Australia Energy Market Operator
By email: ISP@aemo.com.au

Monday, 5 March 2018

**Deakin University Response to Remaining Questions - AEMO Integrated System Plan**

Supplementary to Deakin University's response to preliminary questions on the development of the inaugural Integrated System Plan (ISP) for the National Electricity Market (NEM), we are now pleased to provide input to the remaining items.

Questions 2.1 through 4.4 highlight the limited nature of existing infrastructure planning frameworks to incorporate externalities such as policy and consumer sentiment. The capability within Deakin University to develop and apply multi-layered models of complex infrastructure systems to increase productivity, better manage risk and deliver broad social, environmental and economic benefits addresses this deficiency.

As highlighted previously, successful application of the Deakin University capability in the water and energy sectors has demonstrated benefits to industry through clarification of intended and unintended consequences, establishment of a decision-making framework across infrastructure systems and the unique ability to incorporate non-technical parameters into this framework. By using this methodology, complexity becomes obvious but so do the mechanisms to elicit input from, and communicate to, non-technical stakeholders.

Please contact me if anything in this response requires clarification or about Deakin University's capability generally. We look forward to an opportunity to demonstrate Deakin's model.

Yours sincerely,

Dr Adrian Panow
**Director, Deakin Energy**

***2.1 What are the key factors which can enable generation and transmission development to be more coordinated in future?***

The technical rationale for generation and transmission development (i.e. availability of natural energy resources and interconnection with major loads or other network assets) is covered adequately in the discussion within Chapter 2. However, other factors highlighted, including climate change policy and consumer sentiment (list in Table 4 in section 3.7), must also be incorporated into a decision-making framework at the outset. The consequences of omission are generally increased costs and/or altered scope.

**Specific feedback:**

- **A holistic appraisal of what constitutes and determines performance of an infrastructure system will enable all relevant factors to be identified and input into a coordinated development process.**

***3.1 Does this analysis capture the full range of potential REZs in eastern Australia?***

An extensive and geographically diverse range of REZs has been presented based on solar, wind, hydro and some geothermal resources. Although considered less likely, geothermal resources may feature in some other areas of Victoria and South Australia.

**Specific feedback:**

- **The analysis does capture the most likely REZs based on solar, wind and hydro resources. The ISP should be designed as a dynamic framework that can accommodate unanticipated resource availability or other positive or negative influences.**

***3.2 What other factors should be considered in determining how to narrow down the range of potential REZs to those which should be prioritised for development?***

**and**

***3.3 What are the potential barriers to developing REZs, and how should these be addressed?***

These questions are addressed as one on the basis that the factors which determine REZs extend beyond technical issues but are also, consequently, potential barriers to development. Hence the factors specified in section 3.4 and the barriers specified in 3.7 must be considered together. This approach is, however, not possible unless the infrastructure framework for decision making is capable of incorporating all factors, defining interdependencies, accounting for the dynamic nature of systems and assisting decision makers to identify where best to act.

The only non-network infrastructure identified in the definition of REZs in section 3.4 was the proximity to roads. Of increasing importance is the impact of infrastructure such as water, data and non-road transport. Unless these are considered, opportunities will be missed or unexpected barriers will become evident.

**Specific feedback:**

- **Application of the Deakin University infrastructure methodology in the water sector has demonstrated unexpected value due to the ability to incorporate other infrastructure types, policy, regulation and human behaviour. The factors described in section 3.7 are not able to be considered adequately in conventional planning frameworks. During the consultation process, the Deakin framework should be considered to both collate stakeholder input and as an alternative mechanism to prioritise and understand REZ development. The methodology has already been presented to the AEMO CEO and other Executives.**

***Questions 4.1 – 4.4 are considered together:***

- ***Have the right transmission options been identified for consideration in the ISP?***
- ***How can the coordination of regional transmission planning be improved to implement a strategic long-term outcome?***
- ***What are the biggest challenges to justifying augmentations which align to an over-arching long-term plan? How can these challenges be met?***
- ***Is the existing regulatory framework suitable for implementing the ISP?***

Transmission planning between and across regions is essential to make best use of renewable energy resources which, by their nature, do no observe state boundaries. Although most REZ areas have been represented as falling within only one state, this may be an artefact of state-based historical transmission infrastructure.

By using a planning and decision framework that allows inclusion of national factors and non-network factors but also fine detail, it is probable that understanding, coordination, and acceptance of required changes will be enhanced.

The basis for decisions in the existing regulatory framework is summarised in statement in section 4.3 – "*In most instances, a range of credible solutions could serve a similar purpose. AEMO proposes to use an optimised least-cost modelling process to determine the timing and scale of upgrades which might be economic.*" If interpreted narrowly by a regulator and/or planner, with costs only ascribed to delivery of the network infrastructure over a short timeframe, there is significant risk that longer term, strategic investment as required to a much greater extent when REZs are considered, is dismissed.

**Specific feedback:**
**Development of REZs and the consequential transmission infrastructure may be compromised if existing regulatory frameworks are used. REZs are inherently strategic initiatives, without all participants known at the outset. Valuation only on the basis of economic costs and benefits directly associated with transmission, is likely to compromise optimal REZ development.**