AEMO INTEGRATED SYSTEM PLAN CONSULTATION

SUBMISSION

INTRODUCTION

The main Australian power system, the National Electricity Market (NEM), managed by the Australian Energy Market Organization (AEMO) has operated effectively as a deterministic system based on fossil (actually accumulated concentrated solar) resources for some time.

Concerns over climate change and the rising cost/availability of fossil resources has triggered a change to the only other natural resource available, radiant low energy solar, including its effects on weather, to provide adequate energy resources for the NEM.

These new resources have different characteristics from fossil resources requiring changes to the way the network operates. Both wind and solar have capacity factors ~30% so at least three times the nameplate rating of their generating capability would be needed to gain energy equivalence with an existing fossil generator. In addition, wind may not be present when called for and clouds may minimize solar radiation when required for service.

This results in the network needing considerably more available generation reserve. How to fund this additional generation and how to keep it available for service as required by the community is of concern.

The new network is to be weather driven and stochastic in nature, calling up necessary additional generation to complement available weather driven generation to supply community needs at an acceptable cost.

The present network links load centres with generation facilities via a network that is essentially north/south in orientation. The two components load and generation interact effectively. However, the new configuration leaves the load centres in a north /south relationship but requires generation to lie in an east/west direction to access best resilience from wind conditions together with adequate solar.

The present network is in a reduced state of stability as it transforms to one operated stochastically based on weather activities compensated by supplying necessary additional generation to match the communities need.

The eventual goal of a stable network is the prime focus on AEMO's development of an integrated system plan (ISP) focusing on moving to a known stable future from the present state.

AEMO has made a series of proposals/queries with respect to the proposed ISP and requested submissions to answer/comment on the questions while leaving room for additional comment.

This independent submission is made to assist in moving to a stable network obeying Australia's international commitments and settling to power prices acceptable to the community it serves. Comments are provided on the strategy, necessary principles and the tactical pressing additions to the network.

STRATEGY

It is understood that the present network is in a state of transition and the focus should be on moving from an existing incomplete transition state towards a more stable state.

The proposed weather driven network has an uneven distribution of weather generation sites within States, as previously the network had an uneven distribution of fossil resources. For this reason it is considered that the most prudent development lies with maintaining the existing network as a single system and not with possibly dividing it into smaller units.

This requires a set of basic principles some of which are proposed below.

PROPOSED PRIINCIPLES

1 Any change should be for the benefit of the system.

2 Any change should focus on moving to a more stable system state and not attempt to solve existing problems.

3 The new system will be weather driven and stochastic in nature with known implications.

4 Weather based generation sites should be clustered in an east/west direction and preferably large to take advantage of weather variation, economies of scale and necessary connection costs.

While solar and wind generation have different characteristics availability of wind should define location as their output is less problem in controlling the operation of the network.

A solar installation vs longitude map should be developed to guide potential investment to minimize solar surge on the system.

5 While demand management can be utilize for unusual network conditions it should not be used to a level that affects Australia's industrial productivity.

6 Transmission network extension should be used as the driver to encourage new generation installations rather than the present generation site selection followed by transmission connection. This facility is available from AEMC now. It would allow a form of network expansion guidance to be instituted which is considered desirable.

7 Forward planning should be based upon developing scenarios likely to encompass community needs for the following twenty years. To ensure there are no unforeseen discontinuities/inconsistencies there should also be some form of working backwards

from a known future position such as that outlined in the AEMO 100% Renewable Report.

8 In due course a complete review of the existing rules should be undertaken to make them appropriate for the new system. A strong attempt should be made to reduce the complexity and extent of the present set.

9 Promote the development of industries that can utilize interruptible power at a reduced price to allow generators on notional reserve margin duty to have some additional income.

TACTICS

While this initiative is being developed there are a number of more pressing tactical extensions to the network being considered. Development of these should generally align with the principles set out above.

A general comment is that the proposals listed solve local problems but are not the expectations for a system undergoing major transition.

ANSWERS/COMMENTS TO SPECIFIC QUESTIONS

The following comments are made on the specific questions posed in the consultation document.

1.1
The ISP should focus on achieving a target stable state and not try to solve the many problems existing during the transformation period.

1.2
The scenarios proposed are adequate to develop a first model. The following set of scenarios should have a component allowing for unexpected political requirements together with some form of back casting to identify potential discontinuities not identified by forward directed scenarios.

2.1
The key factor in coordinating generation and transmission is to use controlled transmission to lead the development of generation with gas to follow separately where needed.

3.1
This analysis does not capture the full potential for weather generation clusters (renewable energy zones). These cluster sites should be driven by longitudinal minimization of solar surge combined with advantageous wind site combinations using transmission development to lead local generation.

3.2
The selection of sites should follow locations derived from above, that lie along a potential east/west transmission line.

3.3
The primary barrier to weather generation clusters is the need for much greater reserve margin as the proportion of non-dispatchable increases and the investment needed for this.

4.1
The transmission developments suggested are generally minor in nature and not that expected for a network under major transition.

4.2
Identifying a potential series of weather driven clusters along a potential transmission extension and starting to drive the line in the desired direction with encouragement/incentives to install appropriate generation facilities.

4.3
The main challenge is funding investment in the necessary major increase in reserve margin as the proportion of wind/solar generation increases.

4.4
The existing regulatory framework can be used but improvements could make the transition significantly more efficient and affordable.

POSSIBLE ADDITIONAL ACTIONS

AEMO should consider the following additional actions as part of its execution of its integrated system plan.

1 Repeat the AEMO 100% renewable study with the existing network as a basis primarily to confirm the extent of additional reserve margin as the proportion of non-dispatchable generation rises.

2 Request the various climate change funding organizations to offer research/demonstration funding for technologies that are dispatchable in the network and to organizations to develop industries that can thrive on interruptible supply of power at a reduced price.

3 Consider modifying the nomenclature used to use terms that the power system can understand. For instance the system does not understand the word “renewable” but does understand dispatchable and non-dispatchable. An agreed definition of being available when required and not being so is required. Replace the present “Renewable energy zone” with “Weather generation cluster” as being rather more descriptive.

4 Identify suitable rights of way at as early stage as possible for prospective transmission lines in conjunction with relevant developers.

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