ELECTRICITY INDUSTRY ACT

ELECTRICITY INDUSTRY (WHOLESALE ELECTRICITY MARKET) REGULATIONS 2004

WHOLESALE ELECTRICITY MARKET RULES

Power System Operation Procedure

Operational Data Points For Non-Western Power Networks, Substations, And Loads

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1. OPERATIONAL DATA POINTS FOR NON-WESTERN POWER NETWORKS, SUBSTATIONS, AND LOADS

1. Operational Data Points for Non-Western Power Networks, Substations, and Loads specifies System Management's requirements for the operational data points to be transmitted through the SCADA Operational Interface between the Western Power Networks **(WPN)**, East Perth Control Centre **(EPCC)**, and non-WPN network, substation, and load plant. It does not specify the requirements for the operational data points to be transmitted through the SCADA Operational Interface between WPN owned and operated Transmission and Distribution elements of the South West Interconnected System **(SWIS)** network and the EPCC. Nor does it specify the performance requirements for the Supervisory Control and Data Acquisition (SCADA) Operational Interfaces.

2. The operational data points specified in the Appendices provide real time data that will be directly used by System Management for the monitoring, control , and on-line studies associated with the management of the security of the SWIS.

3. Operational data points, other than those specified and agreed according to the provisions of this document, that are required by System Management for non real-time studies and forecasting purposes, may be provided in a form, at an update rate, and using a communications media that has been agreed between the Market Participant concerned and System Management.

2. SCOPE

1. The Operational Data Points for Non-Western Power Networks, Substations, and Loads procedure discusses the factors that influence these requirements and how they are to be applied to the specific types of networks, substations, and loads connected to the SWIS.

2. The requirements are summarised in the tables in the appendices to this document.

3. The operational data points specified in the appendices comprise of the minimum requirements, and Participants may in agreement with System Management, agree modified agreements.

3. ASSOCIATED PROCEDURES AND OPERATIONS STANDARDS

The following Power System Operation Procedures are associated with this Operational Data Points for Non-Western Power Networks, Substations, and Loads procedure, but without limitation:

a. Power System Operation Procedure - Communications and Control Systems.
b. Power System Operation Procedure - The Performance of Power System Operational Data Communications Facilities

4. TYPES OF NETWORK, SUBSTATION AND LOAD FACILITIES

1. The requirements in this document shall apply to all types of non-WPN network, substation and load plant that is capable of being connected to the SWIS at transmission network and substation level including:

- Substations where part of the substation is owned by WPN;

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- Substations where the whole substation and the network connecting it to the WPN network is not owned or operated by WPN;
- Loads connected directly to a transmission network or substation owned by WPN;
- Non- Dispatchable Loads connected to a non-WPN substation; and
- Interruptable. Curtailable, and Dispatchable Loads as defined in the Wholesale Electricity Market Rules (WEM Rules).

2. They also apply to Interruptable. Curtailable, and Dispatchable Loads connected at distribution network level but **DO NOT** apply to:

   - Non-dispatchable loads connected at distribution network level.
   - Loads connected at distribution network level that are part of a scheme designed to reduce system load at peak demand times (sometimes called Peak Demand Saving schemes)

3. In general it is expected that the loads will be connected to the lower voltage side of a step down transformer that may or may not be owned by WPN. There may also be reactive compensation devices (capacitors, reactors, SVC etc) connected with the load that are critical to ensuring that the load power factor is with the specified limits.

5. APPLICATION OF THESE REQUIREMENTS

1. The minimum requirements specified in this procedure will apply to all new non-WPN networks, substations or load plant that is not already connected to the SWIS for which an Access Application is submitted after the commencement date of this procedure.

2. Where the provisions of item 5.1 above apply, once the Market Participant has signed an Electricity Transfer Access Contract the Market Participant must consult with System Management and agree on the operational data points requirements for their non-WPN networks, substations or load plant

3. The minimum requirements specified in this procedure will not apply to any new non-WPN networks, substations or load plant that is not already connected to the SWIS for which an Access Application has already been submitted prior to the commencement date of this procedure, except where the Market Participant and System Management agree that the minimum requirements specified in this procedure will be applied.

4. Where the provisions of items 5.1 and 5.3 above apply and modifications or major upgrades are being made to the non-WPN networks, substations or load plant that will result in a requirement for operational data points additional to those already provided, the Market Participant must apply to System Management to vary the minimum requirement based upon their particular circumstance.

5. The minimum requirements specified in this procedure will not apply to existing non-WPN networks, substations or load plant that is already connected to the SWIS at the commencement date of this procedure except under the following circumstances:

   a) where modifications or major upgrades are being made to the generating plant that will result in a requirement for operational data points additional to those already being provided
   b) where an agreement exists between the Market Participant and SM for additional data points to be provided

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6. Where the provisions of items 5.3.a) above apply to existing non-WPN networks, substations or load plant, the Market Participant must apply to System Management to vary the minimum requirement based upon their particular circumstance.

6 AGGREGATION OF FACILITIES

1. In the case of substations where only Non-dispatchable loads are connected, the load may be aggregated at the step down transformer circuits. ☐

2. Where Interruptable, Curtailable, and Dispatchable Loads are connected the requirements apply to the individual load types.

7. BOUNDARIES OF RESPONSIBILITY

1. The level of operational data to be interfaced with the SCADA will depend upon how the network, substation, or load plant involved is to be operated and the location of the operational boundary between WPN owned plant and the non-WPN owned plant at the substation. The following configurations are typical:☐

    - Where the transformer circuits and load plant are non-WPN owned it is expected that the operational boundary will be on the HV busbar side of the HV circuit isolator(s) of the transformer circuits that supply the non-WPN loads ie Western Power will own and operate the HV busbar and the incoming HV lines. This arrangement will typically apply where the substation is connected through transmission lines that are wholly owned and operated by WPN.☐
    - Where the substation only is wholly non–WPN owned the operational boundary is expected to be located at the point where the WPN transmission lines cross the boundary fence of the wholly non-WPN owned substation. This arrangement will apply where the non-WPN substation is connected through transmission lines that do not supply any other substations.☐
    - Where the substation and the transmission lines connecting it to the SWIS are wholly non-WPN owned the operational boundary is expected to be located on the substation side of the transmission line circuit isolator at the WPN owned operated substation to which the transmission lines are connected.☐

    Note that other arrangements may be agreed between WPN and the Network Operator/Market Customer.☐

2. To enable System Management to monitor the operating state of non-WPN networks, substations and loads connected to the SWIS, the Network Operator/Market Customer shall provide real time operational data points from their networks, substations, and loads to interface through the SCADA Operational Interface with the WPN SCADA Remote Terminal Units (RTU) in the substation. The operational data points shall be transmitted between the WPN Substation SCADA RTU and the WPN SCADA Master Station at the EPCC. At the EPCC the operational data points shall be interfaced with the System Management SCADA operational displays that will provide operational information similar to that provided on the non-WPN network, substation and load plant operational displays. ☐

3. For non-WPN network, substation and load plant where the owner has agreed that System Management will remotely operate the plant, the operational data points shall provide the same level of control and monitoring that is provided to a local operator. Where appropriate alarms for plant remotely operated by System Management, and requiring System Management to take the same action, shall be grouped.☐

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4. Where System Management has the provision to transmit desired set point levels to the non-WPN network, substation and load plant the operational data points shall include separate feedback data points to enable the actual operating set point level to be monitored independently of the desired level.

5. It is assumed that operational data points from:

   a) Equipment owned by the Market Participant, will be interfaced from the control equipment in the Market Generators facility with either a Remote Monitoring Equipment or a Remote Terminal Unit provided by the Network Operator.

   b) Equipment owned by the Network Operator, will be interfaced with the Remote Terminal Unit provided by the Network Operator.

6. The Remote Monitoring Equipment and the Remote Terminal Unit provided by the Network Operator is assumed to be located in a separate room/building provided within the Market Particpants facility.

8 INTERRUPTIBLE, CURTAILABLE, AND DISPATCHABLE LOADS

A Network Operator/Market Customer with loads that are subject to the dispatch process shall provide a mechanism for the sending, receiving, and acknowledgement of: ☐

- Interruptible, Curtailment and Dispatch Instructions, ☐
- Interruptible, Curtailment, and Dispatch Advisories, ☐
- changes to the Capacity, and ☐
- Outage Plans ☐

☐

relating to the Interruptible, Curtailable, and Dispatchable Loads concerned.
☐

9. SYSTEM SECURITY

9.1 Network Analysis Facilities

1. In order to facilitate the monitoring and control of the security of the SWIS, it is necessary for System Management to analyse the operating state of the SWIS using a number of Network Analysis facilities that are integrated with the SCADA System.☐

2. To account for the loss of incoming operational data, System Management must estimate the operating state of the SWIS using the State Estimation facility. ☐

3. To anticipate possible operating scenarios, where the Power System Security limits may be breached, System Management must be able perform calculations, using the Contingency Selection and Analysis facility, to determine voltage and ampere levels in the power system for a range of contingency situations. System Management will, when necessary, use the results of these calculations to take appropriate pre-emptive action in order to prevent the occurrence of a breach of Power System Security.☐

4. To ensure that the elements of the Power System are not subject to fault, operating conditions that may exceed the switchgear fault rating System Management must be able perform Fault Level calculations as the Power System configuration changes. System Management, where necessary, will use the results of these calculations to reconfigure the network to ensure that the network elements are operating within their rated capacity.☐

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5. The Network Analysis facilities in the SCADA require System Management to be able to model operation of the Power System using modelling data provided through the SMMITS interface and using real time Power System configuration data provided through the SCADA Operational Interface including real time operational data from non-WPN networks, substations, and loads. ☐

6. The Network Operator/Market Customer shall provide all the operational data points to enable System Management model the non-WPN networks, substation, and loads connected to the SWIS.

9.2 Emergency Disconnection of Unattended non-WPN plant

1. The Technical Rules provide for Western Power to direct that a non-WPN network and/or substation and/or its load must be taken out of service and/or disconnected if it is likely to adversely affect the secure operation of SWIS. Where the operator of a non-WPN network, substation, or load does not comply with such directions within a reasonable period of time System Management may disconnect the non-WPN network, substation or load from the SWIS without further notification. ☐

2. It should be noted that a non-WPN network, substation or load will only be disconnected as a last resort when System Management have taken all reasonable measures to contact the owner/operator or when the owner/operator has not complied with a reasonable request to disconnect and the secure operation of the SWIS is still being adversely affected.☐

3. Where a non-WPN network, substation, or load is to be operated unattended or may be unattended at any time, the Network Operator/Market Customer shall provide operational data points to allow System Management to remotely open the main circuit breaker connecting the network, substation, or load to the SWIS.☐

4. Where the non-WPN network, substation, or load is operated from a 24 hrs 7 day per week attended control facility, System Management will implement emergency disconnection by opening the circuit breaker(s) at the point of connection in the WPN substation on the circuits through which the non-WPN network, substation, or load are connected to the SWIS. ☐

5. Where the substation concerned has both WPN and non-WPN owned plant the emergency disconnection will be implemented by opening the WPN owned circuit breakers on the WPN transmission lines supplying the substation.

10. ANCILLARY SERVICES

1. Ancillary Service requirements in the WEM are governed by chapter 3 of the WEM Rules together with the Ancillary rules and Procedures issued by System Management.

2. Where non-WPN owned plant is contributing to the Dispatch Support Ancillary service, the Market Customer shall provide the operational data points required to enable System Management to send and receive real time operational data to and from any control facility incorporated in the SCADA system at EPCC. This will include any “handshake” signals to ensure that the communications channels are intact.☐

11. NETWORK CONTROL SERVICES

1. The Network Control Services requirements in the WEM are governed by Chapter 5 of the WEM Rules.☐

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2. Where non-WPN owned plant is contributing to the provision of Network Control Services the Network Operator/Market Customer shall include operational data points to enable System Management to monitor and, where agreed, control the operational status of any device that is critical to the provision of these services. This shall include the switching of reactive power compensation devices, SVC control mode (power factor or voltage) selection and related set point commands. ☐

12. NETWORK PROTECTION SCHEMES

1. Where the agreed access conditions include the provision of special network protection schemes, the SCADA operational interface shall include operational data points for the control and monitoring of the network, substation and load. This will include signals to control the output of the substation loads and to provide the local operators with indications that these schemes have operated.☐

13. COMPLIANCE MONITORING

1. System Management is required to monitor compliance of Market Customers with Load Dispatch Instructions and Advisories. In order to monitor compliance, System Management must be able to monitor the operating state of critical operational data points on all non-WPN networks, substations, and loads connected to the SWIS. This will normally be implemented by interfacing data points from the non-WPN network, substation, and loads to a separate high-speed disturbance recording device.☐

2. Where it has been determined that System Management will monitor the performance of the non-WPN networks, substations and loads, the Network Operator/Market Customer shall provide the operational data points that System Management considers critical to ensuring that the owners/operators of the non-WPN networks, substations or loads are meeting their obligations under the WEM Rules. These operational data points shall be separate to those transmitted to the EPCC and shall normally be interfaced directly with the separate high-speed disturbance recording device. ☐

14. SCADA INTERFACE PERFORMANCE

1. The provision of reliable, accurate and timely operating data to and from the non-WPN networks, substations and loads is critical for System Management to perform its role required by the WEM Rules. The Network Operator/Market Customer shall ensure that the SCADA Operational Interface operates in accordance with the specified performance requirements.

2. The performance Requirements for the SCADA Operational Interface are dealt with in a separate document.

15 SPECIFIED POINTS

The attached tables indicate the types of SCADA Operational Data points that are required. Alarm points may be provided as a single point where points from individual devices are paralleled within the non-WPN network, substation or load facility, or may be provided as individual points from the individual devices concerned. Status points must be provided directly from the auxiliary contacts provided on the device concerned. To ensure adequate redundancy for the Network Analysis facilities in the SCADA system at the EPCC all analogue points must be provided from a direct measurement of the quantities. Summated analogue values are not acceptable

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16. COMMUNICATIONS AND CONTROL

1. Clause 2.35.4 of the WEM Rules requires that System Management document the communication and control system requirements needed to support the dispatch process. System Management has documented this in the Power System Operation Procedure – Communications and Control ☐

17. CONFIDENTIALITY

The data from the operational data points agreed between System Management and a Market Participant in accordance with the provisions of this procedure, which is transmitted through the SCADA Operational Interface between generating plant connected to the SWIS and the EPCC will:

a) be used by System Management for the monitoring, control, and on-line studies associated with the management of the security of the SWIS
b) not be disclosed to a third party without the written consent of the Participant concerned

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Table 1 - System Management Operational Data Points Requirements for non-WPN Networks and Substation supplying Non-dispatchable Loads

Point Description☐	Transmission Connected and 10 MW or more☐	Transmission Connected and less than 10 MW☐
Status☐	☐	☐
All HV switching devices opened/closed (isolators, earth switches, circuit breakers, etc - 2 complementary contacts ie. NO/NC pair)☐	√☐	√☐
Reactive Power device control mode (eg power factor, voltage)☐	R☐	☐
Special Network Protection Device operational status (enabled/disabled)☐	√☐	☐
☐	☐	☐
Alarms☐	☐	☐
HV switching device(s) tripped by protection☐	√☐	√☐
HV switching device(s) Protection Defective☐	R☐	☐
Battery Fail - AC and DC ☐	R☐	☐
HV switching device(s)Trip Circuit Supervision☐	R☐	☐
HV switching device(s) Trip Supply Supervision☐	R☐	☐
Load Shedding equipment defective ☐	√☐	☐
Special Network Protection operated☐	√☐	☐
☐	☐	☐
Measured Values☐	☐	☐
HV active power import at each HV connection point☐	√☐	√☐
HV reactive power import at each HV connection point☐	√☐	√☐
HV Load current☐	√☐	√☐
Voltages at each HV connection point☐	√☐	√☐
Net facility output of active energy (impulse)☐	M☐	M☐
☐	☐	☐
Control☐	☐	☐
Emergency Tripping of each HV connection point☐	U☐	☐
Set point control of reactive power devices (power factor and voltage)☐	R☐	☐
Control mode of reactive power devices (power factor/voltage)☐	R☐	☐
Enable/disable automatic control of reactive devices	R	

☐

Note 1 : Voltage on Western Power side of Main Switch☐
Blank cell = not required☐
√ = required☐
M = not required if metered☐
R = required if WP contracted to provide remote control☐
U = required if facility unattended or if WP contracted to provide remort control☐

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Table 2 - System Management Operational Data Points Requirements for non-WPN Networks and Substations supplying Dispatchable, Curtailable, or Interruptable Loads

Point Description☐	Transmission Connected and 10 MW or more☐	Transmission Connected and less than 10 MW☐	Distribution Connected☐
Status☐	☐	☐	☐
All HV and LV switching devices opened/closed (isolators, earth switches, circuit breakers, etc - 2 complementary contacts ie. NO/NC pair)☐	√☐	√☐	☐
Reactive Power device control mode (eg power factor, voltage)☐	R☐	☐	☐
Special Network Protection Device operational status (enabled/disabled)☐	√☐	☐	☐
☐	☐	☐	☐
Alarms☐	☐	☐	☐
HV and LV switching device(s) tripped by protection☐	√☐	√☐	☐
HV and LV switching device(s) Protection Defective☐	√☐	☐	☐
Battery Fail - AC and DC ☐	√☐	☐	☐
HV and LV switching device(s)Trip Circuit Supervision☐	√☐	☐	☐
HV and LV switching device(s) Trip Supply Supervision☐	√☐	☐	☐
Load Shedding equipment operated☐	√☐	√☐	√☐
Load Shedding equipment defective ☐	√☐	☐	☐
Special Network Protection operated☐	√☐	☐	☐
☐	☐	☐	☐
Measured Values☐	☐	☐	☐
HV and LV active power import at each connection point☐	√☐	√☐	☐
HV and LV reactive power import at each connection point☐	√☐	√☐	☐
HV and LV voltages at each point of connection☐	√☐	√☐	☐
Net facility output of active energy (impulse); (not required if metered)☐	M☐	M☐	M☐
Dispatchable/Curtailable/Interruptible Load active power demand per stage☐	√☐	√☐	√☐
☐	☐	☐	☐
Control☐	☐	☐	☐
Emergency Tripping of Facility☐	U☐	√☐	☐
Set point control of reactive power devices (power factor and voltage)☐	R☐	☐	☐
Control mode of reactive power devices (power factor/voltage)☐	R☐	☐	☐
Enable/disable control of reactive devices ☐	R		

Note 1 : Voltage on Western Power side of Main Switch☐
Blank cell = not required☐
√ = required☐
M = not required if metered☐
R = required if WP contracted to provide remote control☐
U = required if facility unattended or if WP contracted to provide remote control☐

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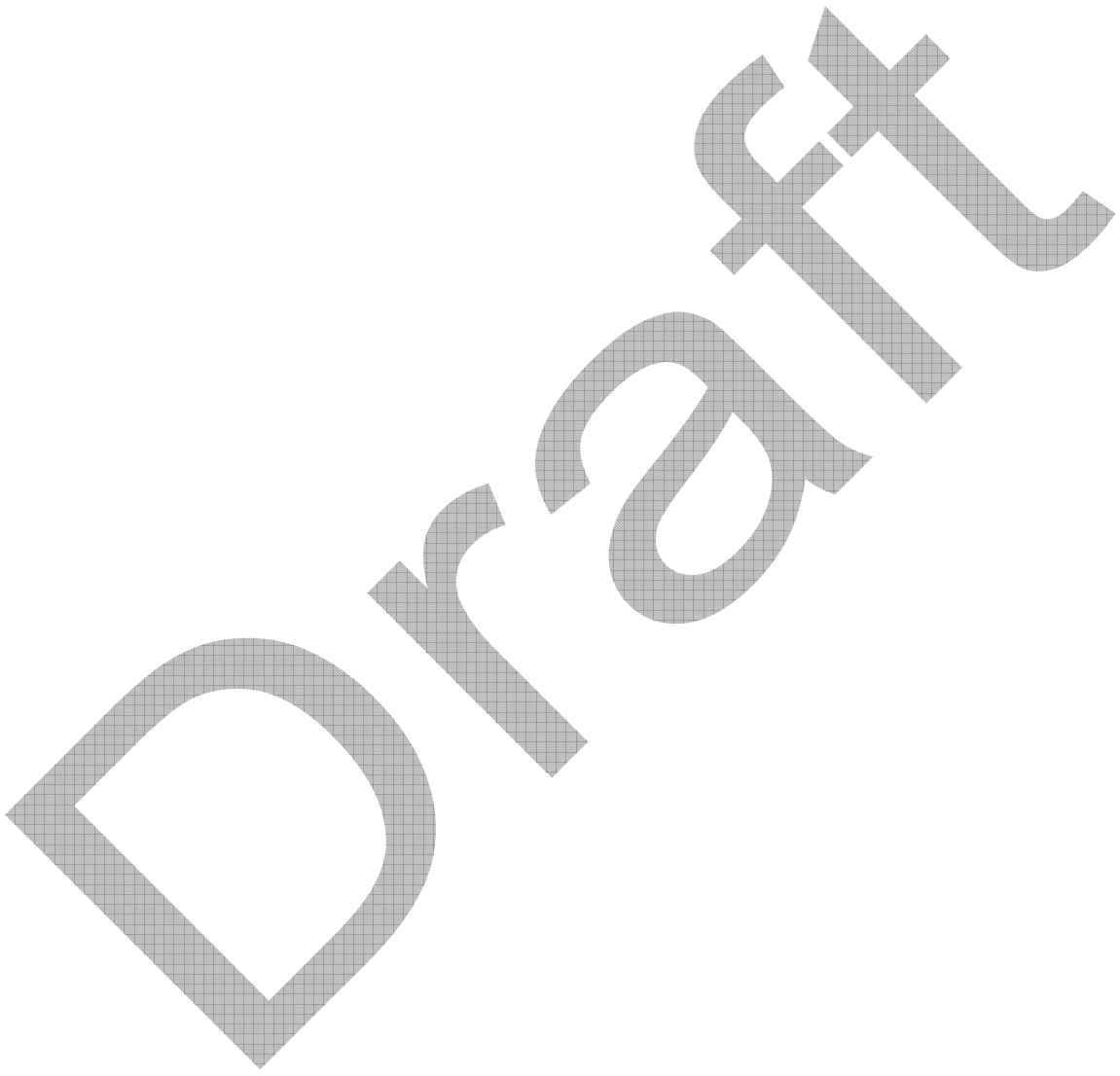
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