



Minutes

Transformation Design and Operations Working Group (TDOWG): Meeting 4

Time: 1.30pm – 3.30pm
Date: 19 November 2019
Venue: Level 45, 152 St Georges Terrace, Perth

Attendees:

Attendee	Organisation	Attendee	Organisation
Aden Barker	ETIU	Margaret Pырchla	Western Power
Aditi Varma	ETIU (Chair)	Mark de Laeter	EMCa
Adrian Theseira	ERA	Mark Imrie	BC Solar
Angeline Ong	ETIU	Mark Riley	AGL
Ben Rose	Independent Modeller	Matthew Bowen	Jackson MacDonald
Bobby Ditric	The Lantau Group	Matthew Fairclough	AEMO
Brad Huppatz	Synergy	Matt Veryard	Western Power
Christopher Wilson	AEMO	Neil Chivers	Western Power
Clayton James	AEMO	Noel Schubert	ERA
Daniel Kurz	Bluewaters	Patrick Peake	Perth Energy
Dean Frost	Western Power	Paul Arias	Bluewaters Power
Dora Guzeleva	EPWA	Paul Hynch	EPWA
Drew Harris	Simcoa	Peter Huxtable	Water Corporation
Elizabeth Aitken	Perth Energy	Quentin Jeay	Kleenheat
Elizabeth Walters	ERA	Rebecca White	ETIU
Emma Rowe	Treasury	Richard Cheng	ERA
Erin Stone	Point Global	Rod Littlejohn	Tersum Energy
Genevieve Simpson	Western Power	Sabina Roshan	Western Power
Geoff Gaston	Change Energy	Sam Lei	Alinta Energy
Geoff Glazier	Merz	Scott Davis	Australian Energy Council
Greg Ruthven	AEMO	Simon Middleton	AEMO
Jacinda Papps	Alinta Energy	Sonia Kolar	Alinta Energy
Jason Froud	Synergy	Stephen Eliot	Rule Change Panel Support
Jenny Laidlaw	Rule Change Panel Support	Steve Gould	Community Electricity
Jo-Anne Chan	Synergy	Steven Kruit	ETIU
Kaler Yadi	Alinta Energy	Stuart Featham	AEMO
Kate Ryan	EPWA	Tim Robinson	Robinson Bowmaker Paul
Kristian Myhre	TransAlta	Wendy Ng	ERM Power
Laura Koziol	Rule Change Panel Support	Wesley Medrana	ETIU
Leon Kwek	AEMO	Yau Chow	Western Power

Item No.	Issue
1.	Opening remarks

The Chair opened the meeting and outlined the ground rules for the meeting. The Chair informed the TDOWG that Taskforce publications were available on <https://www.wa.gov.au/government/document-collections/taskforce-publications> and that a Design Decisions Register for the Delivering the Future Power System work stream was planned for release in January 2020.

Outcome

- *ETIU to publish Design Decisions Register in January 2020.*

2.	ESS Scheduling and Dispatch
----	-----------------------------

Tim Robinson (TR) from Robinson Bowmaker Paul presented on ESS Scheduling and Dispatch.

- TR gave a recap on the new ESS products: the regulation upward/downward services, contingency reserve raise/lower services, and Rate of Change of Frequency (RoCoF) Control service.
- TR outlined contingency reserve accreditation requirements, which would include new standing data and the assessment of a speed factor to measure facility response capability.
- Elizabeth Aitken (EA) from Perth Energy asked how the speed factor would be set for new facilities, before they had any actual data to measure. TR replied that frequency injection tests or engineering reports may be used. Clayton James (CJ) from AEMO added that AEMO had previously used frequency injection tests with spinning reserve providers. This existing data could be used for the accreditation of existing facilities in the new market. Wendy Ng (WN) from ERM Power asked whether every facility would be tested. TR replied that only those facilities that opted in to provide the contingency raise service would be tested.
- Ben Rose (BR), independent modeller, asked what a battery's response curve would look like. TR replied that there would be a short detection delay followed by a fast response. BR asked how the detection delay would compare to the response of a gas facility. TR replied that the detection delay would likely be estimated quite conservatively in the first instance, and this estimation could be refined over time as more data became available. Geoff Glazier (GG) from Merz Consulting noted that the response curves would be derived from the dynamic models required to be provided by generators at connection - a relatively detailed and accurate source of data.
- Noel Schubert (NS) from the ERA noted that governor settings may slow down the response time for some facilities and asked how this would be managed. TR replied that facilities would be able to change their governor settings if they would like to provide a faster response.
- TR noted that bidding in the new market would be simpler for market participants, as they would only need to offer a price to reserve a megawatt of headroom or foot room without needing to consider reserve prices. EA asked if the clearing engine was already capable of facilitating this. TR replied that it wasn't yet, but all the individual components required were feasible and AEMO was currently prototyping how to combine them. If it proved to be infeasible, there was a fallback option of using a less dynamic model.

- TR presented on the accreditation of facilities providing the regulation and RoCoF control services. EA noted that RoCoF accreditation could affect accreditation and registration processes more broadly. TR replied that registration processes were still to be considered, but he could not currently foresee how RoCoF accreditation could cause facilities to change their registration status.
- TR presented on the construction of ESS offers in the new market. Regulation and Contingency Reserve offers would include up to 10 price-quantity pairs per interval in dollars per megawatt per hour, with increasing prices, upper and lower enablement limits and response break points. RoCoF Control offers would be made in dollars per megawatt-second per hour, with a single price-quantity pair expected for most facilities. Gate closure for all ESS would be the same as for energy.
- EA asked why Regulation and Contingency Reserve offers needed to increase with quantity. TR replied that this was function of how the problem was defined in the clearing engine. EA asked whether the RoCoF Control service would allow for a 'start' for the provision of RoCoF. TR replied that, while the dispatch engine would not issue instructions for units to switch on to provide RoCoF, market participants would be able to see the pre-dispatch schedule and determine whether there is enough financial incentive to switch their units on to provide RoCoF in upcoming intervals.
- EA asked TR to make a note to ensure that start costs would be able to be incorporated into a facility's short run marginal cost (SRMC) when switching on to provide the RoCoF Control Service. TR noted that this would be considered in the market power work stream.
- TR presented on the minimum and maximum enablement limits for ESS providers. ESS offers from facilities operating outside enablement limits would not be considered in real-time dispatch, whereas facilities with ESS offers operating inside enablement limits would not be dispatched off, and therefore 'trapped in the ESS zone'. Participants would need to monitor forecasts and adjust their offers to ensure they were placed for the services they wished to provide.
- Matthew Fairclough (MF) from AEMO asked if there would be make-whole payments for the facilities trapped providing ESS. TR replied that there would not.
- TR provided some examples for how the enablement limits would be defined for facilities providing the new ESS. Jenny Laidlaw (JL) from Rule Change Panel Support asked whether offers would be accepted from facilities that were not switched on. TR replied that they would not. JL asked whether facilities capable of providing the RoCoF Control service would by default be providing the service when they were operational. TR replied that they would be, but the quantity of the service procured would be determined by running the clearing engine without enablement limits to determine the amount required. The amount of RoCoF Control service procured would not necessarily be equal to the actual amount of system inertia.
- Brad Huppatz (BH) from Synergy asked why facilities that were operating outside the enablement limits would not be considered for ESS provision and noted that there may be situations where it would be more efficient for a facility to alter their output in order to be within the enablement limits and therefore provide ESS at a lower cost than other providers. TR replied that it was not possible for the engine to select a facility to provide ESS if it was not operating within its enablement limits, but participants should be able to use the pre-dispatch schedule to adjust their offers where it would be profitable to do so. BH noted that this may be inefficient for the system as whole. EA replied that any inefficiency would be limited to 5-minute intervals, which would still be much more efficient than the current system. TR added that the alternative was to remove the enablement limits entirely, but this would likely result in facilities being given dispatch instructions that they were physically incapable of complying with.
- TR presented on the dispatch process. In addition to the clearing engine, there would be a dynamic frequency contingency model that would calculate performance factors, the contingency factor and the RoCoF Control service requirement and iterate with the

clearing engine to determine the optimal co-optimised dispatch of energy and ESS. As mentioned earlier, AEMO had begun prototyping to determine the feasibility of the approach.

- WN asked whether the model would be linear based. TR replied that the clearing engine would be linear, but the dynamic frequency contingency model would not.
- TR gave an example of how performance factors would interact with inertia and speed of response. An individual facility's speed factor was set independent of system conditions, but the way a facility with a particular speed factor contributes to system security would be dependent on system conditions. If a facility was capable of providing inertia, the level of headroom it had available should not have any effect on the amount of inertia it could provide.
- EA asked if it was intended that participants would receive information on system conditions in advance. TR replied that he would make a note that such information could be included in the pre-dispatch outputs, as it would be a function of which facilities were active. EA asked if there was currently any information on system conditions available to participants. CJ replied that information on historical inertia levels was available in the Taskforce's other ESS papers. EA asked how facilities coming online to provide inertia when they are not required to provide energy could be facilitated given the current SRMC requirements. TR replied that in future, as low-cost energy comes online in greater quantities the SRMC rule will become less appropriate to use as a market power benchmark. The market power work stream would consider SRMC in more detail.
- Greg Ruthven (GR) from AEMO asked if RoCoF Control would be co-optimised with energy so that energy price differentials can be incorporated into the SRMC in future. TR replied that it would, so facilities would nominate the costs of providing each of the different services they were eligible to provide, and the clearing engine would select the mix of facilities that would provide all of the services required at the lowest overall cost, meaning in some cases ESS providers could be dispatched ahead of cheaper providers of energy. EA noted that during negative energy pricing intervals ESS providers would need to increase their ESS offer prices to offset the loss they would make in the energy market. TR replied that the market clearing engine would automatically make those calculations, and that he would need to provide detailed worked examples at a later date to demonstrate exactly how the clearing engine would work.
- TR presented on the inputs and outputs of the market clearing engine and dynamic frequency contingency model. WN asked how quickly the clearing engine would complete its calculations. TR replied that each iteration in the process took only fractions of a second, and it would perform similarly to how NEMDE already operates.
- JL asked unit commitment could be organised in such a small market, where a single outage could cause a relatively large shortfall relative to overall demand. TR replied that this would be discussed in the next section. EA noted that many more plant would be eligible and incentivised to participate in the new ESS markets. TR added that AEMO may also need to undertake extra forecasting to avoid such situations in future.
- TR presented on dispatch tiebreaking. Dispatch would be allocated equally between any tied energy offer bands, but tied ESS offer bands may use a different process. EA noted that due to differing MLFs for different facilities, any ties should be very rare. MF replied that this would be true except in minimum price events, where ties would be more likely and there could be very strange dispatch outcomes.
- TR presented on AEMO's monitoring and processes for responding to dispatch non-compliance. Paul Arias (PA) from Bluewaters Power asked why a self-reporting requirement had been included, noting that it would be a substantial burden on market participants. TR replied the requirement would not be onerous and would require only the provision of measurements rather than the commissioning of an engineering report. MF added that self-reporting would only be required following a major contingency. BH

noted that Western Power had high-speed recorders already at several facilities, and asked whether their information could be used rather than doing parallel studies. TR replied that there needed to be a mechanism to access that data for existing facilities, as well as to compel new facilities to provide the required data. JL asked why the high-speed recorders were currently in place. Dean Frost (DF) from Western Power replied that Western Power had undertaken dynamic studies previously on frequency response. The Chair noted that how to obtain high-speed data was an outstanding item for the ETIU to consider.

- TR presented on how real-time shortfalls would be handled, noting that while this was currently dealt with by AEMO manually, under SCED it could be handled by the market clearing engine. In future, AEMO would retain the ability to manually intervene in emergency situations but shortfalls would be dealt with by the clearing engine in the first instance. DF noted that future challenges may be more likely to occur during minimum load periods than during peaks, and asked how this was being considered in the ESS work stream, given minimum load periods are often quite popular times for facility maintenance. JL replied that outages were currently subject to approval, so facilities would not be approved to go on outage if system security would be put at risk. DF noted that forecasting would be required and asked if ESS needs would be forecasted as well as capacity. TR replied that it would.
- TR presented on storage participation, noting that there were not currently any storage facilities registered and participating in the WEM. Storage facilities would participate in future with slightly different standing data requirements than generators, including the requirement for real-time visibility of the current storage level. EA asked why such visibility would be required, given that facilities would not bid into the market if they weren't capable of providing energy. TR replied that pre-dispatch is done four hours in advance, when future charge would be unknown. EA responded that wind farms would currently nominate an expected output in pre-dispatch, and storage facilities could do the same. CJ noted that wind facilities currently provided real-time SCADA data. EA replied that the Hornsdale battery facility did not currently provide real-time data, and it therefore may not be necessary. TR replied that several substantial measures had been taken in the background to ensure the operation of Hornsdale, and such a situation should be avoided in the WEM.
- JL asked whether storage facilities would register as both a load and a generator, or whether another participant class is proposed to be introduced. TR replied that a new participant class was the preferred option.
- JL asked how pre-dispatch would optimise a storage facility's bids. TR replied that a storage facility would make separate offers into the different markets, just as a generator would, but the clearing engine would also need to know its level of charge to optimise dispatch.
- EA asked if the entirety of a storage facility was being assumed to be registered for ESS, noting that participants may wish to use storage facilities to provide energy too. TR replied that once a facility was registered, it may be accredited to provide different services and its offers could be structured to participate in the different markets as participants wished.
- TR presented on the accreditation of intermittent generators to provide ESS. Accreditation would include the existence of facility generation forecasts every 5 minutes and analysis of forecast accuracy to determine headroom requirements, as more than one megawatt of headroom would be required to provide one megawatt of regulation or contingency reserve.
- TR presented on the participation in ESS of intermittent generators collocated with storage facilities. Where such facilities were providing energy and ESS, the storage component could only be used for the provision of ESS, not energy. EA asked why this decision had been made. TR replied that if not, the facility would be using that capacity to affect its energy output while offsetting against its ESS output. EA noted that non-

scheduled generators could also do that. TR replied that the principle would apply to all hybrid facilities. EA replied that this could put an arbitrary ceiling on the size of a storage facility participants would be willing to install at their existing generation facilities. TR noted that a general principle should be that semi-controllable facilities should not be given an unfair advantage over scheduled generators.

- TR presented on the participation of distributed/demand-side resources in ESS. EA asked how an aggregation of smaller interruptible loads could participate in ESS. TR responded that the aggregator would need to coordinate each of the individual loads and present one single offer into the market. EA asked whether a new registration class would be introduced for this purpose. The Chair responded that this would be considered in the registration and participation work stream. TR added that an aggregator could also participate as a scheduled load. JL asked whether an aggregator would need to register as a load, generator or ESS provider. TR replied that this would be considered in the registration and participation work stream.
 - Simon Middleton (SM) from AEMO asked how rigid the presumption of no enablement limits was. TR replied that the intention was that participants would be required to only make offers that they were capable of delivering. EA noted that scheduled or interruptible loads were not bound by SRMC, but rather by the opportunity cost of foregone energy, and this was another reason that SRMC would need to be revisited.
 - TR presented on the next steps, which would include future discussion on non-optimised ESS, ESS settlement, compliance and monitoring, market power mitigation, PASA, and worked examples of ESS pricing. EA noted that 30-minute settlement could have a substantial impact on 5-minute dispatch, and this may also need to be considered. The Chair replied that ETIU would be happy to discuss further. GR asked how ESS would interact with STEM. TR replied that pre-dispatch would be used to indicate the ESS requirement forecast post STEM. EA asked whether it would be up to participants to ensure they don't offer into ESS markets energy that they have already sold in the STEM. TR replied that participants were always able to adjust their offers in such circumstances. WN asked whether participants would be required to bid all of their output in the STEM. TR replied that this would be covered in a separate session specifically addressing STEM.
 - The Chair closed the meeting, noting that the meeting slides would be available on www.energy.wa.gov.au shortly. The next TDOWG meeting would be held on 25 November 2019. EA asked when the timeframe for implementation of the new dispatch engine would be known, noting that participants would need around 18 months plus testing time to prepare, giving a deadline in the first half of 2020. Stuart Featham (SF) from AEMO replied that this matched the timeframe AEMO was working towards.
-