Chapter 4

Modelling requirements

4.1 Overview

Your Connection Application includes plant models, which are required to assess and demonstrate the performance of a proposed connection against the access standard requirements. Models must comply with AEMO's *Power System Model Guidelines* and any additional specific requirements set out in this section.

Table 4-1 summarises the modelling platforms suitable for each access standard, based on the type of assessment required. See Section 5 for further guidance on the recommended modelling platform and scope for assessing each clause.

Table 4-1 Modelling platforms by access standard and assessment type

Clause	Description	PSS®E SMIB	PSCAD SMIB	PSS®E NEM	PowerFactory
S5.2.5.1	Reactive power capability4	Dynamic & Static	Dynamic		Static
S5.2.5.2	Quality of electricity generated				Harmonic model
S5.2.5.3	Response to frequency disturbances	Dynamic			
S5.2.5.4	Response to voltage disturbances	Dynamic	Dynamic		
S5.2.5.5 S5.2.5.5A	Disturbance ride through capability	Dynamic	Dynamic	Dynamic	
S5.2.5.75	Partial load rejection for synchronous production units	Dynamic		Dynamic	
S5.2.5.8	Protection from power system disturbances	Dynamic	Dynamic		
S5.2.5.11	Frequency control	Dynamic	Dynamic		
S5.2.5.12	Impact on network capability			Static Dynamic	
S5.2.5.13	Voltage and reactive power control	Dynamic	Dynamic	Dynamic	
S5.2.5.14	Active power control	Dynamic	Dynamic		
S5.2.5.15	Short circuit ratio		Dynamic		

4 Static studies to be performed with either PSS®E or PowerFactory non-aggregated models

5 Not required for projects applying NER version 234 or later, as S5.2.5.7 was amended to apply only to synchronous production units

Clause	Description	PSS®E SMIB	PSCAD SMIB	PSS®E NEM	PowerFactory
S5.2.8	Fault current				Fault calculation

4.2 Model aggregation

You may use model aggregation to simplify the plant representation, provided you retain the electrical characteristics and control behaviour required for accurate power system studies.

What you need to do

- Use enough aggregated model instances configured appropriately to:
  - represent each transformer interface
  - capture feeder-level electrical and control behaviour
  - distinguish between different technology types
  - support reliable assessment of plant and power system performance.
- Where multiple technologies are connected to the same medium-voltage feeder, use a separate model instance for each technology.

See AEMO's *Power System Model Guidelines* for further guidance on model aggregation.

Modelling the main grid transformer

What you need to do

- Model each main grid transformer separately. Do not aggregate them.
- Include the on-load tap changer (OLTC), where applicable.
- Represent three-winding main grid transformers explicitly as three-winding transformers. Do not aggregate them or convert them to two-winding equivalents.

4.3 PSS®E dynamic model requirements

What you need to do

4.3.1 PSS®E SMIB model

- Submit a PSS®E single machine infinite bus (SMIB) model of the proposed plant that complies with AEMO's *Power System Model Guidelines*, along with a Releasable User Guide (RUG).
- Include PSS®E .sav files representing each corner point of the NER S5.2.5.1 P–Q capability curve under the minimum, typical and maximum short-circuit ratio (SCR) scenarios. See Section 5.2.10 for a description of the PQ capability curves used to assess S5.2.5.1.
- Submit your SMIB model in PSS®E version 34.7 or later.
- Provide a PSS®E version 36-compatible SMIB model to support AEMO's transition to version 36.

- Include benchmarking results demonstrating consistency between the PSS®E version 34.7+ and version 36 models.

See Section 4.3.3 for more advice on the version 36 transition.

4.3.2 Modelling considerations

Bus numbering and dummy buses

- Update the bus numbers in the PSS®E SMIB model to align with the OPDMS numbering provided by AEMO as part of Connection Application submission feedback.
- Do not include dummy buses that do not represent physical buses in the plant or network.
- Where practicable, adopt the OPDMS bus-numbering convention to minimise the changes required after AEMO assigns the relevant station identifier.

See AEMO's OPDMS snapshot guideline in the OPDMS package for further details.

PPC model

If a PPC controls more than one production unit instance in the PSS®E model:

- Do not attach the PPC dynamic model to a specific production unit.
- Represent the PPC as a user-defined bus model attached to the Connection Point bus.

Miscellaneous models

- Try to avoid implementing user-defined models as miscellaneous models.
- If you are considering a miscellaneous model, please consult AEMO for guidance before submission.

Generator reactive power dispatch

- Do not lock the reactive power dispatch in the submitted PSS®E .sav file (i.e., by assigning the same value to the production unit Q_{MAX} and Q_{MIN} limits).
- Set each production unit reactive power dispatch to regulate the Connection Point as the remote bus.
- If the generator instances have different reactive power capabilities, include clear instructions on how the reactive power would be shared between each production unit with the model RUG.
- Use the correct values for RMPCT function of PSS®E with the Connection Point as remote-controlled bus for each generator instance.

4.3.3 PSS®E Version 36 Advice

- Model submissions must support AEMO's PSS®E 36 transition requirements.

What you need to do

- Include in your submission:
  - models in both PSS®E version 34 and version 36
  - the associated dynamic model source code and DLLs for both versions

- benchmarking results between version 34 and version 36.

For further guidance and updates on the transition plan, see AEMO's *PSS®E Version 36 Transition Fact Sheet*.

4.4 PSS®E RUG

Use AEMO's RUG template as the basis for your PSS®E RUG and include all the applicable requirements detailed in this section.

What you need to do

4.4.1 Limits

- Clearly specify all the limits implemented at the plant controller level and at the production units level, including any voltage control components such as:
  - active power/active power command limits
  - reactive power/reactive power command limits
  - any current limits at generator unit level and current priorities
  - voltage limits at the generator unit level, if any

4.4.2 Description of the controls

- Provide an overview of all the controls enabled for the plant, supported by high-level block diagrams of the plant controller and inverter/production unit controllers.

Reactive power control modes

- Provide details of all reactive power control modes, including voltage droop control mode, direct reactive power control mode and power factor control mode (if applicable).
- For each control mode, provide the following information:
- Voltage droop control mode:
  - voltage droop curve, presented graphically, together with the associated settings
  - details of the droop implementation, including the droop base and relevant parameters
  - sufficient information to enable users to modify the voltage droop settings in the model
  - instructions for enabling voltage droop control mode and changing between control modes
  - instructions for changing the voltage setpoint, including the relevant parameter location and units
- Direct reactive power control mode:
  - instructions for enabling direct reactive power control
  - instructions for changing the reactive power setpoint, including the relevant parameter location and units.
- Power factor control mode (if applicable)
  - instructions for enabling power factor control
  - instructions for changing the power factor setpoint, including the applicable power factor sign convention

Active power control modes

- Describe the active power control modes implemented within the plant, supported by high-level block diagrams.
- Provide a detailed description of the frequency droop function and sufficient information to enable users to modify the frequency droop settings in the model, including a:
  - diagram illustrating the frequency droop characteristic
  - complete list of the associated parameters and settings.
- For hybrid facilities where frequency droop functionality is implemented within individual PPCs, include:
  - a schematic representation of the frequency droop function implemented within each PPC
  - the aggregated frequency droop response at the Connection Point
  - the effective total frequency droop at the Connection Point.
- For facilities with multiple DUIDs or PPCs, provide sufficient information to explain the operation of each PPC and the coordination of the individual DUIDs and the plant as a whole.

Reactive current control and limits

- Provide a detailed description of the:
  - reactive current control logic with associated block diagrams, including details of the PPC and inverter/production unit level FRT logic, such as FRT thresholds, hysteresis, K factor, freeze delays, and other relevant settings
  - current limits (i.e., limits on total per phase current, limits on sequence currents, etc.)
  - current-priority logic applied when limits are reached, including positive-sequence Iq, negative-sequence Iq, Id
  - handshaking or coordination logic between the PPC and the inverter/production unit controllers (if applicable).

4.4.3 Operation with reduced number of production units in-service

- Provide instructions for modelling operation with a reduced number of production units in service, including:
  - a complete list of the parameters and settings that require adjustment
  - the methodology for scaling the relevant model parameters
  - instructions for switching harmonic filters, where required below specified levels of production units in service.

4.4.4 Details of temperature derating

- Configure models for the nominal rated temperature of the production units and provide clear instructions for modelling high-temperature derating, including:
  - all production unit-level parameters and settings that require adjustment
  - the methodology for scaling the relevant parameters, including calculation formulas.

- Document all required production unit-level adjustments.
- Do not rely on reducing only the PPC active and reactive power limits to represent equipment thermal derating.

4.4.5 Energy source availability modelling

- Provide clear instructions for modelling energy source availability6, including:
  - reduced solar irradiance
  - night-mode operation
  - operation below the cut-in wind speed.
- Document all model inputs, parameters and control settings required to represent energy source-limited operation.
- Include a diagram illustrating the input energy to output power conversion curve in the RUG. For wind farms, this should include cut-in and cut-out wind speeds.

4.5 PSCAD dynamic model requirements

What you need to do

4.5.1 SMIB model

PSCAD version and compiler compatibility

- Submit a PSCAD SMIB model of the proposed plant that complies with AEMO's *Power System Model Guidelines* together with a model RUG:
  - compatible with PSCAD version 5.0
  - compiled using the Intel® oneAPI Fortran Compiler Classic 2021.x
  - compatible with both 32-bit and 64-bit environments.

Model initialisation

- Initialise the PSCAD case file (.pscx) to the maximum active power and zero reactive power at Connection Point under site-specific minimum SCR (highest network impedance) conditions.
- Provide PSCAD cases for other corner points of the reactive power capability proposed under clause S5.2.5.1.
- Configure the OLTC model of the plant's main transformers to initialise to the correct tap within the first 3 seconds of the simulation run.
- Implement automatic fast tapping of the OLTC during the initialisation period.
- Include any associated instructions on OLTC operation and initialisation in the RUG.

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6 It is highly recommended that OEM advice be sought on the modelling setup, configuration, test methods and any limitations that best represent the plant's performance.

Separate PSCAD model for withstand SCR tests

- Provide the PSCAD model used to perform the withstand SCR tests under S5.2.5.15, if the settings differ from the site-specific PSCAD model. Use the same PSCAD model and DLL as for other GPS clause assessments, changing only the settings necessary for this assessment.
- Clearly identify the parameters that differ from the standard site-specific model and the applicable parameter values.

Inverter representation – detailed switching model vs. average model

- Where the site-specific PSCAD model uses an average representation of power electronic switching devices, provide benchmarking results for the site-specific model, demonstrating close alignment between the average model and the corresponding detailed model with full power electronic switching representation.
- Discuss the scope of studies with Transgrid. The benchmarking must demonstrate close alignment between the models across representative steady-state operating conditions, network strengths and disturbances, including balanced and unbalanced faults, voltage disturbances, control-reference changes and cases that activate relevant control or current limiters.

PSCAD model outputs

- Include all output channels specified in Table 21 of AEMO's *DMAT Guideline*.
- Ensure the sequence components of the inductive and capacitive reactive currents are measured at the Connection Point and the production unit terminals.

Modelling for DC coupled hybrid projects

- For DC-coupled hybrid facilities, ensure the PSCAD model represents the relevant dynamic behaviour of the DC-DC converter with sufficient accuracy for the required assessments.
- Consult Transgrid and AEMO to clarify the expected model representation.

4.5.2 Modelling considerations

Earthing transformers

- Include earthing transformers in the PSCAD model where required to establish an appropriate earth reference and prevent parts of the network, such as delta-connected sections, from floating at an undefined voltage.

Use of dummy resistors

- Do not include large resistors with high impedances (dummy resistors) in the PSCAD models.

4.6 PSCAD RUG

What you need to do

- Prepare the PSCAD RUG in accordance with the AEMO RUG template. As well as addressing the applicable requirements in Section 4.4, the PSCAD RUG must also specify:

- the range of simulation time steps supported by the model
- the compatible Fortran compiler versions
- whether different compiled library files are required for 32-bit and 64-bit environments, together with clear instructions for selecting and linking the correct files for each environment (where applicable).

4.7 PowerFactory model requirements

What you need to do

4.7.1 Harmonic model requirements

- Submit a PowerFactory model in DIgSILENT PowerFactory version 2026 to support the assessment of your plant's harmonic performance at the Connection Point.
- Provide the assessment report as detailed in *Attachment 2 - Harmonic Assessment Requirements*

4.7.2 Protection model requirements

- Submit a PowerFactory model suitable for assessing compliance with NER clause S5.2.8, including accurate modelling of short circuit current contribution of each production unit.
- Ensure the PowerFactory model is consistent with the submitted PSS®E and PSCAD models.
- Provide the completed PowerFactory model checklist in the *Attachment 3 - Submission Checklist* (see *Attachment 4 - Connection Application Folder Structure*).

4.8 Small signal model requirements

What you need to do

- Submit the small signal stability model as early as possible – and definitely before Registration.
- Follow the *Attachment 5 - SSAT model requirement guideline* in the Regional Network Data document.

4.9 SMIB model setup

Many performance assessments for connecting plant are undertaken using a SMIB representation of the power system at the Connection Point. This section outlines how to set up SMIB models for different network conditions and performance assessments.

What you need to do

4.9.1 Modelling the external network

- Model the external network in SMIB using a Thevenin equivalent source. Base the Thevenin series impedance on the specified fault level(s) at the Connection Point.
- If the plant is controlling the voltage at a location other than Connection Point, include all the electrical equipment between the Connection Point and the voltage control point in the SMIB model.

- If the fault levels provided by Transgrid are referenced at the Connection Point and a substation transformer exists between the Connection Point and the voltage control point:
  - model the transformer explicitly
  - consider the transformer impedance when calculating the Thevenin equivalent impedance
  - describe the method used to calculate the Thevenin impedance in the RUG
  - model the transformer OLTC in accordance with the information in the Regional Network Data document.
- Include any Designated Network Asset or Identified User Shared Asset in the SMIB model up to the boundary of the Transgrid network.

4.9.2 Site-specific fault levels and system impedances

- Only consider the fault levels/system impedances in the Supplementary Report when setting up SMIB cases for compliance assessments.
- Do not use site-specific fault levels/system information from the SSPA or from an OPDMS case.

4.9.3 Target voltage

- Tune and test your plant models across the anticipated network voltage range, including onerous operating conditions, to demonstrate compliance with the Generator Performance Standards (GPS)
- Ensure your plant meets its GPS across the normal voltage operating range from 0.9 p.u. to 1.1 p.u. at the Connection Point. Note: system voltage is coordinated by AEMO and/or Transgrid and is adjusted according to the network conditions.
- Use the historical voltage profile from the Supplementary Report to establish representative pre-disturbance voltages and plant voltage setpoints. This data will be provided for the Connection Point where practicable, or for a nearby bus. If the relevant percentile values are unavailable, request them from Transgrid through the RFI process.
- Set up assessment cases using historical voltage data and OLTC operation. As a guide, use:
  - Q_{MIN} : 99th percentile voltage value (V_{HIGH})
  - Q_{ZERO} : 50th percentile voltage value (typical voltage/ V_{NOM})
  - Q_{MAX} : 1st percentile voltage value (V_{LOW})
- Adjust the target voltage reference to achieve different operating conditions (Q_{MAX}, Q_{MIN}, Q_{ZERO}) within the historical voltage range to test the plant in accordance with the droop characteristics and across the reactive power capability range.
- Assess remote voltage control arrangements where applicable (see Section 3.1.1). Additional assessment cases may be required to consider combinations of historical voltages at both the Connection Point and the remote control location. Discuss the scope of any additional assessment cases with Transgrid and AEMO.
- Demonstrate that the generating system has been appropriately tuned across the anticipated operating range. Consult Transgrid and AEMO if you encounter performance limitations or tuning challenges.

The methodology described above is used by Transgrid for selected performance standard assessments, including S5.2.5.5 reactive current injection studies, to assess plant performance under realistic operating conditions.

4.10 OPDMS snapshot selection and study case development

What you need to do

4.10.1 Guide for OPDMS snapshots selection

- Consider a representative range of network conditions when selecting OPDMS snapshots for PSS®E NEM studies.
- Choose cases that demonstrate the connecting plant can:
  - operate stably
  - satisfy the relevant GPS requirements
  - not cause a detrimental impact on existing or committed plant, other network users or otherwise adversely impact network capability.

Note: The number of OPDMS cases required will depend on the size, location and technology of the connecting plant, the proximity of the Connection Point to interconnectors or weaker parts of the network, and the purpose and scope of the assessment. As a guide, consider the OPDMS snapshot selection approach summarised in Table 4-2.

Separate study cases are not necessarily required for each NER clause or assessment. A single appropriately selected and configured study case may be used to address multiple assessment requirements.

See Transgrid's most recent *Transmission Annual Planning Report* for relevant regional loading levels and select OPDMS snapshots that represent the required loading and network conditions. The number of cases identified in Table 4-2 is a guide only. You are responsible for demonstrating compliance under a suitable range of plant dispatch and network conditions. Transgrid and AEMO may request additional studies based on the proposed access standard, observed plant performance and potential network impacts.

Table 4-2 OPDMS snapshot selection approach based on type of assessment

GPS Clause	Assessment scope	Recommended study cases	Matters to be considered
S5.2.5.5 and S5.2.5.5A	• Fault ride-through capability • Stable reactive current injection response • Active power recovery post contingency • Demonstrate that connecting plant does not adversely impact nearby plant	• At least one low demand and low fault level case (set up as per Section 4.10.2) • At least one high demand case with high local area renewable generator dispatch.	• If connecting plant is BESS, nearby BESS should follow a similar dispatch (i.e., charging/discharging) and level consistent with the connecting plant. • Similarly, if the connecting plant is solar or wind, similar energy source availability (therefore similar levels of generation) should be considered for the nearby plants using the same energy source. • Additional sensitivity cases may be required depending on the plant

GPS Clause	Assessment scope	Recommended study cases	Matters to be considered
			size, location and observed performance.
S5.2.5.12	• Demonstrate that connecting the plant does not reduce intra-regional or inter-regional transfer capability. • Demonstrate that the connection does not adversely affect thermal capability, voltage stability or transient stability.	• At least two cases representing high interconnector flows (and/or high intra-regional flows) covering both export and import conditions.	• See the relevant Transgrid Operating Manuals and AEMO's Interconnector Capabilities Report for case tuning. • Additional cases may be required where the connection is close to interconnectors.
S5.2.5.13	• Demonstrate voltage and reactive power control performance (setpoint changes, voltage disturbances, nearby reactive plant switching)	• At least 2 cases: • 1 high fault level case (typically high demand case with high number of synchronous generators) • 1 low fault level case.	• Select cases that provide a representative range of system strength and voltage conditions at the Connection Point. • Additional cases may be required where nearby reactive plant, transformer tap-changing arrangements or other voltage-control interactions are material to the assessment.

4.10.2 Tuning OPDMS snapshots for NEM studies

What you need to do

Network operating information

- Review existing market constraint equations available through AEMO to gain an understanding of relevant regional power system limitations.
- Review the information on network constraints, operating arrangements and transfer limits in the extracts of Transgrid Operating Manuals in the *Attachment 6 - Regional Network Data* document.

Study case development

- Use standard AEMO OPDMS snapshots as the starting point for developing PSS®E NEM study cases.
- Before using the cases for GPS compliance assessments, update them as necessary to:
  - incorporate relevant committed plant
  - represent the latest network configuration
  - adjust the dispatch of nearby plant
  - establish the required demand and fault-level conditions
  - achieve the relevant intra-regional and inter-regional power transfers.

- Consider the demand, fault level, generation dispatch and interconnector flow conditions in Table 4-2.
- Use the general guidance in Table 4-3 to develop high-demand/high-fault-level and low-demand/low-fault-level cases.

Table 4-3 Guidance on study case development

Criteria	High demand/high fault level	Low demand/low fault level
Number of synchronous units	• No specific limit on number of in-service synchronous units • Eraring Power Station units should not be included considering its scheduled retirement	• 2 synchronous units each from the following power stations in NSW (total of 6 units) are typically sufficient for low demand/low fault level case: • Bayswater • Mt Piper • Vales Point
Local area dispatch	• Include all nearby in-service and committed plants, as per the latest plant list provided in Data Pack • High dispatch of nearby plant (for nearby BESS plants discharging/charging consistent with the connecting plant)	• Include all nearby in-service and committed plants, as per the latest plant list provided in Data Pack • High dispatch of nearby plant to the extent where possible (for nearby BESS plants discharging/charging consistent with the connecting plant), subject to achieving the interconnector flow requirement below.
Interconnector flow	• High import into NSW to the extent where possible, while prioritising local area dispatch requirement above.	• High export from NSW

See the latest *AEMO System Strength Report* for information on fault-level requirements at relevant system strength nodes.

- Make sure the study cases represent an appropriate range of operating conditions for the connecting plant, including relevant active and reactive power levels. For a BESS or hybrid facility incorporating a BESS, assess both charging and discharging operation.
- When configuring the dispatch of nearby plant, consider:
  - maximum output from the connecting plant
  - high output from nearby in-service and committed renewable generation
  - for a BESS or hybrid connection, nearby BESS operating in a mode consistent with the connecting plant; for example, charging when the connecting plant is charging and discharging when it is discharging
  - reducing dispatch of the synchronous generators to allow the asynchronous plant to be dispatched at the highest level possible
  - keeping network and interconnector flows within the applicable capability limits specified in the relevant Transgrid Operating Manual extracts and AEMO's *Interconnector Capabilities Report*.
- Review the resulting transmission line flows for the study cases to ensure that:

- all flows are within the relevant system N and N-1 line ratings and satisfy relevant voltage, transient or oscillatory stability constraints
- interconnector flows are as close as possible (but not exceeding) the limits (thermal, voltage, transient and oscillatory stability, as applicable) as specified in OM 520 and the cases are stable.

- In the Connection Study Report (CSR), document for each study case:
  - NSW-VIC, QLD-NSW or NSW-SA interconnector flow levels
  - key transmission line flow levels within NSW
  - all nearby plant considered in the studies and their dispatch levels (MW and as a % of capacity).
- For connections near an intra-regional or inter-regional boundary:
  - consider the relevant in-service and committed generating systems, network conditions and contingencies identified in all Regional Data Documents provided
- For connections near an interconnector:
  - consider relevant plant and dispatch conditions in the neighbouring region.
- Include the OPDMS snapshot cases and dynamic setup files in the Connection Application submission.

Information Specific to Southern Region Connections

- Ensure all study cases represent appropriately stressed network conditions by taking into consideration that:
  - Project Energy Connect (PEC) and HumeLink now have considered status and therefore must be incorporated to the network model. Models and associated RUGs for these two projects are available from AEMO Data Request.
  - Cases must include high power transfers both from VIC to NSW and from NSW to VIC, as applicable. High transfer across Bundey – Buronga 330 kV between NSW and SA to be also considered as applicable.
  - power transfer between NSW and VIC is represented by summated flow on lines Line 65 (Murray – Upper Tumut 330 kV) metered at Murray, Line 66 (Murray – Lower Tumut 330 kV) metered at Murray, Line O60 (Wodonga – Jindera 330 kV) metered at Wodonga, Line X1 and X9 (Red Cliffs – Buronga 220 kV circuits).
  - re-dispatch generation in North-West VIC and South-West NSW is needed to achieve a high-power transfer on Lines X1 and X9.
  - re-dispatch generation in Victoria and Central-West NSW is needed to achieve a high level of transfer on the Eastern 330 kV corridor (Lines 65, 66, O60).
  - the interconnector flows should be close to (but not exceeding) the applicable limits for NSW-VIC and NSW-SNOWY specified in OM 520 (PEC limits are specified in PEC limit advice included in your Regional Data Pack)
  - voltage stability limits for Line 63 between Darlington Point and Wagga Wagga and Line 51 between Wagga Wagga and Lower Tumut must not be exceeded

Information Specific to Northern Region Connections

- Ensure all study cases represent appropriately stressed network conditions by taking into consideration that:
  - the high- and low-demand cases must include high power transfers both from QLD to NSW and from NSW to QLD.
  - re-dispatch generation in Southern Queensland and Northern NSW and Central-Coast NSW is required to achieve high level of transfer across QNI. See OM 520 and AEMO's *Interconnector Capabilities Report* for the applicable QNI limits.
- Information Specific to Central Region Connections
- Ensure all study cases represent appropriately stressed network conditions by taking into consideration that:
  - The high- and low-demand cases must include, depending on the connecting location, either
- high power transfers both from QLD to NSW and from NSW to QLD or
- high power transfers both for NSW to VIC and VIC to NSW
- See OM 520 and AEMO's *Interconnector Capabilities Report* for the applicable interconnector limits.

4.10.3 Robustness of NEM base cases

- Run each base case without a disturbance (i.e., flat-run) for at least 40 seconds to ensure that a steady state solution is reached.
- Verify steady state operation by monitoring the bus voltages, line flows, and synchronous machine rotor angles.
- Investigate and resolve any material drift, sustained oscillation or unexpected control response observed during the flat run before using the case for assessments.

4.10.4 Presenting the results for OPDMS studies

- Plot the following signals, at a minimum, when presenting OPDMS results. Curves and legends must clearly distinguish:
- Voltage, P and Q flows and frequency at the CP and production unit level of the plant under study.
- Voltage, P and Q flows of nearby plants and Synchronous Condensers
- P and Q flows of the nearby transmission lines
- Voltage of nearby buses
- Relative rotor angles of large synchronous generators in the region
- Interconnector P and Q flows in the region
- Voltage magnitude, angle and frequency of either side of interconnector substations