9 August 2012

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Mr Steven Graham
Chief Executive
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Mr Graham,

RE: AEMC Consultation Paper – National Electricity Amendment (Connecting Embedded Generators) Rule 2012

Ausgrid welcomes the opportunity to provide comments on the AEMC's consultation paper on the connecting of embedded generators rule change proposal.

Ausgrid is a member of the Energy Networks Association (ENA) and supports the ENA's submission.

ClimateWorks Australia, Seed Advisory and Property Council of Australia (the proponents) rule change request identifies a number of perceived problems with the current framework for connecting embedded generators. Most notably, they claim that there is a gap in the regulatory framework for connecting embedded generators with a nameplate rating between 10kW and 30MW.

Ausgrid does not agree that there is a gap in the regulatory framework for connecting embedded generators. We note there have been a number of reviews have been undertaken in recent years aimed at testing the appropriateness of the framework for accommodating generator connections. These reviews have generally concluded that the framework is appropriate and robust.

Ausgrid recognises that there is value in having clear and published connection processes and documentation, particularly as the volume of 'smaller' intermittent embedded generator connections increases. However, we note that there are a number of industry reforms (which have recently been finalised or are currently underway) that appear likely to already address the proponents' concerns in this regard. We believe that time needs to be allowed in order for reform changes to be implemented and the impacts to be realised, before further fundamental changes to the framework are made.

Whilst Ausgrid is supportive of improving understanding, transparency in information on processes and availability of clear information, we do not support their proposed changes in their current form. We do not believe that amending Chapter 5 of the National Electricity Rules (NER) is the best and only way for addressing the proponents' concerns.

As noted by the ENA, it is widely accepted by DNSPs that embedded generators can provide benefits to both customers and networks. However, the proliferation of embedded generators connected within distribution networks needs to be considered in the broader context of a DSNPS obligation to provide a safe and reliable electricity supply that meets licence conditions and regulatory requirements. We believe that the view that DNSPs seek to obstruct embedded generation connections is a misconception based on a lack of understanding of the broader considerations a DNSP must have regard to in operating its network and a lack of

appreciation of the complexities involved in safely integrating embedded generation within distribution networks.

Ausgrid's submission does not aim to provide detailed responses to the AEMC consultation questions. Rather, our submission seeks to demonstrate that the proposed amendments are not the most efficient or effective means for addressing the proponents' perceived problems and has sought to make a number of suggestions to the AEMC as to how these issues could be better addressed.

If you have any queries or wish to discuss this matter in further detail please contact Keith Yates on (02) 9269 4171.

Yours sincerely,

Peter Birk
Executive General Manager System Planning and Regulation

Submission on AEMC Consultation Paper - National Electricity Amendment (Connecting embedded generators) Rule 2012

August 2012

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Executive Summary

Ausgrid is a member of the ENA and supports the views presented in the ENA's submission.

Ausgrid considers that there is a broad perception among external stakeholders that network businesses oppose the wider use of generation within the distribution network and may in fact seek to erect barriers to generator connections. Ausgrid does not consider this to be the case.

The potential benefits that embedded generation can provide to the National Electricity Market (NEM) as a whole are widely accepted and DNSPs recognise the role that embedded generators could play in addressing challenges associated with most efficiently meeting peak demand. However, increasing proliferation of embedded generators connected within distribution networks needs to be considered in the broader context of a DSNPS obligation to provide a safe and reliable electricity supply that meets licence conditions and regulatory requirements.

A number of market reviews have been undertaken in recent years testing the appropriateness of the market frameworks in accommodating generators connection and these reviews have concluded that frameworks are generally robust. However, the Federal Government proposed in its draft Energy White Paper "further assess[ment of] the impacts of increased intermittent generation, particularly any consequent new requirements on the structure and operations of networks".[1]

Ausgrid agrees that further assessment of the impacts of increased embedded generation (some of which would be intermittent) is needed and this would also assist in addressing the perceptions mentioned above. This work, together with an evolution of the current Regulatory and Licence Compliance Frameworks, could lead to a more cost effective and optimal outcome enabling the network to accommodate and potentially facilitate the future proliferation of embedded generation.

We recognise that there is value in having clear and published connection processes and documentation, particularly as the volume of 'smaller' intermittent embedded generator connections increases. We also note the opportunities provided by recent industry reforms such as:

1. the establishment of the National Energy Customer Framework (including the addition of the new Chapter 5A to the existing Rules;
2. the establishment of a National Framework for Distribution Planning and Expansion; and
3. reforms that are being considered and developed as a result of the DSP3 Power of Choice Review.

The new processes associated with these changes are being established across jurisdictions. Time needs to be allowed in order for the impacts of these reforms to be realised. This then would allow any opportunities for further harmonisation on processes and procedures to be considered against a stable regulatory context.

Whilst supportive of improving understanding, transparency in information on processes and availability of clear information, we do not support their proposed changes in their current form. Specifically, we do not support the following changes proposed by the proponents:

- **Automatic right of connection –** Ausgrid opposes this based on a range of technical and safety concerns.
- **Right to export electricity** – Ausgrid believes that embedded generators should be able to export, subject to the embedded generator establishing that it has met certain technical requirements, rather than the embedded generator having an explicit 'right.'
- **Establishing timeframes to connect** – the timelines established by the proponents are unrealistic and fails to take into account contestability arrangements in New South Wales (NSW).

[1] Draft Energy White Paper, p 165.

- **Technical standards** – 10kW to 30MW covers a broad range of embedded generator technologies and installations. Developing a single set of technical standards to cover all possible types and installations would take a substantial period of time and would most likely result in standards that are overly burdensome and onerous for smaller embedded generators and may act as a barrier to connection.
- **Requirement to publish information** – this would likely lead to duplication as it is likely that this information can be derived from information contained in the Electricity System Development Review (ESDR) and the Distribution Annual Planning Report (DAPR) once this obligation is in place.
- **Connection charges and fees** – Ausgrid considers the existing regulatory structure for charging these fees is appropriate and sufficient. We note that the provision of "distribution services" by DNSPs across the NEM is regulated by the Australian Energy Regulator (AER) and is determined each regulatory control period by the AER in its classification of services in its determination of the Framework and Approach to apply to DNSPs during the regulatory control period.
- **Embedded generators should only pay shallow costs of connection** – Ausgrid opposes this on the basis that this gives rise to the risk of cross subsidisation, whereby customers not directly benefiting from the embedded generation are expected to pay the cost of the connection. In addition this may distort investment decisions.

Our submission makes a number of suggestions to the AEMC as to how the issues raised by the proponents could be better addressed.

1. Introduction

The potential benefits that embedded generation can provide to the National Electricity Market (NEM) as a whole are widely accepted and as articulated in the ENA's submission, DNSPs recognise the role that embedded generators could play in addressing challenges associated with most efficiently meeting peak demand. [2]

However, it is important to note that the associated benefits from embedded generation are not the only consideration that DNSPs must have regard to when responding to connection enquiries/and or applications. The connection of embedded generation within networks needs to be considered in the broader context of DNSPs' obligation to provide a safe and reliable electricity supply that meets licence conditions and regulatory requirements. To do otherwise, may compromise the ability of DNSPs to maintain:

- safety to customers and people working on or near the electricity infrastructure;
- protection of customer installations and appliances, as well as network assets; and
- reliability and quality of power to all customers.

Whilst Ausgrid is supportive of improving understanding, transparency of information on processes and the availability of clear information; we do not consider the proposed rule changes to be necessary or appropriate.

Ausgrid's submission seeks to demonstrate that the proposed amendments are not the most efficient or effective means for addressing the proponents' perceived problems and has sought to make a number of suggestions to the AEMC as to how these concerns could be better addressed. These include:

- undertaking further examination of the proponent's issues to determine whether they apply universally across the National Electricity Market (NEM) or whether they are unique to Victoria and the application of the Victorian code;
- consideration of the introduction of the new Chapter 5A as an alternative (and perhaps a more appropriate mechanism for smaller generators than Chapter 5) for resolving the process and information exchange issues identified by the proponent;
- standardisation of technical standards could be facilitated by identifying common classes or categories of embedded generators within the 10kW to 30MW range; and
- broad consideration and further assessment of the impacts of increased intermittent generation, particularly any consequent new requirements on the structure and operations of networks.

Specifically, the focus of Ausgrid's submission is to:

- provide the AEMC with further context on connection arrangements in New South Wales (NSW) and overview of work done to facilitate embedded generation connection;
- provide analysis on the perceived problems with the current connection arrangements and the underlying drivers behind these problems;
- highlight the broader considerations and issues raised by the proponents' proposed amendments; and
- provide suggestions that better meet the National Electricity Objective (NEO) and address the proponents' concerns.

[2] The ENA has undertaken numerous pieces of work (Discussion paper, developed national guidelines for the preparation of DNSP documents and processes for connecting embedded generators, and has created an embedded generator taskforce aimed improving the connection of embedded generators.

2. Connecting embedded generators

2.1. Overview of connection arrangements in New South Wales

The following comments are provided by Ausgrid, operating as one of three New South Wales (NSW) based Distribution Network Service Providers (DNSPs). Ausgrid operates a distribution network that supplies electricity to customers in Sydney, Central Coast and Hunter regions.

In 1995 the NSW Government introduced contestability for certain electricity distribution network connection services. The *Electricity Supply Act 1995* and the *Electricity Supply (General) Regulation* provide a framework for customers to choose a third party accredited service provider (ASP) to undertake electricity connection works. The *NSW Code of Practice for Contestable Works* (Code of Practice) outlines the principles underpinning contestability, the type of work that is contestable and the respective responsibilities of the parties. Works that are contestable include major network reticulation work, high voltage sub-transmission and underground residential developments as well as smaller connections.[3]

The policy purpose of contestability in NSW is to promote competition, efficiency and consumer choice. The accredited service providers' scheme (ASP Scheme) was designed to support this policy objective by providing a mechanism for ensuring that contestable connections works are carried out by competent service providers in a manner that maintains the safety, reliability and security of the electricity distribution network.

The contestability framework in NSW is different from other jurisdictions in that if a customer is funding the design or construction of connection assets, it can choose an ASP to undertake that work.[4] The customer contracts directly with the ASP in these circumstances and payment for services is made directly to the ASP under the contract. The DNSP assumes ownership and responsibility for operation and maintenance of assets once they are commissioned and become part of the distribution network. In limited circumstances, Ausgrid provides contestable connection services in an ASP capacity. These services are provided by an internal business unit of Ausgrid that is ring-fenced to ensure competitive neutrality where Ausgrid competes for contestable work.

2.2. Connection processes for embedded generators

As a general principle, Ausgrid seeks to treat embedded generators in the same manner as any load customer seeking to connect to its network. In order to facilitate the connection of embedded generators, Ausgrid has developed a set of standards, Network Standards 194 (NS194) and Electricity Supply Standards 11 (ES11), which set out the technical requirements and processes required to safely connect embedded generators to Ausgrid's network. These standards are available on Ausgrid's website.

An embedded generator seeking to connect to Ausgrid's network (applicant) will ordinarily go through the following process:

- a planning and investigation phase;
- design phase; (Note the ASP undertakes the design work in accordance with Ausgrid's design information package and relevant standards);
- build phase; and
- testing and commissioning

This process is outlined in more detail in the Appendix 3.

[3] NSW Government, Code of Practice Contestable Works, April 2007, page 4.

[4] Section 31 of the Electricity Supply Act NSW

2.3. Application of Ausgrid's connection process

The process for connecting *micro embedded generators* to the distribution network is more streamlined.[5] These types of embedded generators are connected automatically, once established that the installation is compliant with Australian standard (AS) 4777 and the NSW Service and Installation Rules 2007. This process will change slightly when Chapter 5A becomes enforced. Under Chapter 5A, connection of micro embedded generators will be via a standing model agreement for basic connection services approved by the AER.

It is important to note that the connection process varies in terms of time, parties involved (in terms of the contestable works), information requirements, technical studies, technical requirements and costs depending on the following important factors:

- the capacity of the generator seeking to connect;
- whether the generator is seeking to export electricity[6]; and
- whether existing assets need to be altered or additional connection assets installed in order to enable the embedded generator to safely connect to the network[7].

Typically the size, complexity and duration of system studies increases with increasing connection capacity and voltage. Also, as the generator connection voltage increases, the equipment specifications for connection to the network may become more onerous due to the impacts the generator can have on system performance.

Consequently, the information requirements, technical studies and costs for connecting larger embedded generators can be significantly more than for micro and smaller generators. In addition, the time required to connect large embedded generators to Ausgrid's sub-transmission network is also substantially longer than the time taken to connect embedded generators to the distribution network. This is largely a reflection of the complexity involved in connecting these types of embedded generators to the network.

2.4. Embedded generation and Ausgrid's network

Ausgrid currently has over 59,000 embedded generators connected to its network, with an additional 2,500 connection enquiries currently underway. The vast majority of embedded generators connected to Ausgrid's network are photovoltaic generation (PV) installations that meet the definition of *micro embedded generation* unit, and are compliant with the Australian Standards and NSW Service and Installation Rules.

As noted above, the connection of these types of PV systems to the network is generally considered to be straight forward, as these units typically pose little risk to safety and network performance. In addition, this technology is well established meaning DNSPs can confidently predict how these types of technology will behave once integrated into the network. Consequently, the connection process for these units is more streamlined than the connection of larger embedded generators.

Currently, the connection of embedded generators other than PV installations constitutes a very small proportion of the total number of embedded generators connecting to Ausgrid's network (less than 1%). As a result, there is limited data and experience with connecting these types generators and how they will behave once integrated into the network.

Consequently, the connection of these generators is currently dealt with on a case by case basis. Depending on the configuration of the local network, the configuration of the proponents' installation and how the proponent intends to operate their installation, additional studies, equipment and protection systems may be required for these units to be safely integrated into the network. If there are no network complications anticipated from the

[5] Chapter 5A defines *micro embedded generator connection* an *embedded generating unit* and a distribution network of the kind contemplated by Australian Standard AS 4777 (Grid connection of energy systems via inverters).
[6] A GCA will be required if there is an intention for the applicant to export and if the connection is contestable.
[7] If a connection is contestable Ausgrid's ES 9 standard will also need to be followed.

connection, the planning and investigation; and the offer to connect can be completed within 3 months. The timeframes for completion of the design and build phase for these connections are largely dependent upon the ASP engaged by the applicant.

Whilst the number of larger embedded generators connected to Ausgrid's network is very low, it is anticipated that this number will steadily grow in the future. Currently, internal processes for connecting larger embedded generators are still being refined and further developed with the new Chapter 5A in mind. Over time and with greater connection numbers, DNSPs will have improved understanding and confidence as to how these embedded generators behave. This in turn would allow for DNSPs to refine its internal processes and, where possible, further streamline processes and standardise technical requirements.

3. Perceived problems with current connection arrangements

3.1. Proponent's perceived problems

The proponents' rule change proposal identifies a number of perceived issues with the current framework for connecting embedded generators. In particular, they claim that there is a gap in the regulatory framework for connecting embedded generators with a nameplate rating between 10kW and 30MW (i.e. embedded generators who do not fit within the chapter 5A definition of micro embedded generators and who may be eligible for an exemption from registering as a Market Participant).

The proponents maintain that this regulatory gap has lead to a case by case connection process for connection, which has given rise to uncertainties in relation to:

- Regulatory requirements for connection,
- Connection enquiry and application timelines,
- Information that is required to achieve connection,
- Technical requirements imposed on generators as a condition of connection,
- Costs of connection, and
- Terms of connection.

The proponent argues that this gap in the framework has increased the complexity and burden on the proponents' time and resources resulting in costly delays. In their view, a number of amendments to the current framework are required in order to better accommodate the connection of embedded generators and to improve the efficiency and certainty of embedded generation connections.

3.2. Analysis of proponents' perceived issues

Ausgrid notes that the proponents' perceived issues seem to largely stem from a lack of transparency and clarity in processes, as well as a deficiency in communication between the DNSP and the embedded generator seeking to connect (applicant).

In our view, it would be beneficial if there was further examination of these issues to determine whether they apply universally across the NEM. Further, analysis should be undertaken to assess whether the introduction of the new Chapter 5A will address the issues raised prior to commencing a further round of rule changes.

Whilst it is true that connection requirements vary across jurisdictions, this is a result of differences in jurisdictional legislation and license conditions. [8] Most notably, connection arrangements differ from other jurisdictions depending on the level of contestability. In addition, we note that technical requirements may also differ between DNSPs (even within the same jurisdiction) as each DNSPs' network is configured differently and subject to different location constraints.

[8] DNSP licence conditions are currently determined at a jurisdictional level as opposed to national level.

Ausgrid appreciates that this may cause some confusion for applicants; however, we believe that this issue can largely be addressed by engaging with the applicant and operating transparently. Ausgrid does not agree that these issues are reflective of arrangements in NSW.

Ausgrid notes that some of the proponents' frustrations with the current case by case basis for connecting embedded generators may arise due to some DNSPs not having standards or processes (both internal and external) for connecting embedded generators.

As mentioned above, Ausgrid has developed specific standards for the connection of embedded generators, which are available on its website. These standards have been developed to help facilitate the connection process by setting out the different stages in the connection process, the roles and responsibilities of a different party, technical requirements and information required from each of the party's.[9]

Ausgrid also seeks to actively engage with the applicant throughout the connection process. In particular, we encourage early engagement as much as possible in the planning and investigation phase in order to assist the applicant in determining whether there are any network constraints and the feasibility of their generator proposal.

By regularly consulting with the applicant throughout the connection process, Ausgrid seeks to minimise costs to the applicant and unnecessary delays caused by confusion. This is also vital in managing the applicant's expectations, particularly around timeframes and costs.

Ausgrid recognises that there may be areas for improving its processes for connecting larger embedded generators. Ausgrid has very few large embedded generators connected to its network to date and as such, its experience with such connections is limited and internal processes are still developing. Consequently, the connection of these generators does take significantly longer than the connection of smaller embedded generators. This is in part a reflection of the complexity and technical difficulties in connecting larger embedded generators. However, it is anticipated that over time, with more experience; knowledge; and mature internal processes there will be a reduction in time required to connect these generators, as areas of the process will become more streamlined and technical requirements become more standardised.

It is also important to note that in regards to application timeframes, delays may occur which are beyond the control of the DNSP. For instance, if an applicant does not provide Ausgrid with the necessary information to process its connection application or if an ASP fails to carry out the required work within the agreed timeframe.

4. Underlying drivers

As noted by the ENA, it is widely accepted by DNSPs that embedded generators can provide benefits to both customers and networks.[10] However, what is often overlooked is the fact that realising these benefits is not always straight forward or simple.

In processing connection applications, DNSPs must have regard to broader considerations than the applicant. Generally applicants are driven largely by the commercial benefits from the connection, whereas DNSPs must consider the connection within the broader context of the DNSP's obligations to provide a safe and reliable electricity supply that meets licence conditions and regulatory requirements.

There appears to be the broad perception amongst external stakeholders that DNSPs oppose the wider use of embedded generation within distribution networks. Of particular concern is view that DNSPs are obstructive towards embedded generation connections in that:

[9] Refer to Appendix 3 for an overview of the different responsibilities of parties throughout the connection process.

[10] From a customer perspective, embedded generation may provide additional energy security, flexibility in managing their energy consumption and clean energy supply. For networks, embedded generators can provide benefits in addressing challenges in peak demand, distribution and transmission losses and in network reliability.

- DNSPs do not clearly inform prospective embedded generators of technical and information requirements in a timely manner to enable connection; and/or
- DNSPs impose technical and information requirements which are burdensome and costly, which can undermine the feasibility of connecting an embedded generator.

Ausgrid does not agree with this view. We believe that this is a general misconception based on a lack of understanding of the requirements a DNSP must have regard to in operating its network and a lack of appreciation for some of the technical hurdles that must sometimes be overcome to enable connection of embedded generation within the network.[11]

In our view, these misconceptions form the underlying drivers behind the current rule change proposal. Consequently, this section is aimed providing further context on the complexities that arise in safely integrating embedded generators within distribution networks and why they have arisen in order to clarify external stakeholders' understanding of the connection process.

Specifically, this section is aimed at providing:

- an understanding of the traditional electricity paradigm and the impacts posed by embedded generation;
- an overview of the design of the current framework and how embedded generation connections are currently accommodated; and
- context on the challenges faced by DNSPs by the emerging trend for increased embedded generation

4.1. Understanding the traditional electricity paradigm

The term 'embedded generator' is often used broadly to describe any generator which is not located centrally in a traditional power system. Embedded generators are a privately owned generation source connected within a distribution network that does not have direct access to the transmission network. They are 'embedded' with or near loads supplied by the electricity system allowing embedded generator customers to receive the benefit of their own generation through minimising consumption from the public pool and network.

Electricity networks have been traditionally designed and built according to a paradigm which assumes that electricity flows in one way, from a large generation source to the end consumers via transmission and distribution networks. Embedded generation introduces two way flows of electricity onto networks, which networks are not traditionally built or designed to handle. As networks are not traditionally built to handle two way flows of electricity, the connection of embedded generation can cause potential protection and voltage regulation issues, which in turn may adversely affect a DNSP's ability to safely deliver power supply and affect the reliability and quality of other customers supplied to the network.[12]

In order to facilitate the connection of an embedded generator, a DNSP may need to undertake additional studies to determine the impact of the embedded generator connecting to its network and whether additional protection requirements are necessary to ensure that the embedded generator can be safely integrated into the network without compromising the reliability or quality of other customers power supply.

Undertaking these studies and developing technical solutions to enable embedded generators to safely connect to networks may take time and can often be quite costly to the applicant. This can sometimes be misconstrued by applicants as DNSP's seeking to obstruct the embedded generator's connection by imposing undue burdensome technical requirements, delaying the processing of applications and imposing prohibitive costs.

However, it is important to emphasise the necessity of these precautions in order for DNSPs to maintain:

[11] For instance, Ausgrid has particular problems in connecting embedded generators within the CBD due to reliability requirements; and capacity and voltage constraints.

[12] Note that this is more of an issue for brown field sites as opposed to green field sites.

- safety to customers - people working on or near the electricity network and the general public;
- protection of equipment - DNSP infrastructure and customer installations and appliances; and
- reliability and quality of power supply to all customers.

It is relevant in this discussion on the design and construct of distribution networks that the Federal Government has proposed "further assess[ment of] the impacts of increased intermittent generation, particularly any consequent new requirements on the structure and operations of networks".[13]

4.2. Design of the current regulatory framework

Chapter 5 of the NER provides the framework for connection and access to a transmission or distribution network and establishes the processes to be followed for establishing or modifying a connection to a network. Appropriately, a key focus of Chapter 5 is around the operation and stability of the national grid.

The obligations, responsibilities, technical standards and processes outlined in Chapter 5 were considered too burdensome, time consuming and costly for some smaller embedded generators that supply more limited amount of energy into the NEM. To help alleviate this, amendments were made to provide a standing exemption from registration in the NEM for generators with a nameplate rating less than 5MW. In addition, an exemption may be made available to generators with a nameplate rating between 5MW and 30MW upon application to the Australian Market Energy Operator (AEMO).[14]

In addition, the recent development of Chapter 5A of the NER, as part of the National Energy Customer Framework (NECF), provides a framework for connecting load customers and generators. Under Chapter 5A, DNSPs are required to provide micro embedded generators with a model standing offer for basic connection services.[15]

Under the NECF, DNSPs also have the option of providing a model standing offer to provide standard connection services or to establish a *negotiated* connection. However, the requirement for a model standing offer for standard connection services is at the discretion of individual DNSPs as to whether or not they submit such an offer to the AER for approval.[16]

Whilst it is true that Chapter 5A is currently not in force in most jurisdictions, significant preparations are being undertaken by DNSPs to prepare for its enactment. Ausgrid is currently undertaking work to develop processes in order to implement and support its Chapter 5A obligations. We are working on developing model standing offers for both basic connection services and are considering the most efficient arrangements regarding standard connection services and the use of negotiated connection contracts. Ausgrid has a pre-existing generator connection agreement with various schedules that are applicable dependant on the nature of the generator connection. We will be reviewing these contractual arrangements and associated processes to reflect the arrangements contemplated by the new Chapter 5A. As part of this process we will also be looking for opportunities for improvement in processes and disclosure of information.

We also understand the other NSW DNSPs are undertaking similar work to consider the implementation of Chapter 5A and arrangements for generators.

The proponents' allege in their rule change proposal that there is a gap in the framework for connecting non-registered embedded generators, therefore necessitating the need for a number of amendments to Chapter 5 in order to better accommodate these types of connections.

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[13] Federal Government Draft Energy White Paper, December 2011, p 165.

[14] See AEMO's registration guidelines and clause 2.2.1(c) of the NER.

[15] See clause 5A.B.1(b)(2) of the NER.

[16] See clause 5A.B.4

Ausgrid does not agree with the proponents' view that there is a gap in the regulatory framework for connecting non-registered embedded generators. In fact, a number of market reviews have been undertaken in recent years testing the appropriateness of the market frameworks in accommodating generators connection and these reviews have concluded that frameworks are generally robust.

The Federal Government proposed in its draft Energy White Paper "further assess[ment of] the impacts of increased intermittent generation, particularly any consequent new requirements on the structure and operations of networks".[17] Ausgrid agrees that further assessment of the impacts of increased embedded generation (some of which would be intermittent) is needed and this would also assist in addressing the perceptions mentioned above. This work, together with an evolution of the current Regulatory and Licence Compliance Frameworks, could lead to a more cost effective and optimal outcome enabling the network to accommodate and potentially facilitate the future proliferation of embedded generation.

This is not to dismiss the potential opportunities for improving clarity and availability of information on connection processes and contracts. New processes associated with the recent establishment of the National Energy Customer Framework (including the addition of the new Chapter 5A Connections Framework to the existing Rules) are being established across jurisdictions. Ausgrid suggests that prior to commencing a further round of rule changes, analysis to assess whether the introduction of the new Chapter 5A will address the issues and concerns. We do note that time needs to be allowed in order for the impacts of these reforms to be realised.

In addition, there are a number of market reviews and reforms currently underway which are aimed at ensuring any barriers to accommodating embedded generation within the national electricity framework are avoided or removed. For instance:

- Power of Choice – Demand Side Participation (DSP) 3 Review is aimed at improving incentives for DNSPs to connect and engage with embedded generators in a timely manner;
- The Distribution Network Planning and Expansion rule change proposal – will pace an obligation on DNSPs to publish a Demand Side Engagement document and Distribution Annual Planning Report (DAPR) which will provide greater transparency on how DNSPs' consider non-network alternatives and plan their network.

4.3. Emerging industry trend

Smaller embedded generators, such as PV installations, are generally prevalent in most DNSP networks. As a result of the NSW Solar Bonus scheme, there are in excess of 59,000 PV installations installed within the Ausgrid distribution network.

Increasing environmental pressure and state and federal government incentives is leading to an increase in the number of larger embedded generators seeking to connect to DNSP networks. To date, Ausgrid has a small number of larger embedded generators connected to its network (in the order of 60 – 70).

Consequently, Ausgrid does not have the same level of experience, familiarity or knowledge regarding these types of connections to connect these types of generators within the same timeframes as smaller embedded generators. Unlike micro and small embedded generators, there are no Australian Standards outlining a common set of technical and protection requirements for connecting these types of embedded generators.

Further, as larger embedded generators have a greater potential to adversely affect the network, they pose additional technical challenges for DNSPs. Because technical information is not readily available, these generators often require extensive studies to ascertain the likely impact on the network and to identify whether additional protection and voltage requirements

[17] Draft Energy White Paper, December 2011, p 165.

are necessary to ensure that the generator can be safely integrated without adversely impacting on the DNSP's ability to securely supply power and other network customers' quality of power supply.

In Ausgrid's experience, whilst connecting embedded generators may be complex and technically difficult, technical problems can be overcome. However, overcoming technical problems takes time and money. The costs associated with overcoming technical problems may undermine the feasibility of the project. It is important to note, however, that these measures are necessary to ensure network safety, reliability and quality of power supply.

While the process for connecting larger embedded generators is currently dealt with on a case by case basis and may take a substantial period of time from initial enquiry to completion (commissioning), the connection of these types of generators is still in its infancy. It is anticipated that over time, more information on larger embedded generator connections will be available, areas of the process will become more streamlined, technical requirements become more standardised, resulting in a reduction in timeframes associated with assessing these connections.

5. What has been done to date?

As mentioned above, a number of policy initiatives and reviews have taken place to facilitate embedded generation in the NEM.

It is important to note that some of the market reforms and reviews aimed at addressing embedded generation issues are still being finalised. Consequently, the changes and recommendations from these reforms are yet to be implemented. Ausgrid believes that further time is required in order to allow for these changes to be implemented and for processes to be bedded down before further changes to the framework are made. Ausgrid believes that there is a risk of duplication and unintended regulatory consequences from changing the framework before allowing sufficient time to assess the effectiveness of these changes which are aimed at facilitating greater use of embedded generation.

This section is aimed at providing a brief summary of these initiatives by industry body.

5.1. Ministerial Council on Energy (now Standing Council on Energy and Resources)

The following policy work has been initiated by the Ministerial Council on Energy (MCE) in

- *Draft National Code of Practice for Embedded Generation and Impediments to renewable and embedded generation* (commenced in 2006) – aimed at optimising the use of renewable and distributed generation. To our knowledge, the draft code was never finalised and formally implemented.
- *Economic regulatory incentives for demand side response and embedded generation* (released in 2007) – the NERA Consulting papers released as part of the MCE's economic regulatory package focused on efficient pricing through interval meters to incentivise demand side response (DSR) and embedded generation, but recommended introduction (or continuation) of some specific mechanisms until efficient pricing is achieved. The NERA papers included 28 recommendations, some of which sought immediate changes, while the majority recommended further work be undertaken to develop appropriate approaches.
- *National Energy Customer Framework* (Finalised in 2012) - Resulted in the development of a national connection framework (Chapter 5A), which streamlines the connection process for customer and generator connections.
- *Draft Energy White Paper* – notes that the current framework is generally robust, however, notes that the increasing proliferation of intermitted generation may pose challenges for DNSP and that this may require further assessment of the structure and operation of networks.

5.2. Australian Energy Market Commission (AEMC)

- *Demand Side Participation (DSP) Review – Stage 2* (Final Report 2008) - recommended that the AEMC undertake a review of technical standards for embedded generators
- *Reliability Panel Review of Technical Standards (2009)* – a comprehensive review of technical standards for embedded generators was deferred until there had been sufficient connections under technical standards to assess the appropriateness of the standards.
- *Scale Efficient Network Extensions(SENE) – rule change proposal* (Final Rule 2011) – AEMC determined that the scope for efficiency gains at a distribution level for SENE was less than transmission networks and noted that SENE could result in inefficient investment and duplication of assets for distribution networks.
- *Inclusion of embedded generation in demand management schemes – rule change proposal* – (Final Rule 2011) the Demand Management Incentive Scheme objectives were amended to include embedded generation and the title was amended to recognise demand management schemes encompassed embedded generation.
- *Network Support Payments and Avoided TUoS for Embedded Generators – rule change proposal* (Final Rule 2011) – rule determined that the level of compensation for embedded generators should be reflective of the benefits they provide to the transmission network. In other words, payments to embedded generators should reflect the extend to which they defer investment.
- *Power of Choice: DSP 3 Review* – (current) draft advice will consider whether arrangements provide the right incentives for DNSPs to connect and engage with embedded generators in an efficient and timely manner, as well as efficient options to enhance to enhance the ability of embedded generation installation.
- *Small aggregator generator framework rule change proposal* – (current) aims to establish a new category of Registered Participant to streamline current registration and meter data processes for small generating units.

5.3. Energy Networks Association (ENA)

- *Embedded Generation – ENA Policy Framework Discussion Paper (November 2008)* – outlines key issues from a network perspective that have arisen under the current framework and also outlines key industry positions in relation to these issues.
- *Impacts and Benefits of Embedded Generation in Australian Electricity Distribution Networks* (March 2011) – outlines embedded generation scenarios and analysis methodologies featuring in Australian distribution network segments and outlines key considerations for customers, networks and regulation.
- *ENA Guideline for the preparation of documentation for connection of Embedded Generators within Distribution Networks* (May 2011) – provides a national reference framework for the preparation of documents for connection of embedded generation within distribution networks. It is aimed at providing general information to assist the DNSP in developing and or reviewing documentation for customers in relation to embedded generators.
- *Demand Management Embedded Generation Committee (DMEG)* – formed by ENA members in order to facilitate the connection or embedded generations and the removal of technical barriers to embedded generation connection.

5.4. Ausgrid

- *Electricity Supply Standard ES11* – outlines the requirements for the connection of embedded generators (July 2011)
- *Network Standards NS194* – outlines technical requirements for the connection of embedded generators

- *Generator connection agreement* – sets out the general conditions for connection as well as the operating and maintenance protocol to be followed by the embedded generator.
- *Member of the ENA Demand Management Embedded Generation (DMEG) Taskforce* – which is aimed at facilitating the connection of embedded generation, by identifying technical solutions to allow their safe integration into the network and identifying strategies for the removal of other perceived barriers to connection.

6. Issues raised by the proposed Rule change

The proponent has proposed a number of amendments to Chapter 5 of the NER aimed at streamlining current processes, improving transparency, consistency and collaboration. This section seeks to identify broader issues raised by the proponents' proposed rule change which is not addressed by the AEMC's consultation paper. Our analysis of issues raised will largely seek to focus on the following aspects of the proponents' rule change proposal:

- Automatic right of connection;
- Right to export electricity;
- Establishing timeframes to connect;
- Requirement to publish information;
- Connection charges and fees; and
- Augmentation costs

6.1. Automatic right of connection

Ausgrid does not endorse the concept of providing embedded generators with a nameplate rating between 10kW and 30MW with an automatic right of connection. Embedded generators with a nameplate rating of between 10kW and 30MW is a very broad category and Ausgrid considers that it is unreasonable to assume that larger embedded generators (5MW or greater) require the same level of consideration as small embedded generators.

Any standards that are developed to cover all potential situations for such a broad category of generators is likely to be rigid and prescriptive; and conversely, may act to hinder rather than facilitate connections.

The proponent's proposal to provide embedded generators between 10kW and 30MW with an automatic right to connect dramatically underestimates the complexities involved in connecting embedded generators, particularly larger embedded generators, and overlooks the significant number of variables involved in connecting embedded generators. For instance, the connection of embedded generators is dependent upon the following factors:

- The level of generation already connected,
- The size and type of generation system proposed, and
- The configuration of the network to which the generator will be connected.

As noted earlier, networks have traditionally not been designed or built to handle the two way flow of electricity (i.e. built primary to distribute electricity not receive). Hence, when generators connect to the network they expose DNSPs to a range of risks and introduce added complexity in managing the network. All embedded generators (except for micro and some small embedded generator connections) can impose the need for DNSPs to investigate the impact of the proposed connection on the safety and network performance.

Consequently, allowing larger embedded generators to connect according to the same processes and standards as smaller embedded generators may pose safety risks to both the general public and Ausgrid staff, as well as have a detrimental impact on the reliability and quality of supply to other customers.

In addition, imposing the same level of technical requirements to allow a larger embedded generator to connect may be too onerous for smaller embedded generators to comply with and consequently may act as a barrier to connection for these types of embedded generators.

Given the number of variables involved in connecting embedded generators within such a broad category, it is likely that any technical standards developed to be all encompassing will be stringent. This is due to the range of technical standards that would need to be covered. Any standards would need to cover all potential scenarios to ensure safety to customers and that reliability and quality supplied to other electricity network customers is not adversely affected by an embedded generator connecting.

Ausgrid is concerned that this may end up hindering connections. We note that any technical standards developed to facilitate automatic access will be too burdensome. Consequently, whilst this may streamline the connection process for larger generators and unintended consequence of this proposed rule change is that it may actually create additional barriers for smaller embedded generators.

Ausgrid's preference is for flexibility in the framework to negotiate with prospective embedded generators so that the information we require from them can reflect the specific characteristics of the network at their location, and the desired outcomes for the applicant. For this reason, we believe a connection framework aimed at facilitating the connection for embedded generators should focus on principals and outcomes rather than specific detailed technical requirements covering every eventuality.

6.2. Automatic right to export

Ausgrid does not oppose embedded generators exporting, however, we do not believe that this should be an explicit 'right.' Ausgrid believes that embedded generators should be able to export, subject to the embedded generator establishing that it has met the DNSP's technical requirements.

In order to connect to a DNSP's network, a generator must satisfy technical requirements to maintain:

- Safety to customers, people working on or near the electricity network and the general public;
- Protection of equipment, including our network and other customer installations; and
- Reliability and quality of supply to all customers[18]

These principles are applicable to all customer connections; however, it is more technically complicated to connect a generator that can export electricity to the network than it is to connect a load or a generator that will not export. Addressing these technical requirements can be expensive, and a proponent may elect for a cheaper installation in preference to being able to export. In other words, the decision on whether to export is ultimately the consumer's choice based on the cost of meeting technical requirements, rather than due to a 'technical barrier' that prevents a generator from exporting.

6.3. Establishing timeframes to connect

In Ausgrid's view the timelines established by the proponents are unrealistic and fails to take into account contestability arrangements in NSW. Whilst 65 days may be achievable for smaller connections, which potentially do not pose notable safety or technical issues, it is unrealistic for larger connections and fails to take into account the complexities and considerations involved in assessing an Application for Connection.

As noted above, the size, complexity and duration of system studies typically increase with increasing connection capacity and voltage. The larger the generator seeking to connect the more analysis and consideration required to ascertain the impact on the network. If the

[18] See also, Ausgrid's Electricity Network Operation Standards.

generator is seeking to locate in the CBD or where there are site specific capacity and voltage constraints this also increases the analysis required.

In addition, this timeframe does not appear to take into account delays associated with the application being incomplete or insufficient for a DNSP to assess.

6.4. Requirements to publish information

Ausgrid does not support this aspect of the rule change on the basis that it will likely duplicate reporting obligations. In our view capacity information can be derived from the Electricity System Development Review (ESDR) and the Distribution Annual Planning Report proposed under the Distribution Network Planning and Expansion rule change proposal.

In addition, the Demand Side Engagement document proposed under the Distribution Network Planning and Expansion rule change proposal is also likely help improve locational signals to embedded generators, which in turn will help improve the efficiency of embedded generation investment.

Imposing an obligation to produce an additional annual planning report would place an unnecessary burden on DNSPs, resulting in a diversion of resources and increased compliance costs. Ausgrid is also concerned that given that fault levels are significantly time and network configuration variant that there is a risk of detailed fault information being misinterpreted. This may have significant costing issues for the embedded generator seeking to connect in order to mitigate safety issues arising from fault levels exceeding their allowable limits.

6.5. Connection fees and charges

The proponent is of the view that there is a lack of incentives for DNSPs to respond to connection enquiries or connection applications from generators, and by providing a financial incentive it would assist in improving the cooperation of DNSPs in assessing such enquiries and/or applications.

As outlined above, we are not convinced that this is the best or the only way to address the particular problems that have been identified by the proponents (and more prospective embedded generators). Whilst we appreciate the proponent is concerned with addressing challenges that existing regulatory arrangements poses for embedded generators and prospective embedded generators, we consider that any rule changes need to be considered more broadly in terms of consistency with the NEM framework and achieving the National Electricity Objective (NEO).

Ausgrid is of the view that it would be prudent to consider the regulatory approach that has been adopted for load customers and how, where appropriate, it can be applied and/or extended to generators. In this regard, the new Chapter 5A appears to be a useful starting point to consider non-registered generator connection contracts, processes and charging arrangements.

With regards to connection charging, it is also important to recognise that the provision of “distribution services” by DNSPs across the NEM is regulated by the Australian Energy Regulator (AER). Each regulatory control period the AER classifies the services provided by DNSPs and determines the form of control that applies to the provision of each of those services (or sub-group of services) over the five year period.

In NSW, the current AER Determination allows DNSPs to charge a monopoly fee associated with works of an administrative nature in processing applications, correspondence, and the provision of design information to enable ASPs to undertake their design work. Whilst these fees were not specifically designed for generator connections (and in some cases do not cover in any way the actual costs incurred by the DNSP in assessing the generator

applications)[19] Ausgrid considers the existing regulatory structure for charging these fees is appropriate and sufficient. It is for the DNSP to clearly articulate to the AER the efficient costs of performing this monopoly services and for the AER to determine the form of regulation.

6.6. Embedded generators should only pay shallow costs of connection

Ausgrid does not support the proposal that embedded generators should only pay shallow costs of connection. We believe that this would result in customers, who do not directly benefit from the embedded generation, cross subsidising the cost of connection. In addition, this could distort investment decisions resulting in higher electricity prices to customers and inefficient investment.

The current arrangements reflected in the NER are based on bilateral negotiations between a prospective generator and network service provider on terms and conditions of connection. The regime is based on market economics. The key principle is that a connecting party must pay the full cost of any development to connect the generator to the shared network.

In making decisions on whether to connect, generation proponents take into account:

- the costs of generation;
- incentives provided outside the market (i.e. Renewable Energy Certificates);
- the costs of connecting to the network from the generation location; and
- the cost of shared network augmentation upstream of the connection required to either absorb the proposed embedded generation export, or provide standby capacity when the embedded generator is not operating.

Under these conditions, generators with the most efficient cost structure will enter the market first, and this will ultimately lead to the dispatch of the cheapest generation. In this way, consumers pay the lowest cost for electricity services.

Currently in NSW, the Independent Pricing and Regulatory Tribunal (IPART) Determination *Capital Contributions and Repayments for Connections to Electricity Distribution Networks in New South Wales* establishes the framework for determining how much customers are required to contribute towards the capital costs of connecting them to the electricity distribution network. Generally customers pay the "direct costs of establishing the connection up to a defined point." There are two exceptions to this, *load customers* and *rural customers*, who may be required to contribute to network "augmentation" costs. The exceptions to the general rule are based on considerations of economic efficiency and equity.

Ausgrid applies those same capital contribution principles to generators and typically generators do pay the costs of augmenting Ausgrid's distribution system.

It is also important to note that generator connections do not pay Network Use of System charges, which is the typical mechanism for DNSPs to recover general augmentation costs of load customers.

Also, Ausgrid notes that the AER has recently published its Connection Charge guidelines in accordance with the new Chapter 5A of the Rules. It is worth noting that *non-registered embedded generators* are not exempt from the payment of augmentation charges.[20]

7. Conclusion

[19] As part of the Framework and Approach process being undertaken by the AER for the next regulatory control period (commencing 1 July 2014), NSW DNSPs will be proposing a "monopoly service" or quoted service to cover generator connections.

[20] See clause 5A.E.1(b) of the NER.

In Ausgrid's view there is no gap in the regulatory framework for connecting embedded generators with a nameplate rating between 10kW and 30MW. Ausgrid believes that current market reforms appear likely to address a number of the proponents' concerns regarding the lack of consistency, transparency, uncertainty and collaboration in DNSP processes for connecting embedded generators.

As noted above, Ausgrid is concerned that making fundamental changes to the framework (as proposed by the proponent) before the recent industry reform changes are implemented and sufficient time has elapsed to assess their effectiveness, may give rise to unintended regulatory consequences, may undermine the ability of DNSPs to operate their network in accordance with licence conditions and does not achieve the National Electricity Objectives (NEO).

Ausgrid supports further assessment of the impacts of increased embedded generation once reform actions have been properly implemented and enough time has elapsed to assess their effectiveness. This work, together with an evolution of the current Regulatory and Licence Compliance Frameworks, could lead to lead to a more cost effective and optimal outcome by enabling networks to better accommodate and potentially facilitate the future proliferation of embedded generation.

Ausgrid does not believe that amending Chapter 5 is the best and only way for addressing issues with the current framework. In our view Chapter 5A is a more appropriate mechanism and already contemplates a framework for connection arrangements for embedded generators as well as load customers. We note that there is already scope in the rules contained in Chapter 5A to accommodate non-registered EG more generally, which we believe was the original policy intent.[21]

Consequently, while we are supportive of improving the clarity and transparency of connection processes; we believe that sufficient time is required to allow reform changes and processes to bed down before fundamental changes to the framework are made. To do otherwise, risks duplication and may create ambiguity or regulatory uncertainty.

Ausgrid does not support the proponents' proposed rule change. This is mainly due to the potential impact upon safety of the operation of the network and the quality of power supplied to other network users.

Ausgrid's submission has sought to provide further context on some of the drivers behind the current rule change proposal in order to clarify misconceptions regarding how the regulatory framework operates, the process for connections and DNSPs' attitudes towards embedded generation connection. We have also sought to demonstrate why the proposed rule change is not the most affecting or efficient means for addressing the proponents' specific concerns. In addition, we have sought to highlight possible areas in the framework which could be improved in order to better address the proponents' concerns.

[21] Refer to definitions of "*non registered embedded generator"* and "*retail customer"* in Chapter 5A of the NER.

8. Appendixes

Question 1 Complying with Chapter 5

a) ***Currently any person can require a network service provider to comply with Chapter 5 or elect to use the connection procedure under Chapter 5. Are there any problems or barriers to how this is applied in practice?***

Ausgrid is not aware of any issues.

b) ***If so, what are the problems and/or barriers? What are the costs and impacts on stakeholders?***

As above.

c) ***How would the proposed amendment to specify that an embedded generator has the right to require a network service provider to comply with Chapter 5 resolve these problems and/or barriers?***

As above.

d) ***Given that any person can elect to use the connection process under Chapter 5, when, and why, do non-registered embedded generators choose not to use this process?***

Embedded generators may choose not to follow the processes outlined in Chapter 5 as it can often be perceived as too onerous and complicated in light of the nature of their proposed connection. Some embedded generators prefer the flexibility to negotiate directly with DNSP's as this may allow for streamlining of their connection process.

Question 2 Good faith provisions

a) ***The current NER sets out that network service providers and connection applicants must conduct negotiations in 'good faith'. Are there any problems associated with the application of this provision?***

In Ausgrid's view the proposed application of good faith to the connection process is probably misconceived.

This would create uncertainty as to the nature of the obligation. If it is accepted that the current process is susceptible to delay or inaction by the DNSP, then it would preferable to make sure obligations under the process are clear and not so susceptible.

b) ***How would the proposed amendment for an additional 'good faith' impact stakeholders?***

Ausgrid is not aware of any current problems arising out of the current provisions of the NER that network service providers and connection applicants must conduct negotiations in good faith. If it was established that DNSPs cause delay in the negotiation process, then this would be better dealt with by a provision in the Rules concerning timeframes for negotiation, rather than a general duty to negotiate in good faith.

In any event, we do not support extending the general obligation of the NER to the EG negotiation process in particular. The additional requirement would create uncertainty about the nature of the obligation – i.e. why does this process require the participants in EG connection negotiations to exercise additional good faith, over and above the general duty imposed on them in the NER?

Question 3 Publishing details of information requirements

a) ***What are the costs and benefits to distributors and embedded generators in requiring distributors to publish information on its connection process including an application form and information on application fees and calculation of connection costs?***

Ausgrid currently has a Network Standard (NS194) and Electrical Standard (ES11) that are both published on our external website. These documents provide customers with information on the connection process for embedded generators as well as our technical guidelines. NS194 also contains a sample application form that can be used by customers.

It is beneficial for distributors to publish this information as it sets out the expectations for embedded generator applicants and this assists in the efficient handling of negotiations. There are limitations however on the amount of information that can be published in generic network standards. For example connection costs are very site specific and can be influenced by a number of factors so it would be difficult to publish these costs in a generic standard.

b) ***How would the proposal to add a clause that each party 'must provide the other with information the other reasonably requires in order to facilitate connection to the network' address any problems? What are the details and examples of the current communication issues that stakeholders have experienced with the connection process?***

As above.

c) ***Noting that there are currently provisions under the NER for the exchange of information, what are the deficiencies of the current arrangements?***

Careful consideration needs to be given to the workability of general obligations such as those proposed. There are some precedents for provisions which seek to address the challenges around information exchange. Part D of Chapter 6 of the Rules (6.7) seeks to address this in the context of negotiating frameworks for negotiated services. Chapter 5A also has clauses relating to information provision and exchange. There is also provision for a process in Chapter 5A.C.3 relating to times in which information is to be provided.

d) ***Would the demand side engagement document under the distribution network planning and expansion framework rule change address these information requirements?***

Ausgrid believes that the demand side engagement document and distribution annual planning report would largely address some of the proponents' information concerns. In addition, our processes for connecting embedded generators are also set out in Network Standard (NS194) and Electrical Standard (ES11).

e) ***Should the proposed changes apply generally to all network service providers?***

This would largely depend on the final scope of the changes. It must be noted that the challenges faced by Network Service Providers are not uniform. Each NSP faces different challenges depending on the nature of their electrical network and differences in jurisdictional arrangements. For example, NSW operates under a Contestability regime where customers have the right to engage Accredited Service Providers for design & construction of connection works they are funding.

Question 4 Response to connection enquiries

a) ***In stakeholders' experience, have the response that the network service providers provided in response to connection enquiries been clear and reasonable?***

Ausgrid is not aware of any instances where there has been an issue with its response. Ausgrid actively engages with prospective generators throughout the connection process. If an applicant is unsure about a requirement or any aspect of the connections process outlined in our network standards, they are able to contact an Ausgrid Generator Connection Officer (GCO) to assist them in understanding.

b) Have there been experiences where a connection applicant has been asked to provide information that it has already submitted and, if so, why?

As above.

c) Have there been experiences where a connection applicant has been asked to provide information that it did not consider was 'reasonable'? How was this situation resolved?

Ausgrid is not aware of this occurring and is of the view that such an occurrence is very unlikely. Ausgrid has a legislative responsibility to ensure that the connection of EGs does not effect the safe and reliable operation of the electricity network. The connection of EGs on the network requires careful consideration of a number of technical parameters in order to ensure our obligations under or licence conditions can be met. Detailed information from EG proponents is critical in ensuring these obligations can be met.

d) To what extent would the requirements for distributors to publish the demand side engagement document resolve any issues?

Refer to 3(d) and section 6.4.

Question 5 Information to be included in offers to connect

(a) In practice to date, what information on connection costs are provided in offers to connect? How are the requirements of confirming to rule 5.5 being met? How are the current arrangements deficient?

Currently Ausgrid charges for monopoly services under the guidelines in its publication *ES5 - Charges for Network Miscellaneous & Monopoly Services & Emergency Recoverable Works.* As specified in ES5, monopoly services (as defined by AER) are services that only Ausgrid can perform to facilitate contestable connection works or contestable asset relocation works such as inspection, design certification and the provision of access permits. These services are necessary to ensure an appropriate level of reliability, quality of supply and safety is maintained in the operation of Ausgrid's network and they are charged for at the AER determined rates.

Ausgrid currently uses the most relevant categories that are available to charge for monopoly services associated with EG projects. These monopoly charges are consistent with those allowed by the AER for connections and are normally charged upfront in Ausgrid's initial response.

(b) How would the proposed rule to add an 'itemised statement of connection costs' improve the current arrangements? How would stakeholders be impacted if this requirement were to be introduced?

Ausgrid currently provides and itemised summary of charges to cover costs incurred for monopoly services. In the context of the contestability regime in NSW, Ausgrid is not directly involved in the design and construction of the embedded generation installation, the "itemised statement of connection costs" only covers monopoly services.

Any new requirements in this regard would need to ensure the contestability arrangements in NSW are accommodated.

(c) Should this requirement apply to all types of connections?

Ausgrid assumes that this question is more relevant to other jurisdictions. In NSW, under contestability regulations, developers are required to directly engage Accredited Service Providers for design and construction. The itemised connection costs that Ausgrid normally provides are for monopoly services in accordance with ES5.

Any new requirements in this regard would need to ensure the contestability arrangements in NSW are accommodated.

Question 6 Setting out the time to connect in the preliminary program

(a) Under the current arrangements (either under the NER or jurisdictional arrangements), what are the typical timeframes within which offers to connect are made by distributors?

Offers to connect vary depending on the complexities involved in integrating the embedded generator, the existence of site specific capacity and voltage constraints and the intended location of the generator on the network. Consequently, typical time frames can vary anywhere between 6 weeks to 6 months (for larger more complicated projects).

(b) What are the factors that affect the timeframe for finalising an offer to connect?

Refer to above. In addition a lack of accurate and well documented applications from embedded generator applicants and technical complexities (e.g. CBD export) may affect timeframes.

(c) Is it feasible or practical to include a specific timeframe to finalise an offer to connect at the time of preparing the preliminary program? What information is currently provided in preliminary programs?

Refer to above. It appears likely for larger or more complex generator connections that insufficient information would be available at the preliminary program stage to be able to specify a timeframe for an offer to connect. Often technical studies need to be performed before the details of the connection can be finalised (A connection offer needs to include (among a number of things) the connection point to the network and the terms and conditions, and these are not known at that stage). This was accommodated in the NECF regime by incorporating “negotiated connection contracts”.

(d) If adopted, should this requirement apply to all connection enquiries?

No. See above.

Question 7 Providing an offer to connect within 65 business days

(a) What are the factors that affect the timeframe within which offers to connect may be made? What are the factors that impact the process for negotiating negotiated access standards?

Refer to above and section 2 and Appendix 3 of Ausgrid’s submission.

(b) Have there been cases (particularly in Victoria) where 65 business days was not sufficient to finalise an offer to connect? What were the reasons for requiring more than 65 business days?

Refer to comments contained in submission.

(c) How would network service providers and connection applicants be affected by the proposed amendment?

Refer to comments contained in submission.

(d) Should this requirement apply to all network service providers for all connections?

No, refer to comments contained in submission, particularly comments in 6.3.

Question 8 Terms and conditions of connection

(a) How are the current provisions under clause 5.3.6(b)(2) being applied? That is, are the terms and conditions for connection of the kind as set out in schedule 5.6?

Ausgrid's Generator Connection Agreement: Instrument of Agreement (which references clause 5.3 of the NER) contains all site-specific conditions necessary to the particular embedded generator connection applied for and includes the conditions set out in Schedule 5.6.

(b) In what ways are varying terms and conditions between distributors a problem? Is it appropriate for distributors to have different terms and conditions? Does this reflect relevant differences in network requirements?

The first part of this question seems to be posed to generators. For the reasons outlined in this submission, it is appropriate and necessary for a DNSP to have the ability to specify different terms and conditions for generator connections.

Question 9 Technical standards for embedded generators

(a) Without technical standards currently being in place for embedded generators, how well has the connection process under Chapter 5 worked in practice? How urgently are standards needed?

Ausgrid has developed its own technical standards in respect to connecting embedded generators. These are contained in NS194 and ES11. In addition, the ENA has published a guideline for the preparation of documentation for connection of embedded generation within distribution networks.

(b) Would standards for different types/classes of embedded generators be required?

Yes. There should be a differentiation between smaller PV systems and larger systems that typically involve synchronous machines. AS4777 already exists for installations less than 10kW per phase for PV systems. Ausgrid distinguishes between the following generator sizes for connection: 0-30kW, 30kW-1MW, 1MW-5MW, >5MW. In each case the technical solution is governed both by the nature of the generator and the proposed connection point to the distribution network, i.e. voltage, fault levels, requirement to import or export power, protection, SCADA, power quality (including voltage fluctuations and harmonics).

(c) What factors should be taken into consideration in developing such standards? Are there any specific jurisdictional or local requirements?

See previous answers.

Each jurisdiction has specific safety requirements as part of license conditions that utilities are required to meet. Some jurisdictions also specify power quality and reliability conditions which should not be compromised by an embedded generator. Alternatively, if an embedded generator is put forward as a proposal for network enhancement or augmentation then it must meet the same licence conditions.

(d) What should be the scope of such standards? Can all relevant technical requirements be 'standardised'?

Standards should be relatively high level with minimal prescriptive content to allow the embedded generator to arrive at optimal solutions. All equipment must be certified to an acceptable international standard, at least equivalent to Australian Standards. While it is possible to develop generic generator solutions, each proposal must be examined on its merits and may contain unique factors consistent with the location and point of connection. Each point of connection is unique, there can be no generic electricity network model, it is only possible to illustrate the diversity with typical examples and case studies. It is recommended that AEMC examine the ENA and Ausgrid documents referenced above to assess the degree of standardisation that already exists and the level of technical information already provided by utilities.

Question 10 Embedded generators having an automatic right to export to the grid

(a) Under what circumstances have embedded generators not been allowed to export electricity to the network?

In order to connect to our network, a generator must satisfy technical requirements to maintain:

- Safety to customers, people working on or near the electricity network and the general public;
- Protection of equipment, including our network and other customer installations
- Reliably and quality of supply to customers.

These principles are applicable to all customer connections; however, it is more technically complicated to connect a generator that can export electricity to the network than it is to connect a load or a generator that will not export. Addressing these technical requirements can be expensive, and a proponent may elect for a cheaper installation in preference to being able to export. In other words, the decision on whether to export is generally an economic one, determined by the cost of meeting technical requirements, rather than due to a 'Technical Barrier' that prevents a generator from exporting.

(b) What are the impacts on embedded generators and other participants when exporting is not allowed?

Our experience is that most proponents are seeking to offset their local supply and are motivated by sustainability objectives (or requirements), the desire for local back-up, and a reduction in their electricity bills, rather than by a desire to export as a commercial venture. It should also be noted that network connection, performance, costing arrangements and Licence Compliance requirements are only one part of the equation – the EG proponents (especially those proposing significant export) will also have a raft of retail and trading issues to resolve, all with their own economic considerations.

The ability to export may provide additional income to the proponent and can simplify the operation of their generator. The decision regarding which configuration and operating arrangement to adopt is a commercial one and best made by the proponent based on their particular circumstances.

Example 1: A single building (such as a shopping centre or commercial building) may have multiple connection points and in this circumstance it is necessary to export to supply other customers within their premises. Their decision on whether to export will be based on a consideration of the costs of meeting technical requirements versus benefits such as increased rent and the value of the generated electricity.

Example 2: A customer may opt for (inexpensive) reverse power protection to prevent islanding (a potential safety issue that arises when the generator continues to export power after the network supply has been interrupted, potentially energising faulted equipment). One disadvantage of reverse power protection is that it will disconnect the customer from the network if they export even a small amount. This is not a good choice if the customer will operate their generator at close to their local load to maximise the offset to their local supply, particularly if they have large fluctuations in their power requirements. These fluctuations could lead to a momentary export that would trigger their protection and disconnect the customer from the network.

The obvious consequence of not being able to export is that the generator will not be able to transport, or "sell" electricity to other participants; however, it is worth noting that it may be uncommercial to do so due to the cost of addressing the technical requirements to export large quantities of energy through the distribution network because it is difficult for a small embedded generator to compete with a large efficient turbine with access to cheap fuel supply, or because the retail economics don't provide an adequate incentive.

(c) Are there circumstances where the ability of embedded generators to export electricity to the network should be limited? What conditions could be reasonably imposed to limit exporting?

The requirements that must be met by all connections to our network is discussed above in 10(a), and provided these are met, there should be no reason to limit export to the network.

(d) What are the costs and benefits of allowing, and not allowing, embedded generators to export electricity to the network?

These technical issues discussed above can be resolved through investment in the network or at the customer's installation. Often solutions are expensive and there is disagreement about who should be responsible for paying these costs (particularly in a framework that is far from mature), especially when research and testing is required to establish that a technology is reliable.

The issue of whether generators should pay for deep network augmentation required for their proposal, or be paid a deferred DUOS or TUOS charge is the topic of much debate. Common arguments against making these payments are that generators cannot, for technical reasons[22], be relied on for network support and have no contractual obligation to operate at the times they are needed; and that upgrade to the shared network is often required to accommodate embedded generation, both to manage fault level requirements, and voltage regulation in order to accommodate the

[22] We commissioned a study in 2012 that modelled the stability of typical 'tri-generation' units based on typical fault clearance times for our network. The results suggested that these units would be unstable for local upstream faults, and could not be relied on for network support for these scenarios. The study also indicated that for transmission and sub-transmission faults, that the generator system was likely stable, and so able to ride through these faults. Further modelling and empirical studies are needed to determine the extent to which generators can be relied on for network support.

EG's export, as well as additional capacity and connection points to convey the generated energy.

Furthermore, all proponents to date who have connected embedded generation systems to our network have sought to retain access to network supply for standby / backup to cover maintenance and failures of their generation systems. This means the network assets need to be maintained in place as though the customer was using them, even though they are no longer paying for them. This represents a cross subsidy from other customers to some extent.

We currently plan the network on the basis that the embedded generation is not generating (irrespective of the ability to export). We could then enter network support agreements with existing embedded generators to defer specific investments where it is technically and commercially viable to do so. As part of this process we verify the reliability of the generator to provide network support, which (if cost-effective) might include funding an upgrade to the installation to ensure that it meets our requirements. It should be noted that it is not necessarily a requirement for a generator to operate in parallel with (and export energy to) the network to be suitable for network support. For example many customer backup generators are used for network support via an agreement to simply remove the customer load off the grid and transfer it to the generator in island mode.

(e) Is there any basis for embedded generators to be treated differently to load or other generators? For what reasons?

From a DNSP perspective, a customer negotiation and the economic / regulatory framework should abide by consistent principles – regardless of whether the load is "positive" or "negative". However, the specific issues affecting Embedded Generators may result in them having to be treated differently to load or other generators where there are technical reasons to do so, or if the rules and other applicable regulatory instruments require they be treated differently.

Technically, there are differences with managing embedded generators compared to loads. Generators are an active connection and so contribute fault current. They also increase the voltage at their connection point and have additional stability and power quality considerations.

There are also differences in the technical requirements for embedded generation compared to centralised generators due to the relative scale and location of their connection; as well as differences in the way customers tend to operate these installations.

With respect to export, the most relevant existing differences in the rules relate to the underlying commercial construct of the National Energy Market, which does not work well for generators associated with customer loads, particularly where multiple customers are associated with a local generator. Addressing this inconsistency could be a good thing.

Question 11 Allowing distributors to charge an optional fee for service

(a) What are the barriers that prevent network service providers from charging a 'fee for service' under the current arrangements?

Consideration of the appropriate classification of services and the mechanism for charging for those services is within the scope of the AER's Framework and Approach process, undertaken prior to each regulatory determination. NSW DNSPs consider the design of economic framework is sufficient and appropriate in this regard. NSW DNSPs are currently in the process of proposing an additional service to the AER that specifically relates to generator connections (as part of the F&A for

the regulatory period commencing 1 July 2014). If the AER approves this proposal we consider that this will provide a clear mechanism for DNSPs to recover the efficient costs in assessing generator connections.

(b) Is the proposed rule sufficient in identifying what services would be provided for the 'fee for service'? If not, how should the relevant service be specified?

The proponent has proposed a 'fee for service' in order to "provide the DNSPs with a greater incentive to collaborate constructively". It appears that the proponent may be suggesting that the service provided by the DNSPs is a "negotiated service". Ausgrid requests further information to understand how the proposed service does not form part of the distribution service performed by DSNPs. Also, see previous comments made in this submission regarding other potential options (within the Rules framework) to address the proponents perceived concerns.

(c) What factors should be considered on how such a service should be classified? That is should it be a direct control service or negotiated service? Should the service be on a cost recovery basis only?

As mentioned above, the AER applies criteria specified in the Rules to determine which services are classified as;

- direct control services (and then further as standard control services or alternative control services),
- Negotiated distribution services, and/or
- Unclassified services.

Following this the AER determines the form of control that applies. Ausgrid is of the view that the service provided by NSW DNSPs in assessing generator connection enquiries or applications is a direct control service. If the AER concurs that the service is a direct control service, the form of control is likely to be a cost-based (fee or quoted) mechanism.

(d) Should the NER provide any guidelines on how such a fee should be determined or should it be negotiated between a distributor and embedded generator? Should the fee be approved by the AER and, if so, on what basis?

As noted above, the question posed pre-supposes that the service provided by the DNSP is a negotiated service (for the purposes of service classification). It is not clear how this conclusion has been reached. The question posed also seems to overlook the defined role of the AER in the classification and regulation of services provided by DNSPs.

Question 12 Shared network augmentation costs

(a) Is the current approach to attributing connection costs, particularly in relation to shared network augmentation costs, inefficient, inequitable and not cost-reflective? For what reasons?

For the reasons outlined above, Ausgrid is of the view that the current approach to attributing connection costs, particularly in relation to shared network augmentation costs, seeks to balance economic and equity considerations.

(b) Should embedded generators (noting that embedded generating installations can encompass a broad range of installations) be exempt from paying shared network augmentation costs? Why or why not?

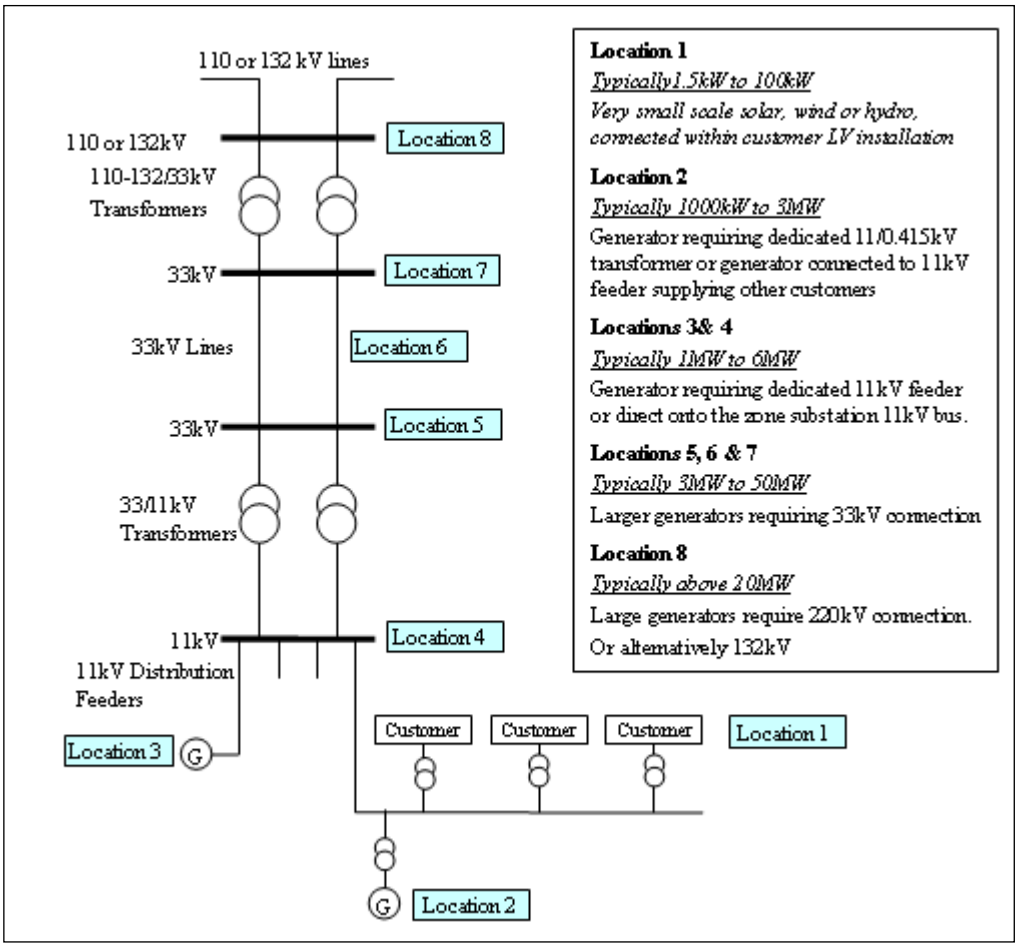
In relation to questions b) and c) when considering whether generators should be exempt from paying shared network augmentation costs, the corollary is a consideration of whether it is appropriate for the broader customer base to completely

fund augmentation costs associated with all generator connections within the distribution network. That is, if the generator does not fund upfront, then the costs are smeared across all load customers. If any changes were to be made to the existing national and jurisdictional arrangements, Ausgrid proposes that a careful consideration of the allocation of these costs to the broader customer base would need to be undertaken.

(c) If embedded generators are exempt from shared network augmentation costs, how should these costs be allocated?

Refer to response for question b)

Appendix 2 – High level schematic of embedded generation location distribution networks



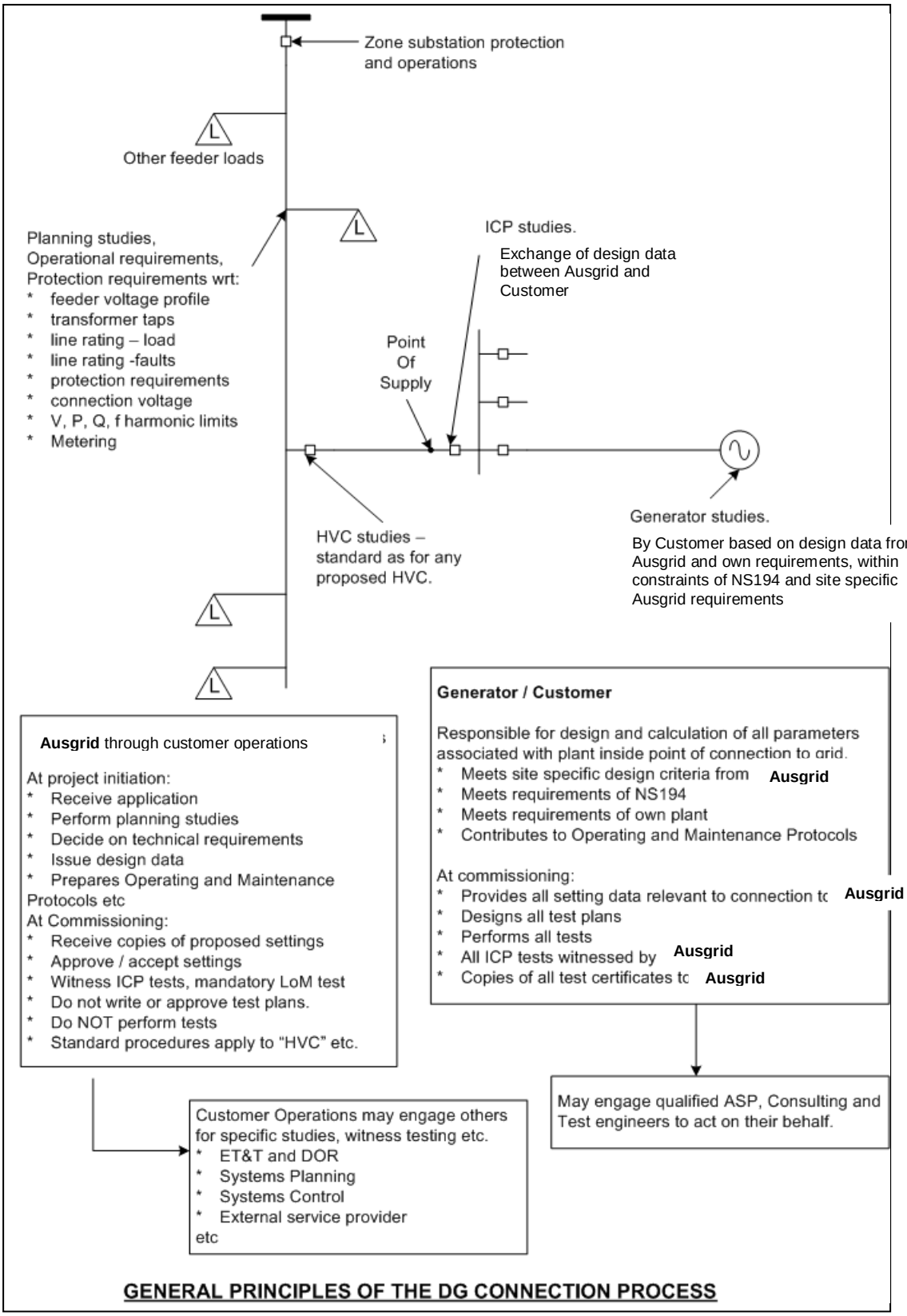
Adapted from BCSE Guide for the connection of Embedded Generation in the National Electricity Market[23]

Note: This is intended to provide an indication only of where embedded generators will likely to be connected on a distribution network.

As a general guideline, generators with a capacity greater than 500kVA are considered to require connection to our 11kV network, above 10MW require connection to the sub-transmission network (for instance 33kV) and generators above 30MVA (these are considered to be a very large generating unit) typically require connection to Ausgrid's 132kV network.

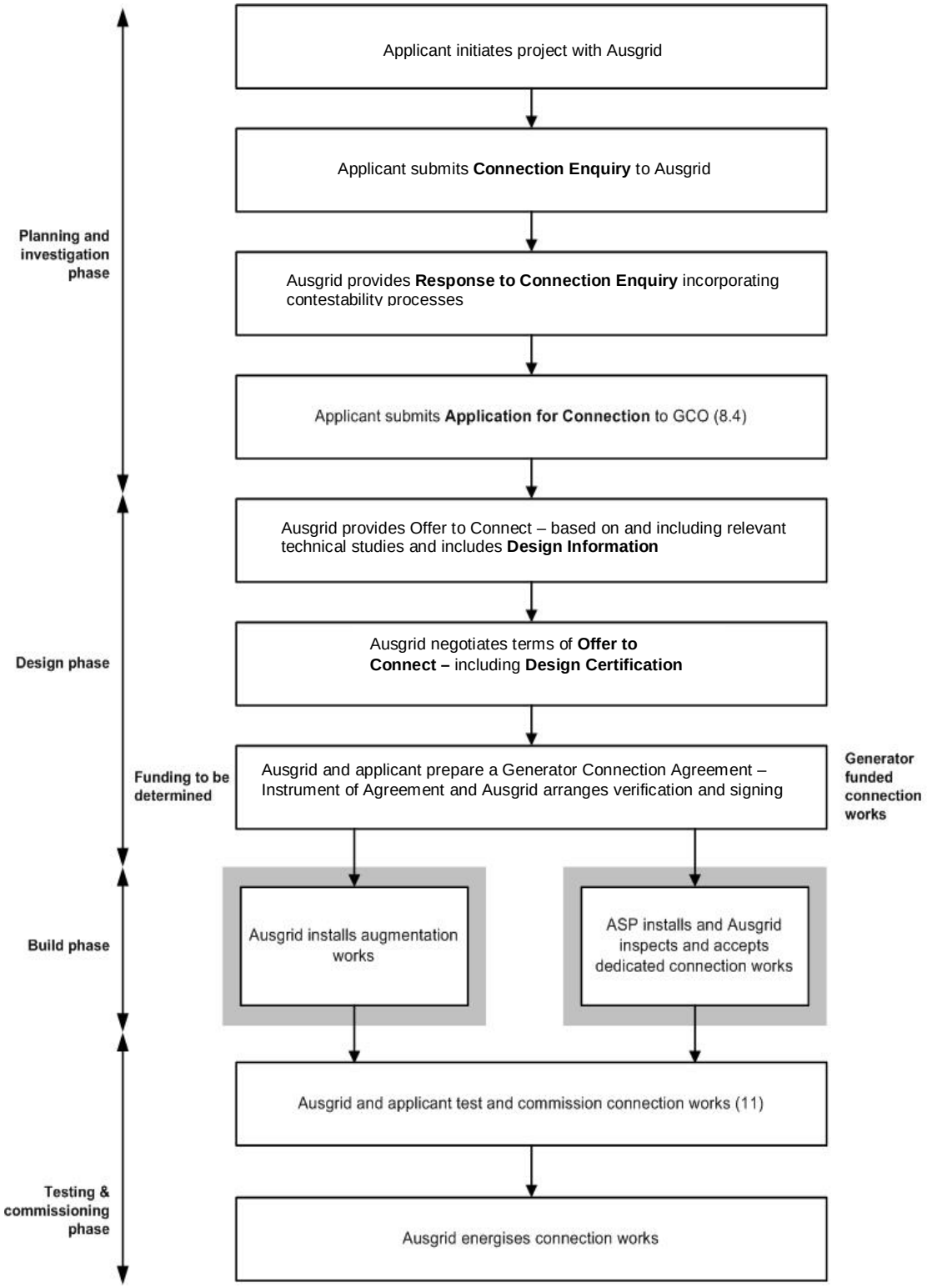
[23] ENA, *National Reference Framework for the preparation of documentation for the connection of embedded generation within distribution networks,* February 2011, p 10.

Appendix 3 – Connection process for distribution network



Appendix 3 – Connection process for distribution network

Figure 1: Connection process for embedded generators



Planning and investigation phase

This phase is aimed at assessing available options for connecting the embedded generator to Ausgrid's network. Necessary stages in this phase include:

- *connection enquiry* – required in order to establish the feasibility of the project[24], during this stage the applicant is required to provide Ausgrid with details regarding the generator in order for Ausgrid to determine whether technical studies are required and the costing of these studies
- *response to the connection enquiry* – Ausgrid aims to respond to connection enquiries within 10 business days[25] outlining: costs, whether a Generator Connection Agreement (GCA) is required, options for connections, preliminary program of milestones for connection and commissioning, whether further information may be required for the Application for Connection, whether connection work is required and the scope of which will be made contestable; and
- *application for connection* - applicant provides generator design information (this may include generator technical data and proposed settings) and negotiates GCA (where required) [26]

Ausgrid encourages early discussion between the applicant in order to identify network constraints, the need for new connection works and technical studies required to assist the applicant to determine the feasibility of the generation proposal.

Design phase

This phase consists of:

- *offer to connect* – an offer to connect will be made once Ausgrid has received a connection application.[27] The offer to connect will vary between applicants as it is based on requirements identified in the preceding technical studies and investigations; and the applicant's final requirements identified in its application.
- *design review*[28] – Ausgrid reviews the embedded generator technical design against network standards and if satisfied the design is certified by Ausgrid and the ASP can commence construction.

Build phase

The generator should provide an action plan coordinating the activities of its own contractors, those of the ASP and Ausgrid for the construction, testing and commissioning of the Generator's own facilities and the connection works.

Testing and commissioning phase

[24] During this stage the applicant is required to provide Ausgrid with details regarding the generator (as set out in NS194 Appendix 3 and ES11) in order for Ausgrid to determine whether technical studies are required and the costing of these studies. Ausgrid notes that some of this information may not be available until the Application stage.

[25] Ausgrid may not always be able to meet this timeframe, particularly when the enquiry poses potential technical difficulties. This is because a number of areas within Ausgrid may need to be consulted in order to respond to the enquiry. However, if it is apparent that this timeframe cannot be met, Ausgrid will s inform the person making the enquiry as soon as possible and explaining why and when a response can be expected.

[26] The GCA consists of two documents: the general conditions (which do not vary) and the instrument of agreement (IoA) which is job specific and requires project details to be entered and to be signed by the parties to the agreement.

[27] An offer is made within the time period specified in the preliminary program or as agreed with the applicant. An offer to connect cannot be made unless the prospective generator has correctly completed an Application to connect. Incomplete Applications may result in delays due to insufficient information for Ausgrid to assess whether the proposed installation meets its technical requirements.

[28] Embedded generation installations are generally dealt with separately from the contestable design undertaken by an ASP3, as they form part of the customer's private installation**.** The exception to this is if there is any network augmentation required for the connection of the embedded generator installation in which case it would be included in the Design Information to be undertaken by an ASP3.

The NER requires the generator to provide a commissioning program with three months notice for connection to a transmission system or one months notice for connection to the distribution network. Ausgrid will respond to this program within 15 days either to agree or request changes to the program in the interest of maintaining safety, network security, and quality of supply. Before the connection and/or the generator installation are commissioned, tests must be carried to ensure that the works are correctly installed and the protection and metering systems operate as required.

Application of Ausgrid's connection process

It is important to note that the process for connecting micro embedded generators is more streamlined than the process described above.[29] Currently, these types of embedded generators are connected automatically, once established that the installation is compliant with Australian standard (AS) 4777 and the NSW Service and Installation Rules 2007. This process will change slightly when Chapter 5A becomes enforced. Under Chapter 5A connection of micro embedded generators will be via a standing model agreement for basic connection services approved by the AER.

Whilst the above process is applied to all prospective embedded generators, it is applied flexibly so that where appropriate certain stages of the process are streamlined for smaller generators. [30] For instance, it may be possible for smaller generators to proceed directly to the connection application stage without having to submit a connection enquiry.

It is important to note that the process detailed above will also vary in terms of time, parties involved in the connection process, information requirements, technical studies, technical requirements and costs depending on:

- the capacity of the generator seeking to connect;
- whether the generator is seeking to export electricity[31]; and
- whether existing assets need to be altered or additional connection assets installed in order to enable the embedded generator to safely connect to the network[32].

It is important to note that the size, complexity and duration of system studies typically increase with increasing connection capacity and voltage. As the generator connection voltage increases, the equipment specifications for connection to the network will become more onerous as system reliability requirements are more stringent. This is because the larger the generator connecting, the larger the impacts on the network as the network is more interconnected at higher voltage levels. In other words, more stringent requirements are imposed if a generator is connecting at higher voltage levels, as an outage at this level has the potential to impact upon more customers.[33]

Consequently, the information requirements, technical studies and costs for connecting larger embedded generators (medium to large)[34] are significantly more than for micro, small or medium embedded generators. In addition, the time required to connect large embedded generators to Ausgrid's sub-transmission network is also substantially longer than the time taken to connect embedded generators to the distribution network. This is largely a reflection of the complexity involved in connecting these types of embedded generators to the network.

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[29] Embedded generators with a capacity less than 30kW and compliant with Australian Standards (AS) 4777.

[30] Small embedded generators are those classified with a nameplate rating greater than 30kW but not more than 1MW , connected to the low voltage (LV) network but not compliant with AS4777.

[31] A GCA will be required if there is an intention for the applicant to export and if the connection is contestable.

[32] If a connection is contestable Ausgrid's ES 9 standard will also need to be followed.

[33] Refer to Appendix 2 for a high level schematic of embedded generation location on distribution networks.

[34] *Medium embedded generators* are those classified as having a nameplate rating greater than 1MW but not more than 5MW, or greater than 1 MW but connected to the high voltage network. *Large embedded generators* are classified as a generator with a nameplate rating of greater than 5MW.

Embedded generation and Ausgrid's network

Ausgrid currently has a total of 59,000 embedded generators connected to its network, with an additional 2,564 connection enquiries currently underway. The vast majority of embedded generators connected to Ausgrid's network are photovoltaic generation (PV) installations (59,000), most of which can be classified as micro or small embedded generators.

The connection of PV systems to the network is generally considered to be straight forward, as these units typically pose little risk to safety and network performance. In addition, this technology is well established meaning DNSP's can confidently predict how these types of technology will behave once integrated into the network.

Consequently, the connection process for these units is more streamlined than the connection of larger embedded generators. Typically, Ausgrid is able to process connection application for smaller embedded generators within 13-16 weeks from receiving a connection enquiry. In some circumstances this may take longer and is usually due capacity and voltage constraints on the local network.

Currently, the connection of embedded generators other than PV installations (i.e. medium to large embedded generators) constitutes a very small proportion of the total number of embedded generators connecting to Ausgrid's network (less than 1%). As a result, there is limited data and experience with connecting these types generators and how they will behave once integrated into the network.

Consequently, the connection of these generators is currently dealt with on a case by case basis and depending on the configuration of the local network, the configuration of the proponents' installation and how the proponent intends to operate their installation, additional studies, equipment and protection systems may be required for these units to be safely integrated into the network. If there are no network complications anticipated from the connection, the planning and investigation; and the offer to connect can be completed within 6 months (usually 13 weeks per stage). The timeframes for completion of the design and build phase for these connections are largely dependent upon the ASP engaged by the applicant and are hence beyond Ausgrid's control. For larger generators requiring major development the construction phase can take up to a year to complete, meaning that the connection process from start to finish can be in excess of a year.

Whilst the number of larger embedded generators connected to Ausgrid's network is very low, it is anticipated that this number will steadily grow in the future. Currently, internal processes for connecting larger embedded generators are still being developed. Over time and with greater connection numbers, DNSPs will have improved understanding and confidence as to how these embedded generators behave. This in turn would allow for DNSPs to refine its internal processes and, where possible, further streamline processes and standardised technical requirements.