AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

2020 FINAL ISP INPUT DATA PACKAGE AND MARKET MODEL INSTRUCTIONS

September 2020

A Guide to the Input Data and Market Model for the 2020 Final Integrated System Plan

Important notice

PURPOSE

AEMO has prepared this document to assist stakeholders in interpreting and using input data produced for the purposes of modelling the National Electricity Market (NEM) for the 2020 Final Integrated System Plan (ISP).

AEMO's dataset covered by this guide is configured for use in the PLEXOS Integrated Energy Model software; the PLEXOS database itself containing the market models underpinning the 2020 Final ISP is also published as part of this data package.

DISCLAIMER

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AEMO aims to use the latest relevant and robust data when performing market modelling to assess the adequacy of supply to meet demand forecast in the Integrated System Plan. This can include data provided to AEMO in confidence.

This data package has had all confidential data removed, and as such the model may not replicate the exact modelled outcomes produced by AEMO as published in the 2020 Final Integrated System Plan report.

AEMO makes no warranties on the PLEXOS Integrated Energy Model, and the input data and model are provided for the information purposes of stakeholders only.

This data package (or the conclusions reached in using it) does not include all the information that an investor, participant or potential participant in the national electricity market might require and does not amount to a recommendation of any investment.

VERSION CONTROL

Version	Release date	Changes
1	22/09/2020	Release of 2020 ISP model

1. 2020 Final ISP DLT Model

This document provides guidelines for the Detailed Long Term (DLT) model and its input assumptions which AEMO has made publicly available to stakeholders.

The DLT model is one of two long-term models used to determine the outlook for generation capacity investments, including Renewable Energy Zone (REZ) developments. The DLT model optimises generation developments with consideration for the available transmission network and generator retirements that have been determined through the use of the Long-Term Integrated Model (IM).

Detailed information about the DLT and the other models used within the 2020 Final ISP can be found in AEMO's Market Modelling Methodologies report[1].

1.1 Market model and data package content

The publication of the 2020 Final ISP DLT Model encompasses:

- One PLEXOS database in .xml format, containing one model which corresponds to development path DP1 for the Central scenario by default (details can be found in 2020 ISP report[2]). Other development paths are provided within the model.
- Underlying demand and renewable generation traces in PLEXOS format.

1.1.1 Supporting data: Trace Files

To account for short and medium-term weather variability, multiple reference years are used so that the modelling captures a broad range of weather patterns affecting customer demand, wind, solar and hydro generation outputs. The model uses a rolling reference year approach where traces are constructed by combining timeseries of ten reference years. These reference years were matched to the IM and DLT planning horizon in the sequence described in Table 1, with the 10-year sequence repeating in the same order until the end of the outlook period.

[1] AEMO, Market Modelling Methodologies, 2019. Available at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/Inputs-Assumptions-Methodologies/2019/Market-Modelling-Methodology-Paper.pdf.

[2] AEMO, 2020 Integrated System Plan. Available at https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en

Table 1 Rolling reference year sequence in DLT model

Planning Year	Demand Reference Year	Hydrological Reference Year	Variable Renewable Energy (VRE) Reference Year
2021-22	2013-14	2013-14	2013-14
2022-23	2014-15	2014-15	2014-15
2023-24	2015-16	2015-16	2015-16
2024-25	2016-17	2016-17	2016-17
2025-26	2017-18	2017-18	2017-18
2026-27	2018-19	2013-14[3]	2018-19
2027-28	2014-15[3]	2006-07 (Dry Year)	2014-15[4]
2028-29	2010-11	2010-11	2010-11
2029-30	2011-12	2011-12	2011-12

[3] For hydro inflows – defined within the PLEXOS database – hydrological reference year 2018-2019 was replaced with 2013-14 due to data unavailability. Among all hydrological reference years available, 2013-2014 was found to have the closest hydro generation to 2018-2019.

[4] For renewable and demand traces - traces for 2006-07 (dry year) were replaced with 2014-15 as they were most similar in profile to the 2006-07 year.

2. Configuring the 2020 Final ISP Model

The following section outlines the steps required to set up the 2020 Final ISP DLT 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 2020 Final ISP webpage[5]. The list of zip files is summarised in Table 2:

Table 2 Zip files from AEMO's 2020 ISP webpage

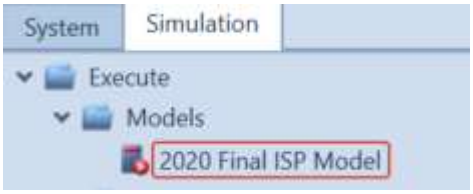
No	File	Description	File location
1	2020 Final ISP Model.zip	Contains .xml file	Place in the root folder
2	2020 ISP Solar Traces.zip	Contains half-hourly generation traces for solar	Place into the '\Traces\solar' folder
3	2020 ISP Wind Traces.zip	Contains half-hourly generation traces for wind	Place into the '\Traces\wind' folder
4	2020 ISP Demand Traces.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

2. Unzip the file **2020 Final ISP DLT Model.zip**. This will generate the 2020 Final ISP Model folder structure. The contents of the 2020 Final ISP Model are illustrated in **Figure 1**

Figure 1 Contents of 2020 Final ISP DLT Model.zip

3. Open the *Traces* folder.
4. Extract the other three zip files into their respective sub-folders as outlined in Table 2.
5. There is a ready-to-execute model in the .xml file (**Figure 2**), where the default scenario corresponds to DP1 for the Central scenario. Change the scenario to a different DP, if required. Note that DP1, DP6 and DP7 are the same, as outlined in Table 3.

Figure 2 Model in the 2020 Final ISP Model - Central.xml file



[5] AEMO, 2020 Integrated System Plan. Available at https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en

Table 3 Candidate development paths assessed in the 2020 Final ISP for the Central scenario

Development path		VNI Minor	Central-west Orana	Project Energy Connect	HumeLink	QNI medium and large	VNI West	Marinus Link Cable 1	Marinus Link Cable 2
1	Central least-cost	2022-23	2024-25	2024-25	2025-26	2032-33 and 2035-36	2035-36	2036-37	N/A
2	Slow low regret					N/A	N/A	N/A	N/A
3	Fast least-cost					2032-33 and 2035-36	2035-36	2031-32	N/A
4	Step least-cost							2028-29	2031-32
5	High DER least-cost						N/A	2031-32	2035-36
6	Central, early works ML						2035-36	2036-37	N/A
7	Central, early works ML and VNI						2035-36	2036-37	N/A
8	Central, early works ML, accelerated VNI						2027-28	2036-37	N/A

2.1 Further Details

Due to the size of the problem and the length of the planning horizon simulation, it is necessary to make some simplifying assumptions, trading off some model accuracy for computational manageability. These simplifications include:

- Aggregating hourly demand across the 21-year planning horizon into a representative number of load blocks.
- Dividing the optimisation into smaller steps (3 steps of 7 years).
- Using static notional interconnector limits to simplify network representation.
- Preliminary screening of generation build candidates by optimising the DLT model for a selection of snapshot years to determine if a technology is part of the most economically efficient solution at any time across the planning horizon. However, note that certain generator technologies such as CCGTs and OCGTs are nevertheless included in the DLT simulations while thermal generation developments such as coal plant are optimised by the Long-Term Integrated model (IM).

Further information can be found in AEMO's Market Modelling Methodology report[6].

[6] AEMO. Market Modelling Methodologies, at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/Inputs-Assumptions-Methodologies/2019/Market-Modelling-Methodology-Paper.pdf