

Forecasting Reference Group Minutes

Forum:	June (a) FRG 2023 (#4)
Date & time:	Wednesday 14 June 2023, 2:00pm – 4:00pm AEST

Disclaimer

This document provides an overview of the main points of discussion on the 14 June 2023 Forecasting Reference Group (FRG) meeting agenda. Readers, please note that:

- *This document is a summary only and is not a complete record of discussion at the forum.*
- *For presentation purposes, some points have been grouped together by theme and do not necessarily appear in the order they were discussed.*
- *The views expressed at the forum and reflected here are not necessarily those of AEMO.*

1 Welcome and Introductions

Levi Rosenbaum (AEMO) welcomed everyone and covered the following:

- Minutes and meeting packs have been added to the FRG webpage.
- Another FRG meeting will be held on 28 June 2023.
- Draft 2023 IASR scenarios and sensitivities update webinar 15 June 2023.
- Submissions can be made to Energy.forecasting@aemo.com.au.

2 Presentation 1 – Draft 2023 maximum and minimum demand forecasts

Magnus Hindsberger (AEMO) presented the draft 2023 maximum and minimum demand forecasts for use in the 2023 Electricity Statement of Opportunities (ESOO) for the National Electricity Market (NEM).

Key topics raised by stakeholders during this session included:

- Connor McLeod (Shell Energy): When will POE10/50/90 and synthetic traces be published?
 - AEMO: In August, the components required by the ESOO model will include POE10 and 50 traces for all scenarios. POE90 traces are not published since they are not used within the default ESOO model. More components may be published with the draft ISP in December.
- Connor McLeod (Shell Energy): In the ESOO, are POE10 and POE50 traces sampled randomly from the distributions or run distinctly?
 - AEMO: The ESOO is run with distinct traces. The reliability outcome is the weighted result of POE10 and POE50 runs.
- Connor McLeod (Shell Energy): Would AEMO consider sharing the underlying data and half-hourly model, to replicate and review the model independently?
 - AEMO: This can be discussed at a Technical Forecasting Workshop. **(Action 2)**
- Joe Hemmingway (Powerlink): In the new model, weather causes extreme seasonal demand forecasts to fall outside the range. Is this a function of the limited weather reference years?
 - AEMO: For the top and bottom 1% of demand, the new methodology causes a lower annual residual, and the spread of outcomes is now mostly driven by weather variability, particularly in winter, with less extreme weather days (1 in 20 in 2021).

- Joe Hemmingway (Powerlink): What are the drivers for the uplift in maximum demand forecast from 2030s onwards, particularly in Queensland and New South Wales?
 - AEMO: There is more EV charging forecast in residential and business sectors. However, as EV charging behaviour becomes more flexible, the impact on maximum demand diminishes.
- Ed White (Ausgrid): What components of demand are Business Mass Market (BMM)?
 - AEMO: BMM includes non-transmission-connected commercial and industrial loads not classified as a large industrial load (LIL) [>10 MW load for 10% of the year].
- Ed White (Ausgrid): How are EV forecasts applied to these demand forecasts?
 - AEMO: EV forecasts are provided by AEMO's consultants (CSIRO for 2023). Demand forecasts are produced on the aggregate of load, and include the influence of EV charging.
- Ben Skinner (AEC): What proportion of demand is controllable? Is forecast demand from electrification and Electric Vehicles considered controllable? Maximum and minimum demand forecast of uncontrollable loads would be useful.
 - AEMO: There are no explicit forecasts of controllable and uncontrollable load. Electrification increases maximum demand. A portion of daily EV charging is assumed to be controlled either as vehicle to home (V2H) or vehicle to grid (V2G) and will have less impact on maximum demand than uncontrolled charging. It should be noted that load to generate hydrogen has been excluded from the demand forecast. Supply modelling dictates times for most economical hydrogen generation. A small proportion (~10%) of hydrogen load is considered non-curtailable, as per participant feedback, but otherwise hydrogen load is flexible and will not be operating at time of maximum demand.
- Jennifer Brownie (QEUN): Given green hydrogen is expected in the ESOO timeframe, how will this be included in the forecasts? Will electrolyser ramping rates be published in the IASR?
 - AEMO: Hydrogen production is modelled as supply rather than demand. The supply model decides the optimal times to generate hydrogen with respect to power system impacts and cost, so hydrogen load does not tend to increase maximum demand materially (there may be some inflexible load). The 10-year ESOO horizon features only small amounts of hydrogen production and takes hydrogen ramp rates from the 2023 IASR.
- Jennifer Brownie (QEUN): What prices were demand forecasts based on? Based on expectations of interest rate rises, the high forecast for business mass market is surprising.
 - AEMO: Prices were accounted for in the consumption forecasts produced in May. The price forecasts feature a short-term spike that moderates around 2027-28.
- Jennifer Brownie (QEUN): Will the components of peak demand forecasts be provided for understanding demand drivers, similar to 2022 ESOO Figure 6?
 - AEMO: Refer to the May 31st FRG meeting for consumption component forecasts.
- Craig Oakeshott (AEMC): Will model components be published alongside the ESOO?
 - AEMO: Yes. The ESOO model is also published, including all inputs and traces, allowing it to be re-run and for supply-side traces to be replicated.
- Richard Hickling (Mott MacDonald): Why does NSW maximum demand forecast grow steeply to the 2030s before growing slower? High PV forecasts would favour high maximum demand growth later in the forecast horizon rather than sooner.
 - AEMO: The maximum demand growth may be from early electrification and improved Energy Efficiency forecasts. Peak demand is occurring in late evening, so PV is not significant. PV may have some influence in low POE simulations. The pace of EV uptake and charging behaviours will also have an influence on the maximum demands.

- Connor McLeod (Shell Energy): The starting point for SA maximum demand appears to be too low, considering recent La Nina.
- Connor McLeod (Shell Energy): What are the model's explanatory variables?
 - AEMO: The explanatory variables vary for each region but include temperature and calendar related variables.

3 Presentation 2 – Draft 2023 Forced Outage Rate forecasts

Ben Jones (AEMO) presented the draft 2023 unplanned outage rate forecasts for generators and key inter-regional transmission flow paths, for use in the 2023 Electricity Statement of Opportunities (ESOO).

Key topics raised by stakeholders during this session included:

- John Godfrey (Bass Coast Climate Action Network): Are all generators assumed to be in their 'useful life' phase? Weibull distributions, where older generators have higher outage risk, would produce a less optimistic reliability forecast.
 - AEMO: The methodology considered literature about increased outages for coal fired power stations near retirement age, and is informed by participant forecasts. Gas generators typically submit flat outage rate projections. The current methodology involves extrapolating on the average of the past four years.
- Ben Skinner (AEC): The flat projection is suitable. Open-cycle gas turbines (OCGT) and hydro generators do not run for many hours, and early coal closures lowers the average age and increases reliable performance.
- Ben Skinner (AEC): Extending FOR calculations to include generation outages in non-committed periods is reasonable. Why was this not the case previously?
 - AEMO: The PLEXOS model only simulates an outage when the generator is committed. In the revised FOR calculation, outages occurring during non-committed periods are divided by the total hours to avoid overstating unreliability.
- Ben Skinner (AEC): Does AEMO expect battery outages by block or cells? A full outage may not be relevant for batteries. A partial outage on a conventional plant may take out 50% of capacity, while a partial outage on a battery may be 1.5 in 100 cells. Perhaps battery outages could be modelled by decreases the average availability.
 - AEMO: Implementation is not yet determined for batteries, so AEMO will review observed history to determine implementation. [Outage history showed predominantly full outages, hence AEMO has implemented a full outage rate only]
- John Godfrey (Bass Coast Climate Action Network): The extent of battery outage depends on the failure mode. Fires tend to bring down the whole site. Mechanical failures may just affect the single cell. It is best to ask the battery operators.
 - AEMO: The only known instance of a grid battery fire was pre-commissioning, so does not appear in the assessed data.
- Connor McLeod (Shell Energy): How are FORs applied in the model? Do they de-rate nameplate capacity by the forecast flat outage rates?
 - AEMO: A FOR represents the portion of the year with an equivalent full unplanned outage. Each model is provided with the full, partial, and long duration outage rates separately. Outages are then randomly assigned during Monte Carlo simulated dispatch. The mean time to repair is published in the IASR.

- Connor McLeod (Shell Energy): Is the probability of unplanned outage events mapped to probabilities of different weather year outcomes?
 - AEMO: Probabilities of outages and weather-dependent components are modelled independently. The ESOO simulations contain different combinations of generator outages, including overlapping outages, and different weather combinations. Consistent with the reliability standard, the unserved energy (USE) reported is the average outcome of weighted USE results.
- Connor McLeod (Shell Energy): Are system shocks other than outage rates applied?
 - AEMO: FORs are a key driver for USE events. Wind and solar variability, maximum demand timing, transmission availability and energy limits all determine system reliability.
- Jennifer Brownie (QEUN): How is the increased likelihood of bushfires causing transmission outages, particularly in renewable energy zones (REZ), modelled?
 - AEMO: This is not currently account for. The National Electricity Rules stipulates that USE assessment for the ESOO, EAAP and MT PASA should assume the transmission network within a region to be fully operational. Accordingly, the ESOO only simulates limited transmission outages.
- Jennifer Brownie (QEUN): What are outage rates for wind and solar? Do they consider that bushfire-affected wind farms could take many years to replace?
 - AEMO: Currently, there is no outage rate for wind and solar, although this is being considered. Only minor partial outages at wind and solar farms have been observed. Due to natural variability, historical observed outages may already be captured in supply traces.

4 Meeting close

The next FRG meeting will be held on 28 June 2023 with presentations on draft 2023 gas price forecasts and discount rate survey results. Visit the [FRG webpage](#) for the forward plan of agenda topics for 2023.

Feedback on the 14 June FRG can be submitted at: <https://forms.office.com/r/TMemhg6WtR>

A1 Attendees:

Table 1 14 June FRG Attendees

Name	Organisation	Name	Organisation
Ben Skinner	AEC	Kerina Heath	Ergon Energy
Craig Oakeshott	AEMC	Jill Cainey	Erne Energy
Ali Habibi Khalaj	AEMO	Brent Hudson	Essential Energy
Alice McLaren	AEMO	Cameron Potter	FFI
Ana Orozco Perez	AEMO	Amin Nabipour	Horizon Power
Andrew Turley	AEMO	David Edwards	Horizon Power
Anula Abeygunawardana	AEMO	David Allen	Hydro Tasmania
Ben Jones	AEMO	Kateryna Kiemele	Hydro Tasmania
Chang Liu	AEMO	Suchitra de Silva	Hydro Tasmania
Ebby Thomas	AEMO	Jack Munro	Iberdrola
Eduard Munsayac	AEMO	Jay Gordon	IEEFA
Grace Liu	AEMO	Bev Hughson	ISP Consumer Panel
Helen Wang	AEMO	Nicolas Taylor	Lantau Group
Hespera Henzell	AEMO	Chotima Micallef	Lochard Energy
Jay Stein	AEMO	Terrence W.K. Mak	Monash University
Jieyang Chong	AEMO	Richard Hickling	Mott Mac
Jin Han Lim	AEMO	Stephanie Bashir	Nexa Advisory
Justin Saunders	AEMO	Daniel O'Neill	NSW DPIE
Ken Harper	AEMO	Shervin Mohebbi	Powercor
Leo Ma	AEMO	Ben McGregor	Powerlink
Levi Rosenbaum	AEMO	Joe Hemingway	Powerlink
Lin Han	AEMO	Rinna Garcia	Powerlink
Maggie Du	AEMO	Jennifer Brownie	QEUN
Magnus Hindsberger	AEMO	Linda Yu	QLD EPW
Marcela Cepeda Aponte	AEMO	Bret Harper	Reputex
Mark Taylor	AEMO	Andrew Manson	SA DEM
Matthew Marston	AEMO	Marino Bolzon	SA DEM
Nick Cimdins	AEMO	Christina Sutherland	Santos
Reinzy Colle	AEMO	Felicity Copeland	Santos
Sayani Gupta	AEMO	Ashley Muldrew	SAPN
Seb Kilborn	AEMO	Elisia Reed	SAPN
Siobhan Attwood	AEMO	Fraser Hampton	SAPN
Tim Abernethy	AEMO	Jason Steele	SAPN
Tristan Smith	AEMO	Judy George	SAPN
Virginia Chen	AEMO	Lachlan Hillier	SAPN
Yee Siong Lee	AEMO	Matthew Napolitano	SAPN
Ed White	Ausgrid	William Coren	SAPN
Jaysson Guerrero	Ausgrid	Connor McLeod	Shell Energy
Navid Haghdadi	Ausgrid	Noel Sligar	Sligar and associates
Morteza Moallemi	AusNet	Connie Ganser	Stanwell
John Godfrey	Bass Coast Climate Action Network	Steve Meiklejohn	Stanwell
Ramon Sa	CEFC	Michael Nelmes	Synergy
Eddie Leow	CleanCo Queensland	Rudy Khong	Synergy
Mamta Grewal	CleanCo Queensland	Dhor Ngor-Apuol	Tas Networks
Swaantje Grunefeld	CleanCo Queensland	Sharon Raymond	TAS RECFIT
Glen Whitehead	DCCEEW	Arindam Sen	TransGrid
Caroline Valente	ECA	Arwin Kahlon	VIC DEECA
Harry Yu	ElectraNet	Ben Willey	VIC DEECA

Name	Organisation	Name	Organisation
Lawrence Irlam	Energy Australia	Cory Jemison	VIC DEECA
Richard Paprzycki	Energy Australia	Mark Kowalczyk	VIC DEECA
Shoaib Amjad	Energy Australia	Riadi Tanzil	VIC DEECA
Benson Heng	Energy Queensland	Bijoy George	Western Power
Craig Pollard	Energy Queensland	Cara Smith	Western power
Chris Seeling	Engie	Iain Machanick	Western power
Haiyan Liu	ERAWA		

A2 Forecasting Reference Group (FRG) Actions Items

Table 2 FRG Action Items (at 15 August 2023)

Item	Date Raised	Topic	Action required	Closing comments	Status
1	26/04/2023	WDR forecasting	AEMO to talk to the WDR provider about its forecasting approach	AEMO has validated with the WDR provider that the approach is fit for purpose.	CLOSED
2	14/06/2023	Publishing half-hourly underlying data	Discuss publication of independently replicable models at a technical forecast workshop	For discussion at a Technical Forecast Workshop	CLOSED