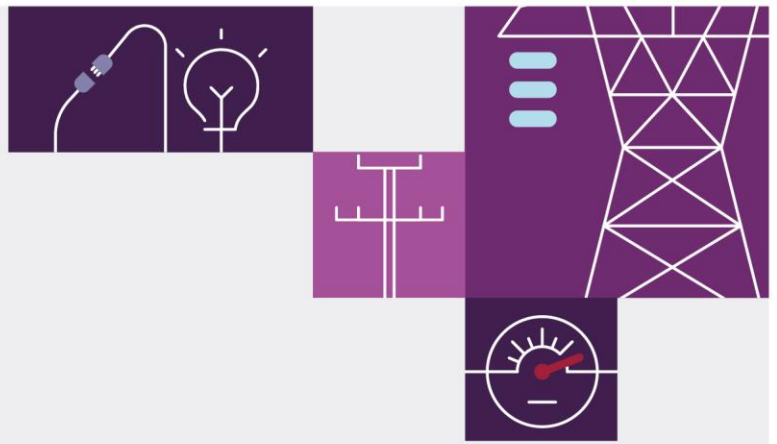# 2022 ESOO Input Data Package and Model Instructions

August 2022

A Guide to the Input Data and
Published Model of the 2022
Electricity Statement of Opportunities

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

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Purpose

AEMO publishes the National Electricity Market Electricity Statement of Opportunities (ESOO) under clause 3.13.3A of the National Electricity Rules (NER). AEMO has prepared this document to assist stakeholders in interpreting and using the input data produced for the purpose of modelling the National Electricity Market (NEM) using the assumptions and approach applied in the 2022 Electricity Statement of Opportunities (ESOO).

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Version control

Version	Release date	Changes
1	31/8/2022	Initial release

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1 Configuring the 2022 NEM ESOO Model

This chapter contains the steps needed to set up the 2022 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 2022 ESOO web page.

Table 1   Zip files from AEMO's 2022 ESOO webpage

No	File	Description	Where to save the files
1	2022 ESOO Model.zip	Contains model files, folder structure, and associated parameter files.	Place the extracted files in the root folder
2	2022 Solar A-L.zip 2022 Solar M-Z.zip	Contains half-hourly generation traces for solar.	Place the extracted files in the '\Traces\Solar' folder
3	2022 Wind A-L.zip 2022 Wind M-Z.zip	Contains half-hourly generation traces for wind.	Place the extracted files in the '\Traces\Wind' folder
4	2022 Rating POE10.zip 2022 Rating POE50.zip	Contains half-hourly line ratings for transmission lines.	Place the extracted files in the '\Traces\Ratings' folder
5	2022 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' folder
6	2022 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' folder
7	2022 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' folder
8	2022 Timeslices.zip	Contains the traces that determine the Generators Ratings' seasons and each regions' seasonal hot days.	Place the extracted files in the '\Traces\Timeslices' folder

2. Unzip the file *2022 ESOO Model.zip*. This will generate the 2022 ESOO Model folder structure. The contents of the 2022 ESOO Model folders are illustrated in Figure 1. The 2022 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 2022 ESOO Model file

Name	Date modified	Type	Size
Traces	10/08/2022 12:31 ...	File folder	
SimulationShell	10/08/2022 12:25 ...	XML Document	279,696 KB

3. Open the *Traces* folder.

4. Extract the other 10 zip files into their respective sub-folders as outlined in Table 1.

5. Use Plexos 8.300 R06 x64 (or higher) to open and run the model file '*SimulationShell.xml*' in the root folder.
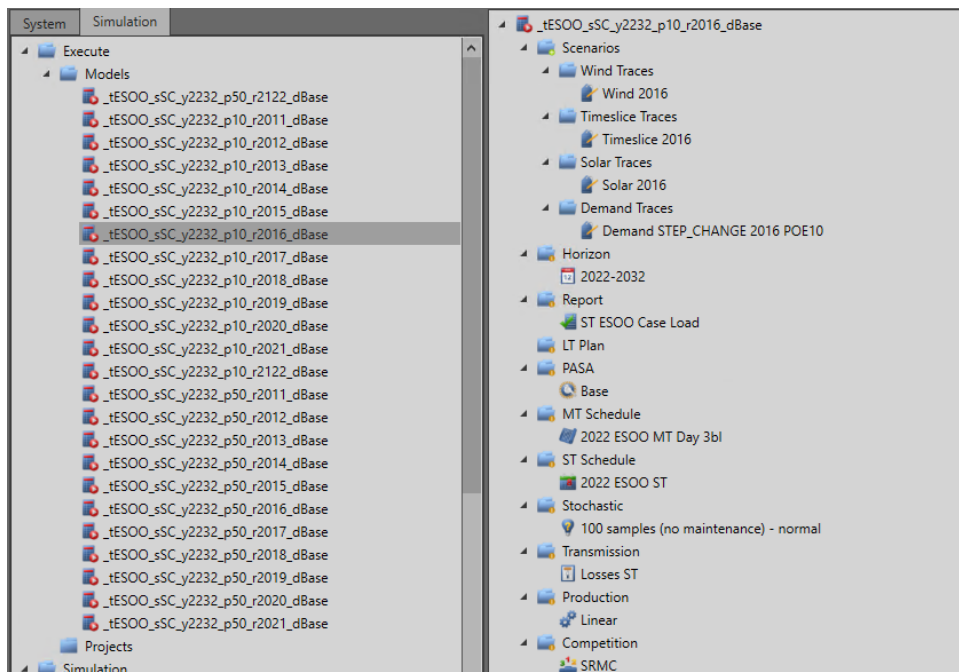
The 2022 ESOO discusses multiple scenarios and sensitivities. Only the Central ESOO scenario is available in the *2022 ESOO Model.xml*. More information about the ESOO scenarios is available in the 2022 ESOO and 2022 *Forecasting Assumptions Update*[1].

The 2022 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*[1]. The rates are applied for the following technology aggregates:

- Black coal New South Wales (until 2027-28).

- Black Coal Queensland (until 2027-28).

- Brown coal Victoria (until 2027-28).

- All coal (from 2028-29).

- 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 24 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 24 iterations per forecast year. In the published 2022 ESOO 2,400 iterations were run (for example, 100 iterations per model which can be selected).

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

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[1] 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.

2 2022 NEM ESOO model naming convention

A set of naming conventions was used in the 2022 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 2022 NEM ESOO. The job sets populated in this model reflect this naming convention.

For example, the job set "_tESOO_sSC_y2232_p10_r2018_dBase" represents the following assumptions:

- Central (called *Step Change* in the model) demand scenario.
- A model horizon between 01 July 2022 and 30 June 2032.
- The POE10 peak demand forecast.
- The 2017-18 reference year.
- Base refers to this being the Central ESOO scenario that assumes only existing and committed projects.

Table 2   ESOO 2022 naming convention

Descriptor	Prefix	Options	Description
Project	_t	ESOO	2022 NEM ESOO
Scenario	_s	SC	SC = Step Change (ESOO Central Scenario)
Financial year	_y	2232	Financial year range modelled, for example, 2022-23 to 2031-32
Probability of exceedance	_p	10, 50	POE demand trace used
Reference year	_r	2011 to 2022	Historical reference year traces used in the model, for example, 2010-11 or 2021-22
Sensitivity	_d	Base	Base = Core ESOO assumptions

3 Further details

The model is populated with the settings that were used in the 2022 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 Central scenario (labelled 'Step Change' in the model).

PLEXOS 8.300 R10 x64 was used to create and run the 2022 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 2022 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 2022 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[2].

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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[2] Any questions related to the NEM constraint set should be directed to planning@aemo.com.au.