AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

2021 ESOO Input Data Package and Model Instructions

August 2021

A Guide to the Input Data and Published Model of the 2021 Electricity Statement of Opportunities

Important notice

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 2021 Electricity Statement of Opportunities (ESOO).

DISCLAIMER

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VERSION CONTROL

Version	Release date	Changes
#1	31/08/2021	Release for 2021 ESOO

1. Configuring the 2021 NEM ESOO Model

This chapter contains the steps needed to set up the 2021 ESOO PLEXOS market model, including configuration of the input data package used in the simulation model. The step by step guide is documented below.

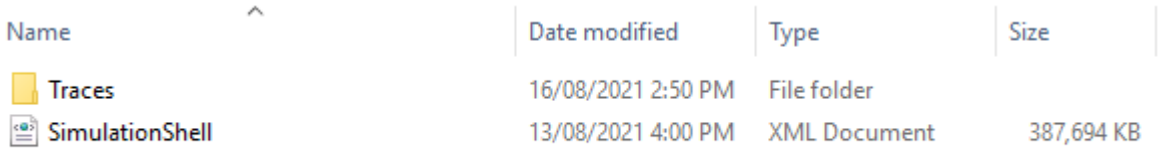
1. Download the zip files from AEMO's 2021 Electricity Statement of Opportunities webpage. The list of zip files is summarised in Table 1.

Table 1 Zip files from AEMO's 2021 ESOO webpage

No	File	Description	Where to put the files
1	2021 ESOO Model.zip	Contains model files, folder structure, and associated parameter files.	Place in the root folder
2	2021 Solar A-L.zip 2021 Solar M-Z.zip	Contains half-hourly generation traces for solar.	Place into the '\Traces\Solar' folder
3	2021 Wind A-L.zip 2021 Wind M-Z.zip	Contains half-hourly generation traces for wind.	Place into the '\Traces\Wind' folder
4	2021 Rating.zip	Contains half-hourly line ratings for transmission lines.	Place into the '\Traces\Ratings' folder
5	2021 PV_TOT.zip	Contains half-hourly regional generation traces for embedded PV, including rooftop PV and PVNSG.	Place into the '\Traces\Demand' folder
6	2021 OPSO_PVLITE.zip	Contains half-hourly regional demand traces for operational demand (demand before the impact of rooftop PV and PVNSG).	Place into the '\Traces\Demand' folder
7	2021 OPSO.zip	Contains half-hourly regional demand traces for operational demand (demand after the impact of rooftop PV and PVNSG).	Place into the '\Traces\Demand' folder
8	2021 Line FOR	Contains the variable daily Forced Outage Rate traces for transmission lines.	Place into the '\Traces\Line FOR' folder
9	2021 Timeslices	Contains the traces that determine the Generators Ratings' seasons and each regions' seasonal hot days.	Place into the '\Traces\Timeslices' folder

2. Unzip the file *2021 ESOO Model.zip*. This will generate the 2021 ESOO Model folder structure. The contents of the 2021 ESOO Model folders are illustrated in Figure 1. This year's ESOO NEM Constraints are already incorporated into the PLEXOS XML Document. No folders or files regarding with the NEM constraints are required this time. This new feature requires the ESOO model to be run in PLEXOS version 8.3 R06 or higher.

Figure 1 Contents of the 2021 ESOO Model file



3. Open the *Traces* folder.
4. Extract the other eight zip files into their respective sub-folders as outlined in Table 1.
5. Use Plexos 8.300 R06 x64 to open and run the model file '*SimulationShell.xml*' in the root folder.

The 2021 ESOO publishes three scenario forecasts. Only the Central ESOO scenario is available in the *2021 ESOO Model.xml*. The Central ESOO scenario is referred to as 'Net Zero 2050' in the model, as the Central ESOO scenario reflects both the Net Zero 2050 and Steady Progress scenario. More information about the ESOO scenarios is available in the 2021 ESOO and 2021 IASR[1].

The 2021 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 ESOO and Reliability Forecast Methodology Document[2]. The rates are applied for the following technology aggregates:

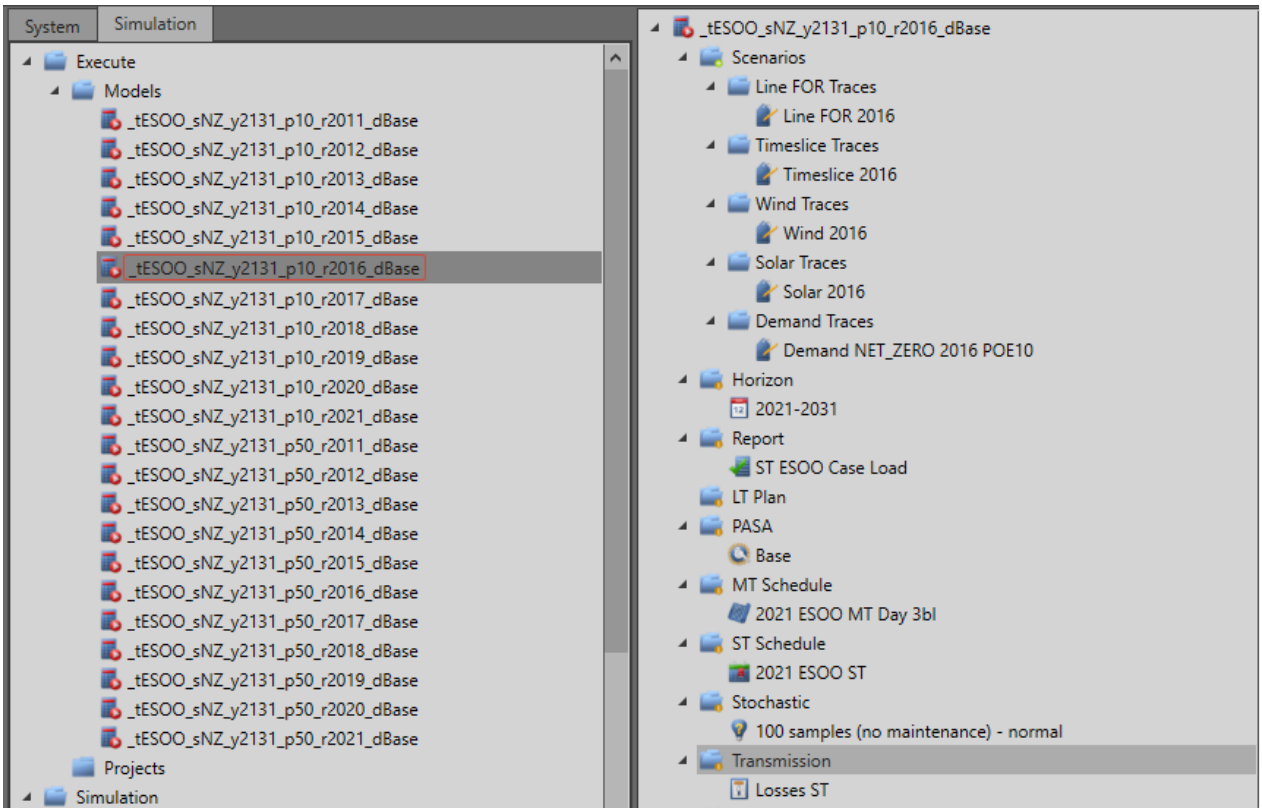
- Black Coal New South Wales (until 2027-28)
- Black Coal Queensland (until 2027-28)
- Brown Coal Victoria (until 2027-28)
- All Coal (from 2028-29)
- CCGTs and Gas-Fired Steam Turbines
- OCGTs
- All Hydros
- Small Peaking plants

There are 22 different models, each with a different Reference Year and maximum demand probability of exceedance (POE). Every model is configured with 100 stochastic iterations, resulting in the potential for 2,200 iterations per forecast year, the same number as the published 2021 ESOO.

[1] At https://aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Inputs-Assumptions-and-Methodologies.

[2] 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. 2021 NEM ESOO Model Naming Convention

A set of naming conventions is developed in the 2021 ESOO to shorten the model names in order to comply with the maximum number of characters allowed in naming models in PLEXOS. Table 2 describes the model naming convention used in the 2021 NEM ESOO. The job sets populated in this model reflect this naming convention.

For example, the job set "_tESOO_sNZ_y2131_p10_r2018_dBase" represents the following assumptions:

- Central (called Net Zero in the model) demand scenario.
- A model horizon between 01 July 2021 and 30 June 2031.
- 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 2021 naming convention

Descriptor	Prefix	Options	Description
Project	_t	ESOO	2021 NEM ESOO
Scenario	_s	NZ	NZ = Net Zero 2050 (ESOO Central Scenario)
Financial Year	_y	2131	Financial year range modelled. E.g.: 2021-22 to 2030-31
Probability of exceedance	_p	10, 50	POE demand trace used
Reference Year	_r	2011 to 2021	Historical Reference Year traces used in the model. E.g.: 2010-11 or 2020-21
Sensitivity	_d	Base	Base = Core ESOO assumptions

3. Further details

The model is populated with the settings that were used in the 2021 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 'Net Zero' in the model).

PLEXOS 8.300 R06 x64 was used to create and run the 2021 ESOO scenarios and sensitivity.

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 2021 ESOO was run with NEM Constraints already integrated to the PLEXOS XML. Unlike in previous years, no external OpenPLEXOS assembly or transmission workbooks are required.

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[3].

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.

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