Submission

No 33

INQUIRY INTO THE ECONOMICS OF ENERGY GENERATION

Organisation:

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Theme:

Summary

Thank you for the opportunity to make a submission in relation to the Committee's inquiry into the comparable economics of energy generation in New South Wales. My submission will focus on the role of renewable energy generation in New South Wales, and will address certain of the terms of reference consecutively.

The mix of energy sources used in New South Wales

The vast majority of stationary energy produced in New South Wales is generated using black coal. Around 10% of the State's electricity generation comes from renewable sources, mainly hydropower. Over the last five years there has been a substantial increase in the amount of energy generated by windpower and by solar PV. The energy mix in New South Wales will continue to become more diverse, with a large number of approved wind energy projects, and continuing demand for solar PV installation by households and businesses.

Issues relating to long term energy security in New South Wales

AEMO projects that additional dispatchable energy generation will not be required for a decade.1[1] It is possible that increased energy efficiency, economic change, and electricity prices may delay the need for more base-load power generation even further into the future. However, within the next decade or so, our existing coal-fired electricity generators will start to reach the end of their operational lives, and will require replacement. A significant question for longer term planning will be how the dispatchable electricity currently produced by these generators will be replaced. The price on certain greenhouse gas emissions imposed by the Commonwealth Government will have an impact on the decision as to which fuel source will be selected for baseload electricity generation in future, with the most likely fuel in light of current technology being gas. This will require additional investment in pipeline infrastructure and in developing New South Wales' gas resources. Renewable energy will also have a role in replacing existing coal-fired electricity generation. Based on current technology, geothermal energy has the greatest capacity to provide dispatchable electricity, with New South Wales having good potential geothermal energy resources in areas proximity to existing coal-fired generators, and the associated transmission infrastructure. Biomass could also be used as a fuel source in the context of traditional thermal power plants. The use of biomass will require amendment of existing environmental laws which do not recognise the value of cleared vegetation as a potential source of renewable energy. Existing solar thermal technology could also be deployed to pre-heat water used in traditional coal-fired power plants. Such hybrid technologies can vastly improve the efficiency of fossil fuel use in thermal power plants and substantially reduce greenhouse gas emissions from stationary energy production.2[2] Regulators should also consider the possibility that technological advances may enable the efficient storage of power generated from intermittent power sources such as wind and solar, so that these technologies may be able to contribute directly to the replacement of existing coal-fired electricity generators when they reach the end of their economic utility.

The potential for NSW sourcing energy interstate

1[1] Australian Electricity Market Operator, *Electricity Statement of Opportunities for the National Electricity Market* (2011), chapter 3.

2[2] A relevant local example is the 9MW solar thermal array currently being developed by Macquarie Generation at the 2,000MW Liddell Power Plant.

Under the National Electricity Market, energy generated in different States is routinely dispatched across State boundaries. Different States have different generation profiles on the basis of different energy resources. For example, Queensland sources a significant part of its stationary energy production from gas, Tasmania and New South Wales generate significant electricity from hydro, and South Australia from wind. A national market accommodates the generation profiles of different jurisdictions and provides for the cheapest electricity to be generated at any specific time to be purchased first, thus recognising and rewarding the most efficient energy generation, whether it be wind energy generated in South Australia, or hydroelectricity from the Snowy. While it is sensible to consider the development of an energy policy for New South Wales, it is also important to recognise that New South Wales is part of a wider energy supply and distribution system.

The potential for, and barriers to, development of alternative forms of energy generation

New South Wales has excellent resources across all forms of renewable energy. Together with low land costs in regional areas and world class research and development facilities, these resources provide enormous potential for the deployment of renewable energy generation. Technological improvements and dramatic reductions in production and component costs are also increasing opportunities for electricity generation from renewable sources. Good exposure to solar radiation provides huge opportunity for solar PV and solar thermal electricity generation. Cost reductions in solar PV in particular will make this technology more and more attractive to households and businesses in the context of rising costs of centralised electricity generation using fossil fuels. A big technological advantage of solar PV is that it empowers users to generate their own electricity to meet their own energy needs. This has the additional advantage of reducing demand, especially during the summer peak, on the existing electricity network.

New South Wales has an excellent onshore wind energy resource in areas conveniently located near existing transmission infrastructure. Wind energy is currently the most efficient renewable technology in terms of generating large amounts of electricity. The Commonwealth Government's Mandatory Renewable Energy Target will drive significant amounts of investment in wind energy over the next decade. It is important that the New South Wales Government ensures proposals for large scale wind energy projects are supported by a clear land use planning regime that facilitates wind energy development while accommodating the involvement of local communities in the planning process.3[3]

Hydroelectricity is an established technology in New South Wales, and provides the vast majority of renewable energy generation in this State. Future opportunities for the development of hydro resources include improving the efficiency of existing plants where possible, and examining the feasibility of low-drop hydroelectricity on weirs and other flow control structures. Local universities, such as the University of NSW, have strong research profiles in water technologies, so that neighbouring countries in Melanesia and South-East Asia could benefit from hydroelectric technology developed in partnership with local research institutions.

3[3] The NSW Department of Planning and Infrastructure is currently developing Wind Farm Guidelines which are designed to provide a clear and consistent framework for the assessment of large wind energy projects.

Bioenergy resources, including biogas from putrescible waste facilities and sewage treatment facilities, wood wastes and sugar cane residues are also widely available in New South Wales, and are being used for electricity production. There may be a need to examine existing environmental laws to ensure appropriate opportunities for deployment of bioenergy resources are not blocked by unnecessary regulation.

Wave, ocean and tidal resources could potentially provide vast amounts of energy for electricity generation. New South Wales has a long coastline exposed to powerful and predictable ocean swells. The coast is also intersected by a large number of lagoon and river mouths providing opportunities to exploit energy generated by tidal flows. New South Wales also possesses good potential geothermal energy resources for electricity production using enhanced geothermal systems, also known as "hot dry rock" technology, especially in parts of Western New South Wales and the Hunter.

The main barrier to large scale deployment of renewable energy for electricity generation in New South Wales relates to the relative costs of these technologies compared to the use of fossil fuels. This barrier is being addressed throughout Australia by the Commonwealth Government's Mandatory Renewable Energy Target, and the carbon pricing regime. While renewable energy incentive schemes introduced by State and Territory Governments may help to address the cost barrier, such ad hoc schemes can actually create other barriers to renewable energy deployment, such as creating a boom and bust cycle, or by increasing regulatory uncertainty as schemes are variously introduced and withdrawn, or by increasing the complexity of investing in different technologies in different parts of Australia. For these reasons, the Council of Australian Governments have advocated for a common approach to environmental pricing on electricity products throughout Australia.

Other barriers to deployment of renewable energy have included regulatory uncertainty through vague, conflicting, or unduly restrictive planning and environmental laws. For example, the use of bioenergy is restricted by laws controlling the use of native vegetation, and the deployment of low-drop hydropower is restricted by laws aimed to protect certain fish species. While such barriers to renewable energy may be appropriate, it is worth reconsidering the utility of such laws which were drafted before the use of such resources of electricity generation was technologically or economically feasible.

Another barrier to renewable energy in New South Wales has been community concerns about the environmental impacts of renewable energy projects. For example, some people are fiercely opposed to wind energy projects due to noise concerns and impacts on visual amenity. Opposition to the development of dams has thwarted the continued development of hydroelectric projects. Community fears about hydraulic fracturing may impact upon the development of enhanced geothermal systems in New South Wales. The reality is that all electricity generation infrastructure will have environmental consequences. Many of the concerns raised by local communities are good reasons to oppose or amend certain types of electricity generation projects in certain areas. However, it is also important to recognise that technological change often raises fears that need to be addressed by good communicative processes.

The use of the term "alternative energy" by the Committee is interesting. Presumably the inference is that with black coal being the dominant traditional fuel for electricity generation in New South Wales, any energy source for electricity generation other than

black coal is considered “alternative”. Of course, the word “alternative” should not suggest that such energy sources are somehow less valuable, or will always be considered “alternative”. Hopefully renewable energy will soon become the dominant source of anthropocentric energy generation in New South Wales, as it was prior to European settlement.

Conclusion

Renewable energy, together with energy efficiency, will continue to become more important influences on the design and operation of the electricity supply and transmission system. It will be important for governments and the market operator to recognise the impact of new technologies on energy demand and on the configuration of the transmission network. The economics of electricity generation will inevitability become more complex and less certain. This will create great challenges, but will also generate opportunities for New South Wales to develop new technologies and new jobs.

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