Decision and Explanatory Memorandum on the Draft Technical Rules for Western Power's South West Interconnected Network

Submitted by Western Power

11 April 2006

Economic Regulation Authority
WESTERN AUSTRALIA

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DECISION

1. On 24 August 2005, Western Power submitted its proposed technical rules for its South West Interconnected Network (**SWIN**) within the South West interconnected system (**SWIS**) (**proposed technical rules**). [1]

2. The Authority published the proposed technical rules alongside Western Power's proposed access arrangement on 31 August 2005. Submissions on the proposed technical rules were not invited at that time.

3. Section 12.11 of the *Electricity Networks Access Code 2004* (**Access Code**) sets out the approvals process for technical rules submitted pursuant to section 12.10 of the Access Code.

4. In approving technical rules, the Authority must be satisfied that they are consistent with the Code objective and comply with chapter 12 of the Access Code.

5. The objectives for technical rules as specified in section 12.1 of the Access Code are that they:

   a) are reasonable; and

   b) do not impose inappropriate barriers to entry to a market; and

   c) are consistent with good electricity industry practice; and

   d) are consistent with relevant written laws and statutory instruments.

6. The Authority must not approve the proposed technical rules: unless it is satisfied that the rules reasonably accommodate the interconnection of further networks in the future; or if it considers that the rules would require any person to engage in an act (or omit to engage in an act) which would contravene a written law or statutory instrument.

7. The Authority's decision is to not approve Western Power's proposed technical rules on the ground that it does not satisfy the requirements of chapter 12 of the Access Code and the Code objective.

8. Pursuant to section 12.11(c)(ii) of the Access Code, the Authority has redrafted the proposed technical rules only to the extent necessary to comply with chapter 12 of the Access Code and the Code objective. The redrafted technical rules (**draft technical rules**) are contained in the Appendix to this Decision and Explanatory Memorandum.

9. This Decision and Explanatory Memorandum:

   a) sets out the Authority's decision and reasons for the Authority's decision;

   b) briefly outlines the structure of the draft technical rules;

[1] In this report, "Western Power" refers to the disaggregated business unit of Western Power Corporation responsible for the SWIN.

c) provides the Authority's views on the 11 "deadlock issues" identified in the Technical Rules Committee (**Committee**) Preliminary Report dated December 2005 (**Deadlock Issues**) [2];

d) provides the Authority's response to the Committee's report;

e) highlights specific issues in the draft technical rules which the Authority invites the public to consider; and

f) invites submissions from the public on the entire draft technical rules.

Reasons for Decision

10. Technical rules consist of the standards, procedures and planning criteria governing the construction and operation of a network. Section 12.32 of the Access Code provides that, unless a different form of technical rules will better achieve the Code objective or the objectives set out in section 12.1 of the Access Code, the technical rules must address the matters listed in Appendix 6 of the Access Code.

11. Chapter 12 of the Access Code outlines the framework for a service provider's technical rules. Section 12.10 of the Access Code provides that a service provider of a covered network must, at the same time as the service provider submits its first access arrangement under section 4.1 of the Access Code, submit proposed technical rules to the Authority.

12. In accordance with section 12.17 of the Access Code, in January 2005 the Authority established the Committee to perform the functions prescribed under section 12.23 of the Access Code.

13. The Authority convened the Committee to consider and advise upon Western Power's proposals. As required by section 12.19(a)(i) of the Access Code, the membership of the Committee consists of representatives from:

a) Office of Energy (Chair, representing the Coordinator of Energy);

b) Networks Business Unit, Western Power Corporation (service provider);

c) Southern Cross Energy (service provider interconnected with Western Power's SWIN);

d) Alinta Limited (user representative);

e) Perth Energy Pty Ltd (user representative);

f) Tiwest Pty Ltd (user representative); and

g) Wesfarmers Energy Limited (user representative).

14. A representative from the Authority also attended the Committee meetings as an observer.

[2] A copy of the Committee's Preliminary Report is available on the Authority's website www.era.wa.gov.au

15. Western Power circulated to members of the Committee sections of its proposed technical rules.

16. The process adopted by the Committee was that the members of the Committee provided written comments on each provision in the proposed technical rules that they wished to raise as an issue for discussion. Prior to each meeting these comments were compiled, circulated to all members and formed the agenda for each meeting.

17. In providing their comments, Committee members were requested to focus on:

    a) whether the proposed technical rules satisfied the objectives set out in section 12.1 of the Access Code; and

    b) any issues that members believed should be brought to the attention of the Authority including any implications the proposed technical rules may have on the achievement of the Access Code objectives (as set out in Section 2.1 of the Access Code).

18. This process commenced in January 2005 to assist Western Power in producing its proposed technical rules, and continued following Western Power's submission of the proposed technical rules in August 2005.

19. A working group was established within the Committee to discuss matters of particular importance to small generators. The outcome of this working group was to provide the Committee with specialist advice and input into the technical rules from the perspective of a small generator.

20. Provisions of the proposed technical rules were considered by exception. That is, unless an issue was raised with a particular provision it was assumed to be endorsed by the Committee.

21. The Committee worked extensively on the proposed technical rules. The proposed technical rules contained 6 sections. Western Power provided the Committee with sections 1 and 4 of the proposed technical rules in advance and, at the time of submitting the proposed technical rules, the Committee had completed its review of sections 1 and 4 and these had been redrafted to reflect the outcomes agreed by the Committee.

22. However, the remainder of Western Power's proposed technical rules had not been considered in detail by the Committee at the time of submission of the proposed technical rules to the Authority. As a result, the Committee's review, in consultation with Western Power, has led to proposals for extensive changes to sections 2, 3, 5 and 6 of the proposed technical rules that were submitted to the Authority on 24 August 2005.

23. On 12 December 2005, the Committee (including Western Power) provided a Preliminary Report to the Authority in accordance with section 12.11(b)(i) of the Access Code. The Committee unanimously advised:

> The fundamental recommendation of this report is that the Committee, including Western Power, advises the Authority not to approve Western Power's proposed Rules.[3]

24. The Authority, having assessed the Committee's preliminary report and having assessed the proposed technical rules against the requirements of chapter 12 of the Access Code and the Code objective, accepts the Committee's unanimous recommendation.

25. Therefore, the Authority's decision is that the proposed technical rules do not comply with chapter 12 of the Access Code and the Code objective. Accordingly, the Authority has drafted its own technical rules, based on those submitted by Western Power in August 2005 and amended the proposed technical rules only to the extent necessary to comply with chapter 12 of the Access Code and the Code objective.

EXPLANATORY MEMORANDUM

Overview of the draft technical rules and specific issues

26. The Committee, together with Western Power, suggested amendments to Western Power's proposed technical rules in order to make them comply with chapter 12 of the Access Code and the Code objective. The Committee's suggested amendments were contained in Appendix 2 to the Committee's report. The Committee recommended that the Authority accept its amendments and continue to develop the proposed technical rules to make them comply with chapter 12 of the Access Code and the Code objective.

27. The Authority accepted the Committee's recommendation and has worked closely with Western Power and key transmission and distribution system stakeholders to develop the proposed technical rules into the draft technical rules attached to this Decision and Explanatory Memorandum. The Authority has also reviewed and redrafted sections of the proposed technical rules to eliminate overlap with the *Wholesale Electricity Market Rules* (**Market Rules**) and to ensure that the technical rules are expressed with clear obligations, are internally consistent and are legally correct.

28. In redrafting the proposed technical rules the Authority has amended the proposed technical rules only to the extent necessary to comply with chapter 12 of the Access Code and the Code objective of the Access Code.

29. The proposed technical rules as originally submitted by Western Power on 24 August 2005 were structured as follows:

- section 1 – General matters;
- section 2 – Network performance and planning criteria;
- section 3 – Technical requirements of user facilities;
- section 4 – Inspection, testing, commissioning, disconnection and reconnection;

[3] Technical Rules Committee Preliminary Report, December 2005, page 2.

- section 5 – Power system security; and
- section 6 – Derogations.

30. The Authority's draft technical rules are divided into five sections. The Authority merged the relevant sections of section 6 of the proposed technical rules into section 1 of the draft technical rules as both dealt with exemptions and derogations.

31. Section 1 of the draft technical rules sets out the general provisions of the technical rules and provides rules of interpretation, dispute resolution and exemption criteria, as well as requiring that users and Western Power act reasonably. The Authority has not made any material amendment to the section as presented in the proposed technical rules, other than to accept the Committee's recommendations by including the technical rules objectives (as stated in chapter 12 of the Access Code). The Authority has also integrated section 6 of the proposed technical rules for consistency and to remove potential duplication.

32. Section 2 of the draft technical rules sets out the power system performance standards and defines the technical obligations of Western Power. It sets standards for the quality of electricity supply to end use customers when the SWIN is operating in a satisfactory steady state condition and also sets boundaries for the transient behaviour of the electricity supply following power system contingency events. Further, it requires and empowers Western Power to install an automatic under-frequency load shedding scheme to facilitate control of the power system following the occurrence of an extreme contingency event. Section 2 also provides the planning and design criteria for the SWIN.

33. The main areas in section 2 of the draft technical rules which have been amended by the Authority relate to:

- inclusion of design criteria for the automatic protection equipment forming part of the transmission and distribution systems, which have been moved from section 3 of the draft technical rules;
- clarifying the distinction between the power system performance standards and Western Power's obligations to plan, design and construct a transmission and distribution network that allows these standards to be met; and
- amending the criteria for the planning and design of augmentations and upgrades to the distribution system.

34. Section 3 of the draft technical rules sets out the technical requirements for the design of user's equipment that can be connected to the SWIN. The section has been significantly redrafted with the objective of clarifying the specified requirements and detailing when they should apply. In addition, requirements for the connection of small generators to the distribution system have been included. Although the section has been significantly redrafted, changes to the design requirements set out by the Committee in its recommended amendments to the proposed technical rules[4] are relatively minor.

35. Section 4 of the draft technical rules defines the rights, obligations and procedures associated with inspection, testing, commissioning, disconnection and reconnection. This section is based on the equivalent requirements in clauses 5.7

[4] See Appendix 2 of the Committee's Preliminary Report.

to 5.9 of the *National Electricity Rules* (**NER**). There were no "deadlock issues" in respect of section 4 and changes to the proposed technical rules are minor, and have generally been made to increase clarity in relation to the application of the draft technical rules to the SWIN.

36. Section 5 of the draft technical rules covers the responsibilities of Western Power, in its role as network service provider, in relation to the operation of the transmission and distribution system. Responsibility for the real time operation of the power system, including those parts of the transmission system needed to support the functioning of the Wholesale Electricity Market (**WEM**), is vested in the Independent Market Operator (**IMO**) established under the *Electricity Industry (Wholesale Electricity Market) Regulations 2004*. The responsibility for the real time operation of the power system is implemented through System Management which, although a ring-fenced business unit of Western Power, reports directly to Western Power's board of directors and is required under the Market Rules to deal with the remainder of Western Power on an "arms length basis".

37. Significant changes have been made to section 5. The proposed technical rules did not make the distinction between Western Power as network service provider and Western Power as system manager. Further, section 5 of the proposed technical rules contained overlaps and inconsistencies with the Market Rules. The scope of section 5 is now limited to the operational and system coordination responsibilities of Western Power in its role as network service provider, and to the operational responsibilities of users to the extent that these are outside the scope of the Market Rules. As a result, overlaps and inconsistencies with the Market Rules have now been removed.

Specific issues

38. As recommended by the Committee, the Authority has worked closely with Western Power and key network stakeholders to develop the draft technical rules. During this process, a number of issues arose which, in the Authority's view, would benefit from submissions from interested parties. The Authority highlights these issues below. While not wanting to limit submissions to these issues only, the Authority invites submissions from interested parties on these issues.

Fault levels

39. Clause 2.5.9 of the draft technical rules sets out the maximum allowable fault levels at the different voltage levels of the distribution system. Many parts of the distribution network currently have fault levels well below this. No maximum fault levels are prescribed for the transmission system, although clause 2.5.8 requires that the transmission and distribution systems be operated so that the calculated maximum fault level at any point does not exceed 95 per cent of the equipment fault rating at that point.

40. Fault levels on a network change over time. In particular, the connection of new rotating plant, including generators and large motors, is likely to increase the fault level on those parts of the network electrically close to the point of connection. This raises the issue of whether a user should be required to upgrade equipment connected to the network if fault levels increase to the point that its existing equipment is no longer suitable.

41. In respect of the distribution system the Authority has clarified this issue by inserting clause 3.2.1(f) in the draft technical rules. This provides that a user who connects to the distribution system must install equipment that is rated for the maximum fault levels specified in clause 2.5.9 unless granted an exemption by Western Power. It is expected that Western Power will grant exemptions for those parts of the distribution system where fault levels are low. However, it is likely that such an exemption would include a condition requiring the user to upgrade its equipment should this become necessary at a later date.

42. The situation becomes more difficult in respect of users connected to the distribution system at the rules commencement date. Their equipment is deemed to comply with the rules in accordance with the "grandfathering" provisions of clause 1.9.4 and the issue is whether such users should be liable for equipment upgrades. This is covered by clause 1.9.5, which requires users to monitor their equipment on an ongoing basis and to ensure its continued safety and suitability as conditions on the power system change. This clause would also apply to users connected to the transmission system at the rules commencement date.

43. In respect of the transmission system, fault levels are expected to gradually increase over time and a consequence of clause 2.5.8(a) is that equipment may need to be upgraded to accommodate this. Liability for such upgrades is not prescribed in the technical rules as it is a commercial issue and the Authority has inserted the following note to clause 3.2.1(f) of the rules to indicate this:

> Where a *User's equipment* increases the fault levels in the *transmission system* or *distribution system*, responsibility for the cost of any upgrades to the *equipment* required as a result of the *changed power system* conditions will be dealt with by commercial arrangements between the *Network Service Provider* and the *User*.

44. This note leaves open the question of liability when distribution or transmission system fault levels increase to a level in excess of the rating of existing Western Power or user equipment. It is anticipated that Western Power would seek to recover from the proponent the cost of any necessary upgrades required to its own equipment as a result of a new connection when negotiating the access contract. However, users connected to the transmission system at the rules commencement date would be liable for their own upgrades in accordance with clause 1.9.5 and Western Power has indicated that it will require a similar clause to be inserted into new access contracts negotiated after the rules commencement date.

45. Under the draft technical rules, if subsequent network changes required Western Power to increase fault levels above those specified for the distribution system in clause 2.5.9 it would need to seek an exemption from the Authority. Assuming the exemption was granted, users affected by the increased fault levels would need to ensure their equipment's fault level rating was adequate for the increased fault level and, if necessary, would need to upgrade the equipment affected.

46. The Authority invites comment from interested parties as to whether these arrangements are appropriate and also whether the question of liability for equipment upgrades as a result of increases in potential fault levels should be more explicitly prescribed in the final technical rules.

Requirements for connection of energy systems to the low voltage distribution system via inverters

47. Clause 3.7 of the draft technical rules sets out the particular requirements for the connection by users of energy systems to the low voltage distribution system via inverters.

48. The clause is prescriptive compared to the requirements in the draft technical rules for generating units to the extent that the clause explicitly covers safety issues and includes detail such as a connection diagram and drawings of signage requirements. Western Power considers that, due to the nature of the installations and the potential hazards they can cause, this level of detail is required and appropriate.

49. The Authority has made no change to this clause. However, it invites comment from interested parties as to whether the detail included in clause 3.7 is appropriate in the final technical rules. The Authority draws stakeholder attention to the safety requirements included in clause 3.7 and invites comment from stakeholders as to whether such requirements should be included in the final technical rules.

Ride-through

50. Clause 3.3.4.3 of the draft technical rules provides design requirements for generating units and their auxiliary systems for continuous uninterrupted operation while being subjected to off-nominal frequency and voltage excursions. The requirements in this clause generally apply to generating units with a rating of over 10 MW, which in most cases would be directly connected to the transmission system.

51. Clause 3.6.5 imposes the same ride-through requirements on smaller units connected to the distribution system. However, for smaller units it may be appropriate to relax the ride-through requirements, given that failure to comply would not normally have a material impact on system stability. The requirements of clause 3.6.5 of the draft technical rules for small generators are more onerous than required by the NER.

52. The Authority has not amended clause 3.6.5 of the draft technical rules. Nevertheless, the Authority invites comment from interested parties on whether the ride-through requirements for small generators are appropriate, or whether the final technical rules should require only larger generators or generators located on more critical parts of the network to be subject to the ride-through requirements.

Load shedding

53. The Authority has included Clause 2.2.1(d) in the draft technical rules. It states:

> Frequency tolerance limits must be satisfied, provided that there is no shortage of spinning reserve in accordance with clause 3.10.2 of the Wholesale Electricity Market Rules, without the use of load shedding under all credible power system load and generation patterns and the most severe credible contingency event.

54. Western Power has indicated that, under certain operating scenarios, it may not be able to comply with this obligation without load shedding. This situation could arise firstly from the loss of the largest connected generator under adverse system generation and load patterns and secondly from the loss of an interconnector. In

either circumstance above, load shedding might be required if the system splits into "islands". Western Power sought to amend the standard to be conditional on sufficient spinning reserve being dispatched to enable compliance.

55. The Authority is reluctant to impose a technical rule or performance standard that is conditional on Western Power being in a position to comply. Furthermore, the frequency tolerance standards imposed by clause 2.2 of the technical rules are less onerous than those imposed by the NER, or indeed on most power systems operating in developed economies. The Authority understands that the probability of non-compliance arising through the loss of a generating unit is low and considers that Western Power should seek an exemption from the rules to cover such low probability scenarios.

56. The Authority accepts Western Power's position regarding the loss of an interconnector. It understands that the load shedding would be required only on the "islanded" part of the power system and so it has further included clause 2.2.1(e) in the draft technical rules to provide for this. This clause states:

> In the event of a loss of interconnecting equipment leading to the formation of an island separate from the rest of the power system, load shedding facilities within the island may be used to ensure that the frequency tolerance limits specified in Table 2.1 are satisfied within the islanded part of the power system. Once the power system within the island has returned to a steady state operating condition, the "island" frequency range in Table 2.1 will apply until the islanded power system is resynchronised to the main power system.

57. Comments are invited from interested parties as to whether the approach taken by the Authority to include clause 2.2.1(d) of the draft technical rules in respect of load shedding offers an appropriate solution or whether the standard should be amended to reflect Western Power's preferred position.

Credible contingency events

58. Clause 2.3.7.1(a) of the draft technical rules states:

> The Network Service Provider must plan, design and construct the transmission and distribution systems so that the short term power system stability and dynamic performance criteria specified in clauses 2.2.7 to 2.2.10 are met under the worst credible system load and generation patterns, and the most critical, for the particular location, of the following credible contingency events without exceeding the rating of any power system component or, where applicable, the allocated power transfer capacity:
>
> - a three-phase to earth fault cleared by disconnection of the faulted component, with the fastest main protection out of service;
> - a single-phase to earth fault cleared by the disconnection of the faulted component, with the fastest main protection out of service;
> - a single-phase to earth fault cleared after unsuccessful high-speed single-phase auto-reclosure onto a persistent fault;
> - a single-phase to earth fault cleared by the backup protection; or
> - sudden disconnection of a system component, e.g. a transmission line or a generation unit.

59. Clause 2.3.7.1(a) of the draft technical rules defines the credible contingency events, which form the benchmark disturbances through which the power system must be able to remain stable and controllable without the use of load shedding.

Accordingly, the definition of a credible contingency event is important not only for system design but also for defining the acceptable technical envelope for system operation. If the definition of credible contingency event is unduly onerous, certain generating patterns and operating configurations may not be permissible and this in turn may prevent available generation from being dispatched for certain network and load configurations.

60. The critical contingency events defined for the SWIN are more onerous than in the NEM in that:

    a) three phase to earth faults are not considered credible on the NEM; and

    b) on the SWIN it is assumed that for a credible contingency event the fastest main protection scheme can be considered to be out of service.

61. Western Power argues that three phase to earth faults do occur on the SWIN and must be taken into account in power system operational planning, particularly in view of the marginal stability of the Goldfields interconnector. The Authority accepts this position.

62. In respect of the fastest main protection scheme being out of service, clause 2.9 of the draft technical rules requires that duplicate main protection schemes be installed on the transmission system and on those parts of the distribution system subject to a critical fault clearance time. Western Power has indicated that this is current practice. Therefore, in undertaking critical stability assessments, the requirement that the fastest main protection be assumed to be out of service is unlikely to be onerous, because the fault clearing time of the second main protection is unlikely to be significantly slower than the fault clearing time of the first main protection. This would not be the case if duplicate main protection was not required since, in this event, it would be necessary to rely on slower backup protection should the main protection not be available.

63. The Authority has made some changes to the wording of clause 2.3.7.1(a) to increase clarity. These have not changed the effect of the clause. However, the Authority's technical advisers, PB Associates, have advised that clause 2.3.7.1(a)(4) of the draft technical rules defines a credible contingency event as existing when a single phase to earth fault is cleared by backup protection. This would require both duplicate protection schemes either to be out of service or to fail to operate correctly.

64. The Authority invites comments from interested parties as to whether the definition of credible contingency events contained in clause 2.3.7.1 of the draft technical rules is appropriate.

Protection requirements for small generating units

65. The protection requirements for small generating units are contained in section 3.6 of the draft technical rules. Table 3.6 in the draft technical rules sets out a detailed summary of those protection requirements, which is significantly more prescriptive than the requirements in clause 3.5.2 for the connection of large generators to the transmission system.

66. Western Power accepts that the requirements in clause 3.6 are more prescriptive than other requirements in the draft technical rules but notes the particular problems it faces in connecting embedded generation to a distribution feeder. It

stated that the amount of prescription provides a degree of certainty to smaller users in regard to Western Power's expectations and notes that Table 6.1 of the draft technical rules is based on Table 8-2 of a much more comprehensive technical guide published by the Australian Business Council for Sustainable Energy.[5]

67. The Authority invites comment from interested parties on whether clause 3.6 in the draft technical rules, and in particular, the detailed protection requirements specified in Table 3.6, are appropriate.

Service standards

68. Section 12.32 of the Access Code provides that, unless a different form of technical rules will better achieve the Code objective or the objectives set out in section 12.1 of the Access Code, the technical rules must address the matters listed in Appendix 6 of the Access Code.

69. Section A6.1(a) of Appendix 6 of the Access Code states that the technical rules must address, among other things, performance standards in respect of service standard parameters. Service standards are defined as being *either or both of the technical standard, and reliability, of delivered electricity.*

70. The draft technical rules contain performance standards in respect of the technical standard of delivered electricity but not in respect of reliability. In the Authority's view, the reliability benchmarks required in the Authority's draft decision on Western Power's proposed Access Arrangement for the SWIN address this requirement for the technical rules.

71. Therefore, the Authority is satisfied that the draft technical rules, together with the amendments required in the Authority's draft decision on Western Power's proposed Access Arrangement for the SWIN will better achieve the Code objective and the objectives set out in section 12.1 of the Access Code. However, the Authority invites comments from interested parties on whether the technical rules should contain performance standards in respect of reliability.

Distribution system design

72. Clauses 2.5.4.3 of the draft technical rules provides design criteria for urban high voltage distribution feeders. Essentially the criteria provide that, should a fault occur at the zone substation or on the feeder exit cable so that the feeder cannot be energised from the zone substation, it must be possible to transfer the feeder loads to adjacent feeders, using spare capacity kept available for this purpose. This is a reasonable requirement consistent with good electricity industry practice.

73. Western Power's proposed technical rules stated that this load transfer capability should be applied only "where technically and economically feasible". The Authority has deleted this proviso on the basis that it is too subjective. This does not prevent Western Power from applying for an exemption where it is not feasible or economic to meet this requirement. Alternatively, the technical rules could contain a more specific definition of "urban distribution feeder" or specify where the requirement would not apply. The Authority invites interested party comments on whether this position is appropriate.

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[5] *Technical Guide for Connection of Renewable Generators to the Local Electricity Network,* Australian Business Council for Sustainable Energy, August 2004.

74. Clause 2.5.7(a) of the draft technical rules requires that all new and replacement high voltage switches, including ring main units, must be remotely operable and controlled from the distribution control centre. Clause 2.5.7(b) further requires that all new and replacement distribution transformers be fitted with load monitoring facilities which are capable of being modified for monitoring from the distribution system control centre.

75. The use of network automation and remote control is becoming increasingly common in the electricity distribution industry. However, most utilities limit the installation of remote control to selected switches on strategic parts of the network where such installation could be expected to have a measurable impact on supply reliability. Installation of remote control facilities as a matter of course on all field-located high voltage switches is relatively uncommon.

76. While remote control on switches in rural areas may result in a significant improvement in supply reliability due to the travelling times required when manual switching is necessary, the justification for all switches in urban areas served by underground distribution to be remotely controlled is not so obvious. Due to the large number of switches in such areas, the cost of implementation is greater than in rural areas, but arguably, given the reduced travelling times, the benefits are less. The proposal also requires developing and maintaining, on an ongoing basis, a much expanded SCADA system with a very large number of remote terminal units spread throughout the SWIS supply area. The costs of maintaining such an extensive system in an operational condition would be significant.

77. In respect of clause 2.5.7(b) of the draft technical rules, Western Power has provided no information of the potential benefits foreseen from remotely monitoring the load at all distribution transformers.

78. These are new requirements that do not reflect Western Power's current practice, nor is it standard practice in the electricity supply industry. The Authority notes that the capital costs involved in meeting these requirements may be significant.

79. The Authority has not, at this point, made any changes to the remote control requirements proposed by Western Power. Nevertheless, it has reservations regarding the technical and economic benefits of the proposals submitted by Western Power and therefore invites comment from interested parties before making final technical rules.

Provision of Primary Speech Equipment

80. Clause 3.3.5(c) of the draft technical rules makes a user responsible for the provision of the primary speech communication channels used to dispatch generation to support the operation of the WEM. This is different from the corresponding NER requirement which mandates that such communication channels be provided by the network service provider.

81. A consequence of the NER requirement is that the network service provider must establish and maintain a secure and dedicated telephone network to support the operation of the power system. This network is designed and constructed to ensure a high level of communication security and is not reliant on any public telephone network. In order to participate in the market, all generators must connect to this telephone network.

82. While acknowledging that clause 3.3.5(c) requires that all speech communication channels must meet specifications provided by Western Power, the Authority is nevertheless concerned that the proposed requirement could potentially result in a proliferation of independent speech channels and could undermine the successful operation of the WEM.

83. At this point the Authority has not changed the requirement proposed by Western Power. However, interested parties are invited to comment on this issue.

Computer Model

84. Clause 3.3.10 requires a large generator to provide a computer model of the dynamic behaviour of its plant to the network service provider, suitable for use in the network service provider's nominated software package, currently PSS/E. The model is required to allow the network service provider to accurately simulate the dynamic behaviour of the power system. The provision of this model in PSS/E format was the subject of extensive debate within the Committee. However, agreement was reached to the extent that it was not formally raised as a deadlock issue.

85. One of the requirements proposed by Western Power in relation to the provision of this computer model in clause 3.3.10 was that:

> The User must support the model for changes and updates in the nominated software for the duration of connection to the transmission or distribution system.

86. In the Authority's view, a user entering into an access contract in full compliance with the technical rules should not be put at risk of having to incur future costs as a result of actions taken unilaterally by the network service provider, when that user is not in a position to influence these actions or negotiate alternative outcomes. That is, if the network service provider chooses to change or upgrade its existing software, for whatever reason, it is reasonable for the network service provider to bear all the consequential costs of this action.

87. The Authority has deleted this requirement from the draft technical rules.

88. The Authority invites comment from interested parties on whether this position is appropriate.

Section 5 requirements and the Market Rules

89. Section 5 of the draft technical rules concerns the obligations of the network service provider and users in respect of power system operation and coordination. However, it does not bind system management, which is responsible for the dispatch of market generators and for ensuring the real time security of the power system, and which must perform these tasks in accordance with the Market Rules.

90. The boundary between the real time operation functions of system management and the network service provider does not appear to be well defined. Firstly, it is not clear at this stage exactly which parts of the transmission system will be "registered facilities" under the Market Rules and hence under the real time control of system management. Secondly, the extent of the effect to which those parts of the power system that do not form part of market operations, and which therefore will remain under the real time control of the network service provider, will have on power system security is unclear. Thirdly, the network service provider will advise

system management on power system security related issues, particularly in respect of power system analysis and planning.

91. Section 5 of the draft technical rules does not define the boundary but imposes requirements on the network service provider in respect of the performance of those operational duties for which the network service provider is responsible.

92. The Authority has worked with Western Power to improve the clarity of the requirements in section 5 and to minimise ambiguity.

93. The Authority invites comments from interested parties on whether the requirements of section 5 are appropriate given the need to be consistent and avoid overlaps with the Market Rules. It also invites comment on the extent to which the requirements of section 5 of the technical rules support the efficient operation of the SWIN as a whole.

Duplication and clarity

94. The Authority has worked closely with Western Power to simplify and remove duplication from the draft technical rules so that the draft technical rules are concise and the obligations on Users and Western Power are clear. The Authority would welcome submissions from interested parties as to where obligations in the draft technical rules are duplicated or where the obligations on users or Western Power are not entirely clear.

Deadlock Issues

95. In its Preliminary Report, the Committee identified 11 deadlock issues which the Committee was unable to resolve by consensus.

96. Section 12.26 of the Access Code provides that if the Authority is advised of a deadlock, it must form a view on the subject of the deadlock and advise the Committee of its determination. The Authority has considered the 11 deadlock issues identified in the Committee's report including the records of discussion. The Authority also received advice from PB Associates,[6] McGill Engineering Services Pty Limited[7] and has discussed these issues with Western Power and users. The Authority advised the Committee of its determination on the 11 deadlock issues on 22 March 2006 and it sets out its views on these issues below.

Issue 1: Frequency standards

97. A user representative on the Committee raised concerns that the frequency standards specified in Table 2.1 of the proposed technical rules could function as a barrier to connection, particularly for large gas turbines. The user put the view that manufacturers of gas turbines would not warrant their machines when exposed to low frequencies for even short periods. However, it was noted that exemptions from the technical rules may be granted to users.

[6] PB Associates confidential report, Review of Deadlock Issues with the Technical Rules Committee, January 2006.

[7] McGill Engineering Services Pty Limited, Comments on TRC Preliminary Report, 20 December 2005.

98. All power systems have a normal operating band within which the frequency must be maintained during normal system operation. Wider frequency tolerances are permitted during and immediately following a system disturbance.

99. The frequency proposed by Western Power is comparable with the NEM and the New Zealand North Island network (which is of similar size to the SWIN). A key difference is that the proposed recovery time in the technical rules from a disturbance (fault) is 25 minutes in the SWIN and only 5-10 minutes in the NEM (depending on the severity of the disturbance). This is a consequence of the reserves policy, where in the NEM, and on most other comparable power systems, instantaneous reserve capacity to replace the full active power output of the largest connected generator must be kept continuously available, whereas in Western Australia only 70 per cent of this capacity must be kept available. The balance of the active power generation capacity required to make up any deficit is then provided by a gas turbine, which is not started until after the fault has occurred.

100. The effect of this instantaneous reserves policy is that excursions from the normal frequency band will be more severe in the SWIN than when a similar disturbance occurs on other networks. In particular, lower frequencies will last for longer periods than on other networks, particularly when a situation arises where insufficient instantaneous reserves are available to make up for a deficit in active power generation. This situation is of particular concern to operators of modern high speed combined cycle gas turbine plant, which can be intolerant of extended low frequency operation due to high stress levels on the outer extremities of their rotor blades. It is noted that, even in the UK with a 100 per cent reserves policy, gas turbines are limited for both time and load below 48.75 Hz (the point at which load shedding will start).

101. In spite of this concern, given the need to operate under current instantaneous reserves policy for the SWIS, in the Authority's view the frequency range proposed by Western Power is appropriate and reflective of similar networks.

102. However, in the Authority's consideration of this issue, a second issue arose, namely whether the Target Recovery Time in Table 2.1 of the proposed technical rules was consistent with the Market Rules. It was noted that rule 3.18.11A of the Market Rules provides for a "Ready Reserve Standard" which contemplated additional energy being available within 15 minutes which is sufficient to cover:

a) 30 per cent of the total output, including parasitic load, of the generation unit synchronized to the SWIS with the highest total output at that time;

b) plus the Minimum Frequency Keeping Capacity as defined in clause 3.10.1(a) of the Rules.

103. The Authority discussed the Target Recovery Time issue with Western Power and Western Power agreed to amend Table 2.1 to be consistent with the Market Rules. Western Power has advised that, in order to be consistent with the Market Rules, it may cause Western Power to incur additional costs than if the standard was 25 minutes. The Authority notes that this may be the case. However, as the standard is prescribed in the Market Rules, there is no discretion for the Authority to accept a lower standard in the technical rules.

Authority's view on Deadlock Issue 1

104. The Authority's view on Deadlock Issue 1 is that the frequency range in Table 2.1 of Western Power's proposed technical rules should not be amended but the recovery time from disturbances should be reduced to a maximum of 15 minutes.

105. The Authority's view is reflected in the draft technical rules.

Issue 2: Stability assessment

106. Users on the Committee contended that Western Power's approach to stability assessment is too conservative and restrains their capacity to transfer power.

107. Users asserted that, using a combination of critical contingencies with worst case system operating conditions, the acceptable stability envelope is determined by scenarios with an extremely low probability of occurring. A higher probability threshold should therefore be used for the selection of stability scenarios used to determine the acceptable operating envelope of the power system. This would permit a less conservative operating policy that would increase the network capacity available to users for power transfer.

108. Western Power argued that a credible trigger event will often escalate into a more serious situation and that it is therefore prudent to take a conservative approach to specifying an acceptable operating envelope. It also stated that probability criteria would be difficult to apply and would require a vast amount of data. Western Power also noted that although stability related events have a very low probability of occurrence, they are also very high impact events that will not only result in the lights going off but can also cause plant damage with significant financial consequences.

109. The Authority notes that the reserves policy discussed in Issue 1 above also means that the SWIS is likely to be more prone to transient and voltage instability which arise following the occurrence of a "trigger event" due to the lower inertia of the system relative to the total load and the consequent lower levels of dynamic reactive support likely to be available.

110. Further, it is noted that this issue is exacerbated by the topography of the SWIS, as the limited capacity of the long 220kV line to Kalgoorlie restricts the ability of generators located in the Goldfields region to support the system voltage in the event of a fault in the vicinity of the Perth metropolitan area.

111. The Authority understands that the use of a less conservative operating policy could increase the capacity of the SWIN, and in particular the Goldfields interconnection, for power transfer purposes. However, the consequences following an extreme trigger event may be more serious as a result. System studies would be needed to quantify these impacts but the overall benefits to generators could be marginal, given the structural nature of the problems resulting from the existing operating policy and transmission system topography.

112. For these reasons the Authority's view is that no amendment should be made to the planning criteria proposed by Western Power for stability assessment.

Authority's view on Deadlock Issue 2

113. The Authority's view on Deadlock Issue 2 is that no change should be made to the planning criteria for stability assessment proposed by Western Power.

114. The Authority's view is reflected in the draft technical rules.

Issue 3: Provision of information

115. Users considered that, in some cases, it would be difficult to provide the information required by Western Power before a user, and in particular a generator, could connect to the network. Users were concerned at the possibility of an access application being held up due to irrelevant data being required. Users proposed that data should be required only when feasible.

116. Western Power argued that provision of information in advance was good practice and that not all of the information scheduled would be required of all applicants and that Western Power would be required to act reasonably in this regard.

117. In response, users noted that while there are requirements in the proposed technical rules for Western Power to be "reasonable", this alone provides insufficient protection against the rule being applied inappropriately. Users argued that they should only be obliged to provide the information that is necessary to ensure system performance and security.

118. In the Authority's view, the informational requirements are not such that it would constitute a barrier to entry and the information required by Western Power is considered to be appropriate for large transmission connected equipment. However, the Authority recognises that if interpreted and applied in full to less complex situations (especially at the distribution network level), it could create an onerous burden to a user in circumstances where the user is providing data that is not technically relevant for a simple connection arrangement.

119. For the reasons above, in the Authority's view, the requirement for provision of information should be confined to include only information required to assess the impact of the proposed connection on system performance and security. In this way, if a dispute occurs over the provision of information and the parties resort to the dispute resolution procedures set out in chapter 10 of the Access Code there will be a benchmark against which Western Power's requirements can be independently assessed. It is noted that more extensive information is likely to be required where large transmission connected equipment is concerned.

Authority's view on Deadlock Issue 3

120. The Authority's view on Deadlock Issue 3 is that the requirement for provision of information must be confined to include only information reasonably required to assess system performance and security.

121. The Authority's view is reflected in the draft technical rules.

Issue 4: Reactive power capabilities

122. A user on the Committee was concerned that the requirement for synchronous generators to be capable of operating at a power factor of 0.8 lagging was

excessive and suggested that the network service provider specify the power factor performance capability as being from 0.9 lag to 0.9 lead.

123. Western Power argued that the specified range is consistent with the capability of existing synchronous generators connected to the SWIN and that the capability is needed given the increased demand for reactive support on the SWIN. This capability is also provided for in the relevant Australian Standard, unless otherwise specified.

124. The Authority notes that, from a technical perspective, there is a need to ensure that sufficient reactive power reserves are available to ensure stable operation of the network under fault conditions.

125. Section 5.2.5.1(a) of the NER require all connected synchronous generators to be capable of producing or absorbing reactive power to a maximum of 0.395 of the rated active power output of the generator, irrespective of the actual generator load. This is equivalent to a power factor of 0.93 lag or lead when the generator is producing its rated active power output.[8] The NER requirement is measured at the connection point to the transmission or distribution system whereas the Western Power requirement is at the generator terminals. By specifying the requirement at the generator terminals Western Power's proposed requirement is inclusive of the reactive power needed to supply the generator transformer and other auxiliary loads between the generator terminals and the connection point.

126. The effect of this is that a generator connected to a NEM transmission system would need to supply more reactive power at its terminals than specified in section 5.2.5.1(a) of the NER in order to both meet the NER requirement and to supply its own generator transformer and auxiliary loads. For example, a generator operating at a 0.93 power factor at its connection point operates at a 0.90 power factor at its generator terminals. Conversely, a generator connected to the SWIS and operating at a power factor of 0.8 at its terminal could be operating at a power factor of 0.85 if measured at the connection point. The Authority notes that this definitional difference means that the difference in required generator capability between the SWIS and the NEM is actually lower than it might appear. In spite of this, the Authority accepts the difference is significant.

127. The NER give no explicit requirement for other types of generators, whereas Western Power proposes a minimum power factor range of 0.95 lead to 0.95 lag for a generator supplying its rated active power output. This is a significantly less onerous requirement than for synchronous generators.

128. For practical purposes, the physical size of a generator is determined by its MVA rating,[9] rather than its active power or MW rating. Therefore, assuming the hypothetical scenario of a proponent considering the connection of a 100MVA rated generator, its reactive power production capability must be:

    a) 60 MVAr on the SWIS, thus restricting its active capability to 80 MW; or

[8] A generator is said to be operating at a lagging power factor when supplying reactive power and at a leading power factor when absorbing reactive power. The power factor reduces as the amount of reactive power supplied or absorbed increases.

[9] MVA or (megavolt-ampere) is the vector product of real and reactive power. It can be determined simply by multiplying rated voltage by rated current.

b) 43 MVAr on a system at 0.9pf, restricting its active capability to 90 MW.

129. From this example it can be seen that the specification of a lower lagging power factor for a generator on the SWIS, while increasing reactive power production capability, reduces the active power capability of a given size of generator. Therefore, a proponent wanting to provide a specific active power capability on the SWIS may need to supply a physically larger (and potentially more expensive) generator than would be required to provide the same active power capability when operating on the NEM.

130. However, the Authority is satisfied that the need for reactive power generation on the SWIN, particularly around the load centre in the Perth metropolitan area, is high. Given the topography of the network and, in particular, the existing policy in relation to the scheduling of spinning reserve (which limits the amount of generation connected to the power system at any time and therefore the potential sources of reactive power), the Authority has concluded that the requirement for reasonably high levels of reactive power capability from new synchronous generators in the draft technical rules is reasonable.

131. The Authority also notes that allowing explicitly for an "automatic" access standard and a "minimum" standard as in the NEM would make any scope for negotiation of this requirement clearer.

Authority's view on Deadlock Issue 4

132. The Authority's view on Deadlock Issue 4 is that no change should be made to the reactive power requirements proposed by Western Power. However, it recognises that reactive power requirements may vary across the transmission and distribution system and encourages proponents affected by this requirement of the technical rules to discuss the likely reactive power requirement for a particular generator location with Western Power.

133. The Authority's view is reflected in the draft technical rules.

Issue 5: Generating unit response to power system disturbances

134. Users on the Committee argued that the required generating unit response to power system disturbances is more restrictive than the corresponding requirements on similar networks and that it is outside manufacturers' specified operating envelopes for modern generating plant.

135. Western Power argued that the SWIS is prone to significant frequency and voltage variations on account of the small size of the system and that this is reflected in the system standards specified in the proposed technical rules. Further, Western Power argued that the specified tolerances are necessary to ensure that connected generators do not trip prematurely and thereby exacerbate the impact of the initial disturbance. Western Power also noted that its existing generators are all capable of meeting the specified ride-through requirements.

136. The Authority notes that the ability of connected generators to ride-through a system fault without tripping is necessary to maintain both system stability and frequency performance since the premature tripping of a connected generator following a disturbance of the power system will exacerbate an already difficult situation and may well prevent the system recovering to a normal operating state.

137. However, this consideration must be balanced against the possibility of generators being damaged by sustained operation outside the voltage and frequency bands in which they are designed to operate. In this regard, the Authority notes that the requirements in the proposed technical rules are similar to those in other jurisdictions.

138. This issue is much more significant for large generators connected to the transmission system. Little system support would be received from a small generator, particularly if it had just recently connected to the distribution system. In the NEM, the system manager has suggested that these requirements apply at critical points in the network only and the system manager should indicate for which applications (and for which generators) these requirements are mandatory.

139. However, as noted above in its consideration of Deadlock Issue 2, given the reserves policy and the topography of the SWIN, the Authority considers that frequency excursions may occur more frequently than on the NEM and therefore, in the Authority's determination, the frequency ride-through requirement for critical generators should not be amended from that proposed by Western Power.

140. For voltage ride-through, the Authority understands that the ride-through requirement is based on worst case fault clearing time assumptions. This means that voltage ride-through requirements may potentially be relaxed for a generator that is to be installed at a network location where faster fault clearing times apply and in particular, where modern circuit breakers with faster operating times have been installed.

Authority's view on Deadlock Issue 5

141. The Authority's view on Deadlock Issue 5 is that no change should be made in the frequency ride-through requirements for critical generators. Concerning voltage ride-through requirements, the Authority is of the view that they may be relaxed if the actual circumstances of the application indicate no significant threat to system stability. However, any relaxation of the voltage ride-through requirements should be treated as an exemption from the requirement in accordance with section 1 of the technical rules.

142. The Authority's view is reflected in the draft technical rules.

Issue 6: Monitoring and control requirements

143. Users on the Committee expressed concern that the proposed technical rules require the remote monitoring and control equipment at a user's installation to be compatible with the SCADA equipment used by the system manager but do not include the detailed technical specifications that would ensure this compatibility. Users considered the requirements that must be met were not fully specified and may constitute a barrier to entry.

144. Western Power argued that the NER provides less detailed requirements than the proposed technical rules and so provision of more detail is not justified.

145. In the Authority's view, compatibility is a reasonable requirement. However, to fully specify the technical requirements that would ensure compatibility could take up an amount of space in the technical rules that is disproportionate to the significance of the requirement. Further, any incremental additional cost incurred in purchasing SCADA equipment to meet a compatibility requirement would be small compared to

the cost of the primary plant. Therefore, it is most unlikely that the compatibility requirement would have a material impact on the total cost of a user's facility.

146. However, in working through this issue, other issues emerged that, while not raised by user representatives on the Committee, concerned the Authority. These were:

a) the list of parameters that may be remotely monitored, as specified in the proposed technical rules, is much more extensive than the corresponding list in the NER. If enforced, this could potentially have a bigger impact on user costs than the specifications for compatibility with the SCADA system since it will impact the size of the SCADA system remote terminal unit and also require cabling and sensors to be provided to feed the required plant inputs into the system. Further, there is no readily identifiable reason why the system manager needs more real time information on connected generating plant than is needed on the NEM; and

b) there was a requirement in the proposed technical rules for extensive remote control (as distinct from monitoring) equipment to be installed at generating plant, implying that the system manager requires direct control of all generation plant subject to dispatch by System Management. This is different from the practice on the NEM where the NER contain no corresponding mandatory requirement for generators using the network to install remote control equipment. Rather, the system manager issues dispatch instructions by telephone (or over some other communication link) to local plant operators who are then responsible for complying with these instructions.

147. In the Authority's view, if it was intended that System Management have remote control of all generators then this would be expected to be reflected in the Market Rules. However, it is clear from section 7 of the Market Rules (dealing with the issue of Dispatch Instructions) that it was not intended that the system manager have facilities to permit direct remote control of all registered generation. Indeed, if such facilities were available, the provisions of sections 7.1 to 7.7 of the Market Rules would not be needed. Further, in the Authority's view, section 7.8 of the Market Rules envisages that direct control of generation by System Management is to be the exception rather than the rule and subject to separate commercial arrangements.

148. On this basis, in the Authority's view, the requirement in the proposed technical rules for generators to install extensive remote control facilities is not consistent with the Market Rules and is therefore not reasonable. However, in discussing this issue with Western Power, it was noted that some generators connected to the network, and in particular some non-scheduled wind power generators, are unmanned. Such generation, particularly when connected to the distribution network can, at times of high prime mover (normally wind) variability cause rapid variations in network voltages to the extent that they have unacceptable impacts on other users. The Authority accepts that where a generation plant is unmanned it is reasonable to make provision for System Management or the network service provider to remotely disconnect a generator from the network. However, the remote control and monitoring requirements specified in the proposed technical rules are much more extensive than needed to meet this limited application.

149. It may be that the extensive remote control and monitoring requirements were included because they could potentially be required if a User was providing ancillary services in accordance with clauses 3.9 to 3.15 of the Market Rules or under a

separate commercial arrangement with Western Power as the network service provider. However, user requirements in the technical rules are intended to cover access requirements only and additional monitoring and control requirements necessary for the provision of ancillary services should be mutually agreed by the parties and included in the relevant ancillary services contract.

150. The Authority invites comment from interested parties on the need to include in the technical rules the extensive schedule of possible inputs included in clause 3.3.5.1(c) of the draft technical rules.

Authority's view on Deadlock Issue 6

151. The Authority's view on Deadlock Issue 6 is that the detailed technical specifications regarding SCADA compatibility should not be specified in the technical rules.

152. The Authority's further view on this issue is that the technical rules should be amended to address the issues raised above by:

a) amending the requirement for the installation of remote monitoring equipment to ensure that only inputs reasonably required by System Management for the monitoring of system operation be provided;

b) explicitly requiring System Management to be consulted in determining the required remote monitoring inputs; and

c) deleting the requirement for remote control facilities to be provided, except for the provision of facilities to remotely disconnect unmanned generating units from the network.

153. The Authority's view is reflected in the draft technical rules.

Issue 7: Power system stabilisers

154. Users on the Committee considered it unreasonable to require all synchronous generators rated over 30 MW to have power system stabilisers, without testing whether this is necessary for the particular network connection.

155. Western Power argued that the provision of power system stabilisers is now recognised as good industry practice and results in minimal additional cost for new generators. It advised that it would not require retrospective fitting of this equipment.

156. In the Authority's view, situations will exist where generators are not able to be dispatched due to instability in the power system. The inclusion of power system stabilisers in new generation plant, at minimal incremental cost to owners, will go some way towards ameliorating this situation.

157. The Authority recognises that situations may arise where the cost of including a power system stabiliser is significant. One possibility is where a user wants to connect a second-hand generator, which does not include a stabiliser, to the SWIN. However, the proposed technical rules do not prevent such a situation being dealt with on its merits by way of exemption.

Authority's view on Deadlock Issue 7

158. The Authority's view on Deadlock Issue 7 is that no change should be made to the requirement in the proposed technical rules for power system stabilisers.

159. The Authority's view is reflected in the draft technical rules.

Issue 8: Maximum fault clearance times

160. Users on the Committee expressed concern that the maximum fault clearing times in the proposed technical rules were considerably slower than in the NER. Users considered that Western Power should aim to align the clearance times with the NER requirements and noted that with slow fault clearing times, generators could be subjected to unnecessary operational constraints, higher installation costs and export limitations.

161. The Authority has compared fault clearing time requirements in the NER and the proposed technical rules and found that any differences do not appear to be as significant as implied by the users on the Committee. While the remote end fault clearing times for new 330 kV connected plant on the SWIN are slightly longer than provided for in the proposed technical rules, the impact on connected plant is likely to be marginal. A more serious concern exists in relation to the clearing times in the event of a circuit breaker failure but Western Power is constrained by the capability of its existing plant.

162. Further, circuit breaker failures are comparatively rare and, in the Authority's view, it is considered unlikely that the longer circuit breaker failure clearing times specified in the proposed technical rules would significantly impact user costs of compliance.

Authority's determination on Deadlock Issue 8

163. The Authority's view on Deadlock Issue 8 is that no change should be made to Western Power's proposed requirement.

164. The Authority's view is reflected in the draft technical rules.

Issue 9: Reasonable endeavours

165. It was argued by users on the Committee that proposed clause 5.3.2(b) and 5.3.2(c) of the proposed technical rules were of a legal nature and should not be included in the draft technical rules. These clauses limited Western Power's obligations to use reasonable endeavours to comply with the requirement. These clauses have now been deleted from section 5 of the draft technical rules and substantially incorporated as clauses 1.8.1(b) and 1.8.1(c) of the draft technical rules.

166. Western Power argued that, according to legal advice received, the clauses were appropriately incorporated into the technical rules. The Authority received alternate advice on this point.

167. Western Power also argued that the clauses were necessary in order to have a consistent standard of conduct applying across the SWIN. Section 12.5 of the Access Code provides that the technical rules will prevail over a contract. As such, the standard will be the standard imported into all access contracts for the SWIN.

Western Power noted that if the standard was not incorporated into the technical rules, then there was a real possibility that some users would be held to a stricter standard than others. In particular, smaller users with less bargaining power may not be able to negotiate the same standard as larger users. Western Power also argued that the clauses were reasonable as they were symmetrical in that they applied the same standard to users and Western Power.

Authority's view on Deadlock Issue 9

168. The Authority considers that the clauses may be characterised as being more of a legal obligation than a technical one. However, the Authority accepts that such clauses may be ancillary to technical rules. Further, the Authority can see merit in Western Power's arguments. Accordingly, the Authority's view on Deadlock Issue 9 is that the clauses should not be deleted from the proposed technical rules. The Authority invites submissions on this point.

169. The Authority's view is reflected in the draft technical rules by the redrafted clauses 1.8.1(b) and 1.8.1(c) of the draft technical rules.

Issue 10: Transmission and distribution network voltage control

170. This issue has already been considered under Deadlock Issue 5: Generating unit response to power system disturbances.

Issue 11: Protection or control system abnormality

171. The proposed technical rules included a requirement that should a user become aware of a protection or control system abnormality in its equipment, the user must advise Western Power. If there was a threat to power system security Western Power could determine whether the equipment was to be taken out of service or operated.

172. It was argued by a Committee member that users would suffer a large detrimental commercial impact if the technical rules contained the requirement for users to operate as per Western Power's direction if Western Power considers there to be a threat to system security.

173. In the Authority's view, where the plant was under the control of the system manager, it is considered that this would be the responsibility of the system manager, who has the power under section 3 of the Market Rules, to give operating directions to users when the system is in a high risk or emergency operating state. In this circumstance the issue was not one for the technical rules.

174. Section 5 of the draft technical rules has been significantly amended in consultation with Western Power. The original requirement in the proposed technical rules is now limited under clause 5.5.4 of the draft technical rules to equipment forming part of the transmission system, and hence will apply only to Western Power and to those few industrial users that own the circuit breakers connecting their plant to the transmission system. The Authority considers this appropriate since it is unlikely that equipment that is so critical to power system security that it must be operated in a high risk state would be under the control of the network service provider.

175. In reaching the conclusion above the Authority is mindful of the importance of maintaining system security and the economic consequences and threat to public

order that would occur in the event of a partial or total system blackout. There is consequently a need for the operators of the power system to be authorised to take extreme action in a power system emergency. However, there is a provision in clause A3.57 of the standard access contract included in Appendix 3 of the Access Code that covers the situation. This clause states:

> Without limiting the generality of clause 3.56 *UserCo* and *service provider* must comply with any directions given by *system operator*.

176. Western Power has proposed an equivalent provision in its Electricity Transfer Access Contract (clause 15).

177. In general the Authority considers these provisions adequate to cover most situations. Nevertheless, should a situation arise where user equipment that is not under the control of system management be critical to system security, the Authority believes that Western Power should reach an appropriate commercial arrangement with the user, either as part of, or outside, the relevant access contract. This arrangement could include liability provisions.

Authority's view on Deadlock Issue 11

178. The Authority's determination on Deadlock Issue 11 is that the issue is primarily one for system management and thus outside the scope of the technical rules.

179. The Authority's view is reflected in the draft technical rules.

Supplementary Issue: Design standards

180. In the course of its considerations, the Authority was concerned with clause 2.6 of Western Power's proposed technical rules which required that all residential, commercial and industrial subdivisions be designed to supply the 50-year maximum load anticipated for that area. Although this was not a deadlock issue, the Authority considered that the clause was not reasonable and therefore did not comply with the objectives of the technical rules. Accordingly, the Authority sets out its views for amending the clause.

181. Clause 2.6 of the proposed technical rules provided that all residential, commercial and industrial subdivisions be designed to supply the 50-year maximum load anticipated for that area. The Authority understands that Western Power has had to undertake significant capital expenditure to upgrade existing subdivision distribution networks to accommodate the additional demand imposed by air conditioning systems and the requirement is intended to reduce the probability of a similar situation occurring in the future. The clause allows Western Power to assume that historic increases in after diversity maximum demand (**ADMD**) will continue into the future. Further, Western Power may require developers to install sufficient capacity to meet not only the needs of their own subdivisions but also the needs of future adjoining subdivisions that might potentially rely on the vested infrastructure.

182. UDIA submitted:

> We acknowledge that Western Power has carried out research into this, and we fully support the notion that all systems should be designed using the correct load criteria. However we are also very wary of over-designing the system by using ADMD values, which are too high, because under the current arrangement the cost of this will be directly borne by the buyers of new residential lots in Western Australia.

> Using the figures in the Western Power submission and assuming a lot production rate of 12,000 new lots per annum, the increase in cost/lot will be of the order of $4,000. We believe this is a significant impost to pass onto lot buyers in Western Australia, and may stifle development.
>
> The industry is concerned that Western Power may not have taken into consideration the recent changes to design parameters in their reports, nor undertaken a detailed enough study on relevant projects.[10]

183. Essentially, clause 2.6 allows Western Power to transfer planning risk to developers. The issue for the Authority was whether such a strategy is fair to all participants and whether it is likely to result in efficient capital investment decisions.

184. In the Authority's view, there is significant uncertainty in the level of energy demand growth on the distribution system over the next 50 years and in light of this it must consider whether it is reasonable to require developers to invest on the basis of the physical life of the assets.

185. Future growth rates are difficult to predict. It may be that current growth rates continue. Alternatively, demand for electricity may now be peaking and future demand on distribution system infrastructure may reduce rather than increase. For example, breakthroughs in electricity storage or micro-generation technologies could potentially result in increased load factors and reduced peak demand on distribution systems.

186. In light of such uncertainty, the Authority considers it unreasonable to expect developers to invest in infrastructure that may well prove unnecessary. It also considers it unreasonable to require developers to invest in capacity that is required only to support neighbouring subdivisions. On this basis, the Authority considers that Western Power must only require developers to install distribution infrastructure to meet the reasonably anticipated demand of a subdivision when fully developed and assuming existing reasonably foreseeable electricity consumption patterns.

187. The Authority has amended clauses 2.6 and 2.8 of the proposed technical rules accordingly. The proposed amendments to clause 2.6 include provisions that encourage the design and provision of distribution systems within new subdivisions in a way that accommodates the possible need for future augmentation. The objective of these changes is to reduce the costs and disruption of possible future system augmentation while not imposing significantly higher costs on current developers. The Authority invites submissions on the provisions of clause 2.6 in the draft technical rules.

Recommendations from the Committee

188. In its Preliminary Report, the Committee made 10 recommendations to the Authority. The Authority details its response to each recommendation below.

Recommendation 1

> The Authority should consider whether the following matters are adequately dealt with in instruments other than the technical rules in a manner which satisfies the achievement of the objectives of the Access Code:

[10] UDIA submission, 9 November 2005.

- performance standards in respect of service standard parameters; and
- the identity of the system operator for the network; and
- the generation and load forecast information that users, consumers and generators must provide to the service provider.

189. The Authority has considered this recommendation as part of its redraft of the proposed technical rules and consultations with Western Power and users. The Authority is satisfied that its draft technical rules satisfy the obligations in the Access Code. Further, where possible in the draft technical rules, the Authority has eliminated overlap with other instruments.

Recommendation 2

> The Authority should adopt the conformed technical rules presented at Appendix 2 to the preliminary report as the basis for any further developments. The Committee, including Western Power, advise that the Authority should not approve the proposed technical rules (24 August 2005 version).

190. The Authority accepted the amendments recommended by the Committee as set out in Appendix 2 to the Committee's Preliminary Report as the basis for its discussions with Western Power and network users.

Recommendation 3

> Western Power should be required to work with the Authority and industry to develop a set of agreed criteria and agreements that are to be used as a pro-forma for carrying out system studies. The intent of this recommendation is to ensure that greater certainty around this key issue is provided to prospective users

191. The Authority invites submissions from industry on this issue.

Recommendation 4

> The Authority should consider the information of Appendix 4.6 and any further information or submissions that Western Power may be able to provide, in determining whether the requirements set out in "TR 3.2.4.1 Reactive power capability" impose unnecessary compliance costs on network users.

192. The Authority has addressed this issue in its consideration of Deadlock Issue 4: Reactive power capabilities.

Recommendation 5

> The Authority should consider the information in Appendix 4.5 and 4.6 and any further information or submissions that Western Power may be able to provide, in determining whether the requirements set out in TR 3.2.4.3 (Generating Unit Response to Disturbances in the Power System) are unreasonable.

193. The Authority has addressed this issue in its consideration of Deadlock Issue 5: Generating unit response to power system disturbances.

Recommendation 6

> In relation to the distribution design changes, the Authority, in consultation with its advisers and the Committee, should develop an information request and require Western Power to make a single comprehensive submission to the Authority. The information request and submission should address all issues required to be

assessed by the Authority under the Access Code, including the economic merits of the design changes.

194. The Authority has addressed this issue in Supplementary Issue 1: Design standards.

Recommendation 7

The Authority should continue consultation with the Small Generators Working Group (**SGWG**) with a view to resolving the remaining issues.

195. The Authority consulted with the SGWG as part of its consideration of the proposed technical rules. The Authority will continue to consult with the SGWG before formulating its final decision on the technical rules.

Recommendation 8

The Authority should require Western Power to propose amendments to the technical rules to differentiate between the roles of system management and that of the network service provider.

196. The draft technical rules have been amended to differentiate between the role of System Management and that of the network service provider.

Recommendation 9

The Authority should subject the technical rules to a legal review and redraft them where necessary.

The focus of the review should be on:

- ensuring consistency of language and style between the rules and other regulatory instruments (such as the Access Code);
- ensuring that obligations on parties are clear, effective and represent a balanced commercial outcome considering the relative risks involved; and
- considering whether legal "exclusion" or "liability" statements are appropriate for inclusion in the technical rules.

197. The Authority has conducted a legal review of the proposed technical rules and has extensively redrafted the proposed technical rules to ensure that they are consistent with the Market Rules and the various obligations are clear. Concerning the third point above, the Authority has considered this issue in its consideration of Issue 11: Protection or control system abnormality.

Recommendation 10

As part of the legal redetermination, the Authority should have regard to comments provided by users and Western Power in determining an appropriate form of the "reasonableness" clause.

198. The Authority has had regard to the comments in the Committee's report and has had discussions concerning this issue with Western Power. In the Authority's view, the redrafted clause 1.6.2 addresses the concerns raised by users and Western Power.

Conclusion

199. The publication of the draft technical rules and this accompanying report satisfies the requirements of section 12.11(c) of the Access Code.

200. The Authority now invites public submissions from interested parties on the draft technical rules. As required by section 12.11(d) of the Access Code, interested parties have 15 business days to provide the Authority with a submission (by **5 May 2006**).

201. Following the publication of the Authority's draft technical rules, the Committee is required to provide the Authority with a final report which sets out the Committee's progress in performing its functions under section 12.23 of the Access Code. The final report is to be provided by the Committee to the Authority within 30 business days before the last day by which the Authority must make its final decision on Western Power's proposed Access Arrangement.

202. The Authority will consider any public submissions received and the Committee's final report. The Authority will then publish approved technical rules which will accompany an approved access arrangement. This date of publication will be in accordance with the Authority's obligations relating to the approval of a proposed access arrangement in chapter 4 of the Access Code. When the Authority publishes the technical rules for Western Power's network it will specify a start date which is both consistent with the Code objective and at least 30 business days after the approved technical rules are published.

APPENDIX – DRAFT TECHNICAL RULES