Electric Utility Sector Code Book

Dispatch Code

DISCLAIMER

This is a draft document and is a work in progress. The document is in the process of preparation and editing and as such Table of Contents, page numbering, appendixes, glossary will be added or modified as appropriate based on stakeholders review comments.

This draft document is for review only by the OUR and Stakeholders. It should not be relied upon by any other party or parties or used for any other purpose.

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DSC 1 CONFIDENTIALITY

All information provided to the System Operator marked as "Confidential" shall be treated in accordance with Licence Condition 7.

DSC 2 SHORT TERM OPERATIONAL PLANNING FOR DISPATCH

The Short Term Dispatch Operations Planning is concerned with:

Dispatch Data Registration

Demand Forecasting

Merit Order Calculation and Reporting

Operating Margin;

Unit Commitment Forecasting and Reporting

Economic Dispatch Forecasting and Reporting

Heat Rate Policy (Development and Testing Schedule)

Dispatcher Training (Simulator setup and use)

DSC 3 DISPATCH DATA REGISTRATION (DDR)

DSC 3.1 Introduction

DSC 3.1.1 The Data Registration sets out a unified listing of all data required by the System Operator from Generators and by Generators from the System Operator for Dispatch.

DSC 3.1.2 The Code specifies the procedures and timing for the supply of data, for routine updating and for recording temporary or permanent changes to data.

DSC 4 OBJECTIVE

DSC 4.1 The objective of the DDR is to:

List and collate all the data to be provided by each category of Generator to the System Operator under the Dispatch Code;

List all data to be provided by the System Operator to each category of Generator under the Dispatch Code; and

DSC 5 SCOPE

DSC 5.1 The Users to which the DDR applies are:

Generators under the terms of the Generation Code;

DSC 6 DATA CATEGORIES AND STAGES IN REGISTRATION

DSC 6.1 Within the Data Categories and Stages in Registration each item of data is allocated to four categories.

Operational Data as required by the Dispatch Code.

Data Required for Demand Forecasting

Data required from Generators in accordance with the Merit Order provisions of the Generation Code.

Design Data for Generator modelling for system simulations

DSC 6.2 Procedures and Responsibilities

DSC 6.2.1 Responsibility for submission and updating of data

In accordance with the provisions of the various Chapters of the Dispatch Code, each Generator must submit data as summarised, listed and collated in the attached Schedules.

DSC 6.2 2 Methods of submitting data

The data must be submitted to the System Operator. The name of the person at the Generator who is submitting each Schedule of data must be included.

The data may be submitted via a computer link if such a data link exists between a Generator and the System Operator or utilising a data transfer media, such as floppy diskette, magnetic tape, CD ROM etc after obtaining the prior written consent from the System Operator.

DSC 6.3 Changes to Generators' data

DSC 6.3.1 The Generator must notify the System Operator of any change to data which is already submitted and registered with the System Operator in accordance with each Chapter of the Dispatch Code.

DSC 6.4 Data not supplied

DSC 6.4.1 If a Generator fails to supply data when required by any Chapter of the Dispatch Code, the System Operator will estimate such data if and when, in the view of the System Operator, it is necessary to do so.

DSC 6.4.2 If the System Operator fails to supply data when required by any Chapter of the Dispatch Code, the Generator to whom that data ought to have been supplied, will estimate such data if and when, in the view of that Generator, it is necessary to do so.

DSC 6.4.3 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 and/or Apparatus or upon such other information as the System Operator or that Generator, as the case may be, deems appropriate.

DSC 6.4.4 The System Operator will advise a Generator in writing of any estimated data it intends to use relating directly to that Generator's Plant and/or Apparatus in the event of data not being supplied.

DSC 6.4.5 The Generator will advise the System Operator in writing of any estimated data it intends to use in the event of data not being supplied.

DSC 6.5 Demand Forecast

DSC 6.5.1 Introduction

DSC 6.5.2 In order for the System Operator to operate the System efficiently and to ensure maximum System Security and System Stability, there is a need for Users and Generators specified to provide Demand and generation output information to the System Operator.

DSC 6.5.3 The Dispatch Code specifies the System Operator's requirements for forecasting for Generating Units subject to Central Dispatch and large demand on connected to the transmission system. This Chapter specifies the information to be provided by all Generators and Users of the System to the System Operator so these requirements can be met.

DSC 6.5.4 The information to be provided under this Chapter is required to enable the System Operator to maintain the integrity of the System.

DSC 6.5.5 Where Demand data is required from the Users. this means the Active (MW)

Demand for electricity at the respective Connection Point with the Users. The System Operator may, in certain cases, specify that the Demand data shall include the Reactive (MVAr) Demand.

DSC 6.5.6 The information to be provided to the System Operator shall be in writing.

DSC 6.5.7 References to data to be supplied on an hourly basis refers to it being supplied for each period of 60 minutes ending on the hour in each day.

DSC 6.6 Objective

This Section applies to the System Operator and the following Generators and Users:

Dispatchable and Non-Dispatchable Generators;

Users connected directly to the Transmission System.

The objectives of DSC 6.5 are as follows:

to specify the requirement for the System Operator and Users to provide unbiased forecasts of both Active Demand and Reactive Demand on the Transmission System within specified timescales. These forecasts are used by the System Operator for Operational Planning purposes, and in the Programming Phase, and the Control Phase;

to describe information to be provided by Users to the System Operator in the post Control Phase; and

to describe certain factors to be taken into account by the System Operator and Users when preparing forecasts of both Active Demand and Reactive Demand on the Transmission System.

DSC 6.6.1 DSC 6.5 outlines the obligations on the System Operator , Generators and other Users regarding the preparation of forecasts of Active Demand, Reactive Demand and VRPP output for the Transmission System. DSC 6.2 sets out the timescales within which Users shall provide forecasts of both Active Demand (MW) and Reactive Demand (MVar) to the System Operator, and the timescales within which the System Operator shall provide forecasts to Generators and Users. These demand forecasts are required for certain operational purposes, specifically the Operational Planning Phase requires annual forecasts of both Active Demand and Reactive Demand on the Transmission System for the succeeding 2 years; the Programming Phase requires weekly forecasts of both Active Demand and Reactive Demand on the Transmission System for the period 1 to 8 weeks ahead; and the Control Phase requires daily forecasts of Demand data on the Transmission System for the day ahead.

Phase	Applicable Parties	Forecast Data	Time period for which forecast data is required
Operational Planning 2 Years ahead (End of January each Year)	All Distribution System Users with Demands in excess of 5MVA	Hourly forecast of Active and Reactive Demand	For Day of Users Max Demand, Day of System Peak and Day of System Minimum
	Users whose actions, in the opinion of System Operator, can have an effect on the stability of the System	Active and Reactive Demand	At specified times each week in the forecast period as identified by the System Operator in advance. The times shall be identified in 1hour periods for each week.
PROGRAMMING PHASE 1 - 8 Weeks (By 10:00am each Friday)	All Users who forecast Demand changes in excess of 5MVA in any 1 hour period	Active and Reactive Demands	Any hour where the User forecasts a Demand change in excess of 5MVA for the period.
Control Phase 0 24hrs Commencing 00:00	all identified Users with Demand changes in excess of 5MVA in any 1 hour period	Active and Reactive Demands	Any hour where the Users forecasts a Demand change in excess of 5MVA for the period.

DSC 6.6.2 DSC 6.6.1 deals with the provision of Demand Control data in timescales consistent with the Operational Planning Phase, the Programming Phase, and the Control Phase.

DSC 6.7 Data required by the System Operator and Users of the Grid Operational Planning Phase

DSC 6.7.1 No later than the end of October each year, the System Operator shall notify each User in writing of the forecast information listed below for each of the following 2 Operational Years:

the date and time of the forecast annual peak Active Demand and Reactive Demand on the Transmission System at annual maximum Demand conditions; and

the date and time of the forecast annual minimum Active Demand and Reactive Demand on the Transmission System at average minimum Demand conditions.

DSC 6.7.2 By the end of January of each year, each User shall provide to the System Operator in writing, the forecast information listed below for each of the succeeding 2 Operational Years:

Each Directly Connected Customer and Distribution Customers with demands in excess of 5 MVA shall provide forecast profiles of hourly Active Power Demand, at the Connection Point, for the day of that Users maximum Demand and for the day specified by the GridOperator as the day of forecast annual peak Demand. These forecasts shall reflect annual maximum Demand conditions;

Each Directly Connected Customer shall provide forecasts of their annual Active Demand requirements, at the Connection Point, for Average Conditions;

Each Directly Connected Customer, at the Connection Point, shall provide forecasts of the profile of hourly Active Demand for the day specified by the System Operator as the day of forecast minimum Demand at Average Conditions.

User forecasts of both Active Demand and Reactive Demand on the Transmission System provided to the System Operator in accordance with DSC 8.3 must reflect the User s best estimates of its forecast requirements.

The System Operator shall use the information supplied to it to prepare forecasts of both Active Demand and Reactive Demand on the Transmission System for use in the Operational Planning Phase.

DSC 6.8 Data required by the System Operator - Programming Phase

DSC 6.8.1 For the period of 1 to 8 weeks ahead each User directly connected to the

Transmission System and identified Customers with changes in excess of 5

MVA shall supply to the System Operator in writing by 13:00 hours each Thursday hourly profiles of Demand for Active Power (MW) and Reactive Power (MVAR) at a Interconnection Point.

DSC 6.8.2 The System Operator shall use the information supplied to it in preparing its forecasts of Demand for Active Power and Reactive Power on the Transmission System for the purposes of the Programming Phase.

DSC 6.9 Control Phase

DSC 6.9.1 Each User shall notify the System Operator of any Demand Control which may result in a Demand change of 5 MVA or more averaged over any hour on any

Connection Point which is planned after 10:00 hours, and of any changes to the planned Demand Control notified to the System Operator prior to 10:00 hours as soon as possible after the formulation of the new plans.

DSC 6.10 Post Control Phase

DSC 6.10.1 Each User shall supply MW profiles for the previous calendar day of the amount and duration of Demand reduction achieved from the use of Demand Control of 1 MW or more on an hourly basis;

DSC 6.11 VRPP Generation Short term Resource Forecasting

JPS requires the VRPP to provide quality resource forecast from reputable and industry proven methods, and or in accordance with requirements that will be dictated by JPS in the transmission Interconnection Agreement or other agreement between JPS and the VRPP. The forecast should provide the following information:

DSC 6.11.1 **Medium-Term Forecast:** a rolling hourly resource forecast submitted to JPS for the next 168 hours. The rolling hourly forecast means the forecast must be provided on an hourly basis.

DSC 6.11.2 **Short-Term Forecast:** JPS reserves the right to also request a rolling 5-minute resource forecast to be submitted to JPS and/or the centralized forecasting vendor for the next 6 hours.

The forecasts must be provided to JPS through web service or **ftp (File Transfer Protocol)** site delivery in a format to be agreed upon with JPS. JPS reserves the right to request a specific file format that the VRPP must accommodate

DSC 6.12 Co- generation Short term Resource Forecasting

To the extent that a host process, in the case of cogeneration plants, is the driver of the export power to the grid, such an entity shall submit a two (2) week projection of their export expectation to the System Operator every Wednesday or within 24 hours of request, such that this information can be used to optimize the expected output of the Dispatchable Generators on the Grid.

DSC 6.13 Embedded Generator Information

DSC 6.13.1 Information relating to Generating Plant Embedded in the Distribution System and not subject to Central Dispatch shall be provided, where specified, to the System Operator. Users with their own generation may be required to furnish such information should the System Operator reasonably consider that it would affect its Demand forecasts.

Phase	Applicable Parties	Forecast Data	Time period for which forecast data is required
Control Phase 0 24hrs Commencing 00:00	Embedded Generators with output changes in excess of 5MVA in any ‰ hour period	Active and Reactive Generation	Any ‰ hour where the Embedded Generator forecasts a output change in excess of 5MVA for the period.

DCS 6.14 System Operator and User Forecast

DSC 6.14.1 The following factors shall be taken into account by the System Operator and the Users when conducting Demand forecasting in the Operational Planning Phase:

Historic Demand Data

Weather forecasts (NB Responsibility for weather correction of User s loads rests with the User);

Historic Demand trends;

Incidence of major events or activities;

Generating Unit active power generation forecasts or schedules; f. Demand transfers;

Interconnection with adjacent Connection Points;

Planned Demand reduction (e.g. block load shedding); and

Any other factor reasonably considered necessary that may impact the Demand forecast.

DSC 6.14.2 The following factors shall be taken into account by the System Operator when carrying out Demand forecasting in the Programming and Control Phases:

Historic Demand data including Transmission System Losses;

Weather forecasts and the current and historic weather conditions;

The incidence of major events or activities which are known to System Operator in advance;

Demand Control of 1 MW or more; and

Other information supplied by Users.

DSC 6.14.3 The System Operator shall produce forecasts of Demand using a forecasting methodology taking into account the above factors to produce, by statistical means, unbiased forecasts of Demand including that to be met by Generating Plant.

DSC 7 OUTAGE PLANNING AND DATA PROVISION

DSC 7.1 Introduction

DSC 7.1.1 The Dispatch Code is concerned with the coordination through various timescales, of Planned Outages of Plant and Apparatus on the Transmission and Distribution Systems for construction, repair and maintenance, with the release of Generating Units for construction, repair and maintenance.

DSC 7.1.2 DSC 12 establishes procedures to enable the collection of such outage data from Generators and Users as is required by the System Operator to comply with the requirements of the Generation, Dispatch, Supply, Distribution and Transmission Codes.

DSC 7.1.3 The means of providing the information to the System Operator and its confirmation includes any non-transitory written form which enables the recipient to retain the information.

DSC 7.1.4 In general terms there is a preferred time period for planned outages of Generating Units, and parts of the Transmission and Distribution Systems. These preferred time periods are determined by reference to the excess of the total capacity of Generating Plant available over the sum of Demand plus the Operating Margin at the relevant time.

DSC 7.1.5 In the Dispatch Code, "Year 0" means the current calendar year at any time, Year 1 means the next calendar year at any time, Year 2 means the calendar year after Year 1, and so on.

DSC 7.2 Objective

DSC 7.2.1 The main objective of this section 3 of the Dispatch Code is to ensure, as far as possible, that the System Operator co-ordinates, optimizes and approves Outages of Generating Units taking into account Transmission and Distribution System Outages in order to minimize the number and effect of constraints on the Transmission System and in order to ensure that, so far as possible, forecast Demand plus the Operating Margin is met.

DSC 7.2.2 To achieve he main objective, this section sets out the Operational Planning Procedure and typical timetable for the co-ordination of outage requirements for Plant and Apparatus to be provided by Users to enable the System Operator to operate the System.

DSC 7.2.3 It also specifies the information to be provided by Users to the System Operator to allow it to meet its obligations under the Codes.

DSC 7.2.4 The System Operator shall, in relation to all matters to be undertaken pursuant to this Dispatch Code, including the co-ordination of Generator Outages, act reasonably and in good faith in the discharge of its obligations.

DSC 7.3 Information flow and coordination

DSC 7.3.1 Embedded Generating Plant

Information relating to Embedded Generating Plant not subject to Central Dispatch whose Registered Capacity is greater than 5 MVA shall be provided where specified directly to the System Operator. This may include Users with own Generation where the System Operator considers it appropriate.

DSC 7.3.2 Other Plant and Apparatus

Information relating to all Plant and Apparatus connected to the System, or that which may affect its Operation, shall be provided to the System Operator on request.

DSC 7.4 Timescales and data

DSC 7.4.1 The following information is required to be provided by Users and Generators to the System Operator in the timescales indicated.

DSC 7.4.2 The Operational Planning Phase covers the Year 1 period. For all Generators and Users with Connection Points on the Distribution System where the System Operator has identified that such Customers must comply with the outage planning requirements of this code due to the impact that their outages may have on the System, such Generators and Users are to inform the System Operator of proposed planned outages required at the Connection Points for the following year commencing January 1st (Year 1).

DSC 7.4.3 The information gathered through this Dispatch Code shall be used by the System Operator in the formation of the Transmission and Distribution System Outage Plan which shall be issued at the end of October.

DSC 7.4.4 As time passes the Year 1 plan becomes the Year 0 or current year plan. The Outage plan shall be kept up to date during year 0 by the System Operator, taking account of System conditions, planned Outage schedule deviations of

Embedded Generators and User s Equipment connected to the Distribution System.

DSC 7.4.5 This Dispatch Code does not provide requirements for the notification and forward planning of outages on the System other than for those identified in DSC 7.4.2

DSC 7.4.6 The Programming Phase covers the period from one(1) week. The phase commences at 13:00 each Friday and at this time the System Operator shall issue the week ahead outage plan covering all outages on the System.

DSC 7.5 Planning of Generation Outages

DSC 7.5.1 The planning of Generator outages is subject to the provisions of the Generation Code. The three (3) year Generator outage planning cycle is summarized below in DSC 7.5.2, DSC 7.5.3 and DSC 7.5.4

DSC 7.5.2 The System Operator shall develop overall generation maintenance plans for three (3) Years in advance. The plans which must incorporate statutory maintenance requirements shall be reviewed annually and updated as may be necessary.

DSC 7.5.3 Generators are required to submit to the System Operator on or before the first day of July of each Year a rolling three (3) Year plan for the scheduled maintenance requirement for their facility beginning in January of the following Year.

DSC 7.5.4 The System Operator shall obtain Scheduling information from Generators for Embedded Generating Plant not subject to Central Dispatch where it considers it appropriate and relevant.

DSC 7.5.5 The Scheduling information shall specify the following on an individual Generating Unit basis:

the period the unit is required;

the planned half-hourly output; and

any other information the System Operator reasonably considers necessary

DSC 7.5.6 The System Operator shall endeavor to schedule Outages in a non-discriminatory manner as far as System security constraints allow. Both the System Operator and Generator shall make best efforts to ensure that interconnection and other related facilities are maintained within the periods stipulated for scheduled maintenance of the Generating Unit.

DSC 7.6 Planning of Transmission System Outages affecting Generators.

The procedure set out below is to be followed in each calendar year.

DSC 7.6.1 The planning of Transmission System Outages is dependent on the schedule of Generator Outages.

DSC 7.6.2 The System Operator shall plan Transmission System Outages required in Years 2 and 3 as a result of construction or refurbishment works taking due account of known requirements. It is not anticipated that any detail of maintenance outages on the Transmission System will be available 2 or 3 years ahead.

DSC 7.6.3 The planning of Transmission System Outages required in Years 0 and 1 ahead shall, in addition, take into account Transmission System Outages required as a result of maintenance.

DSC 7.6.4 Transmission System Outages and Generating Unit Outages shall be coordinated so that, in general, Generating Unit Outages shall take precedence over Transmission System Outages but subject always, in any particular case, to the System Operator s discretion to determine otherwise on the basis of reasons relating to the proper operation of the Transmission System.

DSC 7.6.5 By the end of October in each year the System Operator shall draw up a draft

Transmission System Outage plan covering the period Years 2 and 3 for the System Operator internal use and shall notify each User in writing of those aspects of the draft plan which may operationally affect such User including, in particular, proposed start dates and end dates of relevant Transmission System Outages. A copy of the draft transmission outage plan shall be submitted to the OUR annually. The System Operator shall indicate to a Generator restrictions on the Scheduling and Dispatch of Generating Units to allow the security of the Transmission System to be maintained in accordance with the Licence.

DSC 7.7 Medium Term Operational Planning - Planning for Year 1

DSC 7.7.1 The plan for Year 2 produced pursuant to DSC 7.6.5 above shall become the draft Transmission System Outage plan for Year 1 when, by the passage of time, Year 2 becomes Year 1. Each calendar year the System Operator shall update the draft Transmission System Outage plan for Year 1 and shall, in addition, take into account Outages required as a result of maintenance work.

DSC 7.7.2 By the end of September each year Users shall submit to the System Operator details of any maintenance outages required at the Connection Point for the following Year 1. Maintenance outages scheduled by the System Operator shall also be included in the transmission outage plan.

DSC 7.7.3 By the end of October each year the System Operator shall issue the final

Transmission System Outage plan for Year 1. A copy this Transmission

System Outage Plan shall be submitted to the OUR annually.

DSC 7.7.4 The System Operator shall notify each User in writing of those aspects of the plan which may operationally affect such User including, in particular, proposed start dates and end dates of relevant Transmission System Outages. The System Operator shall also indicate where a need exists to use emergency switching, emergency load management or other measures including restrictions on the Scheduling and Dispatch of Generating Units to allow the security of the Transmission System to be maintained.

DSC 7.8 Short Term Operational Planning

DSC 7.8.1 The Transmission System Outage plan for Year 1 issued under DSC 7.7 shall become the final plan for Year 0 when by the passage of time Year 1 becomes Year 0. The System Operator shall keep the Transmission System Outage Plan updated during Year 0 to take account of fault outages and changes to outage durations of both Generator and Transmission System Equipment.

DSC 7.8.2 The System Operator shall develop a Distribution System Outage plan for Year 0. The System Operator shall keep the Distribution System Outage Plan updated during Year 0 to take account of fault outages and changes to outage plans and durations of both Embedded Generators and Distribution System Equipment.

DSC 7.9 Programming Phase

DSC 7.9.1 Each Friday the System Operator shall update the Transmission and Distribution System Outage plans for the following one week period beginning at 13:00 hours on the Friday.

DSC 7.9.2 The Transmission System Outage plan for the week ahead shall determine the Transmission Constraints which impact on the Unit Commitment Schedule which the System Operator prepares each working day in accordance with Clause 7.7.1 of the Dispatch Code.

DSC 7.9.4 The System Operator shall notify each User in writing of those aspects of the plan which may operationally affect such User including in particular proposed start dates and end dates of relevant Transmission and Distribution System Outages. The System Operator shall also indicate where a need exists to use emergency switching, emergency load management or other measures including restrictions on the Dispatch of Generating Units to allow the security of the Transmission and Distribution System to be maintained.

DSC 7.9.5 During the Programming Phase each User and the System Operator shall inform each other immediately if there is any requirement to depart from the Outages and actions determined and notified under this subsection.

DSC 7.9.6 The programming of outages shall also be subject to the following JPS internal policy documents:

Engineering Instruction 1.11 - Planned Outage Procedure;

System Operation Policy and Procedure 14 - Planned Outage Procedure T & D; and

System Operation Policy and Procedure 19 - Planned Outage Procedure.

For reference purposes these Procedures are reproduced in Appendix A.

DSC 7.9.7 These Procedures outline notice requirements for the submission of outage requests to the System Operator. The provisions in this Dispatch Code shall not supersede the requirement to submit an outage request within the timescales specified in the said Procedures.

DSC 7.9.8 The fact that a transmission outage appears in the Year 1 Transmission Outage Programme does not preclude the requirement to submit an outage request in accordance with the internal Procedures.

DSC 8 OPERATING MARGIN

DSC 8.1 Introduction

DSC 8.1.1 DSC 8 of the Dispatch Code sets out the types of reserves making up the Operating Margin that the System Operator may use in the Control Phase.

DSC 8.2 Operating Margin Constituents

DSC 8.2.1 The Operating Margin comprises Contingency Reserve plus Operating Reserve.

DSC 8.2.2 Contingency Reserve is the margin of Generation Capacity required in the period from 24 hours ahead down to real time, over and above the forecast Demand. It is provided by Generating Units that are not required to be Synchronized but which must be held Available to Synchronize within a defined timescale.

DSC 8.2.3 Operating Reserve provides spare Generation Capacity for Frequency control in real time (Spinning Reserve) and quick time contingency (10_minutes Reserve) and is provided by Generating Units that are either synchronized or can be synchronized within minutes. Contingency Reserve and Operating Reserve provide against uncertainties in Availability of Generating Units and in Demand

forecasts. Operating Reserve consists of Spinning Reserve and 10-minute Reserve.

DSC 8.3 Contingency Reserve

DSC 8.3.1 The System Operator shall determine the amount of Contingency Reserve required for each hour up to 24 hours ahead, taking due consideration of relevant factors, including but not limited to the following;

Availability and historical reliability performance of individual Generating Units;

Notified Risks of Trip of individual Generating Units; or

Demand forecasting uncertainties.

DSC 8.4 Operating Reserve

DSC 8.4.1 The System Operator shall determine the amount of Spinning Reserve and 10 Minute Reserve that must be available to it from Generating Units at any time to ensure System security. The System Operator Operating Reserve policy shall take due consideration of relevant factors, including but not limited to the following:

the magnitude of the largest Active Power infeed from Generating Units;

the predicted Frequency drop following loss of the largest infeed as may be determined through simulation using a dynamic model of the Total System;

the extent to which Demand Control can be implemented;

the cost of providing Operating Reserve at any point in time; and

ambient weather conditions, insofar as they may affect, directly or indirectly, Generating Unit and/or Transmission System reliability.

Variability of intermittent renewable generation

DSC 8.4.2 The System Operator shall keep records of the Operating Reserve policy and of significant alterations to it as determined by the above and any other factors.

DSC 8.5 Procedures

DSC 8.5.1 The Procedures used by the System Operator to determine the Operating Margin are set out in the following documents:

The Generation Code including the Schedules; and

System Operation Policy and Procedure No 8 Operating Spinning Reserve.

DSC 9.0 Merit Order System

The System Operator shall establish a Merit Order based on the real or contracted Variable Operating Cost component of each Generating Unit or Complex, whichever is applicable.

The Variable Cost of each Generating Unit or Complex is the sum of the Variable Operating & Maintenance Cost (VOM) and the Fuel Cost. In mathematical form:

Merit Order Cost ($/MWh) = Fuel Cost ($/MBTU) x Full Load Heat Rate (MBTU/MWh) + VOM ($/MWh)

This information allows the System Operator to rank the Generating Units in the order of their Full Load Point cost of operation.

The commitment and de-commitment of units in the cost optimization process shall be guided by a number of system parameters including load, available units, the Merit Order Ranking and the forecasted duration. Once committed, the dispatch level of each Generating Unit or Complex shall be determined by the application of the equal incremental cost principles in Economic Dispatch as described in Sub-section

The Generating Units Committed and Scheduled in accordance with the Merit Order ranking shall be selected for Generation Dispatch subjected but not limited to the following factors for each Generator or Complex:

Real or Contracted Fuel Price

Real or Contracted Variable Operations and Maintenance Price

Energy Price

Declared and projected (MW) capability;

Declared and contracted operating characteristics including inter alia;

Heat Rate Characteristics (Real or contracted)

Start-up cost of the units;

Transmission Penalty Factor

Network Stability and Security

Spinning and Other Operating Reserves

Units that have been declared based on their contract, as Take-As-Available, are not influenced by the merit order and equal incremental cost optimization processes.

DSC 9.1 NOTIFICATION OF MERIT ORDER

The System Operator shall notify the Generator as to the relative position of its dispatch-able Generating Unit(s) in the Merit Order in terms of ranking number each Week.

The System Operator shall notify the OUR of the daily revised Unit Commitment Schedule and the actual dispatch for the prior twenty four (24) hours.

DSC 9.2 Review of Merit Order and Dispatch input

DSC 9.2.1 Fuel Data

The Merit Order shall be revised on an ongoing basis to reflect the latest available information which includes changes in delivered fuel prices as they occur, consistent with the fuel procurement cycle for each Generating Facility and updates in VOM consistent with the Generator's reporting or business cycle. Updated Merit Order must be declared at the beginning of each Month. Where there is the need to adjust this Merit Order within this monthly cycle the updated Merit Order must be declared within 24 hours of being effected.

Generator shall provide the latest fuel cost and/or VOM information to the System Operator for its Generating Facilities within 24 hours of a request or from the time when such information becomes available.

DSC 9.2.2 Heat Rate Data

Heat Rate is computed by dividing the total British thermal unit (Btu) content of fuel consumed for electricity generation by the resulting net kilowatt-hour generation. The Basis of the value should always be expressed as either Lower Heating Value (LHV) or Higher Heating Value (HHV). The basis of the heating value provided shall be consistent with the relevant contractual arrangements and the capability of the generation technology employed.

The Heat Rate data for each Generating Unit is necessary to determine its variable fuel operating cost. All contracts for new thermal generating capacity shall have a guaranteed Heat Rate curve or point.

The Heat Rate Tests for each Generating Unit, not having a guaranteed curve or point, shall normally be conducted at least twice annually or as stipulated by contract. The schedules for the Heat Rate Test for all Dispatchable Generating Units shall be developed by the System Operator at least one Month before the end of the preceding Year. The Heat Rate Test schedules may be adjusted within the Year to accommodate unforeseen circumstances, subject to agreement

between the Generator and the System Operator. Such schedules for Heat Rate Test shall be submitted to the OUR by the System Operator.

The Heat Rate Test shall be conducted at a minimum of four (4) output levels from the minimum output level to the maximum output level for each Generating Unit.

The Heat Rate information obtained from Heat Rate Tests together with the guaranteed Heat Rates (for units to which this is applicable) shall be used as one of the inputs to the Generator Scheduling and Dispatch optimization process.

If the System Operator has sufficient reasons to believe that the Heat Rate of a Generating Unit which does not have a guaranteed curve or point, has changed significantly within the Month or since the last test (due to rehabilitation, damage etc.) the System Operator may request the Generator to conduct a Heat Rate Test in accordance with the JPS Heat Rate Testing Policy (in the case of JPS owned generators) or other approved policy (in the case of non-JPS generators) and update the Heat Rate curve for such a Generating Unit. All cost associated with the Heat Rate test shall be the responsibility of the Generator.

The Generator may request a heat rate test of its own unit if it can provide information to substantiate that it has made improvements in the performance of its Unit(s). No more than two such requests will be accommodated within any calendar year.

Heat Rate Tests for all Generating Units, including those of the Single Buyer, shall be coordinated (mutually agreed date) by the System Control Engineer. The System Operator shall reserve the right to witness all such tests.

The OUR shall be advised and duly notified beforehand when such tests are contemplated and carried out and reserves the right to witness all such tests.

In the case of Independent Power Producers, the information on which the Generating Units will be ranked shall be based on the contractually agreed performance or such other criteria as established through the Power Purchase Agreement between the Generator and the System Operator.

DSC 9.3 Unit Commitment Scheduling and Dispatch

It is the System Operator's obligation to prepare a Unit Commitment and Dispatch Schedule which reasonably reflects the likely System conditions. This schedule shall be prepared for the following Week and revised on a daily basis, except for weekend days and public holidays. The scheduling of Generating Units shall be in accordance with the latest available information, subject to relevant technical constraints specified in Sub-section 3.2.

Each Generator must submit to the System Control Center by approved communication means a declaration of plant availability and capability, and any other information as agreed between the Generator and the System Operator

from time to time. This data is to be declared to the System Operator in order to facilitate the timely preparation of a Unit Commitment Schedule.

A Weekly Unit Commitment Schedule and Dispatch forecast shall not be regarded by any Generator to be Dispatch Instructions but shall be provided as a service to Generators for planning purposes.

The daily revision of the Unit Commitment and Dispatch Schedule shall at all times take precedence over the short-term predictions.

DSC 9.3.1 Preparation of Unit Commitment and Dispatch Schedule

In the preparation of Unit Commitment and Dispatch Schedule, the System Operator shall take into consideration, among other things pertinent to commitment schedule, the following factors:

- forecasted Demand and geographical Demand distribution;
- each Generator's declaration of each Generating Unit(s) MW capability and availability;
- Generator's contracted operating characteristics;
- contracted and declared Heat Rate curve or point;
- fuel prices and constraints;
- System reserve requirements;
- System Stability implications, frequency and voltage control; and
- System constraints.

Monday - Friday: The daily schedule of expected availability and Generation Dispatch shall be prepared by System Control Center and made available to the System Control Engineer by 1 p.m. each day for the 24 hour period starting 1 p.m. to 1 p.m. the following day. This shall be reviewed by 1 p.m. on the following day.

Saturday-Sunday: The daily schedule of expected availability and generation levels for the weekend shall be done and made available to the System Control Engineer by 1 p.m. on the Friday preceding the weekend. This schedule shall cover the period from Friday 1 p.m. to Monday 1 p.m. and shall be reviewed by 1 p.m. on the Monday afternoon.

To facilitate preparation of these schedules, the Generator shall make a declaration of plant availability and capability over the scheduled period and any other information, as agreed between the Generator and the System Operator from time to time for remaining hours in the current day starting at 11 am.

The specific procedure for receiving data and making notification of commitment of Generating Units for dispatch shall be based on the following:

- An agreed and approved means of communication between the Generator and Operational Planning Engineer with adequate backup in case of the failure of this approved means; and
- In order to ensure rapid transfer of information an interim declaration shall normally be verbally submitted in the first instance and shall be confirmed by the approved means without delay.

Where a Generator becomes aware of any changes in these declared values or other data subsequent to the declaration, then the Generator shall without delay notify the System Control Engineer.

DSC 9.4 Dispatcher Training Simulator (DTS)

DSC 9.4.1 The System Operator shall maintain a functional Dispatcher Training Simulator as part of its SCADA system.

DSC 9.4.2 The System Operator shall request all the data required from each Generator as specified in Appendix XX and as required under DSC XX , the Data Registration Section of this Dispatch Code

DSC 9.4.3 The Dispatcher Training Simulator shall be used to evaluate the historical performance of the system, to validate historical actions taken and to train System operators in the management and control of the System.

The DTS should also be used to test the adequacy of the System Operator's System Restoration Procedures and to guide the development of any new Operating Policy and Procedure.

DSC 9.4.4 Generators shall provide information requested by the System Operator to facilitate its maintenance of an accurate and functional Dispatcher Training Simulator.

DSC 9.5 Dispatch for Operations

DSC 9.5.1 This operations section of the Dispatch Code is concerned with defining the operational responsibilities of the System Operator and Generators in respect of Dispatch and the Dispatch Processes active during real time operation of the System. This section of the Dispatch Code covers the following areas:

SCADA System Real Time Update (demand and generator availability and capability)

Unit Commitment and Dispatch Real Time Update

Non Dispatchable (VRPP) monitoring and management

Generator Outage Execution

Generating Unit synchronization

Frequency (AGC) and Voltage Control

Reserve Margin Monitoring and Control

Dispatch Deviation Tracking and Reporting

After the Fact (AFE) Variance Analysis and Reporting

Safety Co-ordination

Contingency Planning;

DSC 10 SCADA SYSTEM UPDATE

DSC 10.1 Real Time Demand Forecast

DSC 10.1.1 The System Operator shall update the daily projected Demand Forecast in real time with consideration for the change in demand influencing factors such as temperature, weather and change in customer expected use based on actual demand trend.

DSC 10.1.2 The System Control Engineer will keep the Unit Commitment and Dispatch model in the SCADA system updated with the revised demand forecast.

DSC 10.2 Real Time Generator Availability and Capability Update

DSC 10.2.1 The System Operator shall update the Availability and Capability of each Generator in the SCADA system in real time based on information obtained from communicating with the Generators.

DSC 10.2.2. Changes to generation conditions

The Generator shall notify the System Operator as soon as possible of any factors which will or are likely to, affect the power output capability, flexibility, response or cost of production of any of its Generating Units.

Generating Units and apparatus shall not be taken out of service or rendered unavailable without reference to the System Operator except in cases of Emergency. In such cases the System Control Engineer shall be informed as soon as possible of the action taken.

A Generator experiencing an unplanned outage of any of its Generating Units shall inform the System Operator as soon as possible of all relevant details concerning this outage. As soon as the cause of the outage has been properly assessed and a recovery plan established, the Generator shall inform the System Operator of the expected time and the condition under which the Generating Unit shall return to service.

The actual time that the outage occurred and the Generating Unit was returned to service and any other information deemed to be important in relation to the outage shall be logged by the System Control Engineer.

DSC 11 UNIT COMMITMENT AND DISPATCH REAL TIME UPDATE

The System Operator shall seek at all times to minimize the variable cost of electricity production subject to constraints of system security, reliability, safety, fuel availability, emission limits and other environmental considerations, and contractual obligations.

The System Operator is required to operate and maintain a merit order system for Generating Units subject to central dispatch. The scheduling of units for dispatch should be in ascending order of the marginal costs in respect of any hour for the generation and delivery or transfer of electricity into the Grid, to the extent allowed by Transmission System operating constraints and the dynamic operating characteristics of available Generating Units, among other things, based on equal incremental cost principles.

In order to efficiently operate and manage the System Grid in a safe, secure and economic manner, the System Operator will require accurate and timely information on the Generating Units' including, availability, efficiency and technical operating capability.

This section outlines the procedures used to determine how individual Generating Units or Facilities are operated in parallel to achieve these objectives based on the information received by the System Operator.

DSC 11.1 Unit Commitment

The System Operator shall update the planned unit commitment schedule based on new real time information obtained from Generators and a revised demand forecast.

The System operation shall issue timely instruction to Generators to start their Generating units and place them into service to meet the anticipated Demand.

Each Generator is required to ensure that their Generating Unit is prepared and available at their declared capability to respond to a dispatch instruction from the System Operator based on the required unit commitment schedule.

DSC 11.2 Dispatch Instructions

This clause sets out the procedures for issuing Dispatch Instructions to Dispatchable Generating Units and the responsibilities of the System Control

Engineer and the Generating Unit Controllers in the minute to minute control time frame.

Real Power (MW) Dispatch

Real Power (MW) dispatch shall be based on an Equal Incremental Cost principle to minimize the variable operating cost, subject to the considerations specified in Sub-sections 11.2, 11.4 respectively. Dispatch Instructions are normally given on a half hourly basis or anytime that is warranted by the operational requirements of the System.

The Equal Incremental Cost Principle states that, to achieve the most economic dispatch of power generation each Generating Unit on line, should operate at the same System wide point of Incremental Cost to serve a given load, unless the limit of capacity of a Generating Unit or other imposed constraints prevents it from reaching that cost. The Incremental Cost is the cost required to produce an additional MWh of energy above a base amount.

Reactive Power (MVAR) Dispatch

Reactive Power (MVAR) is dispatched at the discretion of System Control Engineer to maintain the System voltage within the tolerable limits. Under normal operating conditions Generating Units operate at 0.85 pf but could be required to operate at as low as 0.8 pf and can be requested to absorb reactive power, within the minimum functional specification of the units.

In instances when the System Operator makes the request for the Generator to absorb VARS, the Generator should not be penalized on their electricity bill during that period, to the extent that the absorption of reactive power has affected the approved tariff ratcheting mechanism.

All Generators are required to provide the generator capability curve for the unit upon request by the System Operator. The System Operator shall at all times use the most economical choice available to manage the system voltage.

Ancillary Service

The System Operator subject to the approval of the OUR may contract with suitably qualified Generators for ancillary services (Voltage Support, Frequency Control, Reserve Support, etc.) to the extent that it does not violate the Power Purchase Agreements.

DSC 11.3 Non-centrally Dispatched Plant

Non Dispatchable Generating Units shall operate as agreed upon between the System Operator and the Generator.

The System Operator shall inform such Generators where there is a need for outage on the Generating Unit or of any incident which would affect the operations or safety of the Generating Unit.

During an Emergency, or where there is life and property at risk, the System Operator and/or the Generator reserves the right to disconnect and so isolate any Generating Unit without prior notification. However, both parties must communicate immediately once the risk has been neutralized, to inform of the action taken and why it was necessary to take such action without prior notice.

The Generator shall communicate with the System Control Engineer on matters of switching and Synchronization during normal operations and in the event of System Emergency.

DSC 12 INSTRUCTION TO SYNCHRONIZE / DESYNCHRONIZE

The times at which a Generator shall be synchronized and desynchronized shall be directed by the System Control Engineer.

DSC 13.0 Frequency and voltage control

DSC 13.1 Frequency and Voltage Management

Adherence to the frequency and voltage standards shall be the responsibility of the System Control Engineer who shall issue to each Generator the required Dispatch Instructions for both Real Power (MW) and Reactive Power (MVAR) output or absorption in the case of Reactive Power, in accordance with the declared operating limits of each Generating Unit as agreed upon between the System Operator and the Generators to ensure adherence to these operating standards.

Automatic Generation Control (AGC) can be used to perform frequency control by sending signals to generator to adjust output.

To the extent that the application of AGC is deemed economically feasible to the consumer and technically possible based on the specific generator capability and/or its expected operating regime, each new Generator shall ensure that the Generating Units are AGC enabled and can, without human intervention, accept and respond to a signal to adjust load.

Additionally, the SCADA/EMS system shall have the capability to facilitate the use of AGC. The range of control afforded by the implementation of AGC shall be the subject of the Generator's PPA.

DSC 13.2 System Control Center Responsiblity

The System Control Engineer shall be responsible for issuing any instruction necessary to:

Maintain the voltage on the Transmission System in accordance with the normal operational limits of +/- 5%;

Maintain, or enable others to maintain, the voltage of supply to consumers within the limits of +/- 5% of the Nominal Operating Voltages;

Supply the Reactive Power requirements of the System as economically as possible, and to organize the disposition of Reactive Power reserves for proper control of the System voltage in accordance with the requirement of i) and ii) above;

Maintain frequency within the limits of 50 Hz +/- 0.2 Hz

Designate Generating Units to operate in Dispatch or Spinning Reserve mode

DSC 13.3 Generator Responsiblity

The Generating Unit Controller shall be responsible for:

Ensuring that the Generating Unit's mode of operation is as designated by the System Control Engineer;

Ensuring that Generating Units operate in active power frequency control mode followed only by frequency control mode when in emergency/abnormal conditions unless operation in this mode has been agreed as being impracticable between the Generator and the System Operator;

Ensuring that Generating Unit(s) automatic voltage regulators are in service continuously. The System Control Engineer shall be informed whenever a Generating Unit is operating without its automatic voltage regulator or Reactive Power limiter; and

Notifying immediately the System Control Engineer of any unusual voltage, frequency or power condition or any dynamic disturbances occurring upon any Generating Unit.

In the event of a sudden change in System voltage a Generating Unit Controller shall not take action to override automatic Reactive Power generation response, unless instructed otherwise by the System Control Engineer or unless immediate action is necessary to comply with stability limits or declared constraints of plant apparatus.

DSC 14 OPERATING RESERVE MONITORING AND MANAGEMENT

DSC 14.1 Spinning Reserve

The System Operator shall carry a minimum Spinning Reserve margin as set out in Schedule D of this Code. The determination of the Spinning Reserve margin shall be based on economics and System Security considerations.

The System Operator may from time to time adjust its Spinning Reserve policy subject to the approval of the OUR. Before such approval can be granted, the System Operator shall submit the revised Spinning Reserve policy to the OUR for review, analysis and determination.

DSC 14.2 Operating Reserve

The System Operator shall co-ordinate Scheduled Outages such that the Ten Minute Reserve margin and the Operating Reserve margin are maintained at or above the level set out in Schedule D. This shall allow the System to be able to accommodate one of the largest Generating Units being forced out of service and still maintain adequate available Capacity to meet System Demand.

The Ten Minute Reserve margin shall comprise units which are able to be synchronized and provide real power within 10 minutes.

In the case of System Emergency and unplanned outages, the Scheduled Outages of Generating Units shall be rescheduled if possible to maintain the defined reserve margin as per SCHEDULE D..

DSC 15 Dispatch Deviation Tracking and Reporting

DSC 15.1 The System Operator shall keep a record all dispatch instructions and the compliance of each Generator with the instructions received.

DSC 15.2 Each Generator shall keep a record all dispatch instructions received and their level of compliance.

DSC 15.3 Dispatch Deviation shall be calculated by the System Operator for all Dispatchable Generators. This information shall be used to calculate the dispatch deviation penalties for Generators which have a dispatch deviation penalty as part of their Power Purchase Agreement (PPA).

DSC 15.4 After the Fact Evaluation (Variance Analysis)

DSC 15.4.1 The System Operator shall perform simulations to determine the actual dispatch performance for each day.

DSC 15.4.2 The System Operator shall do a daily comparison of the Planned Unit Commitment and Dispatch with the Actual Unit Commitment and Dispatch Achieved.

DSC 15.4.3 The System Operator shall provide a Dispatch Variance Report to the OUR for each Day. This report should identify and quantify as best as possible the contributing factors to dispatch variance. The System Operator must provide adequate explanation of all variances from the planned dispatch. Explanatory factors shall include changes to Generator Capability, Availability and Efficiency, System Stability and Security, Frequency and Demand. The Dispatch Variance Report

DSC 15.4.4 All non-compliance with the required Merit Order dispatch shall be communicated in writing by the OUR to the System Operator within 3 months of any such determination of non-compliance.

DSC 15.4.5 The System Operator shall keep a record all dispatch instructions and the compliance of each Generator with the instructions received.

DSC 15.4.6 The OUR shall ensure that an independent audit of the Dispatch process is conducted annually.

DSC 15.4.7 All Generators are required to keep a record of their dispatch performance and shall provide reports to the OUR upon request. Generators are also required to take all steps to facilitate and comply with the information requirements of the OUR commissioned annual Dispatch audit.

DSC 16 SAFETY CO-ORDINATION

DSC 16.1 Objective

DSC 16.1.1 The objective of DSC 16.2 is to ensure that the safety procedures adopted on either side of a Connection Point work together in such a way as to ensure the safety of personnel, and/or Plant at any time that work and/or testing is carried out at or near the Interconnection Point.

DSC 16.2 Approved Safety Management Systems

DSC 16.2.1. The System Operator in conjunction with the connecting Generator shall establish a Safety Management System specifying the principles and procedures, and where appropriate, the documentation to be applied so as to ensure the health

and safety of all who are liable to be working or performing tests on the Generation System, or on Plant and Apparatus connected to it.

DSC 16.2.2. DSC 16.0 requires that an approved Safety Management System is applied by the System Operator to meet statutory and other requirements.

DSC 16.2.3 A Safety Management System is to be adopted and shall be jointly agreed at sites or locations where an Operational Interface exists. This shall include provision for persons approved by the System Operator and Generators to operate the Safety Management Systems in use by field personnel where appropriate.

DSC 16.2.4 Documenation

A system of documentation shall be maintained by the System Operator and the User which records the safety precautions taken when:

work or tests are to be carried out on Plant and/or Apparatus across the Operational Interface; and isolation and/or earthing of the other System is needed.

Where relevant, copies of the Safety Management Systems and related documentation shall be exchanged between the System Operator and Users

for each Operational Interface.

DSC 16.3 Authorised personnel

Safety Management System shall include the provision for written authorisation of personnel concerned with the control, operation, work or testing of Plant and Apparatus forming part of, or connected to, the Generation System.

Each individual Authorisation shall indicate the class of operation and/or work permitted and the section of the System to which the authorisation applies.

The authorisation of personnel concerned with the control, operation, work or testing of Plant and Apparatus which is under the safety management of the System Operators System Control shall only be undertaken by the approved officers of the System Operator.

DSC 16.4 Local Safety Procedures

DSC 16.4.1 DSC 16.4 specifies the procedures to be used by the System Operator and Generators for the establishment, and maintenance of switching and clearance procedures to ensure that work on Apparatus on the System or a User's System can be carried out safely. It applies only when work and/or testing, other than the System Tests covered by Sub-section DSC 16 is to be carried out and where

the safety of personnel or plant requires the System Operator and a Generator or Generators to liaise.

DSC 16.4.2 DSC 16.4 does not define the Safety Rules to be adopted by the System Operator or any Generator but sets out the requirement to prepare procedures, which shall govern the interface between them. In particular it lays down the rules for agreeing the safety procedures (the Local Safety Procedures) which shall be adopted on either side of a Connection Point between the System Operator and any Generator.

DSC 16.4.3 Where the provisions of DSC 16.4 require a party to approve the Local Safety Procedures of another Party, such approval does not imply that the approving party takes any responsibility for the adequacy of the Local Safety Procedures. The approval in such case only implies that there is nothing in the Local Safety Procedures that negates or frustrates any provision of the Local Safety Procedures of the approving Party for the relevant Connection Point.

DSC 16.4.4 Prior to the energising of a new Connection Point (or, for a Connection Point which has been energised before the procedure set out in DSC 6.3 has been adopted, as soon as reasonably practicable), the System Operator and the relevant Generator shall each supply the other with a copy of the Local Safety Procedures which it intends to adopt on its side of the Connection Point.

DSC 16.4.5 The party from whom approval is sought shall, within 7 days of receipt of the Local Safety Procedures, send written comments to the issuing party giving:

its approval of the Local Safety Procedure; or

its reasons for refusing to give approval and the changes which it would wish to see to enable it to grant approval.

If the party from whom approval is sought requires more stringent Isolation and/or Earthing provisions then, to the extent that these provisions are not unreasonable, the other Party shall make such changes to its Local Safety Procedures as soon as is reasonably practicable.

DSC 16.4.6 If, subsequent to the approval of any Local Safety Procedures, the issuing party wishes to change any provision of the procedure, it shall prepare a version of the procedure showing the original text and clearly indicating the changes required to this text and shall seek approval of this procedure as if this procedure had not previously been approved.

DSC 16.4.7 If an approved Local Safety Procedures has been found to be unsound, revisions to this procedure, only to the extent that these are required to ensure the safety of personnel or Plant, may be implemented immediately, subject, only to the Safety Co-ordinators of the other party or parties having been informed of these changes and having confirmed that the changes do not increase the risk to their own personnel and/or plant and are understood.

DSC 16.5 Safety Co-ordinators

DSC 16.5.1 Prior to the energising of a new Connection Point (or, for a Connection Point which has been energised before the procedure set out in DSC 6.4 has been adopted, as soon as reasonably practicable), the System Operator and the relevant Generator shall, in respect of this Connection Point, each appoint a person to act as Safety Co-ordinator and a second person to act as Safety Coordinator at any time that the first named person is unavailable.

DSC 16.5.2 The System Operator and the relevant User shall each inform the other, in writing and without delay, of the identity of the persons appointed by them as Safety Co-ordinators. In the event of an intention to replace the person appointed as Safety Co-ordinator the other party to the Connection Point shall be notified of the identity of the new Safety Co-ordinator without delay.

DSC 16.5.3 The Safety Co-ordinators shall be responsible for co-ordination of all matters concerning safety across the Connection Point, including but not limited to, the approval of Local Safety Procedures. A Safety Co-ordinator may be responsible for more than one Connection Point site.

DSC 16.6 Isolation and Earthing

DSC 16.6.1 Without prejudice to the need to prepare and agree Local Safety Procedures for use at each Connection Point site, it would be expected that Isolation and Earthing principles no less stringent than those outlined in DSC 6.5.2 and DSC 6.5.3 shall be adopted.

DSC 16.6.2 Isolation Device

Where Isolation is achieved by means of an Isolation Device, the isolating position shall be maintained in such a way as to minimise the risk of inadvertent, accidental or unauthorised operation and that when put in this position, a notice or "tag" to this effect shall be attached.

Clearance to work on any Apparatus which requires this Isolation to be achieved shall only be issued when the procedure above has been completed.

DSC 16.6.3 Earthing Device

Where Earthing is achieved by means of an Earthing Device, the Earthing position shall be maintained in such a way as to minimise the risk of inadvertent, accidental or unauthorised operation and that when put in this position, a notice or "tag" to this effect shall be attached.

Clearance to work on any Apparatus that requires this Earthing to be achieved shall only be issued when the procedure above has been completed.

DSC 16.7 Site specific safety

Arrangements shall be made by all parties to ensure site safety and security as required by statutory requirements. Arrangements shall also be made by all

parties to ensure that personnel are warned, by an appropriate means, of hazards specific to any site before entering any area of the site. This shall include hazards that may be temporary or permanent. Where these risks include contamination or similar, suitable decontamination facilities and procedures shall be provided.

Arrangements shall be made to facilitate inspections by the System Operator management and safety representatives to sites accommodating the System Operator owned Plant and Apparatus.

DSC 17 CONTINGENCY PLANNING

DSC 17.1 Introduction

DSC 17.1.1 The Transmission Code covers the detailed System recovery procedures following a Major System Failure and that the System Operator intends to implement Black tart procedures.

DSC 17.2 Objectives

DSC 17.2.1 DSC 17 outlines dispatch requirements with a view to assisting the restart of the Total System or to operating the Total System in abnormal situations which require co-ordination between all Users with a common approach to give uniformity of priorities.

DSC 17.3 System recovery

DSC 17.3.1 The System Operator is responsible for the control of the Transmission System and the Distribution System.

DSC 17.3.2 Following a Major System Failure, the restoration of the System shall be managed through the implementation of a System Restoration Strategy developed by the System Operator under the requirements of Sub-Section TC 6 of the Transmission Code.

During the event of a Major System Failure, the following general procedures shall apply to restore power System-wide:

I. designate Generating Units with Black Start Capabilities to commence restoration;
II. restart these designated Generating Units;
III. establish a transmission line pathway to the nearest other Generating Unit which is to be restarted while clearing all Load in this pathway;

IV. establish a manageable distribution load preferably adjacent to the Generating Unit;
V. start and synchronize the Generating Unit;
VI. repeat procedures (IV) to (Vabove until all Generating Units required to restore power are brought back into service; and
VII. gradually return Load to the System while ramping up the power output of the Generating Units until the System is totally restored.
VIII. Procedures (IV) to (vVII) shall be used to restore the System after a partial System shutdown. For detailed information on System restoration procedures refer to the System Operator's System Restoration Policy and Procedures.

DSC 17.3.3 All Generators shall comply with instructions issued by the System Operator pursuant to the implementation of the System Restoration Strategy.

DSC 17.3.4 It should be recognised by Generators that the restoration of the System needs to be flexible and Generators shall comply with instruction issued by the System Operator during an event even if they conflict with the System Restoration Strategy.

DSC 17.4 User responsibilities

DSC 17.4.1 Each Generator shall follow the System Operator s instructions during a System restoration process, subject to safety of personnel, the System Operator s and the Generator's Plant and Apparatus.

DSC 17.4.2 It shall be the responsibility of the Generator to ensure that any of its personnel who may reasonably be expected to be involved in System restoration procedures are familiar with, and are adequately trained and experienced in their standing instructions and other obligations so as to be able to implement the procedures notified by the System Operator.

DSC 17.5 Black Start Procedure

DSC 17.5.1 The procedure for a Black Start situation shall be that specified by the System Operator at the time of the Black Start situation. Generators shall abide by the System Operator instructions during a Black Start provided that the instructions are to operate within the operating parameters of each Generator.

DSC 17.5.2 The System Operator may issue instructions to a Generator with Black Start capability relating to the commencement of a Generator when an external power Supply is made available to it.

DSC 17.5.3 The System Operator shall also issue instructions relating to the restoration of Demand.

DSC 17.5.4 Black Start instructions shall be implemented in accordance with the following procedures:

a. a Generator with Black Start capability shall start-up as soon as possible and within two hours of an instruction from the System Operator to initiate start-up. The Generator shall confirm to the System Operator when start-up has been completed;

b. following such confirmation, the System Operator shall endeavour to stabilise that Generator by instructing the restoration of appropriate demand following which the System Operator may instruct the start-up and synchronisation of the remaining available Generators at that Generating Facility and their loading with appropriate Demand to create a Power Island;

c. if during this Demand restoration process any Generator cannot keep within its safe operating parameters because of Demand conditions, the operator of the Generator shall inform the System Operator and the System Operator shall, where possible, either instruct Demand to be altered or shall re-configure the Transmission System or shall instruct a User to re-configure its System in order to alleviate the problem being experienced by the Generator;

d. The System Operator accepts that the decision to keep a Generating Unit operating outside its safe operating parameters is one for the Operator of the Generator concerned. The System Operator shall accept and respond accordingly to a decision of the operator of a Generator to change Generation output on a Generator if it believes it is necessary to do so for safety reasons; and

DSC 17.5.5 The System Operator shall have procedures in place for emergency restoration of the System following events such as hurricanes, earthquakes and torrential rains.

DSC 17.5.6 These Procedures shall be reviewed and updated by the System Operator and may be incorporated into other procedures developed in accordance with DSC 17.

DSC 17.5.7 The System Operator shall inform Generators of the end of a Black Start situation and the time at which the Transmission System resumed normal operation.

DSC 17.5.8 All notifications must be made promptly. Notifications by the System Operator to Users and responses may be made by telephone but must be confirmed

within 30 minutes in writing. Where information is requested in writing throughout this Code, facsimile transmission or other electronic means as agreed with the System Operator in writing may be used.

DSC 17.6 Re-Synchronisation Procedures

DSC 17.6.1 Where there is no Total System Shutdown but parts of the Transmission System are out of synchronism with each other, the System Operator shall instruct Users to regulate generation output or Demand to enable the separate parts to be re-synchronised. The System Operator shall inform the relevant Users when re-synchronisation has taken place.

DSC 17.6.2 The System Operator shall issue whatever revised dispatch instructions are required to enable re-Synchronisation and to return the Transmission System to normal operation.

DSC 17.7 Major System Failure Procedures

DSC 17.7.1 Major System Failures are unpredictable both with respect to timing and the resulting implications. The System Operator shall establish procedures for determining when an incident on the System shall be considered a Major System Failure and also establish outline procedures for handling these Major System Failures as required under the Electricity Act 2015, Part VII..

DSC 17.7.2 In certain circumstances, the System Operator may require an Emergency Operation Centre to be established to coordinate the response to a Major System Failure and to avoid placing further stress on existing System Operator and User operational control arrangements.

DSC 17.7.3 The System Operator shall inform Generators promptly that an Emergency Operation Centre is to be established and request all relevant Generators to implement System Incident Communications Procedures. The System Operator shall specify the responsibilities and functions of the Emergency Operations Centre and the relationship with existing operational and control arrangements.

DSC 17.7.4 The Emergency Operation Centre established in accordance with the System Operator s instructions shall have any responsibility for the Operation of the Transmission System and shall be the focal point for communication and the dissemination of information between the System Operator and senior management representatives of relevant Users, the OUR and Government.

DSC 17.7.5 During a Major System Failure, normal communication channels for operational control communication between the System Operator and Users shall continue to be used.

DSC 17.7.6 The System Operator shall decide when conditions no longer justify the need to use the Emergency Operation Centre and shall inform all relevant Generators within 30 minutes by facsimile or other agreed electronic means accordingly.

DSC 17.8 Major System Failure Communications

DSC 17.8.1 The System Operator and Generators shall ensure that there are suitable communication channels available and established protocols, including the

responsibilities of senior members of staff, to facilitate the co-ordination of activities after a Major System Failure.

DSC 17.8.2 The System Operator and all Users shall maintain lists of telephone contact numbers at which, or through which, senior management representatives nominated for this purpose and who are fully authorised to make binding decisions on behalf of the System Operator or the relevant User can be contacted day or night.

DSC 17.8.3 The lists of telephone contact numbers shall be provided in writing prior to the time that a Generator connects to the Transmission System and must be up-dated and circulated to all relevant parties, in writing, whenever the information changes. Notifications and responses shall be made normally by telephone but must be confirmed in writing within 30 minutes.

DSC 17.8.4 All Major System Failure communications between the Senior Management representatives of the relevant parties with regard to the System Operator's role in the Major System Failure shall be made via the Emergency Operation Centre if such a centre has been established.

DSC 17.8.5 System Alerts/Warnings

DSC 17.8.6 In the event of Major System Failures, such as Total System Shutdown or a System separation, the System Operator shall issue promptly an alert warning to all Users.

DSC 17.8.7 The form of the Alert Warning will be:

"This is an Alert timed at hours;

There is a (Major System Failure) at (place); A System Normalisation

Procedure is being implemented; Standby for further instructions"

DSC 18 INCIDENT INFORMATION SUPPLY

DSC 18.1 Introduction

DSC 18.1.1 This Dispatch Code requires the System Operator and Generators to issue notices of all Incidents on their respective Systems that have or may have implications for the Transmission System or a User's System.

DSC 18.1.2 The System Operator shall determine that if Incident should be classified as a Major System Failure in accordance with Section VII of the the Electricity Act 2015. DSC14.0 sets out the procedures for reporting and subsequent assessment of Major System Failures.

DSC 18.1.3 Where a Significant Incident has been declared the System Operator may request an investigation be carried out.

The composition of such an investigation panel shall be appropriate to the Incident to be investigated.

Where there has been a series of Significant Incidents (that is to say, where a Significant Incident has caused or exacerbated another Significant Incident) the System Operator may determine that the investigation should include some or all of those Significant Incidents.

Any investigation under DSC 18 is separate from any inquiry which may be carried out under legal or statutory requirements.

DSC 18.1.4 DSC14 requires the System Operator or a Generator to prepare:

a preliminary written Incident report within 24 hours of the Incident;

For a Major System Failure, a written report is required within 20 days of the Incident.

DSC 18.1.5 In addition, DSC 18 contains requirements governing the content of Major System Failure reports, the circulation of these reports, and their subsequent assessment and review by the Code Review Panel.

DSC 18.2 Objective

DSC 18.2.1 The objectives of DSC 18 are:

I. to specify the obligations of the System Operator and Generators regarding the issue of notices of Incidents on their respective Systems;
II. to ensure notices of Incidents provide sufficient detail to allow recipients of such notices to fully assess the likely implications and risks and take the necessary actions required to maintain the security and stability of the Transmission System or a Generator' s System;
III. to specify the arrangements for reporting Incidents that the System Operator has determined to be a Major System Failure; and
IV. to provide for the review of all Major System Failure reports by the Code Review Panel to assess the effectiveness of policies adopted in accordance with this Dispatch Code and the other Grid Codes.

DSC 18.3 Notification of Incidents

DSC 18.3.1 The System Operator and Generatorss shall issue notifications of Incidents on their respective Systems that have had or may have implications for the Transmission or Distribution System in the case of the Generator, or a Generator's System in the case of both the System Operator and Generator notifications. Where information is requested in writing throughout this Code, facsimile transmission or other electronic means as agreed with System Operator in writing may be used.

DSC 18.3.2 Without limiting the requirements of this Code, Incident notifications shall be issued for the following, subject to DSC 18.3.1; where Plant has been Operated in excess of its rated capability and presented a hazard to Persons;

The activation of any alarm or indication of any abnormal operating condition; adverse weather conditions being experienced; breakdown of, faults on or temporary changes in the capabilities of Plant; breakdown of or faults on control, communication and Metering equipment; and increased risk of inadvertent operation of protection devices, relays or Equipment

DSC 18.4 Incidents on the Transmission System

In the case of an Incident on the Transmission System, which has had or may have an Operational Effect on a Generator's System, the System Operator shall notify the Generator whose Generation System will be, is, or has been affected.

DSC 18.5 Incidents on a Generator's System

In the case of an Incident on a Generator's System, which has had or may have an Operational Effect on the Transmission System, the Generator shall notify the System Operator. Following notification by the Generator, the System Operator shall notify any other Users whose Systems will be, or have been affected.

DSC 18.6 Form of notification

Incident notifications must be issued promptly. Notifications and responses to notifications may be made by telephone or the mass media, but shall be confirmed in writing within one (1) hour or as soon as it is practical to do so.

DSC 18.6.1 The appropriate party shall issue a notification (and any response to questions asked) of any Incident that has arisen independently of any other Incident.

DSC 18.6.2 The notification shall;

describe the Incident (but is not required to state its cause);

be of sufficient detail to enable the recipient of the notification to reasonably consider and assess the implications, and risks arising; andinclude the name of the individual reporting the Incident on behalf of the GridOperator or the User.

DSC 18.6.3 The recipient of a notification may ask questions to clarify the notification and the provider of the notification shall, insofar as they are able, answer any questions raised.

DSC 18.6.4 An Incident notification shall be given as soon after the Incident as possible to allow the recipient to consider and assess the implications and risks arising from the Incident.

DSC 18.7 Major System Failure reporting

DSC 18.7.1 The System Operator may determine that an Incident reported by it or a Generator shall be classified as a Major System Failure.

DSC 18.7.2 The System Operator shall promptly notify all potentially affected Users by telephone or other media that such a determination has been made and that procedures governing Major System Failure reporting are to be followed. The

System Operator shall confirm such notice within 30 minutes by facsimile or other electronic means. All affected Users shall acknowledge receipt of the notification within 15 minutes of receipt by facsimile or other electronic means.

DSC 18.7.3 Timing of Major System Failure reporting

Preliminary report

The System Operator or must produce a preliminary written Incident report within 24 hours.

DSC 18.7.4 Full report

The System Operator or must produce a full written Major System Failure report within 30 business days a Major System Failure

A Generator shall produce a Major System Failure Report within 20 days of a Major System Failure caused by its Generation System. This is to facilitate the System Operator preparing its Major System Failure Report within 30 days for submission to the Office and the Minister as required under the Electricity Act 2015.

DSC 18.8 Written reporting of Major System Failures by the System Operator to Generators.

DSC 18.8.1 In the case of a Major System Failure reported by the System Operator to a Generator , the System Operator shall provide a full written Major System Failure report to the OUR.

DSC 18.8.2 Upon the request of the System Operator, a Generator shall provide a report of the Incident to the System Operator. The System Operator may use the information contained from an Incident report from a Generator therein in preparing the written report.

DSC 18.9 Written reporting of Major System Failures by Generators to the System Operator

DSC 18.9.1 In the case of an Incident, that has been reported by a Generator to the System Operator and determined by the System Operator as a major System Failure, the Generator shall provide a full written Major System Failure report to the System Operator. The System Operator shall not pass this report to other affected Users but may use the information contained therein in preparing a Major Sytem Failure report to the OUR.

DSC 18.10 Form of Significant Incident report

DSC 18.10.1 A full Major System Failure report prepared by the System Operator shall be sent to the Minister and the OUR. The full Major Ssytem Failure report shall contain confirmation of the Major System Failure notification together with full details relating to the Major System Failure.

DSC 18.10.2 Form The Major System Failure report should, as a minimum, contain the following:

a. Date and time of Significant Incident;
b. Location;
c. Apparatus involved;
d. Brief description of the Major System Failure
e. Causes of the Failure
f. Details of any Demand Control undertaken.
g. f. Effect on other System Users including where appropriate:- duration of Incident; and estimated date and time of return to normal service.
h. g. Effect on generation including, where appropriate:- generation interrupted; frequency response achieved; MVAr performance achieved; and estimated date and time of return to normal service
i. measures and procedures taken to restore the system
j. measures that should be taken to avoid a reccurenceof the failure
k. an assessment of the cost associated with the failure.

The above list is not intended to be exhaustive to this DSC 18.

DSC 19 METERING and DATA ACQUISITION (later)

(The System Operator's SCADA Policy will be placed here)

DSC 20 SETTLEMENTS (to be discussed –later)

DSC 21 INFORMATION SYSTEMS (later)

DSC 22 DATA TO BE EXCHANGED BETWEEN THE SYSTEM OPERATOR AND GENERATORS

DSC 22.1.1 The following Table provides details of Schedules I to XIII covering the data to be exchanged between the System Operator and Generators.

(Suggested Dispatch data are highlighted in yellow and the final data tables will be updated to reflect this.)

Schedule	Data Type	Description	User	Code Section	JPS Procedure
I	User System Data	Electrical parameters relating to Plant and Apparatus connected to the Transmission System	JPS	TCC 2.1	EI 3.1 SOPP 4 SOPP 7 SOPP 9
II	Load Characteristics	The estimated parameters of loads in respect of, for example, harmonic content, frequency response.	JPS	TPC 1.3 TPC 4.2	
III	Demand profiles and Active Energy	Total demand and Active Energy taken from the Transmission System	JPS	TPC 1.3 TPC 4.2 TCC 2.1	

				DSC 2.3 GSDC 3.5.1	
IV	Connection Point	Information related to Demand, demand transfer capability and a summary of Embedded Generators and Customer generation connected to the Connection Point.	JPS DCC	TPC 1.3 TPC 4.2	
V	Demand Control	Information related to Demand Control	JPS DCC	DSC 2.4 DSC 2.5 DSC 2.6 GSDC 3.5.1	EI 1.6 SOPP 11
VI	Fault Infeed	Information on Short Circuit contribution to the Transmission System.	JPS DCC GEN	TPC 1.3 TPC 4.2	

Schedule	Data Type	Description	User	Code Section	JPS Procedure
VII	User Outages	Information required by the System Operator for outages on Users Systems., including outages affecting the auxiliary supplies of Generating Plants.	JPS DCC GEN	DSC 282.4 DSC 282.5 DSC 282.6	EI 1.11 SOPP 14 SOPP 19
VIII	Generator Planning Parameters	Generator fixed Electrical Parameters	GEN	GCC 1.2.4	
IX	Generator Operational Planning	Information required for Operational Planning purposes.	GEN	GSDC 3.2	SOPP 7
X	Scheduling and Dispatch	Operating Parameters required for Scheduling and Dispatch	GEN	GSDC 3.2 GSDC 3.5.1 GMPC 5.1	SOPP 7

XI	Generator Outages	Generator Outage Information.	GEN	DSC 282.3 GSDC 3.5.1 GMPC 5.1	EI 1.11 SOPP 19
XII	System Operator information to Users	All relevant information		TCC 2.1 DSC 2.3 DSC 33.4 TPC 4.5.5 GSDC 3.2.3 GSDC 3.5.5	
XIII	Metering Data	All relevant information		TBA	EI 4.7

Key to Users

DCC A Customer connected directly to the Transmission System/Non Embedded Customer

GEN Generator

Abbreviations used in all Schedules:

TPC : Transmission Planning Code

TCC : Transmission Connections Code

DSC : Dispatch Code

GCC : Generation Connections Code

GSDC : Generation Scheduling and Dispatch Code

GMPC : Generation Maintenance Planning Code

GLSC : Generation Load Shedding Code

EI : JPS Engineering Instructions

SOPP : JPS System Operation Policies and Procedures

NOTE: In the Schedules Data Category refers to the Code Sections and/or JPS Instructions/Procedures.

Schedule I - Users System Data

The data in this Schedule I is required from all Users connected directly to the Transmission System

Data Description	Units	Code Section	JPS Instruction/ Procedure
Operation Line Diagram	Drawing	TCC 2.1	SOPP 9

Single Line Diagram showing all existing and proposed equipment and Apparatus and Connections together with equipment rating			
Site Responsibility Schedules	Schedule	TCC 2.1	
Safety Coordinators	Text	DSC 33.4	
Reactive Compensation Equipment For all reactive compensation equipment connected to the User System at [12kV] and above, other than Power Factor correction equipment associated directly with a Customer Plant, the following details		TCC 2.1	SOPP 4 SOPP 7
Type of equipment (e.g. fixed or variable)	Text		
Capacitive rating	MVar		
Inductive rating	Mvar		
Operating range	Mvar		
Details of any automatic control logic to enable operating characteristics to be determined	Text and/or Diagrams		
Point of Connection to the User System in terms of electrical location and System voltage	Text		
Switchgear For all switchgear (i.e. circuit breakers, switch disconnectors and isolators) on all circuits Directly Connected to the Connection Point including those at Production Facilities		TCC 2.1	SOPP 7

Rated voltage	kV		
Operating voltage	kV		
Rated short-circuit breaking current			
Single phase	kA		
Three phase	kA		
Rated load breaking current			
Single phase	kA		

Three phase	kA		

Data Description	Units	Code Section	JPS Instruction/ Procedure
Rated peak short-circuit making current			
Single phase	kA		
Three phase	kA		
User Connecting System data: Circuit Parameters for all circuits For all Systems at [12] kV and above Connecting User System to the Transmission System, the following details are required relating to that Connection Point		TCC 2.1	SOPP 7
Rated voltage	kV		
Operating voltage	kV		
Positive phase sequence			
Resistance	% on 100		
Reactance	% on 100		

Susceptance	% on 100		
Zero phase sequence Resistance Reactance Susceptance	 % on 100 % on 100 % on 100		
Interconnecting transformers For transformers between the Transmission System and the User System, the following data is required: Rated Power Rated Voltage Ratio (i.e. primary/secondary/tertiary) Winding arrangement Vector group Positive sequence resistance @ maximum tap @ minimum tap @ nominal tap Positive sequence reactance @ maximum tap @ minimum tap @ nominal tap Zero phase sequence reactance Tap changer type Tap changer range Tap changer step size	 MVA % on MVA % on MVA % on MVA % on MVA % on MVA % on MVA % on MVA On/Off 	TCC 2.1	SOPP 7 EI 3.1

Impedance value (if not directly earthed)

Data Description	Units	Code Section	JPS Instruction/ Procedure
HV Motor Drives Following details are required for each HV motor drive connected to the User System Rated VA Rated Active Power Full Load Current Means of starting Starting Current Motor torque/speed characteristics Drive torque/speed characteristics Motor plus drive inertia constant	 MVA MW kA Text kA	TCC 2.1	SOPP 7
User Protection Data Following details relates only to protection equipment which can trip, inter-trip or close any Connection Point circuit breaker or any System Operator circuit breaker A full description including estimated settings, for all relays and Protection systems installed or to be installed on the User System A full description of any auto-reclose facilities installed on the User System, including type and time delays The most probable fault clearance time for electrical faults	 Text Text Ms	TCC 2.1	SOPP 7

on any part of the User System Directly Connected to the Trasmission System			
Transient Over-Voltage Assessment Data When requested by JPS, each User is required to submit data with respect to the Connection Site as follows (undertaking insulation co-ordination studies) Busbar layout, including dimensions and geometry together with electrical parameters of any associated current transformers, voltage transformers, wall bushings, and support insulators Physical and electrical parameters of lines, cables, transformers, reactors and shunt compensator equipment Connected at that busbar or by lines or cables to the busbar (for the purpose of calculating surge impedances) Specification details of connected directly or by lines and cables to the busbar including basic insulation levels Characteristics of over-voltage protection at the busbar and at the termination of lines and cables connected at	 Diagram Text Text Text	TCC 2.1 `	SOPP 7

Schedule II – Load Characteristics Data

The following information is required from each User regarding existing and future connections for each Connection Point.

Data Description	Units	Data category	
		YR 0	YR 1
1. Details of individual loads which have fluctuating, pulsing or other characteristics			TPC 1.3
significantly different from the typical range of Domestic, Commercial or Industrial loads Supplied			TPC 4.2
Sensitivity of Demand to variations in voltage and frequency on the Transmission System at the peak Connection Point Demand (Active Power)			
o Voltage sensitivity	MW/kV MVAr/kV		
o Frequency sensitivity	MW/Hz MVAr/Hz		
3. Phase unbalance imposed on the Transmission System			
o Maximum	%		
o Average	%		

4. Maximum harmonic content imposed on the% Transmission System

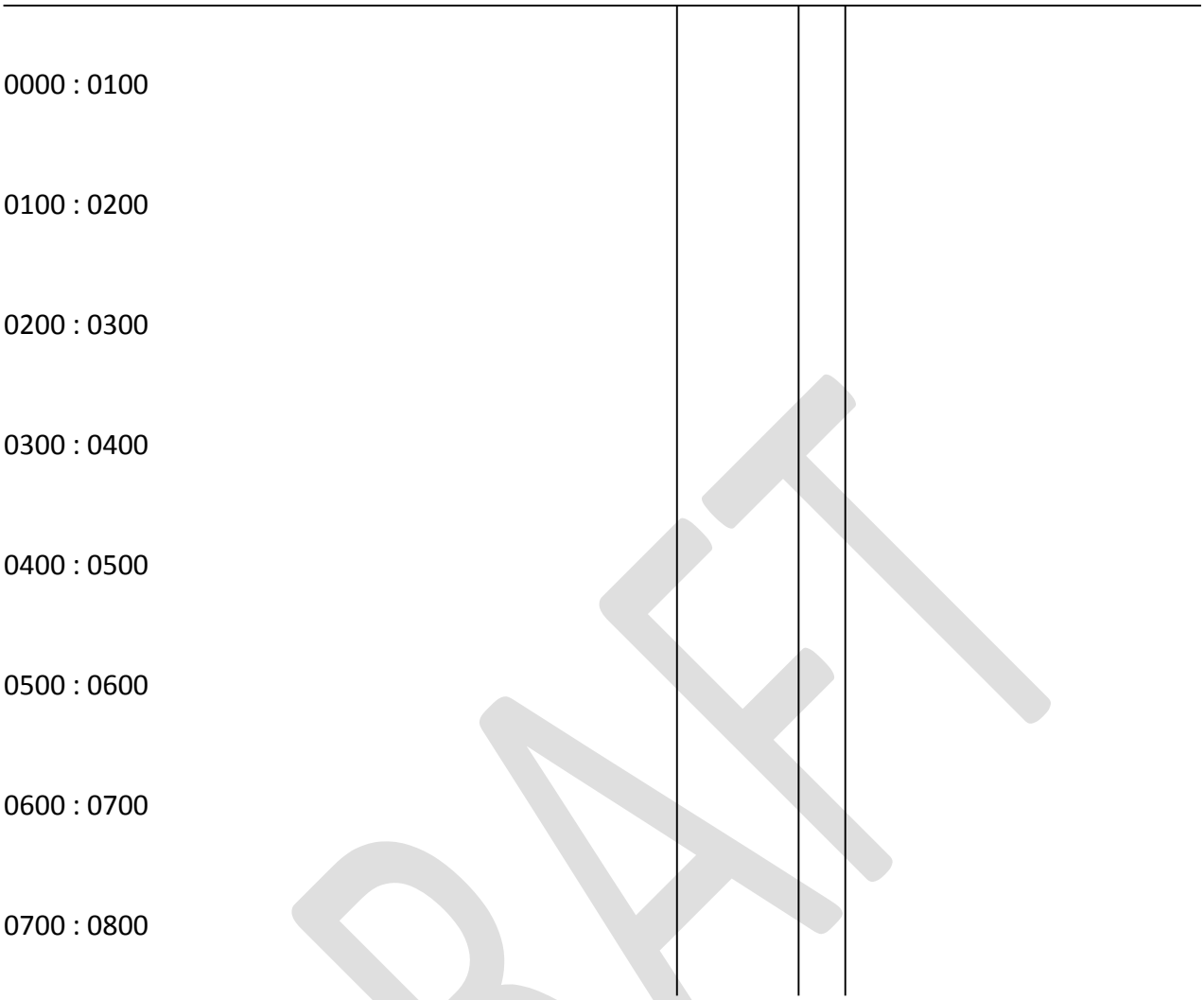
Details of loads which may cause Demand fluctuations greater than [1 MW] at a Connection Point

Schedule III – Demand Profiles and Active Energy Data

The following information is required from each User who is directly connected to the Transmission System with Demand.

Data Description	FY0	FY1		Update Time	Data Category
Forecast daily Demand profiles in respect of each User System (summated over all Connection Points for the Distribution System Operator and at the Connection Point for Non Embedded Generator)	1. Day of User maximum Demand (MW) at Annual MD Conditions 2. Day of peak Transmission System Demand (MW) at Annual MD Conditions 3. Day of minimum Transmission System Demand (MW) at Average Conditions			[End January]	TPC 1.3 TPC 4.2 TCC 2.1 DSC 2.3 GSDC 3.5.1

(Delete as appropriate)



1600 : 1700

1700 : 1800

1800 : 1900

1900 : 2000

2000 : 2100

2100 : 2200

2200 : 2300

2300 : 2400

Data Description	YR 0	YR 1	YR 2		Update Time	Data Category
The annual MWh requirements for each User System for Non Embedded Generator at Average Conditions:					[End Sept]	TPC 1.3 TPC 4.2 TCC 2.1
1. Domestic 2. Agricultural 3. Commercial 4. Industrial 5. Parish						

6. Public Lighting 7. [Any other identifiable categories of Generator] 8. User System losses						
Applicable only to Non-Embedded Generator					[End Sept]	TPC 1.3 TCC 2.1
1. Total Demand (MW) on its System 2. Active Energy (MWh) requirement on its System 3. Active Energy from Embedded Generation						

Schedule IV – Connection Point Data

The following information is required from each User who is directly connected to the

Transmission System with Demand.

Data Description	Units	YR 0	YR 1		Update Time	Data Category
1.						

Annual peak hour User Demand at Annual MD Conditions	MW Pf				[End Sept]	TPC 1.3 TPC 4.2
2. User Demand at Transmission System peak hour Demand at Annual MD Conditions	MW Pf				[End Sept]	TPC 1.3 TPC 4.2
3. User Demand at minimum hour Transmission System Demand at Average Conditions	MW Pf				[End Sept]	TPC 1.3 TPC 4.2
Where a User Demand or group of Demands may be fed by alternative Connection Point(s), the following details should be provided: 1. Name of the alternative Connection Point(s) 2. Demand transferred 3. Transfer arrangement (e.g. manual or automatic) 4. Time to effect transfer	 MW MVAr Hrs				[End Sept]	TPC 1.3 TPC 4.2

Schedule V – Demand Control Data

The following information is required from a Non-Embedded Customer.

Data Description	Units	Time Covered	Update Time	Data Category
Programming Phase: applicable to the Non-Embedded Generator				
Demand Control which may result in a Demand change of [1] MW or more on an hourly and Connection Point basis 1. Demand profile	MW	Weeks 1 to 8	10:00 Friday	DSC 2.4 EI 1.6 SOPP 11 GSDC 3.5.1
2. Duration of proposed Demand Control	hrs	Weeks 1 to 8	10:00 Friday	
Control Phase: applicable to a Non-Embedded Generator				
1. Demand Control which may result in a	Mw	Now to 7		DSC 2.5

Demand change of 1 MW or more averaged over any hour on any Connection Supply Point which is planned after 10:00 hours		Days	Immediate	
2. Any changes to planned Demand Control notified to the System Operator prior to 10:00	hrs	Now to 7 Days	Immediate	
Post Control Phase				
Demand reduction achieved on previous calendar day of 1 MW or more averaged over any Connection Point, on an hourly and Connection Point basis				DSC 2.6
1. Active Power profiles	MW	Previous Day	10:00 Daily	
2. Duration	hrs	Previous Day	10:00 Daily	

Schedule VI – Fault Infeed Data

The following information is required from each User who is connected to the Transmission System via a Connection Point where the User System contains Embedded Generating Unit(s) and/or motor loads. The data is required for the three following years

Data Description	Units	Update Time	Data Category

Short Circuit Infeed to Transmission System from User System at a Connection Point

Name of Connection Point: _____

Symmetrical three-phase short circuit current infeed:

o At instant of fault

After sub-transient fault current contribution has substantially decayed

Zero sequence source impedance values as seen from the Connection Point consistent with the maximum infeed above:

Resistance (R)

Reactance (X)

Positive sequence X/R ratio at instant of fault

Schedule VII – User Outages Data

Data Description	Timescale Covered	Update Time	Data Category
Generators and Non-Embedded Generator provide Details of Apparatus owned by them other than Generating Units at each Connection Point	Year 1	[end Sept]	
System Operator informs Users of aspects that may affect their Systems	Year 1		
Users inform System Operator if not in agreement with aspects as notified	Year 1		
System Operator issues final Transmission System outage plan with advice on Operational Effects on the Distribution and User Systems	Year 1	[end Oct]	DSC 282.5
Generators, and Non-Embedded Generator to inform System Operator of changes to outages previously requested	Week 8 ahead to year end	As occurring	DSC 282.6

Schedule VIII – Generator Planning Parameters Data

Generating Facility Name: _____

The following details are required from each Generating Facility directly connected, or to be directly connected, to the Transmission System and/or an existing, or proposed, Embedded Generating Facility. The data shall be supplied for the following 3 years.

Data Description	Units	Update Time	Data Category
Generating Facility Demand			
Demand associated with the Generating Facility supplied through the Transmission System or via a Generator's own system in addition to Demand supplied through unit transformer		[end Sept]	
1. Maximum Demand that could occur	MW MVAr		
2. Demand at the time of peak Transmission System Demand	MW MVAr		
3. Demand at the time of minimum Transmission System Demand	MW MVAr		

The data in the following table shall be supplied for each generating unit.

Data Description	Units	Update	Data Category

		Time	
Individual Generating Unit Demand			
Demand supplied through unit transformer when Generating Unit is at Rated MW output	MW MVAr		
Generating Unit Performance and Parameters			
General			
1. Details of point of connection to the Transmission System of the Generating Unit in terms of geographical and electrical location and system voltage, including a Single Line Diagram	Text	As required	GCC 1.2.4
2. Type of Generating Unit (e.g. Steam Turbine Unit, Gas Turbine Unit, Cogeneration Unit, wind, etc)	Text		
3. Registered Capacity	MW		
Data Description	Units	Update	Data Category
		Time	
4. Distribution System Constrained Capacity (for Embedded Generating Units only)	MW		
5. Rated Active Power	MW		GCC 1.2.4

6. Minimum Generation	MW		
7. Rated Apparent Power	MVA		
8. Rated terminal voltage	kV		
9. Generator Performance Chart at stator terminals	Chart		
10. Net Dependable Power Capacity (on a monthly basis) 11. Short circuit ratio	MW		
12. Turbo-generator inertia constant (alternator plus prime mover)	MW/MVA		
13. Rated field current at Rated MW and MVAr output and at rated terminal voltage	A		
14. Field current open circuit saturation curve as derived from appropriate manufacture's test certificate			
o 120% rated terminal voltage	A		
o 110% rated terminal voltage	A		
o 100% rated terminal voltage	A		
o 90% rated terminal voltage	A		

o 80% rated terminal voltage	A		
o 70% rated terminal voltage	A		
o 60% rated terminal voltage	A		
o 50% rated terminal voltage	A		
Impedances			GCC 1.2.4
1. Direct axis synchronous reactance	% on MVA		
2. Direct axis transient reactance	% on MVA		
3. Direct axis sub-transient reactance	% on MVA		
4. Quadrature axis synchronous reactance	% on MVA		
5. Quadrature axis sub-transient reactance	% on MVA		
6. Stator leakage reactance	% on MVA		

7. Armature winding direct-current resistance	% on MVA		
Data Description	Units	Update Time	Data Category
Time Constants			GCC 1.2.4
1. Direct axis short-circuit transient time constant	secs		
2. Direct axis short-circuit sub-transient time constant	s		
3. Quadrature axis short-circuit sub-transient time constant	s		
4. Stator time constant	s		
Generator Transformer			GCC 1.2.4
1. Rated Apparent Power	MVA		
Rated voltage ratio			
Winding arrangement			

Vector group

Positive sequence resistance

- o @ maximum tap % on MVA
- o @ minimum tap % on MVA
- o @ nominal tap % on MVA

6. Positive sequence reactance
   - o @ maximum tap % on MVA
   - o @ minimum tap % on MVA
   - o @ nominal tap % on MVA
7. Zero phase sequence reactance % on MVA
8. Tap changer range %
9. Tap changer step size %
10. Tap changer type (i.e on-load or off-load) On/Off

Excitation Control System Parameters GCC 1.2.4

1. Exciter category (e.g. rotating or static) Text

Details of Excitation System described in block diagram Diagram showing transfer functions of individual elements

(including Power System Stabiliser if fitted)

5. Excitation System on-load positive ceiling voltage	V		
Data Description	Units	Update Time	Data Category
6. Excitation System no-load negative ceiling voltage	V		
7. Power System Stabiliser fitted?	Yes/No		

8. Details of over excitation limiter described in block diagram showing transfer functions of individual elements	Diagram		
9. Details of under excitation limiter described in block diagram showing transfer functions of individual elements	Diagram		
Governor Parameters (All Generating Units) Governor system block diagram showing transfer function of individual elements	Diagram		GCC 1.2.4
Prime Mover Parameters Prime mover system block diagram showing transfer function of individual elements and controllers	Diagram		GCC 1.2.4
Generator Flexibility Performance Details required with respect to Generators 1. Rate of loading following a weekend shut-down (Generator and Generating Facility) 2. Rate of loading following an overnight shut-down (Generator and Generating Facility) 3. Block load following Synchronising 4. Rate of De-loading from Rated MW 5. Regulating range 6. Load rejection capability while still Synchronised and able to supply Load	 MW/Min MW/Min MW MW/Min MW MW		GCC 1.2.4

Schedule IX – Generator Operational Planning Data

Generator Facility Name: _____

The following details are required from each Generator in respect of each Generating Unit

Data Description	Units	Data Category	Generating Unit and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
Steam Turbine Generating Units		GSDC 3.2							
1. Minimum notice required to synchronise under following conditions:									
o Hot start	Min								
o Warm start	Min								
o Cold start	Min								
2. Minimum time between synchronising different Generating Units at a Generating Facility	Min								
3. Minimum block Load requirement on synchronising	MW								
4. Maximum Generating Unit loading rates from synchronising under following conditions:									
o Hot start	Min								
o Warm start	Min								
o Cold start	Min								
5. Maximum Generating Unit de-loading rate	MW/Min								
6. Minimum interval between de-synchronising and synchronising a	Min								

Generating Unit (off-load time)									
Gas Turbine Generating Units		GSDC 3.2 SOPP 7							
1. Minimum notice required to synchronise	Min								
2. Minimum time between synchronising different Generating Units at a Generating Facility	Min								
3. Minimum block Load requirement on synchronising	MW								
4. Maximum Generating Unit loading rates from synchronising for									

Data Description	Units	Data Category	Generating Unit and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
o Fast start	Min								
o Slow start	Min								
5. Maximum Generating Unit de-loading rate	MW/Min								
6. Minimum interval between de-synchronising and synchronising a Generating Unit	Min								

Schedule X – Scheduling and Dispatch Data

Generating Facility Name: _____

The following details are required from each Generator in respect of each Generating Unit.

Data Description	Units	Data Category	Generating Unit, and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
Generating Unit Availability Notice		GSDC 3.2 GSDC 3.5.1 GMPC 5.1 SOPP 7							
1. Generating Unit Availability									
o Power Capacity	MW								
o Start time	date/time								
2. Generating Unit unavailability									
o Start time	date/time								
o End time	date/time								
3. Generating Unit initial conditions									
o Time required for Notice to Synchronise	hrs								
o Time required for start-up	hrs								
4. Maximum Generation increase in output above declared Availability	MW								
Any changes to Primary Response and Secondary Response characteristics									
Scheduling and Dispatch Parameters		GSDC 3.2 GSDC 3.5.1							

Data Description	Units	Data Category	Generating Unit, and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
1. Generating Unit inflexibility		GMPC 5.1							
o Description	Text								
o Start date	date/time								
o End date	date/time								
o Active Power	MW								

Data Description	Units	Data Category	Generating Unit, and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
Generating Unit synchronising intervals									
Hot time interval	hrs								
Off-load time interval	hrs								

3.	Station Generating Unit de-synchronising intervals	hrs
4.	Generating Unit basic data	
	Minimum Generation	MW
	Minimum shutdown time	hrs
5.	Generating Unit two shifting limitation	
6.	Generating Unit minimum on time	hrs
7.	Generating Unit Synchronising Generation	MW
8.	Generating Unit Synchronising groups	
9.	Generating Unit run-up rates with breakpoints	MW/min
10.	Generating Unit run-down rates with breakpoints	MW/min
11.	Generating Unit loading rates covering the range from Minimum Generation to Maximum Output	MW/min
12.	Generating Unit de-loading rates covering the range from Maximum Output to Minimum Generation	MW/min

Generating Unit Merit Order Data(*)		GSDC 3.2.2	

Data Description	Units	Data Category	Generating Unit, and Generating Facility Data						
			U1	U2	U3	U4	U5	U6	GF
o Fuel data									

o Heat Rate data

(*)NOTE: Fuel data to be updated at the beginning of each month

Heat Rate data to be updated following twice yearly tests

Schedule XI – Generator Outages Data

Generating Facility Name: _____

The following details are required from each Generator in respect of each Generating Unit.

Data Description	Units	Time Covered	Update Time	Data Category
Provisional Outage Programme				DSC 282.3
1. Generating Units concerned	ID	Year 2 to 3	[End Oct]	GSDC 3.5.1 GMPC 5.1 EI 1.11
2. Active Power not available as a result of Outage	MW	Year 2 to 3	[End Oct]	SOPP 19
3. Remaining Active Power of the Facility	MW	Year 2 to 3	[End Oct]	
4. Duration of Outage	Weeks	Year 2 to 3	[End Oct]	
5. Start date and time or a range of start dates and times	Date hrs	Year 2 to 3	[End Oct]	

System Operator issues Provisional Outage Programme to Users		Year 2 to 3	[End Sept]	
Agreement on Provisional Outage Programme	Text	Year 2 to 3	[End Oct]	
Final Outage Programme				DSC 282.3 GSDC 3.5.1
1. Generating Units concerned	ID	Year 1	[End Oct]	GMPC 5.1 SOPP 19
2. Active Power not available as a result of Outage	MW	Year 1	[End Oct]	
3. Remaining Active Power of the Plant	MW	Year 1	[End Oct]	
4. Duration of Outage	Weeks	Year 1	[End Oct]	
5. Start date and time or a range of start dates and times	Date hrs	Year 1	[End Oct]	

Data Description	Units	Time Covered	Update Time	Data Category
System Operator issues draft Final Outage Programme to Users		Year 1	[End Sept]	
System Operator issues Final Outage Programme to Users	Text	Year 1	[End Oct]	
Short Term Planned Maintenance Outage				GSDC 3.5.1 GMPC 5.1.3 SOPP 19
1. Generating Units concerned	ID	Year 0	5 Days before	
2. Active Power not available as a result of Outage	MW	Year 0	5 Days	

				before	
3.	Remaining Active Power of the Facility	MW	Year 0	5 Days before	
4.	Duration of Outage	Weeks	Year 0	5 Days before	
5.	Start date and time or a range of start dates and times	Date hrs	Year 0	5 Days before	

Schedule XII – System Operator Information to Users

The System Operator will provide Users and prospective Users the following data related to the Transmission System.

Code	Description
TCC 5.3	Operation Diagram
TCC 2.1	Site Responsibility Schedules

DSC 2.3	Demand
	The System Operator will notify each User no later than the [end of October] of each
	calendar year, for the current calendar year and for each of the following 3
	calendar years
	1. The date and time of annual peak of Transmission System demand at Annual
	Maximum Demand Conditions
	2. The date and time of annual minimum Transmission System demand at
	Average Conditions
	Transmission System Data including
TPC 4.5.5	
	Network Topology and ratings of principal items of equipment
	Positive, negative and zero sequence data of lines, cables, transformers etc
	Generating Unit electrical and mechanical parameters
	Relay and protection data

The following Network Data as an equivalent 138kV and 69 kV source at the

Connection Point to the User System

Symmetrical three-phase short circuit current infeed at the instant of fault from the Transmission System

Symmetrical three-phase short circuit current from the Transmission System after the sub-transient fault current contribution has substantially decayed

Zero sequence source resistance and reactance values at the Connection Point, consistent with the maximum infeed below

Pre-fault voltage magnitude at which the maximum fault currents were calculated

Positive sequence X/R ratio at the instant of fault Appropriate interconnection transformer data

DSC 30.4 Names of Safety Co-ordinators

Code Description

Outage Programmes

DSC 282.4 Provisional Outage programme showing the Generating Units expected to be withdrawn from service during each week of Years 2 and 3 for Planned Outages

DSC 282.5 Draft Final Outage programme showing the Generating Units expected to be withdrawn from service during each week of Year 1 for Planned Outages

Demand Estimates and Operating Margin

Synchronising and Desynchronising times of Embedded Generating Units to the Distribution System Operator

Special Actions that may be required of Users

GSDC 3.2.3 Merit Order to be notified to Generators at the start of each month

GSDC 3.5.1 System Operator to provide daily schedule of expected availability and generation dispatch at 15:00hours each day for the following day and at 15:00hours on Friday for the following three (3) days

Schedule XIII – Metering Data

Data Description	Responsible Party	Data Category
Connection and Metering Point reference details for both Delivery Point and Actual Metering Point		EI 4.7
Data communication details when communication systems are used		
Data validation and substitution processes agreed between affected parties		

APPENDIX A

Appendix Title