

# 2024 ESOO Input Data Package and Model Instructions

August 2024

A Guide to the Input Data and  
Published Model of the 2024  
*Electricity Statement of Opportunities*





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# 1 Configuring the 2024 NEM ESOO Model

This chapter contains the steps needed to set up the 2024 ESOO PLEXOS market model, including configuration of the input data package used in the simulation model. The step by step guide is documented below.




1. Download the zip files (summarised in Table 1) from AEMO's 2024 ESOO web page.

**Table 1 Zip files from AEMO's 2024 ESOO webpage**

| No | File   | Description  | Where to save the files  |
|----|--|--|--|
| 1  | 2024 ESOO Model.zip                            | Contains model files, folder structure, a file with descriptions of network constraints and associated parameter files.  | Place the extracted files in the root folder                           |
| 2  | 2024 Solar A-L.zip<br>2024 Solar M-Z.zip       | Contains half-hourly generation traces for solar.  | Place the extracted files in the '\Traces\Solar Traces' folder         |
| 3  | 2024 Wind A-L.zip<br>2024 Wind M-Z.zip         | Contains half-hourly generation traces for wind.   | Place the extracted files in the '\Traces\Wind Traces' folder          |
| 4  | 2024 Rating POE10.zip<br>2024 Rating POE50.zip | Contains half-hourly line ratings for transmission lines.  | Place the extracted files in the '\Traces\Rating Traces' folder        |
| 5  | 2024 PV_TOT.zip                                | Contains half-hourly regional generation traces for embedded PV, including rooftop PV and PVNSG.   | Place the extracted files in the '\Traces\Demand Traces' folder        |
| 6  | 2024 OPSO_PVLITE.zip                           | Contains half-hourly regional demand traces for operational demand (demand before the impact of rooftop PV and PVNSG).   | Place in the extracted files the '\Traces\Demand Traces' folder        |
| 7  | 2024 OPSO_MODELLING.zip                        | Contains half-hourly regional demand traces for operational demand without inter-regional transmission losses (demand after the impact of rooftop PV and PVNSG). | Place in the extracted files the '\Traces\Demand Traces' folder        |
| 8  | 2024 OPGEN_MODELLING.zip                       | Contains half-hourly regional operational demand traces delayed by 1-hour, for use by the Network Constraints.   | Place the extracted files in the '\Traces\Demand Rating Traces' folder |
| 9  | 2024 Timeslices.zip                            | Contains the traces that determine the Generators Ratings' seasons and each region's seasonal hot days.  | Place the extracted files in the '\Traces\Timeslices' folder           |

2. Unzip the file *2024 ESOO Model.zip*. This will generate the 2024 ESOO Model folder structure. The contents of the 2024 ESOO Model folders are illustrated in Figure 1. The 2024 ESOO Model NEM Constraints are already incorporated into the PLEXOS XML Document. No folders or files regarding the NEM constraints are required besides the Rating traces. This feature requires the ESOO model to be run in PLEXOS version 8.3 R06 or higher.

**Figure 1** Contents of the 2024 ESOO Model file

| Name   | Date modified       | Type                 | Size       |
|--|---------------------|----------------------|------------|
|  Traces                           | 23/08/2024 3:03 PM  | File folder          |            |
|  ESOO2024 Constraint Descriptions | 27/08/2024 10:30 AM | Microsoft Excel W... | 66 KB      |
|  SimulationShell                  | 28/08/2024 9:35 AM  | Microsoft Edge H...  | 532,055 KB |

3. Open the *Traces* folder.
4. Extract the other 11 zip files into their respective sub-folders as outlined in Table 1.
5. Use Plexos 9.0 R06 x64 (or higher) to open and run the model file '*SimulationShell.xml*' in the root folder.

The 2024 ESOO discusses multiple scenarios and sensitivities. Only the *Committed and Anticipated Investments* ESOO scenario is available in the *2024 ESOO Model.xml*. Note that the demand traces are labelled with SENSITIVITY\_CER, which relates to the *Committed and Anticipated Investments* ESOO scenario. More information about the ESOO scenarios is available in the 2024 ESOO and 2023 Inputs, Assumptions and Scenarios Report (IASR)<sup>1</sup>.

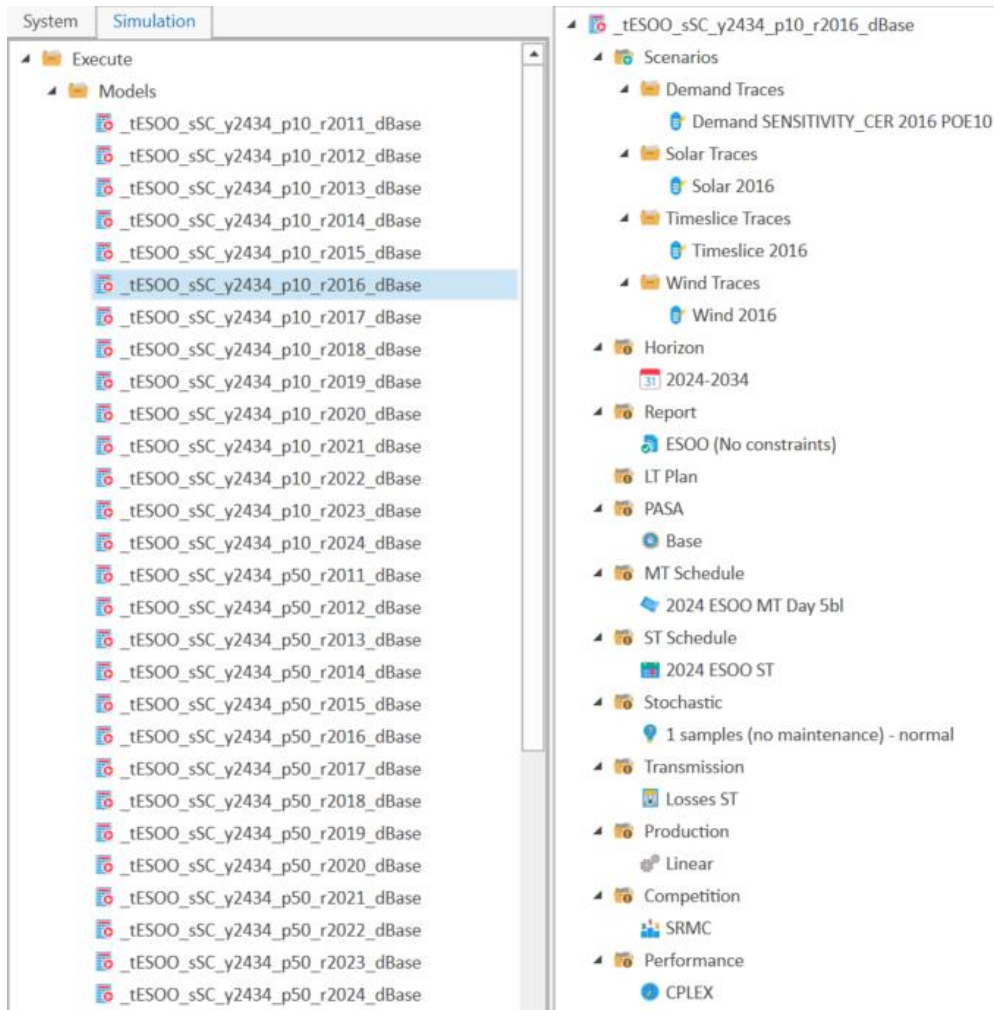
The 2024 ESOO includes four different forced outage rates applied at the station level. To protect confidentiality, the published model includes only averaged technology aggregate rates. A detailed explanation of how these rates are calculated can be found in the *ESOO and Reliability Forecast Methodology Document*<sup>1</sup>. The rates are applied for the following technology aggregates:

- Black coal New South Wales (until 30 June 2028).
- Black Coal Queensland (until 30 June 2028).
- Brown coal Victoria (until 30 June 2028).
- All coal (from 01 July 2028).
- Closed-cycle gas turbines (CCGTs) and gas-fired steam turbines.
- Open-cycle gas turbines (OCGTs).
- All hydros.
- Small peaking plants.

Figure 2 shows that in PLEXOS there are 28 different models, each with a different reference year and maximum demand probability of exceedance (POE). Every model is configured with one stochastic iteration, resulting in the potential for 28 iterations per forecast year. In the published 2024 ESOO 2,800 iterations were run (for example, 100 iterations per model, which can be selected).

<sup>1</sup> At <https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo>.

**Figure 2 Full model list with respective scenarios and settings in PLEXOS**



## 2 2024 NEM ESOO model naming convention

A set of naming conventions was used in the 2024 ESOO to shorten the model names to comply with the maximum number of characters allowed in naming models in PLEXOS. Table 2 describes the model naming convention used in the 2024 NEM ESOO. The job sets populated in this model reflect this naming convention.

For example, the job set “\_tESOO\_sSC\_y2434\_p10\_r2018\_dBase” represents the following assumptions:

- *Step Change* / ESOO Central demand scenario.
- A model horizon between 01 July 2024 and 30 June 2034.
- The POE10 peak demand forecast.
- The 2017-18 reference year.
- Base refers to this being the *Committed and Anticipated Investments* ESOO sensitivity that assumes only existing, committed, and anticipated projects.

**Table 2 ESOO 2024 naming convention**

| Descriptor                       | Prefix | Options      | Description   |
|----------------------------------|--------|--------------|---|
| <b>Project</b>                   | _t     | ESOO         | 2024 NEM ESOO   |
| <b>Scenario</b>                  | _s     | SC           | SC = Sensitivity_CER (ESOO Central Scenario / <i>Step Change</i> )                            |
| <b>Financial year</b>            | _y     | 2434         | Financial year range modelled, for example, 2024-25 to 2033-34                                |
| <b>Probability of exceedance</b> | _p     | 10, 50       | POE demand trace used   |
| <b>Reference year</b>            | _r     | 2011 to 2024 | Historical reference year traces used in the model, for example, 2010-11 or 2023-24           |
| <b>Sensitivity</b>               | _d     | Base         | Base = Core ESOO assumptions for the <i>Committed and Anticipated Investments sensitivity</i> |



## 3 Further details

The model is populated with the settings that were used in the 2024 ESOO modelling which was run using custom results extraction tools on a cloud simulation platform. Desktop applications may require changes to settings to reduce the size of simulations and allow for results to be produced in other forms.

Model file provided:

- SimulationShell.xml – this contains the core *Committed and Anticipated Investments* sensitivity (labelled ‘Step Change’ in the model).

PLEXOS 9.100 R02 x64 was used to create and run the 2024 ESOO scenarios and sensitivities.

PLEXOS software is available from Energy Exemplar.

Each model was run using a Split Execution with the number of splits equal to the number of samples.

The published results in the 2024 ESOO report used a model with individual unit confidential that has been aggregated by technology in the published model. Results achieved with the published model may slightly vary from the published results.

The 2024 ESOO model includes NEM Constraints integrated within the PLEXOS XML.

The NEM constraints represent the constraints that are relevant for assessing reliability. These constraint sets do not account for all transmission limitations in the NEM. The constraint sets applied are focused on constraints that impact reliability outcomes. The transmission augmentation commissioning dates and other dates applied in the constraint sets are sometimes grouped into Timeslices for modelling efficiency that sufficiently match the published commissioning dates for transmission augmentation projects and provide an accurate reliability outcome<sup>2</sup>.

The constraint set also includes outage constraint sets which are triggered based on outage variables specified in the model. These constraints should be ignored if simulating for another purpose, or when transmission outages are not considered.

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<sup>2</sup> Any questions related to the NEM constraint set should be directed to [planning@aemo.com.au](mailto:planning@aemo.com.au).