3 March 2017

Dr Alan Finkel AO
Commonwealth Chief Scientist
Blueprint for Energy Security in the National Electricity Market

By email: NEMSecurityReview@environment.gov.au

Dear Dr Finkel,

Re: Preliminary Report of the Independent Review

Hydro Tasmania is Australia's largest producer of renewable energy, and is internationally recognised for its expertise in renewable energy operation and development. We are an integrated energy business providing retail energy products through our Victorian-based retailer Momentum Energy, power and water consulting services through our specialist consulting business Entura, and are a material participant in the National Electricity Market. Hydro Tasmania's assets generate around 9000GWh from hydropower and 1000GWh from wind generation in an average year (around 5% of NEM demand). In addition, Tasmania's hydropower system can store up to 14 000GWh of energy.

Hydro Tasmania and TasNetworks have significant experience of operating the Tasmanian power system with extremely high levels of non-synchronous generation (up to approximately 80% during low demand, high import periods). In order to optimise the Tasmanian system, we have developed a number of innovative supply and demand side arrangements the details of which have been provided to your secretariat. We have identified additional projects that could cost-effectively facilitate further integration of variable renewable generation in the NEM. We can provide further information on these proposals.

Hydro Tasmania welcomes the release of the Review's preliminary report and the ongoing consultation with the energy industry. The preliminary report contains a number of observations that go to the heart of the issues facing Australia's energy industry. It correctly notes that the NEM was well designed but that technological change and the need to integrate additional low emissions generation mean that a review of its functions and suitability for the future is required.

In considering future energy affordability it is clear that there is a need for strong uptake of energy efficiency across the economy. This has been recognised through the Federal Government's announced National Energy Productivity Plan. Frameworks should balance the need to facilitate uptake of energy efficiency against the creation of additional regulatory requirements on businesses.

Executive Summary

The Federal Government's 26% to 28% emissions reduction target for 2030 indicates that the electricity generation sector will need to significantly reduce the emissions intensity of generation. As you have noted, Australian electricity is among the most emissions intensive of OECD countries. While the national target does not directly translate to a sectoral target, it is reasonable to expect that the electricity sector will at least provide its 'fair share' of emissions reductions. Fortunately, the technologies and expertise needed to achieve this already exist in Australia. The challenge is to ensure a market structure and incentives that can facilitate a stable and effective transition are in place.

The preliminary report notes that:

> *"solutions are available to effectively integrate variable renewable electricity generators into the electricity grid, but we will have to change the way we operate……New and updated frameworks, technical standards and rules may be required."*

Moving towards an increasingly variable and increasingly distributed generation system is a complex but manageable challenge. It is essential if Australia is to decarbonise our electricity supply. Least-cost outcomes for consumers will require an environment where investors do not face unnecessary project or policy risk. Long-term, stable energy and climate policy is a key component of this and must be underpinned by appropriate technical standards and requirements. While ultimately a decision for the Federal Government, the Finkel Review should provide guidance on emissions reduction policies such as an emissions intensity scheme and/or incentives for low emissions generation.

In addition to the issue above, Hydro Tasmania believes that the Review's primary focus should be on identifying the market and governance arrangements that will provide for a stable and efficient low-emissions energy market. There is likely to be a choice between:

1. providing system support through augmenting energy market operation (additional markets). This may have competitive market benefits but be harder to administer; or
2. a regulatory and/or technical standards approach to ensure the provision of sufficient frequency control, inertia, system strength and flexible generation.

The level of market re-design required now will depend on the rate of transition to a low-emissions sector. For example, further variable renewable energy could be successfully incorporated through relatively minor augmentation to the current NEM whereas achieving a zero emissions sector would likely require more significant reform.

Our experiences in Tasmania have demonstrated that modifying the operation of existing plant as well as approaches such as tripping schemes can optimise a variable, interconnected grid and allow the deployment of higher levels of non-synchronous generation.

Any recommended changes should be consistent with a low emissions future but must also, where possible, avoid prescribing particular technological solutions. In our opinion, the most cost-effective transition will be achieved through a mix of new technology and the optimisation of existing plant.

In Hydro Tasmania's view, any recommended changes to NEM operation should deliver an emissions reduction pathway that:

1. is consistent with the intent of the UNFCCC Paris Agreement;
2. maximises the use of competitive market based arrangements to deliver energy security; and
3. ensures that vulnerable energy consumers are considered during the transition.

The role of hydropower

Many of Australia's hydropower stations are more than 40 years old and have passed their half-asset life. Hydro Tasmania's forward capital expenditure requirement over the next ten years for the maintenance, refurbishment and upgrade of existing plant is in excess of $900 million. The modernisation and augmentation of existing flexible renewable energy assets should be a key part of any future energy strategy.

Pumped Hydro

Pumped hydro is an established 'gold standard' energy storage technology. It provides several key characteristics including frequency stabilisation (inertia) and frequency control services and system strength (fault level). However, at present there is no policy or financial signal (beyond energy arbitrage) to develop "firming" projects in Australia. As a result, while there continue to be feasibility studies on potential sites, to date it has remained difficult to progress substantial investments. Hydro Tasmania understands that there is ongoing consideration of the potential for further pumped hydro energy storage in Australia. These studies should include examining opportunities to provide inertia, frequency control and system strength from existing waterways and hydropower assets. Hydro Tasmania's portfolio already operates like a 'virtual' pumped hydro system. When prices are low on the mainland or water resources are low, energy is imported over the Basslink interconnector and natural inflows into many of Hydro Tasmania's water catchments builds up energy storage. There is significant opportunity to invest in Hydro Tasmania's existing portfolio to increase renewable energy production into the NEM and provide additional system support services.

Attachment 1 provides Hydro Tasmania's responses to the questions contained in the preliminary report executive summary. Hydro Tasmania looks forward to providing further advice and evidence as the review progresses. Should you require more information or to arrange a meeting, please contact Colin Wain (email: colin.wain@hydro.com.au or telephone: 03 8612 6443).

Yours sincerely

Stephen Davy
Chief Executive Officer

Attachment 1 – Hydro Tasmania responses to the preliminary report

- ***How do we ensure the NEM can take advantage of new technologies and business models?***

Policy makers and governments should not attempt to predict the particular technologies and business models that will be successful in a future decarbonised NEM. Significant effort goes into modelling future NEM states and to modelling the impacts of alternative policy approaches. This work has value and can assist stakeholders in understanding potential outcomes and risks, however, reality rarely reflects these modelled outcomes. Technological advances frequently occur much faster (solar PV) or slower (geothermal) rate than predicted and market participants (including suppliers, market intermediaries and customers) often respond in new and innovative ways.

Therefore, the most appropriate government action is to focus on outcome based policies. In other words, Governments and energy market bodies should concern themselves with providing the appropriate investment signals, market mechanisms and regulatory frameworks required to reach the desired outcome. To do this, it must be clear what level of reliability, emissions reduction and affordability are expected by the Government and what trade-offs exist between them.

The consequences of poor market structures

Policy certainty and stability will be essential to addressing the energy trilemma. In the absence of stable integrated energy and climate policy, higher risk premiums will prevail, raising costs for end-use energy consumers. In considering outcomes the Review should continue to differentiate between cost and prices. A poorly designed 'NEM 2.0' may have low input costs and yet still ultimately cause high prices for consumers. For example, there may be low cost solutions that can provide system security, frequency control, inertia and system strength, however if the market cannot access these, or there is a preference for new-build technologies over optimisation of existing plant, then this will increase the prices faced by energy consumers. Pumped-hydro and retrofit of existing plant to synchronous condenser operation are two examples of relatively low cost solutions that cannot be easily accessed in the current market. Difficulty identifying and accessing low cost opportunities can lead to higher prices for consumers.

The review panel has also previously noted the need for a simple and clear energy price against which end-users can make strategic and investment decisions. As noted, there may be a need for additional markets in addition to the existing NEM framework however, it is the final cost of delivered energy that is the concern of energy users (and Governments). Where possible, energy consumers should have visibility of energy market dynamics, both in real time and with respect to longer term trends. This can facilitate appropriate risk management and choice for energy consumers. This will be particularly important to large-energy users.

- ***How do we ensure the NEM meets the needs of all consumers, including residential, large-scale industrial and vulnerable consumers?***

This is a broad question but is most appropriately answered with a focus on stable, transparent policies and outcomes. Where there are issues such as vulnerable consumers and ability to pay, these may be better addressed outside of the central energy market structure. Where energy concessions and support policies are provided these should not distort underlying energy signals.

Regulatory frameworks must allow the deployment of new technologies, technology combinations (hybrids) and business models. With respect to electricity retailing, regulation should allow businesses to develop their own business models and to optimise the integration of distributed energy resources while ensuring that consumers are provided necessary information and protections.

Residential customers should be able to access a range of tariff and technology options. However, the ability for a household to invest in distributed generation and energy storage should not subsequently impose costs on households that cannot access these options. Energy market structures must ensure that energy users can make informed choices and are exposed to both the benefits and costs of any technology/tariff option without negatively impacting on other energy users.

- ***What role should the electricity sector play in meeting Australia's emissions reduction targets?***

The electricity sector is the largest contributor to Australia's greenhouse gas emissions and represents more than one third of total emissions. Australia has a highly emissions-intensive electricity sector by developed world standards.

At present, Federal climate policy (ERF and Safeguards Mechanism) is applied at a national level and provides little incentive or guidance on how quickly or to what extent the energy sector must decarbonise. Hydro Tasmania's view is that if Australia's emissions reduction commitments are to be met, then the energy sector should expect a reduction in emissions at least in line with the national target (-26% to -28%). This is likely to be the minimum expectation as other key sectors may not be able to deliver proportionate reductions, particularly when considering a net-zero emissions future. In addition, decarbonisation of electricity generation may be critical to reducing emissions in other sectors, such as the transport sector.

Uncertainty over the rate and extent of energy sector decarbonisation is one barrier to efficient investment in low/zero emissions sources.

<u>The national Renewable Energy Target (RET)</u>

Considerable recent debate has focussed on the role of the RET in Australia's energy sector. Currently, the RET is the only long-term, large-scale policy that can drive the uptake of zero-emissions energy sources and sustain the existing renewable energy base. It remains critical to Hydro Tasmania's business strategy and to reinvestment in our ageing hydropower assets. Hydro Tasmania continues to support the aim to achieve at least 20% renewable energy by 2020 and believes that the architecture and objectives of the current RET have been successful in commercialising additional Australian renewable energy. The RET has produced billions of dollars of investment in renewable assets which would be at risk under any negative changes to the current RET structure and operation.

The post-2020 energy and climate framework must provide appropriate incentives for the retention and modernisation of existing zero/low emissions assets as well as the deployment of additional zero/low emissions generation. This must be consistent with achieving Australia's 2030 international emissions reduction commitments.

- ***What are the barriers to investment in the electricity sector?***

Energy sector assets have multi-decade lifecycles. One of the more obvious barriers to investment is frequently changing Federal energy policy. This is true irrespective of the type of energy generation being considered. In addition, rapid changes in the domestic gas supply/demand balance and the rate of technology change create significant uncertainty over investment timeframes.

The size of the investment required to decarbonise the electricity sector is exceptional. It will require the replacement of existing emissions intensive generation assets with large scale zero or low emissions intensity generation and a mix of system support and energy storage deployments.

In summary, a list of current investment barriers is provided below:

1. Wholesale energy prices are below the LRMC of new zero and low emissions generation. This is a product of competing against wholesale energy prices largely set by depreciated assets bidding at SRMC. As a product of this, new renewable projects are highly dependent on the RET which itself is the subject of uncertainty (particularly its operation post-2020).
2. Non-retirement of aging coal generation with very low Short-Run Marginal Costs (SRMC). The lack of a carbon price or exit signal in the sector means that any abatement opportunity provided by station retirement cannot be quantified. Nationally, emissions reductions are found and paid for by the tax-payer via the Emissions Reduction Fund (ERF) however, it is possible that cheaper abatement could exist within the energy sector. This potentially cheaper energy sector abatement cannot be accessed as (outside of the RET) there is no financial reward for shifting generation between high and low emissions sources (e.g. coal to gas generation) in the current NEM.
3. Historical policy volatility particularly with respect to the RET discourages investment in additional renewable energy. The introduction and subsequent repeal of the carbon tax has left little confidence in the ability of new policy to endure changes of Government.

Some potential actions that could be considered in order to address investment barriers:

1. A stable and enduring energy/climate policy is essential if investor confidence is to return to the Australian energy sector. This should include clear guidance on the energy sector's expected contribution to emissions reductions (either in absolute $tCO2$ or in reduction in t/MWh). Ideally, emissions reduction targets beyond 2030 are necessary to provide longer-term guidance on the future of the sector.
2. A managed programme of station closures could provide a visible pathway to reduce emissions, particularly if a market mechanism is not achievable (this type of approach is being used internationally including in the UK and Canada).
3. Continued policy support for zero/ low emissions energy. This may be required until either a form of carbon price can adequately value abatement and/or wholesale prices rise to the LRMC of new zero emissions generation.
4. A resilient NEM that is able to accommodate a high proportion of variable renewable energy generation without compromising energy security. Key elements include:
    a. An appropriate suite of ancillary services including inertia and frequency support;
    b. Appropriate changes to NEM technical standards and the process for ensuring they are able to evolve as new technologies are deployed;
    c. Potential for increased interconnection, facilitated by through a RIT-T that can consider the benefits of energy sector transition;
    d. Active participation of distributed energy resources (DERs);
    e. Mechanisms to ensure generation adequacy - in particular to ensure there is sufficient fast response zero/low emissions generation capacity (Noting that: If AEMO does not have a role in setting technical minimums then it is likely that jurisdictions will take on this role).

- ***What immediate actions can we take to reduce risks to grid security and reliability?***

Smart investment in low cost network solutions such as those that have been proven in Tasmania could assist short-term risk to security of supply. These opportunities include load shedding arrangements and the retrofit or modernisation of existing plant to provide system support services.

Network Support and Control Ancillary Services (NSCAS) provides a framework under the National Electricity Rules which could be more fully exploited to address security and reliability issues.

The Australian Energy Council has recently produced a study which provides some guidance on other short and medium-term actions that could assist security and reliability in South Australia. In considering actions that could address these challenges, Hydro Tasmania suggests that options should be assessed against core criteria[1]. These could include:

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[1] Please see Hydro Tasmania's submission to AEMC System Security Framework Review – 10 February 2017

- Cost to market/customers;
- Certainty of outcome;
- Adaptability to changing market circumstances;
- Risk to market;
- Technical criteria (relevant to the service);
- Ease of implementation (and timeframe if necessary); and
- Administrative simplicity.

In the short term, it is recommended that the focus be on the transmission network rather than on distribution. Distribution work should progress and new technologies trialled and implemented however this is not a short term solution for NEM wide security and reliability or for displacement of emissions intensive generation.

- ***Is there a role for technologies at consumers' premises in improving energy security and reliability?***

International research is clear that this will be an important part of developing a resilient low carbon power system over the medium to longer-term. Groups such as the CSIRO Future Grid Forum have considered future scenarios and the role that distributed generation could play. The growth and deployment of Distributed Energy Resources (DERs) will happen organically as the cost of technologies continues to fall and as customers are exposed to new retail offerings.

The key issue for policymakers is whether to plan around this evolution (maximise opportunities and minimise risks), or to allow it to disrupt the market which has the potential to make the task of ensuring energy security harder. This goes to a key question over the future of DERs: are they optimised for the consumer; or optimised to support the grid? Can a framework allow both aims to be considered in parallel, thereby rewarding and exposing consumers appropriately for the support and strains they provide and place on the energy system.

The New York Reforming the Vision (REV) initiative and UK's Power Responsive programme[2] offer international examples of attempts to integrate DERs into the wholesale market.

A further question is to the role of DNSPs operating in this emerging competitive space. The new ring fencing arrangements should be closely monitored and if necessary strengthened to ensure regulated activities do not cross subsidise offerings in this area.

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[2] http://powerresponsive.com/

- ***What role is there for new planning and technical frameworks to complement current market operations?***

Transmission planning between TNSP and AEMO needs to be more closely aligned with a greater focus on system security and reliability rather than predominately focussing on supply demand balance.

The role of further NEM interconnection should be carefully considered in any planning frameworks. There continues to be an opportunity for Tasmania to support NEM transition through the provision of flexible, renewable hydropower generation. Tasmania's contribution would be strengthened through further interconnection and would increase on-island energy security and allow the development of additional Tasmanian and mainland zero emissions generation. Within this framework, markets may not be sufficient to provide investment signals for assets such as interconnectors. This is because such investments may not be viable over the full range of possible future scenarios. To achieve an efficient transition of the sector, efficient policies will need to provide the necessary direction for investments and clarity on future scenarios.

- ***How can markets help support additional system security services?***

Addressed in responses above.

- ***How can we improve the supply of gas for electricity generation to contribute to reliability and security?***

In February 2017, Hydro Tasmania made a submission to the COAG Energy Council Secretariat with respect to the Draft National Gas (South Australia) (Pipelines Access-Arbitration) Amendment Bill 2017. Hydro Tasmania strongly supports the gas reform work undertaken by the COAG Energy Council and in particular the recommendations of the report "Examination of the Current Test for the Regulation of Gas Pipelines" by Dr Michael Vertigan AC in December 2016.

Hydro Tasmania has a significant involvement in the east coast gas market as a wholesaler of gas and a user of gas for power generation both in Tasmanian and Victoria. Hydro Tasmania also retails gas in Victoria through its fully owned subsidiary Momentum Energy. With regard to pipeline access, Hydro Tasmania is the largest shipper on the Tasmanian Gas Pipeline as well as a shipper on the Eastern Gas Pipeline and APA's Victorian Transmission System and Victorian gas distribution networks. We would be happy to discuss these issues further if it is helpful to the Review.

- ***How can we ensure that competitive retail markets are effective and consumers are paying no more than necessary for electricity?***

Through our retail business Momentum Energy, we are participating in the current review of electricity and gas retail markets in Victoria and will be making a submission to this process. To ensure that customers continue to enjoy the benefits of competition at the lowest price, governments must resist the temptation to intervene in retail markets except in the case of demonstrated market failure. The complexity of retail markets is such that ill-considered regulation can create unintended consequences or at the very least increases compliance costs for participants for only marginal benefits.

- ***What are the optimal governance structures to support system security, the integration of energy and emissions reduction policy, and affordable electricity?***

The sector has a strong governance framework through the work of the AER, AEMC and AEMO. However, greater coordination between these three bodies will be needed to support the sector. Hydro Tasmania has previously provided submissions to the COAG Review of Governance Arrangements for Australian Energy Markets. We believe that under the current structure the division of functions established by the governance arrangements remain appropriate. At a high level however, we are concerned that the governance arrangements are not facilitating an orderly transition of the sector or at the pace required by consumers, investors and current technology trends. The current governance structures will inherently produce relatively short-term rule-making and decisions. This is because there is no clear and long-term vision for the sector (e.g. zero emissions by 2050). If COAG can agree to a realistic long-term goal for the sector then AEMC and AEMO could arguably be left to achieve and act in accordance with this future state.

Additional comments on the operation of the AEMC, AEMO and COAG Energy Council are contained in our August 2015 submission[3].

[3] http://www.coagenergycouncil.gov.au/publications/review-governance-arrangements-australian-energy-markets-draft-report