5 May 2006

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**VIA EMAIL: wpcdraftdecision@era.wa.gov.au**

Dear Alistair

**SECOND SUBMISSION, *FROM SMALL GENERATORS PERSPECTIVE*, ON DRAFT TECHNICAL RULES FOR WESTERN POWER'S SOUTH WEST INTERCONNECTED NETWORK**

Thank you for the opportunity to comment on the Draft Technical Rules associated with the proposed Network Access Arrangement.

This second submission from Verve Energy is made from the perspective of the impacts of the Draft Technical Rules on small generators, as distinct from the other submission from Verve Energy that is mainly from the perspective of impacts on large generators.

As well as its portfolio of large generators, Verve Energy installs, operates and maintains a range of small generators using a variety of renewable energy sources (eg wind, solar, biomass), diesel engines and a variety of electricity generator types (synchronous and induction generators as well as inverters). Through Noel Schubert, Verve Energy is a member of the Small Generator Working Group (SGWG); formed in October 2005 to allow input from the small generator "industry" to the Technical Rules Committee (TRC) on earlier drafts of the Technical Rules.

The SGWG met only once on 20 October 2005 and discussed some, but not all, of the issues submitted by members of the group as given in Attachment 1. Attachment 2 provides a summary of actions taken by Western Power following the above meeting. The 24 August 2005 Draft Technical Rules were then revised by Western Power and on 22 November 2005 the SGWG was given less than two days in which to review and comment on the new November 2005 draft. Some comments on this draft made by one member of the SGWG are given in Attachment 3.

Since that time members of the SGWG have not heard from the ERA, TRC, Office of Energy or Western Power about what has been happening with revision of the technical rules. Some members are a little surprised and concerned that they were not kept informed of developments or the 11 April notices and releases.



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**Further Comments on the Draft Technical Rules**

A number of the issues raised previously to the TRC and Western Power (see Attachments 1, 2 & 3) have been addressed in the latest (11 April 2006) version. However there are still a significant number of those earlier issues that have not been addressed. There are also cases in the current draft rules where the latest revisions have introduced new technical inconsistencies or issues, or lack of clarity on what applies to each of the large variety of types, sizes and application types of small generators.

Comment on specific draft rules in the current version is not provided in this submission but can be made available soon.

**Future Consultation with the SGWG**

The process undertaken to date by the TRC to consult with the ERA and Western Power on the drafts of the Technical Rules involved a series of face-to-face consultations in meetings. The SGWG also seeks such face-to-face meetings because they are a far more effective and efficient way to consult on such complex technical issues than trying to resolve them only in writing through submissions and responses.

The SGWG does not consider that the current membership of the Technical Rules Committee will adequately represent the small generator industry without ongoing input from the SGWG.

To date opportunities for consultation with the SGWG in a productive way have been limited and very time-constrained. As a result, there are still important shortcomings with the 11 April draft of the Technical Rules and we hope that the desire to finalise the Technical Rules by a certain time does not override the need to implement good, code-compliant rules that allow opportunities for small generators to participate competitively in the electricity market.

As a member of the SGWG we look forward to the opportunity to consult further with the ERA before it formulates its final decision on the Technical Rules, as stated in Item 195 of the "Decision and Explanatory Memorandum on the Draft Technical Rules ..." document published by the ERA on 11 April 2006.

If the Technical Rules are implemented before finalising the resolution of all issues that unreasonably affect small generators, then the SGWG requests that a formal consultative process continue between the ERA, Western Power and the SGWG (via the Technical Rules Committee if appropriate) until such time as suitable amendments to the rules are complete and implemented.

Thank you again for the opportunity to comment on the Draft Technical Rules.

Yours sincerely

**GREG DENTON**
**GENERAL MANAGER**
**TRADING AND SUSTAINABLE ENERGY**

# Attachment 1

(Section numbers in this attachment refer to the 24 August 2005 version of the Draft Technical Rules)

Office of Energy
Government of Western Australia

# Attachment 1 - Small Generators Working Group • Meeting No. 1
## Issues Raised on Chapter 3 of the Proposed Technical Rules

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| 1 | 3.2, 3.4 and 3.5 | All in the above sections | N. Schubert | Annotated changes (numerous) given to Networks on 23 August 2005 have not been incorporated into the current draft Technical Rules.<br><br>**Amendment Suggested by Proponent**<br><br>Networks to incorporate agreed changes into Technical Rules as part of the overall revision. | | |
| 2 | 3.2.4.1 (a) 3 | Reactive Power Capability | N. Schubert (on behalf of Craig Carter) | This paragraph does not make it clear whether or not fixed power factor operation is acceptable for inverter/converter connected generation equipment. Note that all inverter connected wind turbines on Regional Power's distribution networks operate at a preselected fixed power factor, which can be reprogrammed at any time within the specified range of +-0.95pf.<br><br>**Amendment Suggested by Proponent**<br>Consider what is reasonable and revise relevant clause(s). | | |
| 3 | 3.2.4.3 (e) | Generating Unit Response to Disturbances in the Power System | N. Schubert (on behalf of Craig Carter) | It is not clear in this Section whether non-synchronous generators includes inverter/converter connected generators or double-fed induction generators which may have voltage control capability (simple induction generators don't have voltage control capability). Where a non-synchronous generator has voltage control capability, it may be absorbing reactive power after the clearance of the fault, if its terminal voltage is high, eg where clearance of the fault has removed load.<br><br>Where non-synchronous generators have been programmed to operate at a fixed absorbing power factor (eg Bremer Bay Enercon E-40 WTG is set to operate at 0.95pf absorbing) to minimise their impact on voltage, then it is entirely appropriate that they continue to operate at the same power absorbing power factor after the fault has been cleared. | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| | | | | The last paragraph under the heading '*Continuous uninterrupted operation'* immediately following Section 3.2.4.3(e), is inconsistent with Section 3.2.4.3(e), as it requires generators other than synchronous generators to return to pre-fault MVAr within 200ms after the voltage has returned to between 80-110% of nominal voltage.<br>If the pre-fault reactive power flow is into the generator (absorbing) then this paragraph requires it to stay absorbing after the fault, which is inconsistent with Section 3.2.4.3(e).<br><br>**Amendment Suggested by Proponent**<br>This Section should apply to induction generators only or add the following words in italics:<br><br>"…….shall not absorb reactive power from the grid, *if the MVA output of the generator is further reducing system voltages that are already under the desired level,* and the absorption, if any, of (delete **inductive**) reactive power has to be terminated within 200ms after clearing of the fault. Revise relevant clause(s). | | |
| 4 | 3.2.4.5 | Loading Rates | N. Schubert (on behalf of Craig Carter) | Note: Wind and solar PV generators would never comply with a 15% per minute loading/unloading rate.<br><br>**Amendment Suggested by Proponent**<br><br>Consider what is reasonable and revise relevant clause(s). | | |
| 5 | 3.2.4.10 | Generator transformer - Tapping | N. Schubert (on behalf of Craig Carter) | Note: Wind turbine step-up transformers do not normally have on-load tap-changing.<br><br>**Amendment Suggested by Proponent**<br><br>Consider what is reasonable and revise relevant clause(s). | | |
| 6 | 3.2.5.3 | Turbine control system – under the heading "For Non- | N. Schubert (on behalf of Craig Carter) | Wind turbines with blade pitch control do not normally have a control algorithm that reduces their output power when frequency rises above some deadband level | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
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| | | Dispatchable generating units" | | greater than 50Hz. This section may be expressing a desired performance but does not reflect the capability of current wind turbines on the market. Over-frequency power reductions can be easily achieved by setting over-frequency trip settings on individual wind turbines of a wind farm at different levels of over-frequency so that the total power from the wind farm is reduced progressively as frequency rises above say 51Hz or 52 Hz.<br><br>**Amendment Suggested by Proponent**<br>Non-dispatchable generating units with technologies that intrinsically allow control of power to facilitate frequency control, are required to be equipped with such controls. Non-dispatchable generating units without technologies that intrinsically allow control of power to facilitate frequency control, may be required to set over-frequency trip settings on individual generator units at differing levels, if there are multiple generator units, so that there is a progressive reduction of active power as system frequency increases above an agreed deadband limit.<br><br>Revise clause(s). | | |
| 7 | 3.2.5.4 | Excitation Control System – Control Strategy | N. Schubert (on behalf of Craig Carter) | The second paragraph should apply to dispatchable generating units only. Non-dispatchable generating units would nearly always produce unacceptable voltage fluctuations if operating with a power factor equal to the power factor of the peak feeder load.<br><br>**Amendment Suggested by Proponent**<br><br>The second paragraph of this Section should be changed to read:<br><br>"When a ***dispatchable*** generator connected to the distribution system is supplying power to *Western Power* for generation support, the normal operating mode shall be such that each ***dispatchable*** *generating unit* is set to maintain a constant power factor ……".<br><br>A third paragraph should be added to this Section, which should read: | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| | | | | "When a **non-dispatchable** generator connected to a distribution system is supplying power to western Power for generation support each **non-dispatchable** generating unit may be set to maintain a constant power factor (+-0.05 or greater), if the selected constant power factor reduces any voltages variations and voltage flicker produced by the non-dispatchable unit to acceptable levels." | | |
| 8 | 3.4.2.1 | Minimum Standard of Protection Equipment | N. Schubert | The requirement that all protection equipment must at least comply with IEC Standard 255 is unnecessarily prescriptive for many small generator installations and is a barrier to entry for such generators. There are proprietary control and protection systems on the market that are in common use for small generator applications, and which can achieve adequate reliability of control and protection commensurate with the size of the generators relative to their mains connection capacity. These may not be IEC 255 compliant, but if they achieve the performance requirements sought, singly or by duplication if necessary, then they should be acceptable.<br><br>**Amendment Suggested by Proponent**<br><br>Amend all necessary clauses to allow non-IEC 255 compliant protection equipment to be used where it meet specified performance requirements commensurate with the importance of the protection function taking into account risks, consequences and which party is at risk, rather than specifying IEC 255 compliance as a blanket requirement for all small generators. | | |
| 9 | 3.4.2.14 &.15 and perhaps other clauses | Details of Proposed User Protection, & Settings | N. Schubert | The specified times (12 months, 65 business days) in these clauses are unreasonably long for small projects that could be completely implemented in less than 6 months if reasonable turn-around was achieved by Networks. These requirements probably assume transmission connected generators rather than small distribution connected generators.<br><br>**Amendment Suggested by Proponent** | | |

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| | | | | In revising section 3.5 to make it complete and self-contained for small generators, include reasonable times for review and approval of protection and other details. | | |
| 10 | 3.5 | General Comments | R. Bird | 3.5 should be complete in itself and needs to cover such areas as application, synchronising, SCADA, prior to testing requirements and testing and commissioning etc.<br><br>The applicable sections in the balance of Chapter 3 would be totally unrealistic for sets as small as 30KVA.<br><br>**Amendment Suggested by Proponent**<br>Write relevant sections in 3.5 for these and others areas so that it is a plain, complete and simple specification for such applications. | | |
| 11 | 3.5 (and its references to 3.2 and 3.4) | General Introductory Comments | N. Schubert | The Small Generators Working Group (SGWG) is seeking technical rules, guidelines and an approval and connection process that is "No more onerous than is really necessary". To date they have been too onerous for many applications and thus constitute a barrier to entry for many of the wide range of applications in the market.<br>The existing rules and processes required by Network Policy NP 2005 (Noted for revision and attachment to the Technical Rules in TRC Issue # 75) are recognised as being too onerous by both the small generator industry and by Networks.<br>The new proposed Technical Rules are also more onerous than necessary for many applications and the SGWG appreciates this opportunity to review and recommend revision of them in a consultative manner.<br><br>**Amendment Suggested by Proponent**<br>Rather than seek at this stage to revise the current draft Technical Rules that have been developed by a top-down approach – requirements for large transmission-connected generators modified to apply to small distribution-connected generators – it is recommended that a bottom-up approach be used to develop the requirements for small generators | | |

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| | | | | (30 kVA upwards to 10 MW for the most common categories of mains parallel generation) and then use these newly developed requirements to sense check what is proposed by the draft Technical Rules. We expect there will be a significant difference between the two for common applications.<br>Attachment 1 proposes the categories that should be examined separately and in various likely combinations. | | |
| 12 | 3.5 | General comment | A. Yuncken | 1. The technical rules should only impose those requirements on the design or operation of the customer's installation that are strictly necessary to prevent damage or unacceptable disturbances to the network or to other customers. Other than this it is not the network operator's role to act as an arbiter of the customer's design.<br>2. The rules should not repeat requirements that are already covered by the WA Electrical Requirements. The network operator is not the regulator.<br><br>**Amendment Suggested by Proponent**<br>Remove prescriptive or irrelevant design or operating requirements that do not significantly impact on the network or other customers. | | |
| 13 | 3.5 Preamble | Requirements for connection of small generators to distribution network | A. Yuncken | This section relates only to small generators for which many of the requirements of other sections are irrelevant. It would be preferable to make the section completely self-contained. This would considerably simplify the application and compliance processes for small generators.<br><br>**Amendment Suggested by Proponent**<br>Include all technical requirements for small generators in this section and delete cross-references to other sections. | | |
| 14 | 3.5 Preamble | Requirements for connection of small generators to | A. Yuncken | Much of the preamble relates to issues of safety, reliability, good practice and the like. It is suggested that these matters would be better left to the Regulator (i.e. Energy Safety). | | |

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| | | distribution network | | **Amendment Suggested by Proponent**<br>Shorten or delete material following the heading "User's responsibilities". | | |
| 15 | 3.5 Preamble | Requirements for connection of small generators to distribution network | A. Yuncken | Under the heading "User's responsibilities", the sentence: *"In circumstances where it is apparent that safeguards are needed in addition to the requirements of this section, Networks may specify additional performance requirements"* is too vague. The circumstances in which additional requirements may apply, and the nature of the requirements, need to be defined.<br>**Amendment Suggested by Proponent**<br>Define or give examples of circumstances in which additional requirements may apply. Give examples of the requirements. | | |
| 16 | 3.5.1 | Requirements of section 3.2 applicable to small power stations | R. Bird | It is not reasonable that clauses that apply to very large power stations should be applied to sets as small as 30KVA<br>**Amendment Suggested by Proponent**<br>Clause 3.5 should be complete in itself with relevant clauses. | | |
| 17 | 3.5.1 | Requirements of section 3.2 applicable to small power stations | A. Yuncken | Refer to Issue 13 above. Section 3.5 should be self-contained.<br>**Amendment Suggested by Proponent**<br>Insert the applicable section 3.2 requirements in section 3.5. | | |
| 18 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | A category for Occasional Parallel Operation without Export (for say 20 – 200 hours/annum) – see Attachment 1 - is not included in the Technical Rules, and yet this is now a very commonly sought application. There exists over 100 MW of such potential applications in the SWIN, and the current technical requirements are a significant barrier to entry for this capacity that could be very cost- | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
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| | | | | effectively used to meet network and system wide peak demands. Bundling these applications in with the Continuous Parallel Operation category and requirements causes the requirements imposed on the former to be unnecessarily onerous, and therefore costly, causing many interested parties to give up pursuing their proposals.<br><br>**Amendment Suggested by Proponent**<br><br>Add a separate category into 3.5.2 and Table 3.6 of 3.5.6 for Occasional Parallel Operation without Export (for say 20 to 200 hours/annum) for LV generators and differentiate the protection and other requirements for this category from the Continuous Parallel Operation with Export category. | | |
| 19 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | A Gradual Bumpless Transfer (without Export) category – see Attachment 1 - is not included in the Technical rules to distinguish the requirements for these applications from Continuous Parallel Operation category applications' requirements, and from the Bumpless Transfer (less than 1 second paralleling) Rapid Transfer category.<br><br>**Amendment Suggested by Proponent**<br><br>Add a separate category into 3.5.2 and Table 3.6 of 3.5.6 for Gradual Bumpless Transfer (without Export) for say 2 minutes per changeover, for LV generators, and differentiate the protection and other requirements for this category from the Continuous Parallel Operation with or without Export categories proposed. | | |
| 20 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | Categories and protection (and other) requirements are more limiting and onerous than is necessary for certain common applications (two examples given in 2 and 3 above) creating a barrier to entry for these applications.<br><br>**Amendment Suggested by Proponent**<br><br>The categories and protection (and other) requirements | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
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| | | | | included in the proposed Technical Rules need to be reviewed to ensure that, for each separate category suggested in Attachment 1 to this issues list, the requirements are no more onerous than really necessary. | | |
| 21 | 3.5.2 | Facility categories | A. Yuncken | The sentence under "Generator types" beginning *"It includes but is not limited to the following types"* appears to be redundant.<br><br>**Amendment Suggested by Proponent**<br><br>Delete. | | |
| 22 | 3.5.3 | Connection arrangements | A. Yuncken | Description of required connection arrangements.<br><br>**Amendment Suggested by Proponent**<br>It would be helpful to include one or more typical simplified single-line diagrams to illustrate the requirements. | | |
| 23 | 3.5.4 | Power quality and voltage change | R. Bird | It is unreasonable to expect a 30KVA set connected for 1 sec to necessarily comply with 2.2.<br><br>**Amendment Suggested by Proponent**<br><br>Clause 3.5 should be complete in itself | | |
| 24 | 3.5.4 | Remote monitoring and communications | R. Bird | Just because a facility is involved in system peak load management is not a reason to require SCADA.<br>If there are "concerns for safety and reliability" these should be dealt with appropriately not by adding SCADA<br><br>**Amendment Suggested by Proponent**<br>Rewrite paragraph | | |
| 25 | 3.5.4 | Power quality and voltage change | A. Yuncken | Refer to Issue 13 above.<br><br>**Amendment Suggested by Proponent** | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| | | | | The requirements of section 2.2 should be inserted here. | | |
| 26 | 3.5.5 | Remote monitoring and communications | A. Yuncken | Refer to Issue 13 above.<br><br>**Amendment Suggested by Proponent**<br>The applicable requirements of section 3.2 should be inserted here. | | |
| 27 | 3.5.6 | Protection | R. Bird | If table 3.6 is considered correct there is no need to refer to section 3.4 and 3.2.4.8<br><br>**Amendment Suggested by Proponent**<br><br>Para 1, Delete all words after “Compliance with ….” To” 3.2.4.8” | | |
| 28 | 3.5.6 | Protection | R. Bird | Not reasonable for networks to approve protection types, only the protection required<br><br>**Amendment Suggested by Proponent**<br>Delete words “Protection relay types” | | |
| 28 | 3.5.6 | Protection | R. Bird | “Adequate backup from other protections” is totally unreasonable on small plant.<br><br>**Amendment Suggested by Proponent**<br><br>Delete reference to backup protection. | | |
| 30 | 3.5.6 | Protection | R. Bird | Integrated control and protection equipment is completely acceptable overseas<br>**Amendment Suggested by Proponent**<br>Networks has no experience of such equipment and therefore should not be in a position to determine the type of equipment used. | | |
| 31 | 3.5.6 | Protection | R. Bird | Pole slipping protection paragraph is at conflict with Table 3.6 | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| | | | | **Amendment Suggested by Proponent**<br>Delete pole slipping paragraph. | | |
| 32 | 3.5.6 | Protection | A. Yuncken | Refer to Issue 2 above.<br><br>**Amendment Suggested by Proponent**<br>The applicable requirements of sections 3.2 and 3.4 should be inserted here. | | |
| 33 | 3.5.6 | Protection | A. Yuncken | Approval of protection relay types.<br><br>**Amendment Suggested by Proponent**<br>Western Power should only specify requirements for protection relays sufficient to ensure compatibility with Western Power's protection. | | |
| 34 | 3.5.6 | Protection | A. Yuncken | The requirement for back-up protection of small generators is excessively conservative and unnecessary.<br><br>**Amendment Suggested by Proponent**<br>Remove requirement. | | |
| 35 | Table 3.6 | Summary of protection requirements for small generators | A. Yuncken | The cost of pole slipping protection is significant. In the case of small LV generators (<1MVA), the need for it is debatable.<br><br>**Amendment Suggested by Proponent**<br>Generally it should be the customer's decision whether or not to provide pole slipping protection for small LV generators. It should only be a network operator requirement where it is demonstrated that pole slipping may cause significant network disturbance. | | |
| 36 | 3.5.6.1 | Pole slipping protection | A. Yuncken | This section contradicts table 3.6 | | |

| No | Sec. | Section Title | Proponent | Issue | Discussion at Meeting No.1 | Action |
|---|---|---|---|---|---|---|
| | | | | **Amendment Suggested by Proponent**<br>Delete section. | | |
| 37 | 3.5.6.2 | Loss of mains protection and intertripping | A. Yuncken | Why is it necessary to provide two separate means of detecting loss of mains?<br><br>**Amendment Suggested by Proponent**<br>Need for requirement to be justified. | | |
| 38 | 3.5.7 | Computer model | R. Bird | Unreasonable to require a computer model and associated costs for installations as low as 3MW<br><br>**Amendment Suggested by Proponent**<br>Change to 5MW. | | |
| 39 | 3.5.7 | Computer model | A. Yuncken | This requires the customer to have (or have access to) a copy of the PSS/E software – or whatever power systems analysis software Western Power is currently using. Given that the cost of the PSS/E software is of the order of $30,000 this is an unreasonable requirement for small generators.<br><br>**Amendment Suggested by Proponent**<br>Delete the requirement. Customer to provide raw technical data for input by Western Power to its model – if really necessary. | | |

**ATTACHMENT 1**

**<u>Categories of Small Mains-Parallel Generators</u> (connection to the Distribution network, 30 kVA to 10 MW aggregate generation output at a single point of connection)**

This is an expanded list of categories that can subsequently be amalgamated where particular categories are determined to have the same requirements applying to them. Many combinations of the categories in each section below are possible.

**Load to be Supplied by the generator(s):**

(These categories are not distinguished in the proposed Technical Rules for Low Voltage generators).

- No Export to the mains – only supplies on-site load. A commonly sought application.
- Some Export – primary purpose to supply on-site load, but with some export (surplus, or as requested for system support). Not common.
- Export – primary purpose to export to the mains (eg landfill gas power stations). Common.

**Connection Duration:**

(Expanded from those in the proposed Technical Rules).

- Permanent Paralleling – for a substantial portion of the year. Common.
- Occasional Paralleling – on an occasional basis for testing, on-site peak lopping or for demand reduction when requested for system support. Say 20 to 200 hours per year. Commonly sought application now and in future.
- Rapid Transfer (split second) paralleling – for "closed transition" or "Bumpless" load transfer from the mains to the generator(s) or vice versa, in less than one second per event – typically <100 msec paralleling (**no gradual** transfer of load) – no export involved. Commonly sought now and in future.
- Gradual Bumpless Transfer (minute(s) paralleled) – for "closed transition" or "Bumpless" load transfer from the mains to the generator(s) or vice versa, in less than two minutes – typically less than 30 seconds paralleling per event (to allow **gradua**l transfer of load) – no export involved. Commonly sought now and in future.

**Generator Types:**

(Some expansion of the categories in the proposed Technical Rules).

- Synchronous generators – self excited.
- Induction generators with reactive power support – self excited.
- Induction generators without reactive power support – line excited (rely on mains power being present to operate).
- Line-commutated Inverter-connected energy sources – (rely on mains power being present to operate).
- Self-commutated Inverter-connected energy sources – can operate independently of the mains.
- Future use of Static Var Compensators (SVCs) or Statcoms or switched capacitors/reactors in combination with dispatchable (eg diesel) and/or non-dispatchable (eg wind/solar) generator types above for the purpose of providing voltage support and stability for fringe of grid applications.

**Connection Voltages:**

Categories are as in the proposed Technical Rules.

- Low voltage connected: 1,2 or 3 phase plus neutral, 240 V or 415 V.
- High voltage connected: 3 phase, 6.6 kV, 11 kV, 22 kV or 33 kV.

**Generator Sizes:**

The following categories are as in the proposed Technical Rules:

- <150 kVA LV
- 150 – 250 kVA LV
- >250 kVA LV. This could be revised to 250 kVA – 5000 kVA LV if it would be useful to introduce a new category of 5 MVA – to 10 MW LV (for multiple generator installations).

HV generators could perhaps be categorised by size also if the requirements would be different for different sizes – for example:

- < 5 MVA HV
- 5 MVA - 10 MW HV.

The possibility of distribution feeders typically being unable to accommodate > 5MVA may cause requirements for the 5 MVA – 10 MVA categories (HV or LV) to differ from the <5 MVA categories.

The aggregate size of the generator(s) should also be compared to the capacity of the mains supply at the location of the generators. A small generator within a customer's plant supplied with a large capacity mains supply should need less onerous protection requirements than where the generation capacity is closer to the capacity of the mains supply. The relative size of the two should be taken into consideration.

**General comment**

Amalgamation of categories of generators with different minimum requirements tends to cause the generators with lesser requirements to have more onerous than necessary requirements imposed on them.
Hence care is needed to properly evaluate the requirements of each separate category and compare them before any amalgamation.

# Attachment 2

(Section numbers in this attachment refer to the 24 August 2005 version of the Draft Technical Rules)

# *ATTACHMENT 2* - DRAFT TECHNICAL RULES
# SECTION 3.5 – REQUIREMENTS FOR SMALL GENERATORS
## Summary of Actions Taken Following TRC Small Generator Working Group Meeting No. 1 on 20/10/2005

Item numbers in column 1 are from the list of "Issues Raised on Chapter 3 of the Proposed Technical Rules" prepared by the Office of Energy. Only the items relevant to Section 3.5 of the draft rules (items 10 – 39) are included.

| No | Sec. | Section Title | Proponent | Issue | Action Taken |
|---|---|---|---|---|---|
| 10 | 3.5 | General Comments | R. Bird | 3.5 should be complete in itself and needs to cover such areas as application, synchronising, SCADA, prior to testing requirements and testing and commissioning etc.<br><br>The applicable sections in the balance of Chapter 3 would be totally unrealistic for sets as small as 30KVA.<br><br>**Amendment Suggested by Proponent**<br>Write relevant sections in 3.5 for these and others areas so that it is a plain, complete and simple specification for such applications. | Section 3.5 has been simplified, clarified and made more self-contained by deleting many of the "external" cross references and including the relevant requirements in this section. However it is not feasible to make it completely self-contained due to the detailed nature of some of the requirements in section 3.2.4. Repeating these requirements in section 3.5 would result in a large and unwieldy document that would be difficult to maintain and prone to inconsistencies. |
| 11 | 3.5 (and its refs to 3.2 and 3.4) | General Introductory Comments | N. Schubert | The Small Generators Working Group (SGWG) is seeking technical rules, guidelines and an approval and connection process that is "No more onerous than is really necessary". To date they have been too onerous for many applications and thus constitute a barrier to entry for many of the wide range of applications in the market.<br>The existing rules and processes required by Network Policy NP 2005 (Noted for revision and attachment to the Technical Rules in TRC Issue # 75) are recognised as being too onerous by both the small generator industry and by Networks.<br>The new proposed Technical Rules are also more onerous than necessary for many applications and the SGWG appreciates this opportunity to review and recommend revision of them in a consultative manner.<br><br>**Amendment Suggested by Proponent**<br>Rather than seek at this stage to revise the current draft Technical Rules that have been developed by a top-down approach – requirements for large transmission-connected generators modified to apply to small distribution-connected generators – it is recommended | Section 3.5 has been completely reviewed from the point of view of the small generator. The revised version should address many of the issues raised, through:<br>○ Simplifying the requirements as far as possible consistent with not significantly increasing risks to other customers or the network;<br>○ Re-structuring and clarifying the document to make it easier to use;<br>○ Including additional categories of generators (e.g. short-term parallel and bumpless transfer) with simplified requirements. |

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| | | | | that a bottom-up approach be used to develop the requirements for small generators (30 kVA upwards to 10 MW for the most common categories of mains parallel generation) and then use these newly developed requirements to sense check what is proposed by the draft Technical Rules. We expect there will be a significant difference between the two for common applications.<br><br>Attachment 1 proposes the categories that should be examined separately and in various likely combinations. | |
| 12 | 3.5 | General comment | A. Yuncken | 3. The technical rules should only impose those requirements on the design or operation of the customer's installation that are strictly necessary to prevent damage or unacceptable disturbances to the network or to other customers. Other than this it is not the network operator's role to act as an arbiter of the customer's design.<br>4. The rules should not repeat requirements that are already covered by the WA Electrical Requirements. The network operator is not the regulator.<br><br>**Amendment Suggested by Proponent**<br><br>Remove prescriptive or irrelevant design or operating requirements that do not significantly impact on the network or other customers. | Refer to Item 11.<br><br>Section 3.5 is generally consistent with the WA Electrical Requirements (8/9/2005 edition) although it is agreed that there are overlaps and some minor inconsistencies that may need to be addressed. |
| 13 | 3.5 Preamble | Requirements for connection of small generators to distribution network | A. Yuncken | This section relates only to small generators for which many of the requirements of other sections are irrelevant. It would be preferable to make the section completely self-contained. This would considerably simplify the application and compliance processes for small generators.<br><br>**Amendment Suggested by Proponent**<br><br>Include all technical requirements for small generators in this section and delete cross-references to other sections. | Refer to Item 10. |
| 14 | 3.5 Preamble | Requirements for connection of small generators to distribution network | A. Yuncken | Much of the preamble relates to issues of safety, reliability, good practice and the like. It is suggested that these matters would be better left to the Regulator (i.e. Energy Safety). | The section has been re-written. |

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| | | network | | **Amendment Suggested by Proponent**<br>Shorten or delete material following the heading "User's responsibilities". | |
| 15 | 3.5 Preamble | Requirements for connection of small generators to distribution network | A. Yuncken | Under the heading "User's responsibilities", the sentence: *"In circumstances where it is apparent that safeguards are needed in addition to the requirements of this section, Networks may specify additional performance requirements"* is too vague. The circumstances in which additional requirements may apply, and the nature of the requirements, need to be defined.<br><br>**Amendment Suggested by Proponent**<br>Define or give examples of circumstances in which additional requirements may apply. Give examples of the requirements. | The section has been re-written. |
| 16 | 3.5.1 | Requirements of section 3.2 applicable to small power stations | R. Bird | It is not reasonable that clauses that apply to very large power stations should be applied to sets as small as 30KVA<br>**Amendment Suggested by Proponent**<br>Clause 3.5 should be complete in itself with relevant clauses. | Refer to Item 10. |
| 17 | 3.5.1 | Requirements of section 3.2 applicable to small power stations | A. Yuncken | Refer to Issue 13 above. Section 3.5 should be self-contained.<br><br>**Amendment Suggested by Proponent**<br><br>Insert the applicable section 3.2 requirements in section 3.5. | Refer to Item 10. |
| 18 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | A category for Occasional Parallel Operation without Export (for say 20 – 200 hours/annum) – see Attachment 1 - is not included in the Technical Rules, and yet this is now a very commonly sought application. There exists over 100 MW of such potential applications in the SWIN, and the current technical requirements are a significant barrier to entry for this capacity that could be very cost-effectively used to meet network and system wide peak demands. Bundling these applications in with the Continuous Parallel Operation category and requirements causes the requirements imposed on the former to be unnecessarily onerous, and therefore costly, causing many interested parties to give up pursuing their | A category has been included for occasional parallel operation, export or no export, for up to 200 hours per year. |

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| | | | | proposals.<br><br>**Amendment Suggested by Proponent**<br><br>Add a separate category into 3.5.2 and Table 3.6 of 3.5.6 for Occasional Parallel Operation without Export (for say 20 to 200 hours/annum) for LV generators and differentiate the protection and other requirements for this category from the Continuous Parallel Operation with Export category. | |
| 19 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | A Gradual Bumpless Transfer (without Export) category – see Attachment 1 - is not included in the Technical rules to distinguish the requirements for these applications from Continuous Parallel Operation category applications' requirements, and from the Bumpless Transfer (less than 1 second paralleling) Rapid Transfer category.<br><br>**Amendment Suggested by Proponent**<br><br>Add a separate category into 3.5.2 and Table 3.6 of 3.5.6 for Gradual Bumpless Transfer (without Export) for say 2 minutes per changeover, for LV generators, and differentiate the protection and other requirements for this category from the Continuous Parallel Operation with or without Export categories proposed. | Two categories of bumpless transfer have been included:<br>(a) "rapid transfer" (maximum 1 second parallel)<br>(b) "gradual transfer" (maximum 1 minute parallel)<br><br>Simpler requirements apply to these categories. |
| 20 | 3.5.2 and 3.5.6 | Facility Categories and Protection | N. Schubert | Categories and protection (and other) requirements are more limiting and onerous than is necessary for certain common applications (two examples given in 2 and 3 above) creating a barrier to entry for these applications.<br><br>**Amendment Suggested by Proponent**<br><br>The categories and protection (and other) requirements included in the proposed Technical Rules need to be reviewed to ensure that, for each separate category suggested in Attachment 1 to this issues list, the requirements are no more onerous than really necessary. | It is believed that these issues have now been addressed. |
| 21 | 3.5.2 | Facility categories | A. Yuncken | The sentence under "Generator types" beginning *"It includes*<br>*but is not limited to the following types"* appears to be redundant. | Deleted. |

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| | | | | **Amendment Suggested by Proponent**<br><br>Delete. | |
| 22 | 3.5.3 | Connection arrangements | A. Yuncken | Description of required connection arrangements.<br><br>**Amendment Suggested by Proponent**<br>It would be helpful to include one or more typical simplified single-line diagrams to illustrate the requirements. | Western Power is considering the preparation of Technical Guidelines for small generators to address this issue. |
| 23 | 3.5.4 | Power quality and voltage change | R. Bird | It is unreasonable to expect a 30KVA set connected for 1 sec to necessarily comply with 2.2.<br><br>**Amendment Suggested by Proponent**<br><br>Clause 3.5 should be complete in itself | Refer to Item 10. |
| 24 | 3.5.4 | Remote monitoring and communi-cations | R. Bird | Just because a facility is involved in system peak load management is not a reason to require SCADA.<br>If there are “concerns for safety and reliability” these should be dealt with appropriately not by adding SCADA<br><br>**Amendment Suggested by Proponent**<br>Rewrite paragraph | The section has been re-written. The requirement now only applies in specific cases. |
| 25 | 3.5.4 | Power quality and voltage change | A. Yuncken | Refer to Issue 13 above.<br><br>**Amendment Suggested by Proponent**<br>The requirements of section 2.2 should be inserted here. | Refer to item 10. The requirements are too detailed and it is not practical to repeat them in section 3.5. |
| 26 | 3.5.5 | Remote monitoring and communi-cations | A. Yuncken | Refer to Issue 13 above.<br><br>**Amendment Suggested by Proponent**<br>The applicable requirements of section 3.2 should be inserted here. | Refer to items 10 and 24. The requirements only apply in specific cases but it is not practical to repeat them in section 3.5. |
| 27 | 3.5.6 | Protection | R. Bird | If table 3.6 is considered correct there is no need to refer to section 3.4 and 3.2.4.8<br><br>**Amendment Suggested by Proponent** | All protection requirements are now covered by the table, with a few specific qualifications in the text. |

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| | | | | Para 1, Delete all words after “Compliance with ….” To” 3.2.4.8” | |
| 28 | 3.5.6 | Protection | R. Bird | Not reasonable for networks to approve protection types, only the protection required<br><br>**Amendment Suggested by Proponent**<br>Delete words “Protection relay types” | Rewritten. Protection functionality and settings are subject to approval, but not manufacturers. |
| 29 | 3.5.6 | Protection | R. Bird | “Adequate backup from other protections” is totally unreasonable on small plant.<br><br>**Amendment Suggested by Proponent**<br><br>Delete reference to backup protection. | Fail-safe protection accepted as an alternative to backup protection. |
| 30 | 3.5.6 | Protection | R. Bird | Integrated control and protection equipment is completely acceptable overseas<br>**Amendment Suggested by Proponent**<br>Networks has no experience of such equipment and therefore should not be in a position to determine the type of equipment used. | Integrated control and protection equipment permitted provided that the protection functions are functionally independent of the control functions |
| 31 | 3.5.6 | Protection | R. Bird | Pole slipping protection paragraph is at conflict with Table 3.6<br><br>**Amendment Suggested by Proponent**<br>Delete pole slipping paragraph. | The section has been rewritten to remove the inconsistency. |
| 32 | 3.5.6 | Protection | A. Yuncken | Refer to Issue 2 above.<br><br>**Amendment Suggested by Proponent**<br>The applicable requirements of sections 3.2 and 3.4 should be inserted here. | (The reference in the “Issue” column should be to item 13.)<br><br>Refer to Item 10. |
| 33 | 3.5.6 | Protection | A. Yuncken | Approval of protection relay types.<br><br>**Amendment Suggested by Proponent**<br>Western Power should only specify requirements for protection relays sufficient to ensure compatibility with Western Power’s protection. | Refer to item 28. |
| 34 | 3.5.6 | Protection | A. Yuncken | The requirement for back-up protection of small | Refer to Item 29. |

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| | | | | generators is excessively conservative and unnecessary.<br><br>**Amendment Suggested by Proponent**<br>Remove requirement. | |
| 35 | Table 3.6 | Summary of protection requirements for small generators | A. Yuncken | The cost of pole slipping protection is significant. In the case of small LV generators (<1MVA), the need for it is debatable.<br><br>**Amendment Suggested by Proponent**<br>Generally it should be the customer's decision whether or not to provide pole slipping protection for small LV generators. It should only be a network operator requirement where it is demonstrated that pole slipping may cause significant network disturbance. | The section has been rewritten to clarify the requirements. |
| 36 | 3.5.6.1 | Pole slipping protection | A. Yuncken | This section contradicts table 3.6<br>**Amendment Suggested by Proponent**<br>Delete section. | Refer to Item 31. |
| 37 | 3.5.6.2 | Loss of mains protection and intertripping | A. Yuncken | Why is it necessary to provide two separate means of detecting loss of mains?<br><br>**Amendment Suggested by Proponent**<br>Need for requirement to be justified. | The document now makes it clear that in most cases loss of mains detection will normally be achieved without the need for a separate device. |
| 38 | 3.5.7 | Computer model | R. Bird | Unreasonable to require a computer model and associated costs for installations as low as 3MW<br><br>**Amendment Suggested by Proponent**<br>Change to 5MW. | Western Power will not require the User to provide a computer model unless it is determined that there is a need carry out dynamic simulation studies. This would normally only be the case for larger generators. |

# Attachment 3

**Extract from later (24 November 2005) email to the Chairman and Executive Officer of the Technical Rules Committee in response to the earlier (22 November 2005) email below:**

Thank you for the opportunity to comment on the latest revision of the Technical Rules as they apply to small generators. Because of the limited time in which to review them, the review has not been thorough but it is clear that some important issues are still outstanding as described below, in spite of the extensive revision.

I agree with your key outcomes listed below from the SGWG meeting on 20 October. I appreciate the effort that has gone into the revision to address some of the issues listed and/or raised at this meeting #1.

The following are some of the outstanding issues with the November version of the technical rules:

1. **Items not addressed.** Item numbers 1 - 9 of the list of "Issues Raised on Chapter 3 of the Proposed Technical Rules" prepared by the Office of Energy for meeting #1 have not been addressed. This is noted by Networks on the "Summary of Actions Taken following TRC Small Generator Working Group Meeting No. 1" document you sent out with your email below.
2. **Main generator categories missing.** The revisions in response to Item 18 of the same SGWG list have not addressed the need for separate categories for Occasional Parallel Operation **With Export and No Export for LV generators.** Even though the text states that a category of "Occasional Parallel Operation, export or no export" has now been included (which is appreciated), this category does not differentiate protection requirements in Table 3.6 for LV generators that Export versus those LV generators Without Export. For HV generators a No Export column is given separately from a column for Export, but this distinction is not included for LV generators. The same applies for the Short Term Test Parallel category in Table 3.6 which does not make it clear whether for LV generators the requirements assume No Export (as for the HV column). LV generators seeking to run in parallel with No Export for Test or Occasional operation purposes are the largest two categories of generators seeking to parallel at present. They include hundreds of standby diesel generators totaling over 100 MW of installed capacity that could be used for network and system wide capacity support at peak demand times if they could occasionally parallel. The protection requirements for No Export should be less onerous than for Export, so a category is required for No Export LV generators separate to Export in Table 3.6 and other related clauses.
3. **Specified protection types need further discussion with the SGWG.** The actual protection types specified for each category still require further discussion between the small generator industry and Networks through the SGWG as they still appear to be more onerous than really necessary for some applications/categories for small generators and therefore a barrier to entry. The current version of the technical rules lists the protection types required in Table 3.6, but related clauses cause uncertainty about whether only some, or all of these types are required when some types of protection achieve more than one required outcome. Also it is not clear whether or not the specified protection is additional to control or protection functionality that may already exist as part of a proprietary piece of equipment such as a parallel transfer switch. It appears that no explicit consideration has been included in this version, of the **size of the generator relative to the capacity of the network supply** to the point of connection of the generator as requested at the meeting #1.

4. The requirement for protection equipment to meet the IEC 60255 standard for all parallel generation situations needs further discussion with the SGWG. I understand the reasons for this being prescribed, but the fact that a lot of non-compliant control and protection equipment is already in use by the small generator industry around Australia and the rest of the world, and it is accepted by many electricity utilities and/or regulators, including being used by Western Power for certain applications, suggests that this requirement should be questioned

and discussed further. Perhaps the Western Power requirement is convenient, but it seems to be unnecessarily onerous and a barrier to entry for small generators.

5. There are more drafting and detail comments that can be made through an appropriate forum given more time.

It is important to the SGWG that an avenue for further detailed discussion of these issues is made available by the Technical Rules Committee and the ERA. These discussions will need to cover the technical detail and so involve appropriately qualified/experienced people familiar with the wide variety of small generator applications.

I trust that the above comments assist with your feedback on small generator industry concerns with the current version of the rules.

Feel free to contact me if you need clarification of any of the issues raised to date.

## Extract from earlier (22 November 2005) email from the Executive Officer of the Technical Rules Committee:

Dear SGWG members,

Thank you for your attendance at the meeting of the Small Generators Working Group (SGWG) on 20 October 2005. As we understood it, the key outcomes from that meeting was the recognition of:

- The need for greater involvement of small generation stakeholders in the rule-making process;
- Contention over the appropriate categories for generators, and the differential requirements for each category based on size and connection type;
- Concern at the current 'top-down' approach to outlining the requirements for generators;
- The potential for simplified presentation of requirements for small generators, to reduce a perceived barrier to entry;
- A need for further work to be done to classify categories of parallel operators with respect to the export/non-export of energy; and
- A need for ongoing work with the Economic Regulation Authority for continuous improvement of the Technical Rules for small generators, to make uptake easier.

Since then, Western Power has submitted its proposed Technical Rules to the Technical Rules Committee. The redrafting includes **extensive changes to section 3.5, the focus of the SGWG**.

I have attached Western Power's table detailing the actions they have taken to address the issues raised by the SGWG. I have also attached the latest version of Western Power's Technical Rules for your reference.

Your **final comments are sought on whether the redrafted section 3.5 addresses the issues** that were raised by the SGWG. This will assist the Technical Rules Committee to assess the proposed rules when writing its preliminary report for the Economic Regulation Authority.

The time that has been taken to implement the redrafts has left us with extremely tight timeframes to meet our legislated deadlines. Because of this, your comments are requested by **COB Thursday 23 November 2005**. We appreciate any comments you are able to make in this period.

If you have any queries about any of this information please feel free to contact us.

regards

Executive Officer Technical Rules Committee