage** *(PC.A.5.3.2(c))* UfO | | V | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **Excitation System On-Load** *(PC.A.5.3.2(c))* **Positive Ceiling Voltage** UpL+ | | V | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **Excitation System No-Load** *(PC.A.5.3.2(c))* **Positive Ceiling Voltage** UpO+ | | V | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **Excitation System No-Load** *(PC.A.5.3.2(c))* **Negative Ceiling Voltage** UpO- | | V | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
| **Power System Stabiliser (PSS)** fitted *(PC.A.3.4.2)* Stator Current Limit (PC.A.5.3.2(c)) | | Yes/No  A | □  □ | ■ | **SPD**  **DPD II** |  | |  | |  | |  | |  |  | |  | |
| Details of **Excitation System** *(PC.A.5.3.2(c))*  (including **PSS** if fitted) described in block  diagram form showing transfer functions of  individual elements. | | Diagram | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
| Details of **Over-excitation Limiter** *(PC.A.5.3.2(c))*  described in block diagram form showing transfer functions of individual elements. | | Diagram | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |
| Details of **Under-excitation Limiter** *(PC.A.5.3.2(c))*  described in block diagram form showing transfer functions of individual elements. | | Diagram | □ |  | **DPD II** |  | |  | |  | |  | |  |  | |  | |
|  | |  |  |  |  |  | |  | |  | |  | |  |  | |  | |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 7 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | | G3 | | G4 | | | G5 | | G6 | | STN |
|  |  |  |  |  |  |  | |  | |  | | |  | |  | |  |
| GOVERNOR AND ASSOCIATED PRIME MOVER PARAMETERS | | | | |  |  | |  | |  | | |  | |  | |  |
|  | |  |  |  |  |  | |  | |  | | |  | |  | |  |
| Note: The data items requested under Option 1 below may continue to be provided by **Generators** in relation to **Generating Units** on the **System** at 9 January 1995 (in this paragraph, the "relevant date") or they may provide the new data items set out under Option 2. **Generators** must supply the data as set out under Option 2 (and not those under Option 1) for **Generating Unit** and **Synchronous** **Power Generating Unit** governor control systems commissioned after the relevant date, those **Generating Unit** and  **Synchronous** **Power Generating Unit** governor control systems recommissioned for any reason such as refurbishment after the relevant date and **Generating Unit** and **Synchronous** **Power Generating Unit** governor control systems where, as a result of testing or other process, the **Generator** is aware of the data items listed under Option 2 in relation to that **Generating Unit** and  **Synchronous** **Power Generating Unit**. | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| Option 1 |  |  |  |  |  | |  | |  | |  |  | |  | |  | |
|  |  |  |  |  |  | |  | |  | |  |  | |  | |  | |
| GOVERNOR PARAMETERS (REHEAT UNITS) *(PC.A.5.3.2(d) – Option 1(i))* |  |  |  |  |  | |  | |  | |  |  | |  | |  | |
|  |  |  |  |  |  | |  | |  | |  |  | |  | |  | |
| HP Governor average gain | MW/Hz | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| Speeder motor setting range | Hz | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| HP governor valve time constant | S | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| HP governor valve opening limits |  | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| HP governor valve rate limits |  | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| Re-heat time constant (stored **Active Energy** in reheater) | S | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| IP governor average gain | MW/Hz | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| IP governor setting range | Hz | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| IP governor time constant | S | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| IP governor valve opening limits |  | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| IP governor valve rate limits |  | □ |  | **DPD II** |  | |  | |  | |  |  | |  | |  | |
| Details of acceleration sensitive |  | □ |  | **DPD II** | (please attach) | | | | | |  |  | |  | |  | |
| elements HP & IP in governor loop |  |  |  |  |  | |  | | | |  |  | |  | |  | |
| Governor block diagram showing |  | □ |  | **DPD II** | (please attach) | | | | | |  |  | |  | |  | |
| transfer functions of individual elements |  |  |  |  |  | |  | | | |  |  | |  | |  | |
|  |  |  |  |  |  | |  | | | |  |  | |  | |  | |
| GOVERNOR (Non-reheat steam and Gas |  |  |  |  |  | |  | | | |  |  | |  | |  | |
| Turbines) *(PC.A.5.3.2(d) – Option 1(ii))* |  |  |  |  |  | |  | | | |  |  | |  | |  | |
|  |  |  |  |  |  | |  | | | |  |  | |  | |  | |
| Governor average gain | MW/Hz | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Speeder motor setting range |  | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Time constant of steam or fuel governor valve | S | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Governor valve opening limits |  | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Governor valve rate limits |  | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Time constant of turbine | S | □ |  | **DPD II** |  | |  | | | |  |  | |  | |  | |
| Governor block diagram |  | □ |  | **DPD II** | (please attach) | | | | | |  |  | |  | |  | |
|  |  |  |  |  |  | |  | |  | |  |  | |  | |  | |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 8 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 1(iii))* |  |  |  |  |  |  |  |  |  |  |  |
| BOILER & STEAM TURBINE DATA\* |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Boiler time constant (Stored **Active Energy**) | S |  |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| HP turbine response ratio:  (Proportion of **Primary Response** arising from HP turbine) | % |  |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| HP turbine response ratio:  (Proportion of **High Frequency Response** arising from HP turbine) | % |  |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | End of Option 1 | | | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Option 2 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| All **Generating Units** and  **Synchronous** **Power Generating Units** |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Governor Block Diagram showing  transfer function of individual elements including acceleration sensitive elements |  | □ |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Governor Time Constant  *(PC.A.5.3.2(d) – Option 2(i))* | Sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Governor Deadband  *(PC.A.5.3.2(d) – Option 2(i))*  - Maximum Setting  - Normal Setting  - Minimum Setting | Hz  Hz  Hz |  |  | **DPD II** **DPD II**  **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Speeder Motor Setting Range  *(PC.A.5.3.2(d) – Option 2(i))* | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Average Gain *(PC.A.5.3.2(d) – Option 2(i))* | MW/Hz | □ |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Steam Units** |  |  |  |  |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(ii))* |  |  |  |  |  |  |  |  |  |  |  |
| HP Valve Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| HP Valve Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| HP Valve Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| HP Valve Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| HP Turbine Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(ii))* |  |  |  |  |  |  |  |  |  |  |  |
| IP Valve Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| IP Valve Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| IP Valve Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| IP Valve Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| IP Turbine Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(ii))* |  |  |  |  |  |  |  |  |  |  |  |
| LP Valve Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| LP Valve Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| LP Valve Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| LP Valve Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| LP Turbine Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(ii))* |  |  |  |  |  |  |  |  |  |  |  |
| Reheater Time Constant | sec |  |  | **DPD II** |  |  |  |  |  |  |  |
| Boiler Time Constant | sec |  |  | **DPD II** |  |  |  |  |  |  |  |
| HP Power Fraction | % |  |  | **DPD II** |  |  |  |  |  |  |  |
| IP Power Fraction | % |  |  | **DPD II** |  |  |  |  |  |  |  |

# Where the generating unit or synchronous power generating unit governor does not have a selectable deadband facility, then the actual value of the deadband need only be provided.

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 9 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Gas Turbine Units** |  |  |  |  |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(iii))* |  |  |  |  |  |  |  |  |  |  |  |
| Inlet Guide Vane Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Inlet Guide Vane Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Inlet Guide Vane Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Inlet Guide Vane Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(iii))* |  |  |  |  |  |  |  |  |  |  |  |
| Fuel Valve Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Fuel Valve Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Fuel Valve Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Fuel Valve Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(iii))* |  |  |  |  |  |  |  |  |  |  |  |
| Waste Heat Recovery Boiler Time Constant |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Hydro **Generating Units** |  |  |  |  |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(d) – Option 2(iv))* |  |  |  |  |  |  |  |  |  |  |  |
| Guide Vane Actuator Time Constant | sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Guide Vane Opening Limits | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Guide Vane Opening Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Guide Vane Closing Rate Limits | %/sec | □ |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Water Time Constant  **Synchronous Electricity Storage Units** and **Modules**  (PC.A.5.3.2(d) – Option 2(v)  Valve Actuator Time Constant  Valve Opening Limits  Valve Opening Rate Limits  Valve Closing Rate Limits  For **Synchronous Electricity Storage Modules** which are derived from compressed air energy storage systems the above data should be provided. For other **Synchronous Electricity Storage Modules** data should be supplied as required by **The Company** in accordance with PC.A.7. | sec  sec  %  %/sec %/sec | □  □  □  □  □ |  | **DPD II**  DPD II DPD II DPD II DPD II |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | End of Option 2 | | | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| UNIT CONTROL OPTIONS\* |  |  |  |  |  |  |  |  |  |  |  |
| *(PC.A.5.3.2(e)* |  |  |  |  |  |  |  |  |  |  |  |
| Maximum droop | % |  |  | **DPD II** |  |  |  |  |  |  |  |
| Normal droop | % | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Minimum droop | % |  |  | **DPD II** |  |  |  |  |  |  |  |
| Maximum **Governor Deadband**  Normal **Governor Deadband**  Minimum **Governor Deadband** |  |  |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| Maximum **Frequency Response Deadband**1 | ±Hz |  |  | **DPD II** |  |  |  |  |  |  |  |
| Normal **Frequency Response Deadband**1 | ±Hz |  |  | **DPD II** |  |  |  |  |  |  |  |
| Minimum **Frequency Response Deadband**1  Maximum **Frequency Response Insensitivity**1  Normal **Frequency Response Insensitivity**1  Minimum **Frequency Response Insensitivity**1 | ±Hz  ±Hz  ±Hz  ±Hz |  |  | **DPD II**  **DPDII**  **DPDII**  **DPDII** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | ±Hz  ±Hz  ±Hz |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Frequency settings between which  Unit Load Controller droop applies: |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum | Hz |  |  | **DPD II** |  |  |  |  |  |  |  |
| Normal | Hz |  |  | **DPD II** |  |  |  |  |  |  |  |
| Minimum | Hz |  |  | **DPD II** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Sustained response normally selected | Yes/No |  |  | **DPD II** |  |  |  |  |  |  |  |
| 1 Data required only in respect of **Large Power Stations** comprising **Type C** and **Type D** **Power Generating Modules** owned and operated by **EU Code Generators**. |  |  |  |  |  |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 10 OF 19**

| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CAT. | **POWER PARK UNIT** (OR **POWER PARK** **MODULE**, AS THE CASE MAY BE) | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN | |
| **Power Park Module** Rated MVA  *(PC.A.3.3.1(a))* | MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  | |
| **Power Park Module** **Rated MW**  *(PC.A.3.3.1(a))* | MW | □ | ■ | **SPD+** |  |  |  |  |  |  |  | |
| \*Performance Chart of a **Power Park Module** at the connection point *(PC.A.3.2.2(f)(ii))* |  |  |  | **SPD** | (see **OC2** for specification) | | | | | | | |
| \***Output Usable** (on a monthly basis)  *(PC.A.3.2.2(b))* | MW |  |  | **SPD** | (except in relation to **CCGT Modules** when required on a unit basis under the **Grid Code**, this data item may be supplied under Schedule 3) | | | | | | | |
| Number & Type of **Power Park Units** within each **Power Park Module** *(PC.A.3.2.2(k))*  Number & Type of **Offshore Power Park Units** within each **Offshore Power Park String** and the number of **Offshore Power Park Strings** and connection point within each **Offshore Power Park Module** *(PC.A.3.2.2.(k))* |  | □ |  | **SPD**  **SPD** |  |  |  |  |  |  | |  |
| In the case where an appropriate **Manufacturer’s Data & Performance Report** is registered with **The Company** then subject to **The Company’s** agreement, the report reference may be given as an alternative to completion of the following sections of this Schedule 1 to the end of page 11 with the exception of the sections marked thus # below. | Reference the **Manufacturer’s Data & Performance Report** |  |  | **SPD** |  |  |  |  |  |  | |  |
| **Power Park Unit** Model (including **Non Synchronous Electricity Storage Units**) - A validated mathematical model in accordance with PC.5.4.2 (a) | Transfer function block diagram and algebraic equations, simulation and measured test results | □ |  | **DPD II** |  |  |  |  |  |  | |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 11 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CAT. | **POWER PARK UNIT** (OR **POWER PARK** **MODULE**, AS THE CASE MAY BE) | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN |
| **Power Park Unit Data** (where applicable) |  |  |  |  |  |  |  |  |  |  |  |
| Rated MVA *(PC.A.3.3.1(e))* | MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| **Rated MW** *(PC.A.3.3.1(e))* | MW | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Rated terminal voltage *(PC.A.3.3.1(e))* | V | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Site minimum air density *(PC.A.5.4.2(b))* | kg/m3 | □ | ■ | **DPD II** |  |  |  |  |  |  |  |
| Site maximum air density | kg/m3 | □ | ■ | **DPD II** |  |  |  |  |  |  |  |
| Site average air density | kg/m3 | □ | ■ | **DPD II** |  |  |  |  |  |  |  |
| Year for which air density data is submitted |  | □ | ■ | **DPD II** |  |  |  |  |  |  |  |
| Number of pole pairs |  | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Blade swept area | m2 | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Gear Box Ratio |  | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Stator Resistance *(PC.A.5.4.2(b))* | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Stator Reactance *(PC.A.3.3.1(e))* | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Magnetising Reactance *(PC.A.3.3.1(e))* | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Rotor Resistance (at starting).  *(PC.A.5.4.2(b))* | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Rotor Resistance (at rated running)  *(PC.A.3.3.1(e))* | % on MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Rotor Reactance (at starting).  *(PC.A.5.4.2(b))* | % on MVA | □ |  | **DPD II** |  |  |  |  |  |  |  |
| Rotor Reactance (at rated running)  *(PC.A.3.3.1(e))* | % on MVA | □ | ■ | **SPD** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the first mass (e.g. wind turbine rotor and blades) at minimum speed  *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the first mass (e.g. wind turbine rotor and blades) at synchronous speed *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the first mass (e.g. wind turbine rotor and blades) at rated speed  *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the second mass (e.g. generator rotor) at minimum speed *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the second mass (e.g. generator rotor) at synchronous speed *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent inertia constant of the second mass (e.g. generator rotor) at rated speed *(PC.A.5.4.2(b))* | MW secs  /MVA | □ | ■ | **SPD+** |  |  |  |  |  |  |  |
| Equivalent shaft stiffness between the two masses *(PC.A.5.4.2(b))* | Nm / electrical radian | □ | ■ | **SPD+** |  |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 12 OF 19**

| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CAT. | **POWER PARK UNIT** (OR **POWER PARK** **MODULE**, AS THE CASE MAY BE) | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | | G5 | | G6 | | STN |
| Minimum generator rotor speed (Doubly Fed Induction Generators) *(PC.A.3.3.1(e))* | RPM | □ | ■ | **SPD+** |  |  |  |  | |  | |  | |  |
| Maximum generator rotor speed (Doubly Fed Induction Generators) *(PC.A.3.3.1(e))* | RPM | □ | ■ | **SPD+** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| The optimum generator rotor speed versus wind speed *(PC.A.5.4.2(b))* | tabular format | □ |  | **DPD II** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| Power Converter Rating (Doubly Fed Induction Generators) *(PC.A.5.4.2(b))* | MVA | □ | ■ | **DPD II** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| The rotor power coefficient (Cp) versus tip speed ratio () curves for a range of blade angles (where applicable) (*PC.A.5.4.2(b))* | Diagram + tabular format | □ |  | **DPD II** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| # The electrical power output versus generator rotor speed for a range of wind speeds over the entire operating range of the **Power Park Unit**. *(PC.A.5.4.2(b))* | Diagram + tabular format | □ |  | **DPD II** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| The blade angle versus wind speed curve  *(PC.A.5.4.2(b))* | Diagram + tabular format | □ |  | **DPD II** |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  | |  | |  | |  |  |
| The electrical power output versus wind speed over the entire operating range of **the Power Park Unit**.  *(PC.A.5.4.2(b))* | Diagram + tabular format | □ |  | **DPD II** |  |  |  | |  | |  | |  |  |
|  |  |  | |  |  |  |  | |  | |  | |  |  |
| Transfer function block diagram, parameters and description of the operation of the power electronic converter including fault ride though capability (where applicable). *(PC.A.5.4.2(b))* | Diagram | □ |  | **DPD II** |  |  |  | |  | |  | |  |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
|  |  |  | |  |  |  |  |  | |  | |  | |  |
| For a **Power Park Unit** consisting of a synchronous machine in combination with a back to back **DC Converter** or **HVDC Converter**,or for a **Power Park Unit** not driven by a wind turbine, the data to be supplied shall be agreed with **The Company** in accordance with PC.A.7. *(PC.A.5.4.2(b))* |  | □ |  |  |  |  |  |  | |  | |  | |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 13 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | | DATA  CAT. | **POWER PARK UNIT** (OR **POWER PARK** **MODULE**, AS THE CASE MAY BE) | | | | | | |
| CUSC Contract | | CUSC App. Form | G1 | G2 | G3 | G4 | G5 | G6 | STN |
| Torque / Speed and blade angle control systems and parameters *(PC.A.5.4.2(c))*  For the **Power Park Unit**, details of the torque / speed controller and blade angle controller in the case of a wind turbine and power limitation functions (where applicable) described in block diagram form showing transfer functions and parameters of individual elements | Diagram | □ | |  | **DPD II** |  |  |  |  |  |  |  |
| # Voltage/**Reactive Power**/**Power Factor** control system parameters *(PC.A.5.4.2(d))*  # For the **Power Park Unit** and **Power Park Module** details of **Voltage/Reactive Power**/**Power Factor** controller (and **PSS** if fitted) described in block diagram form including parameters showing transfer functions of individual elements. | Diagram | □ | |  | **DPD II** |  |  |  |  |  |  |  |
| **# Frequency** control system parameters  *(PC.A.5.4.2(e))*  # For the **Power Park Unit** and **Power Park Module** details of the **Frequency** controller described in block diagram form showing transfer functions and parameters of individual elements. | Diagram | □ | |  | **DPD II** |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | |
| As an alternative to PC.A.5.4.2 (a), (b), (c), (d), (e) and (f), is the submission of a single complete model that consists of the full information required under PC.A.5.4.2 (a), (b), (c), (d) (e) and (f) provided that all the information required under PC.A.5.4.2 (a), b), (c), (d), (e) and (f) individually is clearly identifiable. *(PC.A.5.4.2(g))* | Diagram | □ |  | | **DPD II** |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | |
| # Harmonic Assessment Information  *(PC.A.5.4.2(h))*  (as defined in IEC 61400-21 (2001)) for each **Power Park Unit**:- |  |  | | |  |  |  |  |  |  |  |  |
| # Flicker coefficient for continuous operation |  | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| # Flicker step factor |  | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| # Number of switching operations in a 10 minute window |  | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| # Number of switching operations in a 2 hour window |  | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| # Voltage change factor |  | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| # Current Injection at each harmonic for each **Power Park Unit** and for each **Power Park Module** | Tabular format | □ |  | | **DPD I** |  |  |  |  |  |  |  |
| Note:- **Generators** who own or operate **DC Connected Power Park Modules** shall supply all data for their **DC Connected Power Park Modules** as applicable to **Power Park Modules**. | | | | | | | | | | | | |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 14 OF 19**

HVDC SYSTEM AND DC CONVERTER STATION TECHNICAL DATA

HVDC SYSTEM OR DC CONVERTER STATION NAME DATE:\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Description | Units | DATA to **RTL** | | Data  Category | **DC Converter** **Station** Data |
| *(PC.A.4)* | | CUSC Contract | CUSC App. Form |  | |
| **HVDC SYSTEM** AND **DC CONVERTER STATION** DEMANDS:  **Demand** supplied through **Station Transformers** associated with the **DC Converter Station** and **HVDC System [PC.A.4.1]**  - **Demand** with all **DC Converters** and **HVDC Converters** within and HVDc System operating at **Rated MW** import.  - **Demand** with all **DC Converters** and **HVDC Converters** within an HVDC System operating at **Rated MW** export.  Additional **Demand** associated with the **DC Converter Station or HVDC System** supplied through the **National Electricity Transmission System**. **[PC.A.4.1]**  - The maximum **Demand** that could occur.  - **Demand** at specified time of annual   peak half hour of **The Company Demand** at   **Annual ACS Conditions**.  - **Demand** at specified time of annual  minimum half-hour of **The Company Demand**.  **DC CONVERTER STATION** AND **HVDC SYSTEM** DATA  Number of poles, i.e. number of **DC Converters** or **HVDC Converters** within the **HVDC System**  Pole arrangement (e.g. monopole or bipole)  Details of each viable operating configuration  Configuration 1  Configuration 2  Configuration 3  Configuration 4  Configuration 5  Configuration 6  Remote ac connection arrangement | MW  MVAr  MW  MVAr  MW  MVAr  MW  MVAr  MW  MVAr  Text  Text  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram | □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □ | ■  ■  ■  ■  ■  ■  ■  ■  ■ | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **SPD+**  **SPD+**  **SPD**+  **SPD** |  |

**SCHEDULE 1 – POWER PARK MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 15 OF 19**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating Configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **DC CONVERTER STATION AND HVDC SYSTEM** DATA *(PC.A.3.3.1d)*  **DC Converter** or **HVDC Converter** Type (e.g. current or Voltage source)  Point of connection to the **National Electricity** **Transmission System** (or the **Total System** if **Embedded**) of the **DC Converter Station** or **HVDC System** configuration in terms of geographical and electrical location and system voltage  If the busbars at the **Connection Point** are normally run in separate sections identify the section to which the **DC Converter Station** or **HVDC System** configuration is connected  **Rated MW** import per pole **[PC.A.3.3.1]**  **Rated MW** export per pole **[PC.A.3.3.1]** | Text  Text  Section  Number  MW  MW | □  □  □  □  □ | ■  ■  ■  ■  ■ | **SPD**  **SPD**  **SPD**  **SPD +**  **SPD +** |  |  |  |  |  |  |
| **ACTIVE POWER** TRANSFER CAPABILITY (PC.A.3.2.2)  **Registered Capacity**  **Registered Import Capacity**  **Minimum Generation**  **Minimum Import Capacity**  **Maximum HVDC Active Power Transmission Capacity**  **Minimum Active Power Transmission Capacity**  Import MW available in excess of **Registered Import Capacity** and **Maximum Active Power Transmission Capacity**  Time duration for which MW in excess of **Registered Import Capacity** is available  Export MW available in excess of **Registered Capacity** and **Maximum Active Power Transmission Capacity**.  Time duration for which MW in excess of **Registered Capacity** is available | MW  MW  MW  MW  MW  MW  MW  Min  MW  Min | □  □  □  □  □  □  □  □  □  □ | ■  ■  ■  ■ | **SPD**  **SPD**  **SPD**  **SPD**  **SPD**  **SPD**  **SPD**  **SPD** |  |  |  |  |  |  |

**SCHEDULE 1 –POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 16 OF 19**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating Configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **DC CONVERTER** AND **HVDC CONVERTER** TRANSFORMER **[PC.A.5.4.3.1]**  Rated MVA  Winding arrangement  Nominal primary voltage  Nominal secondary (converter-side) voltage(s)  Positive sequence reactance  Maximum tap  Nominal tap  Minimum tap  Positive sequence resistance  Maximum tap  Nominal tap  Minimum tap  Zero phase sequence reactance  Tap change range  Number of steps | MVA  kV  kV  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  +% / -% | □  □  □  □  □  □  □  □  □  □  □  □ |  | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), DC CONNECTED POWER PARK MODULE, HVDC SYSTEM, POWER PARK MODULE AND DC CONVERTER TECHNICAL DATA**

**PAGE 17 OF 19**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **DC NETWORK [PC.A.5.4.3.1 (c)]**  Rated DC voltage per pole  Rated DC current per pole  Details of the **DC Network** described in diagram form including resistance, inductance and capacitance of all DC cables and/or DC lines. Details of any line reactors (including line reactor resistance), line capacitors, DC filters, earthing electrodes and other conductors that form part of the **DC Network** should be shown. | kV  A  Diagram | □  □  □ |  | **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |
| **DC CONVERTER STATION** AND **HVDC SYSTEM** AC HARMONIC FILTER AND REACTIVE COMPENSATION EQUIPMENT  **[PC.A.5.4.3.1 (d)]**  For all switched reactive compensation equipment  Total number of AC filter banks  Diagram of filter connections  Type of equipment (e.g. fixed or variable)  Capacitive rating; or  Inductive rating; or  Operating range  **Reactive Power** capability as a function of various MW transfer levels | Diagram  Text  Diagram  Text  MVAr  MVAr  MVAr  Table | □  □  □  □  □  □  □  □ | ■  ■  ■ | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II DPD II DPD II  DPD II** |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE, HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 18 OF 19**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| CONTROL SYSTEMS **[PC.A.5.4.3.2]**  Static VDC – PDC (DC voltage – DC power) or  Static VDC – IDC (DC voltage – DC current) characteristic (as appropriate) when operating as –Rectifier –Inverter  Details of rectifier mode control system,   in block diagram form together with parameters showing transfer functions of individual elements.  Details of inverter mode control system,   in block diagram form showing transfer functions of individual elements including parameters.  Details of converter transformer tap changer control system in block diagram form showing transfer functions of individual elements including parameters. (Only required for **DC**  **Converters** and **HVDC Systems** connected to the **National Electricity Transmission System**.)  Details of AC filter and reactive compensation equipment control systems in block diagram form showing transfer functions of individual elements including parameters. (Only required for **DC** **Converters** and **HVDC Systems** connected to the **National Electricity Transmission System**.)  Details of any frequency and/or load control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of any large or small signal modulating controls, such as power oscillation damping controls or sub-synchronous oscillation damping controls, that have not been submitted as part of the above control system data.  Details of **HVDC Converter** unit models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of AC component models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of DC Grid models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of Voltage and power controller and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of Special control features if applicable (e.g., power oscillation damping (POD) function, subsynchronous torsional interaction (SSTI) control and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of Multi terminal control, if applicable and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of **HVDC System** protection models as agreed between **The Company** the **HVDC System Owner** and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  Transfer block diagram representation of the reactive power control at converter ends for a voltage source converter  Transfer block diagram representation of the reactive power control at converter ends for a voltage source converter. | Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram | □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □ |  | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 1 – POWER GENERATING MODULE, GENERATING UNIT (OR CCGT MODULE), POWER PARK MODULE, DC CONNECTED POWER PARK MODULE**, **HVDC SYSTEM AND DC CONVERTER TECHNICAL DATA**

**PAGE 19 OF 19**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| LOADING PARAMETERS **[PC.A.5.4.3.3]**  MW Export Nominal loading rate Maximum (emergency) loading rate  MW Import Nominal loading rate Maximum (emergency) loading rate  Maximum recovery time, to 90% of pre-fault loading, following an AC system fault or severe voltage depression.  Maximum recovery time, to 90% of pre-fault loading, following a transient DC Network fault. | MW/s  MW/s  MW/s  MW/s  s  s | □  □ |  | **DPD I**  **DPD I**  **DPD I**  **DPD I**  **DPD II**  **DPD II** |  |  |  |  |  |  |

NOTE: **Users** are referred to Schedules 5 & 14 which set down data required for all **Users** directly connected to the **National Electricity Transmission System**, including **Power Stations**. **Generators** undertaking **OTSDUW Arrangements** and are utilising an **OTSDUW DC Converter** are referred to Schedule 18.

**SCHEDULE 2 - GENERATION PLANNING PARAMETERS**

**PAGE 1 OF 3**

This schedule contains the **Genset** **Generation Planning Parameters** required by **The Company** to facilitate studies in **Operational Planning** timescales.

For a **Generating Unit** including those within a **Power Generating Module** (other than a **Power Park Unit**) at a **Large Power Station**, the information is to be submitted on a unit basis and for a **CCGT Module** or **Power Park Module** at a **Large Power Station** the information is to be submitted on a module basis, unless otherwise stated.

Where references to **CCGT Modules** or **Power Park Modules** at a **Large Power Station** are made, the columns "G1" etc should be amended to read "M1" etc, as appropriate.

**Restoration** **Contractors**, data only needs to be provided by a **Restoration Contractor** where they are not a **CUSC Party** and the data has not been submitted. In this case the data to be submitted would be pursant to the the terms of the **Anchor Restoration Contract** or **Top Up Restoration Contract** if required.

**Power Station**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Generation Planning Parameters**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | | UNITS | DATA to **RTL** | | DATA CAT. | **GENSET** OR STATION DATA | | | | | | | |
|  | |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | G5 | G6 | STN | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| OUTPUT CAPABILITY | |  |  |  |  |  |  |  |  |  |  |  | |
| *(PC.A.3.2.2)* | |  |  |  |  |  |  |  |  |  |  |  | |
| **Registered Capacity** on a station and unit basis (on a station and module basis in the case of a **CCGT Module** or **Power Park Module** at a **Large Power Station**)  **Maximum Capacity** on a **Power Generating Module basis** and **Synchronous Generating Unit** basis and **Registered Capacity** on a **Power Station** basis**)** | MW  MW | □  □ | ■  ■ | **SPD**  **SPD** |  |  |  |  |  |  |  |
| **Minimum Generation** (on a module  basis in the case of a **CCGT Module** or **Power Park Module** at a **Large Power Station**)  **Minimum Stable Operating Level** (on a module basis in the case of a **Power Generating Module** at a **Large Power Station** | MW  MW | □  □ | ■  ■ | **SPD**  **SPD** |  |  |  |  |  |  |  |
| MW available from **Power Generating Modules** and **Generating Units** or **Power Park Modules** in excess of **Registered Capacity** or **Maximum Capacity** | MW | □ | ■ | **SPD** |  |  |  |  |  |  |  |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| REGIME UNAVAILABILITY | |  |  |  |  |  |  |  |  |  |  |  | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| These data blocks are provided to  allow fixed periods of unavailability to be registered. | |  |  |  |  |  |  |  |  |  |  |  | |
| Expected Running Regime. Is **Power Station** normally available for full output 24 hours per day, 7 days per week? If No please provide details of unavailability below.  *(PC.A.3.2.2.)* | |  | □ | ■ | **SPD** |  |  |  |  |  |  |  | |
| Earliest **Synchronising** time: *OC2.4.2.1(a)* | |  |  |  |  |  |  |  |  |  |  |  | |
| Monday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
| Tuesday – Friday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
| Saturday – Sunday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| Latest **De-Synchronising** time: *OC2.4.2.1(a)* | |  |  |  |  |  |  |  |  |  |  |  | |
| Monday – Thursday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
| Friday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
| Saturday – Sunday | | hr/min | ■ |  | **OC2** |  |  |  |  |  |  | - | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| **SYNCHRONISING PARAMETERS** | |  |  |  |  |  |  |  |  |  |  |  | |
| *OC2.4.2.1(a)* | |  |  |  |  |  |  |  |  |  |  |  | |
| Notice toDeviate from Zero (NDZ) after 48 hour **Shutdown** | | Mins | ■ |  | **OC2** |  |  |  |  |  |  |  | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| Station **Synchronising** Intervals (SI) after  48 hour **Shutdown** | | Mins | ■ |  |  | - | - | - | - | - | - |  | |
|  | |  |  |  |  |  |  |  |  |  |  |  | |
| **Synchronising** Group (if applicable) | | 1 to 4 | ■ |  | **OC2** |  |  |  |  |  |  | - | |

**SCHEDULE 2 - GENERATION PLANNING PARAMETERS**

**PAGE 2 OF 3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CAT. | **GENSET** OR STATION DATA | | | | | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | | G3 | | G4 | | G5 | | G6 | STN |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| **Synchronising Generation (SYG)** after  48 hour **Shutdown**  *PC.A.5.3.2(f) & OC2.4.2.1(a)* | MW | ■ |  | **DPD II**  **&**  **OC2** |  |  | |  | |  | |  | |  | - |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| **De-Synchronising** Intervals (Single value)  *OC2.4.2.1(a)* | Mins | ■ |  | **OC2** | - | - | | - | | - | | - | | - |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| RUNNING AND **SHUTDOWN** PERIOD LIMITATIONS: |  |  |  |  |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| Minimum Non Zero time (MNZT) after 48 hour **Shutdown** *OC2.4.2.1(a)* | Mins | ■ |  | **OC2** |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| Minimum Zero time (MZT) *OC2.4.2.1(a)* | Mins |  |  | **OC2** |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| **Existing AGR Plant Flexibility Limit** (**Existing AGR Plant** only) | No. |  |  | **OC2** |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| 80% Reactor Thermal Power (expressed as Gross-Net MW) (**Existing AGR Plant** only) | MW |  |  | **OC2** |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| **Frequency Sensitive AGR Unit Limit** (**Frequency Sensitive AGR Units** only) | No. |  |  | **OC2** |  |  | |  | |  | |  | |  |  |
|  |  |  |  |  |  |  | |  | |  | |  | |  |  |
| RUN-UP PARAMETERS |  |  |  |  |  |  | |  | |  | |  | |  |  |
| *PC.A.5.3.2(f) & OC2.4.2.1(a)* |  |  |  |  |  |  | |  | |  | |  | |  |  |
| Run-up rates (RUR) after 48 hour **Shutdown**: | (Note that for DPD only a single value of run-up rate from Synch Gen to Registered Capacity is required) | | | | | | | | | | | | | | |
| (See note 2 page 3) |  |  |  |  |  | |  | |  | |  | |  |  |  |
| MW Level 1 (MWL1) | MW | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  | - |
| MW Level 2 (MWL2) | MW | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  | - |
|  |  |  |  |  |  | |  | |  | |  | |  |  |  |
|  |  |  |  |  |  | |  | |  | |  | |  |  |  |
| RUR from Synch. Gen to MWL1 | MW/Mins | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
| RUR from MWL1 to MWL2 | MW/Mins | ■ |  | **OC2** |  | |  | |  | |  | |  |  |  |
| RUR from MWL2 to RC | MW/Mins | ■ |  | **OC2** |  | |  | |  | |  | |  |  |  |
|  |  |  |  |  |  | |  | |  | |  | |  |  |  |
| Run-Down Rates (RDR): | (Note that for DPD only a single value of run-down rate from Registered Capacity to de-synch is required) | | | | | | | | | | | | | | |
|  |  |  |  |  |  | |  | |  | |  | |  |  |  |
| MWL2 | MW | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
| RDR from RC to MWL2 | MW/Min | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
| MWL1 | MW | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
| RDR from MWL2 to MWL1 | MW/Min | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
| RDR from MWL1 to de-synch | MW/Min | ■ |  | **DPD II**  **OC2** |  | |  | |  | |  | |  |  |  |
|  |  |  |  |  |  | |  | |  | |  | |  |  |  |

**SCHEDULE 2 - GENERATION PLANNING PARAMETERS**

**PAGE 3 OF 3**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENSET** OR STATION DATA | | | | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | G1 | G2 | G3 | G4 | | | G5 | G6 | STN |
| REGULATION PARAMETERS |  |  |  |  |  |  |  |  | | |  |  |  |
| *OC2.4.2.1(a)* |  |  |  |  |  |  |  |  | | |  |  |  |
| Regulating Range | MW | ■ |  | **DPD II** |  |  |  |  | | |  |  |  |
| **Load** rejection capability while still **Synchronised** and able to supply **Load**. | MW | ■ |  | **DPD II** |  |  |  |  | | |  |  |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |
| **GAS TURBINE LOADING PARAMETERS:** |  |  |  |  |  |  |  |  | | |  |  |  |
| *OC2.4.2.1(a)* |  |  |  |  |  |  |  |  | | |  |  |  |
| Fast loading | MW/Min | ■ |  | **OC2** |  |  |  |  | | |  |  |  |
| Slow loading | MW/Min | ■ |  | **OC2** |  |  |  |  | | |  |  |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |
| **CCGT MODULE PLANNING MATRIX** |  |  |  | **OC2** | (please attach) | | |  | |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  | |  |  |
| **POWER PARK MODULE PLANNING MATRIX** |  |  |  | **OC2** | (please attach) | | |  | |  | |  |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |
| **Power Park Module Active Power Output/ Intermittent Power Source Curve**  **(e.g., MW output / Wind speed)** |  |  |  | **OC2** | (please attach) | | | |  | |  |  |  |
|  |  |  |  |  |  |  |  |  | | |  |  |  |

NOTES:

(1) To allow for different groups of **Gensets** within a **Power Station** (e.g., **Gensets** with the same operator) each **Genset** may be allocated to one of up to four **Synchronising Groups**. Within each such **Synchronising Group** the single synchronising interval will apply but between **Synchronising Groups** a zero synchronising interval will be assumed.

(2) The run-up of a **Genset** from synchronising block load to **Registered Capacity** or **Maximum Capacity** is represented as a three stage characteristic in which the run-up rate changes at two intermediate loads, MWL1 and MWL2. The values MWL1 & MWL2 can be different for each **Genset**.

**SCHEDULE 3 - LARGE POWER STATION OUTAGE PROGRAMMES, OUTPUT USABLE AND INFLEXIBILITY INFORMATION**

**PAGE 1 OF 1**

(Also outline information on contracts involving **External Interconnections**)

For a **Generating Unit** at a **Large Power Station** the information is to be submitted on a unit basis and for a **CCGT Module** or **Power Park Module** at a **Large Power Station** the information is to be submitted on a module basis, unless otherwise stated.

In the case of **Restoration Contractors**, data only needs to be provided by a **Restoration Contractor** where such a **Resoration Contractor** is not a **CUSC Party** and the data has not been submitted previously. In this case, the data to be submitted would be would be pursant to the the terms of the **Anchor Restoration Contract** or **Top Up Restoration Contract**.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | TIME  COVERED | UPDATE  TIME | DATA  CAT | DATA to **RTL** | |
|  |  |  |  |  |  |  |
| OUTPUT PROFILES | | | | | | |
|  |  |  |  |  | CUSC Contract | CUSC App. Form |
| In the case of **Large Power Stations** whose output may be expected to vary in a random manner (e.g., wind power) or to some other pattern (e.g., Tidal) sufficient information is required to enable an understanding of the possible profile | MW | F. yrs 1 - 7 | Week 24 | **SPD** |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  | |
|  |  |  |  |  |  | |
|  |  |  |  |  |  | |
|  |  |  |  |  |  | |
|  |  |  |  |  |  | |
|  |  |  |  |  |  | |

Notes: 1. The week numbers quoted in the Update Time column refer to standard weeks in the current year.

**SCHEDULE 4 - LARGE POWER STATION DROOP AND RESPONSE DATA**

**PAGE 1 OF 1**

**GOVERNOR DROOP AND RESPONSE** *(PC.A.5.5* ■ *CUSC Contract*)

The Data in this Schedule 4 is to be supplied by **Generators** with respect to all **Large Power Stations**, **HVDC System Owners** and by **DC Converter Station** owners (where agreed), whether directly connected or **Embedded**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data Description | Normal Value | MW | Data CAT | Droop% | | | Response Capability | | |
| Unit 1 | Unit 2 | Unit 3 | **Primary** | **Secondary** | **High Frequency** |
| MLP1 | **Designed Minimum Operating Level** or **Minimum Regulating Level** (for a **CCGT Module** or **Power Park Module**, on a modular basis assuming all units are **Synchronised**) |  |  |  |  |  |  |  |  |
| MLP2 | **Minimum Generation** or **Minimum Stable Operating Level** (for a **CCGT Module** **or Power Park Module**, or **Power Generating Module** on a modular basis assuming all units are **Synchronised**) |  |  |  |  |  |  |  |  |
| MLP3 | 70% of **Registered Capacity** or **Maximum Capacity** |  |  |  |  |  |  |  |  |
| MLP4 | 80% of **Registered Capacity** or **Maximum Capacity** |  |  |  |  |  |  |  |  |
| MLP5 | 95% of **Registered Capacity** or **Maximum Capacity** |  |  |  |  |  |  |  |  |
| MLP6 | **Registered Capacity** or **Maximum Capacity** |  |  |  |  |  |  |  |  |

Notes:

1. The data provided in this Schedule 4 is not intended to constrain any A**ncillary Services Agreement**.
2. **Registered Capacity** or **Maximum Capacity** should be identical to that provided in Schedule 2.
3. The Governor **Droop** should be provided for each **Generating Unit** (excluding **Power Park Units**), **Power Park Module**, **HVDC Converter** or **DC Converter**. The Response Capability should be provided for each **Genset** or **DC Converter**.
4. **Primary**, **Secondary** and **High Frequency Response** are defined in CC.A.3.2 or ECC.A.3.2 and are based on a frequency ramp of 0.5Hz over 10 seconds. **Primary Response** is the minimum value of response between 10s and 30s after the frequency ramp starts, **Secondary Response** between 30s and 30 minutes, and **High Frequency Response** is the minimum value after 10s on an indefinite basis.
5. For plants which have not yet **Synchronised**, the data values of MLP1 to MLP6 should be as described above. For plants which have already **Synchronised**, the values of MLP1 to MLP6 can take any value between **Designed Operating Minimum Level** or **Minimum Regulating Level** and **Registered Capacity** or **Maximum Capacity**. If MLP1 is not provided at the **Designed Minimum Operating Level**, the value of the **Designed Minimum Operating Level** should be separately stated.
6. For the avoidance of doubt **Transmission DC Converters** and **OTSDUW DC Converters** must be capable of providing a continuous signal indicating the real time frequency measured at the **Transmission Interface Point** to the **Offshore Grid Entry Point** (as detailed in CC.6.3.7(e)(vii) and CC.6.3.7(e)(viii) or ECC.6.3..3.1.1(f) to enable **Offshore Power Generating Modules,** **Offshore Generating Units**, **Offshore Power Park Modules** and/or **Offshore DC Converters** to satisfy the frequency response requirements of CC.6.3.7 or ECC.6.3.7.
7. Alternative governor settigs shall be supplied by **Generators**, **HVDC System Owners** and **DC Converter** **Owners** where operation is required as part of **System Restoration** - as required in CC.6.3.5 or ECC.6.3.5.2 and ECC.6.3.5.5(vii).

**SCHEDULE 5 - USERS SYSTEM DATA**

**PAGE 1 OF 11**

The data in this Schedule 5 is required from **Users** who are connected to the **National Electricity Transmission System** via a **Connection Point** (or who are seeking such a connection). **Generators** undertaking **OTSDUW** should use **DRC** Schedule 18 although they should still supply data under Schedule 5 in relation to their **User’s System** up to the **Offshore Grid Entry Point**.

**Table 5 (a)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CATEGORY |
|  |  | CUSC Contract | CUSC App. Form |  |
| **USERS SYSTEM** LAYOUT *(PC.A.2.2)* |  |  |  |  |
|  |  |  |  |  |
| A **Single Line Diagram** showing all or part of the **User’s System** is required. This diagram shall include:- |  |  |  | **SPD** |
| 1. all parts of the **User’s System**, whether existing or proposed, operating at **Supergrid Voltage**, and in Scotland and **Offshore**, also all parts of the **User System** operating at 110kV and greater, |  | ■ | ■ |  |
| (b) all parts of the **User’s System** operating at a voltage of 50kV and greater, and in Scotland and **Offshore** greater than 30kV, or higher which can interconnect **Connection Points**, or split bus-bars at a single **Connection Point**, |  | ■ | ■ |  |
| (c) all parts of the **User’s System** between **Embedded Medium Power Stations** or **Large Power Stations** or **Offshore Transmission Systems** connected to the **User’s Subtransmission System** and the relevant **Connection Point** or **Interface Point**, |  | ■ | ■ |  |
| (d) all parts of the **User’s System** at a **Transmission Site**. |  | ■ | ■ |  |
|  |  |  |  |  |
| The **Single Line Diagram** may also include additional details of the **User’s Subtransmission System**, and the transformers connecting the **User’s Subtransmission System** to a lower voltage. With **The Company**’s agreement, it may also include details of the **User’s System** at a voltage below the voltage of the **Subtransmission System**. |  | ■ | ■ |  |
|  |  |  |  |  |
| This **Single Line Diagram** shall depict the arrangement(s) of all of the existing and proposed load current carrying **Apparatus** relating to both existing and proposed **Connection Points**, showing electrical circuitry (i.e., overhead lines, underground cables, power transformers and similar equipment), operating voltages. In addition, for equipment operating at a **Supergrid** **Voltage**, and in Scotland and **Offshore** also at 110kV and greater, circuit breakers and phasing arrangements shall be shown. |  | ■ | ■ |  |
|  |  |  |  |  |

**SCHEDULE 5 - USERS SYSTEM DATA**

**PAGE 2 OF 11**

**Table 5(b)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA  EXCH | | DATA  CATEGORY |
|  |  | CUSC Contract | CUSC App. Form |  |
| REACTIVE COMPENSATION *(PC.A.2.4)*  For independently switched reactive compensation equipment not owned by a **Relevant** **Transmission Licensee** connected to the **User's System** at 132kV and above, and also in Scotland and **Offshore**, connected at 33kV and above, other than power factor correction equipment associated with a customer’s **Plant** or **Apparatus**: |  |  |  |  |
|  |  |  |  |  |
| Type of equipment (e.g., fixed or variable) | Text | ■ | ■ | **SPD** |
| Capacitive rating; or | MVAr | ■ | ■ | **SPD** |
| Inductive rating; or | MVAr | ■ | ■ | **SPD** |
| Operating range | MVAr | ■ | ■ | **SPD** |
|  |  |  |  |  |
| Details of automatic control logic to enable operating characteristics to be determined | text and/or diagrams | ■ | ■ | **SPD** |
|  |  |  |  |  |
| Point of connection to **User's System** (electrical location and system voltage) | Text | ■ | ■ | **SPD** |
|  |  |  |  |  |
|  |  |  |  |  |
| SUBSTATION INFRASTRUCTURE *(PC.A.2.2.6(b))* |  |  |  |  |
|  |  |  |  |  |
| For the infrastructure associated with any **User’s** equipment at a Substation owned by a **Relevant Transmission Licensee** or operated or managed by **The Company**:- |  |  |  |  |
| Rated 3-phase rms short-circuit withstand current | kA | ■ | ■ | **SPD** |
| Rated 1-phase rms short-circuit withstand current | kA | ■ | ■ | **SPD** |
| Rated Duration of short-circuit withstand | s | ■ | ■ | **SPD** |
| Rated rms continuous current | A | ■ | ■ | **SPD** |
|  |  |  |  |  |

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 3 OF 11**

**Table 5 (c)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | | UNITS | DATA  EXCH | | DATA  CATEGORY |
|  | |  | CUSC Contract | CUSC App. Form |  |
| LUMPED SUSCEPTANCES *(PC.A.2.3)* | |  |  |  |  |
|  | |  |  |  |  |
| Equivalent Lumped Susceptance required for all parts of the **User’s Subtransmission System** which are not included in the **Single Line Diagram**. | |  | ■ | ■ |  |
| This should not include: | |  | ■ | ■ |  |
| (a) | independently switched reactive compensation equipment identified above. |  | ■ | ■ |  |
| (b) | any susceptance of the **User’s System** inherent in the **Demand** (**Reactive Power**) data provided in Schedule 1 (**Generator** Data) or Schedule 11 (**Connection Point** data). |  | ■ | ■ |  |
|  | |  |  |  |  |
| Equivalent lumped shunt susceptance at nominal **Frequency**. | | % on 100 MVA | ■ | ■ | **SPD** |
|  | |  |  |  |  |

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 4 OF 11**

**USER’S SYSTEM DATA**

**Circuit Parameters** *(PC.A.2.2.4)* *(■ CUSC Contract & ■ CUSC Application Form)*

The data below is all **Standard Planning Data**. Details are to be given for all circuits shown on the **Single Line Diagram**

Table 5 (d)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Years Valid | Node 1 | Node 2 | Rated Voltage kV | Operating Voltage kV | Positive Phase Sequence % on 100 MVA | | | Zero Phase Sequence (self) % on 100 MVA | | | Zero Phase Sequence (mutual) % on 100 MVA | | |
| R | X | B | R | X | B | R | X | B |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes

1. Data should be supplied for the current, and each of the seven succeeding Financial Years. This should be done by showing for which years the data is valid in the first column of the Table.

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 5 OF 11**

**USERS SYSTEM** **DATA**

Transformer Data *(PC.A.2.2.5)* (■ *CUSC Contract &* ■ CUSC Application Form)

The data below is all **Standard Planning Data**, and details should be shown below of all transformers shown on the **Single Line Diagram**. Details of Winding Arrangement, Tap Changer and earthing details are only required for transformers connecting the **User’s** higher voltage system with its **Primary Voltage System**.

**Table 5 (e)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Years valid | Name of Node of Conne-ction | Trans-former | Rating MVA | Voltage Ratio | | Positive Phase Sequence Reactance % on Rating | | | Positive Phase Sequence Resistance % on Rating | | | Zero Sequence Reactance % on Rating | Winding Arr | Tap Changer | | | Earthing Details (delete as app)\* |
| HV | LV | Max Tap | Min Tap | Nom Tap | Max Tap | Min Tap | Nom Tap | Range +% to -% | Step size % | Type (delete) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ON/ OFF | Direct/ Res/ Rea |

\*If Resistance or Ractance please give impedance value

Notes

1. Data should be supplied for the current, and each of the seven succeeding Financial Years. This should be done by showing for which years the data is valid in the first column of the Table

2. For a transformer with two secondary windings, the positive and zero phase sequence leakage impedances between the HV and LV1, HV and LV2, and LV1 and LV2 windings are required.

**SCHEDULE 5 –USERS SYSTEM DATA**

**PAGE 6 OF 11**

**USER’S SYSTEM** **DATA**

Switchgear Data *(PC.A.2.2.6(a))* (■ *CUSC Contract & CUSC Application Form* ■)

The data below is all **Standard Planning Data**, and should be provided for all switchgear (i.e., circuit breakers, load disconnectors and disconnectors) operating at a **Supergrid Voltage**, and also in Scotland and **Offshore**, operating at 132kV. In addition, data should be provided for all circuit breakers irrespective of voltage located at a **Connection Site** which is owned by a **Relevant Transmission Licensee** or operated or managed by **The Company**.

**Table 5(f)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Years Valid | **Connection Point** | Switch No | Rated Voltage kV rms | Operating Votage kV rms | Rated short-circuit breaking current | | Rated short-circuit peak making current | | Rated rms continuous current (A) | DC time constant at testing of asymmetrical breaking ability (s) |
| 3 Phase kA rms | 1 Phase kA rms | 3 Phase kA | 1 Phase kA |
|  |  |  |  |  |  |  |  |  |  |  |

Notes

1. Rated Voltage should be as defined by IEC 694.
2. Data should be supplied for the current, and each of the seven succeeding Financial Years. This should be done by showing for which years the data is valid in the first column of the Table

**SCHEDULE 5 –USERS SYSTEM DATA**

**PAGE 7 OF 11**

**Table 5(g)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CATEGORY |
| **PROTECTION SYSTEMS** *(PC.A.6.3)* |  | CUSC Contract | CUSC App. Form |  |
|  |  |  |  |  |
| The following information relates only to **Protection** equipment which can trip or inter-trip or close any **Connection Point** circuit breaker or any **Transmission** circuit breaker. The information need only be supplied once, in accordance with the timing requirements set out in PC.A.1.4 (b) and need not be supplied on a routine annual basis thereafter, although **The Company** should be notified if any of the information changes. |  |  |  |  |
|  |  |  |  |  |
| (a) A full description, including estimated settings, for all relays and Protection systems installed or to be installed on the **User's System**; |  | ■ |  | **DPD II** |
|  |  |  |  |  |
| (b) A full description of any auto-reclose facilities installed or to be installed on the **User's System**, including type and time delays; |  | ■ |  | **DPD II** |
|  |  |  |  |  |
| (c) A full description, including estimated settings, for all relays and **Protection** systems installed or to be installed on the **Power Generating Module**, **Power Park Module** or **Generating Unit's** generator transformer, unit transformer, station transformer and their associated connections; |  | ■ |  | **DPD II** |
|  |  |  |  |  |
| (d) For **Generating Units** (other than **Power Park Units**) having a circuit breaker at the generator terminal voltage clearance times for electrical faults within the **Generating Unit** zone must be declared. |  | ■ |  | **DPD II** |
|  |  |  |  |  |
| (e) Fault Clearance Times: |  |  |  |  |
| Most probable fault clearance time for electrical faults on any part of the **Users System** directly connected to the **National Electricity Transmission System**.  (f) Alternative **Protection** data as submitted under (a) to (e) above in respect of **System Restoration** | msec | ■  ■ |  | **DPD II**  **DPD II** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA  CATEGORY |
| **POWER PARK MODULE/UNIT PROTECTION SYSTEMS** |  | CUSC Contract | CUSC App. Form |  |
| Details of settings for the **Power Park Module/Unit** protection relays (to include): *(PC.A.5.4.2(f))* |  |  |  |  |
| (a) Under frequency, |  | ■ |  | **DPD II** |
| (b) Over Frequency, |  | ■ |  | **DPD II** |
| (c) Under Voltage, Over Voltage, |  | ■ |  | **DPD II** |
| (d) Rotor Over current, |  | ■ |  | **DPD II** |
| (e) Stator Over current, |  | ■ |  | **DPD II** |
| (f) High Wind Speed Shut Down Level, |  | ■ |  | **DPD II** |
| (g) Rotor Underspeed, |  | ■ |  | **DPD II** |
| (h) Rotor Overspeed. |  | ■ |  | **DPD II** |

**SCHEDULE 5 - USERS SYSTEM DATA**

**PAGE 8 OF 11**

Information for Transient Overvoltage Assessment (**DPD I**) *(PC.A.6.2 ■ CUSC Contract)*

The information listed below may be requested by **The Company** from each **User** with respect to any **Connection Site** between that **User** and the **National Electricity Transmission System**. The impact of any third party **Embedded** within the **Users System** should be reflected.

(a) Busbar layout plan(s), including dimensions and geometry showing positioning of any current and voltage transformers, through ­bushings, support insulators, disconnectors, circuit breakers, surge arresters, etc. Electrical parameters of any associated current and voltage transformers, stray capacitances of wall bushings and support insulators, and grading capacitances of circuit breakers;

(b) Electrical parameters and physical construction details of lines and cables connected at that busbar. Electrical parameters of all plant e.g., transformers (including neutral earthing impedance or zig-zag transformers if any), series reactors and shunt compensation equipment connected at that busbar (or to the tertiary of a transformer) or by lines or cables to that busbar;

(c) Basic insulation levels (BIL) of all **Apparatus** connected directly, by lines or by cables to the busbar;

(d) Characteristics of overvoltage **Protection** devices at the busbar and at the termination points of all lines, and all cables connected to the busbar;

(e) Fault levels at the lower voltage terminals of each transformer connected directly or indirectly to the **National Electricity Transmission System** without intermediate transformation;

(f) The following data is required on all transformers operating at **Supergrid Voltage** throughout **Great Britain** and, in Scotland and **Offshore**, also at greater than 110kV: three or five limb cores or single phase units to be specified, and operating peak flux density at nominal voltage.

(g) An indication of which items of equipment may be out of service simultaneously during **Planned Outage** conditions.

Harmonic Studies (**DPD I**) (PC.A.6.4 ■ CUSC Contract)

The information given below, both current and forecast, where not already supplied in this Schedule 5 may be requested by **The Company** from each **User** if it is necessary for **The Company** to evaluate the production/magnification of harmonic distortion on the **National Electricity Transmission System** and **User’s** systems. The impact of any third party **Embedded** within the **User’s System** should be reflected:

(a) Overhead lines and underground cable circuits of the **User's Subtransmission System** must be differentiated and the following data provided separately for each type:

Positive phase sequence resistance

Positive phase sequence reactance

Positive phase sequence susceptance

(b) for all transformers connecting the **User's Subtransmission System** to a lower voltage:

Rated MVA

Voltage Ratio

Positive phase sequence resistance

Positive phase sequence reactance

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 9 OF 11**

(c) at the lower voltage points of those connecting transformers:

Equivalent positive phase sequence susceptance

Connection voltage and MVAr rating of any capacitor bank and component design parameters if configured as a filter

Equivalent positive phase sequence interconnection impedance with other lower voltage points

The minimum and maximum **Demand** (both MW and MVAr) that could occur

Harmonic current injection sources in Amps at the Connection voltage points

Details of traction loads, e.g., connection phase pairs, continuous variation with time, etc.

(d) an indication of which items of equipment may be out of service simultaneously during **Planned Outage** conditions

Voltage Assessment Studies (**DPD I**) *(PC.A.6.5* ■ *CUSC Contract)*

The information listed below, where not already supplied in this Schedule 5, may be requested by **The Company** from each **User** with respect to any **Connection Site** if it is necessary for **The Company** to undertake detailed voltage assessment studies (e.g., to examine potential voltage instability, voltage control co-ordination or to calculate voltage step changes). The impact of any third party **Embedded** within the **Users System** should be reflected:

(a) For all circuits of the **User’s Subtransmission System**:

Positive Phase Sequence Reactance

Positive Phase Sequence Resistance

Positive Phase Sequence Susceptance

MVAr rating of any reactive compensation equipment

(b) for all transformers connecting the **User's Subtransmission System** to a lower voltage:

Rated MVA

Voltage Ratio

Positive phase sequence resistance

Positive Phase sequence reactance

Tap-changer range

Number of tap steps

Tap-changer type: on-load or off-circuit

AVC/tap-changer time delay to first tap movement

AVC/tap-changer inter-tap time delay

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 10 OF 11**

(c) at the lower voltage points of those connecting transformers:‑

Equivalent positive phase sequence susceptance

MVAr rating of any reactive compensation equipment

Equivalent positive phase sequence interconnection impedance with other lower voltage points

The maximum **Demand** (both MW and MVAr) that could occur

Estimate of voltage insensitive (constant power) load content in % of total load at both winter peak and 75% off-peak load conditions

Short Circuit Analyses:(**DPD I**) *(PC.A.6.6* ■ *CUSC Contract)*

The information listed below, both current and forecast, and where not already supplied under this Schedule 5, may be requested by **The Company** from each **User** with respect to any **Connection Site** where prospective short-circuit currents on equipment owned by a **Relevant** **Transmission Licensee** or operated or managed by **The Company** are close to the equipment rating. The impact of any third party **Embedded** within the **User’s System** should be reflected:-

(a) For all circuits of the **User’s** **Subtransmission System**:

Positive phase sequence resistance

Positive phase sequence reactance

Positive phase sequence susceptance

Zero phase sequence resistance (both self and mutuals)

Zero phase sequence reactance (both self and mutuals)

Zero phase sequence susceptance (both self and mutuals)

(b) for all transformers connecting the **User's Subtransmission System** to a lower voltage:

Rated MVA

Voltage Ratio

Positive phase sequence resistance (at max, min and nominal tap)

Positive phase sequence reactance (at max, min and nominal tap)

Zero phase sequence reactance (at nominal tap)

Tap changer range

Earthing method: direct, resistance or reactance

Impedance if not directly earthed

(c) at the lower voltage points of those connecting transformers:‑

The maximum **Demand** (in MW and MVAr) that could occur

Short-circuit infeed data in accordance with PC.A.2.5.6(a) unless the **User’**s lower voltage network runs in parallel with the **Subtransmission** **System**, when to prevent double counting in each node infeed data, a  equivalent comprising the data items of PC.A.2.5.6(a) for each node together with the positive phase sequence interconnection impedance between the nodes shall be submitted.

**SCHEDULE 5 – USERS SYSTEM DATA**

**PAGE 11 OF 11**

Dynamic Models:(**DPD II**) *(PC.A.6.7* ■ *CUSC Contract)*

The information listed below, both current and forecast, and where not already supplied under this Schedule 5, may be requested by **The Company** from each **EU Code User** or in respect of each **EU Grid Supply Point**  with respect to any **Connection Site**

1. Dynamic model structure and block diagrams including parameters, transfer functions and individual elements (as applicable)
2. Power control functions and block diagrams including parameters, transfer functions and individual elements (as applicable)
3. Voltage control functions and block diagrams including parameters, transfer functions and individual elements (as applicable)
4. Converter control models and block diagrams including parameters, transfer functions and individual elements (as applicable)

**SCHEDULE 6 – USERS OUTAGE INFORMATION**

**PAGE 1 OF 3**

| DATA DESCRIPTION | UNITS | DATA to **RTL** | | TIMESCALE  COVERED | UPDATE  TIME | DATA  CAT. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  |  |  |
| Details are required from **Network Operators** of proposed outages in their **User Systems** and from **Generators** with respect to their outages, which may affect the performance of the **Total System** (e.g., at a **Connection Point** or constraining **Embedded Large Power Stations** or constraints to the **Maximum Import Capacity** or **Maximum Export Capacity** at an **Interface Point**) *(OC2.4.1.3.2(a) & (b)).*  Outages of **Plant** and **Apparatus** of **Restoration Contractors** and key **Plant** and **Apparatus** of a **Network Operator’s** **System** associated with a **Distribution Restoration Zone Plan** also need to be co-ordinated withoutages on the **National Electricity Transmission System**. This includes data from **Network Operators** **and Restoration Contractors** which would impact the ability to operate a **Local Joint Restoration Plan** or **Distribution Restoration Zone Plan**. |  | ■ |  | Years 2-5 | Week 8  (**Network Operator** etc)  Week 13  (Generators) | **OC2**  **OC2**  **PC.A.5.7.2** |
|  |  |  |  |  |  |  |
| (**The Company** advises **Network Operators** of **National Electricity Transmission System** outages affecting their **Systems**) |  |  |  | Years 2-5 | Week 28) |  |
|  |  |  |  |  |  |  |
| **Network Operator** informs **The Company** if unhappy with proposed outages) |  | ■ |  | " | Week 30 | **OC2** |
|  |  |  |  |  |  |  |
| (**The Company** draws up revised  **National Electricity Transmission System** |  |  |  | " | Week 34) |  |
| (outage plan advises **Users** of operational effects) |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Generators** and **Non-Embedded Customers** provide  Details of **Apparatus** owned by them (other than **Gensets**) at each **Grid Supply Point** *(OC2.4.1.3.3)* |  | ■ |  | Year 1 | Week 13 | **OC2** |
|  |  |  |  |  |  |  |
| (**The Company** advises **Network Operators** of outages affecting their **Systems**) (OC2.4.1.3.3) |  |  |  | Year 1 | Week 28) |  |
|  |  |  |  |  |  |  |
| **Network Operator** details of relevant outages affecting the **Total System** *(OC2.4.1.3.3)* |  | ■ |  | Year 1 | Week 32 | **OC2** |
|  |  |  |  |  |  |  |
| Details of:-  **Maximum Import Capacity** for each **Interface Point**  **Maximum Export Capacity** for each **Interface Point**  Changes to previously declared values of the **Interface Point Target Voltage/Power Factor** *(OC2.4.1.3.3(c )).* | MVA / MW  MVA / MW  V (unless power factor control |  |  | Year 1 | Week 32 | **OC2** |
|  |  |  |  |  |  |  |
| (**The Company** informs **Users** of aspects that may affect their **Systems**) (OC2.4.1.3.3) |  |  |  | Year 1 | Week 34) |  |
|  |  |  |  |  |  |  |
| **Users** inform **The Company** if unhappy with aspects as notified  *(OC2.4.1.3.3)* |  | ■ |  | Year 1 | Week 36 | **OC2** |
|  |  |  |  |  |  |  |
| (**The Company** issues final **National Electricity Transmission System** |  | ■ |  | Year 1 | Week 49 | **OC2** |
| (outage plan with advice of operational) *(OC2.4.1.3.3)*  (effects on **Users System**) |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Generator**, **Network Operator** and **Non-Embedded Customers** to inform **The Company** of changes to outages previously requested |  |  |  | Week 8 ahead to year end | As occurring | **OC2** |
|  |  |  |  |  |  |  |
| Details of load transfer capability of 12MW or  more between **Grid Supply Points** in England and Wales and 10MW or more between **Grid Supply Points** in Scotland. |  |  |  | Within Yr 0 | As **The Company** request | **OC2** |
| Details of:-  **Maximum Import Capacity** for each **Interface Point**  **Maximum Export Capacity** for each **Interface Point**  Changes to previously declared values of the **Interface Point Target Voltage/Power Factor** | MVA / MW  MVA / MW  V (unless power factor control |  |  | Within Yr 0 | As occurring | **OC2** |

Note: **Users** should refer to **OC2** for full details of the procedure summarised above and for the information which **The Company** will provide on the **Programming Phase**.

**SCHEDULE 6 – USERS OUTAGE INFORMATION**

**PAGE 2 OF 3**

The data below is to be provided to The Company as required for compliance with the applicable **Retained EU Law** (Commission Regulation (EU) No 543/2013 (OC2.4.2.3)). .

|  |  |  |  |
| --- | --- | --- | --- |
| ECR ARTICLE No. | DATA DESCRIPTION | USERS PROVIDING DATA | FREQUENCY OF SUBMISSION |
| 8.1 | Year Ahead Forecast Margin information as provided in accordance with OC2.4.1.2.2  - Output Usable | Generator | In accordance with OC2.4.1.2.2 |
| 14.1(a) | Registered Capacity or **Maximum Capacity** for Generating Units or **Power Generating Modules** with greater than 1 MW Registered Capacity or **Maximum Capacity** provided in accordance with PC.4.3.1 and PC.A.3.4.3 or PC.A.3.1.4  - Registered Capacity or **Maximum Capacity** (MW)  - Production type (from that listed under PC.A.3.4.3) | Generator | Week 24 |
| 14.1(b) | Power Station Registered Capacity for units with equal or greater than 100 MW Registered Capacity provided in accordance with PC.4.3.1 and PC.A.3.4.3  - Power Station name  - Location of Generating Unit  - Production type (from that listed under PC.A.3.4.3)  - Voltage connection levels  - Registered Capacity or **Maximum Capacity** (MW) | Generator | Week 24 |
| 14.1(c) | Estimated output of Active Power of a BM Unit or Generating Unit for each per Settlement Period of the next **Operational Day** provided in accordance with BC1.4.2  - Physical Notification | Generator | In accordance with BC1.4.2 |
| 15.1(e) | Outage data from a **Network Operator** relating to an outage on the **Network Operator’s System** or an outage of a **Restoration Contractor’s Plant** and **Apparatus**  (not already supplied) which would prevent the operation of a **Restoration Plan**. Outages of **Plant** and **Apparatus** of **Restoration Contractors** and key **Plant** and **Apparatus** of a **Network Operator’s** **System** associated with a **Distribution Restoration Zone Plan** also need to be co-ordinated withoutages on the **National Electricity Transmission System** | Network Operators and Restoration Service Contractors | In accordance with the requirements of OC2 |

**SCHEDULE 7 - LOAD CHARACTERISTICS AT GRID SUPPLY POINTS**

**PAGE 1 OF 1**

All data in this schedule 7 is categorised as **Standard Planning Data** (**SPD**) and is required for existing and agreed future connections. This data is only required to be updated when requested by **The Company**.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | DATA FOR FUTURE YEARS | | | | | | | |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | Yr 1 | Yr 2 | Yr 3 | Yr 4 | Yr 5 | | Yr 6 | Yr 7 |
|  |  | CUSC Contract | CUSC App. Form |  |  |  |  |  | |  |  |
| FOR ALL TYPES OF **DEMAND** FOR EACH **GRID SUPPLY POINT** |  |  |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| The following information is required infrequently and should only be supplied, wherever possible, when requested by **The Company** *(PC.A.4.7)* |  | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| Details of individual loads which have  Characteristics significantly different from the typical range of domestic or commercial and industrial load supplied: *(PC.A.4.7(a))* |  | □ |  | (Please Attach) | | |  |  |  | |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| Sensitivity of demand to fluctuations in voltage  And frequency on **National Electricity Transmission System** at time of peak **Connection Point Demand (Active Power)** *(PC.A.4.7(b))* |  | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| Voltage Sensitivity *(PC.A.4.7(b))* | MW/kV MVAr/kV | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| **Frequency Sensitivity** *(PC.A.4.7(b))* | MW/Hz MVAr/Hz | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| **Reactive Power** sensitivity should relate to the  **Power Factor** information given in Schedule 11 (or for **Generators**, Schedule 1) and note 6 on Schedule 11 relating to **Reactive Power** therefore applies: *(PC.A.4.7(b))* |  | □ |  |  |  |  |  |  | |  |  |
| Phase unbalance imposed on the **National Electricity Transmission System** *(PC.A.4.7(d))* |  |  |  |  |  |  |  |  | |  |  |
| - maximum | % | □ |  |  |  |  |  |  | |  |  |
| - average | % | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| Maximum Harmonic Content imposed on **National Electricity Transmission System** *(PC.A.4.7(e))* | % | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |
| Details of any loads which may cause **Demand**  Fluctuations greater than those permitted under Engineering Recommendation P28, Stage 1 at the **Point of Common Coupling** including **Flicker Severity** (**Short Term**) and **Flicker Severity** (**Long Term**) *(PC.A.4.7(f))* |  | □ |  |  |  |  |  |  | |  |  |
|  |  |  |  |  |  |  |  |  | |  |  |

**SCHEDULE 8 - DATA SUPPLIED BY BM PARTICIPANTS**

**PAGE 1 OF 1**

|  |  |
| --- | --- |
| CODE | DESCRIPTION |
| **BC1**  **BC1** & **BC2**  **BC1**  **BC1**  **BC2**  **BC1** & **BC2** | **Physical Notifications**  **Export and Import Limits**  **Bid-Offer Data**  **Dynamic Parameters** (Day Ahead)  **Dynamic Parameters** (For use in **Balancing Mechanism**)  **Other Relevant Data** | |

- No information collated under this Schedule will be transferred to the **Relevant Transmission Licensees**

**SCHEDULE 9 - DATA SUPPLIED BY THE COMPANY TO USERS**

**PAGE 1 OF 1**

(Example of data to be supplied)

|  |  |
| --- | --- |
| CODE | DESCRIPTION |
|  |  |
| **CC** or **ECC** | Operation Diagram |
|  |  |
| **CC** or **ECC** | Site Responsibility Schedules |
|  |  |
| **PC** | Day of the peak **National Electricity Transmission System Demand** |
|  |  |
|  | Day of the minimum **National Electricity Transmission System Demand** |
| **OC1.7** | From 31 December 2026 and during normal system operation, **The Company** shall publish on a daily basis, 60% and 100% of the peak **National Demand**, under pre **System** shutdown conditions for the following day, based on the latest forecast that would feed into the **System Restoration Regional** targets by means of messages inputted by **The Company** to the **Balancing Mechanism Reporting Service** (**BMRS**).  From 31 December 2026 and during **System Restoration**, **The Company** shall publish for each **System Restoration Region**,the **Demand** that is used to calculate the **National Demand** on an hourly basis on a reasonable endeavours basis by means of messages inputted by **The Company** to the **Balancing Mechanism Reporting Service** (**BMRS**). |
|  |  |
| **OC2** | **Surpluses** and **Output Useable** (**OU**) requirements for each **Generator** over varying timescales |
|  |  |
|  | Equivalent networks to **Users** for **Outage Planning** |
|  |  |
|  | **Negative Reserve Active Power Margins** (when necessary) |
|  |  |
|  | **Operating Reserve** information |
|  |  |
| **BC1** | **Demand** Estimates, **Indicated Margin** and **Indicated Imbalance**, indicative **Synchronising** and **Desynchronising** times of **Embedded Power Stations** to **Network Operators**, special actions. |
|  |  |
| **BC2** | **Bid-Offer Acceptances**, **Ancillary Services** instructions to relevant **Users**, **Emergency Instructions** |
|  |  |
| **BC3** | Location, amount, and **Low Frequency Relay** settings of any **Low Frequency Relay** initiated **Demand** reduction for **Demand** which is **Embedded**. |

- No information collated under this Schedule will be transferred to the **Relevant Transmission Licensees**

-In respect of OC1, the data would also be supplied to **Restoration Contractors**

DATA TO BE SUPPLIED BY **THE COMPANY** TO **USERS**

PURSUANT TO THE **TRANSMISSION LICENCE**

1. The **Transmission Licence** requires **The Company** to publish annually the **Seven Year Statement** which is designed to provide **Users** and potential **Users** with information to enable them to identify opportunities for continued and further use of the **National Electricity Transmission System**.

When a **User** is considering a development at a specific site, certain additional information may be required in relation to that site which is of such a level of detail that it is inappropriate to include it in the **Seven Year Statement**. In these circumstances, the **User** may contact **The Company** who will be pleased to arrange a discussion and the provision of such additional information relevant to the site under consideration as the **User** may reasonably require.

2. The **Transmission Licence** also requires **The Company** to offer terms for an agreement for connection to and use of the **National Electricity Transmission System** and further information will be given by **The Company** to the potential **User** in the course of the discussions of the terms of such an agreement.

**SCHEDULE 10 - DEMAND PROFILES AND ACTIVE ENERGY DATA**

**PAGE 1 OF 2**

The following information is required from each **Network Operator** and from each **Non-Embedded Customer**. The data should be provided in calendar week 24 each year (although **Network Operators** may delay the submission until calendar week 28).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | F. Yr.  0 | F. Yr.  1 | F. Yr.  2 | F. Yr.  3 | F. Yr.  4 | F. Yr.  5 | F. Yr.  6 | F. Yr.  7 | UPDATE TIME | DATA CAT |
|  |  |  |  |  |  |  |  |  |  |  |
| Demand Profiles | *(PC.A.4.2) (■ – CUSC Contract & ■ CUSC Application Form)* | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Total User's**  **system** profile (please delete as applicable) | Day of **User's** annual Maximum demand at **Annual ACS Conditions** (MW)  Day of annual peak of **National Electricity Transmission System Demand** at **Annual ACS Conditions** (MW)  Day of annual minimum **National Electricity Transmission System Demand** at average conditions (MW) | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| 0000 : 0030 |  |  |  |  |  |  |  |  | Wk.24 | **SPD** |
| 0030 : 0100 |  |  |  |  |  |  |  |  | : |  |
| 0100 : 0130 |  |  |  |  |  |  |  |  | : |  |
| 0130 : 0200 |  |  |  |  |  |  |  |  | : | : |
| 0200 : 0230 |  |  |  |  |  |  |  |  | : | : |
| 0230 : 0300 |  |  |  |  |  |  |  |  | : | : |
| 0300 : 0330 |  |  |  |  |  |  |  |  | : | : |
| 0330 : 0400 |  |  |  |  |  |  |  |  | : | : |
| 0400 : 0430 |  |  |  |  |  |  |  |  | : | : |
| 0430 : 0500 |  |  |  |  |  |  |  |  | : | : |
| 0500 : 0530 |  |  |  |  |  |  |  |  | : | : |
| 0530 : 0600 |  |  |  |  |  |  |  |  | : | : |
| 0600 : 0630 |  |  |  |  |  |  |  |  | : | : |
| 0630 : 0700 |  |  |  |  |  |  |  |  | : | : |
| 0700 : 0730 |  |  |  |  |  |  |  |  | : | : |
| 0730 : 0800 |  |  |  |  |  |  |  |  | : | : |
| 0800 : 0830 |  |  |  |  |  |  |  |  | : | : |
| 0830 : 0900 |  |  |  |  |  |  |  |  | : | : |
| 0900 : 0930 |  |  |  |  |  |  |  |  | : | : |
| 0930 : 1000 |  |  |  |  |  |  |  |  | : | : |
| 1000 : 1030 |  |  |  |  |  |  |  |  | : | : |
| 1030 : 1100 |  |  |  |  |  |  |  |  | : | : |
| 1100 : 1130 |  |  |  |  |  |  |  |  | : | : |
| 1130 : 1200 |  |  |  |  |  |  |  |  | : | : |
| 1200 : 1230 |  |  |  |  |  |  |  |  | : | : |
| 1230 : 1300 |  |  |  |  |  |  |  |  | : | : |
| 1300 : 1330 |  |  |  |  |  |  |  |  | : | : |
| 1330 : 1400 |  |  |  |  |  |  |  |  | : | : |
| 1400 : 1430 |  |  |  |  |  |  |  |  | : | : |
| 1430 : 1500 |  |  |  |  |  |  |  |  | : | : |
| 1500 : 1530 |  |  |  |  |  |  |  |  | : | : |
| 1530 : 1600 |  |  |  |  |  |  |  |  | : | : |
| 1600 : 1630 |  |  |  |  |  |  |  |  | : | : |
| 1630 : 1700 |  |  |  |  |  |  |  |  | : | : |
| 1700 : 1730 |  |  |  |  |  |  |  |  | : | : |
| 1730 : 1800 |  |  |  |  |  |  |  |  | : | : |
| 1800 : 1830 |  |  |  |  |  |  |  |  | : | : |
| 1830 : 1900 |  |  |  |  |  |  |  |  | : | : |
| 1900 : 1930 |  |  |  |  |  |  |  |  | : | : |
| 1930 : 2000 |  |  |  |  |  |  |  |  | : | : |
| 2000 : 2030 |  |  |  |  |  |  |  |  | : | : |
| 2030 : 2100 |  |  |  |  |  |  |  |  | : | : |
| 2100 : 2130 |  |  |  |  |  |  |  |  | : | : |
| 2130 : 2200 |  |  |  |  |  |  |  |  | : | : |
| 2200 : 2230 |  |  |  |  |  |  |  |  | : | : |
| 2230 : 2300 |  |  |  |  |  |  |  |  | : | : |
| 2300 : 2330 |  |  |  |  |  |  |  |  | : | : |
| 2330 : 0000 |  |  |  |  |  |  |  |  | : | : |

**SCHEDULE 10 - DEMAND PROFILES AND ACTIVE ENERGY DATA**

**PAGE 2 OF 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | Out-turn | | F.Yr. | Update | Data Cat | DATA to **RTL** | |
|  | Actual | Weather | 0 | Time |  |  | |
|  |  | Corrected. |  |  |  |  | |
| *(PC.A.4.3)* |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| **Active Energy** Data |  |  |  | Week 24 | **SPD** | ■ | ■ |
| Total annual **Active Energy** requirements under average conditions of each **Network Operator** and each **Non-Embedded Customer** in the following categories of **Customer** Tariff:- |  |  |  |  |  | ■ | ■ |
|  |  |  |  |  |  |  |  |
| LV1 |  |  |  |  |  | ■ | ■ |
| LV2 |  |  |  |  |  | ■ | ■ |
| LV3 |  |  |  |  |  | ■ | ■ |
| EHV |  |  |  |  |  | ■ | ■ |
| HV |  |  |  |  |  | ■ | ■ |
| Traction |  |  |  |  |  | ■ | ■ |
| Lighting |  |  |  |  |  | ■ | ■ |
| **User System** Losses |  |  |  |  |  | ■ | ■ |
|  |  |  |  |  |  |  |  |
| **Active Energy** from **Embedded** |  |  |  |  |  | ■ | ■ |
| **Small Power Stations** and |  |  |  |  |  |  |  |
| **Embedded Medium Power Stations** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

NOTES:

1. 'F. yr.' means '**Financial Year**'

2. **Demand** and **Active Energy** Data (General)

**Demand** and **Active Energy** data should relate to the point of connection to the **National Electricity Transmission System** and should be net of the output (as reasonably considered appropriate by the **User**) of all **Embedded Small Power Stations**, **Medium Power Stations** and **Customer Generating Plant**. Auxiliary demand of **Embedded Power Stations** should be included in the demand data submitted by the **User** at the **Connection Point**. **Users** should refer to the **PC** for a full definition of the **Demand** to be included.

3. **Demand** profiles and **Active Energy** data should be for the total **System** of the **Network Operator**, including all **Connection Points**, and for each **Non-Embedded Customer**. **Demand Profiles** should give the numerical maximum demand that in the **User**'s opinion could reasonably be imposed on the **National Electricity Transmission System**.

4. In addition the demand profile is to be supplied for such days as **The Company** may specify, but such a request is not to be made more than once per calendar year.

**SCHEDULE 11 - CONNECTION POINT DATA**

**PAGE 1 OF 5**

The following information is required from each **Network Operator** and from each **Non-Embedded Customer**. The data should be provided in calendar week 24 each year (although **Network Operators** may delay the submission until calendar week 28).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 11(a)**  **Connection Point:** |  | | | | |  | |  | | | | |
|  |  | | | | |  | |  | | | | |
| **Connection Point Demand** at the time of - (select each one in turn)  (Provide data for each Access Period associated with the Connection Point) | | a) maximum **Demand** b) peak **National Electricity Transmission System Demand** *(specified by* ***The Company****)* c) minimum **National Electricity Transmission System Demand** *(specified by* ***The Company****)* d) maximum **Demand** during **Access Period** e) specified by either **The Company** or a **User** | | | | | | | | | | | | | | | | | | |
| Name of **Transmission Interface Circuit** out of service during **Access Period** *(if reqd*). | |  | | | | | | | | | | | | | | | | | **PC.A.4.1.4.2** | |
|  | |  | |  |  | |  | | |  | |  | |  | |  |  |  |  | |
| DATA DESCRIPTION  *(CUSC Contract □ & CUSC Application Form ■)* | | | Outturn | Outturn | F.Yr | | F.Yr | | | F.Yr. | | F.Yr. | | F.Yr. | | F.Yr | F.Yr | F.Yr | | DATA CAT |
|  | Weather Corrected | 1 | | 2 | | | 3 | | 4 | | 5 | | 6 | 7 | 8 | |  |
| Date of a), b), c), d) or e) as denoted above. | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.3** |
| Time of a), b), c), d) or e) as denoted above. | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.3** |
| **Connection Point Demand** (MW) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.1** |
| **Connection Point Demand** (MVAr) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.1** |
| Deduction madeat **Connection Point** for **Small Power Stations**, **Medium Power Stations** and **Customer Generating Plant** (MW) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.2(a)** |
| Reference to valid **Single Line Diagram** | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.4.3.5** |
| Reference to node and branch data. | | |  |  |  | |  | | |  | |  | |  | |  |  |  | | **PC.A.2.2** |
| *Note: The following data block can be repeated for each post fault network revision that may impact on the Transmission System.* | | | | | | | | | | | | | | | | | | | | |
| Reference to post-fault revision of **Single Line Diagram** | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.5** | |
| Reference to post-fault revision of the node and branch data associated with the **Single Line Diagram** | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.5** | |
| Reference to the description of the actions and timescales involved in effecting the post-fault actions (e.g. auto-switching, manual, teleswitching, overload protection operation etc) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.5** | |
|  | | |  | | | | | |  | |  | | | |
| **Access Group:** | | |  | | | | | | | | | | | | | | | |  | |
| *Note: The following data block to be repeated for each* ***Connection Point*** *with the* ***Access Group****.* | | | | | | | | | | | | | | | | | | | | |
| Name of associated **Connection Point** within the same **Access Group:** | | |  | | | | | | | | | | | | | | | | **PC.A.4.3.1** | |
| **Demand** at associated **Connection Point** (MW) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.3.1** | |
| **Demand** at associated **Connection Point** (MVAr) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.3.1** | |
| Deduction madeat associated **Connection Point** for **Small Power Stations**, **Medium Power Stations** and **Customer Generating Plant** (MW) | | |  |  |  | |  | | |  | |  | |  | |  |  |  | **PC.A.4.3.2(a)** | |

**SCHEDULE 11 - CONNECTION POINT DATA**

**PAGE 2 OF 5**

**Table 11(b)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Embedded Generation Data** | | | | | | | | | | | |
| **Connection Point:** |  | | | | | | | | | | |
| DATA DESCRIPTION | Outturn | Outturn | F.Yr | F.Yr | F.Yr. | F.Yr. | F.Yr. | F.Yr | F.Yr | F.Yr | DATA CAT |
|  | Weather Corrected | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Small Power Station**, **Medium Power Station** and **Customer** Generation Summary | For each **Connection Point** where there are **Embedded Small Power Stations**, **Medium Power Stations** or **Customer Generating Stations** the following information is required: | | | | | | | | | |  |
| No. of **Small Power Stations**, **Medium Power Stations** or **Customer Power Stations** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.1.4(a)** |
| Number of **Generating Units** within these stations |  |  |  |  |  |  |  |  |  |  | **PC.A.3.1.4(a)** |
| Summated Capacity of all these **Generating Units** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.1.4(a)** |
| Where the **Network Operator’s System** places a constraint on the capacity of an **Embedded Large** **Power Station** | | | | | | | | | | |  |
| **Station Name** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |
| **Generating Unit** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |
| **System Constrained Capacity** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)(i)** |
| **Reactive Despatch Network Restriction** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)(ii)** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Where the **Network Operator’s System** places a constraint on the capacity of an **Offshore Transmission System** at an **Interface Point** | | | | | | | | | | |  |
| **Offshore Transmission System Name** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |
| **Interface Point Name** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |
| **Maximum Export Capacity** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |
| **Maximum Import Capacity** |  |  |  |  |  |  |  |  |  |  | **PC.A.3.2.2(c)** |

**SCHEDULE 11 - CONNECTION POINT DATA**

**PAGE 3 OF 5**

**Table 11(c)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| For each **Embedded Small Power Station** of 1MW and above, the following information is required, effective 2015 in line with the Week 24 data submissions. | | | | | | | | | | | | |
| DATA DESCRIPTION | An **Embedded** **Small** **Power Station** reference unique to each **Network Operator** | Connection Date (**Financial Year** for generator connecting after week 24 2015 | Generator unit Reference | Technology Type  / Production type | CHP (Y/N) | Registered capacity in MW (as defined in the **Distribution Code**) | Lowest voltage node on the most up-to-date **Single Line Diagram** to which it connects or where it will export most of its power | Where it exports electricity from wind PV or storage, the geographical location of the primary or higher voltage substation to which it connects | Control mode | Control mode voltage target and reactive range or target pf (as appropriate) | Loss of mains protection type | Loss of mains protection settings |
| DATA CAT | PC.A.3.1.4 (a) |  | PC.A.3.1.4 (a) | PC.A.3.1.4  (a) | PC.A.3.1.4 | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) | PC.A.3.1.4  (a) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

**Table 11(c)**

**SCHEDULE 11 - CONNECTION POINT DATA**

**PAGE 4 OF 5**

NOTES:

1. 'F.Yr.' means '**Financial Year**'. F.Yr. 1 refers to the current financial year.

2.All **Demand** data should be net of the output (as reasonably considered appropriate by the **User**) of all **Embedded Small Power Stations**, **Embedded Medium Power Stations** and **Customer Generating Plant**. Generation and / or Auxiliary demand of **Embedded Large Power Stations** should not be included in the demand data submitted by the **User**. **Users** should refer to the **PC** for a full definition of the **Demand** to be included.

3. Peak **Demand** should relate to each **Connection Point** individually and should give the maximum demand that in the **User's** opinion could reasonably be imposed on the **National Electricity Transmission System**. **Users** may submit the **Demand** data at each node on the **Single Line Diagram** instead of at a **Connection Point** as long as the **User** reasonably believes such data relates to the peak (or minimum) at the **Connection Point**.

In deriving **Demand** any deduction made by the **User** (as detailed in note 2 above) to allow for **Embedded Small Power Stations**, **Embedded Medium Power Stations** and **Customer Generating Plant** is to be specifically stated as indicated on the Schedule.

4. **The Company** may at its discretion require details of any **Embedded Small Power Stations** or **Embedded Medium Power Stations** whose output can be expected to vary in a random manner (e.g. wind power) or according to some other pattern (e.g. tidal power)

5. Where more than 95% of the total **Demand** at a **Connection Point** is taken by synchronous motors, values of the **Power Factor** at maximum and minimum continuous excitation may be given instead. **Power Factor** data should allow for series reactive losses on the **User's System** but exclude reactive compensation network susceptance specified separately in Schedule 5.

1. Where a **Reactive Despatch Network Restriction** is in place which requires the generator to maintain a target voltage set point this should be stated as an alternative to the size of the **Reactive Despatch Network Restriction**.

**SCHEDULE 11 - CONNECTION POINT DATA**

**PAGE 5 OF 5**

**Table 11 (d)**

**Embedded Small Power Stations <1MW**

|  |  |
| --- | --- |
| **Network**  **Operator** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fuel Type** | **Aggregate**  **Registered**  **Capacity**  Total MW | **Number of**  **PGMs** | **Comments** |
| Biomass |  |  |  |
| Fossil brown coal/lignite |  |  |  |
| Fossil coal-derived gas |  |  |  |
| Fossil gas |  |  |  |
| Fossil hard coal |  |  |  |
| Fossil oil |  |  |  |
| Fossil oil shale |  |  |  |
| Fossil peat |  |  |  |
| Geothermal |  |  |  |
| Hydro pumped storage |  |  |  |
| Hydro run-of-river and poundage |  |  |  |
| Hydro water reservoir |  |  |  |
| Marine |  |  |  |
| Nuclear |  |  |  |
| Other renewable |  |  |  |
| Solar |  |  |  |
| Waste |  |  |  |
| Wind offshore |  |  |  |
| Wind onshore |  |  |  |
| Other |  |  |  |

**SCHEDULE 12 - DEMAND CONTROL**

**PAGE 1 OF 2**

The following information is required from each **Network Operator** and where indicated with an asterisk from **Externally Interconnected System Operators** and/or **Interconnector Users** and a **Pumped Storage Generator** and **Generators** in respect of **Electricity Storage Modules**.Where indicated with a double asterisk, the information is only required from **Suppliers**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | | UPDATE TIME | |
|  |  |  |  |  |
| **Demand Control** |  |  |  |  |
|  |  |  |  |  |
| **Demand** met or to be relieved by **Demand Control** (averaging at the **Demand Control Notification Level** or more over a half hour) at each **Connection Point**. |  |  |  |  |
|  |  |  |  |  |
| **Demand Control** at time of **National Electricity Transmission System** weekly peak demand |  |  |  |  |
| Amount | MW | )F.yrs 0 to 5 | Week 24 | **OC1** |
| Duration | Min | ) |  |  |
|  |  |  |  |  |
| For each half hour | MW | Wks 2-8 ahead | 1000 Mon | **OC1** |
|  |  |  |  |  |
| For each half hour | MW | Days 2-12 ahead | 1200 Wed | **OC1** |
|  |  |  |  |  |
|  |  |  |  |  |
| For each half hour | MW | Previous calendar day | 0600 daily | **OC1** |
|  |  |  |  |  |
| **\*\*Customer Demand Management**  (at the **Customer Demand Management Notification Level** or more at the **Connection Point**) |  |  |  |  |
| For each half hour | MW | Any time in Control Phase |  | **OC1** |
|  |  |  |  |  |
| For each half hour | MW | Remainder of period | When changes occur to previous plan | **OC1** |
|  |  |  |  |  |
| For each half hour | MW | Previous calendar day | 0600 daily | **OC1** |
| \*\*In Scotland, **Load Management Blocks**  For each block of 5MW or more, for each half hour | MW | For the next day | 11:00 | **OC1** |

**SCHEDULE 12 - DEMAND CONTROL**

**PAGE 2 OF 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | TIME COVERED | UPDATE TIME | DATA CAT. |
| \***Demand Control** or Pump  Tripping Offered as Reserve |  |  |  |  |
|  |  |  |  |  |
| Magnitude of **Demand** or pumping  load or **Electricity Storage** charging load which is tripped | MW | Year ahead from week 24 | Week 24 | **DPD I** |
|  |  |  |  |  |
| **System Frequency** at which  tripping is initiated | Hz | " | " | " |
|  |  |  |  |  |
| Time duration of **System Frequency**  below trip setting for tripping to be initiated | S | " | " | " |
|  |  |  |  |  |
| Time delay from trip initiation to  Tripping  **Electricity Storage Module** data **Maximum Capacity**  **Maximum Import Power**  **Registered Import Capability**  Charge Time  Discharge time  Operating periods | S  MW    MW  MW  Min  Min  Min | "  "  "  "  "  "  “  “  “ | "  "  "  "  "  "  “  “  “ | "  "  "  "  "  "  “  “  “ |
|  |  |  |  |  |
| Emergency Manual Load Disconnection |  |  |  |  |
|  |  |  |  |  |
| Method of achieving load disconnection | Text | Year ahead from week 24 | Annual in week 24 | OC6 |
|  |  |  |  |  |
| **Annual ACS Peak Demand**  (**Active Power**) at **Connection Point** (requested under Schedule 11 - repeated here for reference) | MW | " | " | " |
|  |  |  |  |  |
| Cumulative percentage of  **Connection Point Demand**  (**Active Power**) which can be disconnected by the following times from an instruction from **The Company** |  |  |  |  |
|  |  |  |  |  |
| 5 mins | % | " | " | " |
| 10 mins | % | " | " | " |
| 15 mins | % | " | " | " |
| 20 mins | % | " | " | " |
| 25 mins | % | " | " | " |
| 30 mins | % | " | " | " |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. **Network Operators** may delay the submission until calendar week 28.

2. No information collated under this Schedule will be transferred to the **Relevant Transmission Licensees** (or **Generators** undertaking **OTSDUW**).

**SCHEDULE 12A - AUTOMATIC LOW FREQUENCY DEMAND DISCONNECTION**

**PAGE 1 OF 1**

Time Covered: Year ahead from week 24 Data Category: OC6

Update Time: Annual in week 24

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | GSP  Demand | Low Frequency Demand Disconnection Blocks MW | | | | | | | | | Residual |
| Grid Supply Point | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | demand |
| MW | 48.8Hz | 48.75Hz | 48.7Hz | 48.6Hz | 48.5Hz | 48.4Hz | 48.2Hz | 48.0Hz | 47.8Hz | MW |
| GSP1 |  |  |  |  |  |  |  |  |  |  |  |
| GSP2 |  |  |  |  |  |  |  |  |  |  |  |
| GSP3 |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Total demand disconnected MW  per block % | |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Total demand disconnection MW ( % of aggregate demand of MW) | | | | | | | | | | | |

Note: All demand refers to that at the time of forecast **National Electricity Transmission System** peak demand.

**Network Operators** may delay the submission until calendar week 28

No information collated under this schedule will be transferred to the **Relevant Transmission Licensees** (or **Generators** undertaking **OTSDUW**).

**SCHEDULE 13 - FAULT INFEED DATA**

**PAGE 1 OF 2**

The data in this Schedule 13 is all **Standard Planning Data**, and is required from all **Users** other than **Generators** who are connected to the **National Electricity Transmission System** via a **Connection Point** (or who are seeking such a connection). A data submission is to be made each year in Week 24 (although **Network Operators** may delay the submission until Week 28). A separate submission is required for each node included in the **Single Line Diagram** provided in Schedule 5.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr. 7 | | DATA to **RTL** | | |
| SHORT CIRCUIT INFEED TO THE **NATIONAL ELECTRICITY TRANSMISSION SYSTEM** FROM **USERS SYSTEM** AT A **CONNECTION** **POINT** | |  |  |  |  |  |  |  |  | | CUSC Contract | CUSC App. Form | |
| *(PC.A.2.5)* | | | | | | | | | | | | | |
| Name of node or **Connection Point** |  | | |  |  |  |  |  |  | □ | | | ■ |
| Symmetrical three phase  short-circuit current infeed |  |  |  |  |  |  |  |  |  |  | | |  |
| - at instant of fault | kA |  |  |  |  |  |  |  |  | □ | | | ■ |
| - after subtransient fault  current contribution has  substantially decayed | Ka |  |  |  |  |  |  |  |  | □ | | | ■ |
| Zero sequence source  impedances as seen from the  **Point of Connection** or node on the **Single Line Diagram** (as appropriate)consistent with the maximum infeed above: |  |  |  |  |  |  |  |  |  |  | | |  |
| - Resistance | % on 100 |  |  |  |  |  |  |  |  | □ | | | ■ |
| - Reactance | % on 100 |  |  |  |  |  |  |  |  | □ | | | ■ |
| Positive sequence X/R ratio  at instance of fault |  |  |  |  |  |  |  |  |  | □ | | | ■ |
|  |  |  |  |  |  |  |  |  |  |  | | |  |
| Pre-Fault voltage magnitude  at which the maximum fault  currents were calculated | p.u. |  |  |  |  |  |  |  |  | □ | | | ■ |

**SCHEDULE 13 - FAULT INFEED DATA**

**PAGE 2 OF 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr. 7 | DATA to **RTL** | |
| SHORT CIRCUIT INFEED TO THE **NATIONAL ELECTRICITY TRANSMISSION SYSTEM** FROM **USERS SYSTEM** AT A **CONNECTION** **POINT** | |  |  |  |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| Negative sequence impedances  of **User’s System** as seen from  the **Point of Connection** or node on the **Single Line Diagram** (as appropriate). If no data is given, it will be assumed that they are equal to the positive sequence values. |  |  |  |  |  |  |  |  |  |  |  |
| - Resistance | % on 100 |  |  |  |  |  |  |  |  | □ | ■ |
| - Reactance | % on 100 |  |  |  |  |  |  |  |  | □ | ■ |

**SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS)**

**PAGE 1 OF 5**

The data in this Schedule 14 is all **Standard Planning Data**, and isto be provided by **Generators**,with respect to all directly connected **Power Stations**, all **Embedded Large Power Stations** and all **Embedded Medium Power Stations** connected to the **Subtransmission System**. A data submission is to be made each year in Week 24.

Fault infeeds via **Unit Transformers**

A submission should be made for each **Generating Unit** (including those which are part of a **Synchronous Power Generating Module**)with an associated **Unit Transformer**. Where there is more than one **Unit Transformer** associated with a **Generating Unit**, a value for the total infeed through all **Unit Transformers** should be provided. The infeed through the **Unit Transformer(s)** should include contributions from all motors normally connected to the **Unit Board**, together with any generation (e.g. **Auxiliary Gas Turbines**) which would normally be connected to the **Unit Board**, and should be expressed as a fault current at the **Generating Unit** terminals for a fault at that location.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | | | UNITS | | F.Yr.  0 | | F.Yr.  1 | | | F.Yr  2 | | | F.Yr.  3 | | | F.Yr.  4 | | | F.Yr.  5 | | | F.Yr.  6 | | | F.Yr.  7 | DATA to **RTL** | | | |
| *(PC.A.2.5)* | | | | | | | | | | | | | | | | | | | | | | | | | | CUSC Contract | | | CUSC App. Form |
| Name of **Power Station**  Number of **Unit Transformers** |  | | | | | | |  | | |  | | |  | | |  | | |  | | |  | | | □  □ | | | ■  ■ |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Symmetrical three phase short- circuit current infeed through the **Unit Transformers**(s) for a fault at the **Generating Unit** terminals | |  | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | |  |  | |
| - at instant of fault | | kA | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | | □ | ■ | |
| - after subtransient fault  current contribution has  substantially decayed  Positive sequence X/R ratio  at instance of fault  Subtransient time constant (if significantly different from 40ms)  Pre-fault voltage at fault point (if different from 1.0 p.u.)  The following data items need only be supplied if the **Generating Unit** Step-up Transformer can supply zero sequence current from the **Generating Unit** side to the **National Electricity Transmission System** | | kA  ms | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | | □  □  □  □ | ■  ■  ■  ■ | |
| Zero sequence source  impedances as seen from the  **Generating Unit** terminalsconsistent with the maximum infeed above: | |  | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | |  |  | |
| - Resistance | | % on 100 | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | | □ | ■ | |
| - Reactance | | % on 100 | |  | |  | | |  | | |  | | |  | | |  | | |  | | |  | | | □ | ■ | |

**SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS)**

**PAGE 2 OF 5**

Fault infeeds via Station Transformers

A submission is required for each **Station Transformer** directly connected to the **National Electricity Transmission System**. The submission should represent normal operating conditions when the maximum number of **Gensets** are **Synchronised** to the **System**, and should include the fault current from all motors normally connected to the **Station Board**, together with any Generation (e.g. **Auxiliary Gas Turbines**) which would normally be connected to the **Station Board**. The fault infeed should be expressed as a fault current at the hv terminals of the **Station Transformer** for a fault at that location.

If the submission for normal operating conditions does not represent the worst case, then a separate submission representing the maximum fault infeed that could occur in practice should be made.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr.  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr.  7 | DATA to **RTL** | |
| *(PC.A.2.5)* | | | | | | | | | | CUSC Contract | CUSC App. Form |
| Name of **Power Station** |  | | |  |  |  |  |  |  | □ | ■ |
| Number of **Station Transformers** |  | | |  |  |  |  |  |  | □ | ■ |
| Symmetrical three phase  short-circuit current infeed for a fault at the **Connection Point** |  |  |  |  |  |  |  |  |  |  |  |
| * at instant of fault | kA |  |  |  |  |  |  |  |  | □ | ■ |
| - after subtransient fault  current contribution has substantially decayed | kA |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Positive sequence X/R ratio  At instance of fault |  |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Subtransient time constant (if significantly different from 40ms) | ms |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Pre-fault voltage (if different from 1.0 p.u.) at fault point (See note 1) |  |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Zero sequence source Impedances as seen from the **Point of Connection** Consistent with the maximum Infeed above: |  |  |  |  |  |  |  |  |  |  |  |
| * Resistance | % on 100 |  |  |  |  |  |  |  |  | □ | ■ |
| * Reactance | % on 100 |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |

Note 1. The pre-fault voltage provided above should represent the voltage within the range 0.95 to 1.05 that gives the highest fault current

Note 2. % on 100 is an abbreviation for % on 100 MVA

**SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS)**

**PAGE 3 OF 5**

Fault infeeds from **Power Park Modules**

A submission is required for the whole **Power Park Module** and for each **Power Park Unit** type or equivalent. The submission shall represent operating conditions that result in the maximum fault infeed. The fault current from all motors normally connected to the **Power Park Unit’s** electrical system shall be included. The fault infeed shall be expressed as a fault current at the terminals of the **Power Park Unit**, or the **Common Collection Busbar** if an equivalent **Single Line Diagram** and associated data as described in PC.A.2.2.2 is provided, and the **Grid Entry Point**, or **User System Entry Point** if **Embedded**, for a fault at the **Grid Entry Point**, or **User System Entry Point** if **Embedded**.

Should actual data in respect of fault infeeds be unavailable at the time of the application for a **CUSC Contract** or **Embedded Development Agreement**, a limited subset of the data, representing the maximum fault infeed that may result from all of the plant types being considered, shall be submitted. This data will, as a minimum, represent the root mean square of the positive, negative and zero sequence components of the fault current for both single phase and three phase solid faults at the **Grid Entry Point** (or **User System Entry Point** if **Embedded**) at the time of fault application and 50ms following fault application. Actual data in respect of fault infeeds shall be submitted to **The Company** as soon as it is available, in line with PC.A.1.2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr.  0 | | F.Yr.  1 | F.Yr.  2 | | F.Yr.  3 | | F.Yr.  4 | | F.Yr.  5 | | F.Yr.  6 | | F.Yr.  7 | | DATA to **RTL** | |
| *(PC.A.2.5)* | | | | | | | | | | | | | | | | | CUSC Contract | CUSC App. Form |
| Name of **Power Station** |  | | | | |  | |  | |  | |  | |  | |  | □ | ■ |
| **Name of Power Park Module** |  | | | | |  | |  | |  | |  | |  | |  | □ | ■ |
| **Power Park Unit** type |  | | | | |  | |  | |  | |  | |  | |  | □ | ■ |
| A submission shall be provided for the contribution of the entire **Power Park Module** and each type of **Power Park Unit** or equivalent to the positive, negative and zero sequence components of the short circuit current at the **Power Park Unit** terminals, or **Common Collection Busbar**, and **Grid Entry Point** or **User System Entry Point** if **Embedded** for  (i) a solid symmetrical three phase short circuit  (ii) a solid single phase to earth short circuit  (iii) a solid phase to phase short circuit  (iv) a solid two phase to earth short circuit  at the **Grid Entry Point** or **User System Entry Point** if **Embedded**.  If protective controls are used and active for the above conditions, a submission shall be provided in the limiting case where the protective control is not active. This case may require application of a non-solid fault, resulting in a retained voltage at the fault point. |  | |  |  | |  | |  | |  | |  | |  | |  | □  □  □  □  □ | ■  ■  ■  ■  ■ |

**SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS)**

**PAGE 4 OF 5**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr.  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr.  7 | DATA to **RTL** | DATA DESCRIPTION |
|  |  |  |  |  |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| * A continuous time trace and table showing the root mean square of the positive, negative and zero sequence components of the fault current from the time of fault inception to 140ms after fault inception at 10ms intervals | Graphical and tabular  kA  versus s |  |  |  |  |  |  |  |  | □ | ■ |
| - A continuous time trace and table showing the positive, negative and zero sequence components of retained voltage at the terminals or **Common Collection Busbar**, if appropriate | pu versus s |  |  |  |  |  |  |  |  | □ | ■ |
| - A continuous time trace and table showing the root mean square of the positive, negative and zero sequence components of retained voltage at the fault point, if appropriate | pu versus s |  |  |  |  |  |  |  |  | □ | ■ |

**SCHEDULE 14 - FAULT INFEED DATA (GENERATORS INCLUDING UNIT TRANSFORMERS AND STATION TRANSFORMERS)**

**PAGE 5 OF 5**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr.  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr.  7 | DATA to **RTL** | DATA DESCRIPTION |
|  |  |  |  |  |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| For **Power Park Units** that utilise a protective control, such as a crowbar circuit,   * additional rotor resistance applied to the **Power Park Unit** under a fault situation * additional rotor reactance   applied to the **Power Park Unit** under a fault situation. | % on MVA  % on MVA |  |  |  |  |  |  |  |  | □  □ | ■  ■ |
| Positive sequence X/R ratio of the equivalent at time of fault at the **Common Collection Busbar** |  |  |  |  |  |  |  |  |  | □ | ■ |
| Minimum zero sequence impedance of the equivalent at a **Common Collection Busbar** |  |  |  |  |  |  |  |  |  | □ | ■ |
| **Active Power** generated pre-fault | MW |  |  |  |  |  |  |  |  | □ | ■ |
| Number of **Power Park Units** in equivalent generator |  |  |  |  |  |  |  |  |  | □ | ■ |
| Power Factor (lead or lag) |  |  |  |  |  |  |  |  |  | □ | ■ |
| Pre-fault voltage (if different from 1.0 pu) at fault point (See note 1) | pu |  |  |  |  |  |  |  |  | □ | ■ |
| Items of reactive compensation switched in pre-fault |  |  |  |  |  |  |  |  |  | □ | ■ |

Note 1. The pre-fault voltage provided above should represent the voltage within the range 0.95 pu to 1.05 pu that gives the highest fault current

**SCHEDULE 15 – MOTHBALLED POWER GENERATING MODULE, MOTHBALLED GENERATING UNIT, MOTHBALLED POWER PARK MODULE (INCLUDING MOTHBALLED DC CONNECTED POWER PARK MODULES), MOTHBALLED HVDC SYSTEMS, MOTHBALLED HVDC CONVERTERS, MOTHBALLED DC CONVERTERS AT A DC CONVERTER STATION AND ALTERNATIVE FUEL DATA**

**PAGE 1 OF 3**

**MOTHBALLED POWER GENERATING MODULES, MOTHBALLED GENERATING UNIT,** **MOTHBALLED POWER PARK MODULE** (INCLUDING **MOTHBALLED DC CONNECTED POWER PARK MODULES**), **MOTHBALLED HVDC** SYSTEMS, **MOTHBALLED HVDC CONVERTERS** OR **MOTHBALLED** **DC CONVERTER** AT A **DC** **CONVERTER STATION**  AND ALTERNATIVE FUEL DATA

The following data items must be supplied with respect to each **Mothballed Power Generating Module**, **Mothballed Generating Unit**, **Mothballed Power Park Module** (including **Mothballed DC Connected Power Park Modules**), **Mothballed HVDC Systems**, **Mothballed HVDC Converters** or **Mothballed DC Converters at a DC Converter station**

**Power Station Generating Unit, Power Park Module** or **DC Converter** Name (e.g. Unit 1)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | Data CAT | **Generating Unit** Data | | | | | | |
| <1 month | 1-2 months | 2-3 months | 3-6 months | 6-12 months | >12 months | Total MW being returned |
| MW output that can be returned to service | MW | DPD II |  |  |  |  |  |  |  |

Notes

1. The time periods identified in the above table represent the estimated time it would take to return the **Mothballed Power Generating Module**, **Mothballed Generating Unit, Mothballed Power Park Module (Mothballed DC Connected Power Park Modules**), **Mothballed HVDC Systems**, **Mothballed HVDC Converters** or **Mothballed** **DC Converter** at a **DC Converter Station** to service once a decision to return has been made.
2. Where a **Mothballed Power Generating Module**, **Mothballed Generating Unit, Mothballed Power Park Module** (including a Mothballed **DC Connected Power Park Module**), **Mothballed HVDC System**, **Mothballed HVDC Converter** or **Mothballed** **DC Converter** at a **DC Converter Station** can be physically returned in stages covering more than one of the time periods identified in the above table then information should be provided for each applicable time period.
3. The estimated notice to physically return MW output to service should be determined in accordance with **Good Industry Practice** assuming normal working arrangements and normal plantprocurement lead times.
4. The MW output values in each time period should be incremental MW values, e.g. if 150MW could be returned in 2 – 3 months and an additional 50MW in 3 – 6 months then the values in the columns should be Nil, Nil, 150, 50, Nil, Nil, 200 respectively.
5. Significant factors which may prevent the **Mothballed Power Generating Module**, **Mothballed Generating Unit**, **Mothballed Power Park Module (Mothballed DC Connected Power Park Module). Mothballed HVDC System, Mothballed HVDC Converter** or **Mothballed** **DC Converter** at a **DC Converter Station** achieving the estimated values provided in this table, excluding factors relating to **Transmission Entry Capacity**,should be appended separately.

**SCHEDULE 15 – MOTHBALLED POWER GENERATING MODULES, MOTHBALLED GENERATING UNIT, MOTHBALLED POWER PARK MODULE (INCLUDING DC CONNECTED POWER PARK MODULES), MOTHBALLED HVDC SYSTEMS, MOTHBALLED HVDC CONVERTERS, MOTHBALLED DC CONVERTERS AT A DC CONVERTER STATION AND ALTERNATIVE FUEL DATA**

**PAGE 2 OF 3**

ALTERNATIVE FUEL INFORMATION

The following data items for alternative fuels need only be supplied with respect to each **Generating Unit** whose primary fuel is gas including those which form part of a **Power Generating Module**.

**Power Station Generating Unit Name (e.g. Unit 1)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | Data CAT | **Generating Unit** Data | | | |
| 1 | 2 | 3 | 4 |
| Alternative Fuel Type (\*please specify) | Text | DPD II | Oil distillate | Other gas\* | Other\* | Other\* |
| CHANGEOVER TO ALTERNATIVE FUEL For off-line changeover: |  |  |  |  |  |  |
| Time to carry out off-line fuel changeover | Minutes | DPD II |  |  |  |  |
| Maximum output following off-line changeover | MW | DPD II |  |  |  |  |
| For on-line changeover: |  |  |  |  |  |  |
| Time to carry out on-line fuel changeover | Minutes | DPD II |  |  |  |  |
| Maximum output during on-line fuel changeover | MW | DPD II |  |  |  |  |
| Maximum output following on-line fuel changeover | MW | DPD II |  |  |  |  |
| Maximum operating time at full load assuing: |  |  |  |  |  |  |
| Typical stock levels | Hours | DPD II |  |  |  |  |
| Maximum possible stock levels | Hours | DPD II |  |  |  |  |
| Maximum rate of replacement of depleted stocks of alternative fuels on the basis of **Good Industry Practice** | MWh (electrical)/day | DPD II |  |  |  |  |
| Is changeover to alternative fuel used in normal operating arrangements? | Text | DPD II |  |  |  |  |
| Number of successful changeovers carried out in the last **Financial Year**  (\*\*delete as appropriate) | Text | DPD II | 0 / 1-5 / 6-10 /  11-20 / >20 \*\* | 0 / 1-5 / 6-10 /  11-20 / >20 \*\* | 0 / 1-5 / 6-10 /  11-20 / >20 \*\* | 0 / 1-5 / 6-10 /  11-20 / >20 \*\* |

**SCHEDULE 15 – MOTHBALLED POWER GENERATING MODULES, MOTHBALLED GENERATING UNIT, MOTHBALLED POWER PARK MODULE (INCLUDING MOTHBALLED DC CONNECTED POWER PARK MODULES), MOTHBALLED HVDC SYSTEMS, MOTHBALLED HVDC CONVERTERS MOTHBALLED DC CONVERTERS AT A DC CONVERTER STATION AND ALTERNATIVE FUEL DATA**

**PAGE 3 OF 3**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | Data CAT | **Generating Unit** Data | | | |
| 1 | 2 | 3 | 4 |
| CHANGEOVER BACK TO MAIN FUEL |  |  |  |  |  |  |
| For off-line changeover: |  |  |  |  |  |  |
| Time to carry out off-line fuel changeover | Minutes |  |  |  |  |  |
|  |  |  |  |  |  |  |
| For on-line changeover |  |  |  |  |  |  |
| Time to carry out on-line fuel changeover | Minutes |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Maximum output during on-line fuel changeover | MW |  |  |  |  |  |
|  |  |  |  |  |  |  |

Notes

1. Where a **Generating Unit** has the facilities installed to generate using more than one alternative fuel type details of each alternative fuel should be given.
2. Significant factors and their effects which may prevent the use of alternative fuels achieving the estimated values provided in this table (e.g. emissions limits, distilled water stocks etc.)should be appended separately.

- No information collated under this Schedule will be transferred to the **Relevant Transmission Licensees**

**SCHEDULE 16 – SYSTEM RESTORATION INFORMATION**

**PAGE 1 OF 2**

**PART I**

|  |  |  |
| --- | --- | --- |
| **SYSTEM RESTORATION** INFORMATION (EXCLUDING PARTIES PARTICIPATING IN **DISTRIBUTION RESTORATION ZONES**)  The following data/text items are required from each **Generator** for each **BM Unit** at a **Large Power Station** as detailed in PC.A.5.7. Data is not required for **Restoration Contractors Plant** and **Apparatus**. The data should be provided in accordance with PC.A.1.2 and also, where possible, upon request from **The Company** during a **System Restoration**. For **Restoration Contractors** who are party to a **Distribution Restoration Zone Plan**, the data submitted should be supplied as part of Schedule 16 Part III of this **Data Registration Code**. | | |
| Data Description  *(PC.A.5.7.1)* *(■ CUSC Contract)* | Units | Data Category |
| Assuming all **BM Units** were running immediately prior to the **Total Shutdown** or **Partial Shutdown** and in the event of loss of all external power supplies, provide the following information: |  |  |
| a) Expected time for the first and subsequent **BM** **Units** to be **Synchronised**, at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours from the restoration of external power supplies, assuming external power supplies are not available at the **User’s Site**. | Tabular or Graphical | DPD II |
| b) Describe any likely issues that would have a significant impact on a **BM Unit’s** time to be **Synchronised** arising as a direct consequence of the inherent design or operational practice of the **Power Station** and/or **BM Unit**, e.g. limited barring facilities, time from a **Total Shutdown** or **Partial Shutdown** at which batteries would be discharged or the availability of primary fuel supplies . | Text | DPD II |
| **Block Loading Capability**: |  |  |
| c) Provide estimated **Block Loading Capability** from 0MW to **Registered Capacity** and the time between each incremental step of each **BM Unit** based on when the unit was running immediately prior to the **Shutdown**) and at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours after the **BM Unit** had been **Shutdown**. The **Block Loading Capability** should be valid for a frequency deviation of 49.5Hz – 50.5Hz. The data should identify any required ‘hold’ points. | Tabular or Graphical | DPD II |

**SCHEDULE 16 – SYSTEM RESTORATION INFORMATION**

**PAGE 2 OF 2**

**PART I**

|  |  |  |
| --- | --- | --- |
| **SYSTEM RESTORATION** INFORMATION (EXCLUDING PARTIES PARTICIPATING IN **DISTRIBUTION RESTORATION ZONES**)  The following data/text items are required from each **HVDC System Owner** or **DC Converter Station Owner** for each **HVDC System** and **DC** **Converter** as detailed in PC.A.5.7. Data is not required for **Restoration Contractors Plant** and **Apparatus**. The data should be provided in accordance with PC.A.1.2 and also, where possible, upon request from **The Company** during a **System Restoration**. | | |
| Data Description  *(PC.A.5.7.1)* *(■ CUSC Contract)* | Units | Data Category |
| Assuming all **BM Units** were running immediately prior to the **Total Shutdown** or **Partial Shutdown** and in the event of loss of all external power supplies, provide the following information: |  |  |
| a) Expected time for the first and subsequent **BM** **Units** to be **Synchronised**, at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours from the restoration of external power supplies, assuming external power supplies are not available at the **User’s Site**. | Tabular or Graphical | DPD II |
| b) Describe any likely issues that would have a significant impact on a **BM Units** time to be **Synchronised** arising as a direct consequence of the inherent design or operational practice of the **HVDC System** or **DC Converter Station** and/or **BM Unit**, e.g. time from a **Total Shutdown** or **Partial Shutdown** at which batteries would be discharged. | Text | DPD II |
| **Block Loading Capability**: |  |  |
| c) Provide estimated incremental **Active Power** steps, from no load to **Rated MW** and the time between each incremental step which an **HVDC System** or **DC Converter Station** can instantaneously supply without causing it to trip or go outside the **Frequency** range of 47.5Hz – 52Hz (or an otherwise agreed **Frequency** range). The time between each incremental step shall also be provided. In addition data shall be provided from 0MW to **Registered Capacity** for each **BM Unit** which was running immediately prior to the **Shutdown**) and at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours after the **BM Unit** had been **Shutdown**. The data supplied should be valid for a **Frequency** deviation of 49.5Hz – 50.5Hz and should identify any required ‘hold’ points. | Tabular or Graphical | DPD II |
| Governor Setting Information |  |  |
| From 2025 onwards, **Generators**, **HVDC System Owners** and **DC Converter** owners, shall supply the governor setting information in accordance with the applicable requirements of CC.6.3.7 (h) or ECC.6.3.7.3.8. | Text | DPD II |

**SCHEDULE 16 – SYSTEM RESTORATION INFORMATION**

**PAGE 1 OF 1**

**PART II**

|  |  |  |
| --- | --- | --- |
| **DISTRIBUTION RESTORATION ZONE** INFORMATION *(PC.A.5.7.2 – DPD)*  Where a **Network Operator** has a **Distribution Restoration Zone Plan** in place, the following data specified shall be submitted by **Network Operators** and **Restoration Contractors**, party to a **Distribution Restoration Zone Plan**.  **Restoration Contractors** shall, where reasonably practicable, submit the relevant information to the **Network Operator** who shall then supply that information to **The Company**. | | |
| Data Description  *(PC.A.5.7.2)* | Units | Data Category |
| The expected time for each **Restoration Contractor’s Plant** to connect to the **Network Operator’s System** following a **Total Shutdown** or **Partial Shutdown**. The assessment should include the **Restoration Contractor’s** ability to reconnect or re-synchronise all their **Plant**, to the **Total System** at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours from the restoration of external power supplies. | Tabular or Graphical | DPD II |
| Additionally, the data and supporting text should highlight any specific issues (eg those that would affect the time before which the **Restoration Contractor’s Plant** could be energised) that may arise as time progresses from **Shutdown** without external supplies being restored or the availability of primary fuel supplies. | Tabular or Graphical | DPD II |
|  |  |  |
| **Block Loading Capability** |  |  |
| Provide estimated **Block Loading Capability** from 0MW to **Registered Capacity** and the time between each incremental step of each **Restoration Contractor’s Plant** and **Apparatus** based on when the **Restoration Contractor’s Plant** and **Apparatus** was running immediately prior to the **Shutdown**) and at time intervals of 12 hours, 24 hours, 36 hours, 48 hours and 72 hours after the **Restoration Contractor’s Plant** and **Apparatus** had been **Shutdown**. The **Block Loading Capability** should be valid for a frequency deviation of 49.5Hz – 50.5Hz. The data should identify any required ‘hold’ points. | Tabular or Graphical | DPD II |
|  |  |  |
| Governor Setting Information |  |  |
| From 2025 onwards, **Restoration Contractors**, **Generators**, **HVDC System Owners** and **DC Converter** owners, shall supply the governor setting information in accordance with the applicable requirements of CC.6.3.7 (h) or ECC.6.3.7.3.8. | Tabular or Graphical | DPD II |

**SCHEDULE 16 – SYSTEM RESTORATION INFORMATION**

**PAGE 1 OF 3**

**PART III**

All **Users** and **Restoration Contractors** are required to confirm annually they comply with the applicable requirements of OC5.7.  In the case of **Generators**, **HVDC System Owners**, **DC Converter** owners, **Non-Embedded Customers**, and **Network Operators** this confirmation shall be provided in their Week 24 submission.

| **SCHEDULE 16 – SYSTEM RESTORATION INFORMATION**  **PART III**  **(3 Pages)** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Assurance Activity** | **Grid Code Reference** | **Parties Involved** | **Frequency of Assurance Activity** | **The Company Witness required** | **Date of test result submission/visit** | **Annual Statement of Compliance (Y/N/Not applicable)** |
| **System Restoration** **Power Island** review | OC9.4.7.6  OC5.7.4.2(iv) | **Relevant Transmission Licensees**, **Network Operators** and **The Company** | Every 3 years | Not applicable |  |  |
| **System Restoration** **Power Island** availability assessment | OC9.4.7.6  OC5.7.4.2(iv) | **Relevant Transmission Licensees**, **Network Operators** and **The Company** | Yearly | Not applicable |  |  |
| Remote Synchronisation test - TO/DNO | OC5.7.2.1(g)  OC5.7.2.3 (d) | **Relevant** **Transmission Licensees**, relevant **Network Operators**, **Restoration Contractors** and **The Company** | Every 3 years | No |  |  |
| **Low Frequency Demand Disconnection Relay** test | CC.A.5.4.3 / ECC.A.5.4.3 | **Relevant Transmission Licences**, relevant **Network Operators**, **Non-Embedded Customers** and **The Company** | Every 3 years although this may be extended to no more than every five years if considered to be required for operational purposes | No |  |  |
| **Anchor Restoration Contractor** test | OC5.7.2.1 /OC5.7.2.2  / OC5.7.2.3 | **Relevant Transmission Licensees, Network Operators**, **Anchor Restoration Contractors** and **The Company** | Every 3 years | Yes |  |  |
| **Top Up Restoration Contractor** test | OC.5.7.2.4 | **Relevant Transmission Licensees**, **Network Operators**, **Top Up** **Restoration Contractors** and **The Company** | Every 3 years | Yes |  |  |
| Resilience to **Partial Shutdown** or **Total Shutdown** of **Restoration Contractor** | OC9.4.7.6.2  OC5.7.4.2(iii)  CC/ECC.7.11 | **Restoration Contractors** and **The Company** | Yearly | No |  |  |
| **Quick Resynchronisation Unit Test** | OC5.7.2.5 | **EU Generators** in respect of **Type C** and **Type D Power Generating Modules**,relevant **Network Operators** and **The Company** | Yearly | Yes |  |  |
| **Distribution Restoration Zone Control System** test | OC5.7.2.6 | **Network Operators**, **Restoration Contractors** and **The Company** | Every 3 years | Yes |  |  |
| Dead Line Charge test | OC5.7.2.1(g)(a)  OC5.7.2.3(d)(a) | **Transmission Licensees**, relevant **Network Operators** **Anchor Restoration Contractors** and **The Company** | Every 3 years | Yes |  |  |
| Remote Synchronisation test -**Restoration Contractor** | OC5.7.2.1(g)(b)  OC5.7.2.3(d)(b) | **Relevant Transmission Licensees**, relevant **Network Operators**, **Restoration Contractors** and **The Company** | Every 3 years | Yes |  |  |
| Assurance Visits | OC5.7.4  OC5.7.5 | **The Company,**  **Relevant Transmission Licensees**, relevant **Network Operators** to visit **Restoration Contractors** | Every 3 years | Yes |  |  |
| Voice Systems Resilience test or equivalent | OC5.7.4.2(vi) | **CUSC Parties,** relevant **Network Operators, Relevant Transmission Licensees** **Restoration Contractors** and **The Company** | Yearly | No |  |  |
| **Critical Tools and Facilities**  control systems resilience demonstration –power resilience including power resilience demonstration & connectivity and alarm event handling | OC.5.7.4.2(iii)  OC5.7.4.2(ix)  OC5.7.4.3  CC.7.10.7  ECC.7.10.7 | **CUSC Parties,** relevant **Network Operators, Relevant** **Transmission Licensees**, **Restoration Contractors** and **The Company** | Every 3 years | No |  |  |
| Control systems resilience demonstration – diagram & topology | OC5.7.2.6 | **CUSC Parties,** relevant **Network Operators, Relevant Transmission Licensees**, **Restoration Contractors** and **The Company** | Every 3 years (as set out in the DRZCS RES)' | No |  |  |
| Cyber-Security | CC.7.10.6  ECC.7.10.6  OC.5.7.4.2(iii)  OC5.7.4.2(x) | **CUSC Parties,** relevant **Network Operators**, **Relevant** **Transmission Licensees**, **Restoration Contractors** and **The Company** | Yearly | No |  |  |
| Telephony services test as per CC/ECC.6.5.4. | CC.6.5.1 – CC.6.5.5  ECC.6.5.1 – ECC.6.5.5  OC.5.7.4.2(vi)  OC5.7.4.2(xi)  OC5.7.4.2(xii) | **CUSC Parties,** relevant **Network Operators,** relevant **Transmission Licensees**, **Restoration Contractors** and **The Company** | Yearly (or as in accordance with CC/ECC.6.5.4.) | No |  |  |
| Resilience to **Partial Shutdown** or **Total Shutdown** of **CUSC Parties** | OC5.7.4  OC5.7.5 | **CUSC Parties** and **The Company** | Yearly | No |  |  |
| Restoration Procedure review | OC9.4.7.6.2  OC5.7.4.2(iv) | **The Company, Relevant Transmission Licensees**, relevant **Network Operators**, **CUSC Parties** and **Restoration Contractors** | Every 3 years | Not applicable |  |  |
| **LJRP** & **DRZP** reviews | OC9.4.7.6  OC5.7.4.2(iv) | **The Company**, **Network Operators**, **Transmission Licensees** and **Restoration Plan** signatories | Every 3 years | Not applicable |  |  |
| Awareness training for **Restoration Contractor** and **CUSC Parties** | OC9.4.7.6.2  OC5.7.4 | **The Company,** relevant **Network Operators,**  **Transmission Licensees**, **CUSC Parties** and **Restoration Contractors** | Every 3 years | Not applicable |  |  |
| Cross industry training | OC9.4.7.6.2  OC5.7.4 | **The Company**, **Network Operators**, **Transmission Licensees**, **CUSC Parties** and **Restoration Contractors** | Every 3 years | Not applicable |  |  |

**SCHEDULE 16 – SYSTEM RESTORATION INFORMATION PAGE 2 OF 5**

**PART III**

**PAGE 4 OF 5**

**PART III**

**SCHEDULE 17 - ACCESS PERIOD DATA**

**PAGE 1 OF 1**

(PC.A.4 - CUSC Contract ■)

Submissions by **Users** using this Schedule 17 shall commence in 2011 and shall then continue in each year thereafter

|  |  |
| --- | --- |
| **Access Group** |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Asset Identifier** | **Start Week** | **End Week** | **Maintenance Year (1, 2 or 3)** | **Duration** | **Potential Concurrent Outage (Y/N)** |
|
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

|  |
| --- |
| **Comments** |
|  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 1 OF 24**

The data in this Schedule 18 is required from **Generators** who are undertaking **OTSDUW** and connecting to a **Transmission Interface Point**.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | DATA to **RTL** | | DATA CAT. | **GENERATING UNIT** OR STATION DATA | | | | | | |
|  |  | CUSC Cont ract | CUSC App. Form |  | F.Yr0 | F.Yr1 | F.Yr2 | F.Yr3 | F.Yr4 | F.Yr5 | F.Yr 6 |
| INDIVIDUAL **OTSDUW** DATA |  |  |  |  |  |  |  |  |  |  |  |
| **Interface Point Capacity** (PC.A.3.2.2 (a))  Performance Chart at the **Transmission** **Interface** **Point** for **OTSDUW Plant and Apparatus** (PC.A.3.2.2(f)(iv) | MW  MVAr | □  □ | ■  ■ |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **OTSDUW DEMANDS**  **Demand** associated with the **OTSDUW Plant and Apparatus** (excluding **OTSDUW DC Converters** – see Note 1)) supplied at each  **Interface Point**. The **User** should also provide the **Demand** supplied to each **Connection Point** on the **OTSDUW Plant and Apparatus**. *(PC.A.5.2.5)* |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| - The maximum **Demand** that could occur. | MW  MVAr | □  □ |  | **DPD I**  **DPD I** |  |  |  |  |  |  |  |
| * **Demand** at specified time of annual peak half hour of **National Electricity Transmission System Demand** at **Annual ACS Conditions**. | MW  MVAr | □  □ |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| - **Demand** at specified time of annual minimum half-hour of **National** **Electricity** **Transmission** **System** **Demand**. | MW  MVAr | □  □ |  | **DPD II**  **DPD II** |  |  |  |  |  |  |  |
| (Note 1 – **Demand** required from **OTSDUW DC Converters** should be supplied under page 2 of Schedule 18). |  |  |  |  |  |  |  |  |  |  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 2 OF 24**

**OTSDUW USERS SYSTEM DATA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | | UNITS | DATA to **RTL** | | DATA  CATEGORY |
|  | |  | CUSC Contract | CUSC App. Form |  |
| **OFFSHORE TRANSMISSION SYSTEM** LAYOUT  *(PC.A.2.2.1, PC.A.2.2.2 and P.C.A.2.2.3)* | |  |  |  |  |
|  | |  |  |  |  |
| A **Single Line Diagram** showing connectivity of all of the **Offshore Transmission System** including all **Plant and Apparatus** between the **Interface Point** and all Connection  **Points** is required. | |  | ■ | ■ | **SPD** |
|  | |  |  |  |  |
| This **Single Line Diagram** shall depict the arrangement(s) of all of the existing and proposed load current carrying **Apparatus** relating to both existing and proposed **Interface Points** and **Connection Points**, showing electrical circuitry (i.e. overhead lines, underground cables (including subsea cables), power transformers and similar equipment), operating voltages, circuit breakers and phasing arrangements | |  | ■ | ■ | **SPD** |
|  | |  |  |  |  |
|  | |  |  |  |  |
| **Operational Diagrams** of all substations within the **OTSDUW Plant and Apparatus** | |  | ■ | ■ | **SPD** |
|  | |  |  |  |  |
| SUBSTATION INFRASTRUCTURE *(PC.A.2.2.6)* | |  |  |  |  |
|  | |  |  |  |  |
| For the infrastructure associated with any **OTSDUW Plant and Apparatus** | |  |  |  |  |
| Rated 3-phase rms short-circuit withstand current | | kA | ■ | ■ | **SPD** |
| Rated 1-phase rms short-circuit withstand current | | kA | ■ | ■ | **SPD** |
| Rated Duration of short-circuit withstand | | s | ■ | ■ | **SPD** |
| Rated rms continuous current | | A | ■ | ■ | **SPD** |
|  | |  |  |  |  |
| LUMPED SUSCEPTANCES *(PC.A.2.3)* | |  |  |  |  |
|  | |  |  |  |  |
| Equivalent Lumped Susceptance required for all parts of the User’s Subtransmission System (including OTSDUW Plant and Apparatus) which are not included in the Single Line Diagram. | |  | ■ | ■ |  |
|  | |  |  |  |  |
| This should not include: | |  | ■ | ■ |  |
| (a) | independently switched reactive compensation equipment identified above. |  | ■ | ■ |  |
| (b) | any susceptance of the **OTSDUW Plant and Apparatus** inherent in the **Demand** (**Reactive Power**) data provided on Page 1 and 2 of this Schedule 14. |  | ■ | ■ |  |
|  | |  |  |  |  |
| Equivalent lumped shunt susceptance at nominal **Frequency**. | | % on 100 MVA | ■ | ■ |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 3 OF 24**

**OFFSHORE TRANSMISSION SYSTEM DATA**

Branch Data (PC.A.2.2.4)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Node 1 | Node 2 | Rated Voltage (kV) | Operating Voltage (kV) | Circuit | PPS PARAMETERS | | | ZPS PARAMETERS | | | Maximum Continuous Ratings | | | Length (km) |
| R1 %100MVA | X1 %100MVA | B1 %100MVA | R0 %100MVA | X0 %100MVA | B0 %100MVA | Winter (MVA) | Spring Autumn (MVA) | Summer (MVA) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes

1. For information equivalent STC Reference: STCP12-1m Part 3 – 2.1 Branch Data
2. In the case where an overhead line exists within the OTSDUW Plant and Apparatus the Mutual inductances should also be provided.

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 4 OF 24**

**OFFSHORE TRANSMISSION SYSTEM DATA**

2 Winding Transformer Data (PC.A.2.2.5)

The data below is **Standard Planning Data**, and details should be shown below of all transformers shown on the **Single Line Diagram**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HV Node | HV (kV) | LV Node | LV (kV) | Rating (MVA) | Transformer | Positive Phase Sequence Reactance % on 100MVA | | | Positive Phase Sequence Resistance % on 100MVA | | | Tap Changer | | | Winding Arr | Earthing method (Direct/ Res/ Reac) | Earthing Impedance method |
| Max Tap | Min Tap | Nom Tap | Max Tap | Min Tap | Nom Tap | Range +% to -% | Step size % | Type |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes

1 For information the corresponding STC Reference is STCP12-1: Part 3 – 2.4 Transformers

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 5 OF 24**

**USERS SYSTEM DATA (OTSUA)**

Auto Transformer Data 3-Winding (PC.A.2.2.5)

The data below is all **Standard Planning Data**, and details should be shown below of all transformers shown on the **Single Line Diagram**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HV NODE | VH (kV) | LV NODE | VL (kV) | PSS/E  Circuit | Rating (MVA) | Trans-former | Positive Phase Sequence Reactance % on 100MVA | | | Positive Phase Sequence Resistance % on 100MVA | | | Taps | | | Win-ding Arrangement | Earth-ing Impe-dance method | EQUIVALENT ZPS PARAMETERS (FLIP) | | | | | | The Com-pany Sheet | The Com-pany Code |
| Max Tap | Min Tap | Nom Tap | Max Tap | Min Tap | Nom Tap | Range +% to -% | Step size % | Type (Onload Offload) | ZOH | | ZOL | | ZOT Dflt X/R=20 | |
| ROH % 100 MVA | XOH % 100 MVA | ROL % 100 MVA | XOL % 100 MVA | ROT % 100 MVA | XOT % 100 MVA |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes

1.For information STC Reference: STCP12-1: Part 3 - 2.4 Transformers

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 6 OF 24**

**OFFSHORE TRANSMISSION SYSTEM DATA**

Circuit Breaker Data (PC.A.2.2.6(a))

The data below is all **Standard Planning Data**, and should be provided for all **OTSUA** switchgear (i.e. circuit breakers, load disconnectors and disconnectors)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Circuit Breaker Data | | | | | | | Assumed Operating Times | | | Conti-nuos Rating (A) | 3 Phase | | | | 1 Phase | | | | DC time constant at testing of asymmetrical breaking ability (s) |
| Location | Name | Rated Voltage | Oper-ating Voltage | Make | Model | Type | Year Comm-issioed | Circuit Breaker (ms) | Minimum Protection & Trip Relay (ms) | Total Time  (ms) | Fault Rating (RMS Symmerical) (3 phase MVA) | Fault Break Rating (RMS Symmertrical) (3 phase) (kA) | Fault Break Rating (Peak Asymmetrical) (3 phase) (kA) | Fault Make Rating (Peak Asymmetrical) (3 phase) (kA) | Fault Rating (RMS Symmerical) (1 phase MVA) | Fault Break Rating (RMS Symmertrical) (1 phase) (kA) | Fault Break Rating (Peak Asymmetrical) (1 phase) (kA) | Fault Make Rating (Peak Asymmetrical) (1 phase) (kA) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 7 OF 24**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **OFFSHORE TRANSMISSION SYSTEM DATA**  REACTIVE COMPENSATION EQUIPMENT (PC.A.2.4(e)) | | | | | | | |
| **Item** | **Node** | **kV** | **Device No.** | **Rating (MVAr)** | **P Loss (kW)** | **Tap range** | **Connection**  **Arrangement** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Notes:  1.For information STC Reference: STCP12-1: Part 3 - 2.5 Reactive Compensation Equipment  2. Data relating to continuously variable reactive compensation equipment (such as statcoms or SVCs) should be entered on the SVC Modelling table.  3. For the avoidance of doubt this includes any AC Reactive Compensation equipment included within the OTSDUW DC Converter other than harmonic filter data which is to be entered in the harmonic filter data table. | | | | | | | |

|  |  |
| --- | --- |
|  |  |
| *PC.A.2.4.1(e)* | A mathematical representation in block diagram format to model the control of any dynamic compensation plant. The model should be suitable for RMS dynamic stability type studies in which the time constants used should not be less than 10ms. |
|  |  |
|  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 8 OF 24**

**OFFSHORE TRANSMISSION SYSTEM DATA**

REACTIVE COMPENSATION - SVC Modelling Data(PC.A.2.4.1(e)(iii))

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HV Node | LV Node | Control Node | Nominal Voltage (kV) | Target Voltage (kV) | Max MVAr at HV | Min MVAr at HV | Slope % | Voltage Dependent Q Limit | Normal Running Mode | R1 PPS\_R | X1 PPS\_X | R0 ZPS\_R | Z0 ZPS\_X | Trasnf Winding Type | Connection (Direct/ Tertiary) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes:

1.For information the equivalent STC Reference is: STCP12-1: Part 3 - 2.7 SVC Modelling Data

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 9 OF 24**

**OFFSHORE TRANSMISSION SYSTEM DATA**

Harmonic Filter Data (including **OTSDUW DC Converter** harmonic Filter Data)

(PC.A.5.4.3.1(d) and PC.A.6.4.2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site Name | | SLD Reference | | Point of Filter Connection | | | |  |
|  | |  | |  | |  | |  |
| Filter Description | |  | |  | |  | |  |
| Manufacturer | | Model | | Filter Type | | Filter connection type (Delta/Star, Grounded/ Ungrounded) | | Notes |
|  | |  | |  | |  | |  |
| Bus Voltage | | Rating | | Q factor | | Tuning Frequency | | Notes |
|  | |  | |  | |  | |  |
| Component Parameters (as per SLD) | | | |  | |  | |  |
|  |  | | |  | |  | |  |
|  | Parameter as applicable | | | | |  | |  |
| Filter Component (R, C or L) | Capacitance (micro-Farads) | | Inductance (milli-Henrys) | | | Resistance (Ohms) | | Notes |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
|  |  | |  | | |  | |  |
| Filter frequency characteristics (graphs) detailing for frequency range up to 10kHz and higher | | | | | | | | |
|  | | | | |  | |  | |
| 1. Graph of impedance (ohm) against frequency (Hz) | | | | |  | |  | |
| 2. Graph of angle (degree) against frequency (Hz) | | | | |  | |  | |
| 3. Connection diagram of Filter & Elements | | | | |  | |  | |
|  | | | | |  | |  | |

Notes:

1. For information STC Reference: STCP12-1: Part 3 - 2.8 Harmonic Filter Data

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 10 OF 24**

Information for Transient Overvoltage Assessment (**DPD I**) *(PC.A.6.2 ■ CUSC Contract)*

The information listed below may be requested by **The Company** from each **User** undertaking **OTSDUW** with respect to any **Interface Point** or **Connection Point** to enable **The Company** to assess transient overvoltage on the **National Electricity Transmission System**.

(a) Busbar layout plan(s), including dimensions and geometry showing positioning of any current and voltage transformers, through ­bushings, support insulators, disconnectors, circuit breakers, surge arresters, etc. Electrical parameters of any associated current and voltage transformers, stray capacitances of wall bushings and support insulators, and grading capacitances of circuit breakers;

(b) Electrical parameters and physical construction details of lines and cables connected at that busbar. Electrical parameters of all plant e.g., transformers (including neutral earthing impedance or zig-zag transformers if any), series reactors and shunt compensation equipment connected at that busbar (or to the tertiary of a transformer) or by lines or cables to that busbar;

(c) Basic insulation levels (BIL) of all **Apparatus** connected directly, by lines or by cables to the busbar;

(d) Characteristics of overvoltage **Protection** devices at the busbar and at the termination points of all lines, and all cables connected to the busbar;

(e) Fault levels at the lower voltage terminals of each transformer connected to each **Interface Point** or **Connection Point** without intermediate transformation;

(f) The following data is required on all transformers within the **OTSDUW Plant and Apparatus**.

(g) An indication of which items of equipment may be out of service simultaneously during **Planned Outage** conditions.

Harmonic Studies (**DPD I**) *(PC.A.6.4 ■* *CUSC Contract)*

The information given below, both current and forecast, where not already supplied in this Schedule 14 may be requested by **The Company** from each **User** if it is necessary for **The Company** to evaluate the production/magnification of harmonic distortion on **National Electricity Transmission System**. The impact of any third party **Embedded** within the **User’s System** should be reflected:‑

(a) Overhead lines and underground cable circuits (including subsea cables) of the **User's OTSDUW Plant and Apparatus** must be differentiated and the following data provided separately for each type:‑

Positive phase sequence resistance

Positive phase sequence reactance

Positive phase sequence susceptance

(b) for all transformers connecting the **OTSDUW Plant and Apparatus** to a lower voltage:‑

Rated MVA

Voltage Ratio

Positive phase sequence resistance

Positive phase sequence reactance

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 11 OF 24**

(c) at the lower voltage points of those connecting transformers:‑

Equivalent positive phase sequence susceptance

Connection voltage and MVAr rating of any capacitor bank and component design parameters if configured as a filter

Equivalent positive phase sequence interconnection impedance with other lower voltage points

The minimum and maximum **Demand** (both MW and MVAr) that could occur

Harmonic current injection sources in Amps at the Connection Points and Interface Points

(d) an indication of which items of equipment may be out of service simultaneously during **Planned Outage** conditions

Voltage Assessment Studies (**DPD I**) *(PC.A.6.5* ■ *CUSC Contract)*

The information listed below, where not already supplied in this Schedule 14, may be requested by **The Company** from each **User** undertaking **OTSDUW** with respect to any **Connection Point** or **Interface Point** if it is necessary for **The Company** to undertake detailed voltage assessment studies (e.g. to examine potential voltage instability, voltage control co-ordination or to calculate voltage step changes on the **National Electricity Transmission System**).

(a) For all circuits of the **User’s OTSDUW Plant and Apparatus**:-

Positive Phase Sequence Reactance

Positive Phase Sequence Resistance

Positive Phase Sequence Susceptance

MVAr rating of any reactive compensation equipment

(b) for all transformers connecting the **User's OTSDUW Plant and Apparatus** to a lower voltage:‑

Rated MVA

Voltage Ratio

Positive phase sequence resistance

Positive Phase sequence reactance

Tap-changer range

Number of tap steps

Tap-changer type: on-load or off-circuit

AVC/tap-changer time delay to first tap movement

AVC/tap-changer inter-tap time delay

(c) at the lower voltage points of those connecting transformers

Equivalent positive phase sequence susceptance

MVAr rating of any reactive compensation equipment

Equivalent positive phase sequence interconnection impedance with other lower voltage points

The maximum **Demand** (both MW and MVAr) that could occur

Estimate of voltage insensitive (constant power) load content in % of total load at both winter peak and 75% off-peak load conditions

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 12 OF 24**

Short Circuit Analyses:(**DPD I**) *(PC.A.6.6* ■ *CUSC Contract)*

The information listed below, both current and forecast, and where not already supplied under this Schedule 14, may be requested by **The Company** from each **User** undertaking **OTSDUW** with respect to any **Connection Point** or **Interface Point** where prospective short-circuit currents on **Transmission** equipment are close to the equipment rating.

1. For all circuits of the **User’s OTSDUW Plant and Apparatus**:-

Positive phase sequence resistance

Positive phase sequence reactance

Positive phase sequence susceptance

Zero phase sequence resistance (both self and mutuals)

Zero phase sequence reactance (both self and mutuals)

Zero phase sequence susceptance (both self and mutuals)

1. For all transformers connecting the **User's OTSDUW Plant and Apparatus** to a lower voltage:‑

Rated MVA

Voltage Ratio

Positive phase sequence resistance (at max, min and nominal tap)

Positive Phase sequence reactance (at max, min and nominal tap)

Zero phase sequence reactance (at nominal tap)

Tap changer range

Earthing method: direct, resistance or reactance

Impedance if not directly earthed

(c) At the lower voltage points of those connecting transformers:‑

The maximum **Demand** (in MW and MVAr) that could occur

Short-circuit infeed data in accordance with PC.A.2.5.6(a) unless the **User’**s **OTSDUW Plant and Apparatus** runs in parallel with the **Subtransmission** **System**, when to prevent double counting in each node infeed data, a  equivalent comprising the data items of PC.A.2.5.6(a) for each node together with the positive phase sequence interconnection impedance between the nodes shall be submitted.

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 13 OF 24**

Fault infeed data to be submitted by **OTSDUW Plant and Apparatus** providing a fault infeed (including **OTSDUW DC Converters**)(PC.A.2.5.5)

A submission is required for **OTSDUW Plant and Apparatus** (including **OTSDUW DC Converters** at each **Transmission Interface Point** and **Connection Point**. The submission shall represent operating conditions that result in the maximum fault infeed. The fault current from all auxiliaries of the **OTSDUW Plant and Apparatus** at the **Transmission Interface Point** and **Connection** **Point** shall be included. The fault infeed shall be expressed as a fault current at the **Transmission Interface Point** and also at each **Connection Point**.

Should actual data in respect of fault infeeds be unavailable at the time of the application for a **CUSC Contract** or **Embedded Development Agreement**, a limited subset of the data, representing the maximum fault infeed that may result from the **OTSDUW Plant and Apparatus**, shall be submitted. This data will, as a minimum, represent the root mean square of the positive, negative and zero sequence components of the fault current for both single phase and three phase solid faults at each **Connection Point** and **Interface Point** at the time of fault application and 50ms following fault application. Actual data in respect of fault infeeds shall be submitted to **The Company** as soon as it is available, in line with PC.A.1.2.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.Yr.  0 | F.Yr.  1 | F.Yr.  2 | F.Yr.  3 | F.Yr.  4 | F.Yr.  5 | F.Yr.  6 | F.Yr.  7 | DATA to **RTL** | |
| *(PC.A.2.5)* |  |  |  |  |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| Name of **OTSDUW Plant and Apparatus** |  |  |  |  |  |  |  |  |  |  |  |
| **OTSDUW DC Converter**  type (i.e. voltage or current source) |  |  |  |  |  |  |  |  |  |  |  |
| A submission shall be provided for the contribution of each **OTSDUW** Plant and Apparatus to the positive, negative and zero sequence components of the short circuit current at the **Interface Point** and each **Connection** **Point** for  (i) a solid symmetrical three phase short circuit  (ii) a solid single phase to earth short circuit  (iii) a solid phase to phase short circuit  (iv) a solid two phase to earth short circuit  If protective controls are used and active for the above conditions, a submission shall be provided in the limiting case where the protective control is not active. This case may require application of a non-solid fault, resulting in a retained voltage at the fault point. |  |  |  |  |  |  |  |  |  | □  □  □  □  □ | ■  ■  ■  ■  ■ |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 14 OF 24**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DATA DESCRIPTION | UNITS | F.  Yr.  0 | F.  Yr.  1 | F.  Yr.  2 | F.  Yr.  3 | F.  Yr.  4 | F.  Yr.  5 | F.  Yr.  6 | F.  Yr.  7 | DATA to **RTL** | |
|  |  |  |  |  |  |  |  |  |  | CUSC Contract | CUSC App. Form |
| * A continuous time trace and table showing the root mean square of the positive, negative and zero sequence components of the fault current from the time of fault inception to 140ms after fault inception at 10ms intervals | Graphical and tabular  kA  versus s |  |  |  |  |  |  |  |  | □ | ■ |
| - A continuous time trace and table showing the positive, negative and zero sequence components of retained voltage at the **Interface Point** and each  **Connection Point**, if appropriate | p.u. versus s |  |  |  |  |  |  |  |  | □ | ■ |
| - A continuous time trace and table showing the root mean square of the positive, negative and zero sequence components of retained voltage at the fault point, if appropriate | p.u. versus s |  |  |  |  |  |  |  |  | □ | ■ |
| Positive sequence X/R ratio of the equivalent at time of fault at the  **Interface Point** and each **Connection Point** |  |  |  |  |  |  |  |  |  | □ | ■ |
| Minimum zero sequence impedance of the equivalent at the **Interface Point** and each **Connection Point** |  |  |  |  |  |  |  |  |  | □ | ■ |
| **Active Power** transfer at the Interface Point and each Connection Point pre-fault | MW |  |  |  |  |  |  |  |  | □ | ■ |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Power Factor (lead or lag) |  |  |  |  |  |  |  |  |  | □ | ■ |
| Pre-fault voltage (if different from 1.0 p.u.) at fault point (See note 1) | p.u. |  |  |  |  |  |  |  |  | □ | ■ |
| Items of reactive compensation switched in pre-fault |  |  |  |  |  |  |  |  |  | □ | ■ |

Note 1. The pre-fault voltage provided above should represent the voltage within the range 0.95 to 1.05 that gives the highest fault current

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 15 OF 24**

Thermal Ratings Data(PC.A.2.2.4)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | **CIRCUIT RATING SCHEDULE** | | | | | | | | | | | | | |  | | | |  | | |
|  | | |  |  | |  |  | |  | |  | |  | | | |  | | | |  | | |
| **Voltage** | ***Offshore TO Name*** | | | | | | | | | | | | | | | | | | | Issue Date | | | |
| **132kV** |  |  |  |  | |  |  | |  | |  | |  | | | |  |  | |  | | | |
| **CIRCUIT *Name from Site A – Site B*** | | | | | | | | | | | | | | | | | | | | | | | |
|  |  |  |  |  | |  |  | |  | |  | |  | | | |  |  | |  | |  | |
|  |  | **Winter** | | | | | | | | **Spring/Autumn** | | | | | | **Summer** | | | | | | | |
| OVERALL CCT RATINGS | | %Nom | Limit | | Amps | | | MVA | | %Nom | | Limit | | Amps | MVA | %Nom | | | Limit | Amps | | | MVA |
| Pre-Fault Continuous | | 84% | Line | | 485 | | | 111 | | 84% | | Line | | 450 | 103 | 84% | | | Line | 390 | | | 89 |
| Post-Fault Continuous | | 100% | Line | | 580 | | | 132 | | 100% | | Line | | 540 | 123 | 100% | | | Line | 465 | | | 106 |
|  |  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
| Prefault load  exceeds line prefault  continuous rating | 6hr | 95% | Line | | 580 | | | 132 | | 95% | | Line | | 540 | 123 | 95% | | | Line | 465 | | | 106 |
| 20m |  | Line | | 580 | | | 132 | |  | | Line | | 540 | 123 |  | | | Line | 465 | | | 106 |
| 10m | mva | Line | | 580 | | | 132 | | mva | | Line | | 540 | 123 | mva | | | Line | 465 | | | 106 |
| 5m | 125 | Line | | 580 | | | 132 | | 116 | | Line | | 540 | 123 | 100 | | | Line | 465 | | | 106 |
| 3m |  | Line | | 580 | | | 132 | |  | | Line | | 540 | 123 |  | | | Line | 465 | | | 106 |
|  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
|  | 6hr | 90% | Line | | 580 | | | 132 | | 90% | | Line | | 540 | 123 | 90% | | | Line | 465 | | | 106 |
|  | 20m |  | Line | | 580 | | | 132 | |  | | Line | | 540 | 123 |  | | | Line | 465 | | | 106 |
| Short Term | 10m | mva | Line | | 580 | | | 132 | | mva | | Line | | 540 | 123 | mva | | | Line | 465 | | | 106 |
| Overloads | 5m | 118 | Line | | 580 | | | 132 | | 110 | | Line | | 540 | 123 | 95 | | | Line | 465 | | | 106 |
|  | 3m |  | Line | | 580 | | | 132 | |  | | Line | | 540 | 123 |  | | | Line | 465 | | | 106 |
|  |  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
| Limiting Item  and permitted  overload  values  for different  times and  pre-fault loads | 6hr | 84% | Line | | 580 | | | 132 | | 84% | | Line | | 540 | 123 | 84% | | | Line | 465 | | | 106 |
| 20m |  | Line | | 590 | | | 135 | |  | | Line | | 545 | 125 |  | | | Line | 470 | | | 108 |
| 10m | mva | Line | | 630 | | | 144 | | mva | | Line | | 580 | 133 | mva | | | Line | 495 | | | 113 |
| 5m | 110 | Line | | 710 | | | 163 | | 103 | | Line | | 655 | 149 | 89 | | | Line | 555 | | | 126 |
| 3m |  | Line | | 810 | | | 185 | |  | | Line | | 740 | 170 |  | | | Line | 625 | | | 143 |
|  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
| 6hr | 75% | Line | | 580 | | | 132 | | 75% | | Line | | 540 | 123 | 75% | | | Line | 465 | | | 106 |
| 20m |  | Line | | 595 | | | 136 | |  | | Line | | 555 | 126 |  | | | Line | 475 | | | 109 |
| 10m | mva | Line | | 650 | | | 149 | | mva | | Line | | 600 | 137 | mva | | | Line | 510 | | | 116 |
|  | 5m | 99 | Line | | 760 | | | 173 | | 92 | | Line | | 695 | 159 | 79 | | | Line | 585 | | | 134 |
|  | 3m |  | Line | | 885 | | | 203 | |  | | Line | | 810 | 185 |  | | | Line | 685 | | | 156 |
|  |  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
|  | 6hr | 60% | Line | | 580 | | | 132 | | 60% | | Line | | 540 | 123 | 60% | | | Line | 465 | | | 106 |
|  | 20m |  | Line | | 605 | | | 138 | |  | | Line | | 560 | 128 |  | | | Line | 480 | | | 110 |
|  | 10m | mva | Line | | 675 | | | 155 | | mva | | Line | | 620 | 142 | mva | | | Line | 530 | | | 121 |
|  | 5m | 79 | Line | | 820 | | | 187 | | 73 | | Line | | 750 | 172 | 63 | | | Line | 635 | | | 145 |
|  | 3m |  | Line | | 985 | | | 226 | |  | | Line | | 900 | 206 |  | | | Line | 755 | | | 173 |
|  |  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |
|  | 6hr | 30% | Line | | 580 | | | 132 | | 30% | | Line | | 540 | 123 | 30% | | | Line | 465 | | | 106 |
|  | 20m |  | Line | | 615 | | | 141 | |  | | Line | | 570 | 130 |  | | | Line | 490 | | | 112 |
|  | 10m | mva | Line | | 710 | | | 163 | | mva | | Line | | 655 | 150 | mva | | | Line | 555 | | | 127 |
|  | 5m | 39 | Line | | 895 | | | 205 | | 36 | | Line | | 820 | 187 | 31 | | | Line | 690 | | | 158 |
|  | 3m |  | Line | | 1110 | | | 255 | |  | | Line | | 1010 | 230 |  | | | Line | 845 | | | 193 |
|  |  |  |  | |  | | |  | |  | |  | |  |  |  | | |  |  | | |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 16 OF 24**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 6hr |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 20m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 10m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 5m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 3m |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 6hr |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 20m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 10m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 5m |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 3m |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Notes or Restrictions Detailed |  |  |  |  |  |  |  |  |  |  |  |  |  |

Notes: 1. For information the equivalent STC Reference: STCP12-1: Part 3 - 2.6 Thermal Ratings

2. The values shown in the above table is example data.

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 17 OF 24**

**Protection Policy** *(PC.A.6.3)*

To include details of the protection policy

**Protection Schedules***(PC.A.6.3)*

Data schedules for the protection systems associated with each primary plant item including:

Protection, Intertrip Signalling & operating times

Intertripping and protection unstabilisation initiation

Synchronising facilities

# Delayed Auto Reclose sequence schedules

**Automatic Switching Scheme Schedules** *(PC.A.2.2.7)*

A diagram of the scheme and an explanation of how the system will operate and what plant will be affected by the scheme’s operation.

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 18 OF 24**

GENERATOR INTERTRIP SCHEMES (PC.A.2.2.7(b))

# Substation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Details of Generator Intertrip Schemes:

A diagram of the scheme and an explanation of how the system will operate and what plant will be effected by the schemes operation.

DEMAND INTERTRIP SCHEMES (PC.A.2.2.7(b))

# Substation:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Details of Demand Intertrip Schemes:

A diagram of the scheme and an explanation of how the system will operate and what plant will be effected by the schemes operation

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 19 OF 24**

*Specific Operating Requirements (CC.5.2.1 or ECC.5.2.1)*

SUBSTATION OPERATIONAL GUIDE

# Substation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Location Details:**

|  |  |  |
| --- | --- | --- |
| **Postal Address:** | **Telephone Nos.** | **Map Ref.** |
|  |  |  |
| **Transmission Interface** | | |
|  | | |
| **Generator Interface** | | |
|  | | |

1. **Substation Type:**
2. **Voltage Control:** *(short description of voltage control system. To include mention of modes i.e. Voltage, manual etc. Plus control step increments i.e. 0.5% or 0.33kV)*
3. **Energisation Switching Information:** *(The standard energisation switching process from dead.)*
4. **Intertrip Systems:**
5. **Reactive Plant Outage:** *(A**short explanation of any system re-configurations required to facilitate the outage of any reactive plant which form part of the OTSDUW Plant and Apparatus equipment. Also any generation restrictions required).*
6. **Harmonic Filter Outage:** *(An explanation as to any OTSDUW Plant and Apparatus reconfigurations required to facilitate the outage and maintain the system within specified Harmonic limits, also any generation restrictions required).*

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 20 OF 24**

**OTSDUW DC CONVERTER** TECHNICAL DATA

**OTSDUW DC CONVERTER** NAME DATE:\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Data Description | Units | DATA to **RTL** | | Data  Category | **DC Converter** **Station** Data |
| *(PC.A.4 and PC.A.5.2.5)* | | CUSC Contract | CUSC App. Form |  | |
| **OTSDUW DC CONVERTER** (**CONVERTER** DEMANDS):  **Demand** supplied through **Station Transformers** associated with the **OTSDUW** **DC Converter** at each **Interface Point** andeach **Offshore Connection Point Grid Entry Point [PC.A.4.1]**  - **Demand** with all **OTSDUW** **DC Converters** operating at **Interface Point Capacity** .  - **Demand** with all **OTSDUW** **DC Converters** operating at maximum **Interface Point** flow from the **Interface Point** to each **Offshore Grid Entry Point** .    - The maximum **Demand** that could occur.  - **Demand** at specified time of annual   peak half hour of **The Company Demand** at   **Annual ACS Conditions**.  - **Demand** at specified time of annual  minimum half-hour of **The Company Demand**.  **OTSDUW DC CONVERTER** DATA  Number of poles, i.e. number of **OTSDUW** **DC Converters**  Pole arrangement (e.g. monopole or bipole)  Return path arrangement  Details of each viable operating configuration  Configuration 1  Configuration 2  Configuration 3  Configuration 4  Configuration 5  Configuration 6 | MW  MVAr  MW  MVAr  MW  MVAr  MW  MVAr  MW  MVAr  Text  Text  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram | □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □ | ■  ■  ■  ■  ■  ■  ■  ■ | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **SPD+**  **SPD+**  **SPD+** |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 21 OF 24**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | DATA to **RTL** | | Data  Category | Operating Configuration | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **OTSDUW DC CONVERTER** DATA  *(PC.A.3.3.1(d))*  **OTSDUW DC Converter** Type (e.g. current or Voltage source)  If the busbars at the **Interface Point** or Connection Point are normally run in separate sections identify the section to which the **OTSDUW** **DC Converter** configuration is connected  **Rated MW** import per pole (PC.A.3.3.1)  **Rated MW** export per pole (PC.A.3.3.1) | Text  Section  Number  MW  MW | □  □  □  □ | ■  ■  ■  ■ | **SPD**  **SPD**  **SPD+**  **SPD+** |  |  |  |  |  |  |
| **ACTIVE POWER** TRANSFER CAPABILITY (PC.A.3.2.2)  **Interface Point Capacity** | MW  MVAr | □  □ | ■  ■ | **SPD**  **SPD** |  |  |  |  |  |  |
| **OTSDUW DC CONVERTER** TRANSFORMER  (PC.A.5.4.3.1)  Rated MVA  Winding arrangement  Nominal primary voltage  Nominal secondary (converter-side) voltage(s)  Positive sequence reactance  Maximum tap  Nominal tap  Minimum tap  Positive sequence resistance  Maximum tap  Nominal tap  Minimum tap  Zero phase sequence reactance  Tap change range  Number of steps | MVA  kV  kV  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  % on MVA  +% / -% | □  □  □  □  □  □  □  □  □  □  □  □ |  | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 22 OF 24**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **OTSDUW DC CONVERTER NETWORK DATA**  (PC.A.5.4.3.1 (c))  Rated DC voltage per pole  Rated DC current per pole  Details of the **OTSDUW** **DC Network** described in diagram form including resistance, inductance and capacitance of all DC cables and/or DC lines. Details of any line reactors (including line reactor resistance), line capacitors, DC filters, earthing electrodes and other conductors that form part of the **OTSDUW** **DC Network** should be shown. | kV  A  Diagram | □  □  □ |  | **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 23 OF 24**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| **OTSDUW DC CONVERTER CONTROL SYSTEMS**  (PC.A.5.4.3.2)  Static VDC – PDC (DC voltage – DC power) or  Static VDC – IDC (DC voltage – DC current) characteristic (as appropriate) when operating as –Rectifier –Inverter  Details of rectifier mode control system,   in block diagram form together with parameters showing transfer functions of individual elements.  Details of inverter mode control system,   in block diagram form showing transfer functions of individual elements including parameters (as applicable).  Details of **OTSDUW DC Converter** transformer tap changer control system in block diagram form showing transfer functions of individual elements including parameters.  Details of AC filter control systems in block diagram form showing transfer functions of individual elements including parameters  Details of any frequency and/or load control systems in block diagram form showing transfer functions of individual elements including parameters.  Details of any large or small signal modulating controls, such as power oscillation damping controls or sub-synchronous oscillation damping controls, that have not been submitted as part of the above control system data.  Transfer block diagram representation of the reactive power control at converter ends for a voltage source converter.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of **OTSDUW DC Converter** unit models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of AC component models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of DC Grid models and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of Voltage and power controller and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of Special control features if applicable (e.g. power oscillation damping (POD) function, subsynchronous torsional interaction (SSTI) control and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of Multi terminal control, if applicable and/or control systems in block diagram form showing transfer functions of individual elements including parameters.  For **Generators** in respect of **OTSDUW** who are also **EU Code Users** details of **OTSDUW DC Converter** protection models as agreed between **The Company** and the **Generator** (in respect of **OTSDW**) and/or control systems in block diagram form showing transfer functions of individual elements including parameters. | Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram  Diagram | □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □  □ |  | **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 18 - OFFSHORE TRANSMISSION SYSTEM DATA**

**PAGE 24 OF 24**

| Data Description | Units | DATA to **RTL** | | Data  Category | Operating configuration | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | CUSC Contract | CUSC App. Form |  | 1 | 2 | 3 | 4 | 5 | 6 |
| LOADING PARAMETERS (PC.A.5.4.3.3)  MW Export from the **Offshore Grid Entry Point** to the **Transmission Interface Point** Nominal loading rate Maximum (emergency) loading rate  Maximum recovery time, to 90% of pre-fault loading, following an AC system fault or severe voltage depression.  Maximum recovery time, to 90% of pre-fault loading, following a transient DC Network fault. | MW/s  MW/s  s  s | □  □  □  □ |  | **DPD I**  **DPD I**  **DPD II**  **DPD II** |  |  |  |  |  |  |

**SCHEDULE 19 – USER DATA FILE STRUCTURE**

**PAGE 1 OF 2**

The structure of the **User Data File Structure** is given below.

| **i.d.** | **Folder name** | **Description of contents** |
| --- | --- | --- |
| **Part A: Commercial & Legal** | | |
| **A2** | Commissioning | Commissioning & Test Programmes |
| **A3** | Statements | Statements of Readiness |
| **A9** | AS Monitoring | Ancillary Services Monitoring |
| **A10** | Self-Certification | User Self Certification of Compliance |
| **A11** | Compliance statements | Compliance Statement |
| **Part 1: Safety & System Operation** | | |
| **1.1** | Interface Agreements | Interface Agreements |
| **1.2** | Safety Rules | Safety Rules |
| **1.3** | Switching Procedures | Local Switching Procedures |
| **1.4** | Earthing | Earthing |
| **1.5** | SRS | Site Responsibility Schedules |
| **1.6** | Diagrams | Operational and Gas Zone Diagrams |
| **1.7** | Drawings | Site Common Drawings |
| **1.8** | Telephony | Control Telephony |
| **1.9** | Safety Procedures | Local Safety Procedures |
| **1.10** | Co-ordinators | Safety Co-ordinators |
| **1.11** | RISSP | Record of Inter System Safety Precautions |
| **1.12** | Tel Numbers | Telephone Numbers for Joint System Incidents |
| **1.13** | Contact Details | Contact Details (fax, tel, email) |
| **1.14** | Restoration Plan | Local Joint Restoration Plan (incl. System Restoration if applicable) |
| **1.15** | Maintenance | Maintenance Standards |
| **Part 2: Connection Technical Data** | | |
| **2.1** | DRC Schedule 5 | DRC Schedule 5 – Users System Data |
| **2.2** | Protection Report | Protection Settings Reports |
| **2.3** | Special Automatic Facilities | Special Automatic Facilities e.g. intertrip |
| **2.4** | Operational Metering | Operational Metering |
| **2.5** | Tariff Metering | Tariff Metering |
| **2.6** | Operational Comms | Operational Communications |
| **2.7** | Monitoring | Performance Monitoring |
| **2.8** | Power Quality | Power Quality Test Results (if required) |

**SCHEDULE 19 – USER DATA FILE STRUCTURE**

**PAGE 2 OF 2**

|  |  |  |
| --- | --- | --- |
| **Part 3: Generator Technical Data** | | |
| **3.1** | DRC Schedule 1 | DRC Schedule 1 - Generating Unit, Power Generating Module, HVDC System and DC Converter Technical Data |
| **3.2** | DRC Schedule 2 | DRC Schedule 2 - Generation Planning Data |
| **3.3** | DRC Schedule 4 | DRC Schedule 4 – Frequency Droop & Response |
| **3.4** | DRC Schedule 14 | DRC Schedule 14 – Fault Infeed Data – Generators |
| **3.5** | Special Generator Protection | Special Generator Protection e.g. Pole slipping; islanding |
| **3.6** | Compliance Tests | Compliance Tests & Evidence |
| **3.7** | Compliance Studies | Compliance Simulation Studies |
| **3.8** | Site Specific | Bilateral Connections Agreement Technical Data & Compliance |
| **3.9** | DRC Schedule 20 | DRC Schedule 20 - Grid Forming Plant Data |
| **Part 4: General DRC Schedules** | | |
| **4.1** | DRC Schedule 3 | DRC Schedule 3 – Large Power Station Outage Information |
| **4.2** | DRC Schedule 6 | DRC Schedule 6 – Users Outage Information |
| **4.3** | DRC Schedule 7 | DRC Schedule 7 – Load Characteristics |
| **4.4** | DRC Schedule 8 | DRC Schedule 8 – BM Unit Data (if applicable) |
| **4.5** | DRC Schedule 10 | DRC Schedule 10 –Demand Profiles |
| **4.6** | DRC Schedule 11 | DRC Schedule 11 – Connection Point Data |
| **Part 5: OTSDUW Data and Information**  (if applicable and prior to **OTSUA Transfer Time**) | | |
|  |  | Diagrams |
|  |  | Circuits Plant and Apparatus |
|  |  | Circuit Parameters |
|  |  | Protection Operation and Autoswitching |
|  |  | Automatic Control Systems |
|  |  | Mathematical model of dynamic compensation plant |

**SCHEDULE 20 – GRID FORMING PLANT CAPABILITY DATA**

The following data need only be supplied by **Users** (be they a **GB Code User** or **EU Code User**) or **Non-CUSC Parties** who wish to offer a **Grid Forming Capability** as provided for ECC.6.3.19.3. Where such a **Grid Forming Capability** is provided then the following data items and models are to be supplied in respect of each **Grid Forming Plant**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATA DESCRIPTION |  | GRID FORMING PLANT DATA | | |
|  |  | 1 | 2 | 3 |
| Submission of **Network Frequency Perturbation Plot** and **Nichols Chart** for each **GBGF-I** (PC.A.5.8.1) | Graphs |  |  |  |
| High level equivalent architecture diagram of Grid Forming Plant (PC.A.5.8.1) | Diagram |  |  |  |
| **GBGF-I Grid Forming Plant** Block Diagram (Laplace Operator) in the general form shown in Figure PC.A.5.8.1 or as agreed with **The Company**.  When submitting either Figure PC.A.5.8.1 (a) or Figure PC.A.5.8.1 (b), each **User** or **Non-CUSC Party** can use their own design, that may be very different to Figures PC.A.5.8.1 (a) or PC.A.5.8.1 (b), but should contain all relevant functions that can include simulation models and other equivalent data and documentation | Block Diagram (Laplace Operator)  Documentation |  |  |  |
| Each **User** or **Non-CUSC Party** shall provide a model of their **Grid Forming** **Plant** which provides a true and accurate reflection of its **Grid Forming Capability**. | Model and documentation – format to be agreed with **The Company** |  |  |  |

In order to participate in the **Grid Forming Capability** market, **User’s** and **Non-CUSC Parties** are required to provide data of their **GBGF-I** in accordance with Figures PC.A.5.8.1(a) and PC.A.5.8.1(b) **Users** and **Non-CUSC Parties** in respect of **Grid Forming Plants** should indicate if the data is submitted on a unit or aggregated basis. Table 1 below defines the notation used in Figure PC.5.8.1

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Symbol** | **Units** |
| The primary reactance of the **Grid Forming Unit**, in pu. | Xin or Xts | pu on MVA **Rating of Grid Forming Unit** |
| The additional reactance, in pu, between the terminals of the **Grid Forming Unit** and the **Grid Entry Point** or **User System Entry Point** (if **Embedded**). | Xtr | pu on MVA **Rating of Grid Forming Unit** |
| The rated angle between the **Internal Voltage Source** and the input terminals of the **Grid Forming Unit**. |  | radians |
| The rated angle between the **Internal Voltage Source** and **Grid Entry Point** or **User System Entry Point** (if **Embedded**). |  | radians |
| The rated voltage and phase of the **Internal Voltage Source** of the **Grid Forming Unit**. |  | Voltage - pu  Phase - radians |
| The rated electrical angle between current and voltage at the input to the Grid transformer. |  | radians |

Table 1

In order to participate in a **Grid Forming Capability** market, **User’s** and **Non-CUSC Parties** are also required to provide the data of their **GBGF-I** in accordance with the Table below to **The Company**. The details and arrangements for **Users** and **Non-CUSC Parties** participating in this market shall be published on **The Company’s Website**.

|  |  |  |  |
| --- | --- | --- | --- |
| **Quantity** | **Units** | **Range**  **(where Applicable)** | **User Defined Parameter** |
| Type of Grid form **Plant** (eg **Generating Unit**, **Electricity Storage Module**, **Dynamic Reactive Compensation Equipment** | N/A |  |  |
| Maximum Continuous Rating at **Registered Capacity** or **Maximum Capacity** | MVA |  |  |
| Primary reactance Xin or Xts(see Table 1) | pu on MVA |  |  |
| Additional reactance Xtr (See Table 1) | pu on MVA |  |  |
| **Maximum Capacity** | MW |  |  |
| **Active ROCOF Response Power** (MW) supplied or absorbed at 1Hz/s **System Frequency** change (which is the maximum frequency change for linear operation of the **Grid Forming Plant**) | MW |  |  |
| **Phase Jump Angle Withstand** | degrees |  | 60 degrees specified |
| **Phase Jump Angle limit** | degrees |  | 5 degrees recommended |
| **Phase Jump Power** (MW) at the rated angle | MW |  |  |
| **Defined Active Damping Power** for a **Grid Oscillation Value** of 0.05 Hz peak to peak at 1 Hz | MW |  |  |
| The cumulative energy delivered for a 1Hz/s **System Frequency** fall from 52 Hz to 47 Hz This is the total **Active Power** transient output of the **Grid Forming Plant** | MWs or MJ |  |  |
| **Inertia Constant** (**H**) using equation 1 or declared in accordance with the simulation results of ECP.A.3.9.4 | MWs/MVA |  |  |
| **Inertia Constant** (**He**) using equation 2 or declared in accordance with the simulation results of ECP.A.3.9.4 | MWs/MVA |  |  |
| Continuous Overload Capability | % on MVA |  |  |
| Short Term duration Overload capability |  |  |  |
| Duration of Short Term Overload Capability | s |  |  |
| **Peak Current Rating** | pu |  |  |
| Nominal **Grid Entry Point** or **User System Entry Point** voltage | kV |  |  |
| **Grid Entry Point** or **User System Entry Point** | - Location |  |  |
| Continuous or defined time duration MVA Rating | MVA |  |  |
| Continuous or defined time duration MW Rating | MW |  |  |
| For a **GBGF-I** the inverters maximum **Internal Voltage Source** (**IVS**) for the worst case condition – for example operation at maximum exporting **Reactive Power** at the maximum AC **System** voltage | pu |  |  |
| Maximum Three Phase Short Circuit Infeed at **Grid Entry Point** or **User System Entry Point** | kA |  |  |
| Maximum Single Phase Short Circuit Infeed at **Grid Entry Point** or **User System Entry Point** | kA |  |  |
| Will the **Grid Forming Plant** contribute to any other form of commercial service – for example Dynamic Containment, Firm Frequency Response, | Details to be provided |  |  |
| **Equivalent Damping Factor.** | ζ |  | 0.2 to 5.0 allowed |

Table 2

H = Installed MWs / Rated installed MVA

(equation 1)

He = (**Active** **ROCOF Response Power** at 1 Hz / s x **System Frequency**) / ( Installed MVA x 2 )

(equation 2)

<END OF DATA REGISTRATION CODE>