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Mr Geoff Willis
Chair, Energy Security Taskforce Secretariat
c/- Department of State Growth
GPO Box 536
Hobart, Tasmania, 7001
Via email: energysecuritytaskforce@stategrowth.tas.gov.au

Dear Mr Willis

TasNetworks response - Tasmanian energy security taskforce consultation paper

Tasmanian Networks Pty Ltd (TasNetworks) is pleased to provide our response to the Tasmanian Energy Security Taskforce Consultation Paper.

As the Transmission and Distribution Network Service Provider (TNSP and DNSP) in Tasmania, TasNetworks is focused on delivering safe and reliable electricity network services while achieving the lowest sustainable electricity prices for Tasmanian customers. Our network also serves customers in other parts of the National Electricity Market (NEM) by facilitating inter-regional power transactions. Our vision is to be trusted by our customers to deliver today and create a better tomorrow.

TasNetworks' significant skill and expertise has supported a range of world leading innovative solutions for Tasmanian customers to reduce network costs while maintaining security of the network and power system. Our expertise will be important as Tasmania navigates an increasingly complex energy landscape, with the emergence of new energy service technologies and products, more intermittent generation, and increasing customer expectations for information, choice and control.

Energy security is important to our customers and we look forward to working collaboratively with the taskforce as it considers the issues raised in the consultation paper. Our team will be able to assist the taskforce with detailed information and respond to any further information requests.

Should you have any queries in relation to our submission, please contact Bess Clark on (03) 6271 6000 or via email, bess.clark@tasnetworks.com.au .

Yours Sincerely

Dan Norton

Dr D Norton AO

Chairman

Tasmanian Energy Security Taskforce Submission

1. About TasNetworks

As the Transmission and Distribution Network Service Provider (TNSP and DNSP), TasNetworks owns, operates and maintains the transmission and distribution electricity networks on mainland Tasmania. TasNetworks also owns and operates an extensive telecommunication network on which we and other external customers depend for various services and functions.

We transport and deliver electricity from hydro, thermal, wind and solar generation assets to approximately 280,000 demand customers throughout the state. The profile of our demand customers varies from domestic and commercial premises supplied from the distribution network, through to major energy users that are connected directly to the high voltage transmission system.

Our networks also help facilitate the transfer of electricity to and from mainland Australia through the Basslink Interconnector (Basslink) that is currently the only transmission path for Tasmania to participate in the National Electricity Market (NEM). Basslink is a privately-owned asset that enables power to be transferred in either direction between George Town in Tasmania and Loy Yang in Victoria using high voltage direct current (HVDC) transmission.

We have a critical role to play in delivering a secure and reliable electricity delivery system by appropriately renewing and augmenting our network and appropriately connecting new customers and generation. In addition, through our annual network planning reports and Tasmanian annual planning statement, we provide extensive information about the current state of the power system along with an overall assessment of the electricity supply-demand balance in Tasmania for the next 10 years. Both capacity constraints and energy constraints of the Tasmanian system are considered.

Energy security is important to our customers, and we look forward to working with the Willis Taskforce review to support positive outcomes for Tasmanian electricity users.

At TasNetworks, and through our predecessor businesses, we have deployed many advanced engineering solutions to maximise the capability of the Tasmanian power system while enabling it to operate securely under a broad range of network conditions. These solutions have resulted in the deferral and/or avoidance of additional, costly network infrastructure developments, while allowing assets such as the Basslink interconnector and several large wind farms, to operate with minimal constraint. The implementation of two new control schemes to optimise Frequency Control Ancillary Service (FCAS) requirements during the recent energy challenge are recent examples of applying our technical expertise to deliver positive customer outcomes.

Our distribution services include innovative solutions to cost-effectively meet customer requirements and we are trialling a range of new technologies likely to feature more strongly in the future. This includes a Bruny Island battery trial, a tariff trial underpinned by advanced meters, a remote area power supply solution, and the introduction of electric vehicles to our fleet.

Our regulated services reflect the revenue needed to efficiently deliver services to our customers, and meet our responsibilities, including reliability obligations. We have a range of service incentives to ensure that service performance does not deteriorate. We provide power system operating services to the Australian Energy Market Operator, together with our obligations to operate the electricity network. We also provide a range of complementary, unregulated services to Tasmanian customers including design, operating and maintenance, and telecommunications services.

The National Electricity Market (NEM) is undergoing unprecedented change as Australia's economy moves toward a lower carbon footprint and in particular, a reduced reliance on fossil fuelled electricity generation. This transition is presenting challenges in ensuring secure operation of the

power system. As the characteristics of the energy market continue to change, our operational experience and engineering capabilities will be even more critical, enabling a range of generation technologies and load to be connected, while maintaining the security and reliability standards that customers have come to expect. In particular, we believe that TasNetworks' experience will be invaluable in maximising the capability of the Tasmanian power system to host various types of renewable generation, including increasing levels of intermittent energy sources such as wind and solar.

In preparing our submission, we have identified a number of key themes which we believe are pertinent to discussions that relate to energy security in Tasmania. The following sections provide an overview of these themes. Details relating to each theme are embedded in the individual answers provided to each of the nineteen questions raised by the Energy Security Taskforce.

2. Power system security

The NEM is underpinned by rules and frameworks that support energy delivery within and across the eastern seaboard states through the operation of a safe and secure power system. There is a range of technical requirements that need to be satisfied on an ongoing basis to ensure that the required quality and security characteristics are met. Within this environment, TasNetworks has a critical role in defining the operating limits of its transmission and distribution networks which ultimately determines how much energy the network can transport under various conditions. This in turn affects dispatch outcomes for generators and spot prices faced by customers. Understanding the 'technical envelope' is becoming more challenging as the performance characteristics of the power system evolve and become more complex, most notably through the growing trend to install intermittent energy sources interfaced through power electronics in place of traditional synchronous generators. TasNetworks also has a role in ensuring that Tasmania's specific technical challenges are given appropriate consideration at a national level.

The terms reliable and secure are often used interchangeably but it is useful to distinguish between them. Reliability is an outcome that measures the availability of a particular service; that is its propensity to fail. Security is the existing state of a system and is a measure of its ability to provide a continuous service in the event of a failure of one part of that system; that is, a contingency event.

A power system that is reliable offers sufficient capability to generate and transport electricity to meet all consumer demand, under both normal operating conditions, as well as in the presence of defined outage events. The level of security experienced by end-use customers depends not only on the availability of generation assets, but also on the performance and redundancy in transmission and distribution networks that provide the pathway for electricity flow. The availability of appropriate ancillary services to facilitate the transport of the electricity is another important consideration.

Energy security and reliability in the electricity supply industry can each be considered over three distinctive time frames described as follows:

- Investment timeframe

  Applicable to activities over a number of years that include the planning of new supply entrants, managing forecast retirement of aged assets, and identifying required network augmentations to cope with expected future needs;

- Adequacy timeframe

  Includes assessments typically covering a year ahead of the serviceability of existing generation plant and network assets including the forecasting of disruptions to and any anticipated shortfalls in energy availability; and

- Operational timeframe

  Covers the minute-to-minute operation of the power system and its robustness and resilience in the face of contingency events which may present themselves in various forms.

Useful discussions on power system security issues should clearly relate to a particular timeframe. The issues pertinent to each period, whilst related, are different.

Within the **investment timeframe**, the reliability standard for allowable unserved energy is set at a national level through the Australian Energy Market Commission's Reliability Panel[1]. This reliability standard is used for the purpose of establishing appropriate signals for new entrant generation and identifying inter-regional transmission needs.

The **adequacy timeframe** is concerned with asset management practices and the availability of plans and options to manage extended periods of significant disruptions which include events such as fire, flood, storm, major asset failures and forecast energy shortfalls.

In the **operational timeframe**, system security has a particular meaning which dictates how the power system must be operated by the Australian Energy Market Operator (AEMO) so that it remains in a satisfactory operating state following a credible contingency event. It is this timeframe that is of particular interest when establishing and enforcing performance standards required of new entrant generation technologies.

Another important point to be made is the difference between short term demand and longer term energy consumption. During the recent energy challenge, Tasmania did not have a shortfall in generation capacity. All demand could be met in the short term, that is on a minute to minute basis. Being largely an energy constrained hydro based generation system, the issue was the supply of energy over the medium term; that is, month by month. The implementation of the Tasmanian Government's Energy Security Strategy mitigated the energy shortfall. It should be noted that intermittent generation cannot be relied upon in the short term to meet demand in an operational timeframe, but can contribute to longer term energy reserves if managed appropriately in conjunction with hydro assets.

The 2015-16 energy supply challenge highlighted the need for enduring plans and strategies to provide the foundations for a secure and reliable Tasmanian power system through ensuring both generation plant capability and energy supply. Such plans should define clear trigger events/conditions that initiate predefined actions, possibly staged so that they can be implemented efficiently and cost effectively in light of developing circumstances.

Tasmania's island setting, with its historic generation, load and network developments, results in an energy supply chain that has inherent single points of potential failure across generation, transmission and gas supply. The cost of providing redundancy across all elements of the supply chain is typically high, and must be weighed against customer value. How low probability, high consequence events are to be managed must be considered ahead of time.

TasNetworks supports an enduring energy security plan that balances benefits, risks and costs.

3. Power system planning responsibilities

TasNetworks produces an Annual Planning Report (APR) required under the National Electricity Rules (the Rules), which provides information on the planning activities undertaken in the past year. We conduct an annual planning review to analyse the existing network and consider its ability to

[1] http://www.aemc.gov.au/About-Us/Panels-committees/Reliability-panel

accommodate forecast changes to load and generation, and whether there are any limitations in meeting the required jurisdictional security and national system performance standards. In addition, the APR describes the forecast electricity demand over the next ten years, the factors that influence that demand, and provides an assessment of whether the generation supply is sufficient to meet the forecast demand.

Together with the Annual Planning Report we prepare the Tasmanian Planning Statement which is a condition of our transmission licence. The Tasmanian Annual Planning Statement is required to provide an overview of the state of the Tasmanian power system through the provision of information and analysis in respect of:

- the performance of the existing transmission system;
- power transfer capabilities within the transmission system including the connection to the Basslink interconnector;
- the adequacy of the transmission system and available generating systems to meet the forecast power transfer and forecast load over a 10-year period;
- the identification of transmission constraints and their impact on the performance on the Tasmanian power system;
- the adequacy of reactive power ancillary services (reactive support) including network support services to meet forecast power transfers and forecast load over a 10-year period; and
- the risks to the security of Tasmania's energy supply.

The Statement is prepared in accordance with a guideline issued by the Tasmanian Economic Regulator, and is published in a single document with the Annual Planning Report, as permitted by the guideline.

As the Tasmanian network operator and planner, we recognise and understand the capabilities of generation, load and interconnection, as important providers of various network support services that allow the power system to be operated securely. A key issue for TasNetworks is the ongoing provision and management of a power system comprised of a range of generation technologies, network assets and diverse customer characteristics that can be securely operated in real-time under a range of different scenarios.

Within the Tasmanian Energy Strategy Progress Report[2], the importance of retaining transmission and distribution planning responsibilities within TasNetworks was highlighted. A review was undertaken to consider whether it was beneficial for AEMO to perform the functions of network planning in Tasmania, as is done in Victoria. The review concluded that there was likely to be little benefit, with some risks and material cost involved. However, we have a close working relationship with AEMO in both developing future plans and meeting day to day Tasmanian power system operational challenges.

3.1 Transmission

As the jurisdictional planning body, TasNetworks is responsible for planning the Tasmanian electricity transmission network. In undertaking this task, we take account of a range of national and state

[2] http://www.stategrowth.tas.gov.au/__data/assets/pdf_file/0004/137065/Tasmanian_Energy_Strategy_Progress_Report.pdf

planning and operating requirements, and consider the value of customer reliability in our investment decision making.

As part of our transmission forecasting and planning activities, we also apply the Tasmanian Network Planning Requirements as set by the Tasmanian Government in the Electricity Supply Industry (Network Planning Requirements) Regulations 2007. These requirements outline the acceptable levels of unserved energy arising from a range of contingent events.

Historically, we have worked with the Tasmanian Government and other stakeholders to develop the regulations that give the option to affected transmission customers to agree to lower transmission reliability levels rather than face the higher charges that would result from network augmentations. Alternatively, customers can accept the costs of increased reliability where it is sufficiently valuable to their operations.

3.2 Distribution

Within the distribution network, TasNetworks must also comply with a range of national planning and operational obligations. This is complemented by a state scheme that outlines reliability expectations for critical infrastructure, high density commercial, urban and regional centres, higher density rural and lower density rural communities[3]. Affected customers receive payments where we do not meet service targets set for their community.

Recent distribution customer surveys indicate that most customers are satisfied with their level of supply reliability, with lower prices being the factor most likely to improve customer satisfaction. Customers who have experienced more than five outages in a year tend to be willing to pay more to achieve greater reliability.

Our customers also tell us that timely communication is important to them. We are working on a range of measures and tools to improve communications with our customers, in particular outage restoration information.

4. The connection of intermittent generation

TasNetworks continues to facilitate the connection of additional generation, including low emission generation technologies, at transmission and distribution levels.

AEMO has recognised that there are a range of challenges in enabling connection to and operating power systems with a high proportion of intermittent generation. South Australia has in recent times began to experience the effects of a rapidly changing generation mix, including the impacts of significant embedded generation, mostly in the form of rooftop photovoltaics (PV). As a result, the South Australian Government has recently initiated four proposed Rules changes intended to help manage a number of power system security issues.

Additionally, the Australian Energy Market Commission (AEMC) in collaboration with AEMO has initiated a System Security Market Frameworks Review[4] to consider whether existing market products and services are sufficient to support the security needs of the power system going forward. In the context of South Australia's recent experiences, the displacement of conventional, centrally dispatched synchronous generation by intermittent, non-synchronous generation presents particular power system security challenges that are difficult to manage within the existing market

[3] http://www.economicregulator.tas.gov.au/domino/otter.nsf/alls-v/AD67FCD9EC5050F8CA25721A00808E04
[4] http://www.aemc.gov.au/Markets-Reviews-Advice/System-Security-Market-Frameworks-Review

framework. It is expected that such issues will continue to evolve over time and thus require attention now at a national level.

Similarly, in the draft 2016 Tasmanian Electricity Network Reliability Review[5] the Office of the Tasmanian Economic Regulator (OTTER) also highlighted issues identified through the course of the Review as having potential impacts on future electricity network reliability in Tasmania.

To maximise our ability to host intermittent generation technologies and ensure that power system security and reliability standards can be adequately maintained within Tasmania without undue impost on existing generators and network customers, connection standards for intermittent generation technologies will need to be strengthened. The standards are likely to be higher than many of the *minimum access standards* currently defined in the Rules. It has been noted that other Australian and International jurisdictions have introduced specific technical requirements aimed at facilitating the connection of high levels of intermittent generation, with some considering further changes as additional needs are identified.

5. Interconnection

In our role as jurisdictional transmission operator and planner, we analyse a range of technical and economic issues associated with new connections to and augmentations of the Tasmanian transmission network.

In this context, the key considerations for TasNetworks in relation to a second Bass Strait interconnector include the technical performance characteristics (required of the interconnector) necessary to successfully integrate with the Tasmanian power system, the interconnector's impact on the design and operability of the Tasmanian transmission network, and the resulting net customer and market benefits. TasNetworks can also offer its extensive experience in the areas of environmental planning and stakeholder management where appropriate to do so.

The recent announcement by the COAG Energy Council[6] noted the important role interconnectors play in a transitioning energy sector and agreed to review the regulatory test for investment in new transmission assets to ensure the test is effective in the current market environment. This will have implications for a second Bass Strait interconnector if it is developed as a regulated asset.

As the TNSP for the Tasmanian region of the NEM, TasNetworks stands ready to provide appropriate levels of assistance to any prospective developer of a second Bass Strait interconnector, including with respect to technical, regulatory, telecommunications and network connection considerations.

6. Summary

TasNetworks is very positive about the future of electricity in Tasmania. Tasmania leads Australia in low carbon generation, with the storage and technical properties of hydro generation expected to be of increasing value in the future NEM.

TasNetworks' significant skill and expertise has supported a range of world leading innovative solutions for Tasmanian customers to reduce network costs while maintaining security of the

[5] http://www.economicregulator.tas.gov.au/domino/otter.nsf/LookupFiles/2016_Network_Reliability_Review_Draft_Report%20-%20Final%20Version%20PDF.PDF/$file/2016_Network_Reliability_Review_Draft_Report%20-%20Final%20Version%20PDF.PDF

[6] http://www.coagenergycouncil.gov.au/publications/5th-coag-energy-council-meeting-communique-19-august-2016

network and power system. Our expertise will be important as Tasmania navigates an increasingly complex energy landscape, with the emergence of new energy service technologies and products, more intermittent generation, and increasing customer expectations for information, choice and control.

As we look to the future, the laws of physics remain unchanged and a secure, reliable, cost effective electricity network will continue to play a key role in meeting our customers' needs and furthering economic activity in Tasmania. We look forward to working with the Taskforce to support its review.

Energy Security Taskforce Questions

The following responds to the specific questions raised by the Energy Security Taskforce in its consultation paper.

Energy Security

Question 1:

What are the specific risks to Tasmanian energy security that you think the Taskforce should consider?

The following summarises a number of key points and encourages the Taskforce to request more detailed information and/or discussion (at its discretion) as part of the consultation process.

The timeframes over which energy security risks develop and impact can range from minutes through months, to possibly years, and the strategies and actions to manage the risks vary accordingly.

(a) There is an inherent lack of redundancy in the infrastructure that currently supports energy imports into Tasmania. The recent extended outage of Basslink has highlighted how 'single points of failure' can dramatically impact energy transfer capabilities. TasNetworks' understanding is that single points of failure also exist within Tasmania's natural gas supply chain from Victoria.

While the probability of a critical failure may be assessed as low, the fact that a single event can potentially have significant consequences should mean that the overall risk is appropriately assessed and managed.

Specific risks considered to be appropriate for inclusion within the Tasmanian Annual Planning Statement should therefore include single mode failure events and possibly combinations of events such as (but not limited to):

- an extended outage of the Basslink interconnector;
- interruption to gas supplies from Victoria;
- unexpected unavailability of a major hydroelectric scheme such as Gordon or Poatina Power Station which have single point dependencies; and
- catastrophic loss of critical transmission infrastructure.

(b) Being a hydro dominated power system, a recurrence of the climatic conditions that prevailed during the spring and summer of 1967 and 2015 has the potential to stress the Tasmanian power system unless some diversification exists within the generation portfolio.

Gas and temporary diesel generation provided energy alternatives in the first half of 2016. While wind (and to a much lesser extent, solar) provided useful contributions during this period, their intermittent nature can result in uncertain energy yields in any specific short-term period. Generation that is supported by a continuous energy source can be reliably dispatched at any time to serve all demand in the short to medium term, whereas the contributions from intermittent generation are best factored into longer term averages. The availability of various

ancillary services[7] to maintain secure and reliable operation of the network should also be considered in addition to the supply of electrical energy.

The specific risks therefore relate to not having:

- diversity in energy supply options either as a result of environmental conditions, equipment failures, or decisions to remove assets from service; and
- plant and equipment with suitable capabilities to provide ancillary services that enable secure and reliable operation of the power system in accordance with required standards. It should be recognised that this risk could be inadvertently created if generation with inadequate technical capabilities were given preference through artificial subsidies or other incentive measures aimed at increasing Tasmania's energy security position.

(c) Any inability of major industrial (MI) customers to respond to future energy supply constraints should be recognised as a risk. Significant load reductions were provided by several MI customers during the events of 2016 and played a key role in managing the energy shortfall challenge.

While demand side management represents one available tool to mitigate energy shortfalls, TasNetworks recognises that the application of this tool will be time dependent and a function of prevailing social and economic circumstances. The inherent risk is not being able to access sufficient load reduction without imposing equivalent or greater hardship in a different form.

(d) While the Tasmanian Electricity Industry responded admirably to the challenges presented in the first half of 2016, the opportunity for established energy security contingency plans (and resources to implement such plans) was highlighted.

Much has been learnt during 2016 and it would seem sensible that those learnings form part of an enduring energy security plan for the State that considers what could/should be done under various combinations of extenuating circumstances such as those mentioned above.

Such a plan should consider and articulate:

- the role of existing gas fired generation for energy security;
- the role that demand side management is able to play at large and small customer levels, including through contracted load reduction supported by advanced metering;
- the role that 'temporary' generation has to play in Tasmania, including a range of logistical issues relating to pre-planning, and when installation of temporary generation options should be triggered; and
- any local operating requirements that should be effective when Tasmania is isolated from the mainland and the power system is under abnormal stress.

The Taskforce discussions focus on energy security issues that gradually present over time rather than responses to sudden emergency events. This submission also highlights issues around the secure operation of the power system in the face of possible contingency events. It is useful to note that the Tasmanian State Emergency Service has developed comprehensive Tasmanian

[7] In the context of this paper, the term 'ancillary services' should be interpreted to include all functions and capabilities that support operation of the network. The formalised group of ancillary services currently managed by AEMO are a subset of that described here.

Emergency Management Plans.[8] As part of that framework and TasNetworks' distribution and transmission licence requirements, TasNetworks has, in conjunction with Hydro Tasmania, a State Owned Energy Business Emergency Management Plan developed under guidelines issued by the Jurisdictional System Security Coordinator (JSSC)[9]. This emergency management plan is part of a broader Tasmanian and National suite of electricity industry specific emergency management plans involving the Department of State Growth and AEMO.

In developing a strategy built around energy-based trigger conditions[10], any number of scenarios could be mitigated to a large extent "on paper", potentially without having to commit to any significant infrastructure developments. The ability to respond to trigger conditions and to leverage off the investments made during the recent events in a pre-determined, structured, organised manner may be more efficient, timely, and cost effective than other alternatives.

It is recognised that through National and State governance requirements, including arrangements with the State Emergency Service, Tasmania has established emergency management plans, including provisions to test practical scenarios.[11]

Question 2:

What risks are acceptable to you or your business in terms of energy security and the risk/cost trade off? How well are you or your business able to manage energy supply disruptions?

While TasNetworks' customers will have various views on this question, it should be noted that Tasmania already operates under national reliability standards for unserved energy (USE)[12]. However, the scope of this Reliability Standard measure for generation and bulk supply (transmission) only includes USE associated with power system reliability incidents that result from:

- a single credible contingency relating to a generating unit or an inter-regional transmission element, that may occur concurrently with generating unit or inter-regional transmission element outages; or
- delays to the construction or commissioning of new generating units or inter-regional transmission network elements, including delays due to industrial action or 'acts of God'[13].

The standard, expressed as a probability of unserved energy (USE), measures the adequacy of electricity generating systems and transmission interconnectors to meet consumer demand. It is also used to evaluate whether there is sufficient investment in generator capacity and demand side response so that supply can meet consumer demand. Setting the reliability standard involves

[8] http://www.ses.tas.gov.au/assets/files/Plans/State/Tasmanian%20Emergency%20Management%20Plan%20-%20Issue%208.pdf

[9] JSSC - a person appointed by the Minister of a participating jurisdiction in accordance with section 110 of the National Electricity Law.

[10] Potentially defined in terms of the lost energy injection (due to an event or combination of events) as a percentage of expected energy demand in any given period

[11] http://www.ses.tas.gov.au/h/em/publications/temp

[12] Reliability standard and reliability settings review (2014), Australian Energy Market Commission. http://www.aemc.gov.au/Markets-Reviews-Advice/Reliability-Standard-and-Settings-Review-2014

[13] It excludes unserved energy associated with power system security incidents that results from: (a) multiple or non-credible contingencies; (b) outages of transmission or distribution network elements that do not significantly impact the ability to transfer power into the region where the USE occurred; or (c) industrial action or 'acts of God' at existing generating or inter-regional transmission facilities.

balancing the value that consumers place on the supply of reliable electricity with the costs required to deliver this level of reliability.

As noted earlier, part of our transmission forecasting and planning activities we also apply the Tasmanian Network Planning Requirements as set by the Tasmanian Government in the Electricity Supply Industry (Network Planning Requirements) Regulations 2007. These requirements outline the acceptable levels of unserved energy arising from a range of contingent events.

Question 3:

What level of reliable electricity supply is required by customers? Do customers consider reliability should be as close as possible to 100 per cent at all times, or would, for example, reliable supply closer to 99 per cent of the time be acceptable if the cost is significantly less?

A concept that is widely used in the electricity industry is the Value of Customer Reliability (VCR). The VCR is generally expressed in terms of dollars per unit of electrical energy and represents a customer's willingness to pay for a reliable supply of electricity. More explicitly, it aims to evaluate the cost to customers of interruptions to electricity supply. Among other considerations, TasNetworks uses the VCR to assess the economic merits of and options for carrying out additional investment in the electricity network.

AEMO reviewed the VCRs for each State and by customer sector during 2013–14.[14] For Tasmanian customers as a whole, the VCR was estimated at $28.58/kWh; that is, just over 100 times the current domestic light and power tariff for electrical energy consumed.

For reference, TasNetworks' 2016 customer survey results suggest that 78% of residential customers are not prepared to pay more for increased network reliability over and above existing performance levels. Lower prices continue to dominate the statistics as the number one consideration that drives satisfaction levels.

To this end, TasNetworks is currently implementing a tariff reform trial aimed at delivering price signals that promote positive customer outcomes through maximising efficient network utilisation. The timely transition to more cost reflective pricing will support targeted network investments that can lead to secure network services at efficient prices.

In considering customer reliability expectations, it is also important to consider different energy service models. Stand-alone systems for the supply for distribution customers are now technically achievable and could be more widely deployed under a number of scenarios to address different reliability and cost expectations. Nationally, the COAG Energy Council released a paper on stand-alone systems to start consultation on key issues to be considered as part of regulating such systems under a national framework.[15] The consultation paper identifies a number of scenarios through which stand-alone energy systems are or could be deployed:

- **Existing remote locations** – where distance from the main grid makes it impractical and inefficient to supply them with their electricity needs by connection to the interconnected national electricity system.
- **Greenfield developments** – of housing estates within urban areas but a decision is made to have them remain isolated from the grid to some extent. If there is a grid connection, it would be captured as an embedded network – the policy question is whether this would be appropriate.

[14] http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Value-of-Customer-Reliability-review

[15] http://www.scer.gov.au/publications/energy-market-transformation-%E2%80%93-consultation-processes

- **Distributor led transition from interconnected network** – network providers may conclude that it is cheaper to disconnect edge-of-grid customers and instead use a stand-alone system. It is not clear under the current regulatory framework how such a transition would be treated.
- **Brownfields/community led transition from interconnected network** – in this situation there is existing grid infrastructure and a community engages a stand-alone energy system provider to transition the community off the interconnected grid.

TasNetworks will participate in this review, so as to be able to consider implications for Tasmanian customers.

Question 4:

How well are Tasmania's energy security risks understood and communicated to the community?

TasNetworks plays an important role in communicating energy security risks to the general public when circumstances demand. The business was prominent in its support of emergency generation installations during the first half of 2016 and further assisted Hydro Tasmania through the provision of media relations personnel. TasNetworks communications to customers during recent storm events through various media (television, internet, social media) has also resulted in positive feedback being received by the business.

While evidence is anecdotal rather than factual, TasNetworks is of the view that domestic customers 'expect' energy supply and energy security to be proactively managed and therefore do not necessarily appreciate the risks that may be more evident to those fully engaged in the industry, including major industrial customers.

Question 5:

What existing frameworks for assessing and monitoring energy security might the Taskforce wish to consider?

During the recent energy security challenge, the relevant industry participants worked collaboratively to develop and implement an energy security plan suited to the circumstances that were unfolding. This worked well, but relied heavily on established relationships and a small number of key individuals in decision making roles within each organisation. While there is no reason to suspect that the same constructive styles and outcomes would not be replicated in the future if required, a clearer governance framework, with clearly defined oversight responsibilities, may be more appropriate and in the long term interests of the State.

Consideration should therefore be given to strengthening governance frameworks for managing Tasmanian energy security matters, and potentially managing issues that relate to power system security more generally.

Question 6:

Which potential energy security solutions should the Taskforce consider?

From TasNetworks' perspective, there is already sufficient generation capability in Tasmania (both in terms of capacity and energy), with the connection of temporary plant representing a credible contingency measure for the most onerous of circumstances.

It is difficult to see how any new, permanent generation developments or a second Bass Strait interconnector (as examples) could be economically justified purely on an energy security mandate. If such developments did occur in combination with other drivers, then this would bolster the State's energy security position.

Energy security solutions for consideration therefore include:

(a) Having a clear energy security strategy to manage unexpected events, either individually or in parallel (as already discussed in Part C of Question 1).

This should inherently include:

- Issues related to water management policies.
- The role of demand side management (what can be reasonably expected/negotiated from industry, commercial and residential customers).
- The role of temporary generation and the trigger points for initiating such activities.
- A list of specified events or contingencies which must be protected against, i.e. 'protected events'.

(b) Maximising the benefits of investments already made to establish new network connection points which allow temporary generation to be deployed quickly and in a staged manner (as required). In practice, this means maintaining the assets already established, acknowledging their ongoing need as part of network planning activities, and potentially making improvements where it is cost effective to do so.

Water management for hydroelectric storages

Question 7:

What international examples of water storage management practices should be considered by the Taskforce when reviewing Hydro Tasmania's approach?

TasNetworks has no contributions for this question but notes that internationally, Iceland has a very similar power system to that of Tasmania, and New Zealand, Canada and Norway are all heavily reliant on hydro-electric generation. It should be noted that Canada and Norway benefit from significant interconnector capacity between neighbouring countries.

Question 8:

What governance arrangements might be useful to consider in strengthening water storage management in Tasmania?

TasNetworks believes that the scope of governance arrangements discussed under Question 5 could include oversight of Tasmania's water storage position in context of power system security conditions more generally.

Interconnection with the NEM

Question 9:

What economic opportunities and risks are there for Tasmania associated with a second Bass Strait interconnector, and how would it improve Tasmania's energy security?

The Australian and Tasmanian governments have jointly initiated a feasibility study of Tasmania's renewable energy resources and the potential role that a second interconnector would have in a

future NEM. As part of that study, a preliminary report was published in June 2015[16]. Whilst that report discusses many of TasNetworks' concerns and interests, the following highlights the key risk/reward elements:

Opportunities:

(a) A second interconnector with appropriately specified technical characteristics would facilitate bi-directional power transfer (in the same manner as Basslink), as well as provide a number of ancillary services to support network operations (frequency and voltage control capabilities being relevant examples). Such capability provides a level of redundancy for electrical energy imports into Tasmania and would also serve to reduce the impact of any step changes in Tasmanian load demand.

(b) A second interconnector would likely improve access to mainland retailers for new wind farms and other generation types in Tasmania. The ability to negotiate power purchase agreements across Bass Strait is currently constrained due to the loss of Basslink being a credible contingency event.

(c) It follows that a correctly designed second interconnector would increase the ability of Tasmania to participate in the 'de-carbonisation' of the NEM, either through the direct export of additional renewable energy, or via the provision of capabilities that support the operation of renewables located in South Australia and Victoria (for example). The ability of Tasmania's hydro assets to provide various market support services is likely to be of increased value in the future and enable higher levels of renewable penetration than may otherwise be economically achievable.

(d) The value of additional communications bandwidth across Bass Strait could also be considered in the form of an appropriately sized fibre-optic cable laid in conjunction with the second interconnector.

Risks:

(a) A second interconnector would increase the operational complexity of the Tasmanian power system. This is a risk that can be largely mitigated by quality engineering and design, notwithstanding that novel solutions may be required. TasNetworks has the expertise to work with stakeholders to develop such solutions, as demonstrated during the Basslink development where there was a need to implement various System Protection Schemes (SPS) for network loading and frequency control.

(b) Understanding how the cost of additional network infrastructure will be apportioned between mainland and Tasmanian load customers should be progressed. One of the financial challenges in developing a second interconnector as a regulated link is correctly defining who receives the market benefits (and in what proportions) so that network charges are distributed in an efficient manner.

[16] http://industry.gov.au/Energy/Documents/Preliminary-Report-Feasibility-of-a-second-Tasmanian-interconnector.pdf

The Tasmanian Gas Market

Question 10:

How might the Taskforce consider the role for gas generation in Tasmania relative to other options to maintain energy security and the associated costs and risks?

Considerations for the Taskforce could include:

- At what level of Tasmanian water storage (or rate of storage decline) should gas generation be brought into service to proactively manage hydro energy reserves and provide operating margin to mitigate for the unplanned loss of Basslink or other 'protected events'?
- At what level of 'availability' should baseload gas generation be maintained in Tasmania?
- Gas generation in Tasmania has a single failure mode due to its dependence on one pipeline from Victoria. If that pipeline (or associated assets) becomes inoperable, it will affect the ability of gas generation to support energy security in Tasmania. The role of temporary emergency generation options should be considered under such onerous scenarios.
- Other services that can be provided by baseload gas generation during periods of stress on the Tasmanian power system, e.g. fault level, inertia and frequency control, and what value such technical characteristics will have going forward, especially in the presence of additional renewable energy developments (wind and solar).
- The potential impacts of future gas market conditions. In March, the Commonwealth Department of Industry forecast that southern gas markets in Victoria, New South Wales, Tasmania and South Australia currently have insufficient reserves to meet long-term supply requirements.

Question 11:

What can be done to strengthen the Tasmanian gas market without significant subsidy from Government and costs on taxpayers or consumers?

TasNetworks has no contributions for this question.

Renewable Energy and Emerging Technology

Question 12:

How could the potential expansion of renewable energy generation in Tasmania help long term energy security without creating increased costs for consumers?

The expansion of renewable generation in Tasmania (expected to be predominantly wind and to a lesser extent, embedded PV) would assist to diversify the energy portfolio and reduce the impacts of single point failure mechanisms, as discussed above. If installed with the correct technical and performance capabilities, intermittent generation can be operated in a complementary way to existing hydro generation given the inherent operational flexibility of hydroelectricity.

The minimum connection standards to be applied in Tasmania need to be reviewed to ensure that the network as a whole is either 'better off' or 'no worse off' and is not forced to operate in an inefficient or constrained manner as a result of having connected non-synchronous generation. The potential impacts on Frequency Control Ancillary Services (FCAS) and Network Support & Control Ancillary Service (NSCAS) are two examples where an inability of transmission connected generation to support operation of the network could have negative cost impacts on consumers.

Intermittent generation cannot be relied upon in the short term to meet demand in an operational timeframe, but can contribute to longer term energy reserves if managed appropriately in conjunction with the storage capability of hydro. As wind and solar are not controllable energy sources, their benefit from an energy security perspective is only realisable over long time frames.

Question 13:

Which renewable energy technologies and products present the best opportunity for Tasmania and why?

TasNetworks is ready to accommodate all types of renewable energy technologies and facilitate their timely connection to the Tasmanian distribution and transmission network.

The Rules require TasNetworks to be technology agnostic. Our overriding interest resides in the performance characteristics of new generator connections, the impacts that the various technologies can have on network security and operability, and the potential impacts on existing network customers.

It should be noted that there are some fundamental differences between transmission connected generation and energy sources embedded in the distribution network. The additional challenges associated with small scale renewables (such as domestic PV) are:

- Lack of visibility to network operators; there is typically no remote telemetry to indicate the status of generation at an individual unit level. Estimates of aggregated output are available across broad areas, but are subject to significant uncertainties in short time frames.
- Lack of controllability; embedded generation is not subject to central dispatch limitations and is therefore unconstrained and free to operate whenever it is able. This can create challenges for operation of both the distribution and transmission networks.
- Increased uncertainty in regards to performance characteristics; transmission connected generation is subjected to formal testing and operates within a compliance management framework defined by the Rules. Small embedded units at the distribution level are not subjected to the same rigour, creating uncertainty as to their actual performance characteristics.

It follows that the operation of a power system dominated by small scale renewable energy source embedded in the distribution network will be more challenging than if the same installed capacity is connected at the transmission level where visibility, controllability and performance requirements are all defined and enforceable through the Rules.

Question 14:

Is there a limit on the level of intermittent renewable generation that Tasmania can sustain without affecting the reliability of the network, or requiring significant cost to strengthen the network?

There are a broad range of factors that can influence the ultimate level achievable and the costs of doing so. In addition to the overriding ability of the Tasmanian power system to absorb or export all of the energy generated, a selection of critical factors is provided below to indicate the complexity of the situation in practice:

- Connection point location – locational specific issues exist that can impact the operation of generating equipment and thereby affect power system security if not adequately addressed and mitigated.
- The technologies involved and their technical performance characteristics.

- Whether the generation is connected to the transmission or distribution network, the deciding factor usually being the installed capacity of the generating system.
- Whether the renewable generation is subject to the stringent technical requirements of the Rules (refer previous discussions in Question 13 regarding visibility, controllability and performance management).
- How the existing generation fleet is able to be operated to support the renewable energy sources. Depending on the mix of technologies, the dispatch of traditional synchronous machines to provide fault level, inertia and frequency control may be required to enable renewable generation to operate unconstrained without affecting power system security[17].
- The willingness and/or ability of all generators to participate in new local or state wide control or special protection schemes which could potentially extend the capability of the power system to host intermittent generation.
- The use of local energy storage devices to regulate the output of intermittent generation (towards the network) and thereby reduce its minute to minute impact on power system operation. The controllability of the energy storage device becomes a separate technical issue that also needs to be considered.

In recognising these issues the AEMC in collaboration with AEMO initiated a System Security Market Frameworks Review to consider whether existing market products and services are sufficient to support the security needs of the power system. Similarly, OTTER in the draft 2016 Tasmanian Electricity Network Reliability Review[18] also highlighted these issues as having potential impacts on future electricity network reliability in Tasmania.

A core TasNetworks skill is understanding how the Tasmanian power system performs under a wide range of operational scenarios and establishing requirements to accommodate new generation, new loads and network infrastructure. We have the expertise and experience to support connection applications with the aim of maximising the ability of the power system to accept new entrants while ensuring that power system performance standards are maintained.

Question 15:

Are there material barriers to the take up of emerging energy products and services in Tasmania?

Some of the barriers that exist in Tasmania include:

- financial capability of Tasmanian households to invest in emerging technologies;
- the size and geographic spread of the market and the limited local presence for these technology suppliers; and
- the lack of retail competition.

One mechanism that will facilitate the take up of emerging energy products is the development of revenue streams for services that can be provided by the technologies, specifically those capable of assisting with network security and operation. TasNetworks is working towards this through the Bruny Island distributed energy storage trial and investigating the impacts of electric vehicles. The

[17] These have been the basis for Rule changes requested by the South Australian Government and AGL Energy, http://www.aemc.gov.au/Rule-Changes?topicId=0&status=3

[18] http://www.economicregulator.tas.gov.au/domino/otter.nsf/LookupFiles/2016_Network_Reliability_Review_Draft_Report%20-%20Final%20Version%20PDF.PDF/$file/2016_Network_Reliability_Review_Draft_Report%20-%20Final%20Version%20PDF.PDF

objective of these initiatives is to maintain the ongoing integrity of the network while maximising the ability to host new technologies and accommodate changes in services requested by customers.

The Australian Energy Regulator (AER) recently published a draft guideline for 'ring fencing' that proposes to legally separate regulated prescribed network activities from potentially competitive activities, including in emerging energy products and services. The initial assessment of the proposed ring fencing obligations appears to be very onerous in the Tasmanian context, particularly given the current limited nature of competition in the Tasmanian electricity supply industry and related services. This could result in constraints on TasNetworks in delivering a range of existing and emerging services efficiently and cost effectively to Tasmanian customers.

Question 16:

Is there a timeframe where renewable energy developments could be more favoured in Tasmania than elsewhere?

Victoria's new renewable energy target (40% by 2025) presents a time bound opportunity for Tasmania to contribute to renewable energy generation, limited by when Victoria's wind generation aspirations reach their potential.

Beyond this point, Tasmania's contribution may be best delivered in alternate ways, possibly in the form of pumped storage developments operating in conjunction with the import capability of one or more Bass Strait interconnectors. The ability of a second interconnector to facilitate the provision of various ancillary services, as well as providing access to bulk energy storage options in Tasmania, could be an 'enabler' for higher levels of renewable energy penetration on the mainland than may otherwise be technically feasible.

Question 17:

What impact will the national commitment to reduce carbon emissions have on renewable energy development in Tasmania and in the wider NEM?

The commitment could potentially have a large impact by creating a more stable environment for long-term market-based investment.

Impact of Climate Change

Question 18:

Are there other climate change related implications for energy security in Tasmania?

Changing weather patterns are not only impacting on energy security from the perspective of extended low rainfall periods; the increased risk of extreme weather patterns, storm events and bushfire is a consideration for network service providers such as TasNetworks.

Scenario Planning

Question 19:

Are there other scenarios with energy security implications in Tasmania that the Taskforce should be considering?

A scenario that the taskforce should consider is an extended outage of Basslink coincident with an unplanned outage of a major generating system; for example, Gordon or Poatina Power Stations. TasNetworks' Tasmanian Annual Planning Statement includes some analysis in this regard.