



Implementing the Connecting Embedded Generation Rule

Project Outcomes Report

A project by ClimateWorks Australia, Property Council of Australia and Seed Advisory

May 2015

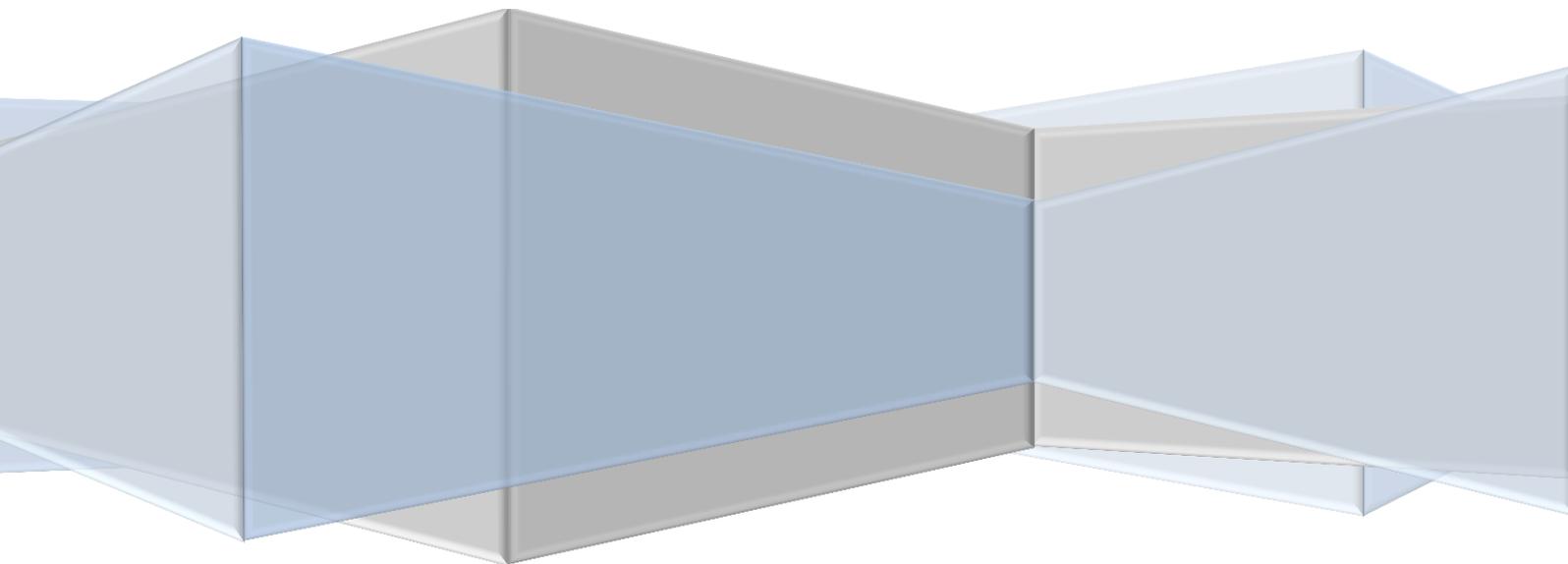




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Disclaimer:

This project was funded by Energy Consumers Australia (formerly Consumer Advocacy Panel) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas.

The views expressed in this document do not necessarily reflect the views of Energy Consumers Australia or the Australian Energy Market Commission.

Executive Summary

Connecting Embedded Generators: Measuring Compliance with the new National Electricity Rules

In April 2014, two years after the initial proposal was lodged, the Australian Energy Market Commission (AEMC) made its Final Determination on the Connecting Embedded Generators Rule Change proposed by ClimateWorks Australia, the Property Council of Australia and Seed Advisory.¹ The original Rule Change proposal and the AEMC's changes are intended to improve the connection process making it quicker and the timing more certain, clearer, more transparent and improving the balance of responsibilities between the parties. The changes benefit consumers by reducing the time and expense of connecting embedded generators and encouraging the efficient adoption of embedded generation across the National Electricity Market.

With effect from 1 October 2014 the AEMC introduced a number of new requirements into the National Electricity Rules (NER) to improve the process for connecting large solar installations, co- and trigeneration, wind and other technologies to the distribution network. The new requirements primarily affect Chapter 5 of the NER.² Among the changes introduced, distributors must now include on their websites:

- an Enquiry Form, which starts the connection process
- an Information Pack designed to assist project proponents through the detailed connection process, providing detailed information to assist a project proponent evaluate its proposal
- a Register of completed embedded generation projects, with details on previous connections to provide project proponents with some insight into what's previously been acceptable to the distributor.

Results

The Project Team's March 2015 assessment of distributors' performance in meeting these requirements found a very significant overall improvement since mid-November. In summary, 83 per cent of the distributors (10 of 12) met at least 35 of the 43 requirements (81 per cent compliance). All distributors except one had updated their websites as this report was being prepared.³ The distributors that achieved a perfect score in the second assessment – United Energy, Ergon and SA Power – should be congratulated for their particular efforts in meeting the AEMC's original implementation date and in responding to our assessment. Extensive engagement by the Project

¹ AEMC 2014, *Connecting Embedded Generators, Rule Determination*, 17 April 2014, Sydney.

² In early 2015, as a result of the Clean Energy Council's Rule Change proposal relating to generators covered by Chapter 5A of the NER the AEMC extended the benefits of the new Chapter 5 process to smaller generators who choose to use Chapter 5 in preference to Chapter 5A.

³ ActewAGL has accepted that existing materials on their website are not compliant. Changes to improving measured compliance are currently in train with the view to publishing revised materials by the end of March 2015. Citipower/Powercor also intends making some further changes to its website which would increase its measured compliance.

Team with distributors since December 2014 resulted in a number of distributors reviewing and improving their materials in the light of our initial comments.

The March results are a significant improvement on the results of our assessment in mid-November 2014, when around sixty percent of distributors achieved a reasonable level of measured compliance with the new rules relating to the connection of embedded generators, meeting at least 17 of the 43 requirements (40 per cent compliance). Fifty per cent of distributors (6 of 12) achieved a significantly higher level of compliance, meeting at least 26 of the 43 requirements (60 per cent compliance). At that time, none were fully compliant with the requirements for the Enquiry Form, the Information Pack and the Register of completed embedded generation projects, although one distributor performed very strongly. Compliance with the requirement for a Register was affected by the confidentiality requirements in previous Connection Agreements.

Chart 1 shows measured compliance in November 2014 and Chart 2 shows the March 2015 results based on our assessment of current compliance with the new, publicly available requirements of Chapter 5 of the National Electricity Rules (NER).

The Project Team

ClimateWorks Australia, the Property Council of Australia and Seed Advisory (the Project Team) have been funded by the Consumer Advocacy Panel to review compliance with the changes to the NER.

For this project, the Project Team has reviewed materials now required by the Rules to be published on distributors' websites to assist customers understand and navigate the connection process. The process used to score distributors' compliance is detailed in Section 2.

The Project Team has also reviewed the Model Connection Agreements required as part of distributors' Information Packs. We are grateful to Herbert Smith Freehills for undertaking this review; their findings are summarised in Section 3.

The technical standards required to be included in distributors' published materials have been reviewed by Wood & Grieve Engineers (Wood & Grieve). We are grateful for their insight into the published technical materials, which can be found in Section 4.

The Model Connection Agreements

Herbert Smith Freehills' review identified no provisions clearly breaching any requirements of the NER. However, it did identify areas any project proponent, or, in the language of the NER, Connection Applicant,⁴ should consider negotiating to achieve a more balanced outcome relative to the Model Agreement. Distributors' treatment of issues critical to project proponents is not uniform; some distributor's approaches may be preferable to others, depending on a project's precise circumstances. While projects generally can't be moved to a distribution area where the contracting

⁴ In this report, we have more adopted more customer friendly language, using "project proponent" in preference to "Connection Applicant" on all occasions except where we are directly quoting from the National Electricity Rules or referring to the Connection Agreement, entered into by the Connection Applicant with the relevant distributor. Similarly, "distributor" is preferred to "Distribution Network Service Provider" or DNSP because we can't criticise the industry for being unconsciously embedded in jargon and then use it ourselves.

regime is more attractive, the differences in distributors' approaches provide possible alternative contracting models and a basis for negotiations. For example, distributors take different approaches to the maximum compensation a generator may be required to pay in the event it causes harm to the distributor's network. In negotiating the Connection Agreement, the project proponents may wish to draw on these alternative models.

Some details of these issues that proponents should consider negotiating – including allocation of risk, questions of liability and issues relating to compensation – are provided in Section 3.

Chart 1: Measured distributor Compliance, November 2014

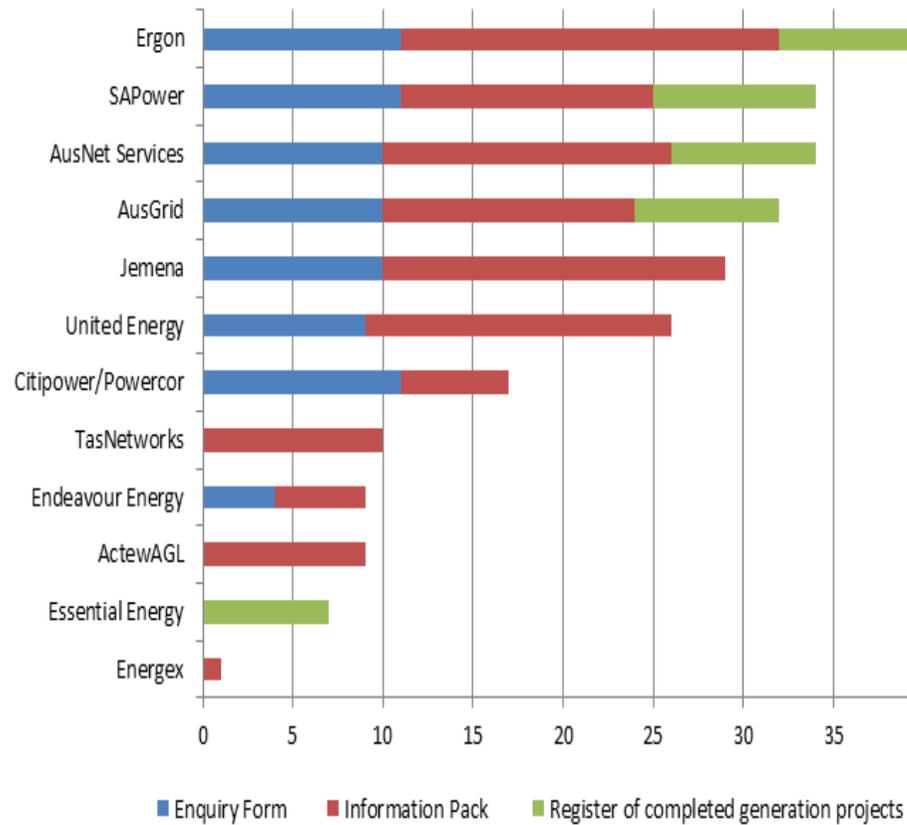
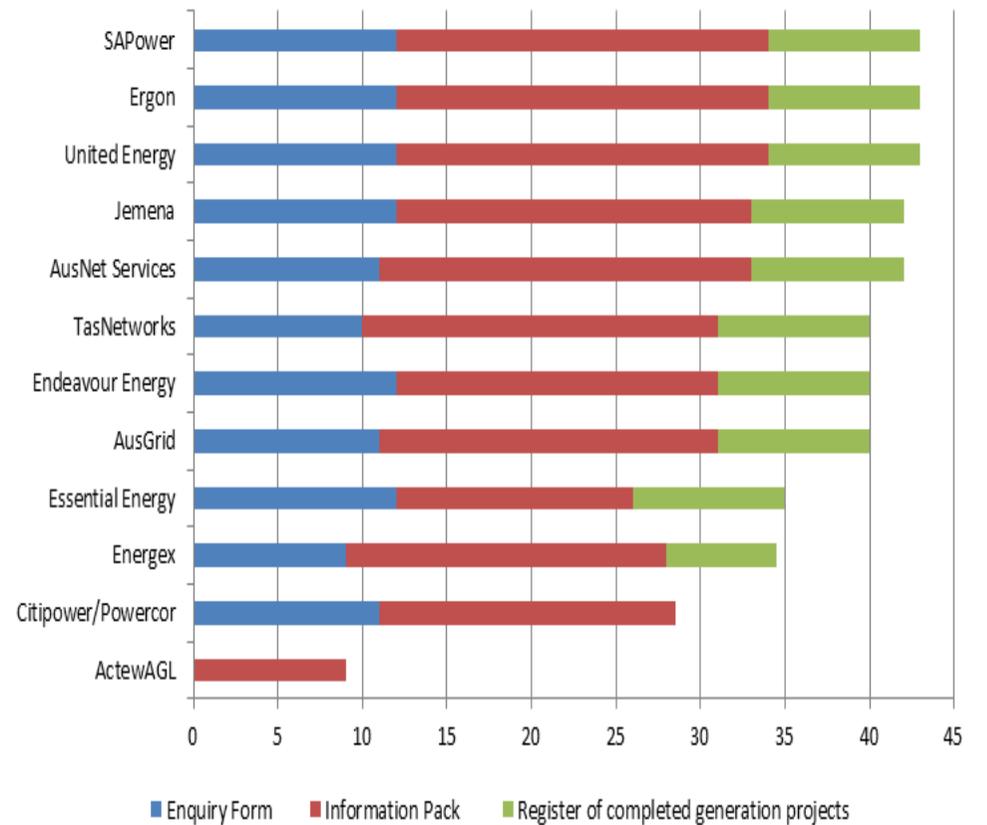


Chart 2: Measured Distributor Compliance: Assessment, March 2015



The new Rules: observations

Monitoring matters

Measured compliance of less than 50 per cent by around sixty per cent of distributors six weeks after the implementation date suggests weaknesses in the current approach to regulatory oversight.

There's no evidence that any potential project proponent suffered as a result of the low level of compliance of a number of distributors, but, in relying only on the actions of private parties to ensure compliance by instigating a complaint about a specific Connection Application, the credibility of the regulatory regime is diminished. Not all Rule Changes will have the benefit of the follow up this Rule Change has received. Project proponents have a number of disincentives to complaining formally about the operation of the Rules, as we argued in the original Rule Change Proposal – delays to the already protracted process can impose significant costs on project proponents, and, rightly or wrongly, some project proponents that deal repeatedly with the same distributor are concerned about the treatment of future projects in the event that they pursue a complaint.

There's also an issue of the equity of the regulatory burden where some distributors comply and others' compliance is markedly lower. Interestingly, those distributors which showed the lowest level of compliance in November 2014 are all state owned; privately owned distributors' measured compliance was very high, both absolutely and in comparison to all distributors.

Improving market participants' understanding of the rules

Although the AEMC communicates its decisions using a range of materials – a detailed discussion of the process and rationale in its Determination, a marked-up version of the Rules to demonstrate the specific changes introduced, a high level guide to the changes in a Frequently Asked Questions release and, for this Rule Change, a graphic of the new connection process – different strategies may be needed to inform affected market participants about the implications of changes to the NER to ensure compliance by the implementation date.

The Project Team found a surprising level of confusion among distributors about elements of the Rule Change, given that potential changes had been under discussion for two years and that many of the distributors had attended, and been represented by their industry body, at workshops about the proposals hosted by the AEMC. Since our initial assessment we have reviewed materials by distributors that have inaccurately described the coverage of the new Rules, the interaction between the Rules and AEMO's registration procedures and that, in other material ways, have been inconsistent with the new requirements.

User friendliness or, who is the customer?

A truly customer centred approach is still some distance away, although, as we discuss in the following section, there have been improvements in the ease of finding materials on some distributors' websites and some distributors have made real efforts in their materials to address a wider, less technical audience. A key objective of the customer led Rule Change was to improve certainty and clarity in the connection process, so that project proponents can make efficient

investment decisions when considering connecting generators to distribution networks. The Project Team did not evaluate the materials for user-friendliness or the simplicity of the language used. (Wood & Grieves has reviewed the technical materials provided against a number of criteria, including the level of detail provided and the practicality and usefulness of the standards included. See Section 4.) In practice, the level of user friendliness and the complexity of the language used can present additional barriers to the connection process if the materials intended to assist project proponents are obscure or deeply steeped in industry jargon.

Take an example. Some distributors were clear that the majority of embedded generation connections in their network would occur in the low voltage areas of the network. Other distributors were equally clear that embedded generators would connect to their high voltage network. This observation would be a fairly harmless observation about the differences between distributors' networks, if it wasn't also the case that some distributors appear to start from the perspective that anyone searching their site for information on connecting an embedded generator must already know this key characteristic for the relevant network. These distributors (or their website designers) assume project proponents will search for the required information by first specifying the network voltage level and only then looking for connection materials. In at least one case, our search for materials in November 2014 entirely overlooked a distributor's Enquiry Form and other required materials because not only was it not obvious to us that we should first search by the voltage level, but also because the search facility on the distributor's website didn't identify the (implicit) relationship between voltage and connection.

We found other examples, some of which are discussed in the next section.

Areas for future work

Addressing the *last in, worst dressed* problem

The issues raised by the frequent requirement for embedded generators to make capital contributions to fund network investments remain to be addressed.

The current regulatory and contractual approaches to this issue are inadequate. At present, the AER appears to believe that only limited requests, consistent with the principle that generators do not pay to connect, are made. This belief is inconsistent with project proponents' experiences.

However, the alternative contractual negotiation route, recommended as a remedy by the AEMC, looks very difficult. Distributors' Model Connection Agreements are silent on this issue, but even if reimbursement is introduced into Agreements during negotiations, effective monitoring and enforcement by the project proponent would appear to be very difficult, particularly in a meshed network such as an urban or CBD environment.

Finally, the advice the Project Team has received is that 'pioneer schemes' are not designed to reimburse the costs borne by generation connections, so relying on this regulatory route in its current form is not a robust basis for ensuring that projects bear only the appropriate costs.

Why do the costs of connection differ so widely?

The new Rules, in requiring distributors to publish illustrative costs for connection applications and for connections also provide an insight into individual distributor's internal processes and costs, as well as the cost of connecting across distributors' territories.

The Project Team noted that cost estimates tended to vary between distributors, both in nature and scope. Enquiry fees, defined by the AEMC as a fee intended to cover the 'reasonable' costs incurred by a distributor, can differ very significantly from one distributor to another, surprisingly given that the Project Team anticipates that the activities required (and the grade and seniority of the personnel undertaking them) would be more similar than not.

The insights from comparing distributors' charges can be valuable to embedded generation projects, particularly where the project proponent has the choice to contract externally in preference to using the distributor's services, and also to regulators and others in seeking to assess relative cost levels and comparative efficiency. The value to project proponents, however, is limited by the absence of any choice in their supplier in the early stages of a project's lifecycle – competitive services, where available, are typically restricted to the construction phase.

Moving to consistent standards

The Rule Change, which required published and publicly available technical standards, lays the basis for our longer term aspiration of national, or at the very minimum NEM-wide, technical standards.

Wood & Grieve's observations on the degree of alignment displayed by distributors' published standards suggest that the level of alignment between distributors' standards even within a single jurisdiction is currently very low (Section 4). Although we appreciate that differences in distributors' standards have emerged to reflect different organisations' priorities and risks, the lack of standardisation imposes real costs on project proponents and the economy. From a national perspective, these additional costs may not be outweighed by the benefits to the individual firm of diverging from its peers.

Standardisation will lower project costs and should increase innovation among project proponents. In the absence of a considered move towards standardisation, the costs and time required for innovations in energy generation, distribution and consumption to be introduced into the market will be much higher than they should be, to the detriment of consumers.

Section 1: Connecting Embedded Generators: Measured Compliance, November 2014 and March 2015

In April 2014, two years after the initial proposal was lodged, the Australian Energy Market Commission (AEMC) made its Final Determination on the Connecting Embedded Generators Rule Change proposed by ClimateWorks Australia, the Property Council of Australia and Seed Advisory.⁵ The original Rule Change proposal and the AEMC's changes are intended to improve the connection process making it quicker and the timing more certain, clearer, more transparent and improving the balance of responsibilities between the parties. The changes benefit consumers by reducing the time and expense of connecting embedded generators and encouraging the efficient adoption of embedded generation across the National Electricity Market.

With effect from 1 October 2014 the AEMC introduced new requirements into the National Electricity Rules (NER) to improve the connection process for large solar installations, co- and trigeneration, wind and other technologies to the distribution network. The revamped connection process empowers customers with:

Certainty and faster connection stages

1. **A clear map of and guidance** on the new connection process.
2. **Time bounded connection stages:** preliminary enquiry, detailed enquiry, connection application and connection agreement. Previously, these stages in the connection process were open-ended and ill-defined.
3. **No 'stop the clock' option** for distributors to consult third parties. Beforehand, a distributor could stop the clock without time restrictions during the connection application stage, in the absence of required information, for example, or reflecting the need to negotiate with another distributor or transmission network operator.

These features take the past guess work out and will speed up connections.

Critical information and lower costs

4. **Standardised enquiry forms** to be created by distributors will cut down customers' 'green tape'.
5. **Information packs** from distributors, including: technical standards, costs, application details, timing and a model connection agreement. This will allow applicants to produce early feasibility assessments with little expense; previously difficult to achieve due to the lack of relevant information.
6. **Location specific network information** will be provided by distributors. This will help applicants find out very early where the 'no go' zones are (network capacity constraints that

⁵ AEMC 2014, *Connecting Embedded Generators, Rule Determination*, 17 April 2014, Sydney.

require expensive infrastructure upgrading if applicants proceed). Currently, constraints are known well into the process, with considerable time and money spent by applicants.

- 7. Registers of completed projects** with details of previously connected equipment by distributor for systems larger than 5MW. This will make it easier for applicants to identify opportunities and examples of what has been approved.

Greater customer rights

- 8. A more balanced set of mutual obligations**, including a description of both parties' obligations.
- 9. A clearer dispute resolution process** to be used if parties cannot agree on any matter, especially technical issues. For example, an applicant may instigate the dispute resolution process if the applicant does not agree with a distributor's assessment of a request to export electricity into the grid.
- 10. More time and flexibility for applicants** to accept a distributor's offer. In the past, applicants may have had only 2-3 days to comb through extensive contracts, and commonly discovered detrimental 'surprise clauses'. Applicants now have 20 business days and the option to extend this if required.

Among the new requirements, distributors must now publish on their websites:

- an Enquiry Form, which starts the connection process (4 above)
- an Information Pack designed to assist project proponents through the detailed connection process, providing detailed information to assist a project proponent evaluate its proposal (5)
- a Register of completed embedded generation projects, with details on previous connections to provide project proponents with some insight into what's previously been acceptable to the distributor (7).

Summary

The Project Team's March 2015 assessment of distributors' performance in meeting these requirements found a very significant overall improvement since mid-November. In summary, 83 per cent of the distributors (10 of 12) met at least 35 of the 43 requirements (81 per cent compliance). All distributors except one had updated their websites as this report was being prepared.⁶

The March results are a significant improvement on the results of our assessment in mid-November 2014, when around sixty percent of distributors achieved a reasonable level of measured compliance with the new rules relating to the connection of embedded generators, meeting at least 17 of the 43 requirements (40 per cent compliance). Fifty per cent of distributors (6 of 12) achieved a significantly

⁶ ActewAGL has accepted that existing materials on their website are not compliant. Changes to improving measured compliance are currently in train with the view to publishing revised materials by the end of March 2015. Citipower/Powercor also intends making some further changes to its website which would increase its measured compliance.

higher level of compliance, meeting at least 26 of the 43 requirements (60 per cent compliance). At that time, none were fully compliant with the requirements for the Enquiry Form, the Information Pack and the Register of completed embedded generation projects, although one distributor performed very strongly. Compliance with the requirement for a Register was affected by the confidentiality requirements in previous Connection Agreements.

Our approach to measuring compliance is discussed in detail in the next section.

Our results

The preliminary results: mid November 2014

Chart 1 shows our preliminary ranking of distributors by their compliance with the new requirements for an Enquiry Form, Information Pack and Register of Completed embedded generation projects to be published on their websites. Compliance was measured in mid-November 2014.

Around sixty percent of distributors achieved a reasonable level of compliance, although none are fully compliant. Fifty per cent of distributors (6 of 12) achieved a significantly higher level of compliance, meeting at least 26 of the 43 requirements (60 per cent compliance). At that time, none were fully compliant with the requirements for the Enquiry Form, the Information Pack and the Register of completed embedded generation projects, although one distributor performed very strongly.

Confidentiality and data availability issues have prevented some distributors from providing the required Registers of completed projects or from populating the registers with all the information specified in the Rules.

Changes in measured compliance: March 2015

The Project Team gave all distributors the opportunity to provide feedback on the preliminary assessment and improve their measured performance. To measure compliance levels post-engagement, the Project Team updated the initial assessment using the same 43 requirements from Chapter 5 of the NER.

The Project Team's March 2015 assessment of distributors' performance in meeting these requirements found a very significant overall improvement since mid-November (Chart 2). In summary, 83 per cent of the distributors (10 of 12) met at least 35 of the 43 requirements (81 per cent compliance). All distributors except one had updated their websites as this report was being prepared. The distributors that achieved a perfect score in the second assessment – United Energy, Ergon and SA Power – should be congratulated for their particular efforts in meeting the AEMC's original implementation date and in responding to our assessment.

There was strong engagement from all distributors in response to our initial observations. Despite the difference in the approaches taken, distributors intended to comply and the majority of the distributors were ready and willing to devote resources in responding to our comments on their original efforts.

Along with the very significant improvements recorded, the Project Team has observed a number of other positive developments not taken account of in our scoring methodology.

- It's often easier to find the required materials on distributors' websites than it was in late 2014. Where previously some technical knowledge and/or persistence were required to find the materials, you can now often find the material one or two pages below the home page on distributors' sites.
- Some of the materials, particularly those materials making up the Information Pack, make significant and successful efforts – judging by the feedback from the less technical members of our team – to address the intended, non-technical audience.
- Materials previously restricted to a technical, pre-registered part of the website are now publicly available.

A truly customer centred approach is still some distance away. Some distributors were clear that the majority of embedded generation connections in their network would occur in the low voltage areas of the network. Other distributors were equally clear that embedded generators would connect to their high voltage network. This observation would be a fairly harmless observation about the differences between distributors' networks, if it wasn't also the case that some distributors appear to start from the perspective that anyone searching their site for information on connecting an embedded generator must already know this key characteristic for the relevant network. These distributors (or their website designers) assume project proponents will search for the required information by first specifying the network voltage level and only then looking for connection materials. In at least one case, our search for materials in November 2014 entirely overlooked a distributor's Enquiry Form and other required materials because not only didn't it occur to us to first search by the voltage level, but also because the search facility on the distributor's website didn't identify the (implicit) relationship between voltage and connection!

Connecting Embedded Generators

Chart 1: Measured distributor Compliance, November 2014

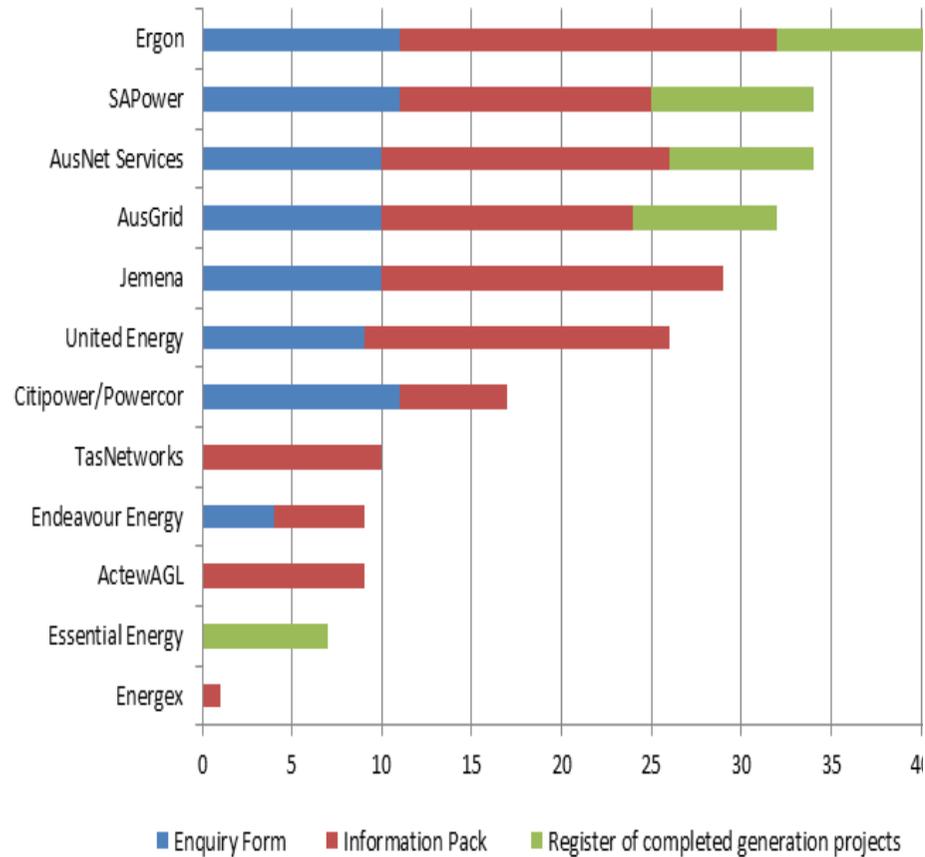
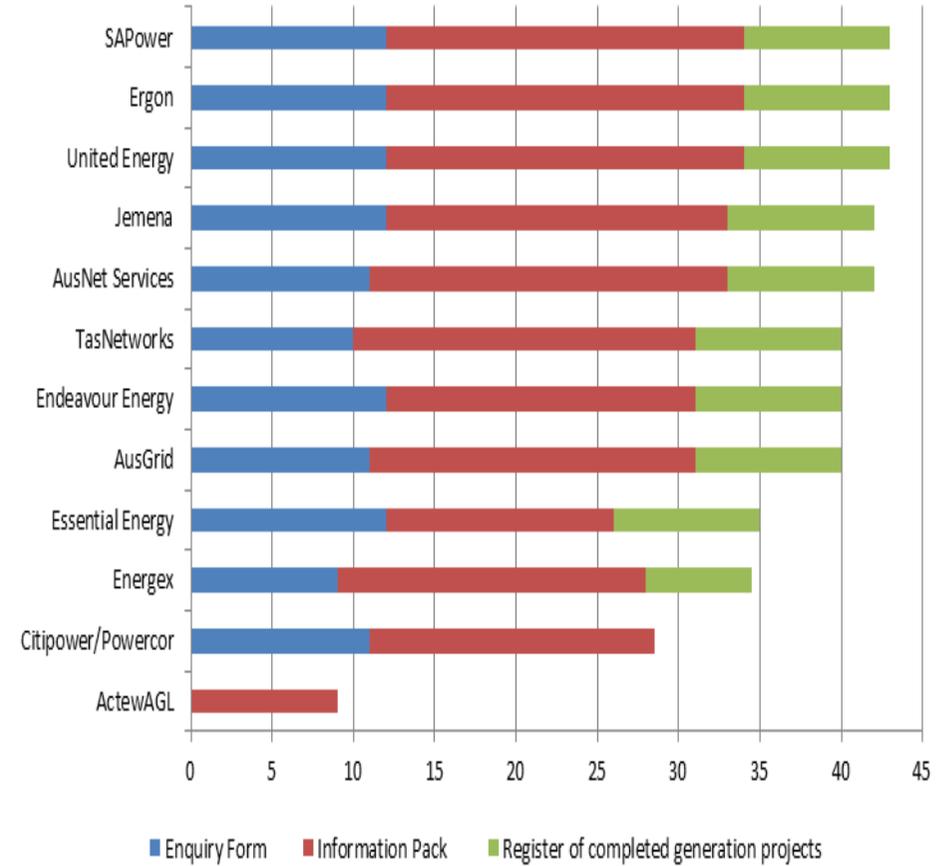


Chart 2: Measured Distributor Compliance: Assessment, March 2015



Other observations

Who is the customer?

A key objective of the customer led Rule Change was to improve certainty and clarity in the connection process, so that project proponents can make efficient investment decisions when considering connecting generators to distribution networks.

The Project Team did not evaluate the materials for user-friendliness or the simplicity of the language used. (Wood & Grieshaber has reviewed the technical materials provided against a number of criteria, including the level of detail provided and the practicality and usefulness of the standards included. See Section 4.) In practice, the level of user friendliness and the complexity of the language used can present additional barriers to the connection process if the materials intended to assist project proponents are obscure or deeply steeped in industry jargon. The best example of both of these issues (obscurity and industry jargon) can be found in the discussion above about the implicit assumption that project proponents know in advance of reviewing the distributor's connection materials which element of the network – whether high or low voltage – the application will connect to if it proceeds.

There are other examples. Distributors are required in their Information Packs to outline their approaches to negotiating a negotiated access agreement. In some cases, a distributor's Information Pack says something along the following lines: "Our approach to negotiating a negotiated access agreement follows the requirements of the NER". The distributor might say National Electricity Rules rather than NER, and may give a reference to the relevant section of the Rules. It's not clear to us in what circumstances the shortest version of this statement – referring to the NER without explanation or reference to the relevant section – is likely to be useful to anyone other than an industry participant and even identifying the Rules still, in our view, presents a barrier to a project proponent engaging usefully with the materials supplied. In our scoring, discussed in detail in the next section, the Project Team has taken the view that to be useful at a minimum the information included should include a reference to where the Rules can be found, although the Project Team thinks it would be better for the distributor to actually describe its own process in its own words.

The technical detail found in many of the Information Packs suggests that many distributors assume a degree of familiarity with the connection process by the project proponent. This impression was reinforced in discussions the Project Team had with several distributor representatives about their materials and, in at least one case, the practice of locating the standards and other technical materials in parts of the website intended for contractors and service providers.

Implementing the Connecting Embedded Generation Rule Change: Report

Exercising judgement: reducing the information requirements on project proponents

One of the distributors has purposefully omitted from its Enquiry Form elements specified in the relevant Schedule to the Rules as required, based on its judgement that the material requested is too detailed at the Preliminary Enquiry stage of the connection process. Our score for its compliance reflected these judgements as failures to comply: no points were recorded.

The Project Team sympathises with the distributor's view about the onerous nature of the information specified in the Rules. One of our observations emerging from this review is that there is relatively little difference in the information requirements specified in the Schedules of the Rules between the Enquiry and Application stages. Some of the specified information is very detailed, given that the Preliminary Enquiry is designed to be made at a very early stage in the project's life cycle. The approach the Project Team has taken, however, records this material as omitted. The distributor's score is lower than it would otherwise be, had it included the requirements it considers overly onerous.

A similar issue has arisen where, exercising the right to specify additional items of information to be provided by the prospective project proponent, distributors have included additional items more appropriate, in our judgement, to a later stage in the connection process. Some distributors require a project proponent to provide a single line diagram of its proposed protection scheme in the information to be included in the Preliminary Enquiry. In our view, this requirement is misplaced. There is support in the NER for our view. The Rules first discuss single line diagrams in the context of the connection process in the information the distributor is required to provide the project proponent in response to the preliminary enquiry (Schedule 5.4A (n)).⁷

Where the distributor has requested additional information, our scoring methodology does not adjust the distributor's scores for imposing more onerous information requirements even though these requirements are inconsistent with both the letter and the intention of the Rules in our view. The Project Team has, however, raised this issue with the relevant distributors.

In both of these cases, our scoring methodology is deliberately simplistic, not penalising the addition of more onerous conditions, but failing to recognise the exercise of judgement in favour of less onerous conditions. An alternative approach where the Project Team adjusted our scores to reflect these views would, however, be open to much higher levels of subjectivity.

Observations on the new Rules

Over time the Project Team expects that our observations and those of project proponents, distributors and others should give rise to minor adjustments to the Rules. At this stage, our impressions about where this might be the case are just that, impressions, but the Project Team has recorded them here.

⁷ Schedule 5.4A details the contents of the distributor's response in the preliminary response to a preliminary enquiry. Schedule 5.4A (n) requires the distributor to provide "an overview of any available options for connection to the DNSP's network, as relevant to an enquiry lodged, at more than one connection point in a network, including (1) example single line diagram and relevant protection systems and control systems used by existing connection agreements". The language is consistent with our view of the AEMC's intent that these issues are negotiable between the project proponent and the distributor, particularly in the early stages of the connection process, within the framework of the distributor's required standards. A requirement for a detailed single line diagram from the project proponent in the preliminary enquiry, particularly if the distributor regards this requirement as a Pass/Fail requirement, is not consistent with this view.

Implementing the Connecting Embedded Generation Rule Change: Report

- There is relatively little difference in the information requirements specified in the Schedules of the Rules between the Enquiry and Application stages. Some of the specified information is very detailed, given that the Preliminary Enquiry is intended to be made at a very early stage in the project's life cycle.
- The Project Team thinks there's likely to be a case for reviewing the information required from project proponents in the Enquiry phase of the process, or alternatively, in recognising some discretion for distributors to exercise their judgement by requiring less, rather than specifying more information.
- Alternatively, it is open to distributors to describe some elements of the information required in the Enquiry Form as optional.
- The Registers of completed embedded generation projects look like an idea that will be more valuable in the future than is currently the case. The Project Team understands that distributors are inhibited by existing confidentiality agreements and project proponents' refusals for their materials to be included from populating the Registers with existing projects. The Project Team has been encouraged by distributors' statements that, for future projects, project proponents' consent to publication of the required details will be sought as part of the Connection process.

The Project Team has been struck by the lack of consensus among distributors about the interpretation of some elements of the Rules, including, in no particular order:

- the objective of information being more widely available, including to a non-technical audience
- related to this, the meaning of publication in the Rules (see Section 2, *The meaning of publication*)
- the size and class of embedded generation applicant covered by the new Rules
- related to this, the relationship between AEMO's approach to registering embedded generators and the requirements on project proponents
- assumptions concerning the applicant's level of technical expertise and experience with connecting embedded generation systems (see the earlier discussion about the voltage level at which connections are expected, above).

Some of these issues surprised us. There was extensive discussion in at least one workshop hosted by the AEMC about the size of the generators covered by Chapter 5 and the relationship between AEMO's registration or exemption procedures and the operation of Chapter 5. Despite this, the Project Team has reviewed materials that incorrectly describe the generators covered by the new Rules, referring to Registered Embedded Generators, rather than all embedded generators, whether or not registered, more than 5 MW. In at least one instance, registration with AEMO has been included in the Enquiry Form as a precondition to submitting the form, even though this is entirely inconsistent with AEMO's role and the general timing of registration, which typically occurs shortly before commissioning.

Implementing the Connecting Embedded Generation Rule Change: Report

The Project Team is not advocating a shift towards a more legalistic approach to the Rules and their interpretation, but in complex areas like connections the AEMC may need to provide more detailed guidance about its intentions and the application of the Rules to ensure that all the affected parties share a view about the changed Rules.

Section 2: Scoring compliance: How the results were calculated

Choosing the elements of the Rule Change to review

Changes to the connection process for embedded generators introduced by the Rule Change cover the entire connection process, from the Preliminary Enquiry to the agreed Connection Offer, as well as imposing some additional ongoing reporting obligations on distributors. The changes took effect for all embedded generation applications where the generator was at least 5 MW from the beginning of October 2014. Our conversations with distributors throughout this process suggest there have been at least two applications under the new process, but, given the relatively short time since the introduction of the changes to the NER, these applications have neither reached a Connection Agreement nor been dropped, so their experience cannot be relied on as the basis for our assessment. In any case, two applications are too few to provide a robust insight into the performance of the new process.

The assessment relies on publicly available information. Because of this, only parts of the connection process can be assessed – the Enquiry Form, the Information Pack and the Register of completed embedded generation projects, all of which are required to be published on distributors' websites. The Connection Application form, in contrast, is not required to be published by a distributor, so it cannot be assessed against the new requirements. (Some distributors have published their Connection Application Forms, but in the interests of a level playing field, these have not been reviewed.) What can be assessed are those elements of the new Rules designed to assist prospective project proponents inform themselves about the process they are entering, the technical characteristics their projects will be obliged to meet, the costs entailed in an application, and the terms and conditions likely to be included in their Connection Agreement, should the project proceed to completion.

Our initial assessment was based on scoring the embedded generation connection materials identified on distributors' websites. Every distributor affected by the Rule Change was written to with our initial score, identifying where the Project Team believed their published materials fell short of the requirements of the Rules and providing a comparison with the overall performance of their peer group. Our findings were subsequently discussed with many of the distributors and the Project Team has had communications from all of the remaining distributors about their intentions in response to our assessment of their compliance as of mid-November 2014. As a result of these productive and co-operative discussions, the Project Team is confident that the assessment as at March 2015 is a robust reflection of the current compliance by distributors with the Rule requirements that can be observed.

Selecting the items reviewed

Sections 5.3A.3, Publication of Information and 5.4.5, Design of Connected Equipment of the Rules, detail the new requirements for distributors to publish Enquiry Forms, Information Packs and Registers of completed embedded generation projects. Looking at the detailed description of the contents of the Enquiry Forms, Information Packs and Registers in the Rules, there are 44 separate requirements governing these publications, only 43 of which can currently be met. The 44th refers to

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the annual update of the Register of completed embedded generation projects and can only be measured from 2015. The Project Team has identified the separate requirements, scanned distributors' websites to locate the relevant materials and reviewed the materials for compliance with the individual requirements of the Rules. For every individual requirement identified as met, a point was recorded. For example, if the review concluded the Information Pack contains the required description of "the steps a Connection Applicant ... need[s] to follow at each stage of the connection enquiry and application processes" (5.3A.3(b)(ii)), one point was recorded.

No judgement was exercised in this assessment other than asking whether the requirement in the Rules has been met. In this process, the Project Team has not assessed the materials for appropriateness or usability, although in the review of distributors' materials and our discussions with distributors these issues were raised sometimes. Where, for example, in reviewing a distributor's material the Project Team observed that the Enquiry Form could more clearly describe the class of embedded generators obliged to complete the form or the Enquiry Form could be better laid out, that observation has been privately communicated with the distributor, carefully differentiating these observations made in a private capacity and out of scope as far as this project is concerned from those within the scope of the project. Where, however, the materials inaccurately define the class of generators subject to the changed Rules or inappropriately require other actions, such as submitting an AEMO Registration Form as part of the requirements of the Preliminary Enquiry, our scoring and our communications with distributor have noted these points.

As a result of our engagement with distributors after our initial assessment, in a small number of cases the Project Team has taken into account distributors' arguments about the relative merits of their individual approaches and the more mechanistic approach used in the project, and given the distributor a score reflecting partial compliance with individual requirements. A distributor scored as partially complying with a requirement of the Rules received a score of 0.5 for each response judged to be partially compliant in the March assessment. In the small number of cases where this approach was taken, distributors' absolute scores were affected, but the ranking of distributors relative to their peers was not.

Scoring compliance

Where judgement has been exercised, it has taken the form of recognising sensible responses to the requirements of the Rules in preference to requiring literal adherence to the letter of the Rules. So the Project Team has chosen to recognise materials that, while meeting the new Rules' requirements, may not strictly comply with the letter of the Rules. For example, if the distributor's site contains a Model Connection Agreement, but the Agreement's separate to, not included in the Information Pack as strictly required by the Rules, (5.3A.3 (b) (7)), if it's part of a clearly labelled set of materials collectively making up the Information Pack, one point was recorded. But if it's elsewhere on the site and not hyper-linked in the Information Pack, a point has been withheld. And the same approach has been taken to technical requirements, minimum access standards, sample schematics and other Rules' requirements. These materials are often provided as separate documents, sometimes with hyperlinks from the Information Pack: if the material is grouped and/or linked to the Information Pack, a point has been recorded, but if the material had to be searched for, no points have been recorded.

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A response which refers the project proponent to the Rules – for example, for the process for negotiating negotiated access standards – does not, in our scoring system, meet the requirements of the Rules and a point has not been recorded. In relation to a number of technical issues, distributors have referred customers to third party documents or policies, not even including a hyperlink. For example, where a distributor has referred to the Schedules of the NER, the Victorian Electricity Distribution Code or the Green Book Code of Practice in a description of the policies it would apply, then the Project Team believes that a minimum requirement is that a clear description of where the materials are to be found or, even better, a hyperlink should be included to better meet customers' needs. At least one distributor's score has been adversely affected by this view.

The meaning of “publication”

In its Final Determination, in discussing how it balance the costs and benefits of the changes to the Rules, the AEMC focussed on the benefits that information, transparency and publication provided to both project proponents and distributors in improving the quality and reducing the costs to both parties of applications. Discussing the publication of technical standards, for example, the AEMC said:

“To further facilitate transparency, the final rule requires distributors to publish information on the technical requirements for the connection of embedded generation. The position paper noted the benefit of this additional information for distributors would be to minimise the requirement to educate prospective Connection Applicants (during the connection process) who may not be aware of these technical requirements. It would also provide Connection Applicants with a perspective of the individual distributor's technical requirements before investing time and money into the development of their business case. That is, an understanding of how the distributor's network operates and the requirements for the integration of embedded generation. This added transparency should lead to more efficient investment in embedded generation.”⁸

In our assessment of compliance, “publication” has been interpreted to mean accessible to prospective project proponents, which encompasses a large number of classes of people and is not restricted, for example, to prospective project proponents' electrical consultants. A small number of distributors made the necessary materials – particularly technical standards, but not restricted to technical standards – available on their websites, but only accessible by previously registered accredited installers. This is inconsistent with both the original intention in putting forward the Rule Change and the Project Team's understanding of the AEMC's intent in changing the Rules to make information more widely available. Further, it means that in important areas for these distributors the Project Team was unable to assess their compliance with the Rules, not being registered installers. Materials the Project Team could not identify or access have not been captured in the scores.

However, where, as a result of engagement with distributors, previously inaccessible materials have been moved to a freely accessible section of the relevant distributors' websites, this availability has been reflected in the revised score for the relevant distributors.

⁸ AEMC 2014, *Connecting Embedded Generators, Rule Determination*, 17 April 2014, Sydney, p. 55. A similar discussion can be found in this section of the AEMC's Determination relating to protection requirements, single line diagrams of connection schema, worked examples of potential costs and the Model Connection Agreements.

Section 3: Review of Model Connection Agreements

Summary

The review identified no provisions clearly breaching any requirements of the NER. However, it did identify areas a Connection Applicant should consider negotiating to achieve a more balanced outcome than that put forward in the Model Connection Agreements. Distributors' treatment of issues critical to Connection Applicants is not uniform; some distributor's approaches may be preferable to others, depending on a project's precise circumstances. While projects generally can't be moved to a distributor's area where the contracting regime is more attractive, the differences in the distributors' approaches provide possible alternative contracting models and a basis for negotiations. For example, distributors take different approaches to the maximum compensation a generator may be required to pay in the event it causes harm to the distributor's network. In negotiating on this issue in the Connection Agreement, the Connection Applicant may wish to draw on these alternative models.

Background

Herbert Smith Freehills was asked to review the available Model Connection Agreements against the requirements of the NER. They reviewed Model Connection Agreements published by:

- Ausgrid (NSW)
- AusNet Services (Vic)
- Endeavour Energy (NSW)
- Ergon Energy (Qld)
- Jemena (Vic)
- SA Power Networks (SA)
- United Energy (Vic).⁹

Herbert Smith Freehills was asked to compare the approaches taken by the distributors on a range of issues important to Connection Applicants, including:

- The allocation of risks between the distributor and the Connection Applicant
- The proposed mechanism, if any, for satisfying the distributor that the connection remains compliant with the Connection Agreement
- The quantum of any liabilities for non-performance/breach of the Connection Agreement, if an event giving rise to a liability to the distributor arises

⁹ Not all distributors had published Model Connection Agreements at the time the review was undertaken. Model Connection Agreements available only on request from the distributor or provided behind a wall on the website have also not been reviewed.

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- The proposed mechanism (for example, insurance/bond/other) for satisfying the distributor that the Connection Applicant can meet its liabilities for non-performance, if an event giving rise to a liability to the distributor arises
- The circumstances, if any other than a threat to the safe operation of the network, that allow the distributor to suspend, amend or revoke the power transfer capability included in the Connection Agreement
- The operation of any proposed reimbursement mechanism in the event that a subsequent Connection Applicant uses capacity and/or equipment funded by the Connection Applicant, considering features including the timeframes for reimbursement and the roles of each party to the Connection Agreement.

Herbert Smith Freehills were also asked to recommend approaches applicants might consider in negotiating their agreements with the relevant distributor.

The brief to Herbert Smith Freehills can be found at Appendix 1. With the exception of the discussion of the *last in, worst dressed* problem, the material that follows is based on that advice. The discussion of the *last in, worst dressed* problem, however, considers the broader issues neither acknowledged by the Australian Energy Regulator nor addressed by the AEMC in the changes to Chapter 5 of the Rules, and discusses the implications of Herbert Smith Freehills' advice on the applicability of existing state based 'pioneer schemes' to this issue for embedded generation connections.¹⁰

The Model Connection Agreements

Compliance with the NER

No provisions clearly breaching any requirements of the NER were found in the Model Connection Agreements reviewed. However, the nature of the NER's requirements in respect of offers to connect and connection agreements are not prescriptive, listing the subject areas to be addressed in the connection agreement (Schedule 5.6 of the NER), but not specifying the terms that should apply. For example, while Schedule 5.6 requires that connection agreements must address payment conditions, the time to be allowed for payment of distributor bills is not specified.

Risk Allocation and limits to generator liability

As is typical in connection agreements for larger power stations, the Model Connection Agreements reviewed present a risk allocation position that favours the distributor across a range of issues.

Distributors' risks and liabilities

- **Power Transfer Capability:** the distributors generally seek to limit their liability in respect of any failure to provide this power transfer capability at the connection point. In most of the model agreements distributors will only be liable for failure to provide power transfer capability in circumstances in which the failure is due to its negligence or bad faith.

¹⁰ AEMC 2014, *Connecting Embedded Generators, Rule Determination*, 17 April 2014, Sydney, pages 109-111

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- This has the effect of passing some of the risk of the distributor’s failure to provide that power transfer capability to the Generator.
- Two of the Model Connection Agreements reviewed include provisions that envisage the potential for compensation to be paid by the distributor to the Generator if power transfer capability fails or is limited due to certain specified events. The model agreements do not include any specified events; these will be a matter for negotiation on a case-by-case basis.
- **Constraint Risk:** The distributor’s obligation to provide power transfer capability does not extend to ensuring a particular level of export (or import) capability where that capability is affected by congestion or other issues arising in the broader network. Accordingly, the Generator bears the risk of network constraints. This is the case even where the Generator is required as a condition of its Connection Agreement to fund capital works to remove network constraints. The capital works may remove a constraint to the Generator’s operations, but the continued absence of a constraint is not guaranteed even as a result of the Generator’s payment.
- **Limitations of liability:** In addition to the immunities provided to network service providers in the National Electricity Law, typically, the terms of the connection agreements apply significant limitations on the distributors’ liability. These additional limitations generally include a disclaimer of any liability for the distributor in respect of the Generator’s financial loss (e.g. loss of revenue); and consequential loss or contractual liability to any third party, whether arising due to breach of the Generator’s contractual obligations, its negligence or otherwise.
 - By way of example, the effect of these limitations is that if the distributor breached its obligations or is negligent and, as a result, failed to provide power transfer capability, the distributor would not be liable to the Generator for the revenue it might otherwise have earned from the sale of electricity into the NEM or for any other liability it might have to a third party if that failure (for example) prevented it from generating.
 - Five of the Model Connection Agreements reviewed limit their liability to the Generator to cases of the distributor’s bad faith or negligence.
- **Monetary Caps on distributor liability:** any liability accepted by the distributor may be capped, but there is some variability in the approach taken by distributors in setting these caps. For example:
 - One distributor applies a \$1 million cap (indexed annually)
 - Two distributors apply \$5 million annual caps respectively (one of whom also applies a \$1 million cap per event)
 - By contrast one distributor caps its liability at the amount of charges it receives in the year of the claim.

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- Another distributor provides for a cap amount to be included in its connection agreement. However, the amount is not set out in the Model Connection Agreement provided.

Connection Applicant's (Generator's) risks and liabilities

- **Satisfying the distributor that the connection complies with Connection Agreement:** Generally the Model Connection Agreements do not expand materially upon the rights of testing and inspection permitted to the distributor under the NER. In one Model Connection Agreement reviewed it is anticipated that the parties will enter into an operating and maintenance protocol to coordinate ongoing testing. In all the Agreements reviewed, the Generator is required to grant the distributor access to the site for the purpose of inspection and or testing in various circumstances.
- **Responsibility for compliance with performance standards:** It is the Generator's obligation to arrange all approvals and property rights necessary for the connection infrastructure on terms acceptable to the distributor. Equally, the Generator is responsible for ensuring that the power station is capable of meeting generator performance standards as required to ensure system security.
- **Providing credit support:** Most of the connection agreements reviewed allow a right for the distributor to call for credit support upon execution of the agreement and/or at a later time. Where credit support (or additional credit support) can be called for by the distributor at a later time a trigger, such as a reduction in creditworthiness of the Generator or late payment by it of invoices, is required before the distributor can exercise that right. In addition, there is some variation around the specificity of these triggers.
- **Suspension, amendment or revocation of power transfer capability:** All the distributors reserve the right to disconnect or suspend due to the Generator's non-payment of invoices or any other breach by the Generator of its obligation under the connection agreement.
 - The distributor's right to disconnect for breach of the agreement by the Generator is generally circumscribed by a requirement to allow the Generator a cure period to remedy the breach prior to disconnection. These cure periods vary between connection agreements.
 - Other examples of suspension rights included in the connection agreements include rights of suspension to allow scheduled and unscheduled network maintenance, for repair or to facilitate the connection or servicing of another customer.
- **Generator liability for its actions:** Under a number of the Model Connection Agreements the Generator is required to indemnify the distributor against loss, liability and damages caused by its misconduct, negligence or breaches of the agreement and law. One Model Connection Agreement reviewed, for example, explicitly extends the Generator's liability to cover the distributor's liability under electricity law, including the Service Target Performance Incentive Scheme and Guaranteed Service Level obligations, arising due to Generator voltage variations, irrespective of Generator fault.

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- **Monetary Caps on Generator liability:** With the exception of one Model Connection Agreement reviewed, none of the Model Connection Agreements provide the Generator with the benefit of limitation of liability provisions such as those enjoyed by the distributors. One Model Connection Agreement reviewed provides a cap equal to the sum of \$50 million **and** any insurance proceeds the Generator is entitled to claim in respect of the relevant incident.

Negotiating the Model Connection Agreement: significant issues and better practice models

The differences in the distributors' approaches provide possible alternative contracting models. For example, distributors take very different approaches to the maximum compensation a generator may be required to pay in the event it causes harm to the distributor's network. In negotiating on this issue in the Connection Agreement, the Connection Applicant may wish to draw on these alternative models.

Herbert Smith Freehills considers a Connection Applicant should consider the following principles in their Connection Agreements:

- **Termination and disconnection:** ensuring that any right of the distributor to disconnect or suspend its connection, in circumstances other than for the immediate protection of property or people or where required by law, is subject to a reasonable notice and reasonable cure period (if triggered by Generator default) and in any event does not exceed the time required to carry out necessary works or essential maintenance.
- **Credit Support:** ensuring that any right of the distributor to call for additional credit support during the term of the connection agreement is included with clear parameters. For example the trigger (e.g. a credit downgrade) and the amount of additional support to be called for (e.g. 3 months' estimated invoices) is clearly defined.
- **Distributor Liability:** seeking to ensure that the caps and carve-outs on distributor's liability are reasonable. It is unlikely that, as a general rule, a distributor will accept liability for the Generator's lost revenue other than in specific and limited instances. However, the following principles should be considered:
 - **Bad faith/negligence:** the distributor should be liable (and indemnify the Generator where necessary) for loss suffered by the Generator as a result of the distributor's bad faith or negligence.
 - **Personal Injury/Property Damage:** consider requesting an indemnity and/or an exclusion from any liability cap, in respect of any liability incurred by the Generator from injury to a person or damage to property caused by the distributor's (or its agents' or contractors'). It will be a matter for negotiation whether loss recoverable under this indemnity must be caused by the distributor's bad faith or negligence.
- **Power Transfer Compensation:** it is unlikely that a distributor would agree to indemnify a Generator for its lost pool revenue. However, given the precedent set by two Model

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Connection Agreements reviewed, the Connection Applicant should consider specifying certain power transfer failures (e.g. disconnection or constraint due to distributor maintenance activities that weren't urgent but took place during a nominated peak period) that attract compensation in the form of specified liquidated damages. Care will be required to ensure such sums are not considered to be penalties and thus unenforceable.

- **Generator Liability:** seeking to include reasonable limitations on the Generator's liability to the distributor under the connection agreement. This might include:
 - **Types of loss:** disclaiming liability for some or all of the following: indirect, consequential or special loss, financial or economic loss, including loss of profit, loss of revenue, increased costs or liability of the distributor under statutory incentive or service level requirements etc.
 - **Cause of loss:** limiting the scope of any indemnity given by the Generator to loss caused by its breach of the agreement or law or which is wilfully or negligently caused and ensuring force majeure carve-outs are made in the Generator's favour
 - **Quantum of loss:** limiting the quantity of any indemnity to the value of the insurance required by the distributor to be held, with the value of that insurance to be set based on a reasonable assessment of the possible damage to the distributor's network.

Last in, worst dressed: reimbursement for capital works benefitting future network connections

Connection Applicants can be asked to pay for certain capital works as a condition of a Connection Offer. Precisely what capital works is more easily defined in theory than in practice. However, neither the Rule Change nor the Model Connection Agreements reviewed provide any comfort to a Connection Applicant faced with a requirement to pay for capital works as a condition of the Connection Offer.

The general principle in the National Electricity Market, illustrated by the Australian Energy Regulator's submission on the Rule Change Proposal to the AEMC, is that *load connections* may give rise to certain augmentation costs, typically recovered by the distributor through the its Regulated Asset Base. However, the costs a *generator* can be required to pay are restricted to the costs of removing network constraints to its own operations, that is, constraints to potential exports.¹¹ In envisaging Connection Applications in this way, the policy requires capital works required by *load* and *generation* connections to be clearly distinguishable one from the other, a distinction that for many embedded generation connection applications cannot be sustained.

As well as requiring a difficult in practice distinction between *load* related and *generation* related capital works, this statement of principle is inconsistent with project proponents' experiences.

¹¹ In Victoria, even the latter category – removing network constraints – generally should not be charged to an Applicant given the continuing application of the Essential Services Commission's Guidelines relating to capital contributions from generators, ESCV Electricity Industry Guideline No. 15.

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Embedded generation proponents have experienced demands to pay for capital works not restricted to removing constraints on potential exports. Further, project proponents have faced capital works funding requirements even when no exports are proposed in the operation of the generator and where no exports are feasible, given the design and configuration of the generator.

Even assuming the principle relied on by the Australian Energy Regulator formed the basis for all capital works requests, from a project proponent's position the policy is difficult to enforce: the capital works required as a condition of a Connection Offer are not typically labelled as applying to either to the *load connection element* of that Connection Application or its *generation connection element*. Distinguishing compliant capital works requirements from non-compliant capital works requirements is time consuming, difficult and expensive and, where the capital works funding request is a condition of a Connection Agreement being offered, may not be presented as being negotiable.

Finally, the policy works on a *last in, worst dressed* basis. A project proponent intending to connect to a constrained area of the network can be asked to fund lumpy capital works significantly in excess of those works required to meet its own needs.¹² Recovering the benefits to future network connections – both load and generation – from its investment requires the project proponent to negotiate with the distributor as the AEMC advises.¹³

However, a project proponent deciding to negotiate a reimbursement policy with the distributor starts from scratch. The Model Connection Agreements reviewed provide no mechanism for the recovery of lumpy capital expenditures required to be made by a Connection Applicant, the benefit of which accrues to future connections. None of the connection agreements reviewed contemplate refunding any of the costs of capital works funded by the generator where a subsequent connection uses capacity or equipment funded by the original project proponent.

Further, while certain of the distributors' AER approved connection policies include the terms of their 'pioneer schemes' which provide for the reimbursement of capital contributions made by Connection Applicants up to 7 years after their connection to the network, this is unhelpful to Connection Applicants looking for reimbursement of charges incurred by generation load. The terms of these policies do not adequately provide for the operation of the reimbursement system in the context of the connection of an embedded generator because the schemes refer to the connection of customer 'load' rather than the connection of generation. Further, the language and the construction of the AER's guideline which governs 'pioneer schemes' is directed at reimbursements for the costs incurred in connecting customer load, not the capital costs imposed on generation connections. Given the AER's position that generation connections are only charged for a very narrow class of capital works, this interpretation of the AER's Guideline is internally consistent, if not reflecting actual behaviour.

Neither project proponents' widespread experiences nor the limitations of the AER's Guideline and the application of the current pioneer schemes are well understood, including by the relevant regulatory authorities.

¹² In Victoria, Guideline 15 includes a formula that pro-rates the costs to be paid on the basis of the Applicant's requirements.

¹³ AEMC 2014, *Connecting Embedded Generators, Rule Determination*, 17 April 2014, Sydney, pages 109-110

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In its Final Determination, the AEMC deferred consideration of the wider issues raised by project proponents' experiences and the feedback it received on the operation of 'pioneer schemes' to some other forum on a future date. Nothing in the Model Connection Agreements suggests the issues will be resolved in the absence of this review.

Section 4: Distributors' Technical Standards

Summary

Even within jurisdictions, distributors take materially different approaches to the standards that are to be applied by project proponents considering connecting embedded generation to their network, as shown in the Table on page 31.

- The four Victorian distributors' approaches range from AusNet Services' approach – which refers to the National Electricity Rules, the Victorian Electricity Distribution Code and AusNet Services Rules – to that taken by Jemena and United Energy – which refer to the National Electricity Rules, the Victorian Electricity Distribution Code and the Victorian Service Installation Rules (with relaxed framework), Australian Standards and their own standard.
- Citipower/Powercor's list of applicable standards is shorter than that given by Jemena and United Energy, but it includes relevant international standards for which a reference list is included in its Information Pack, although that list is clearly marked as not exhaustive.
- NSW distributors show a similar range of differences in approach to Victorian distributors.
- In Queensland, Energex and Ergon share an approach to standards.

Only a small number of distributors are identified in this summary table as requiring improvements to the materials published.

In the individual assessments in Appendix 2, however, in several cases Wood & Grieve identified that even a reasonable project proponent would need the services of an experienced electrical engineer at an early stage of the project's lifecycle to interpret the distributor's requirements and, in some cases, even to respond to the requirements of the Enquiry Form. We think this outcome is inconsistent with the AEMC's intentions in making the Rule Change, particularly in the very early stages of the project corresponding with the Enquiry Form being lodged.

Wood & Grieve was asked what, in their view, were the prospects of achieving one uniform standard amongst DNSPs, and, of the standards published, which one(s) might provide a foundation for a future uniform standard. On the basis of the existing low level of alignment, even within jurisdictions, you could reasonably conclude that the prospects for alignment in the immediate to short term are low. However, if alignment was to occur, Wood & Grieve view SA Power Network's technical materials as their preferred foundation for a uniform standard.

Background

Wood & Grieve was asked to review the technical materials the Rule Change required to be published and to answer the following questions.

- Are technical standards easily accessible on the distributor's website and where are they?
- Does the distributor comply with the National Electricity Rules, as specified under NER 5.3A.3?

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- What sort of standards are the standards published (own DNSP, reference to NER schedules, Australian Standards, or other)?
- Are these standards practical and useful, and what improvements can be made?
- Can this distributor's standards be aligned with other distributors' standards?

Finally, Wood & Grieve was asked what, in their view, were the prospects of achieving one uniform standard amongst distributors, and which one(s) might provide a foundation for a future uniform standard.

Wood & Grieve's review was undertaken from January 2015 and completed in April 2015. Over that time the materials on some distributors' websites changed and some websites were updated. A number of distributors made changes to their materials between December and early February in response to our initial assessment of their performance against the requirements of the Rule Change, while others have made more recent changes, both in response to our feedback and reflecting longer term improvement programs. Wood & Grieve's assessment is based on materials that may differ from those materials considered in our November and February/March scores. As a result, our assessment – which looked at the availability of the required materials – and theirs – which looked at availability among a range of other factors – are not directly comparable.

State and DNSP	Documents reviewed	Are technical standards easily accessible on the DNSP's website and where are they?	Does the DNSP comply with NER, as specified under NER 5.3A.3?	What sort of standards are they (own DNSP, reference to NER schedules, Australian Standards (AS), or other)?	Are the standards practical and useful, and what improvements can be made?	Can this DNSP's standards be aligned with other DNSPs' standards?
Victoria						
AusNet Services	<ul style="list-style-type: none"> Guidelines for the Connection of Registered Embedded Generators 	Yes (Website)	Yes	NER, VEDC, AusNet Services Rules	Yes	
CitiPower/Powercor	<ul style="list-style-type: none"> Customer Guidelines for Low Voltage Connected Embedded Generation 	Yes (Website)	Yes	VEDC, AS, International		
Jemena Electricity Networks	<ul style="list-style-type: none"> Embedded Generation Guidelines JEN GU 0020 	Yes (Website)	Yes	NER Guidance, EDC, VSIR with relaxed framework, AS and own standard	Yes	Aligned with United Energy
United Energy	<ul style="list-style-type: none"> Embedded Generation Network Access Standards Document No. UE ST 2008 	Yes (Website)	Yes	NER Guidance, EDC, VSIR with relaxed framework, AS and own standard	Yes	Aligned with Jemena
Tasmania						
TasNetworks	<ul style="list-style-type: none"> Guideline for the Connection of Embedded Generators to the TasNetworks Distribution Network NG R PD 08 	Yes (Website)	Yes	NER, TAS Electricity Code, ENA, AS and own standard	No - more details required	

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State and DNSP	Documents reviewed	Are technical standards easily accessible on the DNSP's website and where are they?	Does the DNSP comply with NER, as specified under NER 5.3A.3?	What sort of standards are they (own DNSP, reference to NER schedules, Australian Standards (AS), or other)?	Are the standards practical and useful, and what improvements can be made?	Can this DNSP's standards be aligned with other DNSPs' standards?
South Australia						
SA Power Networks	<ul style="list-style-type: none"> • Network Information for Contractors and Customers - NICC 270 • Connection of large embedded generation • SA Power Networks Technical Standard - TS 131 • Large solar PV above 200 kW or rotating generating 	Yes (Website)	Yes	Combination of DNSP, NER, EDC, EMTC, AS SA Legislation and SPAN documents	Yes	
Queensland						
Energex Limited	<ul style="list-style-type: none"> • Customer Standard for Small to medium scale embedded Generator No. 03972 V2 - 11/01/2012 	Yes - relatively easy. Had to use search to find	Yes. Refer to information pack Embedded Generators >5MN	Combination of own standard, DNSP for South East Queensland, NCR and AS	Yes	This is partially done for QLD DNSP This standard is aligned with Ergon Energy Standard

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State and DNSP	Documents reviewed	Are technical standards easily accessible on the DNSP's website and where are they?	Does the DNSP comply with NER, as specified under NER 5.3A.3?	What sort of standards are they (own DNSP, reference to NER schedules, Australian Standards (AS), or other)?	Are the standards practical and useful, and what improvements can be made?	Can this DNSP's standards be aligned with other DNSPs' standards?
Ergon Energy Corporation	<ul style="list-style-type: none"> Standard for Connection of Embedded Generators in Ergon Energy Distribution Network Parallel operation connection to EE distribution network IMW to, however not exceeding 5MW 	Yes (Website)	Yes	NER, AS, AMEC Standards	Yes	This is partially done for QLD DNSP This standard is aligned with Energex Limited Standard
ACT						
ActewAGL Distribution	<ul style="list-style-type: none"> Guidelines for Embedded Generator Connection to ActewAGL's low voltage (LV) Network - March 2013 	No (Website) Quite difficult to find this information	Yes	NER, AS, ActewAGL Service and Installation Rules	Partially, as this guideline only covers generators	

State and DNSP	• Documents reviewed	Are technical standards easily accessible on the DNSP's website and where are they?	Does the DNSP comply with NER, as specified under NER 5.3A.3?	What sort of standards are they (own DNSP, reference to NER schedules, Australian Standards (AS), or other)?	Are the standards practical and useful, and what improvements can be made?	Can this DNSP's standards be aligned with other DNSPs' standards?
NSW						
Ausgrid (ACT & NSW)	<ul style="list-style-type: none"> • NS19GB - Guidelines for Rotating Machine connected to Ausgrid Network Oct 2014 • NS238 Supply Quality Feb 2014 • NS178 Secondary System requirements for major substations • ES11 Requirements for connection of embedded generators July 2011 	Yes (Website)	Yes	NER, AusGrid Network Standards, ACT Service and Installation Rules Standards are nominated	Consideration should be given to enhancing the embedded generation guideline with specific requirement for 30kW to 5MW	No
Endeavour Energy	<ul style="list-style-type: none"> • Embedded Generators 5MW and greater Feb 2015 	No - not available for generator up to 5MW	Yes - nominated in embedded generator 5MW and greater application guidelines	NER and Endeavour Energy Rules	Consideration should be given to creating a guideline with specific requirements for 30kW to	No

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State and DNSP	• Documents reviewed	Are technical standards easily accessible on the DNSP's website and where are they?	Does the DNSP comply with NER, as specified under NER 5.3A.3?	What sort of standards are they (own DNSP, reference to NER schedules, Australian Standards (AS), or other)?	Are the standards practical and useful, and what improvements can be made?	Can this DNSP's standards be aligned with other DNSPs' standards?
Essential Energy	<ul style="list-style-type: none"> Connection Process: For negotiated HV Retail Customer and Embedded Generator > 30KW April 2015 	Yes (Website)	Yes	NER, AS and service and Installation Rules of NSW	Yes	

Section 5: Observations and next steps

The new Rules: observations

Monitoring matters

Measured compliance of less than 50 per cent by around sixty per cent of distributors six weeks after the implementation date suggests weaknesses in the current approach to regulatory oversight.

There's no evidence that any potential project proponent suffered as a result of the low level of compliance of a number of distributors, but, in relying only on the actions of private parties to ensure compliance by instigating a complaint about a specific Connection Application, the credibility of the regulatory regime is diminished. Not all Rule Changes will have the benefit of the follow up provided by the initiators with the support of the Consumer Advocacy Panel and from some private firms that this Rule Change has received. Connection Applicants have a number of disincentives to complaining formally about the operation of the Rules, as we argued in the original Rule Change Proposal – delays to the already protracted process can impose significant costs on Connection Applicants, and, rightly or wrongly, some Connection Applicants that deal repeatedly with the same distributor are concerned about the treatment of future projects in the event that they pursue a complaint.

There's also an issue of the equity of the regulatory burden where some distributors comply and others' compliance is markedly lower. Interestingly, those distributors which showed the lowest level of compliance in November 2014 are all state owned; privately owned distributors' measured compliance was very high, both absolutely and in comparison to all distributors.

Improving market participants' understanding of the rules

Although the AEMC communicates its decisions using a range of materials – a detailed discussion of the process and rationale in its Determination, a marked-up version of the Rules to demonstrate the specific changes introduced, a high level guide to the changes in a Frequently Asked Questions release and, for this Rule Change, a graphic of the new connection process, different strategies may be needed to inform affected market participants about the implications of changes to the NER to ensure compliance by the implementation date.

The Project Team found a surprising level of confusion among distributors about elements of the Rule Change, given that potential changes had been under discussion for two years and that many of the distributors had attended, and been represented by their industry body, at workshops about the proposals hosted by the AEMC. Since our initial assessment we have reviewed materials by distributors that have inaccurately described the coverage of the new Rules, the interaction between the Rules and AEMO's registration procedures and that, in other material ways, have been inconsistent with the new requirements.

User friendliness or, who is the customer?

A truly customer centred approach is still some distance away, although, as we discuss in the following section, there have been improvements in the ease of finding materials on some distributors' websites and some distributors have made real efforts in their materials to address a wider, less technical audience. A key objective of the customer led Rule Change was to improve

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certainty and clarity in the connection process, so that project proponents can make efficient investment decisions when considering connecting generators to distribution networks. The Project Team did not evaluate the materials for user-friendliness, simplicity of language and technical accuracy. In practice, however, these issues can present additional barriers to the connection process where the materials intended to assist project proponents are obscure or deeply steeped in industry jargon.

Areas for future work

Addressing the *last in, worst dressed* problem

The issues raised by the frequent requirement for embedded generators to make capital contributions to fund network investments remain to be addressed.

The current regulatory and contractual approaches to this issue are inadequate. At present, the AER appears to believe that only limited requests, consistent with the principle that generators do not pay to connect, are made. This belief is inconsistent with project proponents' experiences.

However, the alternative contractual negotiation route, recommended as a remedy by the AEMC, looks very difficult. Distributors' Model Connection Agreements are silent on this issue, but even if reimbursement is negotiated, effective monitoring and enforcement by the project proponent would appear to be very difficult, particularly in a meshed network such as an urban or CBD environment.

Finally, the advice the Project Team has received is that 'pioneer schemes' are not designed to reimburse the costs borne by generation connections, so relying on this regulatory route in its current form is not a robust basis for ensuring that projects bear only the appropriate costs.

Why do the costs of connection differ so widely?

The new Rules, in requiring distributors to publish illustrative costs for connection applications and for connections also provide an insight into individual distributor's internal processes and costs, as well as the cost of connecting across distributors' territories.

The Project Team noted that cost estimates tended to vary between distributors, both in nature and scope. Enquiry fees, defined by the AEMC as a fee intended to cover the 'reasonable' costs incurred by a distributor, can differ very significantly from one distributor to another, surprisingly given that the Project Team anticipates that the activities required (and the grade and seniority of the personnel undertaking them) would be more similar than not.

The insights from comparing distributors' charges can be valuable to embedded generation projects, particularly where the project proponent has the choice to contract externally in preference to using the distributor's services, and also to regulators and others in seeking to assess relative cost levels and comparative efficiency. The value to project proponents, however, is limited by the absence of any choice in their supplier in the early stages of a project's lifecycle – competitive services, where available, are typically restricted to the construction phase.

Moving to consistent standards

The Rule Change, which required published and publicly available technical standards, lays the basis

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for our longer term aspiration of national, or at the very minimum NEM-wide technical standards. This aspiration is shared by the Clean Energy Council and the AEMC, among others. In its Final Determination on the Rule Change, the AEMC recognised in light of the work undertaken by AECOM for the Department of Industry (formerly DRET), that Australian standards may be created in the future.¹⁴

Wood & Grieve's observations on the degree of alignment displayed by distributors' published standards suggest that the level of alignment between distributors' standards even within a single jurisdiction is currently very low (Section 4). Although we appreciate that differences in distributors' standards have emerged to reflect different organisations' priorities and risks, the lack of standardisation imposes real costs on project proponents and the economy. From a national perspective, these additional costs may not be outweighed by the benefits to the individual firm of imposing higher standards than its peers.

Standardisation will lower project costs and should increase innovation among project proponents. In the absence of a considered move towards standardisation, the costs and time required for innovations in energy generation, distribution and consumption to be introduced into the market will be much higher than they should be, to the detriment of consumers.

¹⁴ AECOM Australia, *Mid-Scale Embedded Generation Connection Standards - Feasibility Study Final Report*, 2013, www.scer.gov.au/workstreams/energy-market-reform/demand-side-participation/embedded-generation/

Appendix 1: The review of the Model Connection Agreements

The contract review brief

Herbert Smith Freehills was asked to review the Model Connection Agreements as follows:

1. Each of the *Model Connection Agreements* included in the Information Packs required by 5.3A.3 of the NER should be reviewed for compliance with the requirements for a Connection Agreement specified in the NER, assuming that any offer to connect an embedded generator is substantially based on the *Model Connection Agreement*.
2. Considering both the requirements of the NER and commercial contracting practices, for each of the *Model Connection Agreements*, in your opinion should a well advised *Connection Applicant*:
 - a. Accept the *Model Connection Agreement* as proposed?
 - b. Propose amendments to the *Model Connection Agreement* only where necessary to reflect the particular circumstances of the Applicant's specific project?
 - c. Propose material amendments to the *Model Connection Agreement*?
 - d. Put forward an alternative agreement as the basis for the Connection Agreement and, if the alternative is unacceptable, walk away?
3. For the *Model Connection Agreements*, compare:
 - a. The allocation of risks between the distributor and the *Connection Applicant*
 - b. The proposed mechanism, if any, for satisfying the distributor that the connection remains compliant with the Connection Agreement
 - c. The quantum of any liabilities for non-performance/breach of the *Connection Agreement*, if an event giving rise to a liability to the distributor arises
 - d. The proposed mechanism (insurance/bond/other) for satisfying the distributor that the *Connection Applicant* can meet its liabilities for non-performance, if an event giving rise to a liability to the distributor arises
 - e. The circumstances, if any other than a threat to the safe operation of the network, that allow the distributor to suspend, amend or revoke the power transfer capability included in the *Connection Agreement*
 - f. The operation of any proposed reimbursement mechanism in the event that a subsequent *Connection Applicant* uses capacity and/or equipment funded by the *Connection Applicant*. The comparison should consider features including the timeframes for reimbursement and the roles of each party to the *Connection Agreement*.

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A copy of their advice is available on request.

Appendix 2: Distributors' Technical Requirements: Detail Provided

The material following is Wood & Grieve's assessment of each of the distributor's required technical materials, looking at whether the level of detail provided is acceptable – that is, provides a worthwhile guide to a project proponent – or whether it's unacceptable, in particular by providing too little guidance to a potential user about the required performance of the connected equipment.

AusNET Services

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	24 February 2015
WGE Revision No:	0
DNSP	AusNET
Project Name:	Guideline for the connection of registered embedded Generators
Version/Date:	Issue 1 dated 29 September 2014

Technical Requirement	Acceptable Detail	Insufficient Detail
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and and reasonable.

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Citipower/Powercor

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	24 February 2015
WGE Revision No:	0
DNSP	Citipower
DNSP Document Name:	Customer Guidelines for Low Voltage Connected Embedded Generation
DNSP Version/Date:	Version 2 dated 16 April 2013

Technical Requirement	Acceptable Detail	Insufficient Detail
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network		✓
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate and reasonable proponent will need an experienced engineer to interpret the requirements and provide the required details. There will be some negotiations required.

Limited information related to Augmentation and limiting of fault level contributions Citipower could provide more information in this area

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Jemena Electricity Networks

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	24 February 2015
WGE Revision No:	0
DNSP	Jemena
Project Name:	Embedded Generation Guideline (JENGU 0020)
Version/Date:	24 March 2013

Technical Requirement	Acceptable Detail	Insufficient Detail
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and reasonable.

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United Energy

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	24 February 2015
WGE Revision No:	0
DNSP Project Name:	United Energy Embedded Generation Network Access Standards (UE ST 2008)
Version/Date:	28 June 2012

Technical Requirement	Acceptable Detail	Insufficient Detail
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and and reasonable.

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TasNetworks

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	24 February 2015
WGE Revision No:	0
DNSP	TasNetworks
Project Name:	Guideline for the connection of Embedded Generators to TAS Networks Distribution Network
Version/Date:	Version 2 dated July 2014

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes		✓
Fault level management principles		✓
Reactive power capability and power factor correction		✓
Power quality and how limits are allocated		✓
Responses to frequency and voltage disturbances		✓
Voltage control and regulation		✓
Remote monitoring equipment, control and communication requirements		✓
Earthing requirements and other relevant safety requirements		✓
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network		✓
Commissioning and testing requirements		✓

Outcome of Review

Technical information is deemed to be limited and the proponent will need to engage with TAS Networks to complete connection application.

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SA Power Networks

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	27 April 2015
WGE Revision No:	0
DNSP	SA Power Networks
DNSP Document Name:	Technical Standard -TS 131
DNSP Version/Date:	dated 01 October 2014

Technical Requirement	Acceptable Detail	Insufficient Detail
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and easy to follow.

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Energex

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP	Energex Limited
Project Name:	Customer Standard for Small to medium scale embedded Generator
Version/Date:	No. 03972 V2 - 11/01/2012

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and reasonable.

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Ergon Energy

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP	Ergon Energy
Project Name:	Standard for Connection of Embedded Generators in Ergon Energy Distribution Network
Version/Date:	Standard STNW1165 Version 3

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation		✓
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network		✓
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate and reasonable proponent will need an experienced engineer to interpret the requirement and provide the required details.

Voltage control and regulation - limited information

Augmentation details are not mentioned in this document. Maybe in other locations however could not find it in the application or enquiry form.

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ActewAGL

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP	ActewAGL
Project Name:	Embedded Generator Connection to ActewAGL's low voltage (LV) Network
Version/Date:	Initial Issue March 2013

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes	✓	
Fault level management principles		✓
Reactive power capability and power factor correction	✓	✓
Power quality and how limits are allocated		✓
Responses to frequency and voltage disturbances		✓
Voltage control and regulation		✓
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements		✓
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network		✓
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be insufficient

Fault level management principles are not clearly documented with limited information.

Argumentation details or basis of cost not mentioned other than costs will be provided to applicant during the process.

Power quality, responses to frequency and voltage disturbances, voltage control and earthing - more information could be provided.

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AusGrid

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP Project Name:	AusGrid (NSW & ACT) - NS19GB - Guidelines for Rotating Machinery connected to Ausgrid Network Oct 2014 - NS238 Supply Quality Feb 2014 - NS178 Secondary System requirements for major substations - ES11 Requirements for connection of embedded generators July 2011
Version/Date:	As per above

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be more generic for distribution network and not specific for embedded generation and DSPN specific requirements. Suggest more comprehensive technical embedded generation standard or guideline be established.

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Endeavour Energy

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP Project Name:	Endeavour Energy Embedded Generators 5MW and Greater
Version/Date:	0.2 February 2015

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes		✓
Fault level management principles		✓
Reactive power capability and power factor correction		✓
Power quality and how limits are allocated		✓
Responses to frequency and voltage disturbances		✓
Voltage control and regulation		✓
Remote monitoring equipment, control and communication requirements		✓
Earthing requirements and other relevant safety requirements		✓
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network		✓
Commissioning and testing requirements		✓

Outcome of Review

Technical information is deemed insufficient information to be provide to access. Reference to negotiated connection service and a technical review request. Consideration should be given to establishing a guideline for all technical aspects for generators between 30kW and 5MW

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Essential Energy

WGE Project Name	Embedded Energy Sub Committee
WGE Project No:	BD11084-MEL-E
Date:	16 April 2015
WGE Revision No:	0
DNSP Project Name:	Essential Energy Connection Process for negotiated HV Retail Customer Connections and Embedded Generator > 30KW
Version/Date:	CEOP8079 Issue 9 10 April 2015

Technical Requirement	Acceptable Detail	Insufficient Detail (not prescriptive enough)
Protection systems and protection schemes	✓	
Fault level management principles	✓	
Reactive power capability and power factor correction	✓	
Power quality and how limits are allocated	✓	
Responses to frequency and voltage disturbances	✓	
Voltage control and regulation	✓	
Remote monitoring equipment, control and communication requirements	✓	
Earthing requirements and other relevant safety requirements	✓	
Circumstances in which augmentation may be required to facilitate integration of an embedded generating unit into the network	✓	
Commissioning and testing requirements	✓	

Outcome of Review

Technical information is deemed to be accurate, comprehensive and reference to other relevant documents are provided.