Anti-competitive effects of Transpower's pricing for the HVDC link

Meridian Energy

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1. Executive summary

1. The Electricity Governance Board is seeking authorisation of its proposed electricity market arrangements from the New Zealand's Commerce Commission. At the request of Meridian Energy, Frontier Economics has analysed the pricing elements of those proposed market arrangements as they relate to transmission. As a result, we have concluded that the transmission pricing components have the potential to cause anti-competitive outcomes in the electricity industry, and specifically within the generation sector.

2. The operations of the wholesale electricity market are governed by a set of highly complex industry rules and structures designed to support those markets. The detail of these rules and structures will impact significantly on the nature of the competition that results in the electricity industry. Seemingly small factors have the potential to distort outcomes in unforeseen ways and may significantly undermine the benefits of competition. Accordingly, Frontier sees it as important that the Commerce Commission fully consider the details of the pricing arrangements proposed. Without doing this, it cannot be sure that competition within the electricity sector will be promoted.

3. As a result of our review of the proposed transmission pricing rules, we have concluded that the approach Transpower is proposing to recoup the cost of its new investment will harm competition. Transpower has proposed a set of pricing principles to guide the establishment of its charging regime. Its proposed pricing principle for recovering the costs of new transmission investment is: "the full cost of new investments must be allocated to expected beneficiaries".

4. The only competition policy argument that can sensibly be made for pricing new investment costs separately from Transpower's existing fixed and sunk costs is to provide 'locational pricing signals'. The purpose of these signals would be to guide the choice of Transpower's generation and load customers on the location to establish their new physical infrastructure, such as a new generation plant.

5. However, locational pricing signals are only justified if new generation customers have the right to require Transpower to provide sufficient transmission capacity for them to inject at full capacity. In other words, if they can force Transpower to incur additional new investment costs.

6. This is not the case. Under its governance arrangements Transpower has the right to leave such new generation "stranded" if it considers that a more cost effective option exists for providing increased power to its load customers. As generators and load customers cannot force additional costs on Transpower by

their decisions on where to locate new infrastructure, locational pricing signals are not warranted.

7. If, notwithstanding this, Transpower decides to adopt locational pricing signals, it should amend the new investment pricing principle it has proposed in order to take account of the fact that in general effective locational prices should:

- reflect forward-looking long-run marginal costs, rather than the revenue requirement of the existing assets; and

- be levied on those entities responsible for causing the increased new investment costs, not the beneficiaries of new investment.

8. A comparison of Transpower's current charging regime for the HVDC link against a revised new investment pricing principle that reflected these factors suggests that the existing charge is likely to be harming competition outcomes in the electricity sector. The current HVDC charge would be providing incorrect locational pricing signals to Transpower's customers even if those responsible for new investment costs could be determined, given that:

- the charge is based on the revenue requirements of the existing assets, not the long run marginal cost of augmenting capacity on the link at some stage in the future;

- Transpower has indicated that it is unlikely to increase capacity on the link in the foreseeable future (hence there are no future costs to signal);

- the HVDC link is the only transmission asset owned by Transpower that is subject to a locational pricing signal; and

- the locational pricing signal for the link is only levied on generators, not load customers.

9. As a result, the current HVDC charge is likely to be distorting investment decisions and harming competition. The charge will be encouraging investment – in both generation and load – in the wrong locations, thereby increasing the overall cost of supplying electricity to end-users.

2. Introduction

10. Frontier Economics has been asked by Meridian Energy to provide an assessment of the possible anti-competitive effects of Transpower's charging regime for the High Voltage Direct Current (HVDC) link between the North and South Islands.

11. The charging regime is not new. It has been in place for some time and Meridian has already expressed concerns about its effects. However, the Electricity Governance Board (Ltd) is currently in the process of seeking authorisation of its draft Rulebook by the Commerce Commission. Given that this Rulebook has direct implications for the charging regime for the HVDC, Meridian considers it important to raise its concerns with the Commission on the anti-competitive effects of that regime.

3. Importance of market rules and structures

12. Markets provide an extremely effective way of linking buyers and sellers. They coordinate the actions of a potentially vast numbers of disparate people and organisations. Moreover, they generally do so in a way that leads to the most efficient use of the resources of the parties involved, and therefore maximises the aggregate welfare of the market participants.

13. Markets also provide valuable information. They reveal the lowest cost ways of producing different goods, as well as what those costs of production actually are.

14. As a result, there has been a tendency over recent decades for governments to use market-based solutions. Traditionally this has involved governments privatising assets and/or relinquishing control over outcomes through deregulation. More recently, it has also involved governments using markets in conjunction with active ongoing policy and regulatory involvement, such the creation of markets for tradable greenhouse gas emission rights.

15. However, in parallel with this increased use of markets, there has been growing recognition of the fact that their application does not always produce the expected or desired results. To an extent, this can be seen as due to limits on the applicability of market-based solutions. However, increasingly there is an acceptance that it frequently also can reflect weaknesses in the underlying rules and structures put in place to support market operations. In other words, there is increasingly clear evidence that markets only work well if they are supported by an appropriate set of rules and institutions. Without them, perverse outcomes can and frequently do occur.

16. Many of the conditions needed to make markets work well are so fundamental to the operation of modern Western economies that we almost take them for granted. Some examples include:

- the need for a well-designed and operated competition law and policy framework, and a high-quality legislative framework more generally;
- clear definition and enforcement of property and contract rights;
- well-established and liquid capital markets; and
- appropriate governance arrangements for government owned or controlled bodies.

17. But while crucially important, there is growing evidence that provision of these economy-wide conditions may not always be sufficient to ensure the proper functioning of markets. Additional industry-specific rules and institutions are frequently also required.

18. The electricity industry is a very good example of this. The complexity and sheer volume of the rules currently being proposed by the Electricity Governance Board reflects the fact that New Zealand's general legislative and regulatory environment is not sufficient to ensure that the wholesale electricity market will work adequately. Some of the key additional requirements include:

- a well-designed bidding process, including:
  - the form that generator bids take
  - whether bids are allowed to be resubmitted
  - whether, and if so when, bid information is made public ; and
- appropriate roles, responsibilities and governance arrangements for those central organisations that are subject to governmental rather than market controls, especially Transpower.

19. Experience internationally and within New Zealand strongly suggests that in sectors such as electricity, positive competitive outcomes will not occur if these additional market-specific conditions are not met.

20. The shortcomings witnessed in California's electricity sector over the last 12-18 months provide a good example of this. In a situation that was very similar

to that of New Zealand, prior to deregulation California's electricity system was centrally controlled. Decisions ranging from generation to retail were made inside each vertically integrated electric utility.

21. Of course, deregulation eliminated the central control by imposing a market between the generation and retailing functions. This was deliberate, and with good reason: it made it possible to promote competition between generators, and between the retail companies. However, it now seems clear that insufficient attention was given to the design of the controls that were to take the place of those previously used by the regulated, vertically integrated utilities.

22. Under the Californian regime, while the wholesale prices that the utilities bought power at was set by the market, the retail price utilities could charge their customers remained set by the regulator. Accordingly, when the wholesale price increased significantly, retailers had no ability to encourage customers to undertake measures to conserve power. Nor did they have any ability to raise prices to offset the increased costs they faced as a result of higher wholesale prices.

23. Furthermore, long-term supply contracts between generators and retailers were prohibited - power could only be bought in the spot market. Accordingly, retailers were also unable to smooth the volatility of day-to-day wholesale prices and reduce their planning uncertainty.

24. As a result, many of the benefits one would normally expect to accrue from competition could not occur. There was no demand-side response from consumers, and generators gained significant market power at periods of peak demand. The information provided by the market was also less useful. As wholesale prices far exceeded marginal production costs they provided limited information on the supply side. And because retail prices were fixed, they gave no information about the demand-side.

25. We do not claim that these two factors alone were responsible for the problems recently experienced in the Californian electricity market. However, there seems little doubt from the evidence emerging from the USA that they were an important component.

26. Our purpose in raising these issues is simple. They provide a clear demonstration of the fact that market design matters. And not just the high-level design: the fine details of how it is done matter. If these design issues are not handled correctly, competition and net national welfare will suffer.

27. Accordingly, we see the detailed aspects of the market operation rules being proposed by the EGB as being of fundamental importance to the effectiveness of competition in the New Zealand electricity sector. They should

certainly be seen as relevant to the Commerce Commission in its effort to ensure that competition in the electricity sector is promoted.

4. Overview of Transpower's charging regime for the HVDC

28. Transpower currently levies four different types of charge:

- *Connection charges*: These charges cover the revenue requirement associated with the cost of connecting a customer - either generation or distribution and direct connection (load) - to the core grid assets. They include the cost of spur lines and substations. They are calculated on the basis of the assets customers use, with shared assets split according to peak offtake and/or injection.

- *Interconnection charge*: The interconnection charges recover the cost of all other components of the AC grid. The charge is levied only on load customers - generators do not contribute. It is calculated monthly on the basis of maximum demand.

- *HVDC charge:* The HVDC charge recovers the revenue requirement associated with the interisland link. As it is the key concern of this paper it is discussed in more detail below.

- *Adjustment charge:* The three charges discussed are calculated at the start of each year on the basis of estimated revenue requirements. Once actual revenue requirements for a year have been confirmed, any adjustments required are made through this adjustment charge.

29. Returning to the HVDC charge, according to Transpower's most recent Pricing methodology document that will apply from April 2002[1]:

> *"The purpose of the HVDC charge is to recover Transpower's revenue requirement to meet the cost of making available the assets used to provide the inter-island link between Benmore in the South Island and Haywards in the North Island."* (p.12)

30. The HVDC charge is calculated by first deriving a HVDC rate, which is obtained by dividing the HVDC revenue requirement by the maximum injection of South Island generators for a historical period (once the new methodology

[1] "Pricing for Grid Connection Services"

comes into effect in April, this will be from 1 September 2000 to 31 August 2001). The rate is then applied to the maximum injection by South Island generators over the period from the start of the measurement period (1 September 2000) to the present month and divided by twelve. Therefore, whilst Meridian's HVDC monthly charge would generally be fixed, if Meridian injects an amount that exceeds any injection since the start of the measurement period, it would be required to pay a higher charge for that month.

31. The HVDC revenue requirement is made up of operating and maintenance costs, overheads and capital return and recovery costs - which comprise by far the largest component.

5. Transmission pricing principles

32. Transpower has already proposed a set of pricing principles[2] to guide it in setting its specific transmission charges in the future. These principles are important in that they will shape the overall approach Transpower takes to transmission pricing.

33. The principles are based around the following categories of costs Transpower faces in providing its services:

- sunk costs;
- fixed costs;
- variable costs; and
- new investment costs

34. New investment costs are defined as those that are avoidable by not proceeding with an investment, but which will become sunk or fixed once a new investment is committed to.

[2] See "Confirmed Pricing Methodology – Draft Design Principles", dated 25 January 2002

35. Rather than developing an entirely new set of pricing principles, we start with Transpower's proposed set and highlight any weaknesses that exist. In this way, we hope to maintain as common a framework as possible with Transpower for assessing these issues. Transpower's proposed pricing principles are:

Mandatory Criteria

- *Integrated approach to transmission pricing:* The pricing signals for sunk, fixed and variable costs, grid use and new investment must be as consistent as possible

- *Marginal cost pricing*: Variable costs should be charged to the causer

- *New investments charged to beneficiaries*: Full cost of new investments must be allocated to expected beneficiaries

- *Transmission charges must preclude cross-subsidies*: Transmission charges for the sunk, fixed, variable and new investment costs of providing a service must not be less than the incremental cost, nor more than the stand-alone cost, of providing that service through a transmission solution.

- *Economic value:* Transmission charges for the recovery of sunk and fixed costs must not exceed the economic value of the service

Maximising Criteria

- *Fixed costs should be recovered through fixed charges which are unavoidable in the short term*: Fixed costs should be recovered through fixed charges which are, as far as possible, unavoidable in the short term

- *Sunk and fixed costs allocated*: The transmission pricing methodology for the recovery of sunk and fixed costs of transmission is an allocation

- *Least-distortionary sunk and fixed cost allocation:* Sunk and fixed costs should be allocated in a way that minimises distortions to production/consumption and investment decisions made by grid users

- *Sunk costs should be recovered through fixed and unavoidable charges*: Sunk costs should be recovered through charges which are, as far as possible, fixed and unavoidable

- *Resolve conflicts consistently with energy policy*: Where any principles conflict, those conflicts should be resolved in a manner that is most consistent with

the delivery of electricity in an efficient, fair, reliable and environmentally sustainable manner to all classes of consumer

36. With the exception of the principle relating to new investment, we consider these pricing principles to be a sensible starting point for the design of specific charging regimes. We therefore focus solely on the appropriate approach to charging for Transpower's new investment costs in the remainder of this section.

5.1. Efficient pricing of new investment

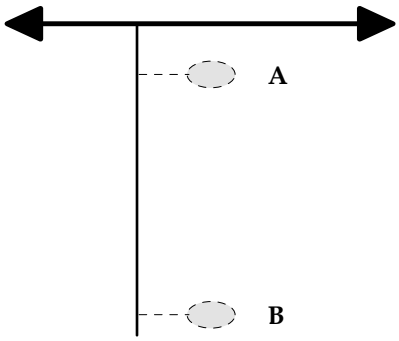
37. From a competition policy perspective the objective of any new investment charges levied by Transpower should be to encourage the development of new generation or load infrastructure:

- at the optimal time; and
- in the least-cost location (when taking all costs, from generation and transmission through to retail, into account).

38. Incentives for optimal timing of new investment in generation or load infrastructure are already provided through the operation of the wholesale spot market. Those prices reflect the overall balance of supply and demand. When they are sufficiently high, new investment in generation capacity or demand-side management measures will be undertaken by market participants voluntarily.

39. However, the story is more complex with regard to encouraging the least-cost location of new generation or load infrastructure. To see why, it is useful to consider a hypothetical example. In Figure 1 below, a generator has the choice of locating either at A or at B in the transmission network. Fuel costs are cheaper at B, but the cost of augmenting the capacity of the transmission network more than makes up for this advantage. Conversely, fuel is more expensive at A, but only limited transmission network augmentation is required. In fact, if the generator were to optimise over both parameters (generation and transmission costs) it would locate at A. An 'ideal' charge or transmission investment regime would therefore aim to ensure that the generator takes into account the higher future network costs at B and locates at A.

Figure 1. Generator location decision



40. This example highlights that in order to be effective, charges aimed at encouraging the optimal location of new generation or load infrastructure have to accurately reflect the costs that Transpower's customers impose on the network. This needs to be measured in terms of how those customers' actions affect network transfer capabilities and investment plans.

41. It should be stressed that there is no competition policy or general economic efficiency argument for pricing new investment differently from existing sunk and fixed costs other than attempting to provide such "locational signals".

42. However, the pricing principle proposed by Transpower in relation to new investment – that the "*full cost of new investments must be allocated to expected beneficiaries"* – is not consistent with the provision of appropriate locational signals. Accordingly, in order to promote competition Transpower needs to either charge for new investment on the same basis that it charges for existing fixed and sunk costs, or amend its new investment principle.

43. On balance we consider it is not desirable to retain a separate pricing principle for new investment. The arguments for this are set out in the next section which assesses the existing HVDC charge. However, if Transpower does choose to retain a new investment pricing principle, that principle should:

- reflect forward-looking long-run marginal costs, rather than the revenue requirement of the existing assets; and
- be levied on those entities responsible for causing the increased new investment costs, not the beneficiaries of new investment.

6. Assessment of Transpower's existing HVDC charge

44. Transpower's existing charge for the HVDC is inconsistent with an appropriate 'new investment' pricing principle that relates to forward-looking long run marginal cost, and applies to the parties whose actions are responsible for the increased new investment costs. (In fact, it is also inconsistent with Transpower's original proposal for the new investment pricing principle. However, we do not discuss that issue here as we consider the principle to be inappropriate).

45. We discuss these inconsistencies below in two broad categories: conceptual issues, and implementation-related issues.

6.1. Conceptual issues

46. As discussed above, in general terms it is desirable for Transpower to levy new investment charges on its customers - both generation and load - to reflect the impact of their activities on its long run marginal costs.

47. However, such charges are only appropriate if the actions of its customers will have the effect of *imposing* costs on Transpower. In other words, a new investment charge is only appropriate if a real externality exists. This is not the case for Transpower given the process it follows to make new investment decisions. Transpower currently bases its investment decisions on a series of "key drivers". The key drivers are to:

- develop and price the grid for industry efficiency and value;
- continuously improve the efficiency of transmission services by making the services contestable wherever possible and producing them at least cost; and
- provide services at the quality and quantity that are demanded through a process of agreement with the customers of those services.

48. The question, therefore, is whether under its governance arrangements and these key drivers, Transpower is forced to augment transmission capacity when faced by decisions by generator or load customers to build new infrastructure in high-cost locations from a transmission perspective.

49. At least under Transpower's existing arrangements, the answer is no. Consider again the situation described in Figure 1 where a generator had two

options for locating new capacity. One involved low fuel costs, but higher transmission costs – location B. The other involved higher fuel costs, but considerably lower transmission costs and was more cost-effective overall – location A. Purely for the purposes of exposition, let us work on the assumption that location B is in the South Island, and location A in the North Island.

50. The discussion of this situation in the previous section implicitly assumed that if the generator chose to locate at B, in the South Island that the transmission operator had no choice but to augment transmission capacity in order to ensure that the new plant's full capacity could be transported to load customers. In other words, if the location of additional generation plant in the South Island caused the HVDC linked to frequently become constrained, Transpower would have no choice but to increase capacity of the link across Cook Strait.

51. But in fact this is not the case. Under its governance arrangements Transpower has the right to leave such new generation "stranded" if it considers that a more cost effective option exists for providing increased power to its load customers. Generators and load customers cannot force additional costs on Transpower by their decisions on where to locate new infrastructure. Transpower can always choose not to augment its transmission capacity unless the specific customers involved are willing to share some or all of the costs involved. Turning again to the specific situation of the construction of additional generation capacity in the South Island, Transpower has the right to leave capacity of the HVDC linked at current levels (or indeed reduce it) if it considers that doing so is the most cost-effective solution.

52. Given this, there is no reason to place locational pricing signals on South Island generators through the specific HVDC charge.

6.2. Detailed implementation-related issues

53. Even if generators were able to impose new investment costs on Transpower, the current HVDC charge would be inconsistent with the objective of providing appropriate locational signals as:

- the charge is based on the revenue requirements of the existing assets, not the long run marginal cost of augmenting capacity on the link at some stage in the future;
- Transpower has indicated that it is unlikely to increase capacity on the link in the foreseeable future (hence there may be no future costs to signal);
- the HVDC link is the only transmission asset owned by Transpower that is subject to a locational pricing signal; and

- the locational pricing signal for the link is only levied on new generators, not load customers.

Each of these issues is discussed further below.

6.2.1. Backward looking basis

54. Transpower's existing HVDC charge is "intended to recover that part of Transpower's revenue requirements associated with the annual cost of the inter-island link ..."[3]. In other words, the charges are "backward looking" as they reflect the costs of Transpower's existing assets not future ones.

55. This is clearly inconsistent with the objective of providing locational pricing signals to new generation or load customers. As discussed above, such a pricing signal would need to reflect the future, or forward-looking, costs that Transpower is likely to incur as a result of its customer's actions.

56. There can therefore be no doubt that the signal being sent by Transpower to South Island generators is wrong, in that it is almost certainly too high or too low. On balance, it is probably too high given that Transpower has no plans in the medium-term to expand to the link (see discussion below). However, regardless of whether it over or underestimates the correct cost, in sending the wrong price signal Transpower is encouraging inefficient investment decisions by its customers, and harming competition between generators.

57. It should also be noted that such a forward-looking locational pricing signal would not be expected to perfectly match the revenue requirements of the operator's existing assets. In this sense, it is equivalent to the use of marginal cost based pricing, which often leads to a revenue shortfall that must be made up through the application of fixed charges of some form. Accordingly, if the locational prices provide insufficient revenue to cover Transpower's existing costs for the HVDC link, the revenue shortfall should be recovered on the same basis that Transpower recovers all other sunk or fixed costs.

6.2.2. No expectation of increased capacity on the link

58. Transpower has publicly suggested that it is unlikely to increase capacity on the HVDC link in the foreseeable future. If it is certain that the link will not be expanded for a number of decades, by definition the forward-looking costs of expanding capacity on the link – which should be discounted – will be negligible.

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[3] "Pricing for Grid Connection Services" Page 9

59. Even if there is a moderate possibility that capacity on the link will be expanded within the next, say 20 years, at least for the next 5 years or so the forward-looking costs will remain small. Accordingly, given that no upgrade is planned in the short to medium-term, the current locational pricing signal based on the existing operating and capital costs of the link is likely to be far too high.

6.2.3. Locational charge on the HVDC link only

60. With the exception of the HVDC link, Transpower charges for all of its core grid assets solely through the interconnection charge. In other words, the link is the only asset Transpower provides a locational pricing signal for.

61. However, the link is clearly not the only component of Transpower's network that suffers from capacity constraints. Indeed, Transpower's 2000/01 Asset Management Plan clearly identifies a number of other areas where transmission constraints exist and that are likely to require upgrading in the near future.[4]

62. Again, this is likely to lead to distorted, rather than improved investment decisions by Transpower's generation and load customers. Providing such an incomplete set of locational pricing signals runs the risk of directing new customer infrastructure into areas where transmission augmentation costs are just as high, if not higher, but where a suitable locational pricing signal does not exist.

63. This outcome would be bad for Transpower as its new investment costs may be higher than they otherwise would be, and will harm competition in the electricity generation market to the detriment of end-users.

6.2.4. Charge levied on generation only

64. Both new generation and load infrastructure have the potential to lead to increased constraints in parts of Transpower's transmission network. However, the HVDC charge is only levied on South Island generators.

65. Increased demand for power in the North Island has the potential to impact on electricity flows across the HVDC link just as much as the addition of new generation capacity on the South Island. Similarly, increased load located in the South Island has the potential to decrease flows across the link.

[4] See section 3 of the 2000/01 Asset Management Plan - Regional Grid Overview

66. Again, by providing such a partial locational pricing signal, Transpower runs the risk of distorting behaviour in a suboptimal way. Accordingly, competition in the electricity generation market will again be harmed.

7. Conclusion

67. The HVDC charge currently being levied by Transpower is likely to be harming competition in the New Zealand electricity generation sector.

68. In general terms, the only competition policy or general economic efficiency rationale that exists for pricing "new investment" cost separately from existing fixed or sunk costs is to provide locational pricing signals to Transpower's generation and load customers. The locational signals would be designed to reflect to those customers the impact that their decisions on where to locate new infrastructure would have on Transpower's requirements to augment transmission capacity.

69. However, locational pricing signals are not warranted in this instance. Under its governance arrangements Transpower has the right to leave such new generation "stranded" if it considers that a more cost effective option exists for providing increased power to its load customers. In other words, generators and load customers cannot force additional costs on Transpower by their decisions on where to locate new infrastructure.

70. If Transpower decides to proceed with locational pricing signals despite this, properly designed locational pricing signals should reflect forward-looking long-run marginal costs, and be levied on the full range of customers considered most likely to have "caused" the need for additional capacity. Accordingly, Transpower should address the following weaknesses in its current charge:

- the fact that the charge is based on the revenue requirements of the existing HVDC assets, not the future cost of augmenting capacity on the link;
- the need to reflect that it is unlikely that capacity on the link will be expanded in the foreseeable future;
- the fact that the HVDC link is the only transmission asset owned by Transpower that is subject to a locational pricing signal; and
- the fact that the locational pricing signal for the link is only levied on generators, not load customers.