20 March 2019

Ms Nicola Falcon
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AEMO
GPO Box 2008
Melbourne VIC 3001
Submitted by email to Planning@aemo.com.au

RE: 2019 Planning and Forecasting Consultation Paper

Wednesday 20/3/2018

Dear Ms Falcon,

ENGIE considers the planning and forecasting functions of AEMO extremely important as it may influence government policy and impacts large expenditures on transmission.

ENGIE appreciates the opportunity to comment on the Planning and Forecasting Consultation Paper.

ENGIE is a member of the Australian Energy Council (AEC), supports the associations submission and makes the following additional comments.

1 Choice of scenarios

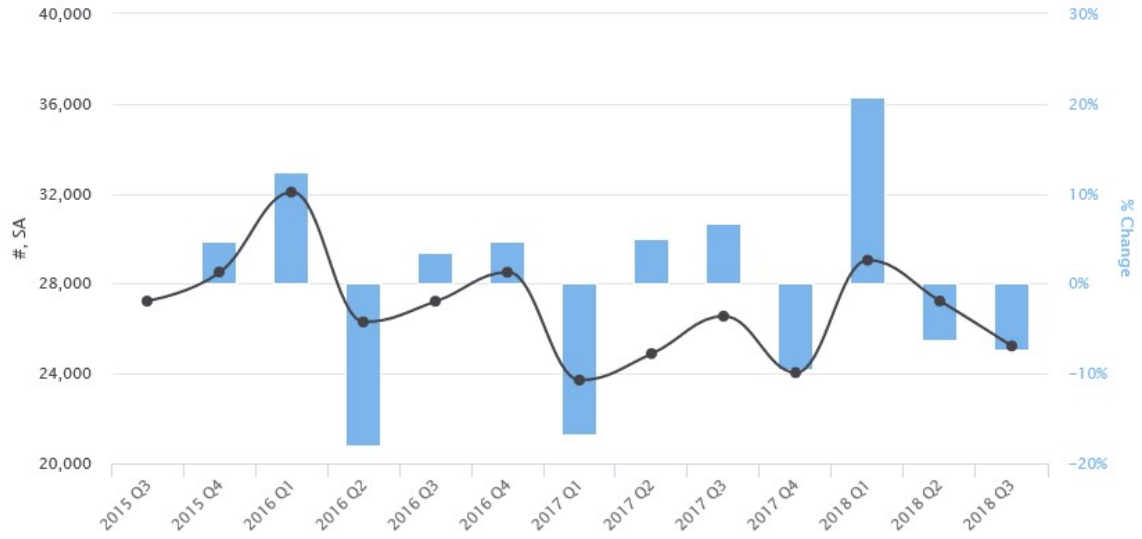
1.1 Economic performance

Economic performance continues to slow globally and domestically due to a range of factors. The conservative International Monetary Fund (IMF), continues to revise its forecasts down and warns of “Softening Momentum, High Uncertainty” ahead. It should be noted that given its conservative approach and based on past performance, the IMF is more of a trend follower rather than a trend predictor.

Overview of some of the key indicators:

- Lower global economic performance, also impacting Australia
    - EU economy slowing
    - China economy slowing
    - Latin America slow/some economies in a depression
- Australia specific considerations
    - Real estate bubble is showing signs of bursting, with accelerating price declines nationally
    - Fall over rate of off-the plan real estate jumped from 5% in 2015 to 25-35% in 2018
    - Stagnant wages growth
    - Persistent under-employment
    - Slowing housing starts (Figure 1)
    - Likely change of Fed government and new tax policies covering capital gains, negative gearing of real-estate property and dividend imputation credits.

Figure 1: Australian Housing starts



Ref Moody's Analytics (*https://www.economy.com/australia/residential-housing-starts/seasonally-adjusted*)

To cover the range of economic performance uncertainty, a scenario which incorporates very low economic performance is needed

Australia has enjoyed 28 years of continuous economic growth and the modelling assumes that this will continue for another 20 years, the only question being examined is how fast. By not considering an economic decline in a suite of scenarios means that negative growth is considered impossible.

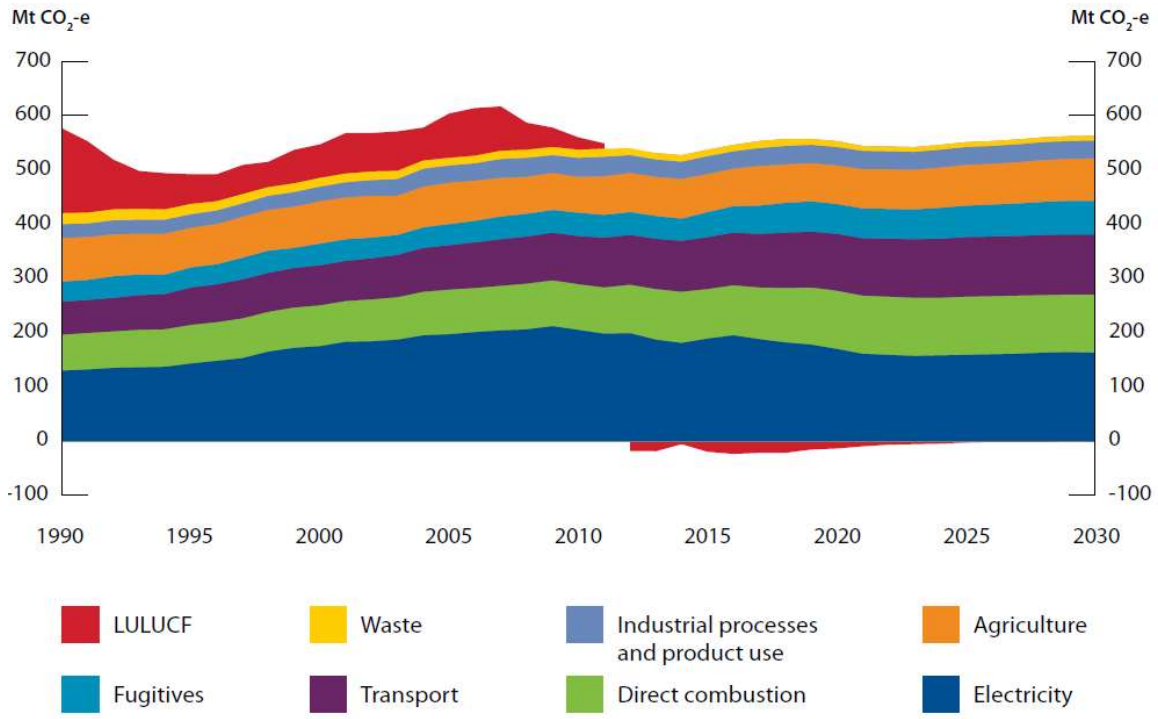
ENGIE asks AEMO to include a scenario with negative growth in some years as a bookend scenario.

1.2 Emission reduction considerations

1.2.1 Level of emission reductions

The documentation effectively covers policy scenarios contemplated by the major parties and includes state-based policies. The emission reductions are applied on a proportional basis to the electricity sector. However, it is likely going to be difficult to achieve the targeted emission reduction in other sectors apart from electricity and waste as illustrated in the following chart. All other economic sectors are projected to under-deliver their share of emission reductions.

(Ref The following chart was sourced from "Australia's emission projections to 2030" report produced by the Department of Environment and Energy in Dec 2018).



ENGIE recommends a scenario with significantly higher emission reduction be considered as a "book end" and to inform participants and policy makers of its practicality and cost.

1.2.2 Modelling approach to emission constraints

The model is currently configured to meet a stipulated emissions trajectory on an annual basis. To increase flexibility of meeting the target consider relaxing the modelling emissions constraint so that it meets a cumulative emissions target by 2030 and another one at 2050.

In this way the model would minimise costs of meeting the cumulative emissions target and may determine that earlier reductions in emissions maybe more effective. The build limits need careful consideration to ensure that plant construction is realistic.

ENGIE suggest AEMO formulate the emission constraint based on cumulative emissions when seeking least cost solutions.

2 Plant related assumptions and modelling approach

2.1 Fuel costs for OCGT (or low capacity gas fired plant in general)

Gas turbines require gas supply infrastructure and firm gas availability to be certain to run when required. The cost of gas infrastructure and cost of purchasing firm gas need to be recovered when the plan operates. For low capacity plant these costs will be very significant and are not currently modelled correctly.

ENGIE recommends that AEMO increases gas costs to low capacity gas turbines as a proxy for the abovementioned costs. These are likely to be in the 3-7$/GJ range, but AEMO is encouraged to seek feedback from participants prior to finalising such quantum.

2.2 Fixed operating and maintenance (FOM) costs

The fixed maintenance costs are currently expressed as $/MW/year. As capacity factor decreases, these fixed costs will tend to dominate the levelised costs of production. However, in practice, a significant amount of maintenance will be driven by the running hours (or equivalent running hours in case of gas turbines) and not be a function of calendar time. To illustrate the concept, gas turbine operating at a 10% capacity factor, would only consume 1/10th of the current fixed O&M costs.

It is recommended that AEMO use plant running hours (as modelled) as a driver of fixed costs.

$$\text{Actual FOM} = \frac{\text{Plant running hours(1)}}{\text{Calendar hours}} * \text{annual \$/MW FOM}$$

(1) These need to be equivalent plant running hours and include the plant life usage during start-ups and shutdowns

2.3 Plant life assumptions

ENGIE supports the AEMO stated objective that the modelling should include current polices but refrain from second guessing potential government policies and regulations.

The approach to plant closures was outlined in the AEMO workshop as either following announced closures or retiring plant when it reaches 50-years of age. To meet deeper emission cuts some plant closures are accelerated however the specific formulation of this heuristic/constraint is unstated.

Plant closures based on asset life of coal fired generators have been implemented in Canada and are not part of any current government policy, consideration or discussion in Australia.

In addition, time-based closures of gas fired plant which occur ahead of coal fired plant closures is inconsistent with least cost modelling and emission reductions.

The closure of LYA, and having LYB rely on the mine is totally unrealistic and ignores the total mine operating costs.

ENGIE considers the current modelling approach to scheduled closures based on plant life inconsistent with the objective of least costs and inappropriate as it is based on a non-existent plant closure policy.

However, it is expected that least cost modelling will remove/retire high emitting generating plant and replace it with low or zero emitting technology to meet specific emission constraint.

ENGIE recommends removing the plant life-based closure from the modelling formulation and using economic criteria for plant closures.

2.4 Application of thermal plant "Mingens"

As previously outlined, plant retirement should be based on economic criteria of revenue adequacy. The model typically commits plant when it is made available. At times of low spot prices, plant with significant mingens will be dispatched at the minimum generation level and accumulate large losses in the process.

It is possible for models to implement some form of look ahead and to commit plant only if it is profitable to run. Unfortunately, these mixed integer formulations tend to be computationally demanding, can be unstable and unnecessarily complicate the model configuration and running.

In real life, plant could be two-shifted and/or modified to reduce mingens. The main classes of plant impacted are the black and brown coal generators.

A simple and pragmatic modelling approach is to reduce the level of mingen to a very small level, or to dispense with them entirely, then examine the modelling output to determine if there is an issue with too many unit starts or sustained dispatch to unreasonably low output levels.

For these reasons, ENGIE recommends that AEMO remove mingen levels from black and brown coal plant.

2.5 Electric vehicle assumptions

The assumption for the transport sector in all scenarios is that zero emission vehicles will adopt battery storage technology. However other low and zero emitting technologies are being aggressively developed. These include the use of hydrogen in modified internal combustion engines and electric vehicles using hydrogen fuel cell technology. The latter is particularly suited to trucks, busses and longer-range vehicles. Many manufacturers are developing vehicles using the hydrogen fuel cell technology, Toyota, Hyundai, Honda, BMW as well as others. In Japan alone, there are H2 refuelling stations and there is a target of 200,000 fuel cell vehicles within the next 6 years.

Honda Clarity hydrogen fuel cell vehicle on the road in Japan and being refuelled by Dr. Alan Finkel.

The impact of hydrogen vehicles on the electrical system will be very different to the impacts of battery powered EVs and will include different network utilisation and network locations, time of use and amount of electricity used/stored (ie H_2 is a form of energy storage with much higher capacity than EV batteries).

ENGIE urges AEMO to include hydrogen vehicles and hydrogen production in the EV mix instead of "betting" only on the battery EV technology.

3 Need for detailed and complete information

3.1 Modelling inputs

The modelling methodology and detailed assumptions should be made available to participants in order to make the process transparent and complete. Participants should be able to replicate AEMO results from the available documentation and data and to build on these to develop their own scenarios and sensitivities. AEMO has made a large volume of information and data

available, but it is insufficient to enable the reproduction of AEMO processes. As an example; a more detailed documentation is needed to describe the demand (MD and energy) development process.

At times, AEMO approaches universities to assist with analysis and methodology development. From a participant perspective, these studies remain undocumented and are not available to participants.

ENGIE request AEMO to provide all the information relevant to the forecasting process and modelling approach.

3.2 Modelling outputs

The modelling process provides a rich set of data and insights into the various scenarios and sensitivities. This information serves to inform NEM participants on impacts about various policies and technological developments and assists the RIT-T process used for assessing investments in transmission.

However, there is need to better inform and educate policy makers. Of particular interest is the resource costs for each modelling run.

ENGIE requests AEMO to provide the resources costs for each scenario and sensitivity (Total NEM, individual NEM regions, and by modelling year).

ENGIE trusts that the comments provided in this response are of assistance to the AEMO in its RIT-T process. Should you wish to discuss any aspects of this submission, please do not hesitate to contact me on, telephone, 0417343537.

Yours sincerely,

David Hoch

Regulatory Strategy and Planning Manager