PSS®E 36 Transition

Fact Sheet

Updated: 29 July 2025

Summary of changes

AEMO uses PSS®E studies to support network operation, connections, and system security. AEMO is requesting industry support with the transition from PSS®E version 34 to version 36 over the next 12 months.

What are the benefits?

AEMO has made the decision to transition all studies to use PSS®E version 36 for the following reasons:

- PTI Siemens ended support for PSS®E version 34 in October 2024.
- PSS®E version 34 automation is based on Python 2.7 which is now depreciated and poses a security risk.
- PSS®E version 36 dynamic model source code is version independent, meaning AEMO will not have to recompile models for future versions.

What is the timeline for the transition?

AEMO will begin requiring dynamic model source code in both PSS®E versions 34 and 36 from 4 August 2025. AEMO anticipates the full transition to be completed by July 2026.

AEMO will update the Power System Modelling Guidelines in due course following the transition to reflect future modelling requirements.

What will this change mean for the industry?

The transition will require a coordinated effort from industry, including NSPs, applicants/developers and OEMs. Based on a July 2026 target, this includes:

Connections without executed connection agreement:

- Models submitted through the connection process will require source code and DLLs compatible with PSS®E version 34.7+ and version 36 from 4 August 2025.
- Benchmarking requirements are provided in FAQs of this factsheet.

Connections with connection agreement but yet to complete R2 model validation:

- Only PSS®E version 34.7+ compatible source code and DLLs required. PSS®E version 36 source code and DLLs are encouraged to be submitted, otherwise AEMO will transition the models.
- For details regarding generators completing a 5.3.9 alteration, see FAQs of this factsheet.

Operational generators that have submitted models:

- AEMO is currently transitioning all existing dynamic models to PSS®E version 36 independently. No action is expected from current generation asset owners.

NSPs: NSPs are recommended to transition to PSS®E version 36 as soon as possible to maintain alignment with AEMO modelling capability.

From 1 July 2026:

- All generator connections prior to completion of R2, or generators completing a 5.3.9 alteration that require a model update are required to submit PSS®E source code and DLLs compatible with PSS®E v36. PSS®E v34 models will no longer be accepted or required.

Technical facts – Modelling requirements

- Models must be compiled with Intel OneAPI Fortran Compiler version 2024.2 or a later version.
- Models must not contain any LPDEV commands in the source code, as this function has been discontinued.
- During the transition period, AEMO will require DLLs submitted for models that are compatible with both PSS®E version 34.7+ and PSS®E version 36 (this may require two separate DLLs to be submitted).
- Although existing dynamic models used in PSS®E version 34 may function in PSS®E version 36, users should review models for any required updates or replacements due to changes in modelling standards, for example:
    - File Compatibility: New features in PSS®E version 36 may not work if the model is used in PSS®E version 34.
    - Dynamic Model Compatibility: User defined dynamic models may need to be recompiled or updated for PSS®E version 36. Any changes in the API or functions will need to be validated.
    - Solver Differences: Although the core functions are similar, it is recommended to validate the model's results after upgrading due to version 36.
- Users may need to convert existing RAW, DYR, and other network data files to ensure compatibility with the updated file formats in PSS®E version 36.
- Enhanced data precision in PSS®E 36 may necessitate adjustments in data preparation, particularly for large-scale power system models. For example, instead of entering 230.0 kV in version 34, 230.123 kV may need to be entered in version 36 to take advantage of the enhanced precision.
- Users may need to download or configure new model libraries included in PSS®E version 36.

AEMO appreciates your support with the ongoing operation and maintenance of this critical modelling capability.

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Frequently asked questions

Will PSS®E version 35 models ever be required?

No, AEMO is moving directly from PSS®E version 34 to version 36.

Will this affect existing and already commissioned plant?

No, AEMO will transition existing dynamic models independently.

Can AEMO and NSPs specifically request PSS®E version 36 models?

Yes, as per AEMO's Power System Modelling Guidelines, participants must submit PSS®E models compatible with version 34.7 **at a minimum**. AEMO and NSPs can request participants submit models compatible with newer versions, such as version 36.

How are LPDEV commands removed?

The general structure of a PSS®E write statement meant for output to the progress window would look as follows:

```
WRITE(DBUF01, format_statement) output_data
Call PROGRESS(dbuf01,number_of_lines_of_dbuf01)
```

where, 'format_statement' is the format statement number to write the 'output_data' into the buffer 'DBUF01', and 'number_of_lines_of_dbuf01' stands for the number of lines in the buffer 'DBUF01' that need to be flushed out via call to 'PROGRESS'.

Examples of code:

Example 1:

```
WRITE(LPDEV, *) 'Under Voltage Relay TRIP...'
```

Becomes:

```
WRITE(DBUF01, *) 'Under Voltage Relay TRIP...'
CALL PROGRESS(DBUF01,1)
```

Example 2:

```
IF (.NOT. Printed) THEN
   WRITE(LPDEV, '(//" BUS",I7,"  MACHINE ",A,",MODEL ABC1:")') IBUS, IM
END IF
```

Becomes:

```
IF (.NOT. Printed) THEN
   WRITE(DBUF01,'(//" BUS",I7,"  MACHINE ",A,", MODEL ABC1:")') IBUS, IM
   CALL PROGRESS(DBUF01,3)
END IF
```

How is the code converted from PSS®E 34 to PSS®E 36?

The user will need to install the 'PSS®E User Model Compile/Link - Environment Manager' with the PSS®E 36 install. In the Environment Manager go to the code converter tab. Add the PSS®E 34 code and proceed with the conversion.

What if I am having issues with the changeover?

If you are having issues with the changeover or benchmarking, AEMO will provide assistance. Please contact us at psse36transition@aemo.com.au

What other software does AEMO use for compiling PSS®E 36?

- Microsoft Visual Studio 2022 (Community Edition)
- Microsoft Build Tools 2022
- Intel Fortran Compiler (Stand-Alone Version)

Are there plans to consider model portability in the future?

AEMO have commenced work on a long-term initiative mapping out a plan to develop model data that is not dependent on a specific modelling platform. This work is currently in the scoping stage, and AEMO commits to providing further details on this initiative and associated timeframes at a later date.

What are the full benchmarking requirements?

For generators required to submit both PSS®E version 34 and PSS®E version 36 models, benchmarking must be provided. AEMO has developed a script to assist with this process, which automatically runs all studies for the full benchmarking process, including the plotting of results. The output of this script can be submitted as evidence of compliance, with no further reporting required.

Alternatively, the following studies should be conducted:

- Load flow scenarios should contain:
    - Different plant active power levels, e.g. 25%, 50%, 75% and 100% of maximum active power generation and absorption. The grid should have SCR of 3 and X/R ratio of 3 at the POC. If the plant controller is expected to control a hybrid plant, then the plant should be configurated as a typical hybrid plant with all generators in service.
- A summary of the full scenarios included in the benchmarking script available from AEMO is given below:
    - Steady state flat run
    - Playback of swing bus voltage changes:
        - Small voltage changes that cause no generator tripping
        - Large voltage changes that trig overvoltage and undervoltage protections.

  - Playback of swing bus frequency changes:
    - Small frequency changes that cause no generator tripping
    - Large frequency changes that trig over-frequency and underfrequency protections.
  - Vref step changes
  - Pref step changes
  - Pref step changes while playback of swing bus frequency small change
  - Trip and reclose a line that connecting the POC to the external grid
  - Trip of a bus in the external grid that has a direct connection to the POC
  - Trip of a generator of the connecting project
  - Voltage dip at POC caused by 1ph, 2ph, 2phg or 3ph fault on different fault impedances
- PSS®E dynamic parameters should be compatible with Section 2.3 of the Dynamic Model Acceptance Test Guidelines.

What options are available to reduce the benchmarking requirements?

OEMs are encouraged to complete the full benchmarking scope for their model version currently being used in the connections application process. This benchmarking can be completed on a generic generating system. These results can be submitted to AEMO for review and approval. Once approved, AEMO will issue a letter to the OEM confirming that model version is "Benchmark Approved". For any model that is "Benchmark Approved", only limited site-specific benchmarking will be required, rather than the full benchmarking scope.

For example, *OEM_A* submits the full benchmarking for their latest model, version 1.0.6, based on a generic generating system. AEMO reviews and issues a "Benchmark Approved" certificate for model 1.0.6. From that point onwards, all generators using model 1.0.6 from *OEM_A* are only required to submit limited site-specific benchmarking, along with the "Benchmark Approved" certificate.

If *OEM_A* updates the model in the future (for example to version 1.1.0), they are encouraged to contact AEMO to discuss what additional benchmarking (if any) is required to add version 1.1.0 to the "Benchmark Approved" certificate. AEMO intends to take a pragmatic approach and does not intend for this process to discourage future model updates from being made.

AEMO will continue to collaborate with OEMs and support this approach throughout the PSS®E version 36 transition, to minimise unnecessary duplication of benchmarking results and assist the industry during the transition.

What is the scope of the limited site-specific benchmarking?

The following tests should be included in the limited site-specific benchmarking:

- Load flow scenarios should contain:
  - Plant active power levels at 25%, and 100% of maximum active power generation and absorption. The grid should be set to be at the lowest SCR in normal operating condition and the typical X/R ratio in such SCR. All generators are in service for initialisation.
- The site-specific benchmarking should contain the following scenarios:
  - Playback of swing bus voltage changes that trigger overvoltage and undervoltage protections

  - Playback of swing bus frequency changes that trigger over-frequency and underfrequency protections.
  - Vref step changes (±2.5% and ±5%)
  - Pref step changes while playback of swing bus frequency small change (0.5Hz under frequency while Pref step down, 0.5Hz over frequency while Pref step up)
  - Trip of a single generator of the connecting project
  - Voltage dip at POC caused by 3ph fault on different fault impedances (three different fault depths at approximately 0.8pu, 0.5pu and 0pu)
- PSS®E dynamic parameters should be compatible with Section 2.3 of the Dynamic Model Acceptance Test Guidelines.

When do I need to submit benchmarking?

The benchmarking between PSS®E version 34 and PSS®E version 36 models must be submitted for projects that have not signed a connection agreement by 4 August 2025. The benchmarking can be submitted late in the connection application process (i.e. at a point when no further model updates are expected) but should be submitted prior to signing a connection agreement.

What happens on 1 July 2026?

From this date only PSS®E version 36 models will be required for all projects, regardless of their stage in the connections process. Submission of PSS®E version 34 models or benchmarking between PSS®E version 34 and PSS®E version 36 models will no longer be required at this time.

What 5.3.9 alterations require submission of benchmarked PSS®E version 34 and PSS®E version 36 models?

Between 4 August 2025 and 1 July 2026, for the majority of 5.3.9 alterations, submitting a PSS®E version 36 model and benchmarking will be recommended but not required, as AEMO will transition these models from PSS®E version 34 to PSS®E version 36.

In the case the 5.3.9 alteration leads to a significant model change (for example, changing the inverter OEM, adding a BESS to an existing generating system, adding a new piece of reactive plant, adding a new model for the AVR, etc), benchmarked PSS®E version 34 and PSS®E version 36 models will be required for projects that have not received a 5.3.10 letter prior to 4 August 2025. AEMO can provide assistance to ascertain the materiality of a 5.3.9 alteration and whether resulting model changes are significant enough to warrant PSS®E version 36 model submission and benchmarking. Please contact AEMO at contact.connections@aemo.com.au for advice.

What about projects that have received a 5.3.4A letter, but have not signed a connection agreement?

Projects that have received a 5.3.4A letter prior to 4 August 2025, but have not signed a connection agreement by 4 August 2025, are required to submit benchmarked PSS®E v34 and PSS®E v36 models. It is expected that these models will be provided prior to execution of a connection agreement. Noting that specific edge cases may exist around this scenario, if required please contact the AEMO connections team to discuss timeframes further at contact.connections@aemo.com.au.

Where can I find more information?

AEMO modelling requirements	https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/network-connections/modelling-requirements
Chapter 2 of the National Electricity Rules	https://www.aemc.gov.au/regulation/energy-rules/national-electricity-rules
PTI Siemens for further information including licensing	https://www.siemens.com/global/en/products/energy/grid-software/planning/pss-software.html

For any further enquiries, please contact Onboarding & Connections at contact.connections@aemo.com.au