

ELECTRICITY COMMISSION

Consultation Paper

Options for Determining Transmission Service Definitions

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1 Executive Summary

1.1 The purpose and structure of the paper

1. The Electricity Governance Rules (“the Rules”) requires the Commission to develop benchmark agreements for connection to the transmission grid and/or use of the grid. The benchmark agreements are intended to provide a basis for Transpower and designated transmission customers to negotiate transmission agreements, and are intended to become default transmission agreements in the event parties are unable to agree contracts before a date specified by the Board.
2. The Commission is preparing draft benchmark agreements containing service definitions and measures, and processes for determining service levels on a case-by-case basis. The draft benchmark agreements will also contain other technical and commercial terms and conditions necessary for them to be used as default contracts.
3. This paper provides high-level policy options and recommendations regarding the scope and content of the benchmark agreements, which need to be decided before detailed draft agreements can be completed.
4. In particular, the paper discusses:
 - a. Who should be responsible for specifying, monitoring, and enforcing service commitments from Transpower, and how those activities should be regulated, if at all;
 - b. Whether performance incentives should be adopted to encourage Transpower to meet its service commitments, and if so, what types of performance incentives should be adopted;
 - c. The scope of services to be covered by benchmark agreements, the allocation of risk between Transpower and its customers, and the various service definitions and measures appropriate to each case; and
 - d. The mechanisms through which transmission services should be specified and enforced (e.g. via the Rules or by contract).

The Commission’s overall approach

5. The paper discusses a broader range of issues than just the content of benchmark agreements. The Commission has adopted this approach because it is concerned default contracts may not provide an effective mechanism to address ‘free rider’ problems with the monitoring and enforcement of interconnection services.
6. As the Commission is considering alternatives to the default contracts approach, the analysis of key problems for defining transmission services (sections 1.2 and 3.3) is conducted on the basis that the default contract

approach is not implemented. This allows the Commission to compare all options on a 'first principles' basis.

Structure of the paper

7. The paper considers multiple options for multiple sets of issues, many of which are interrelated. To aid readability and understanding, the paper contains a lengthy executive summary, supported by a more detailed paper for readers that need to consider the Commission's analysis in more depth.
8. The next section discusses key problems with determining and defining transmission services, which forms the basis for the high-level policy options discussed in the rest of the paper.

1.2 Key problems for defining transmission services

1.2.1 Key features of transmission

9. There are several key features of transmission that need to be taken into account when defining transmission services and measures. These include:
 - a. *Bilateral monopoly problems* between Transpower and transmission customers, which create serious 'hold out' problems for parties negotiating transmission agreements when they have already made their investments;
 - b. *Operational interdependencies* between the Commission, the grid owner, the system operator, and connected parties. Operational interdependencies complicates the monitoring and enforcement of overall system performance;
 - c. *The common service* nature of the grid. This gives rise to 'free rider' problems, particularly in regard to monitoring and enforcement activities (this is discussed further below);
 - d. *Weak competitive pressures* on retailers and lines companies to monitor and enforce transmission performance in the interests of end users;
 - e. The occurrence of *large and unpredictable external shocks* further compounds the 'free rider' problem. The infrequency of extreme events, combined with difficulties observing the grid owner's and system operator's actions, can sometimes make it difficult to accurately assess the true performance of the grid owner; and
 - f. *The risk of cascade failure* is a key feature of transmission because cascade failure carries large and widespread economic and social consequences. This makes it important to assign responsibility and accountability for managing system operation to the party or parties

best placed to minimise cascade failure risks, and to define the grid owners' services and service measures appropriately.

1.2.2 Further discussion of 'free rider' problems

Incentives for group action

10. The common service nature of interconnection services means that grid users have incentives to band together to negotiate jointly with Transpower, and to jointly monitor and enforce Transpower performance. By joining forces, grid customers with common views about service definitions, measures, and levels can save on contracting costs and achieve superior contracting outcomes from Transpower.

'Free riding' problems can occur

11. There may be some grid users, however, for whom the costs of contributing to group action exceed the benefits they receive on the margin. For example, they may not share the views of the majority of group members. Or they may believe the group will remain, and act just as effectively, without them. In both cases they will lose very little from refusing to contribute to the group.
12. In general 'free riding' is more attractive to small grid users than large ones. Large grid users know that if they withdraw from the coalition then it could collapse and they would lose the benefits the group might achieve.
13. With 40 or so connected parties, some of whom are quite small, it seems unlikely that grid customers would voluntarily fund collective action in regard to negotiating, monitoring, and enforcing services from existing transmission assets.

Implications for Transpower's performance

14. The consequences of 'free riding' are minimal if there are few 'free riders,' but if there is no coalition at all then monitoring and enforcement of Transpower's performance is likely to be weak over the long run.
15. In practice it seems unlikely that weak monitoring and enforcement by grid users would greatly affect the grid owner's incentives to avoid cascade failure, as there are strong public policy incentives on Transpower's management to minimise the risk of cascade failure. If weak monitoring and enforcement by grid users occurs, it is more likely to affect Transpower's incentives to minimise grid constraints.

Q1: What difficulties are you experiencing, or have experienced in the past, with enforcing transmission service performance? What problems have these difficulties caused your business? Please provide examples or evidence of current and historical events to illustrate your case.

- Q2: Does the paper adequately describe key issues relevant to determining transmission service definitions and measures? Are there other features of transmission relevant to determining transmission service definitions and measures? What are they?
- Q3: Do you believe 'free rider' problems are likely to be significant among grid users in regard to monitoring and enforcing transmission services? Please provide examples or evidence of current and historical events to support your view.

1.3 Summary of the options

16. As discussed below, the Commission proposes different approaches to connection and interconnection services. It is important to appreciate that in this paper:
- a. *Connection services* refer to services provided by connection assets, rather than to services received at points of connection;
 - b. *Interconnection services* refer to services provided by interconnection assets – assets for which it is too difficult to attribute services to a single party because of 'loop flow' effects.

1.3.1 Options for determining transmission services

17. In regard to connection services, the Commission intends to adopt the approach specified in section II of part F of the Rules. This involves using benchmark agreements as default transmission agreements. As this approach conforms to section II of part F of the Rules, the Commission has not considered or evaluated other options for connection services.
18. In regard to interconnection services, the Commission has considered three options (summarised in Table 1.1):
- c. *The default contracts approach (option A1)*: Grid users negotiate their own contracts with Transpower but default transmission agreements would apply if they are unable to reach agreement within specified timeframes;
 - d. *The co-regulation approach (option A2)*: The Commission would establish a multilateral body of grid users to negotiate interconnection services with Transpower, the results of which would be specified in the Rules. Arbitration would be used if the multilateral body and Transpower are unable to reach agreement; and
 - e. *The direct regulation approach (option A3)*: After consulting Transpower and grid users, the Commission would directly specify interconnection services in the Rules
19. Table 1.1 outlines the approach adopted in each option for monitoring and enforcing services, and for providing explicit performance incentives.

Table 1.1: Summary of Options for Interconnection Services			
Option	<i>Specification of services</i>	<i>Monitoring of performance</i>	<i>Enforcing performance and performance incentives</i>
A1 Default Contracts	Voluntary negotiation by grid users, with benchmark agreements applying if parties are unable to voluntarily agree transmission agreements Parties can 'contract out' of benchmark agreements Provisions specified in bilateral contracts	Grid users responsible for monitoring performance Informal monitoring by the Commission	Voluntary enforcement by grid users Benchmark agreements will specify mediation and arbitration rather than court enforcement Performance incentives left to parties to negotiate with Transpower (but may be included in benchmark agreements)
A2 Co- regulation	Negotiation conducted by multilateral body, with arbitration occurring if parties are unable to agree transmission agreements Provisions specified in the Rules	Multilateral body responsible for monitoring performance Multilateral body would keep the Commission and grid users informed	Enforcement by multilateral body appealing to existing rule breach processes Use of performance incentives depends on what multilateral body negotiates with Transpower
A3 Direct regulation	Commission directly determines interconnection services and specifies them in the Rules	The Commission responsible for monitoring performance Informal monitoring by grid users	Individual grid users enforce services through rule breach processes, with assistance from the Commission

Option A1 – default contracts

20. In effect benchmark agreements (and therefore default contracts) are a form of regulation, because:
- a. They directly regulate the relationship between Transpower and transmission customers if the parties are unable to reach agreement within specified timeframes; and
 - b. The Rules establish obligations on Transpower and transmission customers to seek Board approval for transmission agreements that decrease services below those described in a benchmark agreement, or where the parties are uncertain about whether the transmission agreement will decrease or increase services vis-à-vis benchmark agreements.
21. A key feature of the default contracts approach is that Transpower and transmission customers can voluntarily agree contracts to avoid default transmission agreements, and can at any time 'contract out' of default transmission agreements, provided they meet the requirements just discussed in paragraph (b) above. The voluntary feature of this option is seen by some parties as a key mechanism for allowing innovations to

occur over time, and for reducing the risks of 'regulatory creep.' Other parties see the voluntary feature as raising significant practical issues.

Option A2 – co-regulation

22. The term 'co-regulation' is used to signal that the approach utilises the rule-making powers of the Commission to set the framework for industry self-determination of interconnection services, and uses the Rules to ensure all grid users are contributing to the monitoring and enforcement of Transpower's performance commitments. It is a mix of official regulation and self-regulation.
23. A key area of difference between options A1 and A2 is the approach to monitoring and enforcing performance. The co-regulation approach envisages collective monitoring by the multilateral industry body and a more direct role for the Commission and Rulings Panel in arbitrating disputes. The default contracts approach leaves it to individual parties to decide the monitoring and enforcement mechanisms that suit them best.

Option A3 – direct regulation

24. The direct regulation approach is similar to the co-regulation approach, except that the Commission would directly specify interconnection services (after consulting industry) rather than delegate that task to a multilateral body. As with the co-regulation approach, there would be no option for parties to 'contract out' of interconnection services specified in the Rules.
25. A key difference between options A2 and A3 is in regard to monitoring Transpower's performance. The co-regulation approach provides for transmission customers to monitor interconnection services collectively, whereas under the direct regulation approach the Commission (and individual grid users) would monitor Transpower's performance against regulated targets for interconnection services.

1.3.2 Options for defining and measuring transmission services

26. The Commission has considered three options for defining transmission services. These options draw fairly directly from the work undertaken by the Transport Working Group (TWG) and Transpower during 2002 and 2003.

Option B1 – the 'asset availability' approach

27. The asset availability approach defines the grid owner's service as making specified assets and information available to its customers, consistent with health and safety standards, grid reliability standards, the grid investment test, and with conducting maintenance when doing so produces maximum net economic benefits. Under this option transmission customers choose from a menu of service measures.
28. This definition of the grid owner's services takes into account load growth and also the effects on dispatch costs:

- a. Load growth is taken into account because the grid owner is required to meet grid reliability standards, and is required to undertake investments approved by the Commission based on the grid investment test; and
 - b. Dispatch costs are optimised under the asset availability approach because the grid owner is required to justify its maintenance expenditure plans with a cost-benefit assessment. This would be implemented via Transpower's outage protocol, which would oblige it to conduct maintenance in a way that maximises net economic benefits, based on 'fit-for-purpose' cost-benefit assessments.
29. The service measures for this option relate primarily to:
- a. The megawatt ratings of specified interconnection assets at each point of service and the extent of design redundancy at each point of service;
 - b. The extent of planned outages of specified grid assets, and the expected level of unplanned outages;
 - c. The timeliness and accuracy of information provided to customers about installed capacity at each point of service and about planned and unplanned outages; and
 - d. The timeliness and accuracy of information provided to customers about the service measures contained in the conveyance approach (option B3).

Option B2 – the 'meet demand' approach

30. The 'meet demand' approach defines the grid owner's services as providing assets sufficient to meet off-take demand at agreed security and quality standards for each point of service. Under this option transmission customers choose a package of service measures relating to local security and local quality.
31. The service measures for this option include those for the asset availability approach (option B1) and also:
- a. Specified redundancy levels for each point of service; and
 - b. Specified voltage range objectives for each point of service.
32. The 'meet demand' approach (option B2) differs subtly from the asset availability approach (option B1) in regard to final decision rights to make investment decisions. Under the asset availability approach Transpower cannot expand connection capacity without the agreement of relevant connected parties.¹

¹ Note that default contracts would require Transpower under option B1 to meet grid reliability standards specified by the Commission, but this would not necessarily be the case for voluntary connection agreements.

33. In contrast, under the 'meet demand' approach Transpower is legally obligated to expand capacity to meet local security and quality levels specified in their connection contracts unless connected parties renegotiate those levels. This would give Transpower final decision rights over connection assets, which is quite different from the status quo.
34. Although Transpower would need to prepare demand forecasts for each connection point and undertake investments when necessary to meet forecast demand growth, in practice it is not likely to do so without agreeing the forecast with affected parties. This would provide customers with the option to investigate transmission alternatives and/or renegotiate service levels as a cost/quality trade-off.

Option B3 – the conveyance approach

35. The conveyance approach defines the grid owner's service as the conveyance of electricity at agreed quality levels from generators to off-take customers. The service measures for B3 include those for option B2 and also:
 - a. The extent of planned and unplanned interruptions, and the extent and magnitude unserved energy, momentary interruptions, load reduction, and use of system protection schemes;
 - b. Excursions and deviations in power quality; and
 - c. The extent and cost of transmission losses and constraints.
36. This definition of the grid owner's services takes into account not only customer load growth but also the performance of the overall system. The conveyance approach (option B3) differs subtly from the 'meet demand' approach (option B2) in that B2 only includes local security and local quality at each point of service, whereas B3 includes overall system security and quality.

Allocation of risk and responsibility

37. The choice of service definition affects the allocation of risk and responsibility.
38. Under the asset availability approach (option B1), provided the grid owner makes its assets available in accordance with its service commitments, it is not responsible for interruptions to the supply of electricity or for minimising delivered energy costs (although it is required to minimise the effects of its maintenance decisions on delivered energy costs). It is also responsible for providing open and fair access to its assets in terms of facilitating connection to grid assets.
39. The 'meet demand' approach (option B2) expands the asset availability approach (option B1) to make the grid owner primarily responsible for estimating load growth at each point of service and enhancing grid capacity over time to meet ongoing load growth.

40. The conveyance approach (option B3) expands the 'meet demand' approach (option B2) to make the grid owner responsible for interruptions to the supply of electricity, deviations in the quality of delivered electricity, and for minimising delivered energy costs.
41. Under the current Rules the Commission contracts with the System Operator to implement the Commission's real-time performance requirements. The conveyance approach (option B3) would therefore shift responsibility to the grid owner for the overall performance of the electricity system.

Interaction with the 'A' options

42. Under the default contracts approach (option A1) it would be the responsibility of grid users to monitor overall system performance and enforce performance against the grid owner if the conveyance approach to defining services (option B3) was adopted. Likewise, under the co-regulation approach (option A2) monitoring and enforcement would be the responsibility of a multilateral body of grid users, established by the Commission. The conveyance approach (option B3) therefore shifts responsibility for monitoring and enforcing overall system performance from the Commission to grid users if the default contracts or co-regulation options are adopted.
43. The conveyance approach (option B3) therefore carries potentially far-reaching consequences for who is responsible for overall system performance. It also carries far-reaching consequences for the transparency of the wholesale electricity market, and may limit future options to separate system operation from the grid owner. For example, separation of those functions could not occur if the direct regulation approach (option A3) and the conveyance approach (option B3) were both adopted.

Financial Transmission Rights (FTRs)

44. The conveyance approach (option B3) includes service measures relating to transmission losses and constraints. The Commission is investigating the role of transmission hedges and may wish to introduce FTRs in the future, which could affect Transpower's incentives to minimise losses and constraints.
45. If conveyance approach is adopted then it may be necessary in the future to revise the service measures and levels if an FTR product is introduced that alters the financial incentives on Transpower.

1.3.3 Options for the choice of counterparty

46. As presented in an earlier consultation paper,² the Commission believes generators and directly connected customers should be counterparties for transmission agreements, but it has yet to decide who should be the

² Preliminary Consultation Paper: Transmission Contract Structure and Designated Transmission Customers, 24 September 2005.

agent for end-users. The Commission has considered three counterparty options:

- a. *Option C1*: Line companies;
- b. *Option C2*: Retailers; and
- c. *Option C3*: Line companies and retailers.

47. The Farrier Swier report evaluated essentially two options for the choice of counterparty to transmission agreements covering interconnection services. This section draws on the Farrier Swier analysis and evaluates the three options outlined below:

1.3.4 Summary of the options

Table 1.2: Summary of Options for Transmission Services		
A	B	C
<i>Specifying, monitoring, enforcing, and incentivising services</i>	<i>Service definitions and measures</i>	<i>Choice of counterparties³</i>
A1 Default contracts A2 Co-regulation A3 Direct regulation	B1 Asset availability B2 Meet demand B3 Overall system performance	C1 Line companies C2 Retailers C3 Line companies & retailers

Q4: Are there other options the Commission should consider, and if so, what are they and why should they be considered?

1.4 Evaluation criteria

48. Based on regulatory considerations outlined in the paper, the Commission has adopted the following criteria for evaluating the options for determining transmission services:

“The approach to determining transmission services should as far as practicable:

- a. Achieve standards of power quality and grid reliability required by grid users;
- b. Provide appropriate incentives for Transpower to continuously improve transmission services and produce the services at least cost;
- c. Promote efficient investment in transmission assets;

³ All options include generators and directly connected consumers.

- d. Facilitate commercial arrangements between Transpower and designated transmission customers;
- e. Provide efficient and effective processes for resolving disputes during the negotiation of commercial arrangements between Transpower and designated transmission customers;
- f. Provide efficient and effective processes for resolving disputes regarding the performance of contractual terms by all parties;
- g. Minimise the need for changes to the Electricity Governance Regulations and Rules;
- h. Minimise administration and compliance costs;
- i. Able to be implemented within the timeframe specified in the GPS;
- j. Be consistent with international experience; and
- k. Be consistent with recent New Zealand experience and context.”

Q5: Has the Commission adopted appropriate evaluation criteria? What criteria should be omitted or added?

1.5 Evaluation of options for connection services

49. A key feature of connection services is that they are specific to each location, and the type and level of service can vary markedly from one location to another. The Commission believes the ‘hold out’ problem is the primary issue for connection services, rather than ‘free rider’ problems with monitoring and enforcing performance.

1.5.1 The process for determining connection services

50. The Commission intends to adopt the default contract approach (option A1), which is the approach specified in the Rules. The only issues to evaluate are those relating to the high-level content of the default contract. These include:
- a. Whether the courts or an alternative arbitration process should be used to enforce performance;
 - b. Whether explicit performance incentives are required in addition to standard contract enforcement provisions; and
 - c. The proposed service definitions and measures.
51. The first two issues will be evaluated at a later date when the Commission is in a position to propose specific clauses for arbitration and performance

incentives.⁴ The third issue is evaluated below and in section 6.3 and appendix 3.

1.5.2 Connection service definitions and measures

52. The Commission considered two options for defining connection services:
- a. *The asset availability approach (option B1):* Making connection assets available to customers at specified ratings and standards; and
 - b. *The ‘meet demand’ approach (option B2):* Making connection assets available to customers sufficient to meet customer demand at agreed security and quality standards for each point of service.
53. The proposed service measures for options B1 and B2 are very detailed, and are presented in section 5.2 of the paper. Service levels are not specified under either option, as they would be determined on a case-by-case basis for each connection asset and connected party.

1.5.3 Summary evaluation of proposed connection service definitions and measures

54. There is very little to choose between the asset availability and ‘meet demand’ approaches. The latter scores marginally better in terms of local power quality requirements but the asset availability approach scores marginally better on incentives for innovation and cost efficiency.
55. Table 1.3 provides a summary evaluation of each option against the evaluation criteria listed above. A detailed evaluation is provided in section 6.3 and appendix 3. Note the far right-hand-side column of the table ranks the options against each criteria. The notation “>” means “better than” and “=” means “equal.”

<i>Criterion</i>	<i>Option B1: Asset availability</i>	<i>Option B2: Meet demand</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Yes because connected party makes investment decision to achieve required grid reliability standards. This option is not relevant for power quality	Yes because connected party negotiates required grid reliability standards directly with Transpower. This option is not relevant for power quality	B2>B1
<i>(b) Incentives for innovation and cost minimisation</i>	This option requires Transpower to negotiate with connected parties before deciding capacity expansion for connection assets. This adds competitive tension to the incentives possible from	This option has the same negotiation requirements	B1=B2

⁴ The Commission intends to release the consultation paper on the proposed benchmark agreement after it has received submissions on this paper and made high-level policy decisions. It is possible that specific performance incentives may not be included in the first draft of the benchmark agreement.

Table 1.3: connection service definitions and measures – summary evaluation

<i>Criterion</i>	<i>Option B1: Asset availability</i>	<i>Option B2: Meet demand</i>	<i>Rank</i>
	adopting appropriate monitoring and enforcement regimes, and explicit performance incentives		
<i>(c) Efficient investment in transmission assets</i>	This option requires Transpower to negotiate with connected parties when capacity expansion is needed. This interaction is likely to achieve better information and stronger incentives for deciding what, where, when, and how much investment in connection assets should occur	Efficient investment under this outcome relies on connected parties specifying accurate incentive arrangements in their contracts with Transpower	B2=B1
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(g) Minimise need for rule changes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(h) Minimise administration and compliance costs</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(i) Can be implemented within short timeframe</i>	Yes as essentially the current approach to provision of connection assets	Takes a little longer than option B1 because Transpower will need to develop new systems to meet service commitments under option B2	B1=B2
<i>(j) Consistent with international experience</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(k) Consistent with recent NZ experience and context</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
Summary	Both options appear equally preferable for connection services		

1.5.4 Choice of contract counterparty for connection services

56. In the case of connection services Farrier Swier concluded that the only practical and feasible option was for all physically connected parties (generators, distribution line companies and direct customers) to become designated transmission customers. This is option C1 in Table 1.2 above.

Q6: Do you agree with the Commission's evaluation of the options for connection services, and if not, why not? Please refer to the evaluation in section 6 and appendix 3 when answering this question.

1.6 Evaluation of options for interconnection services

1.6.1 Key features of interconnection services

57. As with connection services there is a significant issue in regard to bilateral monopoly and 'hold out' problems, giving rise to the need for external mechanisms to resolve disputes over the negotiation of existing services.
58. In contrast to connection services, a key feature of interconnection is that many of the services are provided to multiple customers located in different parts of the grid. In general it is not technically feasible to separately deliver interconnection services to individual customers.

1.6.2 The process for determining interconnection services

59. The Commission considered three options for determining interconnection services, which are summarised in the Table 1.1 above.

1.6.3 Summary evaluation for determining interconnection services

60. Table 1.4 (next page) provides a summary evaluation of each option against the evaluation criteria listed above. A detailed evaluation is provided in section 7.2 and appendix 3.
61. Overall, the direct regulation approach looks to be the better option because the other options score poorly on key criteria. For example, the default contracts approach scores poorly in regard to power quality, grid reliability, innovation, cost minimisation, and investment in transmission assets. The co-regulation approach scores poorly in terms of practicality (criteria f, g, and h), and consistency with recent New Zealand experience and context. In contrast, the direct regulation approach scores 'first place' or 'second place' on almost all criteria.

<i>Criterion</i>	<i>A1: Default contracts</i>	<i>A2: Co-regulation</i>	<i>A3: Direct regulation</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Yes because grid users can 'contract out' of default transmission agreements, but 'free rider' problems with monitoring and enforcement are problematic	Yes because grid users specify services via a multilateral body and a multilateral body is likely to undertake effective monitoring and enforcement	Yes because (1) the Commission consults with grid users in specifying service levels, but this is unlikely to be as accurate as the multilateral body, (2) the Commission has incentives to effectively monitor and enforce performance to reduce 'newsworthy' underperformance events, and (3) the Commission can introduce balanced performance incentives	A2>A3>A1
<i>(b) Incentives for innovation and cost minimisation</i>	No because 'free rider' problems with monitoring and enforcement reduce pressure on Transpower to perform. These effects are likely to offset the innovation benefits arising from voluntary contracting	Yes because multilateral body likely to undertake effective monitoring and enforcement, which is important for creating strong incentives for innovation and cost minimisation	Yes because (1) the Commission has public policy incentives to effectively monitor and enforce performance to reduce 'newsworthy' underperformance events, and (2) the Commission can introduce balanced performance incentives	A2=A3>A1
<i>(c) Efficient investment in transmission assets</i>	Same as criterion (b)	Same as criterion (b)	Same as criterion (b)	A2=A3>A1
<i>(d) Facilitate commercial arrangements</i>	Yes because grid users can 'contract out' of default transmission agreements, although material deviations are constrained by the Rules	Yes because multilateral body negotiates with Transpower, although the decision-making process is specified by the EC	No because the intention is for the Rules to supplant commercial arrangements	A1=A2>A3
<i>(e) Efficient and effective resolution of negotiation disputes</i>	No because would have to resolve disputes with multiple parties, which would require significant coordination to achieve	Yes because would have single arbitration between Transpower and multilateral body	Yes because the rule change consultation process provides an efficient and effective mechanism	A2=A3>A1

Table 1.4: process for determining interconnection services – summary evaluation				
<i>Criterion</i>	<i>A1: Default contracts</i>	<i>A2: Co-regulation</i>	<i>A3: Direct regulation</i>	<i>Rank</i>
	consistency across disputes		for addressing disputes	
<i>(f) Efficient and effective resolution of performance disputes</i>	This option may be marginally better than A2 and A3 because it allows parties to voluntarily choose other dispute resolution processes if they believe they are more efficient and/or effective	Criterion does not discriminate between A2 and A3 as both options use appeals to existing rule breach processes	Criterion does not discriminate between A2 and A3 as both options use appeals to existing rule breach processes	A1>A2=A3
<i>(g) Minimise need for rule changes</i>	Yes because benchmark agreements are provided for in part F	No because significant departure from current part F framework	Would require some rule changes and would change current intention of part F	A1>A3>A2
<i>(h) Minimise administration and compliance costs</i>	Yes but unclear whether lower cost than option A3 Commission	No because of large set up costs and ongoing administration and compliance costs	Yes but unclear whether lower cost than Option A1	A1=A3>A2
<i>(i) Can be implemented within short timeframe</i>	Yes because consistent with current part F	No because of the time required to establish multilateral body and the longer time period for multilateral bodies to make collective decisions	Yes because new rules for interconnection services would have to be developed for benchmark agreements anyway	A2>A3>A1
<i>(j) Consistent with international experience</i>	Benchmark agreements are not common in other jurisdictions	Co-regulation, as it is defined in this paper, is rarely found in other jurisdictions	Regulations tend to determine transmission service delimitations and measures in most jurisdictions	A3>A1>A2
<i>(k) Consistent with recent NZ experience and context</i>	Derives from current part F which was developed in response to failure of industry self-governance	Could be considered similar to failed industry self-governance processes	Consistent with the more regulatory approach adopted in part F in regard to the GIT, GRS, and transmission pricing	A1=A3>A2
Summary	Option A3 is superior to options A1 and A2 in regard to determining interconnection services			

1.6.4 Proposed interconnection service definitions and measures

62. The Commission considered three options for defining interconnection services:

- a. *The asset availability approach (option B1):* Making interconnection assets available to customers at specified ratings and standards;
- b. *The 'meet demand' approach (option B2):* Making interconnection assets available to customers sufficient to meet customer demand at agreed security and quality standards for each point of service; and
- a. *The conveyance approach (option B3):* Conveying electricity at agreed quality levels from generators to off-take customers.

1.6.5 Summary evaluation of proposed interconnection service definitions and measures

63. Table 1.5 (next page) summarises the evaluation and ranks the options against each criteria. The asset availability approach scores significantly better than the demand and conveyance approaches, primarily because it retains competitive pressure on Transpower to justify its grid expansion proposals. The asset availability approach also appears to be a more practical solution than the demand or conveyance approaches.

Q13: Do you agree with the Commission's evaluation of the options for defining and measuring interconnection services, and if not, why not? Please refer to the evaluation in section 7.3 and appendix 3 when answering this question.

Table 1.5: interconnection service definitions and measures – summary evaluation

<i>Criterion</i>	<i>B1: Asset availability</i>	<i>B2: Meet demand</i>	<i>B3: Conveyance</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	This criterion does not discriminate between the options because these outcomes are determined primarily by the 'A' options described in section 5.1. See table 5 in section 7.2	Same as B1	Same as B1	B1=B2=B3
<i>(b) Incentives for innovation and cost minimisation</i>	This option requires Transpower to obtain the Commission's approval for investment in interconnection assets. The GIT process provides competitive tension to the incentives possible from adopting appropriate monitoring and enforcement regimes, and explicit performance incentives	The outcome depends largely on whether appropriate monitoring and enforcement regimes, and explicit performance incentives, are adopted	Same as B2. Although option B3 specifies a wider range of responsibilities for the grid owner, Transpower already faces these responsibilities as the System Operator	B1>B2=B3
<i>(c) Efficient investment in transmission assets</i>	Same as criterion (b)	Same as criterion (b)	Same as criterion (b)	B1>B2=B3
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between B1 and B2 as both options have essentially the same service measures and service levels	Criterion does not discriminate between B1 and B2 as both options have essentially the same service measures and service levels	The greater complexity associated with service measures would likely make it more difficult for a third party to determine the grid owners' performance, relative to options B1 and B2	B1=B2>B3
<i>(g) Minimise need for rule changes</i>	Yes	Significant rule changes would be required because option B2 is not consistent with the regulatory	Extensive changes would be required because option B3 is not consistent with the regulatory	B1>>B2>B3

Table 1.5: interconnection service definitions and measures – summary evaluation				
<i>Criterion</i>	<i>B1: Asset availability</i>	<i>B2: Meet demand</i>	<i>B3: Conveyance</i>	<i>Rank</i>
		framework underlying current part F rules	framework underlying current part F rules and it would require disestablishment of the System Operator contract	
<i>(h) Minimise administration and compliance costs</i>	Same costs under B1 and B2	Same costs under B1 and B2	This option involves higher administration and compliance costs because set up costs would be high and it would be more difficult for grid users to monitor and enforce performance under options A1 and A2	B1=B2>B3
<i>(i) Can be implemented within short timeframe</i>	This is the quickest option as it is the most consistent with current part F arrangements	This option would take longer to implement than option B1 because Transpower would need to develop new systems to meet more complex service commitments	This option would take the longest to implement because extensive changes would be required to the Rules, to service provider contracts, and perhaps to the internal organisation of Transpower	B1>B2>B3
<i>(j) Consistent with international experience</i>	A mix of B1 and B2 is often adopted in international jurisdictions	A mix of B1 and B2 is often adopted in international jurisdictions	This option is rarely adopted in international jurisdictions	B1=B2>B3
<i>(k) Consistent with recent NZ experience and context</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
Summary	Option B1 is superior to options B2 and B3 for interconnection assets			

1.6.6 Choice of contract counterparty for interconnection services

64. The Farrier Swier report evaluated essentially two options for the choice of counterparty to transmission agreements covering interconnection services. As presented in its earlier consultation paper, the Commission has considered the two Farrier Swier options and a third option that combines the first two options:
- a. *The lines company approach (option C1)*: All physically connected entities (generators, distribution line companies and direct customers) become designated transmission customers for the interconnection service;
 - b. *The retailer approach (option C2)*: Generators and direct customers become designated transmission customers for the interconnection service, but retailers take the place of distribution line companies for the “down stream” interconnection service; and
 - c. *The combined approach (option C3)*: This is the option identified by the Commission in its preliminary decision. It involves generators and direct customers becoming designated transmission customers, and both retailers and distribution line companies as designated transmission customers for the “down stream” interconnection service.
65. The choice of counterparty is closely interrelated with the choice of options for determining transmission services. In particular, under the co-regulation and direct regulation approaches (options A2 and A3) interconnection services are specified in the Rules rather than in bilateral contracts with Transpower, and so arguably there is no need to determine the counterparty for interconnection services in these cases.⁵
66. Nevertheless, counterparties are certainly necessary under the default contracts approach (option A1). The choice of counterparties should be based on an evaluation of which counterparties are likely to have the best information, incentives and capability to negotiate, monitor, and enforce outcomes in the interest of end-users, and which are the best parties to bear the risks of variations in Transpower’s performance.
67. The following table provides an evaluation of each option against the criteria listed in section 4.3.

⁵ Counterparties are needed for raising revenue based on the transmission pricing methodology. The Commission intends to levy transmission charges on line companies, generators and directly connected consumers.

Table 1.6: Interconnection service counterparty options – summary evaluation				
<i>Criterion</i>	<i>Option C1: All connected parties</i>	<i>Option C2: Retailers replace distribution line companies</i>	<i>Option C3: All connected parties plus retailers</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Connected parties will represent their own interests which will not always coincide with end-user interests	Retailers will represent their own interests which will not always coincide with end-user interests	Although connected parties and retailers will represent their own interests, including both as the counter party is marginally more likely to achieve end-user interests than having only one of them as a counter party	C3>C1=C2
<i>(b) Incentives for innovation and cost minimisation</i>	This option misses the influence retailers can provide	This option misses the influence line companies can provide	Retailers and distribution companies will have different interests. This option therefore provides slightly greater incentives	C3>C1=C2
<i>(c) Efficient investment in transmission assets</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between options. Lines companies would be more effective for some disputes but retailers more effective for other disputes	Same as for C1	Same as for C1	C1=C2=C3
<i>(g) Minimise need for rule changes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(h) Minimise administration</i>	This option requires the least	May incur transition costs and	May incur transition costs and	C1>C2=C3

Table 1.6: Interconnection service counterparty options – summary evaluation				
<i>Criterion</i>	<i>Option C1: All connected parties</i>	<i>Option C2: Retailers replace distribution line companies</i>	<i>Option C3: All connected parties plus retailers</i>	<i>Rank</i>
<i>and compliance costs</i>	change, and involves the same counterparties as for connection	ongoing transaction costs at higher levels than C1	ongoing transaction costs at higher levels than C1 and C2	
<i>(i) Can be implemented within short timeframe</i>	This option is effectively the status quo so could be implemented readily	This involves a transition from the distributor to the retailer, so may take longer to implement	This involves an additional counterparty, and services will need to be allocated between counterparties	C1>C2>C3
<i>(j) Consistent with international experience</i>	International practice in similar electricity markets ⁶ is to use more direct regulation of interconnection services, with revenue from distribution line companies	This option is rarely used internationally	This option is rarely used internationally	C1>C2=C3
<i>(k) Consistent with recent NZ experience and context</i>	This option is effectively the status quo so is the most consistent with recent experience	This would be a new approach in New Zealand	This would be a new approach in New Zealand	C1>C2=C3
Summary	Option C1 is preferred on transaction cost and implementation grounds, but C3 may provide outcomes that are better matched to end user needs, and provide for more innovation.			

⁶ The UK and Australian electricity markets are very close to the New Zealand design, relying on competition in generation and retail, regulating natural monopoly in lines businesses, and coordinating the real-time market through the System Operator.

68. Table 1.6 demonstrates that choosing the best counterparty option appears to be a balance between the transactional efficiency and ease of implementation of the lines company approach (option C1) and the potential for outcomes that are more innovative and closer to those required by end-users, provided by the combined approach (option C3).
69. If the A1 (default contracts) model was adopted, this would put more weight on the combined approach, because the counterparty will have more influence on contracting outcomes. If the A3 (direct regulation) model was adopted, this would put more weight on the lines company approach, because the counterparty would have less influence on contracting outcomes.
70. Farrier Swier concluded that neither distribution line companies, nor retailers, were likely to be good agents for end-users, because they will tend to represent their own interests, and these are not necessarily well-aligned with end-users. This is because transmission line charges are essentially “pass through” costs for both parties.
71. If accepted, this argument tends to favour the lines company approach, especially if direct regulation (option A3) is chosen for interconnection services.

<p>Q7: Do you agree with the Commission’s evaluation of the options for interconnection services, and if not, why not? Please refer to the evaluation in section 7 and appendix 3 when answering this question.</p>
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1.7 The Commission’s proposal

72. The Commission proposes the following approaches to connection and interconnection services:
 - a. *Connection services:*
 - i. The default contracts approach (option A1) for determining connection services;
 - ii. The asset availability approach (option B1) for defining and measuring connection services; and
 - iii. The counterparties are distribution lines companies, generators, and directly connected consumers (option C1);
 - b. *Interconnection services:*
 - i. The direct regulation approach (option A3) for determining interconnection services;
 - ii. The asset availability approach (option B1) for defining and measuring connection services; and

- iii. The choice of counterparty (i.e., the 'C' option) is arguably not an issue for interconnection because, under the direct regulation approach (option A3), interconnection services are specified in the Rules rather than in transmission agreements.
73. Submission requirements are provided in section 2.3. Submission questions are listed in appendix 5.

2. Introduction

2.1 The requirement for benchmark agreements

74. Rule 4.4 of section II of part F of the Electricity Governance Rules (“the Rules”) requires the Commission to develop benchmark agreements for connection to the transmission grid and/or use of the grid. The benchmark agreements are intended to provide a basis for Transpower and designated transmission customers⁷ to negotiate transmission agreements, and are intended to become default transmission agreements in the event parties are unable to agree contracts before a date specified by the Board.⁸
75. Rule 4.3.1.5 of section II of part F specifies that the benchmark agreements must include service definitions, service measures, and service levels to the extent practicable.

2.2 The purpose and content of the paper

76. The Commission is preparing draft benchmark agreements containing service definitions and measures, and processes for determining service levels on a case-by-case basis. The draft benchmark agreements will also contain other technical and commercial terms and conditions necessary for them to be used as default contracts.
77. This paper provides high-level policy options and recommendations regarding the scope and content of the benchmark agreements, which need to be decided before detailed draft agreements can be completed. The paper also discusses changes to the Rules that may be required to complement the benchmark agreements, to achieve effective and efficient provision of transmission services.
78. In particular, the paper discusses:
- a. The scope of services to be covered by benchmark agreements, the allocation of risk between Transpower and its customers, and the various service definitions and measures appropriate to each case;
 - b. Who should be responsible for specifying, monitoring, and enforcing service commitments from Transpower, and how those activities should be regulated, if at all;
 - c. Whether performance incentives should be adopted to encourage Transpower to meet its service commitments, and if so, what types of performance incentives should be adopted; and

⁷ Participants determined by the Commission pursuant to a process set out in rule 2.2 of section II of Part F.

⁸ Rule 3.1.2 of section II of Part F.

- d. The mechanisms through which transmission services and performance incentives should be specified and enforced (e.g. via the Rules or by contract).

The Commission's overall approach

79. Clearly the paper discusses a broader range of issues than just the content of benchmark agreements. The Commission has adopted this approach because it is concerned default contracts may not provide an effective mechanism to address 'free rider' problems with the monitoring and enforcement of interconnection services.
80. As the Commission is considering alternatives to the default contracts approach, the analysis of key problems for defining transmission services (section 3.3) is conducted on the basis that the default contract approach is not implemented. This allows the Commission to compare all options on a 'first principles' basis.

2.3 Submission requirements

81. The Commission would like to invite submissions to the Commission on the proposal and in answer to the specific questions by 5pm on Friday 13 May 2005. Please note that because of the statutory timing obligations of the Commission, submissions received after this date may not be able to be considered.
82. The Commission's preference is to receive submissions in electronic form (Microsoft Word format and pdf) and to receive one hard copy of the electronic version.
83. The electronic version should be emailed with the phrase "Submission on Options for Determining Transmission Services" in the subject header to info@electricitycommission.govt.nz, and one hard copy of the submission should be posted to the address below.

Jenny Walton

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84. The Commission will acknowledge receipt of all submissions. Please contact Jenny Walton if you do not receive electronic acknowledgement of your submission within 2 business days.
85. Submissions should be provided in the format shown in appendix 4. Your submission is likely to be made publicly available on the Commission's

website. Submitters should indicate any documents attached in support of the submission in a covering letter, and indicate clearly confidential information provided to the Commission.

86. All information provided to the Commission is subject to the Official Information Act 1982.

2.4 Commonly used acronyms

ACCC	Australian Competition and Consumer Commission
AMD	Anytime Maximum Demand
AMI	Anytime Maximum Injections
AUFLS	Automatic Under Frequency Load Shedding
BETTA	British Electricity Trading and Transmission Arrangements
CUSC	Connection and Use of System Code
EGEP	Electricity Governance Establishment Project
EUE	Expected Un-served Energy
FTRs	Financial Transmission Rights
GIP	Grid Injection Point
GIT	Grid Investment Test
GPS	Government Policy Statement (as published in October 2004)
GRS	Grid Reliability Standards
GXP	Grid Exit Point
HVDC	High Voltage Direct Current
MACQS	Multilateral Agreement on Common Quality Standards
MITS	Main Interconnected Transmission System
NEC	National Electricity Code (Australia)
NECA	National Electricity Code Administrator (Australia)
NEMMCO	National Electricity Market Management Company (Australia)
NGC	National Grid Company
OFGEM	Office of Gas and Electricity Markets (Britain)
PPOs	Primary Performance Obligations
SCADA	Supervisory Control and Data Acquisition
SPD	Scheduling, Pricing, and Dispatch model
STC	System Operator-Transmission Owner Code (Britain)
TAG	Transmission Advisory Group
TAs	Transmission Alternatives
The Commission	The Electricity Commission
The EGRs	The Electricity Governance Rules (enacted in May of 2004)
The Rules	Electricity Governance Rules
TWG	Transport Working Group (EGEP working group)

3 The Economic Framework

3.1 General approach⁹

87. This section discusses key economic concepts relevant to determining service definitions and service measures in general. Section 3.2 identifies key features of transmission and section 3.3 discusses the economic complications that arise from the particular features of transmission.

3.1.1 Service definitions

88. Services generally comprise bundles of component services. For example, transmission services comprise connection, interconnection, and system operator services.¹⁰ In competitive industries efficient bundling of services is achieved by the decentralised actions of service providers and consumers, and it is common for a firm to offer both bundled and unbundled services.

89. The appropriate service definition depends on which services are bundled together. The full service in a furniture-moving task is a delivery service, whereas the self-drive option is a truck rental service. It is important to properly specify component services, and to understand why they are bundled together, in order to specify appropriate service definitions.

3.1.2 Service measures

90. Service providers in competitive industries have strong incentives to choose service measures that maximise economic efficiency. They do this by choosing measures that:

- a. Reflect the ability of customers to alter their demand for services; and
- b. Reflect key cost drivers to the service provider and their ability to control those factors.

91. The appropriate service measures depend on the way in which services are bundled. For example, if consumers choose to hire a truck to shift their own furniture then service measures could include the capacity of the truck, whether the truck is covered or uncovered, and the time of the day/week/year the truck is required. Alternatively, if consumers choose the full moving service then service measures relating to truck capacity are replaced with service measures relating to the timeliness of pick up and delivery and the condition of the furniture upon delivery.

⁹ Appendix 1 provides a more extensive discussion of economic issues regarding service definitions and measures.

¹⁰ Each of these services can be further broken down into narrower service components. For example, system operator services typically comprise scheduling and dispatch of energy, scheduling and dispatch of instantaneous reserves, monitoring and dispatch of emergency reserves such as automatic under frequency load shedding, contracting and dispatch of frequency keeping, voltage support, black start, and so on.

3.1.3 Allocation of risk and accountability

92. Efficient allocation of risks (and therefore accountability) requires that diversifiable risks be allocated to the party best able to hedge against the outcome and non-diversifiable risks be allocated to the party best able to influence the outcome. Where the service provider does not have a natural hedge, it is often left to the consumer to either bear those risks or purchase insurance to cover them.
93. The choice of service measures and levels bears directly on the extent to which service providers can be held accountable for outcomes and who bears the risk of non-performance. Where service providers are not well placed to carry risk, service measures may not fully reflect the service delivered because they are not needed to achieve efficient risk allocation. It is not appropriate to simply identify poorly specified service measures or levels and assume they need revising, because they may be perfectly adequate from a risk allocation perspective.

3.2 Key features of transmission

94. This section discusses key aspects of transmission relevant to defining transmission services and service measures. These include:
 - a. Bilateral monopoly problems between Transpower and its customers;
 - b. Operational interdependencies between the Commission, the grid owner, the system operator, and connected parties;
 - c. The common service nature of the grid;
 - d. Weak competitive pressure on retailers and lines companies to reflect the interests of end users;
 - e. The occurrence of large and unpredictable external shocks; and
 - f. The risk of cascade failure.

3.2.3 Bilateral monopoly problems

95. Large economies of scale for installing transmission make it efficient for transmission assets (over any area) to be supplied by only one provider. As a result transmission providers possess significant market power when terms and conditions are to be negotiated after they have made their investments.¹¹
96. On the other hand, connected parties possess significant political power because of the large economic consequences of transmission asset owners withdrawing service from them. For example, it is politically infeasible for Transpower to disconnect a lines company because doing so affects large numbers of customers.

¹¹ Their market power is reduced when there are close substitutes for transmission and load growth creates opportunities for grid expansion.

97. Similarly, it is difficult to withdraw transmission services from large directly connected parties because many workers would be affected. Withdrawing service from large generating companies could have large and widespread negative effects on consumers through higher wholesale electricity market prices. This would also tend to attract political and regulatory attention.
98. The dual presence of market power and political power effectively creates a bilateral monopoly situation, with large gaps between negotiation positions that can be difficult to close by negotiation.

3.2.4 Operational interdependencies

99. Overall system performance depends on the decisions and actions of the Electricity Commission, the grid owner, system operator, and grid users such as generators, consumers, and distributors.¹² This section outlines key features of system performance and then briefly discusses interdependencies between the grid owner, system operator, and grid users.

System performance

100. System performance has four key dimensions that need to be considered: continuity of electricity supply, minimising delivered energy costs, provision of efficient price signals to consumers and investors, and open and fair access to the grid for generators and consumers.
101. Poor system performance occurs when the number of interruption minutes to electricity supply at grid exit points (GXPs) exceeds target levels, and/or the cost of delivered energy significantly exceeds minimum feasible levels, and/or wholesale electricity prices do not closely reflect the marginal cost of supply. Poor performance on any of these dimensions can impose significant additional cost on electricity consumers.
102. Poor system performance can also affect generators, for example if line outages are excessive or maintenance programmes are poorly timed, then some generators may be unnecessarily restricted in their ability to get their power to all consumers. This can lead to increased dispatch costs and raised prices to consumers.

Minimising interruption minutes¹³

103. Minimising the number of interruption minutes requires minimising the number of interruptions and restoring power as quickly as possible when interruptions occur. Interruptions arise primarily from unplanned

¹² In this paper the 'overall system' refers to the system for transmitting electricity over the national grid, from generators to distributors and directly connected consumers. It is not intended to include arrangements for distributing or retailing electricity, or arrangements relating to government policy issues regarding environmental sustainability.

¹³ The term "minimising interruption minutes" is intended in the economic sense of reducing interruption minutes to the level where the costs of further reducing interruption minutes just equals the benefits of a further reduction in interruption minutes. It is not intended to imply that interruption minutes should be reduced to the absolute minimum possible.

transmission and generation outages, and from the way in which the system operator and grid users respond to them. Supply interruptions can also occur when there are unexpected interruptions to fuel supply for generators, such as unexpectedly dry hydro conditions or temporary gas supply interruptions.

104. Unplanned transmission outages arise primarily from extreme weather conditions, airplane or construction incidents, equipment failure, and tree growth. The grid owner's monitoring and maintenance programmes regarding the condition of its equipment and tree growth, and decisions to lay overhead or underground cables, affect the chances of external factors causing transmission outages. Grid owner decisions about the level of technical skill and manpower required to cater for unplanned outages, and the location of those resources, affects the speed with which transmission equipment can be restored to service. The design and specification of grid assets will also be a factor.
105. The Commission's decisions about grid investment, such as the number and capacity of lines, transformers and switchgear, affect the chances that an outage on one line causes overload problems on other lines, which require corrective action by the system operator.
106. Similarly, the system operator is required to act when unplanned generation outages, or large and unpredicted load spikes, cause large changes in electrical frequency and voltage levels. If the system operator takes the wrong action, or acts too slowly, then supply interruptions are more likely to occur as a result of unplanned outages or load spikes.
107. In reacting to outages and load spikes, the system operator relies on connected equipment belonging to generators, distributors, and directly connected consumers to respond in the manner prescribed.¹⁴ In emergency under frequency situations, for example, part C of the Rules provide that generators must remain connected to, and providing input to, the system, within agreed limits. Part C also requires distributors and directly connected consumers to install and operate automatic under frequency load shedding (AUFLS) systems. In practice, the system operator also purchases additional ancillary services to provide a buffer in emergency situations.
108. The effect of these arrangements is that the system operator oversees and aggregates the contributions from many different parties, and carries out this role within the terms of its contract with the Commission and within the constraints of other parties abiding by the rules and technical codes specified in part C of the Rules. The actions of the grid owner are important for minimising supply interruptions, but are only one component of the overall equation.

¹⁴ Prior to the establishment of part C of the Rules these requirements were specified in Transpower's connection contracts. However, there will still need to be specific technical requirements specified between asset owners.

Minimising delivered energy costs

109. Given existing generation and transmission capacities, and assuming competitive supply of energy, delivered energy costs are minimised by a complex process that minimises overall energy costs, transmission losses and constraints.
110. This process requires adopting an accurate representation of physical loss functions in the scheduling, pricing, and dispatch (SPD) model. This is primarily the responsibility of the Commission, which it implements via its contract with the system operator to use the approved SPD model.¹⁵
111. The frequency and duration of transmission constraints are determined primarily by the availability of generation and transmission assets. For example, line outages in one part of the grid lead to increased power flow over other lines, which may cause them to reach their security constraint levels and require the system operator to dispatch more costly generation located downstream of the constraint.
112. The grid owner's maintenance decisions are important for minimising equipment outages, and are therefore important for minimising grid constraints and the delivered cost of energy. Moreover, the grid owner's decisions about the timing of maintenance (taking into account load profiles and the availability of generation) affects whether constraints occur and affects the severity and cost of the constraints if they do occur.
113. Transmission losses and constraints increase as load growth occurs, and can be reduced by grid investment or investment in transmission alternatives. The grid investment test 'weighs up' the cost of these investments against the cost of losses and constraints to determine the optimal investment in terms of minimising the delivered cost of energy to consumers. Nevertheless, there are many judgements involved in making grid investment decisions and final decisions on these matters rest with the Commission rather than the grid owner.
114. Grid owner decisions, via their effects on planned and unplanned outages, affect wholesale electricity prices and are often viewed by consumers as creating opportunities for generators to exercise market power. In this case prices may exceed the cost of supply, and may lead consumers to make sub-optimal production and consumption decisions.
115. Similar comments may be directed at the Commission in the future in regard to decisions it makes about grid investment and investment in transmission alternatives. The Commission's broader role in determining wholesale and retail electricity arrangements may also be important for addressing competitiveness issues.

¹⁵ The Commission would also rely on the system operator to review the pricing algorithm in the SPD model if it wished to better specify losses in the model.

Open and fair access to generators

116. Open and fair access to generators requires that both the grid owner and system operator conduct their businesses as efficiently and effectively as possible because some generators rely more heavily on the grid than others. For example, large hydro generators at the bottom of the South Island rely on the availability of the whole grid to access many of their customers and to receive maximum prices for their output. Benefits flow to consumers from the open and fair access to generators.

3.2.5 Common carriage services

117. Common services are services supplied to multiple customers that can't be separated technically or commercially in any practical sense. In these situations each customer receives essentially the same service. Both transmission asset provision and system operator services have strong common service attributes.

Interconnection assets

118. Transmission assets provide energy in aggregate to each GXP, and so all consumers at a GXP effectively receive the same conveyance service. Moreover, in networks with capacity constraints, all consumers downstream of constraints on the interconnected part of the grid are equally affected by the constraint. The constraint effectively provides a bottleneck to transmitting low-cost electricity to all consumers downstream of the constraint. Likewise, the constraint provides a bottleneck to all upstream generators seeking to 'export' their power to downstream consumers.
119. Some differentiation of service is possible in the more extreme situations where outages risk interrupting supply. Rather than all consumers experiencing loss of supply, the system operator could degrade services to some consumers by dispatching interruptible load.

Connection assets

120. Economies of scale mean that connection customers sometimes share connection assets, and therefore receive essentially the same connection service.¹⁶ Thus, while connection services will differ between regions, customers within the same region will sometimes share the same level of connection service.

System operator services

121. System operator services are essentially common services for all transmission customers because the technical features of an interconnected transmission system dictate that it is not possible to rely entirely on self-dispatch of generation and load. All transmission systems

¹⁶ There are very few cases where connection customers share connection assets. There are some cases between an industrial customer and a distributor (e.g. New Zealand Steel and Counties Power), and several cases between a generator and a distributor. There is also the odd case where a single connection point serves two distributors.

therefore use some form of centralised dispatch to closely match generation with load to minimise the chances of large swings in frequency and voltage. Coordinated dispatch is achieved either through centralised dispatch of all generation or through centralised dispatch of balancing generation to make up shortfalls between load and self-dispatched generation.¹⁷

3.2.6 Contract chains

122. Consumers of electricity are the ultimate grid users, yet only a few large consumers hold direct connection and conveyance contracts with Transpower. The remainder of electricity consumers contract with lines companies, or contract with retailers who in turn contract with lines companies. The former are called conveyance contracts, while the latter are called interpose contracts because the retailer is interposed between the consumer and lines company.

3.2.7 External shocks and asymmetric information

123. This section discusses the implications of external shocks to the grid for assessing Transpower's performance.

Infrequent events

124. Large external shocks to the grid occur infrequently, and are unpredictable. An example would be storm damage to the HVDC transmission link. The infrequent occurrence of large unpredictable events mean that significant variations can be expected in annual measures of interruption minutes, even with the grid owner operating consistently from year to year.

Hidden actions

125. Although the occurrence of extreme weather conditions is easily observable, it is often not always clear whether the damage could have been avoided or mitigated through better transmission asset design and specification, better maintenance programmes, or different operating practices. The infrequency of events, combined with difficulties observing the grid owner's and system operator's actions, can sometimes make it difficult to accurately assess the true performance of the grid owner.

Interpreting performance statistics

126. Nevertheless the grid comprises large numbers of connection points, from which statistical analysis can be undertaken to assess the overall performance of the grid. For example, the performance of circuit breakers can be benchmarked against international best practice.¹⁸

¹⁷ Countries with large interconnected transmission systems, such as the United States, have multiple dispatchers whose actions are coordinated via coordination protocols.

¹⁸ The large numbers of connection points also suggests the grid owner may often be better placed than its customers to bear performance risks, as the grid owner has 'safety in numbers.' Risk allocation issues are discussed further in section 5.2.

127. Annual performance statistics are also normally interpreted within the context of multi-year trends, and can be adjusted to take into account one-off or rare events to assess underlying performance. A key issue with making adjustments is of course the accuracy of the adjustments, but there is also the issue of whether grid reliability is only truly tested during large and infrequent events.

Two 'schools of thought'

128. These concerns give rise to two 'schools of thought' on performance measurement.
129. One approach favours input-oriented service measures such as assessing whether grid assets were made available and the extent of outages of various grid elements. This approach requires the monitoring party to understand the impact of the performance of grid elements. It will require some degree of technical knowledge of transmission grids and system operation.
130. The other approach favours output-oriented measures, such as grid reliability and power quality measured at grid exit points.¹⁹ These types of measures relate directly to matters that connected parties, and end users, experience and are concerned about. However, it is more difficult to hold the grid owner accountable for output performance because of the operational interdependencies and external shocks. Adopting output-oriented approaches relies on the grid owner to have the technical capability, and maintenance and monitoring systems, to meet output objectives within reasonable ranges.

3.2.8 Risk of cascade failure

131. The risk of cascade failure is a key feature of transmission because cascade failure carries large and widespread economic and social consequences for New Zealand. It is therefore important to assign responsibility and accountability for managing system operation to the party or parties best placed to minimise cascade failure risks, and to define services and service measures appropriately.

3.3 Problems with determining transmission services

132. This section discusses the economic problems that arise with determining transmission services, focusing in particular on factors that may inhibit Transpower and its customers reaching mutually acceptable and efficient outcomes via voluntary contracting. This section provides the basis for the analysis in section 5, which considers whether and how the Commission should be involved in determining transmission services.

¹⁹ Power quality refers to deviations in frequency and voltage, and also other factors such as waveform patterns, flicker, and so on (see section 5b). Grid reliability refers to the probability that grid outages cause involuntary load shedding or involuntary use of system protection schemes.

3.3.1 Efficient voluntary contracting

133. Under the voluntary contracting approach it would be left to grid users to:
- a. Negotiate with Transpower regarding service definitions, service measures, and service levels;
 - b. Monitor Transpower's performance against specified performance measures and service levels; and
 - c. Enforce performance through the courts.
134. Efficient voluntary contracting for transmission services would occur in a greenfield situation, where neither party has invested sunk assets in the relationship. In a greenfield situation, far-sighted and organised consumers can avoid market power problems by negotiating evergreen contracts with transmission providers prior to installation of either party's assets. In this situation the market for transmission services should be competitive, as customers can negotiate with any willing supplier and sign up with that which offered the best deal (in terms of service definitions, service measures, and service levels as well as prices).

3.3.2 'Hold out' problems

135. In practice, transmission service definitions, measures, and levels, have to be determined for situations where the transmission provider and its customers have already made large sunk investments. This leaves both parties with a significant bilateral monopoly problem, creating serious 'hold out' problems for the negotiation of transmission services.
136. The large gaps between the negotiation points of each party means that each stands to gain significantly if they achieve outcomes close to their own negotiation point. This can create strong incentives for over spending on negotiation tactics and for withholding agreement regarding service definitions, measures, and levels. 'Hold out' problems can be maintained for years because it is not commercially feasible for grid users to switch to alternative transmission providers and it is not feasible for the transmission provider to withhold the provision of transmission services from recalcitrant grid users.
137. A key frustration for grid users prior to the formation of the Commission was the apparent reluctance of the grid owner to accept responsibility for the way its actions affected dispatch costs, wholesale electricity prices, and generator access to consumers. These frustrations still exist, despite Transpower's efforts during the EGEP reforms to address the need for service definitions, which was affected by the lack of contractual certainty.

3.3.3 'Free rider' problems

138. The common service nature of some transmission services carries implications for how decisions about those services should be specified, monitored, and enforced. If all transmission services were separable to

individual transmission customers then standard bilateral contracting between Transpower and its customers would certainly be appropriate.

Incentives for group action

139. The common service nature of transmission means that grid users have incentives to band together to negotiate jointly with Transpower, and to jointly monitor and enforce Transpower performance. By joining forces, grid customers with common views about service definitions, measures, and levels can save on contracting costs and achieve superior contracting outcomes from Transpower.

'Free riding' problems can occur

140. There may be some grid users, however, for whom the costs of contributing to group action exceed the benefits they receive on the margin. For example, they may not share the views of the majority of group members. Or they may believe the group will remain, and act just as effectively, without them. In both cases they will lose very little from refusing to contribute to the group.
141. Many markets exhibit 'free rider' problems, such as the labour market where terms and conditions negotiated by unions may be passed onto non-union members, and the equity market where small investors 'free ride' on the monitoring and enforcement activities of large investors.
142. The issue is whether 'free riding' behaviour is sufficiently severe to justify regulatory intervention, as regulatory intervention also carries costs and risks. The severity of the 'free rider' problem depends on how much free riding occurs, and the economic consequences of that 'free riding'.

The extent of 'free riding' among grid users

143. Whether there is a single stable coalition of grid users willing to negotiate, monitor, and enforce services with Transpower depends on the number and size of grid users, and on the extent to which they share common interests in regard to transmission services.
144. In general 'free riding' is more attractive to small grid users than large ones. Large grid users know that if they withdraw from the coalition then it could collapse and they would lose the benefits the group might achieve.²⁰ Small grid users, on the other hand, can withdraw from the coalition without greatly affecting costs borne by other group members, and so they expect the coalition to remain in place and deliver the benefits of group action to everyone.
145. In regard to sharing common interests, it would seem that:

²⁰ For large grid users there is a non-trivial probability the coalition will collapse if they withdraw from it because their withdrawal significantly increases the costs borne by the remaining members.

- a. All grid users benefit greatly from avoiding cascade failure of the grid, and they largely hold common views about how to avoid cascade failure;
 - b. There are also likely to be largely common interests regarding power quality requirements as grid customers have existing equipment calibrated to existing power quality standards. There are also common interests among subsets of grid users in regard to the required reliability of grid components, such as specific connection assets; and
 - c. Interests may differ significantly among grid users regarding SCADA and informational services,²¹ and outage management protocols, but these services can be tailored more directly to individual customers or subsets of customers.
146. With 40 or so connected parties, some of whom are quite small, it is unlikely that grid customers would voluntarily fund collective action in regard to negotiating, monitoring, and enforcing common services from existing transmission assets. In the past, a high degree of cooperation has occurred in regard to establishing power quality standards and technical codes under the auspices of the Grid Security Committee, but there is little reason to believe these efforts will carry through to the current regulatory environment.

The consequences of 'free riding'

147. The likely consequences of 'free riding' depend to some degree on the prevalence of 'free riding' behaviour. If only a few small grid users 'free ride' on the actions of others then the consequences are likely to be minimal for negotiating, monitoring, and enforcing Transpower performance.
148. At the other extreme, the absence of any joint action group may lead to weak monitoring and enforcement of Transpower's performance over the long run, as each user has limited incentives to spend resources monitoring and enforcing performance standards (to the benefit of their competitors) when their competitors are not doing so or are not paying their share of the costs of those actions.²² In this situation, the lack of joint action leaves grid users with limited ability to force Transpower to adopt service measures and levels relevant to most grid users.

Factors compounding 'free riding' problems

149. The weak incentives for monitoring and enforcing performance may be compounded by weak competitive pressures on lines companies to reflect the interests of their connected parties. This is particularly a problem

²¹ SCADA refers to "supervisory control and data acquisition" systems. SCADA services refer to 'live feeds' providing real-time information directly from Transpower's SCADA system into the SCADA systems of connected parties, such as lines companies.

²² For example, retailers often serve customers drawing power from the same GXP. Any effort by one retailer to pursue their customers' interests with Transpower benefit all customers drawing power from the same GXPs, and therefore benefit competing retailers.

where connected parties have few other choices for their source of electricity and other energy sources are not convenient or cost-effective.

150. Difficulties determining grid owner performance from output statistics, such as from annual records of interruption and congestion minutes, means that other methods may be needed to assess Transpower's performance. On the one hand this increases incentives for grid users to band together to fund effective monitoring of Transpower, but on the other hand if joint action is not taken then the quality of monitoring by individual grid users may be particularly poor because of the expense involved in adopting high quality performance monitoring.²³

Implications for Transpower's performance

151. In practice it seems unlikely that weak monitoring and enforcement by grid users would greatly affect the grid owner's incentives to build, maintain, and supply their assets to the system operator in ways consistent with avoiding cascade failure, as there are strong public policy incentives on Transpower's management to minimise the risk of cascade failure. If weak monitoring and enforcement by grid users occurs, it is more likely to affect Transpower's incentives to minimise grid constraints as high wholesale market prices for short periods of time tend not to raise political interest.

Grid investment decisions

152. Grid customers are likely to have strongly divergent interests in regard to grid investment, especially if grid investment affects competitive outcomes or the costs of grid investment are shared with parties that do not benefit from grid investment.
153. In practice cost-sharing is a significant issue because it is difficult to identify the causers or beneficiaries of grid investment, and the methods for determining the extent to which grid users cause the need for grid investment (or benefit from it) are highly contentious. These problems make it difficult for subsets of grid users to form coalitions to pay for grid investments that benefit them.

3.3.4 The scope of Transpower services

154. A key issue in defining Transpower's services is to decide whether system operation and transmission assets are provided as a bundled or unbundled service. This decision has to be made collectively by grid users, or made by a regulator on their behalf, because it is not feasible to provide a bundled service to some grid users and an unbundled service to other grid users. Either the two services are bundled together for everyone, or unbundled for everyone.

²³ These effects become less of an issue if a market for expert assessors develops, from which individual grid users can hire consultancy services.

4 The Evaluation Framework

4.1 Regulatory considerations

4.1.1 Introduction

155. The regulatory framework is a key factor influencing the approach the Commission should adopt in regard to transmission service definitions and service measures.
156. The regulatory framework in New Zealand is determined by a combination of the Electricity Act (as amended by the Amendment Act 2004), the Government Policy Statement on Electricity Governance (issued in October 2004 and hereafter referred to as “the GPS”), the Electricity Governance Regulations 2003, and the Commerce Act.

4.1.2 The Electricity Act

Overarching framework

157. The Act provides the overarching framework for the electricity industry and, in particular:
- a. Part 14 subpart 2 (Electricity Regulation Making Powers) provides for the regulation and enforcement of transmission activities (amongst other provisions); and
 - b. Part 15 sets out the principal objectives, role and function of the Commission.
158. The key regulation provisions of Part 14 relating to transmission provide powers to:
- a. Set standards for common quality and real-time security on the national grid;
 - b. Set quality and security standards for the transmission system;
 - c. Prescribe terms and conditions for connection to the national grid;
 - d. Regulate the process for upgrading the national grid;
 - e. Specify the methodology for allocating Transpower’s revenue requirement to individual participants;
 - f. Direct Transpower and participants to enter into transmission agreements;
 - g. Set the terms of transmission agreements; and
 - h. Monitor and enforce compliance with regulations and rules.

Principal objectives

159. Part 15 of the Act sets out the principal objectives for the Commission, which are to:
- a. Ensure that electricity is produced and delivered to all classes of consumers in an efficient, fair, reliable, and environmentally sustainable manner; and
 - b. Promote and facilitate the efficient use of electricity.

Specific outcomes

160. Consistent with these principal objectives, the Commission is required by Part 15 to achieve a number of specific outcomes. Of particular relevance to transmission are objectives where:
- a. Incentives for investment in generation, transmission, lines, energy efficiency, and demand-side management are maintained or enhanced and do not discriminate between public and private investment;
 - b. The full costs of producing and transporting each additional unit of electricity are signalled; and
 - c. The electricity sector contributes to achieving the Government's climate change objectives by minimising unnecessary hydro spill, efficiently managing transmission and distribution losses and constraints, promoting demand-side management and energy efficiency, and removing barriers to investment in new generation technologies, renewables and distributed generation.

Key functions

161. Part 15 also sets out key functions for the Commission to:
- a. Formulate and make recommendations for regulations and rules;
 - b. Monitor compliance and apply penalties;
 - c. Develop model agreements for use by industry participants; and
 - d. Give effect to GPS objectives and outcomes.
162. These provisions of the Act collectively establish the Commission with wide-ranging powers and obligations to regulate transmission activity and contracting arrangements according to the guidance set out in the GPS.

4.1.3 The Government Policy Statement

Government expectations

163. The foreword of the GPS gives a clear indication of the Government's expectations for the Commission which include:

- a. Overseeing key decision making processes to ensure that transmission makes a cost-effective contribution to security; and
 - b. Providing early warning if the Commission believes there is any material risk that current settings for electricity and for other policy areas are unlikely to produce sufficient investment, particularly in generation and the national grid.
164. The GPS indicates that transmission services should generally be:
- a. Provided at standards of power quality and grid reliability required by grid users as determined by the Commission;
 - b. Continuously improved so as to produce the services grid users require at least cost; and
 - c. Priced in a manner that reflects costs, and promotes efficient investment and use.

Grid interdependencies

165. The GPS recognises the interconnected nature of the transmission grid and the implications for operation according to a set of common standards. Accordingly, the GPS sets out requirements for:
- a. Common standards to be embodied in grid rules that recognise the interconnected nature of the network;
 - b. Grid Reliability Standards that should apply to agreements between Transpower and its customers dealing with connection to and use of the grid, transmission system design and construction, and transmission system maintenance; and
 - c. All transmission customers to have a transmission agreement with Transpower and for the Commission to develop a benchmark agreement to act as a guide (and a default agreement should the parties fail to agree).
166. The development of draft Benchmark agreements is required to be completed by June 2005.

4.1.4 The Electricity Governance Rules

167. Rule 4.4 of section II of part F of the Rules requires the Commission to develop benchmark agreements for connection to the transmission grid and/or use of the grid. The Rules provide specific guidance as to the purpose, principles and content of benchmark agreements, as discussed below.

Purpose of benchmark agreements

168. Rule 4.1 of section II of part F states that the purpose of benchmark agreements is to:

- a. Facilitate commercial arrangements between Transpower and designated transmission customers; and
- b. Act as a default transmission agreement in the event that Transpower and a designated transmission customer fail to enter into an agreement by a certain date.

Principles of benchmark agreements

169. Rule 4.2 of section II of part F specifies that benchmark agreements should:
 - a. Reflect a reasonable balance of interests between Transpower, customers and end use customers;
 - b. Reflect the requirements of customers at grid injection and exit points;
 - c. Reflect the differing needs of different classes of customers;
 - d. Not duplicate, but be consistent with, the grid reliability standards;
 - e. Establish common standards for common configurations; and
 - f. Encourage efficient and effective processes for enforcement and dispute resolution.

Content of benchmark agreements

170. Rule 4.3 of section II of part F states that benchmark agreements must include:
 - a. An obligation to design, construct and operate all plant in accordance with the law, the rules and good industry practice;
 - b. An obligation to comply with Transpower's reasonable technical connection and safety requirements;
 - c. An obligation to pay according to the approved transmission pricing methodology; and
 - d. Service definitions, service levels, and service measures to the extent practicable.

Part F interrelationships

171. Thus part F contemplates a relationship between the GRS and transmission agreements. However, the nature of the relationship is not precisely defined. Transmission agreements should not duplicate the GRS, but must be consistent with it in all material respects, except for bilaterally agreed variations which have met certain process and approval requirements.
172. There is therefore some discretion as to what standards and requirements should be included in the benchmark agreement, and what standards should be included in the GRS.
173. The requirements of part F set out an expectation that the common carrier characteristics of the transmission service will lead to a core of common

services, some of which will be underpinned by the GRS. The development of transmission service definitions, service levels, and service measures, is expected to be a key part of the benchmark agreement process.

4.1.5 The Commerce Act

Commerce Act requirements

174. Part IV of the Commerce Act provides a statutory regime for the targeted control of electricity lines businesses. This regime includes provisions relating to Transpower and the national grid.
175. The purpose of the Part IV provisions is to promote the efficient operation of markets directly related to distribution and transmission by providing strong incentives to improve efficiency and provide services at a quality that reflects consumer demands. The Part IV provisions require the Commerce Commission to set thresholds for the declaration of controls on electricity lines businesses. Any business that breaches these thresholds will be subject to possible price and quality controls under the Act.

Application of the Commerce Act

176. The Commerce Commission has set two thresholds for the regulatory period beginning in 2004: a price path threshold of the form Consumer Price Index (CPI) - X and a quality threshold. Transpower is treated somewhat as a special case, primarily due to uncertainties associated with the proposed investment programme. Nevertheless, Transpower is required to reduce average prices in real terms ($X = 1\%$) for the year commencing 1 July 2004.
177. Quality thresholds were set for Transpower on 1 July 2004, for a period of one year. However the reliability criterion is to be monitored through the trends in unplanned interruptions, and total interruptions expressed as system minutes.

Overlaps with the Electricity Act

178. The targeted control regime provided by the Commerce Act overlaps to some degree with the provisions of the Electricity Act. In particular, the link between price and quality thresholds appears to provide some prospect for incentive regulation of the form contemplated by Farrier Swier (in their report considering how incentive based regulation might supplement contractual arrangements in relation to transmission services and performance).

4.2 Links to other transmission issues

179. The transmission service definitions task is linked closely to several other work streams the Commission is currently undertaking. These include decisions regarding contract structure and counterparties, the grid investment test (GIT), grid reliability standards (GRS), and guidelines for the transmission pricing methodology.

4.2.1 Transmission pricing guidelines

Links between pricing and service measures and levels

180. In normal competitive industries prices are denominated in terms of the service measures adopted and the units adopted for measuring service levels. For example, prices for parcels are often calculated on the basis of the weight, size, distance, and speed of the service.
181. This provides consumers with incentives to tailor their demand for services in ways that take into account the cost of key service dimensions, and it provides incentives for suppliers to provide service bundles that consumers' value more than the cost of supply. Moreover, if prices vary according to service levels delivered, then consumer purchases signal the service levels they desire and suppliers have strong incentives to deliver services to the level required by consumers.²⁴

The guidelines for the transmission pricing methodology²⁵

182. The guidelines for the transmission pricing methodology require Transpower to prepare a methodology similar to its current methodology.²⁶ The main change is that charges covering new and replacement investment in the HVDC transmission link are to be pooled with charges covering investment in AC interconnection assets. The guidelines also request Transpower to review the number of peaks used for calculating interconnection charges, and review whether grid exit point (GXP) peaks should be aggregated, including whether coincident system peaks should be adopted.
183. The current methodology for AC interconnection costs applies charges to load customers on the basis of their share of anytime maximum demand (AMD) at each GXP for the 12 highest demand peaks over a rolling 12-month period. The same rate (\$/MW) is levied on all load customers regardless of their distance from generation. This is called the postage stamp approach. Connection costs are charged to the connection party, and where parties share the connection asset the costs are shared on the basis of AMD or anytime maximum injections (AMIs), as appropriate.

Implications of postage stamp charging for transmission service definitions, measures, and levels

184. The postage stamp approach has been adopted for AC interconnection assets because of concerns that accurate location-based transmission charges are difficult to implement and administer. These difficulties arise

²⁴ As discussed in section 3.1 and appendix 1, it is not always efficient for suppliers to specify service measures and service levels sought by consumers if suppliers do not have sufficient control over the provision of those service measures and levels.

²⁵ Rule 6.2 of section IV of part F requires the Commission to provide Transpower with guidelines for developing its transmission pricing methodology. The Commission provided its guidelines to Transpower on 24 December 2004 and announced that it intends to consider the further development of the pricing guidelines for new investment in 2005.

²⁶ The guidelines explicitly recognise that differences in nodal prices across the grid are a key source of transmission pricing signals. This paper considers only explicit transmission prices charged by Transpower.

from practical problems with measuring the distance component of transmission services.

185. The postage stamp approach should not be seen as constraining the Commission's options for setting transmission service measures and levels. If an accurate and reliable distance-related measure of transmission services were developed in the future then it would be more practicable to adopt location-based transmission charges.

Other implications for transmission service definitions, measures, and levels

186. As Transpower has been requested to review the way that load peaks are averaged across time and space, the guidelines do not currently constrain the Commission's options for setting transmission service measures and levels.
187. Although it is preferable to adopt service measures and levels aligned with pricing, it is not necessary to do so. The primary risk of misalignments between pricing and services is that commercial incentives will not be aligned with performance commitments, and could work against performance commitments. In these situations it may be important to adopt explicit performance rewards and penalties to align commercial incentives with service requirements.

4.2.2 The grid investment test (GIT)

Links between investment and service levels

188. In industries for which services are separable to customers, investment decisions are the sole prerogative of the service provider and are of no concern to consumers. Services are defined, not in terms of the total capacity provided by the service provider, but in terms of the individual services or capacity delivered to each customer. For customers with long-term supply contracts, service levels are essentially independent of the capacity expansion decisions of the service provider.

Grid investment decisions

189. The common service nature of interconnection removes the standard dichotomy between investment and service levels. Grid investment reduces electrical losses on the grid, reduces the frequency and duration of grid constraints, and may improve grid reliability. As all grid users share the grid, grid investment decisions affect the level of losses, congestion, and reliability experienced by all grid users.
190. In this situation it is not possible to separate service levels from investment decisions when service levels are defined in terms of overall system performance. This is option B3 in section 5.2, which is called the conveyance approach.
191. On the other hand, if service measures and levels are specified in terms of asset availability, then service measures and levels relate to the availability of specified (existing) assets. In this case grid investment

decisions can be considered separately as generally they have little bearing on the service levels delivered with existing assets.²⁷ This is option B1 in section 5.2.

192. An intermediate option is the 'meet demand' approach (option B2) in section 5.2, where service measures and levels are specified in terms of 'assets being available to meet demand.' In this case the responsibility falls on the grid owner to identify the need for grid investment by estimating peak load growth. There are also implications for grid reliability standards, which are discussed below.

Implications for transmission service definitions, measures, and levels

193. The GIT forms a key component of the process whereby the Commission approves or rejects transmission investments proposed by Transpower in grid upgrade plans.²⁸
194. Part F assigns final decision rights regarding grid investment to the Commission, which is consistent with defining Transpower's services in asset availability terms (option B1) because under this approach Transpower's performance commitments relate only to making its assets available to the system operator. Defining transmission services in terms of 'meeting demand' (option B2) or conveyance (option B3) would be inconsistent with part F requirements for the Commission to approve Transpower grid upgrade, as grid expansion affects the performance of the overall system.

4.2.3 Grid reliability standards (GRS)²⁹

Links between reliability and service measures and levels

195. Grid reliability refers to the probability that grid outages cause involuntary load shedding. The lower the probability of interruption from specified contingencies the higher the reliability of the grid.
196. Grid reliability, measured in terms of interruption minutes, is a key component of overall system performance discussed in section 3.2 of this paper. Grid reliability standards are minimum service levels.
197. In practice grid users may agree, in their investment contracts with Transpower, service levels above the grid reliability standards set by the Commission. Benchmark agreements therefore need to allow for service levels above grid reliability standards, so that they can be used as default

²⁷ Except for situations where the availability of existing assets is interrupted to undertake new investment.

²⁸ Rule 6.6 of section III of part F of the Rules requires the Commission to recommend to the Minister a GIT for reviewing Transpower's investment proposals and for assisting transmission customers to evaluate alternatives to transmission investment. The Commission made its recommendation on 17 December 2004, and the Minister approved it on 20 December 2004 (and formally notified it in the Gazette on 13 January 2005).

²⁹ The Commission released a consultation paper on the GRS in December 2004, for which consultation closed on 9 February 2005. The consultation paper is available on the Commission's website: <http://www.electricitycommission.govt.nz/consultation/grs/view>

contracts in the event that customers are unable to reach commercial agreements with Transpower.

The GRS

198. The Commission has proposed that the GRS take the form of an economic assessment, where the cost of investing in grid reliability is balanced against the probability-weighted cost of interruptions. This assessment will be undertaken by applying the GIT to reliability investment proposals, and is likely to result in grid reliability standards that differ across the grid.
199. The Commission has also proposed that, for an interim period, a minimum standard of “N-1” will apply to the core grid.
200. The Commission has further proposed that an “N-1” criterion be incorporated in part F of the Rules, as a trigger for investigation of potential reliability investment options using the GIT. The Commission proposes that Transpower be required to monitor and report performance against the “N-1” criterion at all GXPs.
201. Rule 4.3.2 of section II of part F requires the Commission to develop benchmark agreements that are consistent in all material respects with the GRS, and not duplicate requirements that are more appropriately included in the GRS.

Implications for service measures and levels

202. Setting grid reliability standards is consistent with adopting ‘meet demand’ (option B2) or conveyance (option B3) service measures and levels, provided the service measures and levels in the benchmark agreements are consistent with the GRS.
203. The Commission considered the implications of its proposal for the benchmark agreements. If the GRS takes the form of an economic test, as proposed, it will be necessary for the Commission to require definition of reliability service levels, and/or performance standards, consistent with the GRS, individually at each point of connection with the grid.
204. Setting grid reliability standards is also consistent with adopting asset availability (option B1) service measures and levels for Transpower, provided Transpower is not solely responsible for achieving grid reliability standards. This appears to be consistent with the Commission’s proposal for the GRS, which only requires Transpower to monitor and report system performance against the “N-1” criterion.

4.2.4 Contract structure and counterparties

205. Under rule 2 of section II of part F, the Commission is required to propose an appropriate structure for transmission agreements and appropriate categories of participants to be designated transmission customers (counterparties) required to enter into transmission agreements with Transpower.

206. To assist in this process, the Commission engaged Farrier Swier (with support from Concept Consulting) to provide a report identifying and analysing the options and to make a recommendation on the most appropriate contract structure and counterparties. This report, dated 25 May 2004, is available on the Commission's website: <http://www.electricitycommission.govt.nz/advisory/transmission/draft/transmission-contract-structure-and-counterparties.pdf>.
207. The Commission considered the report, and came to the preliminary view that the recommended contract structure and counterparties, and transmission contracts generally, might not attribute sufficient weight to the genuine interests of end users (and retailers). The Commission also found it difficult to assess the merits of particular counterparties in the absence finalised benchmark agreements, the transmission pricing guidelines and the grid investment test. Of particular concern to the Commission was the manner in which Transpower considers and manages the impact on these parties in its management of the grid.
208. To clarify the counterparty issue further, the Commission requested that Farrier Swier provide a further report considering how incentive based regulation might supplement contractual arrangements in relation to transmission services and performance. This report, dated 18 June 2004, is also available on the Commission's website: <http://www.electricitycommission.govt.nz/advisory/transmission/draft/performance-incentives.pdf>
209. The Commission published a preliminary consultation paper in which participants' views were sought on an additional option for the transmission contract structure and counterparties, which had not previously been examined by the Transmission Advisory Group (TAG) or been the subject of advice received by the Commission. Accordingly, this paper did not constitute the formal consultation and submissions process as prescribed in rule 2 of section II of part F. This preliminary consultation closed on 15 October 2004.
210. Following a review and analysis of submissions on the paper, the Commission decided to reconfirm its preliminary proposals to delay formal consultation and a final decision on transmission contract structure and counterparties will be formally consulted on when benchmark agreements are finalised. A key reason for the decision to delay formal consultation was to preserve the option of multiple counterparties purchasing potentially multiple services.

4.3 Evaluation criteria

4.3.1 The need for evaluation criteria

211. As outlined in section 4.1 of this paper, the Rules require the Commission to develop benchmark agreements to facilitate arrangements between Transpower and designated transmission customers, and to act as default transmission agreements if transmission customers are unable to

conclude agreements with Transpower. Section 4.1 also indicated that the GPS contemplates the Commission setting out common standards in part F of the Rules.

212. In determining the best approach to defining and measuring transmission services, the Commission has decided to consider a wider range of intervention options (described in section 5 of this paper) than simply specifying benchmark agreements and specifying common standards in part F. It is therefore necessary to specify criteria for evaluating these options.

4.3.2 The evaluation criteria

213. Reviewing the regulatory considerations outlined in section 4.1 of this paper, and the links to other transmission work streams in section 4.2, suggests the following criteria for evaluating the options for determining transmission services:

“The approach to determining transmission services should as far as practicable:

- a. Achieve standards of power quality and grid reliability required by grid users (from paragraph 164(a) above);
- b. Provide appropriate incentives for Transpower to continuously improve transmission services and produce the services at least cost (from paragraph 164(b) above);
- c. Promote efficient investment in transmission assets (partly from paragraph 164(c) above);³⁰
- d. Facilitate commercial arrangements between Transpower and designated transmission customers (partly from paragraph 168(a) above);
- e. Provide efficient and effective processes for resolving disputes during the negotiation of commercial arrangements between Transpower and designated transmission customers (partly from paragraph 169(f) above);
- f. Provide efficient and effective processes for resolving disputes regarding the performance of contractual terms by all counter parties (partly from paragraph 169(f) above);
- g. Minimise the need for changes to the Electricity Governance Regulations and Rules;
- h. Minimise administration and compliance costs;
- i. Able to be implemented within the timeframe specified in the GPS;

³⁰ Note that efficient use of transmission assets is covered in criterion (b).

- j. Be consistent with international experience; and
- k. Be consistent with recent New Zealand experience and context.

5 Description of the Options

214. Determining the content of the benchmark agreements requires resolution of three key questions:
- a. What role should the Commission, Transpower, and grid customers have in specifying, monitoring, and enforcing transmission services?
 - b. If the Commission has a role in specifying transmission services, what service definitions and measures should it adopt?
 - c. Who should be the counterparty for transmission contracts and are explicit performance incentives needed to achieve efficient provision of transmission services?
215. The following subsections describe options for addressing each of these questions. In order to provide a comprehensive assessment, a full range of options is considered, rather than exclude options because they may require changes to the Rules. Sections 7 and 8 evaluate the options for interconnection and connection services, respectively.

5.1 Options for determining transmission services

216. This section describes options for contracting and regulating transmission services. It discusses alternative roles for the Commission and alternative mechanisms by which transmission services may be determined.
217. The Commission has considered three main options for determining transmission services:
- a. *The default contracts approach (option A1):* Grid users negotiate their own contracts with Transpower but default transmission agreements would apply if they are unable to reach agreement within specified timeframes;
 - b. *The co-regulation approach (option A2):* Establishing a multilateral body of grid users to negotiate interconnection services with Transpower, the results of which would be coded into the Rules. Negotiation disputes would be resolved through arbitration. Connection services would be conducted as in option A1; and
 - c. *The direct regulation approach (option A3):* After consulting Transpower and grid users the Commission specifies interconnection services in the Rules. Connection services would be conducted as in option A1.
218. The rest of this section elaborates on each option.

5.1.1 Option A1 – default contracts

Specification of services

219. The default contracts approach is the approach specified in section II of part F of the Rules. Under this approach transmission customers negotiate and monitor transmission services. Where parties cannot reach agreement with Transpower, the benchmark agreement becomes their default transmission agreement.³¹ Under this option the benchmark agreement would cover both connection and interconnection services.
220. Under this option the Commission specifies the benchmark agreement, and therefore specifies the services to be provided, liability for non-performance, the term of the agreement, dispute resolution and enforcement processes, and other technical and commercial terms needed for benchmark agreements to become contractually binding.
221. Because the benchmark agreements need to apply to many different local situations, the Commission would specify a “menu” of service definitions and associated service measures to enable counterparties to select the services they consider to best apply at their points of connection. The Commission would consult interested parties before finalising its view of the appropriate menu of service definitions and measures.
222. The default position on any service level would be a historical value determined by a process set out in the benchmark agreement.³² Where there are multiple customers involved, the benchmark agreements would require Transpower to consult and reach agreement with all affected parties. Failure to agree on the service levels within a specified timeframe would result in the Commission determining them.

Monitoring Transpower's performance

223. The default contracts approach leaves it to transmission customers to monitor Transpower's performance against the service commitments and reporting requirements specified in the benchmark agreements. In reality the Commission would also monitor Transpower's performance in regard to interconnection services so that it is aware of issues as they arise and can interact with transmission customers as and when necessary.

Enforcement of performance

224. The default contracts approach leaves enforcement of performance to transmission customers. Their enforcement options depend on the processes specified in their agreements with Transpower. The

³¹ Rule 3.1.3 of section II of part F of the Rules. Note that rule 8.1 of section II excludes the benchmark agreements replacing transmission agreements entered into before 29 October 2003 or replacing agreements based on Transpower's standard connection contract and which are entered into before the date on which the first benchmark agreement is included in a schedule to the Rules.

³² Historical values would only apply if there is a historical data set relating to the service measure. There may also be cases where current service levels are only recently established, in which case historical values may not be the only factor to take into account.

benchmark agreements will contain mediation and arbitration provisions that remove parties' rights to seek court resolution of disputes.

Performance incentives

225. Under the default contracts approach, the parties would rely on normal contractual rights and liabilities to incentivise performance. However, in order to address the practical difficulties that result from a bilateral monopoly, it may be appropriate to include a balanced set of incentives in the benchmark agreements. Negotiation of the level of incentive should be left to Transpower and transmission customers, with the Commission assuming an arbitration or appeal role.

Regulatory reach

226. In effect the benchmark agreements are a form of regulation, because:
- a. They directly regulate the relationship between Transpower and transmission customers if the parties are unable to reach agreement within specified timeframes;³³ and
 - b. The Rules establish obligations on Transpower and transmission customers to seek Board approval for transmission agreements that decrease services below those described in a benchmark agreement, or where the parties are uncertain about whether the transmission agreement will decrease or increase services vis-à-vis benchmark agreements.³⁴
227. A key feature of the default contracts approach is that Transpower and transmission customers can voluntarily agree contracts to avoid default transmission agreements, and can at any time 'contract out' of default transmission agreements, provided they meet the requirements just discussed in paragraph (b) above.³⁵ It is expected that contracting out will occur most frequently for services provided by 'point of service' assets, less frequently for deep connection assets, infrequently for the "fringe" interconnection assets, and most improbable for backbone interconnection assets.
228. The voluntary contracting aspect of the default contracts approach is seen by some parties as a key mechanism for allowing innovations to occur over time, and for reducing the risks of 'regulatory capture' and 'regulatory creep.' Other parties believe the approach raises significant practical issues. For example, it raises issues about how to evolve transmission agreements when benchmark agreements evolve over time.

³³ Indeed, rule 4.6 of section II of part F of the Rules includes the benchmark agreement as a schedule to the Rules.

³⁴ Rules 5.2 and 5.3 of section II of part F of the Rules. Rule 5.1 imposes weaker obligations on parties where their proposed transmission agreement increases services above those described in a benchmark agreement.

³⁵ Rule 3.1.4 of section II of part F of the Rules.

5.1.2 Option A2 – co-regulation

Specification of services

229. The co-regulation approach requires the Commission to specify multilateral decision-making processes and criteria in the Rules for determining interconnection services and for monitoring and enforcing performance with respect to them. The default contracts approach (option A1) would apply to connection services.
230. Where the parties are unable to reach agreement on interconnection services, the Rules would provide for them to appeal to the Commission to arbitrate on the particulars of the case presented to them. The Rules would require the arbitrator to arbitrate on the basis of maximising economic efficiency in regard to the issues for which the parties have been unable to reach agreement.
231. A key role for the Commission under the co-regulation approach is the specification of the rules for the multilateral decision-making processes, and codifying in the Rules the outcome of those processes in regard to service definitions, service measures, and service levels for interconnection services. The inclusion of service levels in the Rules means that performance measures and reporting requirements on Transpower will be specified in the Rules.
232. Benchmark agreements under the co-regulation approach would only cover connection services.

Monitoring and enforcement of performance

233. Multilateral decision-making processes would also be adopted in the Rules for monitoring Transpower's performance in regard to interconnection services. This involves establishing a multilateral body comprising Transpower's customers, and funded by them, to monitor Transpower's performance on interconnection services. Transpower's customers, either individually or via the multilateral body, would invoke existing rule breach processes to enforce performance commitments for interconnection services.
234. Performance commitments and reporting requirements for connection services would be specified in the benchmark agreements and enforcement would be through the mechanisms specified in the applicable transmission agreements.

Performance incentives

235. As with the default contracts approach (option A1), the parties would rely on normal contractual rights and liabilities to incentivise performance. However, the multilateral decision process should consider the use of performance incentives for service measures on interconnection services. Failure to agree on performance incentives through the multilateral process could lead to an arbitration or appeal role for the Commission.

236. For connection services it may be appropriate to include a balanced set of incentives in the benchmark agreements. Negotiation of the level of incentive should be left to Transpower and transmission customers, with the Commission assuming an arbitration or appeal role (as for the default contracts approach).

Regulatory reach

237. Option A2 is called the 'co-regulation model' to signal that it utilises the rule-making powers of the Commission to set the framework for industry self-determination of interconnection services, and uses the Rules to ensure all grid users are contributing to the monitoring and enforcement of Transpower's performance commitments. It is a mix of official regulation and self-regulation.
238. The co-regulation approach differs from the default contracts approach primarily in regard to the treatment of interconnection services. Under the co-regulation approach the Commission determines which services are interconnection services, and embodies the results of the multilateral process in the rules. Under the default contracts approach the benchmark agreements cover all services and the parties in effect decide which services are connection or interconnection through their decisions whether to 'contract out' of the benchmark agreement.
239. Another key area of difference is the approach to monitoring and enforcing performance. The co-regulation approach envisages collective monitoring by the multilateral industry body and a more direct role for the Commission and Rulings Panel in arbitrating disputes. The default contracts approach (option A1) leaves it to individual parties to decide the monitoring and enforcement mechanisms that suit them best.

5.1.3 Option A3 – direct regulation

Specification of services

240. Under the direct regulation approach (option A3) the Commission specifies interconnection services in the Rules and leaves transmission customers to negotiate connection services with Transpower. Where parties cannot reach agreement with Transpower on connection services, the benchmark agreement (covering only connection services) becomes their default contract.
241. Under this option the Commission would determine which services are interconnection services, and specify the service measures and levels for them in a schedule to part F of the Rules.³⁶ As these services are supposed to be common to all transmission customers, there is no need to provide a "menu" of service definitions and measures in the Rules. Multiple service levels may be specified in the Rules where interconnection services require a different solution in different areas.

³⁶ The Commission would consult interested parties before finalising its view of the service definitions and measures for common services specified in the Rules and for non-common services specified in benchmark agreements.

Monitoring and enforcing performance

242. For interconnection services the Rules would specify performance commitments and Transpower would be required to report against them. Along with grid users, the Commission would monitor Transpower's performance and enforce performance through existing rule breach processes (that is, investigate counterparty allegations of rule breaches) and by applying regulated incentives. This approach mitigates the 'free rider' problem by leaving most of the cost of enforcement with the Commission.
243. Performance commitments and reporting requirements for connection services would be specified in the benchmark agreements and enforcement would be through the mechanisms specified in the transmission agreements.

Performance incentives

244. In considering the Farrier Swier report on contract structure and counterparties the Commission was particularly concerned about how Transpower's management of the grid might impact on end users and whether this was a factor in making decisions about the most appropriate contract counterparties.
245. The Farrier Swier report concluded that counterparty status (as between retailers and distributors) has little relative effect on this issue, with no quantifiable difference in the incentives between retailers and distributors. Though the report recognised the desirability of specifying the outcomes that the grid owner has to achieve, it noted practical difficulties experienced internationally with achieving this.
246. In order to help clarify this issue, the Commission engaged Farrier Swier to provide a supplementary report³⁷ to consider how incentive based regulation might supplement contractual arrangements in relation to services and performance.
247. The Farrier Swier supplementary report observed that incentive based regulation had been adopted in both the England and Wales electricity market and the Australian electricity market, in order to address similar concerns about how to incentivise performance of the grid owner.
248. Farrier Swier concluded that well designed incentive regulations can overcome the weaknesses inherent in contracting options and recommended that the Commission explore the development of some form of incentive based regulation.
249. Under the direct regulation approach (option A3), the Commission would be directly regulating interconnection services, opening up the prospect for introducing incentive-based regulation for these services.

³⁷ Transmission Contract Structure & Counterparties – Performance Incentives; 18 June 2004.

250. Well-designed incentive-based regulation can overcome the weaknesses inherent in relying on the incentives on different participants in the cascade of contracts through to the end user. This assertion tends to be supported by international experience, although there is a risk that the costs could be greater than the benefits.
251. Incentive-based regulation is normally incorporated in the process of setting thresholds or implementing price controls on the transmission company. This role is often the prerogative of the competition regulator, with grid performance against defined measures incorporated into price and revenue caps. The better the grid performance, the more revenue it is allowed to derive.

252. In New Zealand the Commerce Commission is responsible for a targeted control regime that sets thresholds for both the price and quality of the transmission service. An incentive based transmission service standard appears to be consistent with the purpose of the targeted control regime.

Regulatory reach

253. The direct regulation approach is similar to the co-regulation approach (option A2), except that the Commission would directly specify interconnection services (after consulting industry) rather than delegate that task to a multilateral body. As with the co-regulation approach, there would be no option for parties to 'contract out' of interconnection services specified in the Rules.
254. A key difference between the co-regulation and direct regulation options is in regard to monitoring of performance. The co-regulation approach provides for transmission customers to monitor interconnection services collectively, whereas under the direct regulation approach the Commission (and individual grid users) would monitor Transpower's performance against regulated targets for interconnection services.

5.1.4 Summary of the options

255. In regard to connection services the Commission intends to implement the approach specified in section II of part F of the Rules. This involves the Commission:
- a. Specifying dates by which Transpower and designated transmission customers must have concluded transmission agreements; and
 - b. Developing benchmark agreements and imposing them as default transmission agreements for parties that have been unable to reach agreement with Transpower by their specified date.
256. The Commission intends proposing that benchmark agreements contain mediation and arbitration provisions to avoid court resolution of disputes. They may also contain explicit performance incentive provisions.
257. In regard to interconnection services the Commission believes three main options are worthy of consideration. The role of the Commission under each option is summarised in Table 5.1.

Table 5.1: The Commission's Role for Interconnection Services			
Option	<i>Specification of services</i>	<i>Monitoring performance</i>	<i>Enforcing performance</i>
A1	Backstop role via benchmark agreements	Informal role	Benchmark agreement would specify arbitration
A2	Indirect role by specifying multilateral decision framework. Backstop arbitration role	Indirect role via the Rules specifying performance measures and specifying compulsory monitoring body	Indirect role via the multilateral body appealing to existing rule breach processes
A3	Direct role via the Rules specifying service definitions and measures	Direct role monitoring performance against target levels specified in the Rules	Indirect role via grid users appealing to existing rule breach processes

5.2 Options for service definitions and service measures

258. The default contract and direct regulation approaches (options A1 and A3) require the Commission to specify service definitions and measures.³⁸ This section describes the options for defining and measuring services provided by the grid owner, and outlines the implied allocation of risk between Transpower and its customers.
259. The Commission has considered three options for defining and measuring services provided by the grid owner. All three options draw fairly directly from the work undertaken by the TWG:
- a. *The asset availability approach (option B1)*: The grid owner commits to making specified assets and information available to customers, subject to various requirements;
 - b. *The 'meet demand' approach (option B2)*: The grid owner commits to providing assets sufficient to meet off-take demand, and making specified assets and information available to its customers; and
 - c. *The conveyance approach (option B3)*: The grid owner commits to convey electricity at agreed quality levels from generators to off-take customers.
260. The rest of this section elaborates on each option. Section 5.2.4 briefly comments on the implications of implementing financial transmission rights (FTRs) for the choice of service measures.

³⁸ Option A1 leaves it to transmission customers to negotiate service definitions, measures, and levels with Transpower, but the Commission needs to specify these issues in benchmark agreements so that they can be used as default transmission agreements. Under option A3 the Commission would directly specify service definitions, measures, and levels in the Rules for common services, and develop benchmark agreements addressing these issues for non-common services.

5.2.1 Option B1 – ‘asset availability’

Service definition

261. The asset availability approach defines the grid owner’s service as making specified assets and information available to its customers, consistent with health and safety standards, grid reliability standards, the grid investment test, and with conducting maintenance when doing so produces net economic benefits.³⁹ Under this option transmission customers choose from a menu of service measures.
262. There appear to be three main service components under the asset availability approach:
- a. Making interconnection assets available to the system operator at ratings specified in the transmission agreement (or in the Rules under the co-regulation and direct regulation approaches);⁴⁰
 - b. Making connection assets available to connection customers at ratings specified in the transmission agreement; and
 - c. Making information available to customers to enable them to manage their assets and customers efficiently.
263. This definition of the grid owner’s services takes no account of the performance of the overall system, but it does take into account load growth and also the effects on dispatch costs:
- a. Load growth is taken into account because the grid owner is required to meet grid reliability standards, and is required to undertake investments approved by the Commission based on the grid investment test; and
 - b. Dispatch costs are optimised under the asset availability approach (option B1) because the grid owner is required to justify its maintenance expenditure plans with a cost-benefit assessment. This would be implemented via Transpower’s outage protocol, which would oblige it to conduct maintenance in a way that maximises net economic benefits, based on ‘fit-for-purpose’ cost-benefit assessments.⁴¹

Allocation of risk and responsibility

264. Provided the grid owner makes its assets available in accordance with its service commitments, it is not responsible for interruptions to the supply of

³⁹ This extends the work completed by Transpower and the TWG to achieve consistency with current part F Rules regarding grid reliability standards and the grid investment test.

⁴⁰ Note that the ratings for existing assets will be based on their historical levels, and ratings for new assets will be agreed prior to the approval of grid enhancements. The Commission does not foresee problems with determining asset ratings for the initial transmission agreements.

⁴¹ Transpower deals with 3-4,000 maintenance outages per year. Many of them are unplanned and involve significant health and safety issues, and planned maintenance outages have to be scheduled months in advance of their occurrence. These considerations mean the cost-benefit assessments need to be ‘fit-for-purpose’ tests.

electricity or for minimising delivered energy costs (although it is required to minimise the effects of its maintenance decisions on delivered energy costs). It is also responsible for providing open and fair access to its assets in terms of facilitating connection to grid assets.

Service measures

265. Service measures under this option include:

- a. Providing installed capacity at a point of service;
 - i. The megawatt (MW) ratings of installed assets at each point of service specified in the transmission agreement or in the Rules; and
 - ii. Timely and accurate provision of information and communication to customers about installed capacity at each point of service.
- b. Providing security at each point of service;
 - i. The MW ratings of installed assets at each point of service specified in the transmission agreement or in the Rules;
 - ii. Timely and accurate provision of information and communication to customers about installed capacity at each point of service;
 - iii. The extent of design redundancy at each point of service and over critical deep connection assets and interconnection assets;
 - iv. The extent of planned outages of specified grid assets, and the expected level of unplanned outages;
 - v. The extent of momentary interruptions and the provision of information to customers regarding the frequency, magnitude and date/time of momentary interruptions;
 - vi. Timely and accurate provision of information to customers regarding the frequency, duration, and date/time of planned and unplanned outages for specified grid assets; and
 - vii. Provision of information to customers regarding attendance times at the customer's point of service.
- c. Making Transpower's outage protocol available to customers;
 - i. Publishing the current version of Transpower's outage protocol on Transpower's website;
 - ii. Reporting on Transpower's compliance with the published outage protocol; and

- iii. Consulting with customers about material changes to the outage protocol.
- d. Providing real-time information from Transpower's SCADA system to the customer's SCADA system;
 - i. Providing metering installations;
 - ii. Making metering installations available to connected parties; and
 - iii. Reporting on compliance of metering installations with standards.
- e. Timely and accurate performance reporting to customers against service commitments in (a) to (e), and reporting actions taken to remedy any under-performance;
- f. Timely and accurate performance reporting to customers regarding;
 - i. Reliability of electricity supply, covering the duration, frequency, magnitude, location, and date/time of:
 - o Planned and unplanned interruptions;
 - o Overruns of planned interruptions;
 - o Momentary interruptions; and
 - o Load reduction and use of generation constraint for system protection schemes;
 - ii. Power quality, covering the extent of:
 - o Deviations from the voltage range (around nominal) in steady state;
 - o Step change in voltage;
 - o Flicker outside the limits set out in part C of the Rules;
 - o The level of harmonics and the extent of non-compliance with part C standards; and
 - o The level of voltage imbalance and the extent of non-compliance with the limits specified in part C of the Rules.
 - iii. Transmission losses and binding grid constraints, covering:
 - o The magnitude and cost of losses; and
 - o The frequency, magnitude, cost, duration, location, and date/time of binding grid constraints.
- g. Making special information available to transmission customers;

- i. Reliability of electricity supply, covering the duration, frequency, magnitude, location, and date/time of:
 - o Planned and unplanned interruptions;
 - o Overruns of planned interruptions;
 - o Momentary interruptions; and
 - o Load reduction and use of generation constraint for system protection schemes;
- ii. Power quality, covering the extent of:
 - o Deviations from the voltage range (around nominal) in steady state;
 - o Step change in voltage;
 - o Flicker outside the limits set out in part C of the Rules;
 - o The level of harmonics and the extent of non-compliance with part C standards; and
 - o The level of voltage imbalance and the extent of non-compliance with the limits specified in part C of the Rules.
- iii. Transmission losses and binding grid constraints, covering:
 - o The magnitude and cost of losses; and
 - o The frequency, magnitude, cost, duration, location, and date/time of binding grid constraints.
- iv. Making special information available to transmission customers:
 - o Provision of special information when Transpower has agreed to provide this information; and
 - o Power system investigation, analysis and reporting when Transpower has agreed to provide this service.
- v. Making financial products available to transmission customers, including:
 - o Projections of maximum grid component outage performance as per Contact Energy Ltd "Injection Contract", with associated penalties; and
 - o HVDC availability as per Contact Energy Ltd "Injection Contract", with associated penalties.

266. Note that the service measures in (h) refer to the provision of information rather than to physical performance commitments, and so carry minimal financial implications for Transpower. Provision of this information is

useful for grid users to monitor overall system performance, and is essential information for deciding on Transpower's grid upgrade plans.

Service levels

267. Service levels under the asset availability approach relate to the extent that individual assets or groups of assets are required to be available, and to the timeliness and accuracy of information provided by the grid owner. Transpower would of course be required to remedy performances below specified service levels.

5.2.2 Option B2 – 'meet demand'

Service definition

268. The 'meet demand' approach defines the grid owner's service as providing assets sufficient to meet off-take demand at agreed security and quality levels for each point of service, and making specified information available to its customers. Under this option transmission customers choose a package of service measures relating to local security and local quality, whereas under the asset availability approach (option B1) they choose from a menu of service measures.
269. The 'meet demand' approach differs subtly from the asset availability approach (option B1) in regard to which party has final decision rights to make investment decisions. Under the asset availability approach Transpower cannot expand connection capacity without the agreement of relevant connected parties.⁴²
270. In contrast, under the 'meet demand' approach Transpower is legally obligated to expand capacity to meet demand local security and quality levels specified in their connection contracts unless connected parties renegotiate those levels. This would give Transpower final decision rights over connection assets, which is quite different from the status quo.
271. Although Transpower would need to prepare demand forecasts for each connection point and undertake investments when necessary to meet forecast demand growth, in practice it is not likely to do so without agreeing the forecast with affected parties. This would provide customers with the option to investigate transmission alternatives and/or renegotiate service levels.

Allocation of risk and responsibility

272. The 'meet demand' approach expands the asset availability approach to make the grid owner responsible for estimating load growth at each point of service and enhancing grid capacity over time to meet ongoing growth in off-take demand. This contrasts with current part F rules, which place

⁴² Note that default contracts would require Transpower under option B1 to meet grid reliability standards specified by the Commission, but this would not necessarily be the case for voluntary connection agreements.

the onus on the Commission to approve Transpower's grid upgrade plans and to prepare and publish grid planning assumptions.⁴³

273. Under the 'meet demand' approach (option B2) the grid owner carries no responsibility for interruptions to the supply of electricity or for minimising delivered energy costs, provided it expands grid capacity to meet specified redundancy levels and voltage range objectives at each point of service.
274. As for the asset availability approach (option B1), the grid owner would be responsible for scheduling maintenance for periods that minimise delivered energy costs and for providing open and fair access to its assets in terms of facilitating connection to grid assets.

Service measures

275. Service measures under this option include the service measures under the asset availability approach and also the following service measures:
- a. Specified redundancy levels; and
 - b. Specified voltage range objectives.

Service levels

276. Service levels under the 'meet demand' approach include the service levels under the asset availability approach and service levels relating to minimum MW redundancy levels and minimum voltage ranges.

5.2.3 Option B3 – the conveyance approach

Service definition

277. The conveyance approach defines the grid owner's service as the conveyance of electricity at agreed quality levels from generators to off-take customers. There appear to be two main service components under the conveyance approach:
- a. Making assets and information available, as described in option B2 (which incorporates option B1); and
 - b. Providing system operator services. The system operator coordinates the dispatch of energy and instantaneous reserves, and purchases other ancillary services, to convey electricity over the grid at agreed quality levels.
278. This definition of the grid owner's services takes into account not only customer load growth but also the performance of the overall system. The conveyance approach differs subtly from the 'meet demand' approach

⁴³ Rule 10.3.2 of section II of part F states that the grid planning assumptions should include a reasonable range of credible demand forecasts by region or GXP. Rule 9.1.1.2 of section II of part F requires the grid planning assumptions to be included in statements of opportunities, and rules 9.2 and 9.4 imply that the Commission is responsible for preparing the statement of opportunities.

(option B2) in that B2 only includes local security and local quality at each point of service, whereas B3 includes overall system security and quality.

Allocation of risk and responsibility

279. Under the conveyance approach (option B3) the Grid owner is responsible for interruptions to the supply of electricity, deviations in the quality of delivered electricity, and for minimising delivered energy costs. It is also responsible for providing open and fair access to its assets in terms of facilitating connection to grid assets.
280. Further to the 'meet demand' approach (option B2), the conveyance approach (option B3) shifts responsibility to the grid owner for the overall performance of the electricity system. Under the current Rules the Commission is responsible for the overall performance of the system, and contracts with the System Operator to implement the Commission's real-time performance requirements.
281. Under the default contracts approach (option A1) in section 5.1 it would be the responsibility of grid users to monitor overall system performance and enforce performance against the grid owner. Under the co-regulation approach (option A2) monitoring and enforcement would be the responsibility of a multilateral body of grid users, established by the Commission. The conveyance approach (option B3) therefore shifts responsibility for overall system performance from the Commission to grid users if options A1 or A2 are adopted.
282. The Commission would retain responsibility for the overall system performance if options A3 and B3 are adopted. Nevertheless, the conveyance approach (option B3) would require substantial rule changes, including merging parts C and F of the Rules. It would also require the disestablishment of the System Operator's service provider contract with the Commission, as the provisions of that contract would be included in the Rules.
283. The conveyance approach (option B3) therefore carries potentially far-reaching consequences for who is responsible for overall system performance. It also carries far-reaching consequences for the transparency of the wholesale electricity market, and may limit future options to separate system operation from the grid owner. For example, separation of those functions could not occur if both options A3 and B3 were adopted.

Service measures

284. Service measures under this option include the service measures under options B1 and B2, which already include service measures relating to the provision of information regarding the factors in (a), (b), and (c) below. The additional service measures required for the conveyance approach (option B3) would be in regard to physical performance relating to:
 - a. Reliability of electricity supply;

- i. The extent of planned and unplanned interruptions;
 - ii. The extent of unserved energy;
 - iii. The extent of load reduction; and
 - iv. The extent of required use of generation constraint for system protection schemes.
- b. Power quality;
 - i. The extent of;
 - o Deviations from the voltage range (around nominal) in steady state;
 - o Step change in voltage; and
 - o Flicker outside the limits set out in part C of the Rules.
 - ii. The extent of harmonics outside the limits set out in part C of the Rules;
 - iii. The extent of harmonics outside the limits set out in part C of the Rules; and
 - iv. The extent of voltage imbalance outside the limits set out in part C of the Rules.
- c. Transmission losses and binding constraints;
 - i. The magnitude and cost of grid losses; and
 - ii. The magnitude and cost of binding grid constraints.

Service levels

285. Service levels under the conveyance approach (option B3) relate to the duration, frequency, and date/time of supply interruptions and binding grid constraints, the cost of grid losses and constraints, the extent of deviations from agreed power quality levels, and the timeliness and accuracy of information provided by the grid owner.

5.2.4 Implications of FTRs

286. The conveyance approach (option B3) includes service measures relating to transmission losses and constraints. The Commission is investigating the role of transmission hedges and may wish to introduce FTRs in the future, which could affect Transpower's incentives to minimise losses and constraints.
287. The FTR product designed by Transpower prior to the establishment of the Commission sought to achieve a high degree of revenue adequacy by

issuing FTRs to match expected real-time capacity of the grid.⁴⁴ It was widely regarded by market participants as providing Transpower with minimal financial incentive to optimally manage transmission outages.

288. If the conveyance approach (option B3) is adopted then it may be necessary in the future to revise the service measures and levels if an FTR product is introduced that alters the financial incentives on Transpower.

5.3 Options for the choice of counterparties

289. Section 5.1 described options for the relative roles of the Commission and transmission customers in general, and section 5.2 outlined the implications of alternative service definitions and measures for the allocation of risk between the grid owner, the system operator, and transmission customers.

290. This section describes the options for the choice of counterparty for transmission agreements with Transpower. These options have been described in the Farrier Swier report⁴⁵ to the Commission and in the Commission's consultation paper on the same subject.⁴⁶

5.3.1 The Farrier Swier Report

291. The Farrier Swier report essentially considered two main options as counterparties for transmission contracts. In both options Transpower would contract for the connection service with all physically connected parties (generators, distributors and directly connected customers). For the interconnection (or "use-of-system") service the options were:

- a. Contracting with all physically connected parties; generators as the "upstream" counterparties and distributors; and directly connected customers as the "downstream" counterparties;
- b. Contracting with generators as the "upstream" counterparties and with retailers and directly connected customers as the "downstream" counterparties.

292. The key difference between these options is the substitution of retailers for distributors in option b.

293. Farrier Swier applied a net social benefit test to the evaluations of these options and concluded that option (a) was favoured over option b because:

⁴⁴ In technical terms, this is achieved through the application of a simultaneous feasibility test (SFT) based on expected future grid capacity after removing any circuits relating to planned outages of more than 96 half-hours per month.

⁴⁵ Transmission Contract Structure & Counterparties; Farrier Swier Consulting (in association with Concept Consulting Group); 25 May 2004.

⁴⁶ Preliminary Consultation paper, Transmission Contract Structure and Counterparties, 24 September 2004.

- a. Option (b) would involve material transition costs and ongoing transaction costs (through the substitution of retailers for distributors) based on initial assessments;
- b. There appeared to be no material benefits for efficiency and some potential losses of technical efficiency associated with option b.
- c. The Farrier Swier report recommended that this finding be tested through consultation.

5.3.2 Preliminary Decision

294. After consideration of the Farrier Swier report the Commission came to the preliminary view that the recommended contract structure and counterparties, and transmission contracts generally, might not attribute sufficient weight to the genuine interests of end users and retailers. The Commission also found it difficult to assess the merits of particular counterparties in the absence of having finalised the Benchmark Agreements, the Transmission Pricing Guidelines and the GIT.
295. In its Preliminary Consultation paper the Commission sought comments on the following preliminary proposal:
- a. All participants who have a legitimate interest in having Transpower perform transmission services, should be entitled to have such interests recognised in a contract for services with Transpower, subject to technical, legal, economic, and administrative feasibility;
 - b. The contract structure should cover all transmission services, (connection, inter-connection or other such services which may be contracted for) through the inclusion of schedules for the relevant service;
 - c. Development of benchmark agreements should reflect this and, amongst other things, set out how key service issues, such as outage, constraint, and nodal energy price risk management, are to be dealt with; and
 - d. A final decision on the contract structure, and categories of designated transmission customer to be formally consulted on should be delayed until benchmark agreements are finalised, the process for development of the Transmission Pricing Methodology has been published and the Commission has considered their impact on contract structure and counterparties.
296. The results of the Preliminary Consultation generally supported this approach and the Commission decided to confirm that a final decision on the transmission contract structure and on the categories of designated transmission customers would not be formally consulted on until the Benchmark Agreements were finalised.

297. The Commission also noted that there was support for exploring further regulation of transmission incentives and regulation of distributor–retailer–customer relationships as options for dealing with service delivery issues.

5.3.3 Need to consider counterparties

298. Efficiently defining transmission services and potential service measures requires consideration of the options for monitoring and enforcing services, as outlined in Section 5.1. Efficient monitoring and enforcement relies on consideration of the different incentives, information and capabilities of different counterparties.
299. The Commission recognised this interdependency of issues when it decided to defer consideration of the counterparty issues until the Benchmark Agreement phase. It is therefore important that, in defining options for determining transmission services, that consideration is given to different counterparty options.
300. In order to simplify the options, this paper builds on the Farrier Swier report and the Commission’s preliminary decision and only three options are considered for counterparty status. In each option it is assumed that all physically connected participants would contract for connection services and that generators would be an “up-stream” counterparty for interconnection services only to the extent that they are required to pay for an interconnection service. The Transmission Pricing Guidelines specify that South Island generators receive an interconnection service in respect of the existing HVDC transmission. North Island generators do not receive an interconnection service. This suggests that the main counterparty options for the interconnection service are:
- a. *Option C1* - Line companies and directly connected customers;
 - b. *Option C2* - Retailers and directly connected customers; and
 - c. *Option C3* - Retailers, line companies and directly connected customers.

5.3.4 Option C1 – lines companies as counterparties

301. Option C1 involves the distribution line companies and directly connected customers as the key counterparties for the interconnection service. They would specify services and monitor and enforce interconnection contracts with Transpower.
302. Under this option line companies would negotiate with Transpower for services and service levels to the extent necessary, depending upon which model is adopted for specifying, monitoring and enforcing services.
303. Under the default contracts approach (option A1) this could involve extensive negotiations with Transpower and each line company would be responsible for contracting levels of interconnection services on behalf of end use customers.

304. Under the direct regulation approach (option A3) this would involve a more limited role of contracting for connection services.

5.3.5 Option C2 – retailers as counterparties

305. Option C2 involves the retailers and directly connected customers as the key counterparties for the interconnection service.

306. Under this option the retailers (rather than line companies) would assume the role of negotiating with Transpower for services and service levels. As with option C1 this could be an extensive role (option A1) or a more limited role (option A3).

5.3.6 Option C3 – retailers and line companies as counterparties

307. Option C3 allows retailers and line companies to participate as counterparties to contracts for interconnection services. It is likely to be necessary to specify which counterparty is required to contract for particular interconnection services, but a “menu” of connection services would be available to both retailers and line companies.

308. The extent of negotiations again depends upon the model adopted under section 5.1.

5.4 Summary

309. Section 5 has considered a range of options available to the Commission for contracting and regulating transmission services. The options are summarised in Table 5.2:

Table 5.2: Summary of Options for Defining Transmission Services		
A	B	C
<i>Specifying, monitoring, and enforcing services</i>	<i>Service definitions and measures</i>	<i>Choice of counterparties⁴⁷</i>
A1 Default contracts A2 Co-regulation A3 Direct regulation	B1 Asset availability B2 Meet demand B3 Overall system performance	C1 Line companies C2 Retailers C3 Line companies & retailers

310. In considering the options and attempting to evaluate them it is important to recognise that each option is not entirely independent of other options. Some judgement of the likely combinations will be necessary in order to undertake the evaluation. For example, the conveyance approach (option B3) does not sit easily with the default contracts approach (option A1), as it would require extensive changes to the Rules whereas option A1 is intended to be implementable within the current part F arrangements.

⁴⁷ All options include generators and directly connected consumers.

6 Evaluation of the Options for Connection Services

311. This section evaluates the options for connection services against the criteria specified in section 4.3. The section first identifies the key issues with connection services, identifies the relevant options, and then evaluates them.
312. Connection services refer to services provided by connection assets, rather than to services received at points of connection.
313. The key distinguishing feature of connection assets is that there are no 'loop flow' effects on them, and so power always flows in one direction, making it possible to identify causers/users of the asset. If there are multiple connection parties using particular connection assets, then, as with any shared asset, some form of cost apportionment is required.
314. In principle, the number of parties using an asset is not relevant for defining the asset as connection or interconnection. The key issue is whether causers/users of the asset can be identified.

6.1 The key issues with connection services

315. A key feature of connection services is that they are specific to each location, and the type and level of service can vary markedly from one location to another.

6.1.1 Bilateral monopoly situation

316. The primary issue for Transpower and existing connected parties is that they both exercise a degree of market power or political power. An effective and efficient mechanism is required to encourage Transpower and its customers to agree on service definitions, measures, and levels for existing connection services, and for resolving disputes on these matters where they are unable to reach agreement.

6.1.2 Non-common services

317. Another key feature is that connection services are non-common services. There are some instances of multiple parties sharing connection assets, but connection services are primarily provided to individual customers. Sharing occurs for economic efficiency reasons, rather than because of technical difficulties with providing connection services to individual customers.
318. In the few instances where there are multiple parties sharing connection assets there are only a small number of parties sharing the assets. This suggests there is little value in specifying how the parties negotiate collectively with Transpower, but there may be a need for an effective mechanism for resolving disputes among the connected parties, in addition to disputes they may have with Transpower.

6.1.3 Monitoring and enforcement of performance

319. Where there is only one connection party that party bears the consequences of any under performance by Transpower, and so they will have strong incentives to monitor and enforce Transpower's performance if they are liable to their own customers for under performance by Transpower.
320. Where there are a few parties sharing connection assets, they have strong incentives to jointly monitor and enforce performance. If one of the parties is very small it may have incentives to free ride on the monitoring and enforcement efforts of the other large parties. This is unlikely to materially alter the overall level of monitoring and enforcement activity as the large party still has a strong interest in ensuring Transpower meets its performance commitments.

6.2 The process for determining connection services

321. As discussed in section 5.4, the Commission intends to implement the approach specified in section II of part F of the Rules for connection services. This involves the Commission imposing default contracts on parties unable to reach agreement within specified timeframes, and allowing parties to subsequently 'contract out' of those arrangements provided they satisfy the requirements of rule 5 of section II of part F.
322. Consistent with section II of part F, the Commission does not propose to monitor Transpower's performance in regard to the provision of connection services.
323. As the Commission intends to adopt the part F approach for connection services, the only issues to evaluate are those relating to the high-level content of the benchmark agreement. These include:
 - a. Whether the courts or an alternative arbitration process should be used to enforce performance;
 - b. Whether explicit performance incentives are required in addition to standard contract enforcement provisions; and
 - c. The proposed service definitions and measures.
324. The first two issues will be evaluated at a later date when the Commission is in a position to propose specific clauses for arbitration and performance incentives.⁴⁸ The third issue is evaluated in section 6.3.

⁴⁸ The Commission intends to release the consultation paper on the proposed benchmark agreement after it has received submissions on this paper and made high-level policy decisions. It is possible that specific performance incentives may not be included in the first draft of the benchmark agreement.

6.3 Service definitions and measures

325. Section 5.2 presented three options for defining and measuring transmission services. Only two of these options are relevant for connection services, as system operator services are a component of interconnection services.

6.3.1 The options

Service definitions

326. The two options for defining connection services can be characterised as:
- a. *The asset availability approach (option B1):* Making connection assets available to customers at specified ratings and standards; and
 - b. *The 'meet demand' approach (option B2):* Making connection assets available to customers sufficient to meet customer demand at agreed security and quality standards for each point of service.
327. In both cases information would be made available to customers to enable them to manage their assets and customers efficiently.

Service measures and levels

328. The proposed service measures for options B1 and B2 are presented in section 5.2 above.
329. The service levels are not specified under either option, as they would be determined on a case-by-case basis for each connection asset and connected party.

6.3.2 Evaluation of the options

330. The following paragraphs summarise the evaluation of each option against the criteria listed in section 4.3. A more detailed evaluation is provided in appendix 3, and a summary table is provided at the end of this section.

Criterion (a): achieve standards of power quality and grid reliability required by grid users

331. Both options B1 and B2 can be consistent with power quality levels required by grid users. On balance, the 'meet demand' approach (option B2) is likely to better achieve power quality levels because B2 incorporates local security and local quality standards directly in transmission agreements, whereas B1 relies on connected parties taking explicit action to achieve required quality levels as local demand levels change.

Criterion (b): incentives for innovation and cost minimisation

332. The asset availability and 'meet demand' approaches (options B1 and B2) appear to provide the same incentives for Transpower to innovate and to minimise costs, because Transpower will face essentially the same negotiation requirements under both options. In practice, decisions about

performance incentives and the monitoring regime may overshadow any effects arising from the choice between options B1 and B2.

Criterion (c): efficient investment in transmission assets

333. In practice, both options are likely to promote efficient investment in connection assets equally well, as renegotiation occurs in both cases.

Criterion (d): facilitate commercial arrangements

334. The choice of the asset availability approach (option B1) or B2 is not likely to materially influence the incentives for parties to negotiate commercial arrangements. The primary driver here will be the nature of the dispute resolution mechanism applied to the parties if they do not reach commercial agreements.

Criterion (e): efficient and effective resolution of negotiation disputes

335. This criterion is not relevant to the choice of options B1 and B2.

Criterion (f): resolution of performance disputes

336. This criterion does not discriminate between options B1 and B2.

Criterion (g): minimise need for rule changes

337. Similar rule changes are required for options B1 and B2 in regard to connection assets. The grid investment test under the current part F rules relates primarily to interconnection assets rather than connection assets.

Criterion (h): minimise administration and compliance costs

338. Both options impose the same compliance costs. Transpower will need to forecast load growth and monitor redundancy levels under both options. Compliance costs for Transpower's customers will be the same under both options because lines companies will need to forecast their own load growth to plan their own asset developments regardless of how Transpower's services are specified.

Criterion (i): implementation timeframe

339. Both options are very similar and therefore are likely to involve similar implementation timeframes.

Criterion (j): consistent with international experience

340. Internationally, transmission service measures tend to be defined in terms of loss of load, outage frequency, and voltage standards. This suggests a mixture between options B1 and B2.

Criterion (k): consistent with recent NZ experience and context

341. Both options are consistent with recent New Zealand experience and context regarding industry self-governance arrangements.

Overall conclusion

342. Table 6.1 summarises the evaluation and ranks the options against each criteria (see the far right-hand-side column, where “>” means “better than” and “=” means “equal”).
343. There is very little to choose between options B1 and B2. The ‘meet demand’ approach (option B2) scores marginally better in terms of local power quality requirements but B1 scores marginally better on incentives for innovation and cost efficiency.

<i>Criterion</i>	<i>Option B1: Asset availability</i>	<i>Option B2: Meet demand</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Yes because connected party makes investment decision to achieve required grid reliability standards. This option is not relevant for power quality	Yes because connected party negotiates required grid reliability standards directly with Transpower. This option is not relevant for power quality	B2>B1
<i>(b) Incentives for innovation and cost minimisation</i>	This option requires Transpower to negotiate with connected parties before deciding capacity expansion for connection assets. This adds competitive tension to the incentives possible from adopting appropriate monitoring and enforcement regimes, and explicit performance incentives	Transpower faces the same negotiation requirements under this option.	B1=B2
<i>(c) Efficient investment in transmission assets</i>	This option requires Transpower to negotiate with connected parties when capacity expansion is needed. This interaction will also occur under option B2	Efficient investment under this outcome relies on connected parties specifying accurate incentive arrangements in their contracts with Transpower, and renegotiating with Transpower	B1=B1
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(g) Minimise need for rule changes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(h) Minimise administration and compliance costs</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2

<i>(i) Can be implemented within short timeframe</i>	Yes as essentially the current approach to provision of connection assets	Take a little longer than option B1 because Transpower will need to develop new systems to meet service commitments under option B2	B1=B2
<i>(j) Consistent with international experience</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
<i>(k) Consistent with recent NZ experience and context</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	B1=B2
Summary	Both options appear equally preferable for connection services		

6.4 Choice of contract party

344. The Farrier Swier analysis sought to identify the most appropriate counterparties for transmission agreements as an input to the Commission's decision. Once the Commission has made a decision, the identified counterparties will become "designated transmission customers" under the rules and must assume certain rights and obligations outlined in Part F. In particular, the counterparties will be required to pay for interconnection services at a price determined by the approved transmission pricing methodology.
345. In the case of connection services Farrier Swier concluded that the only practical and feasible option was for all physically connected parties (generators, distribution line companies and direct customers) to become designated transmission customers.
346. This recommendation is supported because:
- a. Connection services are likely to be predominantly focussed on the needs of particular physically connected parties and with relatively few common features;
 - b. Where there are common features, these are likely to be focussed within a region and restricted to a relatively small number of connected parties;
 - c. The physically connected parties are the stakeholders that are likely to have the best information, incentives and capability to negotiate with Transpower, to monitor performance against the transmission agreement, and to bear the risks of variations in Transpower's performance; and
 - d. Any bilateral monopoly problems could most efficiently be dealt with through the role of the Commission in establishing benchmark Agreements and as an appeal authority in the case of disputes.

7 Evaluation of the Options for Interconnection Services

347. This section evaluates the options in section 5 in regard to interconnection services against the criteria specified in section 4.3.
348. It is not practicable to evaluate all combinations of options, so the paper evaluates first the 'A' options, and then the 'B' options, and so on. At each subsequent stage we consider whether decisions in the earlier stage alter the evaluation in the current stage, and vice versa.
349. Interconnection services refer to services provided by interconnection assets – assets for which it is too difficult to attribute services to a single party because of 'loop flow' effects.
350. In principle, the number of parties using an asset is not relevant for defining the asset as connection or interconnection. For example, there may be only one party located on an interconnected line, but due to the line being part of the meshed segment of the grid, 'loop flow' effects make it difficult to attribute that party as the causer of the need for that line. All grid parties benefit from the interconnected line, to varying degrees.

7.1 The key issues with interconnection services

7.1.1 'Hold out' problems

351. As with connection services there is a significant issue in regard to bilateral monopoly and 'hold out' problems, giving rise to the need for external mechanisms to resolve disputes regarding service definitions, measures, and levels for interconnection services.

7.1.2 Common services

352. In contrast to connection services, a key feature of interconnection is that it is provided to multiple customers located in different parts of the grid and using different sets of connection assets. In general it is not technically feasible to separately deliver interconnection services to customers.
353. The level of service can vary markedly between locations upstream and downstream of binding grid constraints, but multiple grid users are affected on both sides of the constraint, in different ways. This raises the issue of how interconnection services should be determined, whether they should be codified in contracts or in the Rules, and how Transpower's performance should be monitored and enforced.

7.2 The process for determining interconnection services

7.2.1 The options

354. Following section 5.1, there are three main process options for determining interconnection services, which are summarised in Table 7.1:

Table 7.1: Summary of Options for Interconnection Services			
Option	<i>Specification of services</i>	<i>Monitoring of performance</i>	<i>Enforcing performance and performance incentives</i>
A1 Default contracts	<p>Voluntary negotiation by grid users</p> <p>Dispute resolution via benchmark agreements</p> <p>Parties can 'contract out' of benchmark agreements</p> <p>Provisions specified in bilateral contracts</p>	<p>Grid users responsible for monitoring</p> <p>Informal monitoring by the Commission</p>	<p>Voluntary enforcement by grid users</p> <p>Benchmark agreements will specify mediation and arbitration rather than court enforcement</p> <p>Performance incentives left to parties to negotiate with Transpower (but may be included in benchmark agreements)</p>
A2 Co-regulation	<p>Negotiation conducted by multilateral body</p> <p>Dispute resolution via arbitration</p> <p>Provisions specified in the Rules</p>	<p>Multilateral body responsible for monitoring</p> <p>Multilateral body would keep the Commission and grid users informed</p>	<p>Enforcement by multilateral body appealing to existing rule breach processes</p> <p>Use of performance incentives depends on what the multilateral body negotiates with Transpower</p>
A3 Direct regulation	<p>Commission determines interconnection services and specifies them in the Rules</p>	<p>The Commission responsible for monitoring</p> <p>Informal monitoring by grid users</p>	<p>Individual grid users enforce services through rule breach processes, with assistance from the Commission</p>

7.2.2 Evaluation of the options

355. The following paragraphs summarise the evaluation of each option against the criteria listed in section 4.3. A more detailed evaluation is provided in appendix 3, and a summary table is provided at the end of this section.

Criterion (a): achieve standards of power quality and grid reliability required by grid users

356. Options A2 and A3 are more likely than the default contracts approach (option A1) to achieve standards of power quality and grid reliability required by grid users, as both options seek to overcome any 'free rider' problems that may occur with monitoring and enforcing performance with interconnection services. Given that the co-regulation approach (option A2) draws more directly on the views of grid users in specifying service levels than option A3, option A2 is likely to satisfy criterion (a) better than the direct regulation approach (option A3).

Criterion (b): incentives for innovation and cost minimisation

357. In most industries voluntary contracting is normally associated with high rates of innovation. The default contracts approach (option A1) is likely to provide greater innovation than the other options, despite the Rules constraining voluntary transmission agreements to be consistent in all material respects with benchmark agreements and grid reliability standards.⁴⁹

358. Effective monitoring and enforcement of Transpower's performance is also a key requirement for providing appropriate incentives to continuously improve services and minimise costs. If there are likely to be significant 'free rider' problems with voluntary monitoring and enforcement of interconnection services then the default contracts approach (option A1) is unlikely to create strong incentives for innovation and cost minimisation.

359. The co-regulation and direct regulation approaches (options A2 and A3) are likely to provide stronger incentives because they provide more effective monitoring and enforcement of Transpower's performance, and the Commission can introduce performance incentives under the direct regulation approach to achieve balanced incentives.

Criterion (c): efficient investment in transmission assets

360. The key issue for investment efficiency is the service definitions, measures, and levels agreed with Transpower, and the associated monitoring, enforcement, pricing, and incentive arrangements.

⁴⁹ See rule 3.2.1 of section II of part F of the Rules. Exceptions apply in regard to variations in services from benchmark agreements and grid reliability standards provided the parties satisfy rule 5 of section II of part F of the Rules.

361. All three options are capable of producing service measures and levels necessary to provide Transpower with appropriate incentives to invest in interconnection assets. Options A2 and A3, however, are likely to provide more effective monitoring and enforcement of Transpower's performance, and the Commission can introduce performance incentives under the direct regulation approach (option A3) to achieve balanced incentives.

Criterion (d): facilitate commercial arrangements

362. Options A1 and A2 appear to be most consistent with the aim of facilitating commercial arrangements between Transpower and its customers. Although the default contracts approach (option A1) appears on the surface to be most consistent with facilitating commercial arrangements, in reality commercial outcomes under option A1 are likely to be heavily influenced by the content of the benchmark agreements.

Criterion (e): efficient and effective resolution of negotiation disputes

363. There appears to be little difference between the options in regard to efficiency of dispute resolution.
364. An effective process for resolving disputes is one that achieves outcomes quickly and achieves outcomes that the parties 'buy into.' The co-regulation approach (option A2) appears to provide a more effective process for resolving disputes because the collective decision-making and explicit dispute resolution processes provide a more transparent basis for determining interconnection services and resolving disputes about them.

Criterion (f): efficient and effective resolution of performance disputes

365. On balance the default contracts approach is probably marginally better than the co-regulation and direct regulation approaches because parties can choose alternative dispute resolution processes if they believe they are superior to existing rule breach processes.

Criterion (g): minimise need for rule changes

366. The default contracts approach (option A1) does not require any rule changes other than a schedule incorporating the benchmark agreements. The direct regulation approach (option A3) would require significant new rules, but these would be largely limited to a schedule incorporating specific service definitions, measures, and levels, and explicit performance incentives. The co-regulation approach (option A2) would require extensive changes to section II of part F of the Rules, as new rules would be needed to specify the objectives, purpose, functions, powers, and administrative processes of the multilateral body.

Criterion (h): minimise administration and compliance costs

367. The default contracts approach (option A1) is likely to involve higher compliance costs than the direct regulation approach (option A3) because grid users would be responsible for maintaining transmission agreements with Transpower. Conversely, option A3 is likely to involve higher

administration costs than A1 because the Commission would be primarily responsible for monitoring and enforcing interconnection services. It is not clear which option is likely to have the lowest overall cost, as the Commission will need to consult grid users under option A3.

368. The co-regulation approach (option A2) is likely to involve higher administration costs than the direct regulation approach (option A3) because collective decision-making by representatives in the multilateral body is likely to be slower and more in-depth than central decision-making by the Commission. Compliance costs will be greater because option A2 involves grid users more directly in ongoing decision-making processes.

Criterion (i): implementation timeframe

369. The default contracts approach (option A1) would be the quickest to implement as it is provided for within current part F arrangements. The direct regulation approach (option A3) would take longer to implement if regulatory performance incentives were adopted, although the other aspects of option A3 would take about the same time to implement as option A1.
370. The co-regulation approach (option A2) would take the longest time period to implement because additional time would be required to establish a new multilateral body and considerable time would be required for it to develop unified negotiating positions.

Criterion (j): consistent with international experience

371. Internationally, interconnection service definitions and measures tend to be determined by regulatory bodies, with incentive-based regulation used to encourage performance. The direct regulation approach (option A3) is therefore more consistent with this criterion than options A1 and A2.

Criterion (k): consistent with recent NZ experience and context

372. Options A1 and A3 are more consistent with recent New Zealand experience and context, where industry self-governance is seen as a failure of multilateral decision processes. The co-regulation approach (option A2) draws heavily from the approach developed by the TWG, which envisaged service measures common to all nodes being developed through a multilateral process, such as the successor to the Multilateral Agreement on Common Quality Standards (MACQS) process.⁵⁰ Multilateral processes (and voting) would also be used to negotiate new service levels for services common to multiple nodes.⁵¹

Overall conclusion

373. Table 7.2 summarises the evaluation and ranks the options against each criteria (see the far right-hand-side column, where “>” means “better than” and “=” means “equal”).

⁵⁰ MACQS refers to the Multilateral Agreement on Common Quality Services.

⁵¹ Existing service levels were to be determined based on historical information and were not part of the multilateral decision-making process.

374. The direct regulation approach (option A3) scores higher than options A1 and A2. Option A3 receives six 'first place' and two 'second place' scores, whereas the default contracts approach (option A1) scores five and zero respectively. The co-regulation approach (option A2) scores four and one respectively.
375. Overall, the direct regulation approach (option A3) looks to be the better option because the other options score poorly on key criteria. For example, the default contracts approach (option A1) scores poorly in regard to power quality, grid reliability, innovation, cost minimisation, and investment in transmission assets. The co-regulation approach (option A2) scores poorly in terms of practicality (criteria f, g, and h), and consistency with recent New Zealand experience and context. In contrast, option A3 scores first or second against almost all criteria.

<i>Criterion</i>	<i>A1: Default contracts</i>	<i>A2: Co-regulation</i>	<i>A3: Direct regulation</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Yes because grid users can 'contract out' of default transmission agreements, but 'free rider' problems with monitoring and enforcement are problematic	Yes because grid users specify services via a multilateral body and a multilateral body is likely to undertake effective monitoring and enforcement	Yes because (1) the Commission consults with grid users in specifying service levels, but this is unlikely to be as accurate as the multilateral body, (2) the Commission has incentives to effectively monitor and enforce performance to reduce 'newsworthy' underperformance events, and (3) the Commission can introduce balanced performance incentives	A2>A3>A1
<i>(b) Incentives for innovation and cost minimisation</i>	No because 'free rider' problems with monitoring and enforcement reduce pressure on Transpower to perform. These effects are likely to offset the innovation benefits arising from voluntary contracting	Yes because multilateral body likely to undertake effective monitoring and enforcement, which is important for creating strong incentives for innovation and cost minimisation	Yes because (1) the Commission has public policy incentives to effectively monitor and enforce performance to reduce 'newsworthy' underperformance events, and (2) the Commission can introduce balanced performance incentives	A2=A3>A1
<i>(c) Efficient investment in transmission assets</i>	Same as criterion (b)	Same as criterion (b)	Same as criterion (b)	A2=A3>A1
<i>(d) Facilitate commercial arrangements</i>	Yes because grid users can 'contract out' of default transmission agreements, although material deviations are constrained by the Rules	Yes because multilateral body negotiates with Transpower, although the decision-making process is specified by the EC	No because the intention is for the Rules to supplant commercial arrangements	A1=A2>A3

<i>(e) Efficient and effective resolution of negotiation disputes</i>	No because would have to resolve disputes with multiple parties	Yes because would have single arbitration between Transpower and multilateral body	Yes because the rule change consultation process provides an efficient and effective mechanism for addressing disputes	A2=A3>A1
<i>(f) Efficient and effective resolution of performance disputes</i>	This option may be marginally better than A2 and A3 because it allows parties to voluntarily choose other dispute resolution processes if they believe they are more efficient and/or effective	Criterion does not discriminate between A2 and A3 as both options use appeals to existing rule breach processes	Criterion does not discriminate between A2 and A3 as both options use appeals to existing rule breach processes	A1>A2=A3
<i>(g) Minimise need for rule changes</i>	Yes because benchmark agreements are provided for in part F	No because significant departure from current part F framework	Would require some rule changes and would change current intention of part F	A1>A3>A2
<i>(h) Minimise administration and compliance costs</i>	Yes but unclear whether lower cost than option A3 Commission	No because of large set up costs and ongoing administration and compliance costs	Yes but unclear whether lower cost than Option A1	A1=A3>A2
<i>(i) Can be implemented within short timeframe</i>	Yes because consistent with current part F	No because of the time required to establish multilateral body and the longer time period for multilateral bodies to make collective decisions	Yes because new rules for interconnection services would have to be developed for benchmark agreements anyway	A2>A3>A1
<i>(j) Consistent with international experience</i>	Benchmark agreements are not common in other jurisdictions	Co-regulation as it is defined in this paper is rarely found in other jurisdictions	Regulators tend to determine transmission service definitions and measures in most jurisdictions	A3>A1>A2
<i>(k) Consistent with recent NZ experience and context</i>	Derives from current part F which was developed in response to failure of industry self-governance	Could be considered similar to failed industry self-governance processes	Consistent with the more regulatory approach adopted in part F in regard to the GIT, GRS, and transmission pricing	A1=A3>A2
Summary	Option A3 is superior to options A1 and A2 in regard to determining interconnection services			

7.3 Service definitions and measures

7.3.1 The options

376. Section 5.2 presented three options for defining interconnection services:

- a. *The asset availability approach (option B1)*: making specified interconnection assets and information available to customers (via the system operator). The service measures for this option related primarily to:
 - i. The MW ratings of specified interconnection assets at each point of service and the extent of design redundancy at each point of service;
 - ii. The extent of planned outages of specified grid assets, and the expected level of unplanned outages; and
 - iii. The timeliness and accuracy of information provided to customers (about installed capacity at each point of service and about planned and unplanned outages).
- b. *The 'meet demand' approach (option B2)*: providing interconnection assets sufficient to meet off-take demand. The service measures for this option included those for the asset availability approach and also:
 - i. Specified redundancy levels; and
 - ii. Specified voltage range objectives.
- c. *The conveyance approach (option B3)*: conveying electricity at agreed quality levels from generators to off-take customers. The service measures for this option included those for the 'meet demand' approach (option B2) and also:
 - i. The extent of planned and unplanned interruptions, and the extent and magnitude unserved energy, momentary interruptions, load reduction, and use of system protection schemes;
 - ii. Excursions and deviations in power quality;
 - iii. The extent and cost of transmission losses and constraints; and
 - iv. The timing and accuracy of information to customers regarding each of the above.

7.3.2 Evaluation of the options

377. The following paragraphs summarise the evaluation of each option against the criteria listed in section 4.3. A more detailed evaluation is provided in appendix 3, and a summary table is provided at the end of this section.

Criterion (a): achieve standards of power quality and grid reliability required by grid users

378. Despite power quality and grid reliability being service measures in option B3 (but not in B1 and B2), adopting the conveyance approach (option B3) for the benchmark agreements or for the Rules under the direct regulation approach (option A3) does not assist in achieving power quality and grid reliability standards required by grid users. In practice, the 'A' options discussed in section 7.2 and appendix 3 are the primary factors to consider in regard to criterion (a).

Criterion (b): incentives for innovation and cost minimisation

379. The asset availability approach (option B1) appears to achieve better incentives for innovation and cost minimisation than the 'meet demand' approach (option B2) because Transpower is required to obtain the Commission's approval for grid upgrades. The Commission provides this approval by applying the grid investment test, which allows alternative solutions to compete with Transpower's proposed solutions.

Criterion (c): efficient investment in transmission assets

380. In practice, the asset availability approach (option B1) appears most likely to promote efficient investment in interconnection assets because the grid investment test provides an open and transparent process for considering alternatives to Transpower's investment proposals (including alternative transmission solutions). If robust performance incentives were developed in the future, then it would make sense to revisit options B2 and B3.

Criterion (d): facilitate commercial arrangements

381. The choice of 'B' options is not likely to materially influence the incentives for parties to negotiate commercial arrangements. The primary driver here will be the nature of the dispute resolution mechanism applied to the parties if they do not reach commercial agreements.

Criterion (e): efficient and effective resolution of negotiation disputes

382. This criterion is not relevant to the choice of 'B' options.

Criterion (f): resolution of performance disputes

383. The co-regulation and direct regulation approaches (options A2 and A3) use the same dispute resolution processes (i.e. appeals to existing rule breach processes) for addressing performance disputes, and so this criterion does not discriminate between those options.
384. On balance the default contracts approach (option A1) is probably marginally better than the co-regulation and direct regulation approaches in regard to this criterion because the contracting parties can 'contract out' of the default contracts if they believe other dispute resolution processes are superior.

Criterion (g): minimise need for rule changes

385. The asset availability approach (option B1) requires minimal changes to the Rules because it is consistent with the current regulatory framework underpinning part F of the Rules. In contrast, options B2 and B3 would require extensive changes to part F of the Rules. The conveyance approach (option B3) would require further changes to service provider contracts, and probably a merging of part C and F of the Rules.

Criterion (h): minimise administration and compliance costs

386. The service measures under the asset availability and 'meet demand' approaches (option B1 and B2) would be relatively simple for the Commission and grid users to monitor and enforce. In contrast, the conveyance approach (option B3) introduces a wider array of service measures, and also service measures over which the grid owner has less control than those in options B1 and B2.

Criterion (i): implementation timeframe

387. The above factors mean that the asset availability approach (option B1) would be the quickest to implement, with the 'meet demand' approach (option B2) taking a little longer to implement, and the conveyance approach (option B3) taking the longest to implement because extensive changes would be required to the Rules and service provider contracts.

Criterion (j): consistent with international experience

388. Internationally, transmission service measures tend to be defined in terms of loss of load, outage frequency, and voltage standards. This suggests a mixture between options B1 and B2.

Criterion (k): consistent with recent NZ experience and context

389. This criterion is not relevant to the choice of options B1, B2 or B3 because each can be implemented within a regulatory environment, with minimal self-governance arrangements.

Overall conclusion

390. Table 7.3 (next page) summarises the evaluation and ranks the options against each criteria (see the far right-hand-side column, where ">" means "better than" and "=" means "equal").
391. The asset availability approach (option B1) scores significantly better than options B2 and B3, primarily because it retains competitive pressure on Transpower to justify its grid expansion proposals. The asset availability approach (option B1) also appears to be a more practical solution than options B2 or B3.

Table 7.3: Interconnection service definitions and measures – summary evaluation

<i>Criterion</i>	<i>B1: Asset availability</i>	<i>B2: Meet demand</i>	<i>B3: Conveyance</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	This criterion does not discriminate between the options because these outcomes are determined primarily by the 'A' options described in section 5.1. See table 7.1 in section 7.2	Same as B1	Same as B1	B1=B2=B3
<i>(b) Incentives for innovation and cost minimisation</i>	This option requires Transpower to obtain the Commission's approval for investment in interconnection assets. The GIT process competitive tension to the incentives possible from adopting appropriate monitoring and enforcement regimes, and explicit performance incentives	The outcome depends largely on whether appropriate monitoring and enforcement regimes, and explicit performance incentives, are adopted	Same as B2. Although option B3 specifies a wider range of responsibilities for the grid owner, Transpower already faces these responsibilities as the System Operator	B1>B2=B3
<i>(c) Efficient investment in transmission assets</i>	Same as criterion (b)	Same as criterion (b)	Same as criterion (b)	B1>B2=B3
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between B1 and B2 as both options have essentially the same service measures and service levels	Criterion does not discriminate between B1 and B2 as both options have essentially the same service measures and service levels	The greater complexity associated with service measures would likely make it more difficult for a third party to determine the grid owners' performance, relative to options B1 and B2	B1=B2>B3

<i>(g) Minimise need for rule changes</i>	Yes	Significant rule changes would be required because option B2 is not consistent with the regulatory framework underlying current part F rules	Extensive changes would be required because option B3 is not consistent with the regulatory framework underlying current part F rules and it would require disestablishment of the System Operator contract	B1>>B2>B3
<i>(h) Minimise administration and compliance costs</i>	Same costs under B1 and B2	Same costs under B1 and B2	This option involves higher administration and compliance costs because set up costs would be high and it would be more difficult for grid users to monitor and enforce performance under options A1 and A2	B1=B2>B3
<i>(i) Can be implemented within short timeframe</i>	This is the quickest option as it is the most consistent with current part F arrangements	This option would take longer to implement than option B1 because Transpower would need to develop new systems to meet more complex service commitments	This option would take the longest to implement because extensive changes would be required to the Rules, to service provider contracts, and perhaps to the internal organisation of Transpower	B1>B2>B3
<i>(j) Consistent with international experience</i>	Variants of this approach is typical in international jurisdictions	Variants of this approach is typical in international jurisdictions	Rarely found in international jurisdictions	B1=B2>B3
<i>(k) Consistent with recent NZ experience and context</i>	Criterion does not discriminate between the options	Criterion does not discriminate between the options	Criterion does not discriminate between the options	B1=B2=B3
Summary	Option B1 is superior to options B2 and B3 for interconnection assets			

7.4 Choice of contract party

7.4.1 The Farrier Swier Report

392. The Farrier Swier report outlined a set of criteria against which it evaluated essentially two options for the choice of counterparty to transmission agreements covering interconnection services. This section draws on the Farrier Swier analysis and evaluates the three options outlined in section 5.3. These options can be summarised as:

- a. *The lines company approach (option C1)*: All physically connected entities (generators, distribution line companies and direct customers) become designated transmission customers for the interconnection service;
- b. *The retailer approach (option C2)*: Generators and direct customers become designated transmission customers for the interconnection service, but retailers take the place of distribution line companies for the “down stream” interconnection service; and
- c. *The combined approach (option C3)*: This is the option identified by the Commission in its preliminary decision. It involves generators and direct customers becoming designated transmission customers, and both retailers and distribution line companies as designated transmission customers for the “down stream” interconnection service.

7.4.2 Evaluation

393. With interconnection services, the choice of counterparty is closely interrelated with the choice of options for determining transmission services (A1 to A3). In particular, under the co-regulation and direct regulation approaches (options A2 and A3) interconnection services are specified in the Rules rather than in bilateral contracts with Transpower, and so arguably there is no need to determine the counterparty for interconnection services in these cases.

394. Nevertheless, counterparties are certainly necessary under the default contracts approach (option A1). The choice of counterparties should be based on an evaluation of which counterparties are likely to have the best information, incentives and capability, to negotiate, monitor, and enforce outcomes that are in the interest of end-users, and which are the best parties to bear the risks of variations in Transpower’s performance. Under option A1 this is clearly an important criterion, because the counterparties exercise the primary role of negotiating, monitoring, and enforcing interconnection services with Transpower.

395. The choice of stakeholders for the multilateral body under the co-regulation approach (option A2) is effectively the counterparty issue under another guise. Stakeholders should be chosen on the basis of whether they are likely to have the best information, incentives and capability, to negotiate outcomes that are in the interest of all end-users.

396. The following table provides an evaluation of each option against the criteria listed in section 4.3.

Table 7.4: Interconnection service counterparty options – summary evaluation

<i>Criterion</i>	<i>Option C1: All connected parties</i>	<i>Option C2: Retailers replace distribution line companies</i>	<i>Option C3: All connected parties plus retailers</i>	<i>Rank</i>
<i>(a) Achieving power quality and grid reliability standards required by grid users</i>	Connected parties will represent their own interests which will not always coincide with end-user interests	Retailers will represent their own interests which will not always coincide with end-user interests	Although connected parties and retailers will represent their own interests, including both as the counter party is marginally more likely to achieve end-user interests than having only one of them as a counter party	C3>C1=c2
<i>(b) Incentives for innovation and cost minimisation</i>	This option misses the influence retailers can provide	This option misses the influence line companies can provide	Retailers and distribution companies will have different interests. This option therefore provides slightly greater incentives	C3>C1=C2
<i>(c) Efficient investment in transmission assets</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(d) Facilitate commercial arrangements</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(e) Efficient and effective resolution of negotiation disputes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(f) Efficient and effective resolution of performance disputes</i>	Criterion does not discriminate between options. Lines companies would be more effective for some disputes but retailers more effective for other disputes	Same as for C1	Same as for C1	C1=C2=C3
<i>(g) Minimise need for rule changes</i>	Criterion does not discriminate between options	Criterion does not discriminate between options	Criterion does not discriminate between options	C1=C2=C3
<i>(h) Minimise administration and compliance costs</i>	This option requires the least change, and involves the same counterparties as for connection	May incur transition costs and ongoing transaction costs at higher levels than C1	May incur transition costs and ongoing transaction costs at higher levels than C1 and C2	C1>C2=C3

<i>(i) Can be implemented within short timeframe</i>	This option is effectively the status quo so could be implemented readily	This involves a transition from the distributor to the retailer, so may take longer to implement	This involves an addition counterparty and services will need to be allocated between counterparties	C1>C2>C3
<i>(j) Consistent with international experience</i>	International practice in similar electricity markets ⁵² is to use more direct regulation of interconnection services, with revenue from distribution line companies	This option is rarely used internationally	This option is rarely used internationally	C1>C2=C3
<i>(k) Consistent with recent NZ experience and context</i>	This option is effectively the status quo so is the most consistent with recent experience	This would be a new approach in New Zealand	This would be a new approach in New Zealand	C1>C2=C3
Summary	Option C1 is preferred on transaction cost and implementation grounds, but C3 may provide outcomes that are better matched to end user needs, and provide for more innovation.			

⁵² The UK and Australian electricity markets are very close to the New Zealand design, relying on competition in generation and retail, regulating natural monopoly in lines businesses, and coordinating the real-time market through the System Operator.

397. This table demonstrates that choosing the best counterparty option appears to be a balance between the transactional efficiency and ease of implementation of option C1 and the potential for outcomes that are more innovative and closer to those required by end-users, provided by option C3.
398. If the A1 (default contracts) model was adopted, this would put more weight on C3, because the counterparty will have more influence on contracting outcomes. If the A2 (co-regulation) model was adopted, this would put more weight on C1, because the counterparty would have less influence on contracting outcomes.
399. Farrier Swier concluded that neither distribution line companies, nor retailers, were likely to be good agents for end-users, because they will tend to represent their own interests, and these are not necessarily well-aligned with end-users. This is because transmission line charges are essentially “pass through” costs for both parties.
400. If accepted, this argument tends to favour option C1 (all physically connected parties as contract counterparties).

Appendix 1: The Economics of Service Definitions and Measures

401. Appendix 1 discusses the economics of service definitions and measures. It begins with a general discussion of the bundling of services, because bundling is key to determining service definitions and understanding the function of different types of service measures. These issues are discussed in general terms first, and then in regard to transmission.

Service definitions

Bundles of services

402. Services are often provided as bundles of component services. For example, consider the case of residential furniture moving. Consumers can hire trucks from a rental firm and then package, load, drive and unload the furniture themselves. Or they can package the furniture themselves and hire a truck and driver to load and deliver the furniture. Alternatively, the consumer can engage a transport firm to undertake the whole service – packaging, loading/unloading, and driving the truck.
403. Similar bundling occurs in regard to other transport services. For example, travellers can choose full airline services, they can charter planes with pilots and carry on their own luggage, or they can pilot the plane themselves if they have appropriate licences. Similar distinctions arise in regard to courier and postal services.

Service bundles and service definitions

404. The appropriate service definition depends on which services are bundled together. The full service in the furniture moving task is a delivery service, whereas the self-drive option is a truck rental service. It is important to properly specify component services, and to understand how they are bundled together, in order to specify appropriate service definitions.

Bundles of transmission services

405. Transmission services typically comprise connection, interconnection, and system operator services.⁵³ Connection and interconnection services are made up of services relating to transformers, capacitors, lines, metering, information about outages and interruptions, fault repairs, network planning, and so on.
406. System operator services typically comprise scheduling and dispatch of energy, scheduling and dispatch of instantaneous reserves, monitoring and dispatch of emergency reserves such as automatic under frequency load shedding, contracting and dispatch of frequency keeping, voltage support, black start, and so on.

⁵³ Readers interested in analogies may see parallels between packaging/unpackaging and transformer services, between loading/unloading and connection services, and between driver and system operator services.

Efficient service bundles

Choice of service bundles

407. Some services are segmented into many component services, while others are offered only as a full service. Efficient bundling depends on the relative costs and benefits of segmenting service provision. In competitive industries efficient bundling or segmentation of services is achieved by the decentralised interaction of service providers and consumers.
408. The cost of segmenting services depends on the technical and commercial interdependence of the component services. Technical interdependence occurs where it is difficult to separate services for technical reasons. For example, it is not possible to separate the provision of 'rear seat' airline services from 'front seat' airline services because the provision of one requires the provision of the other. As a result they are offered as a single service to the market.⁵⁴ Commercial interdependence occurs when providers of one or more component services possess knowledge and facilities that make it cheaper to provide other component services. This is often referred to as 'economies of scope'.
409. The benefit of segmenting services depends on the value consumers' gain from choosing component services that best meet their needs. For example, low income consumers will often choose to package, load, and drive their own furniture because of the cost of their own time relative to paying others to undertake the task. Higher income consumers will often prefer to pay for the full service because the additional cost is low relative to the cost of their own time.
410. Both technological innovation, and changes in employment patterns and incomes, lead to unbundling of some services and bundling of others. In competitive industries, service providers continually seek new ways to package their services to provide better value to their customers and compete for new custom.

Efficient bundling of transmission services

411. Many transmission services are provided in common to multiple consumers because with an integrated transmission system it is impractical to attempt to separate or differentiate those services for individual consumers. For these services it is not possible to leave bundling decisions to individual grid users. Rather, decisions about the bundling of transmission services need to be made collectively by grid users, or made by a central party on their behalf. Nevertheless, essentially the same segmentation costs and benefits discussed above need to be considered in making these decisions.

⁵⁴ Seating preferences are often taken into account when customers book airline seats, but there is no obligation on the airline to meet those preferences and customers pay the same price regardless of whether they receive a front or rear seat, etc.

412. A key issue is the extent to which connection, interconnection, and system operator services can be efficiently unbundled from each other.

Efficient service measures

The economic role of service measures

413. Service providers in competitive industries have strong incentives to choose service measures that maximise economic efficiency. They do this by choosing service measures:
- a. That are meaningful to their customers, because this enhances the attractiveness of their services to customers; and
 - b. That reflect key cost drivers to the service provider, so that it can tailor its service provision in order to minimise costs.
414. For example, couriers and postal businesses define the carriage of a parcel in terms of the weight and size of the parcel, the distance the parcel is to be transported (often approximated by origin/destination regions), and the speed of pick up and delivery of the parcel. The weight, size and speed dimensions are meaningful to customers because they can often alter their parcels and demand for courier/postal services along these dimensions. All four dimensions – weight, size, speed, and distance – reflect key cost drivers for couriers and postal businesses.
415. Courier businesses specify speed/time measures in terms of 5 minute, 15 minute, half-hour, and one-hour deliveries. These specifications are much finer than standard postal delivery times, and are offered because the additional value they create for customers (with urgent delivery needs) exceeds the additional cost of achieving them.

Service bundles and service measures

416. The appropriate service measures depend on the extent to which services are bundled. For example, if consumers choose to hire a truck to shift their own furniture then service measures could include capacity (i.e., the carrying capacity and size of the truck), whether the truck is covered or uncovered, and the time of the day/week/year the truck is required. Alternatively, if consumers choose the full moving service then service measures relating to truck capacity are replaced with service measures relating to the timeliness of pick up and delivery and the condition of the furniture upon delivery.

Input/output distinctions

417. Sometimes service measures are classified as input or output measures, with the strong inference that input measures are inferior to output measures. The above example shows that input/output distinctions are not necessarily useful when classifying service measures. For example, capacity is clearly an output measure for consumers hiring a truck to shift their own furniture, but an input measure for consumers purchasing the

full moving service. In general, the best form of measure will depend upon the nature of the service bundle.

418. This suggests the type of service provided to consumers needs to be well-specified before attempting to specify service measures. Conversely, if input measures are adopted because output measures are not technically possible, then it may be the case that the wrong services definitions have been adopted.

Efficient allocation of risk and accountability

Perfect certainty

419. In general consumers care about the final outcome of a service, and prefer to contract with a single provider committed to achieving those outcomes. Service providers, on the other hand, prefer to make service commitments only for aspects of the service they control. Where providers control all aspects of their service delivery, competition drives service providers to adopt service definitions and service measures directly related to the outcomes valued by consumers.

Uncertainty and allocation of risk

420. In many cases factors outside the direct control of the service provider diminish the ability to achieve outcomes to the complete satisfaction of consumers. For example, the weather and the actions of other road users can cause traffic congestion, making it difficult for couriers or furniture moving services to achieve stated pick up and delivery times. Similar issues arise in regard to transmission outages and congestion. In these cases the consumer and service provider have conflicting goals, requiring the consumer to trade-off lower risk for higher prices, and vice versa.
421. Efficient allocation of risks (and therefore accountability) requires that diversifiable risks be allocated to the party best able to hedge against the outcome and non-diversifiable risks be allocated to the party best able to influence the outcome. In competitive industries the efficient allocation of risk and accountability is achieved by the decentralised interaction of consumers and service providers. Where the service provider does not have a natural hedge, it is often left to the consumer to either bear those risks or purchase insurance to cover them.

Implications for service measures

422. The choice of service measures bears directly on the extent to which service providers can be held accountable for outcomes and who bears the risk of non-performance. Where service providers are not well placed to carry risk, service measures may not fully reflect the service delivered because they are not needed to achieve efficient risk allocation. It is not appropriate, therefore, to identify inadequate service measures and assume they need revising, as it is also necessary to understand efficient risk allocation in each case.

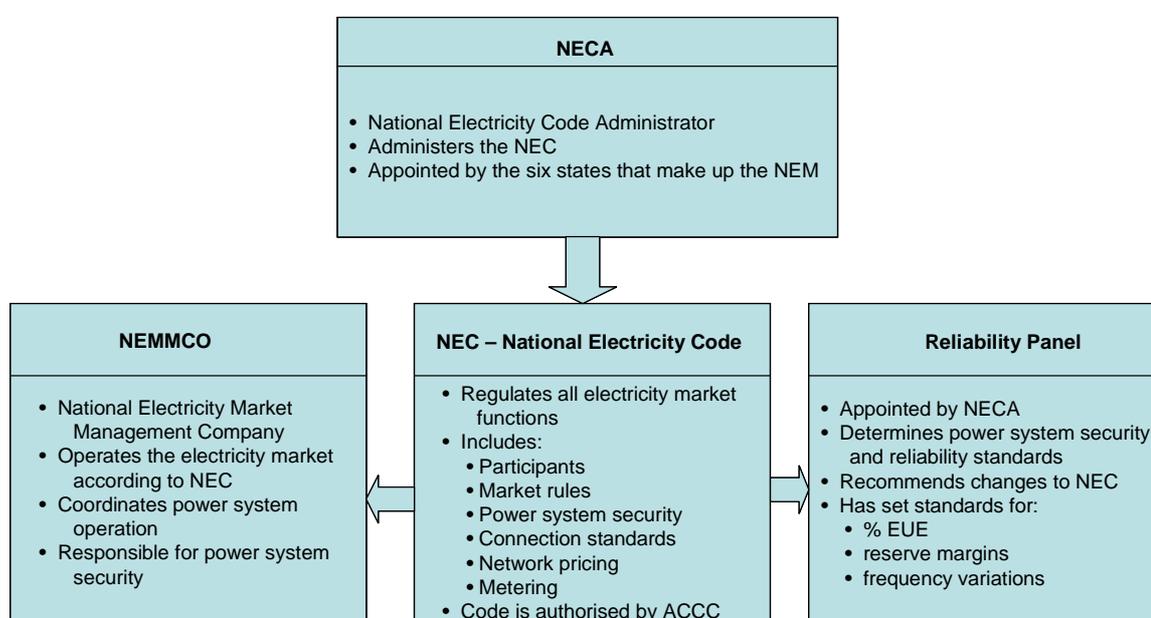
423. For example, furniture moving businesses define their services as providing packaging, loading, and delivery services, but their service measures are usually limited to providing a truck and driver on certain dates, with no commitments and no service measures as to the condition of the delivered goods. Customers are left bearing the risk of their goods being damaged en route to the new destination. Identifying this as an example where service measures are inadequate would miss the point that the service measures may reflect an efficient allocation of risk to customers.
424. A key issue for bundling, defining, and measuring transmission services is determining which parties are best placed to manage particular transmission risks. That is, which party has the best information, incentives, and capability for managing particular transmission risks?

Appendix 2: International Experience with Transmission Service Definitions

The Australian approach

425. The Australian electricity market is administered by the National Electricity Code Authority (NECA) according to a comprehensive set of rules and regulations, set out in the National Electricity Code (NEC).⁵⁵ The structure of regulation is outlined in Figure 1 with particular reference to reliability. Issues of particular note include:
- a. The NEC regulates almost all electricity market arrangements including power system security and reliability standards;
 - b. system planning, and maintains overall responsibility for power system security and reliability; and
 - c. NECA has appointed a Reliability Panel whose role is to determine (upon advice from National Electricity Market Management Company (Australia)(NEMMCO)) the security and reliability standards that are to be used under power system planning and power system operation.
426. Transmission service levels within the Australian model are effectively governed at several levels. In particular:

Figure 1: National Electricity Market - Australia Regulatory Structure



⁵⁵ Note that NECA will be abolished shortly and its functions transferred to the Australian Competition and Consumer Commission (ACCC).

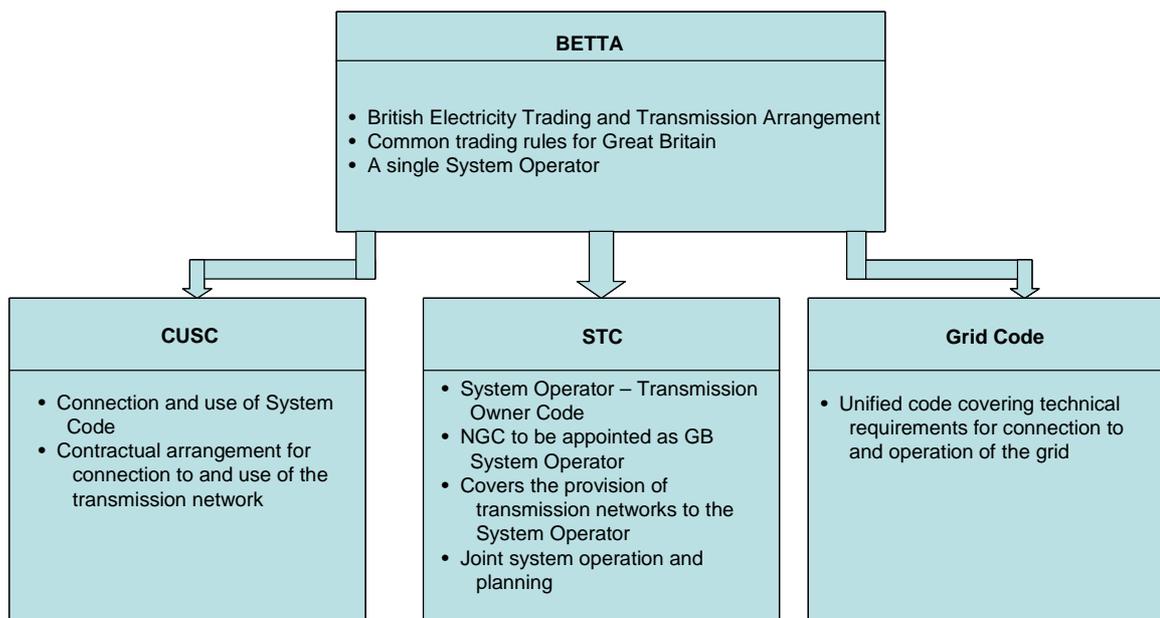
427. Transmission service levels within the Australian model are effectively governed at several levels. In particular:
- a. The NEC specifies system standards, network performance requirements, connection requirements, network planning arrangements, and quality of supply requirements,⁵⁶
 - b. The Reliability Panel determines specific target reliability levels covering levels of Expected Unserved Energy (EUE) and reserve capacity margins to be held within each state; and
 - c. The Australian Competition and Consumer Commission (ACCC) publishes the Regulatory Test for transmission investment and sets transmission service standard guidelines as performance incentives within the transmission revenue cap process.
428. The NEC specifies that NEMMCO is required to operate the power system in a “secure operating state” that effectively means that the system must be operated to survive a range of credible contingencies. Thus, the power system is operated according to criteria that are set out in regulations.
429. The ACCC regulates transmission companies pursuant to Chapter 6 of the NEC and has set performance measures covering circuit availability, outage duration, and outage frequency. It uses these measures to underpin a performance incentive scheme as part of the process of capping the revenues of the network service providers. Thus, the network service providers are incentivised to achieve reliability levels within their own networks, through direct regulation.
430. The ACCC has also recognised that these performance measures do not capture all aspects of the transmission service and, in particular, has identified that the impact of transmission network performance on the wholesale electricity market may not be adequately covered. Accordingly, the ACCC is considering a transmission service standard based on market impacts.
431. The key difference from the proposed New Zealand situation, is that there does not appear to be a role for contracts between the network service providers and designated transmission customers to specify transmission service or reliability levels. Operating and planning reliability standards are effectively set out in the NEC, and transmission service levels are set out, and incentivised, through regulation, rather than enforced through contracts.

⁵⁶ The latter are specified in the form of standards for voltage ranges, harmonics, flicker and unbalance.

The UK approach

432. The UK electricity market is regulated by the Office of Gas and Electricity Markets (Ofgem) according to a comprehensive set of rules and regulations set out in various codes. Ofgem is implementing a new electricity market structure described as the British Electricity Trading and Transmission Arrangements (BETTA), following the passage of legislation in 2004. The BETTA arrangements were intended to be in place by April 2005.
433. The objective of BETTA is to introduce a common set of trading rules so that electricity can be traded freely across Great Britain (England, Wales and Scotland). The proposed structure of regulation is outlined in Figure 2 with particular reference to the arrangements governing the transmission networks.

Figure 2: UK Electricity Market Regulatory Structure



434. The key points to note about Figure 2 are that the system operation is governed by the System operator – Transmission owner Code (Britain) (STC), connection requirements are set out in the Grid Code and the Connection and Use of System Code (CUSC), and the bilateral contracting arrangements currently in place in Scotland will be replaced by the CUSC, which already applies in England and Wales.

435. In preparation for the move to a unified British market, Ofgem has produced a document outlining the planning and operating standards to apply to the wider British market under BETTA⁵⁷. This document sets out:
- a. A set of minimum requirements for the design of generator and customer connections and the Main Interconnected Transmission System (MITS);
 - b. A set of operating standards for the Great Britain transmission system; and
 - c. Voltage limits for all parts of the Great Britain transmission system.
436. The essence of these arrangements is that the transmission system is to be planned and operated according to criteria that provide certain reliability and quality levels and that these arrangements are set out in regulation.
437. Ofgem has also announced proposals⁵⁸ for incentives on the network providers to operate and maintain reliability levels. The proposals are a form of incentive regulation that reward and penalise National Grid Company (NGC) in accordance with its annual performance against target levels of un-served energy.

Discussion

438. The Australian and British approaches to transmission services contrast with the New Zealand approach principally because they both encourage performance by the transmission owner/operator through incentive regulation, rather than through contracts.
439. Transmission service standards are set out, in both cases, in the various codes, and the standards are set for both grid planning and grid operations.

⁵⁷ Planning and operating standards under BETTA; an OFGEM/DTI conclusion document; volume 2; September 2004

⁵⁸ Electricity transmission network reliability incentive schemes – Initial Proposals; OFGEM; 15 October 2004

Appendix 3: Detailed Evaluation of the Options

Interpretation of key evaluation criteria

Criterion (a): achieve standards of power quality and grid reliability required by grid users

440. Criterion (a) requires that the approach to determining services should as far as possible achieve standards of power quality and grid reliability required by grid users.
441. Power quality refers to deviations in frequency and voltage, and also other factors such as waveform patterns, flicker, and so on (see section 5.2). Grid reliability refers to the probability that grid outages cause involuntary load shedding or involuntary use of system protection schemes. Both power quality and grid reliability standards are specifications of service levels.

Criterion (b): incentives for innovation and cost minimisation

442. Criterion (b) requires that the approach to determining transmission services should provide appropriate incentives for Transpower to continuously improve its services and produce them at least cost.

Criterion (c): efficient investment in transmission assets

443. Criterion (c) requires that the approach to determining transmission services should promote efficient investment in interconnection assets.

An aside on investment efficiency

444. A key requirement for achieving efficient investment in any industry is that the parties making the investment decision bear the economic consequences of the decision. In this situation the decision-maker faces appropriate incentives to judge the right timing and type of investment.
445. In most situations firms are paid on the basis of the services they deliver to customers, and they supply services to multiple customers. In these cases they face appropriate incentives to make efficient investment decisions if they are serving a competitive market, or if prices are set in ways that reflect competitive market pricing outcomes.
446. The optimal “location” of investment decision-making is more difficult to determine when firms are not paid purely on the basis of their service delivery, or when they have a long-term contractual relationship with a client(s) because of relation-specific investments undertaken by both parties. In these cases investments are often decided via negotiation

between the firm and customers that will end up paying for the investment.⁵⁹

Interpretation of the criterion

- 447. Efficient investment in transmission assets occurs when the net economic benefit of the investment is positive and exceeds the net economic benefits of all other options including transmission alternatives (TAs).
- 448. Under current part F rules the Commission has final decision rights regarding grid investment, and uses the grid investment test to check that Transpower is proposing the most economically efficient outcomes for grid investment. The discussion in this appendix abstracts from current part F requirements, as consistency with current part F rules is considered further below.

Criterion (d): facilitate commercial arrangements

- 449. Criterion (d) requires that the approach to determining transmission services should facilitate commercial arrangements between Transpower and designated transmission customers.

Interpretation of the criterion

- 450. Commercial arrangements are interpreted to mean commercially derived outcomes, as opposed to regulated outcomes. For example, commercial arrangements could be implemented via the Rules rather than by contract, provided the outcomes reflect positions negotiated by grid users and Transpower.

Criteria (e) and (f): resolution of disputes

- 451. Criterion (e) requires that the approach to determining transmission services should provide efficient and effective processes for resolving disputes during the negotiation of commercial arrangements between Transpower and its transmission customers.
- 452. Criterion (e) refers to disputes occurring during the negotiation of commercial arrangements between Transpower and grid users. It does not refer to disputes regarding Transpower's performance, or any other matters that occur once a commercial agreement is in place. In other words, criterion (e) relates to the 'hold out' problem discussed in section 3.3. Criterion (f) requires the same outcomes in regard to the performance of contracted terms.

⁵⁹ Long-term contracts covering relation-specific investments typically specify price adjustment formula, or governance arrangements for revising prices, over time. These arrangements typically limit profit levels and (in return) allow for pass-through of some costs to the firms' clients.

Interpretation of the criterion

453. An efficient process for resolving disputes is one that:
- a. Optimally trades-off the cost of resolving disputes against the benefits of achieving the right outcome. Efficiency, in this context, requires trading-off accuracy against time or cost; and
 - b. Provides parties with appropriate incentives to trade-off the cost of external dispute resolution against the cost of continuing to try to resolve their own disputes. This can be achieved by assigning the costs of external dispute resolution to the negotiating parties.
454. An effective process for resolving disputes is one that achieves outcomes quickly and gains 'buy in' so that the parties do not seek to re-litigate the dispute through other avenues, such as by seeking changes to the Rules or lobbying for wider policy intervention.

Other criteria

455. The other criteria are self-explanatory.

Evaluation of options for connection service definitions and measures

Criterion (a): achieve standards of power quality and grid reliability required by grid users

Power quality

456. Both options B1 and B2 can be consistent with power quality levels required by grid users. The main difference is that different parties are responsible for ensuring local quality levels are achieved.
457. For example, under the 'meet demand' approach (option B2) it is the responsibility of the grid owner to enhance connection assets to meet rising demand and achieve the quality levels agreed with connected parties. If customer's required quality levels change over time then they will have to renegotiate them with the grid owner.
458. In contrast, under the asset availability approach (option B1) grid users will need to negotiate with the grid owner to enhance their connection assets to maintain local quality at their required level. If their required quality level increased (decreased) then investment negotiations would be brought forward (delayed).
459. On balance, the 'meet demand' approach (option B2) is likely to marginally better achieve power quality levels because B2 incorporates local security and local quality standards directly in transmission agreements, whereas B1 relies on connected parties taking explicit action to achieve required quality levels as local demand levels change. Options B1 and B2 are neutral with respect to system-wide power quality because

system-wide power quality is determined by the actions of the system operator.

Grid reliability

460. Both options B1 and B2 should be consistent with grid reliability standards determined by the Commission.

Conclusion

461. In regard to criterion (a), the 'meet demand' approach (option B2) appears to be marginally better than the asset availability approach (option B1).

Criterion (b): incentives for innovation and cost minimisation

462. Incentives for innovation and cost minimisation derive primarily from the monitoring and enforcement of connection services, the price control regime applied to Transpower in regard to those services, and whether explicit performance incentives are adopted or not. Nevertheless, the choice of service definitions and measures may affect innovation and cost incentives if Transpower can control outcomes more easily under one approach than the other, or if one option provides greater competitive tension than the other.

The asset availability approach

463. Under the asset availability approach (option B1) Transpower will need to negotiate with connection customers whenever capacity expansion is required to meet load growth at each point of service. The prospect of customers choosing alternative options places competitive pressure on Transpower to innovate and minimise costs in the provision of connection assets. Moreover, Transpower exercises considerable control over specified connection assets.

The 'meet demand' approach

464. Essentially the same negotiation process occurs under the 'meet demand' approach (option B2). Transpower service measures are specified in terms of meeting load growth at agreed local security and local quality levels, so in theory Transpower would not negotiate with connection customers when capacity expansion is required. In practice Transpower is likely to discuss investment needs with connection customers before making investment decisions. This would give customers the option to investigate transmission alternatives and/or redefine service levels.

Conclusion

465. The asset availability and 'meet demand' approaches (options B1 and B2) appear to provide the same incentives for Transpower to innovate and to minimise costs, because Transpower will face essentially the same negotiation requirements under both options. In practice, decisions about performance incentives and the monitoring regime may overshadow any effects arising from the choice between options B1 and B2.

Criterion (c): efficient investment in transmission assets

Comparison of options

466. The analysis for this criterion is similar to the analysis for criterion (b). Under the asset availability approach (option B1) connection parties are responsible for deciding, with Transpower, when, where, what, and how much investment should occur, whereas under the 'meet demand' approach (option B2) Transpower makes those decisions in consultation with connection customers.
467. On one hand the 'meet demand' approach (option B2) would probably achieve more efficient outcomes because final decision rights and responsibilities rest with a single party –Transpower – rather than spread among multiple connection customers. On the other hand, few connection assets are shared amongst parties, and connection parties have better information and incentives with which to make connection investment decisions.
468. In contrast, the incentives on Transpower depend on the monitoring, enforcement, and performance incentive regime negotiated with Transpower. In practice it is likely to be difficult to accurately reflect the connection user's incentives via explicit performance incentives.

Conclusion

469. In practice, both options are likely to promote efficient investment in connection assets equally well.

Criterion (d): facilitate commercial arrangements

470. The choice of option B1 or B2 is not likely to materially influence the incentives for parties to negotiate commercial arrangements. The primary driver here will be the nature of the dispute resolution mechanism applied to the parties if they do not reach commercial agreements.

Criterion (e): resolution of negotiation disputes

471. This criterion is not relevant to the choice of options B1 and B2.

Criterion (f): resolution of performance disputes

472. In principle, performance disputes are likely to be resolved more efficiently and effectively the easier it is for a third party (e.g. an arbitrator) to verify performance has or has not occurred. As both the asset availability approach (option B1) and the 'meet demand' approach (option B2) have essentially the same service measures (and therefore service levels), it does not appear this criterion discriminates between options B1 and B2.

Criterion (g): minimise need for rule changes

473. Similar rule changes are required for options B1 and B2 in regard to connection assets. The grid investment test under the current part F rules relates primarily to interconnection assets rather than connection assets.

Criterion (h): minimise administration and compliance costs

474. Both options impose the same compliance costs. Transpower will need to forecast load growth and monitor redundancy levels under both options. Compliance costs for Transpower's customers will be the same under both options because lines companies will need to forecast their own load growth to plan their own asset developments regardless of how Transpower's services are specified.

Criterion (i): implementation timeframe

475. Both options are very similar and in practice would involve similar implementation timeframes.

Criterion (j): consistent with international experience

476. Internationally, transmission service measures tend to be defined in terms of loss of load, outage frequency, and voltage standards. This suggests a mixture between options B1 and B2.

Criterion (k): consistent with recent NZ experience and context

477. Both options are consistent with recent New Zealand experience and context regarding industry self-governance arrangements.

Overall conclusion

478. There is very little to choose between options B1 and B2. The 'meet demand' approach (option B2) scores marginally better in terms of local power quality requirements but B1 scores marginally better on incentives for innovation and cost efficiency.

Evaluation of options for determining interconnection services

Criterion (a): achieve standards of power quality and grid reliability required by grid users

479. Achieving standards of power quality and grid reliability required by grid users requires:
- a. That the standards required by grid users are included in transmission agreements;
 - b. Effective monitoring and enforcement of Transpower's performance against those standards; and
 - c. Perhaps explicit performance incentives to reinforce monitoring and enforcement activities.

The default contracts approach

480. The default contracts approach (option A1) allows for voluntary bilateral or multilateral negotiation with Transpower. If Transpower and its customers are unable to reach agreement on interconnection services then the

standards of power quality and grid reliability specified in benchmark agreements apply. It is likely these standards will reflect grid user views to some extent, as the Commission will consult interested parties in the process of finalising its benchmark agreements.

481. If Transpower and individual grid users wish to deviate from the service levels in the benchmark agreement or from the grid reliability standards then they can do so at any time, provided they satisfy the requirements of rule 5 of section II of part F of the Rules. The default contracts approach (option A1) should therefore achieve outcomes closely tailored to the interests of individual grid users, or groups of grid users, that are prepared to pay for higher levels of power quality or grid reliability for everyone.⁶⁰
482. In regard to effective monitoring and enforcement of Transpower's performance, the default contracts approach (option A1) is unlikely to satisfy criterion (a) for interconnection services if there is significant 'free riding' on monitoring and enforcement activities, as discussed in section 3.3.

The co-regulation approach

483. The co-regulation approach (option A2) mandates a multilateral decision framework within which grid users collectively negotiate with Transpower. If Transpower and its customers are unable to reach agreement on interconnection services both Transpower and grid users submit their negotiating positions to the arbitrator, who must choose one of the options. The chosen option applies to all grid users.
484. The co-regulation approach (option A2) has grid users closely involved in negotiating power quality and grid reliability levels with Transpower, via the multilateral body established by the Commission. This option should therefore achieve outcomes more closely aligned with the average requirements of grid users than is likely to be specified in the benchmark agreement. But option A2 does not provide for individual grid users, or groups of grid users, to deviate from the power quality and grid reliability levels achieved by the multilateral body.
485. In regard to effective monitoring and enforcement, the co-regulation approach (option A2) seeks to overcome any 'free riding' problems identified with the default contracts approach (option A1). It does this by requiring interconnection customers to contribute to a multilateral body charged with monitoring and enforcing performance against Transpower's contract. This should address weak incentives on lines companies and retailers identified by the Farrier Sweir in their report on contract structure and counterparties, as the costs of monitoring and enforcement activity will be shared by all grid users.

⁶⁰ The opposite does not apply. Where individual transmission customers or groups of transmission customers agree contracts with Transpower for lower levels of power quality or grid reliability than specified in default contracts, Transpower would still be obliged to provide other transmission customers the levels specified in their contracts.

The direct regulation approach

486. The direct regulation approach (option A3) is similar to the co-regulation approach (option A2) in that it specifies a single outcome in the Rules with respect to interconnection services. Under option A3 there is no negotiation between Transpower and its customers regarding interconnection services. Instead, the Commission unilaterally determines service definitions, measures, and levels after consulting Transpower and grid users.
487. As stated above, achieving standards of power quality and grid reliability also requires effective monitoring and enforcement of Transpower's performance. Under the direct regulation approach (option A3) the Commission directly monitors and enforces Transpower's performance.
488. Unlike grid users under the co-regulation approach (option A2), the Commission will not have financial incentives to monitor and enforce Transpower's performance. Nevertheless the Commission faces public policy incentives to do so if it is seen by the Government and stakeholders as ultimately responsible for the performance of the grid and overall system and market performance. Incorporating performance standards for interconnection services in the Rules would certainly add to these perceptions.
489. In practice policy incentives will be most acute for large under performance events, such as underperformance causing cascade grid failure or prolonged electricity shortages. Policy incentives are unlikely to be significant for day-to-day performance of the grid owner. An additional consideration with the direct regulation approach (option A3), however, is that the Commission could introduce regulated performance incentives on Transpower to achieve more balanced performance outcomes. If this occurs then option A3 should achieve outcomes comparable to the co-regulation approach (option A2).

Conclusion

490. On balance options A2 and A3 are more likely than the default contracts approach (option A1) to achieve standards of power quality and grid reliability required by grid users, as both options seek to overcome any 'free rider' problems that may occur with monitoring and enforcing performance with interconnection services. Given that the co-regulation approach (option A2) draws more directly on the views of grid users in specifying service levels than the direct regulation approach (option A3), option A2 is likely to satisfy criterion (a) better than option A3.

Criterion (b): incentives for innovation and cost minimisation

491. In most industries voluntary contracting is normally associated with high rates of innovation. The default contracts approach (option A1) should provide greater innovation than the other options despite the Rules constraining voluntary transmission agreements to be consistent in all

material respects with benchmark agreements and grid reliability standards.⁶¹

492. Effective monitoring and enforcement of Transpower's performance is also a key requirement for Transpower to have appropriate incentives to innovate and minimise costs. If there are likely to be significant 'free rider' problems with voluntary monitoring and enforcement of interconnection services then the default contracts approach (option A1) is unlikely to create strong incentives for innovation and cost minimisation.
493. The co-regulation and direct regulation approaches (options A2 and A3) are likely to provide stronger incentives because they provide more effective monitoring and enforcement of Transpower's performance, and the Commission can introduce performance incentives under the direct regulation approach (option A3) to achieve balanced incentives.

Criterion (c): efficient investment in transmission assets

Discussion of the options

494. The key issue for investment efficiency is the service definitions, measures, and levels agreed with Transpower, and the associated monitoring, enforcement, pricing, and incentive arrangements.
495. If the grid owner's services are defined as the conveyance of electricity from generators to consumers (option B3 in section 5.3), then it is Transpower's responsibility to invest in the grid when it is efficient to do so. In this case effective monitoring and enforcement of performance is necessary, and this is best achieved under options A2 and A3. As for criterion (b), if the direct regulation approach (option A3) includes performance incentives then it is likely to provide balanced incentives like the co-regulation approach (option A2). The process for determining interconnection services has only an indirect influence on the type of service definitions, measures, and levels chosen. All three options are capable of producing service measures and levels necessary to provide Transpower with appropriate incentives to invest in interconnection assets.
496. For example, it is likely that default transmission agreements will play a significant role under the default contracts approach (option A1). These agreements are likely to contain essentially the same provisions as the Rules specified in the direct regulation approach (option A3), as the Commission will develop both sets of provisions in consultation with interested parties. Option A3 opens up the prospect for incentive-based regulation, but contract-based performance incentives are also possible under options A1 and A2.

⁶¹ See rule 3.2.1 of section II of part F of the Rules. Exceptions apply in regard to variations in services from benchmark agreements and grid reliability standards provided the parties satisfy rule 5 of section II of part F of the Rules.

Conclusion

497. All three options are capable of producing service measures and levels necessary to provide Transpower with appropriate incentives to invest in interconnection assets. Options A2 and A3, however, are likely to provide more effective monitoring and enforcement of Transpower's performance, and the Commission can introduce performance incentives under option A3 to achieve balanced incentives.

Criterion (d): facilitate commercial arrangements

Comparison of options A2 and A3

498. Options A2 and A3 specify in the Rules the service definitions, measures, and levels for interconnection services. In effect these options supplant contractual arrangements between Transpower and its customers for interconnection services, but allow contractual solutions for connection services and for other terms and conditions.
499. In practice the co-regulation approach (option A2) involves interconnection customers collectively negotiating with Transpower over interconnection services, with either side able to appeal to the Commission for arbitration if they are unable to reach agreement. In contrast, the direct regulation approach (option A3) essentially removes all negotiation between Transpower and its customers. On this basis option A2 is more consistent than option A3 in regard to the aim of facilitating commercial arrangements between Transpower and its customers.

Comparison of options A1 and A2

500. The default contracts approach (option A1) is likely to better meet criterion (d) in regard to interconnection services, because it provides a flexible basis for grid users to decide which services are interconnection services, and the extent to which they are affect all grid users or a subset of them. In contrast, the co-regulation approach (option A2) pre-determines which services are interconnection services.
501. The co-regulation approach (option A2) involves significant regulatory oversight of the negotiation process, although the parties are left to derive their own negotiated outcome. On the other hand, commercial outcomes under the default contracts approach (option A1) are likely to be heavily influenced by the content of the benchmark agreements, particularly as rule 5 of section II of part F of the Rules constrains parties from deviating materially from benchmark agreements.

Specified outcomes versus unspecified outcomes

502. The choice of dispute resolution mechanism for negotiating connection services is likely to strongly affect the incentives on Transpower and grid users to reach their own commercial arrangements.
503. A key difference between options A1 and A2 is that the default contracts approach (option A1) specifies in advance the default outcome, whereas under the co-regulation approach (option A2) the specific implications of

the failure to reach agreement is not made clear to the negotiating parties, at least not until precedence develops from past rulings.

504. Leaving the default position unspecified, as in the co-regulation approach (option A2), means the parties cannot be sure of the support they will get from the Commission and therefore the negotiating parties will need to engage meaningfully with each other, and 'hammer out' an agreement that they 'can live with.' These influences are likely to be important because in practice there will be limited time for precedence to develop as connection customers are all negotiating with Transpower during approximately the same time period.
505. On the other hand, providing a clearly specified default position, as in the default contracts approach (option A1), would make it more credible for either party to threaten to invoke the default agreement. This would concentrate the minds of parties that pursue terms and conditions unfavourable to the other party relative to the benchmark agreements.

Conclusion

506. As interconnection services are common services, options A1 and A2 appear to be more consistent with the aim of facilitating commercial arrangements between Transpower and its customers.

On balance

507. On balance it would seem that the default contracts approach (option A1) is more likely to facilitate Transpower and its customers reaching commercial agreements on service definitions, service measures, and service levels. Both parties have strong incentives to adopt arrangements that make them better off than they would be under the benchmark agreement. If the benchmark agreement is not a costly option for the parties then the policy objective of encouraging parties to agree their own commercial arrangements is not particularly important.

Criterion (e): resolution of negotiation disputes

The default contracts approach

508. The default contracts approach (option A1) uses benchmark agreements, with common terms and conditions, to resolve disputes during the negotiation of commercial arrangements. Benchmark agreements will be developed by the Commission using its normal consultation processes.

The direct regulation approach

509. The direct regulation approach (option A3) involves the Commission directly specifying interconnection services in the Rules without formal negotiations between Transpower and its customers regarding these services. In that sense there is no process under option A3 for resolving disputes during the negotiation process.
510. In practice the process of formulating and proposing new rules and receiving submissions is a negotiation process, particularly if it is

conducted several times. The Commission intends to consider submissions very carefully, as it does for all proposed rule changes, and the decisions it makes as a result can be viewed as a form of dispute resolution between Transpower and its existing customers.⁶² This should provide an efficient and effective process for addressing negotiation disputes.

The co-regulation approach

511. The co-regulation approach (option A2) involves a multilateral body negotiating with Transpower, with recourse to arbitration on issues for which they are unable to reach agreement with Transpower.
512. As a representative group of interconnection customers, the multilateral body would need to canvass its member's views and derive a single view for negotiation with Transpower. In practice this approach would involve issuing position papers and receiving submissions, in much the same way the Commission would be doing under the direct regulation approach (option A3). Final decisions would probably be made by a vote of the members.

Efficient dispute resolution processes

513. An efficient process for resolving disputes is one that optimally trades-off the cost of resolving disputes against the benefits of achieving the right outcome. Efficiency, in this context, requires trading-off accuracy against time and cost.
514. There appears to be little difference between the options in regard to the accuracy and cost of resolving disputes.⁶³ The common service nature of interconnection services means the arbitration approach in the co-regulation approach (option A2) probably wouldn't yield more accurate dispute resolution outcomes than the submissions process in options A1 and A3.
515. Likewise, it seems unlikely that it would be more time-consuming for an arbitrator to resolve a single coherent dispute than for the Commission to resolve disputes through the submissions process under the direct regulation approach (option A3).

The use of a single multilateral body in the co-regulation approach (option A2) to negotiate with Transpower means that arbitration would be for disputes between Transpower and the multilateral body, rather than for multiple disputes with many customers, as would occur under the default contracts approach (option A1). Option A2 is therefore likely to be a more efficient approach than option A1 for resolving disputes, but of course

⁶² Certainly, to the extent that Transpower and its customers agree on proposed rules the Commission is unlikely to take a different approach.

⁶³ Note both of these points differ significantly from the analysis for connection services in section 6.2. In that case it was argued that arbitration would be more accurate but the benchmark approach would be less time-consuming and less costly as a result.

involves higher set up transaction costs (discussed under criterion (h) below).

Effective dispute resolution processes

516. An effective process for resolving disputes is one that achieves outcomes quickly and achieves outcomes that the parties 'buy into.' Collective decision-making under the co-regulation approach (option A2) could assist with gaining 'buy in' for the outcomes of dispute resolution processes, as customers would be deciding collectively whether to appeal for arbitration and on what grounds to appeal on.
517. On the other hand collective decision-making and explicit dispute resolution may merely bring to the fore differences in underlying interests that are difficult to resolve because of the common service nature of interconnection. The direct regulation approach (option A3) avoids these concerns by avoiding explicit dispute resolution and by replacing collective decision-making with central decision-making. The default contracts approach (option A1) also avoids collective decision-making, but allows for solutions to be tailored to individual circumstances. Even with interconnection services there may be significant variation in services across groups of grid users.⁶⁴

Conclusion

518. On balance options A2 and A3 appear to provide more efficient and effective processes for resolving disputes over the determination of existing interconnection services. The main factor supporting this conclusion is that under the default contracts approach (option A1) multiple dispute resolution processes would take place for what is essentially the same service. This is unnecessary and would require significant coordination to ensure consistency was achieved across all disputes.

Criterion (f): resolution of performance disputes

519. The co-regulation and direct regulation approaches (options A2 and A3) use the same dispute resolution processes (i.e. appeals to existing rule breach processes) for addressing performance disputes, and so this criterion does not discriminate between those options.
520. The default contracts approach (option A1) relies on the processes agreed in voluntary transmission agreements, or on mediation and arbitration processes specified in the default transmission agreements. It is not obvious that option A1 is superior to A2 or A3, although it can be said that the parties under option A1 have the freedom to 'contract out' of the default contracts if they believe other dispute resolution processes are superior. This suggests that A1 should be treated as marginally superior to A2 and A3 in regard to this criterion.

⁶⁴ For example, between grid users upstream and downstream of binding constraints.

Conclusion

521. On balance option A1 is probably marginally better than A2 and A3 in regard to resolution of performance disputes.

Criterion (g): minimise need for rule changes

522. The default contracts approach (option A1) does not require any rule changes other than a schedule incorporating the benchmark agreements.
523. The direct regulation approach (option A3) would also require significant new rules, but these would be largely limited to a schedule incorporating specific service definitions, service measures, and service levels in the Rules. Further rule changes would be required in the future to introduce regulated performance incentives if the Commission decided to adopt this approach.
524. The co-regulation approach (option A2) would require extensive changes to section II of part F of the Rules, as new rules would be needed to specify the objectives, purpose, functions, powers, and administrative processes of the multilateral body. As for the direct regulation approach (option A3), a new schedule would also be required to incorporate specific service definitions, service measures, and service levels in the Rules, and to provide for explicit performance incentives if the multilateral body decided to adopt this approach.

Conclusion

525. The default contracts approach (option A1) involves minimal substantive changes to the Rules, and is consistent with the intention of the current part F. Options A2 and A3 require more extensive rule changes and depart from the current part F framework.

Criterion (h): minimise administration and compliance costs

526. The co-regulation approach (option A2) is likely to involve significantly higher administration and compliance costs than options A1 and A3. Administration costs will be higher under option A2 because the Commission would need to establish the multilateral body, populate it with representatives from interconnection users, and oversee its progress. Higher administration costs also arise because collective decision-making by representatives in the multilateral body is likely to be slower and more in-depth than central decision-making by the Commission. Compliance costs will be greater because option A2 involves grid users more directly in ongoing decision-making processes.
527. The default contracts approach (option A1) is likely to involve lower administration costs than the direct regulation approach (option A3), but higher compliance costs. Administration costs will be lower because grid users would be responsible for maintaining transmission agreements with Transpower on an ongoing basis, but this means compliance costs for grid users are higher under option A1 than option A3. It is not clear which option is likely to have the lowest overall cost.

Conclusion

528. Options A1 and A3 minimise administration and compliance costs.

Criterion (i): implementation timeframe

529. The default contracts approach (option A1) would be the quickest to implement as it is provided for within current part F arrangements. The direct regulation approach (option A3) would take longer to implement if regulatory performance incentives were adopted. In the absence of explicit performance incentives, option A3 would take about the same time to implement as option A1 because new rules for interconnection services would be required anyway as clauses in the benchmark agreements.
530. The co-regulation approach (option A2) would take the longest time period to implement because considerable time would be required to establish a new multilateral body and considerable time would also be required for representatives to develop unified negotiating positions.

Conclusion

531. Options A1 and A3 can be implemented far more quickly than option A2.

Criterion (j): consistent with international experience

532. Internationally, interconnection service definitions and measures tend to be determined by regulatory bodies, with incentive-based regulation used to encourage performance. The direct regulation approach (option A3) is therefore more consistent with this criterion than options A1 and A2.

Criterion (k): consistent with recent NZ experience and context

533. This criterion refers to the recent failed attempt by the electricity industry to extend self-governance arrangements under the Electricity Governance Establishment Project (EGEP). The current part F arrangements reflect a new approach developed in response to those failures.
534. The default contracts approach (option A1) is obviously consistent with recent New Zealand experience and context, as it was developed in direct response to the EGEP failure. It is similar to the TWG approach (discussed in section 6 of this paper) in that transmission services were to be specified in bilateral contracts.
535. The co-regulation approach (option A2) also draws on the approach developed by the TWG, as the TWG envisaged service measures common to all nodes would be developed through a multilateral process, such as the successor to the MACQS process.⁶⁵ Multilateral processes (and voting) would also be used to negotiate new service levels for

⁶⁵ MACQS refers to the Multilateral Agreement on Common Quality Services.

services common to multiple nodes.⁶⁶ Nevertheless, the TWG did not intend these outcomes to be codified in rules or in a multilateral contract.

536. The direct regulation approach (option A3) reflects the current regulatory context, where part F provides for far greater regulatory determination of many aspects of transmission, including in particular grid investment, grid reliability standards, and transmission pricing.

Conclusion

537. Options A1 and A3 are more consistent with recent New Zealand experience and context, where industry self-governance is seen as a failure of multilateral decision processes.

Overall conclusion

538. Overall, the direct regulation approach (option A3) looks to be the better option because the other options score poorly on key criteria. For example, the default contracts approach (option A1) scores poorly in regard to power quality, grid reliability, innovation, cost minimisation, and investment in transmission assets. The co-regulation approach (option A2) scores poorly in terms of practicality (criteria f, g, and h), and consistency with recent New Zealand experience and context.

Evaluation of options for interconnection service definitions and measures

Criterion (a): achieve standards of power quality and grid reliability required by grid users

Power quality

539. The power quality required by grid users may differ from the primary performance obligations (PPOs) specified by the Commission and specified in part C of the Rules.
540. The conveyance approach (option B3) specifies power quality standards as a service measure for the grid owner, but options B1 and B2 do not. Nevertheless, under the asset availability approach (option B1) and B2 the Commission specifies power quality standards in part C of the Rules. If the conveyance approach (option B3) was adopted by the Commission and specified in benchmark agreements (under option A1) or in the Rules (under option A3), the Commission would simply adopt the power quality standards in part C. Hence, option B3 provides no advantage over B1 and B2 in regard to achieving power quality standards.
541. In practice, the 'A' options discussed in section 7.2 and appendix 3 are the primary drivers of whether power quality required by grid users is more likely to be achieved or not.

⁶⁶ Existing service levels were to be determined based on historical information and were not part of the multilateral decision-making process.

Grid reliability

542. The same arguments apply in regard to grid reliability. The standards of grid reliability required by grid users may differ from the GRS specified by the Commission, but if the conveyance approach (option B3) was adopted by the Commission and specified in benchmark agreements (under option A1) or in the Rules (under option A3), the Commission would simply adopt the GRS already specified in accordance with part F of the Rules. Hence, option B3 provides no advantage over B1 and B2 in regard to achieving grid reliability standards required by grid users.

Conclusion

543. Despite power quality and grid reliability being service measures in option B3 (but not in B1 and B2), adopting the conveyance approach (option B3) for the benchmark agreements or for the Rules under the direct regulation approach (option A3) does not assist in achieving power quality and grid reliability standards required by grid users. In practice, the 'A' options discussed in section 7.2 and appendix 3 are the primary factors to consider in regard to criterion (a).

Criterion (b): incentives for innovation and cost minimisation

544. These incentives derive primarily from the monitoring and enforcement of connection services, the price control regime applied to Transpower in regard to those services, and whether explicit performance incentives are adopted or not. Nevertheless, the choice of service definitions and measures may affect innovation and cost incentives if Transpower can control outcomes more easily under one approach than the other, or if one option provides greater competitive tension than the other.

The asset availability approach

545. Under the asset availability approach (option B1) Transpower will need to obtain the Commission's approval for grid expansion whenever they believe load growth justifies grid expansion. The Commission is required under part F to use the grid investment test to determine whether other options, including other transmission solutions and alternatives to transmission solutions, are likely to produce higher net economic benefits. This should place competitive pressure on Transpower to innovate and minimise costs in its grid upgrade proposals.

The 'meet demand' approach

546. In contrast, under the 'meet demand' approach (option B2) Transpower's service measures are specified in terms of meeting load growth. Under this approach the part F rules would be altered so that Transpower was not required to obtain the Commission's approval for grid investments. In this situation the incentives for Transpower to 'get it right' depend on the performance incentives specified in their transmission agreements (under option A1) or in the Rules (under options A2 and A3).

The conveyance approach

547. The conveyance approach (option B3) assigns the grid owner an even wider scope of responsibilities than the 'meet demand' approach (option B2). Nevertheless, Transpower as a whole is currently responsible for achieving overall system performance obligations (as System Operator), and so option B3 would not, in substance, change Transpower's responsibilities relative to option B2.

Conclusion

548. The asset availability approach (option B1) appears to achieve better incentives for innovation and cost minimisation than the 'meet demand' approach (option B2) because Transpower is required to obtain the Commission's approval for grid upgrades. The Commission provides this approval by applying the grid investment test, which allows alternative solutions to compete with Transpower's proposed solutions.
549. Although the conveyance approach (option B3) specifies a wider range of responsibilities for the grid owner, Transpower already faces these responsibilities as the System Operator, and therefore option B3 is the same as B2 in regard to this criterion.

Criterion (c): efficient investment in transmission assets

550. The analysis for this criterion is similar to the analysis for criterion (b). Under the asset availability approach (option B1) the Commission is responsible for deciding, with Transpower, when, where, what, and how much investment should occur, whereas under options B2 and B3 Transpower would make those decisions. Whether the latter options would achieve efficient outcomes depends largely on the nature of the performance incentives applying to Transpower.
551. In practice, the asset availability approach (option B1) appears most likely to promote efficient investment in interconnection assets because the grid investment test provides an open and transparent process for considering alternatives to Transpower's investment proposals (including alternative transmission solutions). If robust performance incentives were developed in the future, then it would make sense to revisit options B2 and B3.

Criterion (d): facilitate commercial arrangements

552. This criterion is not relevant for choosing between options B1, B2, or B3 as the primary driver here will be the nature of the dispute resolution mechanism applied to the parties if they do not reach commercial agreements.

Criterion (e): resolution of negotiation disputes

553. This criterion is not relevant to the choice of options B1, B2 or B3.

Criterion (f): resolution of performance disputes

554. In principle, performance disputes are likely to be resolved more efficiently and effectively the easier it is for a third party (e.g. an arbitrator) to verify performance has or has not occurred.
555. As both the asset availability approach (option B1) and the 'meet demand' approach (option B2) have essentially the same service measures (and therefore service levels), it does not appear this criterion discriminates between options B1 and B2.
556. In contrast, the conveyance approach (option B3) contains service measures relating to overall system performance. The presence of large and unpredictable external events, and significant interdependencies in regard to grid operation, would likely make it more difficult for a third party to determine the grid owners' performance, relative to options B1 and B2. This suggests option B3 is likely to reduce the efficiency and effectiveness of processes for resolving performance disputes.

Criterion (g): minimise need for rule changes

557. The asset availability approach (option B1) requires minimal changes to the Rules because it is consistent with the current regulatory framework underpinning part F of the Rules. In particular, the asset availability approach is consistent with the current approach to making grid investment decisions, setting grid reliability standards, and determining the transmission pricing methodology.
558. In contrast, options B2 and B3 would require extensive changes to part F of the Rules. New performance incentive provisions would need to be developed and included in the benchmark agreements or in the Rules, and provisions in part F relating to the Commission's role in preparing and determining grid planning assumptions, the statement of opportunities, and providing a centralised data set would need to be removed.
559. Adopting the conveyance approach (option B3) for interconnection services would require more significant changes. For example, part C provisions on power quality would need to be merged with part F, and the service provider contract with the System Operator would need to be disestablished as its provisions would be incorporated in benchmark agreements or in new part F rules.

Criterion (h): minimise administration and compliance costs

560. Initially, the asset availability and 'meet demand' approaches (options B1 and B2) impose the least administration costs on the Commission and the lowest compliance costs on Transpower and designated transmission customers. Significant one-off costs are likely in regard to the conveyance approach (option B3).
561. Both options B1 and B2 retain clear separation of roles between the Commission and Transpower, and between the grid owner and System Operator roles within Transpower. It would be relatively simple for the

Commission and grid users to monitor and enforce Transpower's performance in regard to service measures under these approaches.

562. The conveyance approach introduces a wider array of service measures, and also service measures over which the grid owner has less control than those in options B1 and B2. For example, the grid owner exercises little control over the availability of generation capacity and fuel or over demand fluctuations. It is likely that grid users under options A1 and A2 would incur substantially larger monitoring and enforcement costs than if option B1 or B2 was adopted.

Criterion (i): implementation timeframe

563. The asset availability approach (option B1) would be the quickest to implement, as it is consistent with current part F arrangements. The 'meet demand' approach (option B2) would take longer to implement because Transpower would need to set up new systems to meet service commitments under option B2. The conveyance approach (option B3) would take the longest to implement because extensive changes would be required to the Rules, service provider contracts, and perhaps to the internal organisation of Transpower.

Criterion (j): consistent with international experience

564. Internationally, transmission service measures tend to be defined in terms of loss of load, outage frequency, and voltage standards. This suggests a mixture between options B1 and B2.

Criterion (k): consistent with recent NZ experience and context

565. This criterion refers to the recent failed attempt by the electricity industry to extend self-governance arrangements under the Electricity Governance Establishment Project (EGEP). The current part F arrangements reflect a more regulatory approach developed in response to those failures.
566. This criterion is not relevant to the choice of options B1, B2 or B3 because each can be implemented within a regulatory environment, with minimal self-governance arrangements.

Overall conclusion

567. The asset availability approach (option B1) scores significantly better than options B2 and B3, primarily because it retains competitive pressure on Transpower to justify its grid expansion proposals. The asset availability approach also appears to be a more practical solution than options B2 or B3.

Appendix 4: Format for Submissions

1) Submission Summary Table – OPTIONS FOR DETERMINING TRANSMISSION SERVICES

Question No.	Comment	Proposed amendment
<i>Q1</i>	<i>Question1 does not....</i>	<i>We think that instead you should take the following approach</i>

Appendix 5: List of Submission Questions

- Q1. What difficulties are you experiencing, or have experienced in the past, with enforcing transmission service performance? What problems have these difficulties caused your business? Please provide examples or evidence of current and historical events to illustrate your case.
- Q2. Does the paper adequately describe key issues relevant to determining transmission service definitions and measures? Are there other features of transmission relevant to determining transmission service definitions and measures? What are they?
- Q3. Do you believe 'free rider' problems are likely to be significant among grid users in regard to monitoring and enforcing transmission services? Please provide examples or evidence of current and historical events to support your view.
- Q4. Are there other options the Commission should consider, and if so, what are they and why should they be considered?
- Q5. Has the Commission adopted appropriate evaluation criteria? What criteria should be omitted or added?
- Q6. Do you agree with the Commission's evaluation of the options for connection services, and if not, why not? Please refer to the evaluation in section 6 and appendix 3 when answering this question.
- Q7: Do you agree with the Commission's evaluation of the options for interconnection services, and if not, why not? Please refer to the evaluation in section 7 and appendix 3 when answering this question.