27 January 2017

Office of the
Chief Executive Officer

Level 22, 570 George Street
Sydney NSW 2000
All mail to GPO Box 4009
Sydney NSW 2001
T +61 2 9269 2115
www.ausgrid.com.au

Mr John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Mr Pierce

RE: AEMC Draft Rule Determination - Transmission Connection and Planning Arrangements Rule 2016 (Ref ERC0192)

Ausgrid is pleased to provide a submission to assist in framing the AEMC's Draft Rule Determination to amend aspects of the National Electricity Rules (NER) that relate to the arrangements for transmissions connections and planning.

Ausgrid is one of the largest energy suppliers in Australia with a network which is uniquely comprised of both transmission and distribution systems. While Ausgrid is primarily a distribution network service provider (DNSP), we own and operate a transmission network for the primary purpose of supporting TransGrid's transmission network. Therefore, for the purposes of Chapter 5, Ausgrid is both a DNSP and a transmission network service provider (TNSP).

Based on discussions with your staff on the 23 January 2017, Ausgrid has been advised that the scope of the rule change is limited to connections to the transmission network only, managed by dedicated TNSPs, and that the rule change does not apply to a DNSP in its capacity as an owner, controller and operator of dual-function assets. Ausgrid strongly supports this position.

Our submission in response to the AEMC's Draft Rule Determination is focused solely on the proposed transmission network connection and access arrangements under proposed rule 5.2A of the Draft Rule.

While Ausgrid supports the policy intent of introducing contestability to transmission connections, due to our experience with managing identified user shared assets (IUSA) over each stage of the assets life-cycle, we consider that there are a number of aspects with the design of the proposed contestable framework which have the potential to undermine the achievement of the stated policy objectives and give rise to unintended consequences. Specifically we would advise that the Draft Rule:

- ***creates a misalignment of efficient risk sharing between the connection parties*** The proposed framework separates accountability for the ongoing maintenance of an identified user shared asset from asset ownership, without providing appropriate controls such as specification of the design of the equipment or appropriate testing and commissioning. This creates an increased risk of safety and reliability incidents occurring on the TNSPs network and

the risk of supply interruptions to TNSP customers with a misalignment to those who hold the liabilities associated with managing the assets.

- ***lacks clarity regarding obligations for maintaining equipment spares and undertaking replacement***
  This may impact on network performance if these issues are not resolved prior to the assets being transferred to the TNSP and may result in disputes relating to accountabilities/ liabilities and costs while also having the potential to pose safety risks to the public.
- ***has the potential to undermine the efficient operation of the TNSP's network***
  The design of equipment connecting to a network service providers (NSP) network strongly influences how the network can be configured. A connection applicant's choice in equipment may limit the NSPs ability to operate its network as planned and may trigger the need for early replacement of network assets resulting in increased costs to TNSP customers. Whilst examples of non-contestable services are provided, they do not provide sufficient clarity that these services will definitely be considered non-contestable, particularly in relation to protection control and communications requirements. It is suggested that this needs to be clarified.

Ausgrid considers that the above issues identified with 5.2A of the Draft Rule could be easily addressed by clarifying that the classification of the specification of protection settings, equipment fault ratings and relays as non-contestable. We consider that these changes strike an appropriate balance between lowering the connection costs to transmission connection applicants while allowing the incumbent TNSP to retain control over key design parameters that have a critical influence over its ability to preserve the safety, reliability and security of its network.

In addition to highlighting the potential for the Draft Rule to give rise to outcomes contrary to the achievement of the National Electricity Objective (NEO), our submission highlights key design features of the New South Wales (NSW) contestable connections framework which could be adapted to the contestable transmission framework to better achieve the AEMC's policy objectives and improve the operation of the framework.

NSW has an established and highly functioning contestable framework for distribution connections that has been in place for over 20 years. Ausgrid is well positioned to advise the AEMC on key design aspects of the NSW contestable framework which have contributed to its successful operation, as well as sharing our experience with different contestability models and the issues that can arise.

Given the significant change in the design of the proposed contestable framework from previous consultation (i.e. Model B in the AEMC's Consultation Paper) Ausgrid suggests that the AEMC consult further with impacted transmission network stakeholders prior to finalising the proposed amendments. This will allow stakeholders to assess the amendments the AEMC proposes to make to the Draft Rule to determine whether further changes are required to address unintended consequences or improve the workability of the proposed contestability regime.

If you have any queries or wish to arrange a meeting to discuss our submission please contact Murray Chandler on (02) 9269 7210 or via email murray.chandler@ausgrid.com.au.

Yours sincerely

RICHARD GROSS
Chief Executive Officer

Attachment: Ausgrid's submission – Transmission Connection and Planning Arrangement Rule 2016

Ausgrid's submission

1. Introduction

Ausgrid supports the establishment of a contestable framework for transmission connections. Ausgrid has been operating under a contestable connection framework for distribution connections for over 20 years, and as such is well placed to provide feedback on key design features of a well-functioning contestability framework and share insights from our experience with different models of contestability.

It has been our experience that a well-designed framework for contestable connections can promote efficiencies in the connection process, as well as lower the cost to connecting parties.

As an operator of both distribution and transmission networks and as advised Ausgrid will not be captured by 5.2A of the Draft Rule. However, we have a strong interest in ensuring that the framework operates effectively and does not expose NSP's to unnecessary costs (associated with implementation or the continued operation of the framework) or adverse impacts on their power supply.

While Ausgrid is comfortable with the dedicated connection asset aspects of the Draft Rule the following information is provided regarding the operation of the proposed identified user shared assets (IUSA). Our submission seeks to highlight potential issues associated with this aspect of the Draft Rule, as well as offer solutions as to how these concerns could be addressed to avoid unintended consequences and better promote the achievement of the National Electricity Objective (NEO).

Summarised below is an outline of our submission:

- ***Section 2:*** provides an overview of Ausgrid's network to provide context to the AEMC on how we could be impacted by the Draft Rule if it was applicable to our network;
- ***Section 3:*** outlines the key issues for consideration that we have identified with the drafting of 5.2A of the Draft Rule;
- ***Section 4:*** outlines our recommendations for how the Draft Rule could be improved to better achieve the AEMC's policy objectives and promote the achievement of the NEO.
- ***Appendix 1 –*** provides examples of connections to a network that have been undertaken via different contestable models to illustrate some of the issues raised in section 3 of our submission.

Ausgrid hopes that our feedback in response to the Draft Rule assists the AEMC in refining the Draft Rule so that it avoids the unintended consequences we have identified and improves the workability of the proposed changes. We look forward to working closely with the AEMC and industry to finalise the amendments to Chapter 5 of the National Electricity Rules (NER or Rules).

2. Overview of Ausgrid's network

Ausgrid operates one of the largest electricity networks in Australia (ranked by size of asset base) servicing a broad customer base ranging from rural, to CBD, and residential to business customers, including mining, manufacturing and agricultural industries. We have more than 100 years of experience in providing a safe and reliable supply of electricity to our 1.7 million customers through the operation of a network that is uniquely comprised of both transmission and distribution systems.

It is important to understand the design and configuration of Ausgrid's network, as this provides necessary context as to how Ausgrid is providing its submission on the possible impacts of the Draft Rule.

To assist the AEMC in understanding the design and configuration of our network we have sought to provide an overview of the assets comprising our network, as well as an explanation of how our network operates and interfaces with TransGrid's transmission network.

Table 1: Overview of Ausgrid's network

Transmission Network	Distribution Network
• 132kV lines (dual function assets) that are operated in parallel to and in support of TransGrid's transmission network; • Substations which are connected to these lines; and • A sub-transmission system of 132kV, 66kV and 33kV assets.	• A high voltage distribution system of 5kV, 11kV and 22kV assets; and • A low voltage distribution system of 415V and 240V

The diagram below shows the electricity supply chain. As illustrated by the diagram our assets (in red and green) extend beyond TransGrid's bulk supply point.

Figure 1 – Diagram outlining the configuration of Ausgrid's network

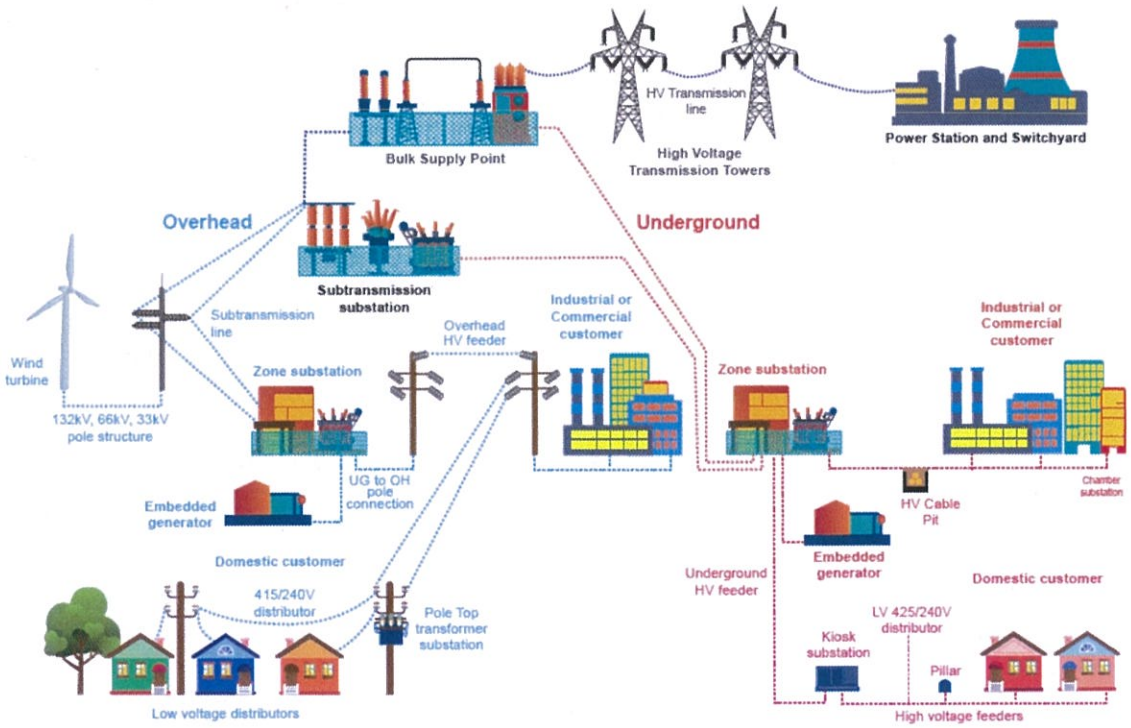

Figure 1 illustrates how Ausgrid takes electricity from TransGrid's transmission network at bulk supply points. Electricity is then transported via Ausgrid's sub-transmission system which consists of both overhead and underground networks operating at 132kV, 66kV and 33kV and approximately 40 sub-transmission substations. The electricity supply is transformed to a high voltage distribution system (predominantly 11kV) at Zone Substations which take their supply from the sub-transmission network. Ausgrid has approximately 190 Zone substations which generally supply entire precincts or multiple suburbs.

The high voltage distribution system consists of both overhead and underground networks supplied by Zone substations. The electricity supply is transformed to the low-voltage distribution system from the high voltage distribution system at distribution substations (shown as Pole Top transformers or Kiosk substations in Figure 1). The low voltage distribution system comprises both overhead and underground networks.

Some customers such as mines and large industrial sites receive electricity directly from our sub-transmission network. Some of our large commercial and industrial customers are supplied directly from our 11kV network. However, the majority of customers are served by the low voltage distribution system.

Most of Ausgrid's Zone substations have a "meshed" supply from the sub-transmission network with two or more sources of supply so that a single sub-transmission fault will not, in most cases, directly result in a sustained outage to a Zone substation. However, a key issue with the Draft Rule if it were to apply to Ausgrid's network arising from the contestable design of protection settings is that a fault on the identified user shared asset (IUSA) may trigger an upstream faults on the high voltage distribution network or Zone substations which would, if it occurred, impact large volumes of customers supplied by the low voltage network.

3. Key issues for consideration

In the classification of Transmission Services in relation to Identified User Shared Assets (IUSA) the AEMC identifies the following processes;

- Function Specification
- Detailed Design
- Construction
- Operations and Maintenance
- Cut in works

Functional Specification

It is agreed that, since the TNSP is accountable for the operation and performance of the shared transmission network, development of the functional specification should be the responsibility of the TNSP. The rationale for this is that the TNSP is able to ensure that the equipment comprising the IUSA is compatible with the TNSP's network and will not negatively impact the performance of the transmission network.

In outlining the Independent Engineer Process the draft rule requires that the independent engineer have regard to;

- *the technical requirements of the connection should not preclude the possibility of future connections;*
- *the technical requirements of the connection being consistent with good electricity industry practice and contributing to a safe, reliable and secure transmission system.*

Ausgrid agrees with these requirements. However, the Commission's conclusions as to Asset Sizing (Section B.3) states that;

> *'The Primary TNSP should provide a connection applicant with a functional specification that is no more than is required for the connection being sought by that connection applicant.'*

This appears to contradict the requirements of the independent engineer process. The draft rule (Schedule 5.11 Clause 12) assumes that the functional specification of identified user shared assets can be made with reference to the nature of the connection being sought. This is not always the case. Certain specifications (e.g. fault level ratings) depend on how the network is configured or intended to be configured. In developing a functional specification for shared network assets, a prudent TNSP allows for likely future network configurations. If this is not done, major items of equipment (e.g. switchgear) may need to be replaced as a result of not being able to perform their required function under different network configurations. The proposed rule change should clarify that the primary TNSP is responsible for the detailed specification of protection, control and communications equipment with reference to current and potential network requirements.

Detailed Design

The draft rule change determination outlined the scope of the detailed design process by way of examples. The examples provided were extensive and appeared to go beyond what Ausgrid believes is understood by the design process. The AEMC included the provision of a single line diagram as an example of the detailed design process which has been classified as contestable. It is agreed that the single line diagram is part of the design process but traditionally, these diagrams are used to assist in the functional specification process. Due to the number of component equipment parts, a single line diagram is able to assist in communicating how the assets could be configured for operating & maintenance purposes. As a result, Ausgrid suggests that the TNSP should be able to provide an initial concept single line diagram that would inform the connecting applicant's detailed design.

In addition, preferred vendor equipment was also provided as an example of a detailed design process. In relation to IUSA primary equipment, Ausgrid has traditionally provided connection applicants with a listing of approved materials and equipment that meets our functional specifications and for which asset management systems and processes are in place to manage them. It is open to the connecting applicant to use alternate equipment but it is necessary for the equipment to be tested and asset management and training systems developed to support the equipment. This would need to be funded by the connection applicant. As a result, it is proposed that the provision of details of preferred vendor equipment should be the responsibility of the primary TNSP.

Testing and Commissioning

One of the important functions not identified in the draft rule change determination relates to testing and commissioning of assets. The System Life Cycle Processes standard[1] specifies the 'Transition Process' requirements which include identification and development of;

- Training and support requirements
- Identification of system constraints
- Enabling systems and support

Since these are complex assets, IUSA need to be tested and commissioned to ensure that new assets operate and are compatible with the existing network assets. This is an important function and assets cannot be safely connected to transmission networks without these steps being undertaken. Since the TNSP is responsible for the operation of the network, it would need to have involvement in or, as a minimum, project oversight of this function.

An example of a significant commissioning issue this relates to is protection schemes and associated equipment. The settings on protection equipment have a significant impact on the ability of the operator to maintain, operate and protect its shared transmission network. Incorrect operation of protection equipment has significant impacts on the safe and reliable operation of a transmission network.

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[1] AS/NZS ISO/IEC/IEEE 15288:2015

Operations and Maintenance

IUSA comprise both primary major items of equipment and secondary protection equipment. Primary equipment generally has a design life of 35-45 years. The cost of primary and related equipment generally represents around 30% of the project cost. Manufacturers of this equipment generally provide TNSP's with design parameters and maintenance requirements.

Secondary equipment, on the other hand, is generally specialised electronic equipment with a design life of 12-20 years with several firmware updates over its life. In a typical substation project, the cost of secondary system equipment is generally less than 5% of the capital cost of the project. Over the life of the primary equipment, secondary equipment is likely to be replaced at least once. The nature of these activities blurs the conventional distinction between replacement and maintenance in the case of secondary equipment.

Issues that arise as a result of this include;

- **Asset Management Systems and Processes**
  Introduction of a new item of equipment into a TNSP requires the production of:
  - Maintenance plans.
  - Standardised protection test plans.
  - Setting templates and base configurations.
  - Operator guides and training (reading flags, resetting, interpreting).
  - Technician guides and training (e.g. configuring, testing, loading settings, extracting records).
  - Engineering application guides and training (e.g. understanding of behaviour, adjustment of settings).
  - Integration of configuration software into IT departments.
  - Spares inventory.
  - Registration of associated drawings and manuals.
  - Evaluation tests to determine compatibility with SCADA systems.
- **Staff Training**
  Operating and maintenance staff rely on protection devices being configured consistently and in accordance with TNSP training. Modern protection equipment is complex and highly configurable – the behaviour of protective elements, trip targets, alarm indicators, displays and output contacts are customised to suit individual TNSP standards. As a result, operations staff are given specialised training in how devices are programmed and configured. Introduction of non-standard settings will impose additional costs on TNSPs who will need to train staff how to operate this equipment on a site specific basis.
- **Provision of equipment settings and data**
  Handover of protection settings is complicated and is likely to add significant cost. Upon receipt of this information the TNSP will need to verify the calculations and modelling performed by the connecting party, duplicating work that has been undertaken by the connection applicant.

In section B.2.4, the Commission states;

> *In order to meet the obligations in respect of the safety, security and reliability of the supply of electricity to the end-users connected to its network, the Primary TNSP must be able to control the operation and maintenance of, and access to, all assets that form part of that network.*

Allowing a connecting party to undertake detailed specification and design of protection and control equipment is likely to prevent a TNSP from safely performing this function.

The broader question also needs to be asked as to whether making the detailed design of these assets contestable is likely to improve the efficiency of connection projects. It is suggested that it may in fact complicate these projects and impose significant additional costs on TNSP's and potentially the connection applicant.

Plant Management Process for Contestable Design - Approved Asset Material Management Processes

Details of Ausgrid's Plant Management process for contestable design are provided by way of background and information as a way of facilitating the design process.

The Approved Material List (AML) is a dynamic list of materials and equipment approved (at that point in time) for installation on Ausgrid's network that is published on Ausgrid's website. This process facilitates the use of equipment for contestable distribution projects and has been recently utilised to support complete green field turn-key major substation projects. The operation of the AML is detailed in NS181 - Approval of Materials and Equipment and Network Standard Variations (attached)

As detailed in NS181, there are three basic ways that materials and equipment can be included in the AML:

1. Submit a successful response to an Ausgrid tender or other procurement arrangement - automatic inclusion in AML, no fees payable by the applicant.
2. Submit an unsuccessful response to an Ausgrid tender or other procurement arrangement and be assessed as being compliant with Ausgrid's technical requirements (i.e. technically compliant) - applicant must request inclusion in AML, no fees (other than factory inspection if necessary).
3. Submit an application in accordance with NS181 - fees are applicable: Australian Energy Regulator (AER) rates if associated with a specific contestable project ("Category A" materials), otherwise commercial rates apply ("Category "B" materials").

Typically the AML lists Ausgrid's contracted supplier of various items of equipment and any other approved suppliers of approved alternatives of the item. In some instances these alternatives may be used by Ausgrid (for some items Ausgrid has more than one contracted supplier), but generally they are only used by Accredited Service Providers (ASP's).

Although the original applicant for approval is listed in the AML as the approved "Supplier", once a particular item is approved it may be obtained from virtually any supplier (i.e. retailer/wholesaler) provided it is the same item from the approved manufacturer.

Ausgrid provides applicants of approved items with a letter stating that the item is approved for use on Ausgrid's network and detailing any pertinent conditions (e.g. expiry date of approval etc.).

As discussed previously, ASPs are required to prepare (contestable) designs in accordance with Ausgrid Network Standards and the designs must incorporate only approved materials and equipment (i.e. which are on the AML). Upon request Ausgrid provides the ASP with a design information package (DIP) detailing the specific parameters for each particular design (e.g. type and required rating of mains, any special conditions etc.)

The ASP submits completed designs to Ausgrid for "Certification". Ausgrid only "Certifies" the designs as complying with the DIP. Ausgrid does not "Approve" the design since doing so would mean that Ausgrid would be assuming responsibility (and liability) for compliance of the design with all aspects of Ausgrid's Network Standards - something which rightly falls to the ASP and indeed is something that the ASP is required to warrant as part of the Authorisation process discussed previously.

Ausgrid's compliance officers co-ordinate ASP construction works, arrange access permits and the electrification of assets constructed by ASPs. They also inspect various aspects of the construction process to help ensure that the ASP is acting in accordance with the certified design and utilising only approved materials, however the scope of these inspections is limited and ultimately the ASP is responsible for rectifying any defects, even after commissioning and hand-over to Ausgrid, for a predefined "defects liability period" (3 years).

Contestability arrangements in New South Wales (NSW)

The following summary of contestability arrangements in NSW are provided by way of information to assist the AEMC.

The NSW Government introduced contestability for particular electricity distribution network connection services in 1995. The legislative framework established to support contestability includes a scheme to accredit businesses that are qualified to provide these services (the ASP Scheme), which is administered by the NSW Department of Industry, Skills and Regional Development (Division of Resources and Energy).

Under the Electricity Supply Act 1995 in NSW, customers are required to fund certain works which are required to enable new or increased capacity connection to the electricity network. These works are contestable and the customer chooses a service provider to carry out these works. Such choice facilitates competition between providers of these services and has been successful in improving the efficiency of connection related works.

The following principles apply to contestable works:

1) The customer decides which Service Provider shall undertake the design, construction and installation of contestable works.
2) Contestable works must be undertaken by an Accredited Service Provider in accordance with a scheme managed by the NSW Department of Industry. Internal contracting businesses operated by electricity distributors must be independently accredited and appropriately ring fenced.
3) Design, construction and/or installation technical standards or requirements for contestable work are set by the local electricity distributor in whose network area the works will be sited.
4) The local electricity distributor may charge for services provided in accordance with its Connection Policy which is approved by the AER.

It is proposed that this contestability framework could readily be adopted as a potential framework for transmission connections.

The key design features of the Contestability Scheme which are provided for by a DNSP on a regulated basis are:

- Design Information
  The provision of design information by the DNSP which sets the minimum functional specifications required to be achieved by the Accredited Designer to prepare a design drawing and submit it for Certification.
- ASP Level 3 Design Certification
  The provision of design certification by the DNSP to certify that the design complies with the design information and other technical standards. This is mainly to ensure that the design will not compromise the safety or operation of Ausgrid's distribution network on the assets are commissioned.
- ASP Level 1 Inspections
  The inspection of construction works undertaken by an ASP Level 1 for the purpose of ensuring the quality of assets to be handed over to Ausgrid for ongoing operation and maintenance.
- Access permits
  The provision of access to a person authorised by Ausgrid to work on or near Ausgrid's distribution system; and
- Asset Commissioning
  The commissioning of assets constructed by an ASP Level 1, including all necessary pre-commissioning checks and tests prior to energisation.

The design elements of the NSW Contestability framework recognises the role of the DNSP in the provision of design information and the process of certifying, inspecting and commissioning the connection assets to be transferred.

The stated intent of the draft rule change is to;

'...facilitate more efficient connections between generators and transmission businesses...'

To ensure the workability of the scheme, it is suggested that in the event of the transfer of ownership and/or operations and maintenance of IUSA to the TNSP, that the assets have been;

- constructed in accordance with the TNSP's functional specification;
- commissioned correctly and are operating compatibly with the transmission network.

Without these safeguards in place, Ausgrid does not consider that the proposed arrangements can be effective in achieving the Commission's objective.

4. Recommendations

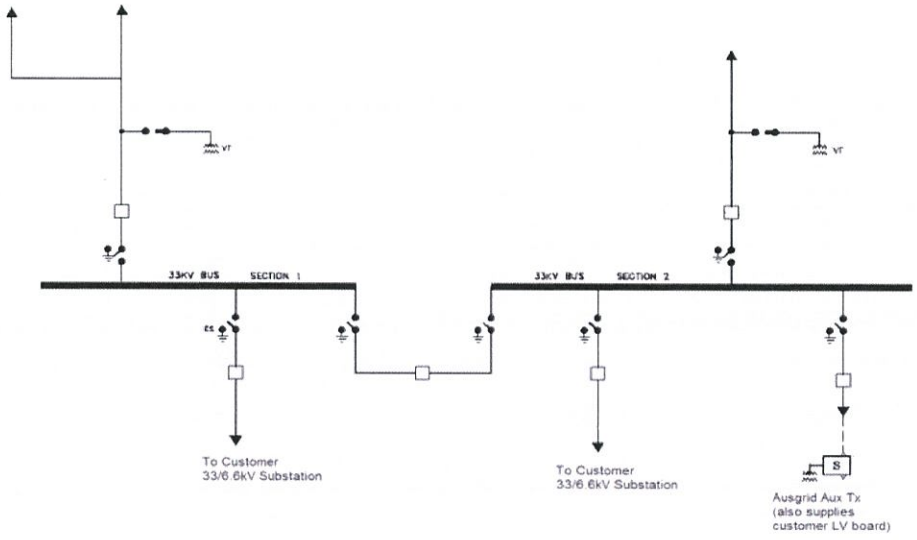
It is recommended that;

- The scope of the proposed rule change is clarified to make it explicit that the rule is not intended to relate to DNSP's with dual function assets such as Ausgrid.
- The examples of non-contestable cut-in works, particularly in relation to protection control and communications equipment, require further clarification to better understand how the construction and commissioning of this equipment could be facilitated.
- Greater recognition of the testing and commissioning phase of connection works particularly in the case where the identified user shared assets are transferred to the primary TNSP.

Appendix 1: Case Studies

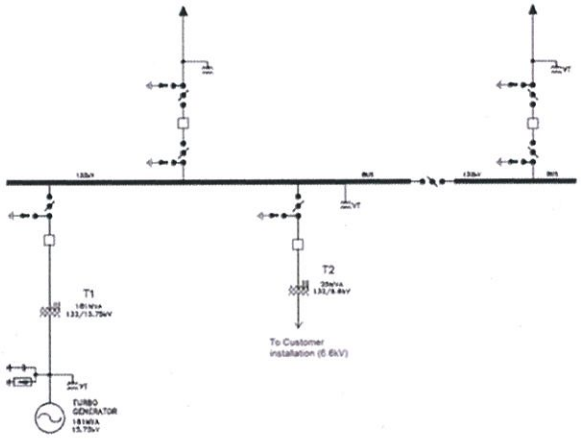
The following case studies of recent connection projects in Ausgrid's network are provided to illustrate the impact of different accountability models.

1. **Customer Switching Station (Built by customer and transferred to Ausgrid).**
    - Facility commissioned in December 2014.
    - Substation was specified by Ausgrid using the existing Network Standards and a Design Information Pack (DIP) that captures any additional requirements related to the site and characteristics of the network involved.
    - The substation was designed and built by contractors.
    - Installation fully complied with Ausgrid's equipment specifications and operating and design standards.
    - The customer had the choice of using equipment that had been tested and was on our Approved Materials List (AML) or other equipment subject to the customer funding the cost of equipment testing. The customer chose to use equipment on the AML.
    - Substation ownership transferred to Ausgrid and has had no operating issues.
    - Project was delivered with an estimated saving of approximately 30% on traditional delivery methods.



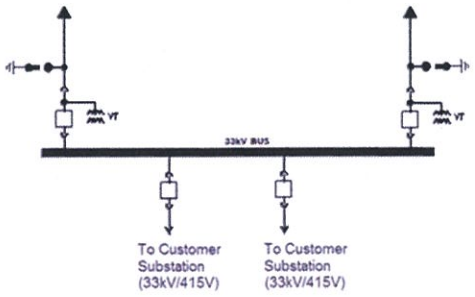
2. **Generator Connection - Private Power Substation (Built, owned, maintained and operated by customer)**

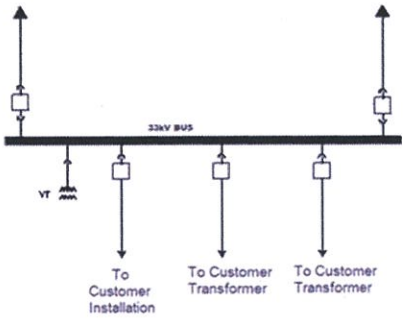
   - Commissioned January 2002
   - Substation built to connect the Generator. Customer's busbar forms a closed ring through the Ausgrid network.
   - There have been ongoing operating issues with the assets, particularly when the generator ceased operating and the plant when into care and maintenance. The substation control room was closed and operating support was difficult to arrange. The ongoing issues finally resulted in the substation being bypassed and cut away.



3. **Major Customer Substations (Built and owned by customer/ Maintained and operated by Ausgrid)**

   - Both private substations now connected as radial tee off the distribution network.
   - Until recently connection was via private busbars forming part of a closed 33kV ring.
   - At both of these locations, while being part of Ausgrid's ringed network, there were failures of the private equipment that opened the closed ring for extended periods while customer repairs could be carried out. The equipment was in poor condition and at end-of-life.
   - Failures resulted in discussions with customer to remove them from the ring.
   - Performance of customer's equipment was always problematic with operating limitations, access limitations and the uncertainty of the reliability of switchgear and protection.
   - Ausgrid recommended facilities and equipment upgrades and/or replacement, but the customer delayed in committing to replacing the assets or has failed to rectify the situation.
   - Both substations suffered major equipment failures even though Ausgrid was undertaking the maintenance.





Implications of Case Studies

- The Functional Specification process needs to include information regarding specific requirements as a result of characteristics of network at the proposed connection point.
- Where the customer intends to transfer ownership of assets to the NSP, primary equipment should be equipment that has been approved by the NSP and incorporated into its Asset Management Systems.
- Where the customer wishes to retain ownership of the identified user shared assets, in the event that the assets are in poor condition, a mechanism needs to be provided to enable the NSP to require the connecting party to replace the assets. The current Reliability Panel arrangements in the Rules may provide a mechanism to resolve the issue in the event of a dispute.