Transmission regulation, merchant investment, and the experience of SNI and Murraylink in the Australian National Electricity Market

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Abstract

Australia has unique experience with merchant and regulated interconnectors that is relevant to the international debate on transmission investment and its regulation. Contrary to a widespread view, and regardless of differences of opinion about market power and stranding risks, the proposed regulated interconnector would be uneconomic despite having eventually been approved. Australian experience suggests that, for interconnectors, overexpansion by regulated transmission may be a more serious concern than underinvestment by merchant transmission. In this context, a 'user pays' arrangement for transmission investment could be helpful. Argentine experience in this respect may be more satisfactory than sometimes perceived, and merits further investigation.

Introduction

The regulation of transmission investment in a competitive electricity market has been the subject of increasingly lively discussion over the last decade. The focus is mainly on two models: the regulated transmission company model and the merchant transmission model.[2] Within the US, the debate is now taking place in the context of a major policy review by FERC,[3] and there are corresponding policy debates elsewhere in the world.[4]

All contributors agree on the importance of designing a system to give the proper mix between merchant and regulated transmission. One suggests that "With the wrong choice, the unintended consequences could undermine the whole foundation of electricity market restructuring."[5]

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I am grateful for numerous comments on an earlier draft, including from William Hogan, Bruce Mountain and a referee.
[2] This classification is due to Joskow and Tirole 2003, who include (for example) Leautier 2000 and Vogelsang 2001 in the first category and Hogan 1992, Bushnell and Stoft 1996, 1997 and Chao and Peck 1996 in the second. For further references on both models see Joskow and Tirole 2003 and Hogan 2003.
[3] FERC, Standard Market Design, Notice of Proposed Rulemaking, July 31, 2002.
[4] The Parer Report in Australia proposed amongst other things that "Electricity transmission planning and regulation be significantly overhauled to better serve the needs of the market." *Towards a Truly National and Efficient Energy Market*, Final Report of the Council of Australian Government's Independent Review of Energy Market Directions, Chair The Hon Warwick Parer, Media Release 20 December 2002, report available at www.energymarketreview.org. The ACCC is presently carrying out a consultation as part of a review of the "regulatory test" for regulated transmission. E.g. ACCC Issues Paper - Review of the Regulatory Test, 10 May 2002 (henceforth ACCC Issues Paper). The appropriate framework for transmission and interconnectors is presently an active issue in the EU.
[5] Hogan 2003, p. 1. See also Joskow and Tirole 2003 pp. 60-1.

Proponents of merchant transmission suggest that "With the right choice, merchant transmission investment could play a significant but not exclusive role in efficient transmission expansion,"[6] and that, once suitable mechanisms are in place, "only where there are market failures … should regulators look to rate-based projects".[7]

Other authors are less convinced.

> We find that the attractive properties of the merchant transmission model are seriously undermined when more realistic characterizations of transmission networks are introduced. // … As a practical matter it is appears to be [sic] unlikely that we can rely primarily on competitive merchant investment to provide efficient investments in transmission infrastructure necessary to support efficient competitive wholesale power markets.[8]

They do not claim that we can instead rely on the alternative model, of regulated transmission investment, to achieve this aim. The solution is left as a challenge for future research.[9]

In these circumstances it seems useful to study the experience in Australia where merchant transmission investment has actually taken place. Admittedly this experience refers to interconnectors, which are essentially connections between networks rather than the multi-node interconnected transmission networks that are a main focus of present policy and analysis. Nevertheless, without some understanding of, and consensus on, the relevant considerations in the simpler case, it is unlikely that much progress will be made on the more complex one.

There are in fact two merchant interconnector lines in Australia[10], namely Directlink and Murraylink, to which several authors briefly refer.[11] Discussing the possibility of a cost-

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[6] Hogan 2003, p. 1

[7] "Initial Comments of John D Chandley and William W Hogan on the Standard Market Design NOPR", November 11 2002, as cited in TransGrid, "Comments of TransGrid on Standard Market Design", FERC NOPR Proceeding, Docket No. RM01-12-000, 2/10? January 2003 (Henceforth TransGrid FERC Comments), p. 25

[8] Joskow and Tirole 2003, pp. 6, 60.

[9] "The challenge for future research is to develop regulatory mechanisms that facilitate efficient investment and operating decisions by incumbent regulated network transmission owners, stimulate merchant investment when it is more efficient, and convey the net benefits of efficient investment and operating decisions made by both regulated and merchant transmission owners to consumers." Joskow and Tirole 2003, p. 60

[10] The US term merchant transmission line was previously referred to in Australia as an entrepreneurial interconnector and is now called a market network service provider (MNSP).

[11] "As far as we can tell, these are the only two merchant transmission lines operating anywhere in the world that have been built in anticipation of recovering their costs entirely from congestion rents arising from the difference in nodal prices." Joskow and Tirole 2003, fn. 3, p. 7. Scottish Power and Scottish HydroElectric funded several extensions of the England-Scotland interconnector in the 1990s that predate the two Australian merchant interconnectors. They increased capacity from 850 MW at the time of privatisation in 1989 to 1400 MW now, with further construction underway scheduled to deliver 2200 MW by the end of 2003. Admittedly the companies were seeking to benefit as generators as well as traders, to take advantage of the higher prices in England than in Scotland. The present plan is for the interconnectors to transfer to regulated status as part of the British Electricity Trading Arrangements (BETTA).

benefit decision rule to choose between regulated and merchant transmission, Hogan says that "The developing experience in Australia provides important information about the issues and problems that arise in such cost-benefit analyses to evaluate regulated investments." (fn. 62, p.23) Unfortunately he does not say what that information is. Joskow and Tirole do not discuss the experience either, but indicate that the merchant approach in Australia has not been entirely successful or satisfactory.[12]

Murraylink and the incumbent transmission company TransGrid (proponent of a regulated interconnector called SNI) have both contributed recently to FERC's consultation in the US. Murraylink's associated company TransEnergie originally suggested that a "framework of transmission bidding has been in place in Australia for a couple of years with initial success."[13] However, Murraylink later applied for transfer from merchant to regulated status, citing uncertainties associated with the regulatory regime. TransGrid commented that

> … rather than operating with 'initial success' the Australian experience with merchant transmission has been highly problematic with the merchant transmission regime in Australia resulting in legal controversy and considerable delay and disruption to investment in efficient new capacity. …/ While merchant transmission may have a role to play, it is limited. Mixing regulated and merchant transmission investment regimes is clearly difficult. It can lead to controversies, litigation, delays and inefficiencies. The Australian experience has demonstrated that merchant transmission is not necessarily worth the trouble.[14]

A widespread impression is thus that merchant transmission is an interesting idea in theory, but that it is unlikely to be satisfactory in practice, and that experience in Australia bears this out.

The purpose of the present paper is two-fold. Part One re-examines Australian experience to assess whether the merchant regime has indeed disrupted investment in efficient new capacity. Part Two examines the analytic basis of the current international debate on transmission investment frameworks, and some proposals for policy. It suggests greater emphasis on comparative performance of alternative arrangements, and attention to the performance monitoring properties of each alternative. In the light of Australian experience it briefly examines experience with the "user pays" scheme in Argentina that has characteristics of both merchant and regulated transmission models.

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[12] "Mixing regulated and unregulated activities that are (effectively) in competition with one another is always a very challenging problem. In Australia, this mixture of competition and regulation has led to extensive litigation between proponents of regulated and merchant transmission links, delaying investments in both." Joskow and Tirole 2003, p. 13, with footnote reference to TransGrid FERC Comments (though that latter paper does not claim that the litigation delayed investments in *both* links).

[13] "Comments of TransEnergie US Ltd on Commission Working Paper on Standardised Transmission Service and Wholesale Electricity Market Design", FERC, Docket No. RM01-12-000 (April 10, 2002), as cited in TransGrid FERC Comments p.2.

[14] TransGrid FERC Comments p. 2 (second of this page number), p. 28. Specifically, the paper argues that "the merchant transmission that has taken place has been socially inefficient and has created obstacles to efficient 'tariff based' investment in transmission." p. 3 (first of this page number).

PART ONE: SNI, MURRAYLINK, THE TRIBUNAL AND THE ACCC

Alternative interpretations

In recent years there has been rivalry between two Australian interconnectors (see Appendix 1). Briefly, TransGrid had been seeking for some time without success to get approval for a regulated interconnector called SNI between New South Wales (NSW) and South Australia (SA). In the meantime, TransEnergie built a merchant interconnector called Murraylink between Victoria and South Australia along part of essentially the same route. (The termini in Victoria and NSW are not far apart.) In December 2001, while Murraylink was under construction, the National Electricity Market Management Company (NEMMCO) held that SNI passed the "regulatory test". Murraylink appealed to the National Electricity Tribunal, which in October 2002 upheld NEMMCO's judgement by a 2-1 majority.[15]

Views differ on how the regulatory framework for transmission investment in the NEM should be defined, more importantly on how it has been implemented by the regulatory authorities, and on how experience to date should be interpreted. Summarised rather crudely, there are two views of the SNI/Murraylink saga.

One view is that SNI was an economic investment in improved transmission and a useful counterbalance to the market power of Murraylink; that Murraylink was objecting to regulatory approval of SNI in order to protect this market power; that the component of SNI that Murraylink advocated (comprising various system reinforcements known as unbundled SNI, explained below) would expose TransGrid to undue risk; that Murraylink's objection was the cause of unnecessary delay in the regulatory process and in the construction of SNI; that the decisions of NEMMCO and the Tribunal Majority, which overrode Murraylink's objections, enable a further useful step in the development of the National Electricity Market in Australia; and that steps should be taken to enable a smoother development of regulatory investment in future and possibly to curtail merchant investment.

A contrary view is that the interconnector part of SNI did not represent an economic investment at all, at least after the construction of Murraylink, but an uneconomic duplication of Murraylink's interconnector capacity; that SNI had negligible value as a counterbalance to Murraylink's market power since that market power was itself negligible; that the alternative system investment (unbundled SNI) would be economic and would not impose significant risk on TransGrid; that TransGrid was seeking regulatory approval for SNI in order to protect and extend its own transmission system regardless of the uneconomic nature of this extension; that the decision to rule out unbundled SNI and thereby approve regulatory investment in SNI was flawed; that in

[15] The author was invited by Murraylink and TransEnergie to comment on part of the regulatory process in Australia in 2001, and was called by these companies to testify in the August 2002 hearing before the National Electricity Tribunal. Neither Murraylink nor TransEnergie has provided financial support for subsequent work or for the writing of this paper, and they are not responsible for the views expressed herein.

consequence regulatory approval for SNI undermined the financial basis not only of Murraylink but of merchant investment more generally; that the decisions of NEMMCO and the Tribunal revealed serious problems with the nature and interpretation of the regulatory framework; that these decisions represented a setback for the development of the National Electricity Market; and that steps ought now to be taken to reduce the regulatory risk to merchant investment and possibly to curtail regulatory investment.

There is thus no agreement as to whether it would be more efficient to build SNI, Murraylink, both or neither. Similarly, there is no agreement whether, in the light of this experience, it would be more sensible to facilitate or restrict merchant or regulated investment, or even whether it is feasible that the two should co-exist.

By implication, the Tribunal's Majority Decision upholding NEMMCO's decision has so far held the first of the above two views to be the more correct.

The economic value of SNI

The regulatory test is quite lengthy but for present purposes the relevant aspects may be summarised as follows:

> A new interconnector or transmission system augmentation satisfies this test if it maximises the net present value of the market benefit having regard to a number of alternative projects, timings and market development scenarios. Market benefit here means the total net benefits to all those who produce, distribute and consume electricity in the National Electricity Market.

In implementing this test, the method used to calculate the net present value of the market benefit, including the weightings attached to each element, is obviously important. The initial appraisal was carried out by NEMMCO's Inter Regional Planning Committee (IRPC) and its consultants ROAM. There was much debate as to whether ROAM's modelling was adequate. In the light of this, TransGrid commissioned its previous consultants IES (represented at the Tribunal by its Managing Consultant Mr Campbell) to carry out similar and additional calculations. Those, too, were the subjects of debate, but for present purposes the IES calculations will suffice.

The nature of the alternatives over which the maximisation takes place turned out to be the key disputed element of the implementation of the regulatory test. IRPC and NEMMCO noted a small number of alternative projects being considered elsewhere, appraised and rejected them. Debate centred on what came to be called "unbundled SNI" (abbreviated by the Tribunal to USNI). This was the SNI proposal excluding the transmission line itself. In other words, it consisted of the reinforcement to the State transmission systems, particularly the system in NSW, without the building of any additional interconnector capacity between NSW and SA.[16] The central issue was

[16] Professor Hogan has conjectured that "some of the need for, and implications of, the unbundled SNI reinforcements are designed to deal with loop flow issues that are not handled well in the Australian electricity market design." Personal communication, 23 May 2003.

whether unbundled SNI should be considered an alternative to what was sometimes called "full SNI".

The importance of this issue can be seen by reference to the cost-benefit calculations carried out by IES.[17] [18] There is no doubt that the interconnector component of SNI and the system reinforcement component were both substantial projects. IES citing TransGrid put the (undiscounted) capital cost of (full) SNI at $110m and the capital cost of unbundled SNI (the system reinforcement) at $46m.[19] (All figures in A$.) This implies that the additional capital cost of the interconnector itself, once the system had been reinforced, was $64m.

IES made cost-benefit calculations for several scenarios. For brevity the results presented here are for the IES Base Case using what IES called Realistic Bidding Scenario 2 which IES considered "the most realistic of the three bidding scenarios used in the modelling". These calculations took into account the impending existence and operation of Murraylink.

On these assumptions, IES calculated that full SNI would have a discounted present cost of $98.4m ($89.1m capital plus $9.4m operating) and a discounted present value of benefits of $264.5m.[20] The present value of the net benefit was therefore $166.1m. This was substantially positive and, on the face of it, implied that full SNI – building a new interconnector and reinforcing the transmission systems - was a very worthwhile project.

However, this conclusion no longer holds once the two components of SNI are examined separately. Under the same assumptions as above, IES says that the discounted present cost of unbundled SNI – that is, of reinforcing the system without building a new interconnector – would be $41.2m and the discounted present value of benefits would be $351.4m.[21] The present value of the net benefit of unbundled SNI was therefore $310.2m.

The value of unbundled SNI was thus greater than that of full SNI. This implies that simply reinforcing the State transmission systems, particularly in NSW, would more than halve the present value of costs and would increase the present value of benefits, compared to doing this reinforcement and building a new interconnector between the states as well.

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[17] Modelling the application of the regulatory test to SNI: A report to Clayton Utz, IES, 28 June 2002. Being the Witness Statement of Andrew James Campbell, 28 June 2002

[18] Evidence to the Tribunal was typically in two stages, e.g. Witness Statement of [X], dated [ ] and Witness Statement of [X] in Reply, dated [ ], In the National Electricity Tribunal, In the matter of an Application of Review of a NEMMCO determination on the SNI interconnector dated 6 December 2001. These are henceforth given as [X] Statement and [X] Reply, respectively. Testimony is available from the NET and from lawyers for each party. Statements and Replies for witnesses called by Murraylink (Cook, King, Littlechild, Thomas) were posted on www.transenergie.com.au/june/murray on 23 October 2002. Statements and Replies for witnesses called by TransGrid (Houston, Kahn) were posted on www.nera.com at about the same time.

[19] Campbell Statement, Exhibit 1, Appendix 1, p. 3

[20] Campbell Statement, Exhibit 49, Appendix 7, p. 47

[21] Campbell Statement, Exhibit 50, Appendix 7, p. 48

The second set of figures may be subtracted from the first set to assess the additional costs and benefits of building a new interconnector, assuming that the transmission system reinforcement goes ahead. The present value of the additional cost of the interconnector would be $57.2m, while the additional benefits would be negative, at -$86.9m.[22] The overall effect would be to reduce the present value of net benefits by $144.1m. In other words, on these calculations by TransGrid's own consultants, reinforcing the State transmission systems would be worthwhile, but building a new interconnector as well would be a serious waste of money rather than an efficient investment to meet the needs of the market.

Table 1 summarises the above numbers.

Table 1 NPV Benefits and costs ($m) of SNI projects, Realistic Bidding scenario 2

	Full SNI	Unbundled SNI	Interconnector SNI
Benefits	264.5	351.4	-86.9
Costs	-98.4	-41.2	-57.2
Net Benefit	166.1	310.2	-144.1

The precise numbers depend on the assumptions and scenarios used.[23] Nevertheless, the general proposition was ultimately not in dispute. The Tribunal put it this way.

> The most significant issue in the proceedings was whether the Tribunal should have regard to USNI as an alternative project. It is common ground that USNI contributes a greater part of the net present value of SNI and if undertaken by itself would result in a higher rate of return than SNI. It is also common ground that acceptance of USNI as an alternative project would mean that SNI does not maximise net present value of market benefit.[24]

If a proposed project comprises two or more components, it might seem natural to an economist to look at the incremental costs and benefits of each component. If all – or indeed more than all – the benefits of the project could be secured by carrying out just one of the components, then there would have to be very good reason for incurring the costs of any of the other components, which would have a negative incremental net benefit. However, neither the IRPC nor NEMMCO looked at it in this way, and the Tribunal (Majority) followed their lead. They all considered that the full project (SNI) should stand as a package unless the component (unbundled SNI) was proved to be a viable alternative. None of them calculated or considered the additional costs and benefits of the interconnector part of SNI. Given that these bodies considered all the other potential alternatives besides unbundled SNI to be infeasible, whether or not they

[22] Quite why the additional gross benefits should be negative, and what this implied for the adequacy of the modelling or the factors required to be taken into account, was not explored in evidence before the Tribunal.

[23] For example, with IES Realistic Bidding scenario 1,the costs are the same but SNI has a gross benefit of only $112.3m and a net benefit of only $13.9m (=$112.3m - $98.5m).

[24] Majority Decision, p.26; see also p. 48 and Order for Costs para 21.

admitted unbundled SNI into consideration would have a critical effect on the final decision.

What proposals are alternatives?

The IRPC took the view that unbundled SNI was not an appropriate alternative to consider because it did not have a proponent. NEMMCO took the view that an alternative project needed to be "a genuine alternative to the project being assessed i.e. a substitute, and the project should also be practicable." (para 4.2).[25]

NEMMCO further said that "in considering the practicability of proposals, the following issues need to be considered:

- the technical feasibility of the additional proposal
- the commercial feasibility of the additional proposal, and
- having regard to the above, whether there is a proponent or likely to be a proponent for the proposal." (para 4.2)

Neither the IRPC nor NEMMCO nor the Tribunal challenged the technical feasibility of unbundled SNI. Both the former bodies took the view that there was no proponent for unbundled SNI. This was sufficient for the IRPC not to proceed with it. However, two of the witnesses for TransGrid (Professor Kahn and Mr Houston), as well as witnesses for Murraylink, all explained why they considered the existence of a proponent to be an inappropriate requirement. The Tribunal (and eventually NEMMCO) accepted this latter view.[26] It followed that "The most significant issue in the proceedings before us was directed to the claim by TransGrid that USNI was not commercially feasible."[27]

Commercial feasibility

The Tribunal summarised as follows the issue of commercial feasibility. It is worth quoting at length because it contains the core of the Tribunal's decision.

[25] It is arguable that the substitutability requirement – which required that "the outcomes delivered by the proposal should be similar to those delivered by the SNI option" - was too restrictive. Mr Houston said that the regulatory test requires, in principle, consideration of all projects "with attributes such that, were they to proceed, would materially affect the net market benefit calculated for the other projects being considered". (Houston Statement, para 44, also Littlechild Reply pp. 33-36) It is debateable how far unbundled SNI, which does not have an interconnector component, delivers similar outcomes to SNI which does, but there is no doubt that, if unbundled SNI were to proceed, this would materially affect the (additional) net market benefit of SNI.

[26] "Conformably with the views of the economists (Mr Houston and Professor Kahn) we accept the view that the existence of a proponent for an alternative project is not a necessary pre-requisite for that project to be considered. Existence of a proponent is, as TransGrid submits, fairly good evidence of commercial feasibility and conversely the non-existence of a proponent is some evidence of lack of commercial feasibility. NEMMCO does not dispute this proposition and asserts that insofar as its determination was read as the need for an alternative to have a proponent the fault lay in the interpretation placed upon its words." Majority Decision, p. 49 The precise meaning and implications of being a proponent were never fully specified or agreed.

[27] Majority Decision, pp. 48-9

> TransGrid's reason for not undertaking USNI is that it would lead to a risk of "asset stranding". It has declined to be a proponent. Its stated fear is that Murraylink, as an unregulated interconnector undertaking its activities by way of arbitrage, might so conduct itself that TransGrid's investment in USNI could become stranded. It contends that USNI would be dependent on the flow of power over Murraylink, and that Murraylink would have the capacity and the financial incentive to withhold flow, which would have as a consequence the possible stranding of USNI.
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> TransGrid has advanced an additional reason for not wishing to undertake USNI, viz that it does not wish to be dependent upon one customer, i.e. Murraylink.
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> … Relevant to the degree of risk is whether USNI is dependent on Murraylink, and the extent to which Murraylink has sufficient market power and/or the incentive to manipulate the flow of current to the detriment of TransGrid.

The Tribunal noted that it had received different views on these issues.

> A number of economists expressed their views concerning "asset stranding"…. Professor Kahn, Mr Houston and Professor Bishop thought it reasonable for TransGrid to regard the risk as substantial. Professor King, Professor Littlechild and Mr Ergas considered it has not been demonstrated that the degree of risk would be other than trivial.
> …
> The differences between economists turn, in effect, on their assessment of the degree of risk stranding, and thus upon the extent to which they think it realistic that Murraylink, as an unregulated interconnector and in competition with generators, would have the ability and the commercial incentive to reduce the amount of power flowing from Victoria in order to achieve higher prices in SA. Relevant to this question, of course, is the degree of Murraylink's market power. All economists seem to agree that Murraylink has some degree of market power. The question is whether it should be characterised as trivial or substantial.

How did the Tribunal resolve this issue? Essentially, it appealed to a set of empirical propositions.

> It is TransGrid's contention that the marginal costs of generating power in SA will, in the foreseeable future, always be more expensive than in New South Wales and Victoria and that during certain periods the Heywood interconnector[28] is constrained.
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> Murraylink would have the ability to reduce the amount of power that it would allow to flow from Victoria to South Australia and it would, in our opinion, have the commercial incentive to do that at least in peak periods. The marginal cost of

[28] [Heywood is an existing 500 MW interconnector between Victoria and SA, near the southern end of the border between the two states, whereas Murraylink and SNI are at the northern end of this border.]

> generating power in South Australia is significantly greater than Murraylink's marginal costs, which are the cost of electricity in Victoria and the cost of transmitting it to South Australia. And this state of affairs is likely to continue for some time in the future, on the information before us.
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> …Taking into account the differing views of the economists and others concerning the degree of risk we have come to the conclusion on the evidence that the implementation of USNI would lead to a real risk of stranding or, at the very least, TransGrid's apprehension of the risk of stranding is real and not unreasonable.[29]

The point of the present paper is not to reargue whether there was or was not a real risk of stranding, but to look at the regulatory process as a whole. Appendix 2 outlines the evidence on the market power and risk stranding issue, so that readers can make their own assessment. I turn here to the rest of the Tribunal Majority's Decision.

Remainder of the Tribunal Majority Decision

Having concluded that the risk of stranding was real, or at least a real apprehension, the Tribunal next considered whether, in view of this, TransGrid's decision could be challenged or whether TransGrid could be forced to undertake unbundled SNI. It concluded not.

> Once the risk is recognised as one that is reasonably open for TransGrid to hold, it is, in our view, a matter for TransGrid to determine whether it is prepared to expose itself to that risk.[30]

It suggested that the Tribunal could not and should not seek to influence or predict TransGrid's decision.[31] Nor were there any relevant regulatory obligations on TransGrid that NEMMCO, for example, could enforce.[32]

If TransGrid cannot be compelled to make the investment in unbundled SNI because of the stranding risk, would it be possible for Murraylink and TransGrid to enter an

[29] Majority Decision, pp. 51-3
[30] Majority Decision, p. 53
[31] "It has been submitted on behalf of Murraylink that economic considerations would dictate that if SNI were refused, then TransGrid would proceed with USNI, despite its denials, because USNI has the capacity to furnish a good rate of return…. / The Tribunal is in no position to direct TransGrid as to how it should invest its money or what projects it should undertake. We do not know how TransGrid proposes to invest in the future. All we do know is that it refuses at the present time to be a proponent for USNI and for the reasons discussed that refusal is not unreasonable." (pp. 53-4)
[32] "But if TransGrid is not willing to be a proponent for the project can it be compelled to be one and/or can it be compelled to permit another entity to become a proponent to undertake the work? / We are of the opinion that NEMMCO itself has no power to compel TransGrid to build USNI. The most NEMMCO can do if it thought augmentation was justified, but that TransGrid would not arrange for it, is to mediate and liaise to resolve the dispute. There is nothing in the Code that authorises NEMMCO to compel TransGrid to invest money." (pp. 54-5)

arrangement to protect TransGrid against that risk? Witnesses on both sides of the case suggested that this would be a possible and sensible way forward.[33]

Muraylink and TransGrid did in fact have discussions on this just before the start of the Tribunal hearing. During the course of the hearing, Murraylink made two offers. TransGrid rejected both, and also argued that these issues lay beyond the Tribunal's remit. The Tribunal rejected the argument that it had no jurisdiction on the matter, and summarised and commented on the two offers. It dismissed the first[34] but commented on the second as follows.

> However, by letter dated 14 August 2002 Murraylink proposed that it be allowed to be "a proponent of unbundled SNI" and to construct it if TransGrid agreed to access to its transmission facilities. On our understanding of the legislation, TransGrid cannot be legally compelled to allow the construction of USNI within its own network. Other than submitting that TransGrid could be compelled to allow work within the network to be undertaken by another, the matter was really taken no further. It was left as an abstract proposition. But even if in some circumstances TransGrid could be compelled to allow some work to be carried out in its network, the question remains whether it could be compelled to permit Murraylink to build USNI, and we are not satisfied that it could.
>
> Accordingly, for all the reasons discussed, we have come to the conclusion that USNI is not relevantly an alternative project for the purpose of the regulatory test". [35]

The Tribunal then held that three other candidate projects were not relevantly alternative projects either.[36] It dealt with four criticisms by Murraylink concerning the reliability of

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[33] To quote only non-Murraylink witnesses, "If Unbundled SNI is really a superior project, TransGrid and TransEnergie should be able to draw up a mutually beneficial contract that protects TransGrid from under-utilisation of Murraylink." Bishop Statement para 6.5. "…as a matter of principle Murraylink and TransGrid should be able to agree a commercial arrangement that transferred the risk from TransGrid to Murraylink. For example, if Murraylink were to underwrite any future stranding of the assets, then the risk faced by TransGrid would be removed, making the project commercially feasible from TransGrid's perspective." Houston Statement para. 189, p. 33. Mr Houston further notes that "since one aspect of the commercial risk faced by TransGrid involves expectations of how Murraylink may operate its interconnector, Murraylink would be a natural party to assume the financial risks to TransGrid associated with that uncertainty". (para 19) "… this situation contains within itself the elements of a solution beneficial to both contesting parties and socially optimal – ie of maximizing the difference between incremental costs and incremental benefits: a contractual arrangement committing TransGrid to build the socially more efficient unbundled investment, which Murraylink would like to see built and purchase guarantees by Murraylink sufficient to make such an investment prudent." Kahn Reply p. 14

[34] "The first letter dated 6 August 2002 offered to purchase from TransGrid the USNI assets at a value which would be determined by the ACCC as part of its revenue capped determination. In our view that proposal does not even address the issue of stranding. Moreover it has an additional complication (unexplored to date) as to how such a sale could be effected bearing in mind that it would be part of TransGrid's network." (p. 55)

[35] Majority Decision, pp. 55-6

[36] The Tribunal held that an 800 MW augmentation called SNOVIC had not been demonstrated to be technically feasible. It accepted TransGrid's advice that a 400 MW augmentation called Newvic 2500

aspects of the modelling, and explained why it did not accept the views of the third member of the Tribunal. The Tribunal (Majority) then came to the conclusion that Murraylink's application should be dismissed, and that SNI was justified.

The Tribunal Minority Decision

The third member of the Tribunal did not accept the views of the other two members. This member pointed out that he was the non-legal member of the Tribunal, with expertise in engineering, economics and sociology. He resolved the Tribunal's tasks into two parts:

- the interpretation of the regulatory test and whether SNI was justified at the time of NEMMCO's determination;
- whether SNI is presently justified.

On the first part, he argued that the ACCC had squarely related the test to the logic and public benefit arguments underlying cost-benefit analysis. In his view, deciding the appropriate interpretation of the test was the first question to be resolved by NEMMCO and by the Tribunal. He concluded

> that NEMMCO's interpretation of that Test is foundationally flawed and that it thus did not apply the Test. Of the various inadequacies of NEMMCO's which include reading the Test out of context, the treatment of alternatives and of interdependencies among them, taxes and transfers, shadow prices, of costs, of incremental optimisation, and of risk and uncertainty, two are especially damaging:
>
> - the failure to make valid economic comparisons of the net present values of alternative investments of *different size* (especially in this case where the differences are large); and
> - the failure to consider the implications, for the calculation of net present values, of the relative magnitudes and probabilities of less uncertain *early occurring*, and the more uncertain *late occurring*, benefits (especially in this case where the late occurring benefits as a proportion of total benefits is large).
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> As I show in Appendix 1 … these deficiencies can be expected to lead to the 'gold plating' of regulated assets proposed for justification. (pp. 6-7)

In this member's view, it was open to NEMMCO to have sought a corporate statement from the ACCC as to the construction of the regulatory test and the method and procedure to be adopted but it did not do so. The result was flawed.[37]

The member explains that NEMMCO's special expertise lies not in economics but in electrical engineering. On the other hand the ACCC has frequently demonstrated

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needed a lot more technical analysis before it could be called a mature scheme capable of being built. It described SNOVIC 600 as no more than an unexplored suggestion.

[37] "Instead, it adopted an interpretation which does not provide a rational investment decision criterion and which therefore fails to examine the merits of alternatives, however they might be defined or otherwise analysed, as regulated economic investments." Minority Decision, p. 7.

familiarity with economic principles and methods. "NEMMCO could be reasonably expected to ensure the economic soundness of its approach to an ACCC public benefits test." However, "its reach exceeded its grasp".

> Moreover, …the formula of interpretation which NEMMCO adopted can be reliably expected to result in 'gold plating. This is a practice which the ACCC has been especially concerned to discourage, and was a major issue in its considerations of and consultations on the Regulatory Test. Though there might be infelicities of drafting in the ACCC's text, I do not accept that it can be interpreted to include that the objective of the Regulatory Test was to encourage so perverse a result. This would be a necessary consequence of the NEMMCO formula. (p. 8)

He concluded that NEMMCO had not applied cost-benefit analysis as intended, and that SNI was not justified.[38]

On the second part of the Tribunal's task, whether SNI was presently justified, the member accepted that although NEMMCO's process did not satisfy the Regulatory Test, nevertheless some sort of comparison had been made during the Tribunal hearing. However, the new Base Case would now need to include SNOVIC if that had been justified,[39] but he was no more confident that such an appraisal would have been properly done for SNOVIC than for SNI. Nor was it feasible for him, by inspection of the evidence, to assess whether SNI was now justified. He concluded that it was not.[40]

Two issues not examined by the Tribunal

On the NEMMCO reasoning accepted by the Tribunal Majority, if unbundled SNI were found not commercially feasible on grounds of stranding risk, this would imply implementation of SNI itself. The Tribunal accepted that this project had a lower NPV than unbundled SNI. On the basis of the IES calculations given above, this would have meant, in effect, the building of an unnecessary duplicate interconnector in order to avoid the stranding risk of unbundled SNI. Faced with this possibility it would have been possible to ask two questions.

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[38] "It is my opinion that the regulatory test involves an application of cost benefit analysis as an investment decision criterion as understood in the economic art and as specifically delimited by the ACCC, that it was not applied by NEMMCO and that the SNI option was not justified by NEMMCO's decision." Minority Decision, p. 8

[39] The Tribunal has to make the correct or preferable decision in the light of circumstances as they stand at the time of the hearing of the application for review. In the instant case, the project SNOVIC 400 had been completed since NEMMCO's determination in December 2001, and was now a committed project rather than an alternative project. Majority Decision p. 19

[40] "More generally, the material available is absent information concerning costs, benefits, probabilities and risks necessary for carrying out the appropriate cost benefit analysis. Further, in the light of NEMMCO's previous performance … there must be doubt as to the probative trust that could be placed in the work that it has presented. / In my opinion the SNI Option is not justified." (p. 9)

First, in the light of the cost of the additional interconnector, would that additional investment itself have been subject to stranding risk comparable to that of unbundled SNI? Evidence was put forward that the cost of the additional investment in interconnector SNI was about two orders of magnitude greater than the alleged stranding risk. This should have raised doubts whether the ACCC would have accepted that investment.[41] Witnesses for TransGrid did not put evidence against this nor, more generally, did they argue that the additional cost of the interconnector component of SNI was the most economic way to protect TransGrid against stranding risk. Indeed, as just noted, they suggested that some form of contractual arrangement to avoid the additional cost and investment would have been sensible.

Second, is there any way to redesign unbundled SNI so as to preserve the benefits but reduce the risk to TransGrid? In order to maximise economic benefit, the proposed system reinforcement (unbundled SNI) needs to be properly configured to meet most efficiently the levels and patterns of flow consequent on (a) there being one interconnector (Murraylink) rather than two, and (b) that interconnector being run as an unregulated (merchant) interconnector rather than as a regulated one.[42]

Whether TransGrid would proceed with unbundled SNI if SNI were not justified, and if so whether such a properly configured unbundled SNI would be significantly different from unbundled SNI as presently envisaged, is not clear[43]. However, the point is that an unbundled SNI that was properly configured to meet the circumstances in which it would operate would not be vulnerable to any risks of asset stranding with respect to Murraylink's behaviour. This point was accepted by at least one witness called by TransGrid.[44]

Both these points were made to the Tribunal. Neither was acknowledged in the Majority Decision.[45]

Statutory duties and regulatory powers

[41] An outline of this argument is contained in Appendix 1. Some evidence from the ACCC's subsequent review is presented below.
[42] The IRPC reportedly took the view that "The IRPC does not believe it is their role to optimise a project for a proponent but rather to evaluate the proposed [sic] as submitted." Cited in Littlechild, Statement, p. B-3. However, this is different from optimising alternatives to a proposed project, where IRPC/NEMMCO surely did have such a role. The ACCC indeed later exercised the latter optimising role, as described below.
[43] "He [Dr Parker, Manager/Transmission Development at TransGrid] said, in effect, that he thought TransGrid would be interested, having regard to its objectives, in being a proponent for USNI, but as he made clear he could not speak for TransGrid itself." Majority Decision, pp. 53-4
[44] "… he [Littlechild] makes what seems to me a compelling answer: clearly in designing its unbundled SNI facility, TransGrid should and should be expected to determine the capacity needed to satisfy the probable demand for it; and if it believes that that demand will be restricted by Murraylink's exertion of monopoly power, the amount of capacity it plans to construct should take that into account, reducing the probable value of this asserted danger of subsequent downward "optimisation" for this particular reason to zero." Kahn Reply, pp. 11-12.
[45] It might be argued that these omissions were within the ambit of the concerns expressed in the Minority Decision, but nothing specific was made of them.

The Tribunal Majority accepted that unbundled SNI had greater net present benefit than SNI but concluded that TransGrid could not be compelled to undertake this investment because of the perceived risk involved. Since the Tribunal did not ask whether this risk could be avoided by appropriate contractual arrangements, or whether there might be a properly configured version of unbundled SNI that would not involve risk to TransGrid, its question whether TransGrid could be compelled to invest in an assumed risky unbundled SNI was perhaps unlikely to receive a positive answer. Even so, the legal situation as described in the Majority Decision seems surprisingly passive. The questions remain whether TransGrid has an obligation to look for ways of reducing risks in order to make potentially beneficial investments, and whether particular regulatory bodies have an obligation to monitor its performance in this respect.

TransGrid is a Statutory State Owned Corporation established pursuant to section 6A of the Energy Services Corporations Act 1995 (NSW). Under Section 6B(1) of that Act,

> (1) The principal objectives of an energy transmission operator are as follows:
> (a) to be a successful business …
> (d) to operate efficient, safe and reliable facilities for the transmission of electricity and other forms of energy,
> (e) to promote effective access to those transmission facilities.
> (2) Each of the principal objectives of an energy transmission operator is of equal importance.

In the present circumstances, does Section 6B(1) not put an obligation on TransGrid actively to seek some way of reducing the perceived risk involved in unbundled SNI, in order to be able to carry out the appropriate investment so as to operate efficient facilities? And if Murraylink offers to build unbundled SNI so as to reduce or remove that risk, does it not oblige TransGrid actively to explore a satisfactory contractual arrangement for achieving this?[46] And if TransGrid chooses not to do these things, is it not incumbent on whatever regulatory body is responsible for enforcing that Act, to investigate whether that refusal is reasonable in all the circumstances? These circumstances would include the nature and extent of that risk and the availability of alternative and more economic ways of mitigating that risk. And if it considers that TransGrid's refusal to act is not reasonable, surely action can and should be taken against TransGrid for breach of its statutory objectives?

According to the Minister for Energy for NSW, the answer to all these questions seems to be No.

[46] Interestingly, the form of Murraylink's second proposal is different from that suggested by the witnesses cited above. Instead of proposing to indemnify TransGrid against any investment stranding risk, Murraylink proposes to make the investment itself. This obviates the need to agree what compensation would be required, or to monitor usage, and does not leave Murraylink with an open-ended risk. However, it apparently necessitates Murraylink's access to reinforce TransGrid's network, which raises other questions apart from legal ones. For example, how far were Murraylink's offer and TransGrid's refusal contingent on Murraylink doing the reinforcement work as opposed to TransGrid doing it at Murraylink's expense? Would Murraylink be entitled to regulated revenues for use of the system reinforcement, and how might this use be attributed either to Murraylink or to other users?

> Section 6B(1) of the ESC [Energy Services Corporations] Act sets out principal objectives of TransGrid. It does not impose any duties on TransGrid. Even if s6B(1) were expressed in different language, stating the "functions" or "community service obligations" of TransGrid, it would express no more than aspirations or ideals which are not enforceable by a court.[47]

The Energy Services Corporations Act does not in fact provide a mechanism for the enforcement of the stipulated objectives. There is no regulatory body charged with ensuring that energy transmission operators abide by the principal objectives stipulated in section 6B.

It might be argued that when TransGrid is arriving at a decision or exercising its statutory functions it should do so in a manner that is not inconsistent with those objectives. It might be argued, too, that NEMMCO and the ACCC each has a duty to have regard to all relevant objectives in (e.g.) assessing TransGrid's investments for purposes of determining regulatory asset values. General administrative law principles regarding the duties of decision-makers may also be relevant - for example, common law principles oblige decision-makers to act reasonably, to have regard to relevant considerations and to not have regard to irrelevant considerations in the proper discharge of their functions and powers. However, all these constitute at best a somewhat indirect enforcement of TransGrid's objectives. There seems to have been little reference to them to date, and if these objectives are simply unenforceable aspirations or ideals it is not clear how much weight NEMMCO or the ACCC could attach to them.

There is a contrast here with regulatory regimes in competitive electricity markets elsewhere.[48]

The Majority Decision response to the Minority Decision

The themes of the Minority argument – that the NEMMCO process was deficient, that it would lead to gold-plating, and that SNI was not justified - are consistent with (but perhaps go beyond) the arguments put by several witnesses for Murraylink. However, the Minority argument did not convince the other two members. The Majority explained why they had come to a different ultimate conclusion. In their view, the concern that the whole process was "fundamentally flawed" was not an issue that had been raised in the proceedings by any party, or by any of the expert witnesses. "The issue was not that the whole process was 'fundamentally flawed': it was that identified aspects of the modelling were subject to criticism." The Majority accepted NEMMCO's submission that the paramount task was to apply the cost benefit analysis conformably with the particular

[47] Opening Address by Minister for Energy (NSW), Evidence to National Electricity Tribunal, 19 August 2002, para 34, p. 9

[48] For example, in the UK the Electricity Act 1989 s. 9(2) gives a transmission licensee a statutory duty to develop and maintain an efficient, co-ordinated and economical system of electricity transmission, and to facilitate competition in the supply and generation of electricity. S. 25 provides that if the Director is satisfied that the licence holder is contravening, or likely to contravene, such a duty he should make an order to secure compliance unless the licensee is already taking steps to comply.

criteria specified in the regulatory test by the ACCC rather than by reference to cost benefit principles at large.[49]

There was indeed concern about particular aspects of the modelling.[50] It also seems reasonable that any practical application of cost benefit analysis should be tailored to the time and resources reasonably available, and focus on the main issues in that particular application.

Having said that, concern does extend beyond "identified aspects of the modelling". The results of the modelling (as opposed to the assumptions) were not presented in a way conducive to understanding, discussion and responsible decision-making. Without the IES modelling that came to light only during the Tribunal process (and then only because TransGrid commissioned and submitted it) important implications of the rival investments would have remained largely unknown. For example, even the key finding that the Tribunal Majority described as common ground – that unbundled SNI contributed a greater part of the value of SNI (*more* than all the value according to the IES calculations) – was unknown at the time of NEMMCO's decision.[51]

The Minority decision listed the impact of taxes and transfers as an inadequacy. The Majority decision pointed out that all parties said that was not an issue in the proceedings. This again is a fair point. However, the Majority did not respond to the two other inadequacies especially highlighted by the Minority, namely the failure to make valid comparisons between investments of different sizes, and the failure to distinguish between early occurring and more uncertain late occurring benefits.

The Minority Decision illustrates these two concerns by specific examples (albeit somewhat buried in an Appendix). As to the first concern, a table in the IRPC report shows a threefold difference in the capital costs of three projects[52]. If the projects are appraised simply in terms of the Net Present Value of Benefits, then the larger projects will have an advantage unless proper account is taken of the benefit that could be obtained by investing the difference in capital cost of the smaller projects: for that reason the projects need to be normalised. As to the second concern, Dr Cook's testimony is that the cumulative NPV benefits of SNI that derive in the near term from fuel cost savings and savings in losses would be relatively small, whereas the savings resulting from the deferral of investment are relatively large but most occur only after ten years.[53]

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[49] Majority Decision, pp. 67-74

[50] Mr Campbell and Mr Houston, witnesses called by TransGrid, accepted some of the criticisms of the ROAM study made by Murraylink and its witnesses, and the IES study sought to respond to these. Even so, there must be a question about the plausibility of a study that shows an additional interconnector as having a substantial negative gross (as opposed to net) benefit. And if the negative net benefit of $86.9m for the interconnector part of SNI is erroneous, that is rather large compared to the additional cost of $57.2m.

[51] "USNI had not been modelled when the matter was before the IRPC and NEMMCO. … Modelling was undertaken by TransGrid after the present proceedings commenced and it became clear that if USNI was relevantly an alternative project the result would have been that SNI did not maximise net present value of market benefit because the net present value of USNI would exceed that of SNI." Tribunal Order for Costs, 17 December 2002.

[52] Minority Decision, Appendix 1, p. 29

[53] Minority Decision, Appendix 1, pp. 29-30

The reason for the Minority concern is the same in both cases: "Failure to make such adjustments for comparability will … systematically favour large projects, and so promote gold-plating". The failure to account for temporal uncertainty "is also likely to – and in the case of the sort of network investments under consideration here, very likely, and in this particular case would – lead to gold plating."[54]

Both these points are valid. It is unfortunate that the Minority Decision did not establish more clearly that, not only were these potential deficiencies in the process, they had in fact led to a wrong decision.[55]

Demonstrating the gold-plating and quantifying its possible extent might have been a critical contribution. The Majority Decision acknowledged (albeit in an indirect way) that the interconnector component had low incremental value, but only in qualitative terms.[56] In effect the Majority accepted that this additional investment was justified because no better alternative – or more precisely no alternative deemed feasible - was put forward. But the Majority was never pressed on magnitudes. The real question was, or should have been, whether this additional investment with substantially negative payoff gave good value (notably in terms of reducing or removing the alleged risk to TransGrid associated with unbundled SNI), or whether there was an alternative more economical way of securing that reduction in risk. The IRPC, NEMMCO, the Majority Decision and the Minority Decision all failed to come to grips with this question.

The potential contribution of the cost benefit tradition in economics

The Minority Decision suggests that NEMMCO should have sought expert economic advice. Although the uneconomic nature of the interconnector component of SNI should have been apparent from the ROAM modelling had the right questions been asked, NEMMCO never got to this point. There is therefore merit in the Minority's suggestion. A greater familiarity with, and sense of responsibility towards, the cost benefit tradition in economics could surely have remedied some of the more serious shortcomings in the process.

Specifically, one would hope that greater use of economic advice would have done some or all of the following:

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[54] Minority Decision, Appendix 1, p. 30. Some witnesses expressed a similar view. E.g. "Consumers should hardly have to bear responsibility for paying for an unnecessary (i.e. gold plated) transmission line [full SNI] simply because the regulated entity (TransGrid) has not managed its regulatory affairs responsibly." Thomas Reply, p. 57.

[55] To demonstrate this would not have been difficult. For example, as explained earlier, IES noted that unbundled SNI had a present cost of $41.2m while full SNI had a present cost of $98.4m, so unbundled SNI has to be given credit for whatever potential benefits would be obtainable by investing the difference of $57.2m. The question is then whether these benefits have a greater or lesser value than the additional expenditure on full SNI. This would then have led to the realisation that the additional expenditure of $57.2m in full SNI – namely on the interconnector component – had a negative value (-$86.9m) rather than a positive one, and that this surely could not have been the most efficient way to invest such money.

[56] Majority Decision, p.26, as cited above.

a) searched more actively for relevant alternative projects and scrutinised them more closely
b) avoided the unduly restrictive approach to the screening of alternative projects
c) looked for ways of making potentially beneficial projects commercially feasible instead of taking a premature judgement and eliminating them
d) been more sensitive to the incremental costs and benefits associated with components or variants of particular projects
e) sought out, identified and highlighted (instead of ignored, failed to identify and concealed) the possibility that particular components of a project could provide all or most or even more than all the benefits associated with the project as a whole
f) actively explored the most economic configuring of submitted projects
g) explored in more detail claims of risks associated with the potentially most beneficial projects, including the sources of such risk, their probability or likelihood, and the expected costs associated with them
h) explored possible and economic ways of mitigating any justified risks, including by alternative network design and by means of contractual or charging arrangements, in the context of the statutory objectives on the parties in question
i) insisted from the outset on a more explicit and accessible form of modelling, with wider and more informed discussion of results,
j) shown more cognisance of the relevant organisational incentives, as documented in the economic literature and as recognisable in practical experience, and their potential implications for the proposals, issues and decisions likely to arise in the context of the regulatory test.

The clear messages of the IES modelling (and perhaps the ROAM modelling too, had it been properly explained and analysed) are two-fold. Once Murraylink was committed, (a) it was economic to reinforce the State transmission systems so as to make best use of that interconnector, and (b) it was uneconomic to build a duplicate interconnector along the same route, at least at the present time.

With this insight, regulatory focus should surely have switched away from quibbles about whether reinforcing the transmission systems (unbundled SNI) constituted a viable alternative to the duplicate and uneconomic interconnector under the regulatory test. The interconnector part of SNI should no longer have been an option. Attention should have shifted to questions about the best way forward, and precisely how unbundled SNI could and should be implemented. The important issues were now the design, pricing and financing of the system reinforcement, the provision in the most economic way of any necessary protection against risk to the incumbent transmission system, and the appraisal of any implications for competition.

A number of specific questions would have arisen here. First, given that the system reinforcement was now to serve just the one interconnector (Murraylink) rather than two (Murraylink and SNI), would it be more economic to reconfigure the extent and nature of the system reinforcement relative to that embodied in unbundled SNI? Second, given that TransGrid would presumably have (or should have) a standard policy on pricing and financing and the bearing of risks to the extent that assets are constructed and costs

incurred and risks entered into on behalf of particular market participants, what did this imply in the present case, and would it need modification to deal with the new circumstance of an unregulated interconnector? For example, would some contribution or assurance normally be required from market participants and if so what kind of contribution or assurance would best protect TransGrid without unduly burdening Murraylink? Third, to the extent that there was legitimate concern about any market power that Murraylink would acquire, should TransGrid be required to consider that issue, or should it lie outside the scope of the regulatory test as then formulated, and outside the statutory duties of a transmission operator?

What steps should be taken in order to secure more use of economic expertise and a more constructively focused process? Could this be guaranteed actually to deliver the most economic outcome? Simply increasing the detailed specification of the regulatory test seems neither necessary nor sufficient. Given an experienced, independent and pro-competitive regulatory stance, the present wording would have sufficed to deal with the SNI proposal. This suggests attention to the constitution or role of NEMMCO. Strengthening the statutory duties on transmission licensees in line with responsibilities in a modern competitive market, and making provision for enforcement, would be helpful. But more may be needed, as suggested below, in order to secure an effective appraisal of potential investments.[57]

The ACCC's preliminary view on Murraylink's conversion to regulated status

On 18 October 2002 Murraylink applied to the ACCC for conversion from a merchant to a regulated interconnector – formally, for a decision that Murraylink's network service be determined to be a 'prescribed service' for the purposes of the Code, and that Murraylink be eligible to receive the maximum allowable revenue from transmission customers until 2012. It attributed its change of policy to regulatory uncertainty (see Appendix 1).

The ACCC's Preliminary View is that the assets can be classified as a prescribed service (i.e. conversion of status is possible).[58] In calculating the maximum revenue cap the ACCC applied the regulatory test. It compared the Murraylink interconnector against several alternative projects. This provides an interesting comparison with NEMMCO: would an experienced and independent competition authority take a different approach?

Consistent with the approach of the Majority Decision, and despite the criticisms of the Minority Decision, the ACCC seems to have accepted broadly the same framework and approach as NEMMCO, rather than undertaken a more explicit cost-benefit analysis. It was able to assess the costing of more alternative projects than NEMMCO did, but essentially because Murraylink provided more alternative costings to assess. It did not mention, or make adjustments to meet, two of the Minority's main concerns, related to

[57] Since the time of the SNI appraisal some changes have been made to the regulatory process (see Mountain and Swier 2002) but they do not address the concerns mentioned here.
[58] Murraylink Transmission Company Application for Conversion and Maximum Allowed Revenue: Preliminary View, ACCC, 14 May 2003. I am grateful to ACCC staff for some clarification of this report.

unequal capital expenditures or to the comparability of early more certain costs and later uncertain benefits.

Nonetheless, there were differences in approach. The ACCC did not require that alternative projects have a proponent. It did seem to take a firm line in adjusting the estimated capital costs of the alternative projects. For example, it reduced or eliminated the extent of undergrounding assumed by Murraylink. It used different cost of capital parameters (8.45% WACC instead of 9%) and significantly lower opex. In removing the capital costs of some features assumed by Murraylink (e.g. phase shifting transformers and associated spares) it took the view that projects were not required to provide precisely the same level of service in order to be considered alternative projects from the point of view of the regulatory test. The bottom line is that its proposed revenue cap was "approximately 50 per cent lower than MTC's proposed revenue cap".[59]

One of the alternatives considered was essentially the interconnector part of SNI. Partly because of undergrounding deemed necessary for environmental reasons, the ACCC's estimated cost of the interconnector part of SNI was above the cost of three alternative interconnectors apart from Murraylink. It was also four times the cost level implicit in the TransGrid and IES calculations relied on by NEMMCO and the Tribunal (see Appendix 3 below). Adding back the cost of the network reinforcement (unbundled SNI) puts the revised cost of full SNI above the top end of the ranges of benefits assumed by the IRPC, NEMMCO and IES. It thus seems extremely unlikely that full SNI would pass the regulatory test on the ACCC cost assumptions, at least without being significantly optimised downwards. Whether unbundled SNI would be justified cannot be deduced from the figures available. However, there can be no doubt that the interconnector part of SNI would not be justified as an efficient investment.

PART TWO: THE ANALYSIS OF MERCHANT AND REGULATED INVESTMENT

Merchant and regulated investment: the present analytic approach

The present debate about the relative roles of merchant and regulated transmission investment contains much reference to the potential disadvantages of merchant transmission. Surprisingly, however, it seems to provide no substantial indication of its potential advantages, or of potential disadvantages with regulated investment. So why not leave it all to regulated investment?

The main advantage of merchant investment in this literature seems to be that it places the risks of bad decisions and operations on investors rather than consumers.[60] Whether

[59] As it happens, NEMMCO's original approach to the regulatory test and the ACCC's changes to this approach both worked to the disadvantage of the merchant interconnector Murraylink.

[60] "… merchant investment's appeal is that it allows unfettered competition to govern investment in new transmission capacity, placing the risks of investment inefficiencies and cost overruns on investors rather than consumers, and bypassing planning and regulatory issues associated with a structure that relies on regulated monopoly transmission companies." (Joskow and Tirole, 2003, p. 16). "In the case of a merchant investment, investors would make the investment choices and take the business risk that alternatives might later alter the value of the investment. / In the case of regulated investment, it is regulators that would make

this is primarily an income distributional issue or has implications for resource allocation is not explained. However, cost functions seem to be taken as given, and there is no indication within this literature that the merchant approach might lead to better investment or improved efficiency, for example. The main disadvantage of regulated investment seems to relate to "planning and regulatory issues" and to "central regulatory decision problems".[61] However, these regulatory issues and problems are not explained.

This is not to suggest that the participants are unaware of the literature and evidence on competition and regulation. Indeed, many have contributed to the deregulation debates and experience of the last decade or so. The point is that these considerations are taken for granted in the above analyses, and do not play an explicit role in the models used to analyse merchant and regulated transmission investment.

Although participants in the present debate differ on the appropriate role for merchant investment, they do seem to agree on the kind of analytic approach (or model or paradigm) that will assist in making this decision. This approach and the existing results have been summarised as follows.

> Research on this model has focused almost entirely on simple cases where transmission investments are characterized by no increasing returns to scale, there are no sunk cost or asset specificity issues, nodal energy prices fully reflect consumers' willingness to pay for energy and reliability, all network externalities are internalised in nodal prices, transmission network constraints and associated point-to-point capacity is non-stochastic, there is no market power, markets are always cleared by prices, there is a full set of futures markets, and the TO/SO has no discretion to affect the effective transmission capacity and nodal prices over time.
>
> Under these assumptions, it can be demonstrated (a) that efficient transmission investments that create transmission rights satisfying certain simultaneous feasibility constraints will be profitable and (b) that inefficient transmission investments will not be profitable. (Hogan 1992, Bushnell and Stoft 1996, 1997) These two results are the primary economic foundation for relying on a merchant transmission model.
>
> …we examine how these results are affected by imperfections in energy markets, lumpy transmission investments, the stochastic properties of transmission capacity and the associated definitions of property rights, network operator behavior, coordination issues and extensions to account for loop flow. We find

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the choice and typically the customer would take the bulk of the risk flowing from the regulator's choice." (Hogan, 2003, p. 18)

[61] "… absent a bright line between merchant and regulated transmission investment, … the intended modest domain of planning for and funding regulated transmission expansion would expand …there is no logical or principled stopping point down this slippery slope. The end point would be with all investment in transmission, generation and demand defaulting to regulated investment…. The end state could be a recreation of the central regulatory decision problems that motivated electricity restructuring in the first place." (Hogan, 2003, p. 18)

> that the attractive properties of the merchant transmission model are seriously undermined when more realistic characterizations of transmission networks are introduced.[62]

In a nutshell, there is an efficient solution and the question is under what assumptions merchant transmission can deliver it. Whether regulated transmission could also deliver the efficient solution is part of a separate discussion[63]. How to choose between merchant and regulated transmission in the event that neither delivers the efficient solution, is unclear.

The broader context of economic analysis

The potential problems of merchant transmission, as described in the above quotation, are very relevant to the appraisal of policy, and it is helpful to analyse them in such detail. However, the question whether these potential disadvantages are worse than the potential disadvantages associated with regulated investment is not discussed. One of the other contributions explicitly acknowledges the need to compare imperfect alternatives, and briefly indicates a way forward.[64] The argument is well-known in economics generally, but may merit an outline here because it does not seem to be strongly reflected in the formal analyses of policy on transmission investment, and because a more explicit recognition and treatment of the overall picture may be fruitful.

The research described above is reminiscent of the debates among (primarily) mathematical economists that took place nearly half a century ago that centred on the following question. Given a set of cost and demand functions, assumed independent of the institutional structure, under what circumstances does there exist a set of prices such that a decentralised structure would yield the same "efficient" outcome as a centralised one? In such circumstances, the decentralised structure, or "competitive market", is said to be "efficient", and can be allowed to replace the centralised one without loss of efficiency. In other circumstances, there is said to be "market failure" of various kinds – for example, associated with monopoly power, inadequate information, externalities etc. In these latter circumstances, the implication is that the "competitive market" would be inefficient, unless subject to regulation that can ensure that the "efficient" solution is attained.[65]

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[62] Joskow and Tirole 2003, pp.5, 6, 60. Hogan 2003 responds to several of these arguments.

[63] E.g. Leautier 2000, 2001 and Vogelsang 2001

[64] "An initial task is to put the problem in context in terms of the criteria for evaluating market design components. An operating assumption here is that there is a tradeoff between imperfect markets and imperfect regulation. At present, there is no first-best solution available at either extreme to guarantee perfect economic efficiency in transmission investments. This should affect the form of the argument. It should not be sufficient to reject a design feature simply because under some conditions this design element alone would not produce the most efficient solution. Uniformly applied, this one-handed comparison would reject all proposals, including the status quo. Rather, the hybrid approach [to accommodate both merchant and regulated transmission investment] looks to a portfolio of methods that can work concurrently with tolerable friction in addressing most investment opportunities." Hogan, 2003, p. 16. Mountain and Swier 2002 also look at the pros and cons of each approach.

[65] This kind of model has already been widely applied in the electricity sector, for example to derive and justify spot and locational marginal pricing. E.g. Hogan (1992) and the many references therein.

Over time, the need to extend this approach has been recognised. Coase (1955) and Demsetz (1969) have argued against the implicit assumption that a centralised or regulated approach can achieve the "efficient" outcome (or, indeed, that there is such a unique efficient outcome). Public choice economists have emphasised and shown that there is "government failure" as well as "market failure". There is increasing recognition that competition should be seen as a process, not a static state, and that the effects of competition and regulation go beyond a comparative static analysis. The "new institutional economics" emphasises that there are transactions costs and that institutions matter. All this suggests the need to compare realistic policy alternatives directly, rather than to appraise the "market solution" against a theoretical benchmark.

From this perspective, the case for competition or merchant transmission does not depend on it yielding the "efficient solution" to an optimisation model involving given cost and demand functions, with given products and constraints.[66] In consequence, the case for merchant transmission is not reduced by the claim that certain assumptions of this model are not met, so that there is "market failure". It also has to be asked whether there would be "regulatory failure", and if so the critical question is which failure would be worst.

The economic case for merchant transmission versus regulated transmission might be couched somewhat differently. It is essentially the same as the economic case for competition versus regulation in the electricity market generally and in the economy as a whole. Setting aside more philosophical issues (e.g of freedom of choice), the economic case for one mode versus the other turns on comparative performance.

In brief, the case for competition is that, for the most part, the market is more likely to discover, invent and provide, more quickly and more effectively, those goods and services that customers want and are prepared to pay for, than are regulated companies. (And less likely to provide those goods and services that customers are not prepared to pay for.) The market is also more likely to find cheaper and more effective ways of providing these goods and services. The market tends to reward those who succeed in these respects, and give them greater power over the allocation of resources in future. This is not to say that a market will never make mistakes. But the penalties for failure are such that, in general, a market is more likely to recognise more quickly when mistakes have been made and to take the necessary remedial action, and those who fail in any project tend to lose control over the allocation of resources in future.

There may of course be disadvantages or limitations of markets in particular circumstances. Market power might limit output, capacity or innovation. Uninformed customers might fail to choose in their best interests. If there are externalities and high transactions costs, the interests of some market participants might be inadequately taken into account, some potentially beneficial investments might not be made and some harmful ones might be, and so on.

[66] In fact, the case for preferring regulation or the market is largely based on the premise that there is not a given set of parameters. The point is precisely to change the cost and demand functions, the products and constraints, and hence the way in which the whole process works.

However, these “market failures” alone do not make the case for regulation. It needs to be shown both that regulation could improve the situation in these respects and that these improvements would more than offset the potential disadvantages of regulation. Gold-plating and empire-building are the best known examples of the latter. More generally, the attenuated incentives associated with regulation will tend to limit the ability of the market to discover and meet customer demands at least cost, to innovate, to respond to new information, and to allocate control over resources to those most able to meet the needs of customers. Instead, resources tend to be used to meet the preferences of the regulators, and those to whom regulators are responsive. Depending on the context, these may include political interests and incumbent operators.

The choice is therefore between regulation and the market as imperfect alternatives. More usually, the question is how to design arrangements that best accommodate the advantages and minimise the disadvantages of each approach.

Comparing merchant and regulated transmission investment

Joskow and Tirole point out the likely problems with merchant transmission in the face of imperfections in energy markets, lumpy transmission investments, the stochastic properties of transmission capacity and the associated definitions of property rights, network operator behavior, coordination issues and extensions to account for loop flow. Let us grant all these problems (though some would challenge them), and accept that, as a result, the signals to investors would at best be workable approximations to “efficient” ones, and perhaps rather poor. In consequence, the nature and extent of merchant transmission investment would be distorted compared to what would eventuate in the absence of these complications. It is quite possible, for example, that some desirable transmission lines would be undersized and others not built at all.

But by the same token these same phenomena can be expected to cause problems for regulated investment too. Market power or its perception can be used to justify excessive investment in transmission. Lumpiness can encourage pre-emption by incumbent regulated operators as well as by merchant entrants. Whatever physical and financial property rights are established can affect the incentives for and evaluation of regulated investment. As just accepted, the discretionary behaviour of transmission operators and system operators with respect to despatch and maintenance can impact on capacity and reliability, and this raises problems for incentivising and regulating those operators. But these problems are not avoided, and might be exacerbated, by a greater rather than lesser scope for regulated action. Also as just accepted, loop flows present a particularly challenging problem of defining property rights contingent on changing market conditions and the policy of the system operator. But loop flows also present a challenging problem of making the right decisions about regulated investment in the absence of whatever information might be provided by those (no doubt imperfect) property rights. Coordination between generators and transmission owners involves transactions costs under either approach, and it is possible that regulated transmission would be less interested than merchant transmission in minimising and overcoming those

costs, or more selective in doing so. Internalising decisions may economise on some costs, but possibly at the expense of bringing less information to bear or subjecting it to less informed scrutiny. Merchant investment might be difficult to finance, more risky than substitutable projects with shorter lead-time like generation, and vulnerable to regulatory uncertainty and opportunism. But risk is a real consideration regardless of which approach is adopted, and regulated investment could by the same criteria be too easy to finance, not appreciated as sufficiently risky compared to shorter-term substitutes, and possibly more vulnerable to regulatory uncertainty and opportunism.

It is possible that some of these difficulties can be reduced by careful and ingenious choice of the regulatory framework, as some authors have suggested. However, in general the nature and extent of regulated transmission investment would still be distorted compared to what would eventuate in the absence of the above complications. It is quite possible, for example, that some transmission lines would be oversized and other ones built when economic considerations indicate that they should not be built at all.

The problem is to choose the lesser of the two sets of evils. Theoretical analysis can be helpful here, but also needed is an understanding of how alternative approaches work in practice, and empirical evidence of the likely magnitudes of these costs and distortions.[67]

Experience with Australian interconnectors can make a small initial contribution here. Admittedly these interconnectors do not exhibit the typical problems of "network deepening", nor do they depend on the definition and implementation of sophisticated locational property rights (such as nodal prices or Financial Transmission Rights). Nonetheless, to a greater or lesser extent they have involved imperfect energy markets, lumpy investment, stochastic properties of transmission capacity, and issues of network operator behaviour, coordination and loop flow.

Australian experience shows that several of the behavioural incentives referred to earlier have been significant in this particular context.[68] For example, the merchant interconnector has been innovative and implemented quickly.[69] It may have taken advantage of an opportunity under consideration by the incumbent transmission company, but there were no suggestions ex ante that the investment was wrongly sized or

[67] See again Coase, 1955

[68] The characteristics of private versus public utilities, and of regulated versus unregulated private companies, have been extensively analysed and documented in recent years, not least in the electricity sector. See De Alessi 1974 for an early survey of the literature and Wolfram 2003 for recent evidence on the effect of restructuring the US generation sector (in effect, transferring it from regulated to merchant operation).

[69] "Murraylink … includes the world's longest underground power cable (180 metres). … Because of the technology chosen, MTC was able to bring this new asset to market in record time, while gaining community acceptance and environmental awards." ACCC Preliminary View (pp. i,ii) "The Murraylink Project has set an Australian record by installing a major power interconnector within just 33 months – from conceiving,, designing, licencing, permitting and building through to commissioning stage. The 176km underground Murraylink interconnector cable was laid in less than 10 months. … The secret to the rapid assembly program is the modular format of the 'HV/DC Light' equipment. Much of it could be pre-assembled and tested." Murraylink Project Update Flyer, 13 August 2002, on www.transenergie.com.au/june/murraylink.html

mistimed.[70] In contrast, the regulated interconnector has exhibited serious gold-plating and has been the subject of repeated delay. However, because the regulated investment is inefficient, this delay has been beneficial to users rather than harmful.[71]

The economic literature has predicted and shown evidence of political influence on regulated investment[72]. There has been political involvement in Australian interconnector regulation from the earliest days.[73] A not-insignificant part of the evidence before the Tribunal sought to establish or refute allegations in the instant case. The Tribunal found that "NEMMCO's decision was not relevantly adversely affected" by a telephone call from a Minister's office. However, of the existence and nature of political involvement there was no doubt.[74]

Compatibility of merchant and regulated transmission

Australian experience has indeed been characterised by controversy, litigation and delay. Is it possible to envisage an arrangement that does not have such problems? Does Australian experience reflect only a transitional stage in the development of a competitive electricity market?

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[70] It has been alleged that experience is different with the other merchant interconnector. "A further factor suggesting that Directlink was built to inefficiently small scale is the fact that the ACCC assessed QNI as an appropriate investment, and the full cost of QNI has been included in the owner's regulated asset base. Thus QNI, with up to four times the transfer capacity of Directlink, was still found to be efficient even though it became operational 7 months after Directlink. Given the economies of scale in transmission it can be argued that it would have been more appropriate to only build one interconnection at that time." TransGrid FERC Comments, pp. 13-14. An analysis of QNI and Directlink is beyond the scope of this paper, but experience to date suggests that the fact that a regulated interconnector has passed a regulatory test is no confirmation whatsoever that it was efficiently sized or that its rival was inefficiently sized. The example does suggest that merchant investors need to balance possible cost reductions against the risk of overestimating market demand, a risk that may be ignored or underestimated by a regulated interconnector. The size of a merchant interconnector also needs to be related to the available system capacity, whereas a regulated interconnector proposed by an incumbent operator may be able to assume further system investment that may or may not be fully costed into the proposal.

[71] Actual experience on size of merchant interconnector and (in)efficiency of regulated investment are thus contrary to the suggestion in Mountain and Swier 2003.

[72] E.g. Joskow, Rose and Wolfram 1996 on executive compensation, which some have suggested could impact on hiring decisions, utility performance and resource allocation.

[73] This includes public commitments at Ministerial level and by the NEM Ministers Forum to greater interconnection between the States. See in addition the role of NSW government in securing revision to the regulatory test (Appendix 1). TransEnergie has also alleged that there were conflicts of interest with the membership of the IRPC and its consultants and with TransGrid itself. E.g TransEnergie FERC submission pp. 31-4

[74] "It is also alleged that, in the course of that [telephone] conversation, Mr Price [consultant adviser to the Minister] told Mr George or Mr Bones [of NEMMCO] that if NEMMCO did not make a determination that in its opinion the proposal [SNI] was justified, there was a possibility that NSW might withdraw from the NEM. There is some dispute about what was actually said in this conversation. The Tribunal accepts that Mr Price made a telephone call and insisted that a decision by NEMMCO be made quickly and that the Minister wanted a decision which favoured TransGrid's application. … The circumstances that the Minister was pushing for a decision of the type he broadly favoured within the time originally stated by NEMMCO does not, in our opinion, raise any implication that NEMMCO succumbed to pressure by the Minister concerning its determination. It may have influenced NEMMCO to make a decision in December 2001 instead of waiting another 3 weeks…." Majority Decision, p. 41-2

One view associates problems with the nature of the regulatory test, and seeks to streamline and simplify the arrangements for regulated investment so that it recognises the competition benefits of interconnectors and does not unduly favour non-regulated investment".[75] Another view is that problems are to be expected where incumbent networks are still characterised by state-ownership and a regulatory framework (with political elements) that have not yet come to terms with the full implications of a competitive market, where there is a lack of clarity about policy,[76] and where incumbent transmission owners have undue influence.[77] A third view is that controversy, litigation and delay are inherent in the process, and that peaceful co-existence is impossible.[78]

An implication of Australian experience to date is that there may be more danger of excessive than thwarted regulatory investment. Even with reform, merchant transmission could remain vulnerable. Hogan (2003) is led by a somewhat different route to a similar dilemma. Regulated investment is liable to crowd out merchant investment. He therefore looks for a "bright line" or decision rule to identify what sort of transmission investment should be merchant and what sort regulated. Commenting on the list of problems raised by Joskow and Tirole, he suggests that some of these have been solved, some apply in any regulated market, and some are of second order importance, but some are "significant and possibly insurmountable for merchant transmission alone." (p. 16) He considers that the most prominent examples of the latter arise from economies of scale and scope, where an economically large expansion of transmission capacity would be worthwhile but would so reduce the price differentials in the network or would involve such transactions costs that the investment would not be profitable, and hence would not get

[75] Findings of NEMMCO working group reported in Issues Paper: Review of the Regulatory Test, ACCC, 10 May 2002, p. 6.

[76] "The energy sector governance arrangements are confused; there are perceptions of conflict of interest; electricity transmission investment and operation is flawed; and the financial contracts market is illiquid, in part reflecting regulatory uncertainty. The Parer Report recommendations have not received unified support from State and Commonwealth Governments or from the electricity industry. Consequently, a clear program of reforms to the NEM institutions, governance and national transmission planning has yet to be devised."

[77] "Perhaps the single most significant lesson from the Australian experience is the importance of ensuring that the incumbent regulated transmission owners do not control or exert any undue influence over the transmission planning process. Allowing such control over planning by incumbent transmission owners effectively kills market-based transmission investments and further stifles any competitive pressures on the incumbent transmission owners." Comments of TransEnergie Australia Pty Ltd on Standard Market Design, NOPR Standard Market Design, FERC Docket No RM01-12-000, February 2003, p. 4.

[78] E.g. the regulatory test "involves a complex, time-consuming and indeterminate process which is open to gaming" and potential delays are "due, in part, to the inability of regulated and non-regulated interconnectors to co-exist efficiently in the NEM". ACCC, Issues Paper: Review of the regulatory test, 10 May 2002, p. 6. "Experience to date indicates that application of the regulatory test is a time-consuming exercise, and one that is prone to extensive dispute. Moves to broaden the scope of benefits and costs included in the test – such as to include the benefits from enhanced competition in the generation sector – although justified, would exacerbate this problem, particularly where the benefits and costs were difficult to measure. / In light of the potential for the benefit of transmission investments to involve the net effect of both large winners and large losers, the tendency for regulatory processes to become contentious, lengthy and litigious should not be unexpected." NERA, Appendix B p. xvi in TransGrid, FERC submission.

made. This leads to a possible decision rule: limit regulated transmission to "large and lumpy" transmission investments and leave everything else to the market.[79]

Hogan is surely right to recognise that, without an appropriate regulatory framework, some economically beneficial transmission investments might not be made on a merchant basis. His challenge is to identify the regulatory conditions that will support such investment without undermining merchant transmission in the larger market. From the perspective of this paper, two main questions arise about the specific bright line proposed.

First, as to whether large and lumpy investments are difficult to organise in the market, some have questioned both the extent of economies of scale and the magnitude of negotiation costs.[80] However, even if the proposition were accepted, might it not also be the case that large and lumpy investments offer altogether too much scope for exploitation in the event of regulated investment? Large and lumpy investments would seem just as vulnerable to gold-plating as small and divisible ones. Indeed, private sector commercial disciplines might be most needed for large and lumpy ones.

Second, can one be quite sure that merchant investment is indeed feasible for small and divisible investments? This assumes, for example, that locational prices and transmission rights would emerge with sufficient clarity throughout the network, that adequate provision could be made for integrating new capacity into the existing system, and that these arrangements would command the confidence of investors, so that merchant transmission could be relied upon to make all the fine-tuning investments required. All of these propositions have been challenged. Is there not a possibility that achievement of all these conditions could be patchy, so that reliance on merchant investment alone could be risky? And is it not also possible that, in some circumstances, merchant investment would involve higher costs or more disruption than regulated investment to define the necessary property rights?[81] If the scope for gold-plating could be constrained, could regulated

[79] "In these [large and lumpy] cases, only large coalitions would be able to justify a merchant transmission investment, and these coalitions would be difficult to assemble. The alternative then would be to turn to a regulated investment that, in effect, compels participation in the coalition./ … This argument then suggests a decision rule that would draw a line between merchant and regulated transmission investment. Regulated transmission investment would be limited to those cases where the investment is inherently large relative to the size of the relevant market and inherently lumpy in the sense that the only reasonable implementation would be as a single project like a tunnel under a river. Further, "large" would be defined as large enough to have such an impact on market prices that the ex post value of incremental FTRs [Financial Transmission Rights] and other explicit transmission products could not justify the investment. Everything else would be left to the market." Hogan 2003, pp. 22-3

[80] "For example, the capacity at which modern DC transmission projects realise economies of scale begins at roughly 200-300 MW, comparable to a modern combined-cycle, gas-fired generation unit. FACTS [Flexible AC transmission system] devices reach the economies-of-scale plateau at capacities of less than 100 MW, comparable to a modern peaking generation unit." "The developer of a proposed merchant transmission project will not negotiate with thousands of end users; instead, it will negotiate with relevant market participants – in practice, a handful in number and largely wholesale in nature." Rotger and Felder 2001, pp. 34, 37

[81] For example, "network deepening investments can, as a practical matter, only be implemented efficiently by the owner of the existing lines. Defining an efficient 'competitive access to deepening investments' policy is likely to be extremely difficult." Joskow and Tirole, 2003, p. 12.

investment not be on balance the preferable option for at least some of the small and divisible investments?

In other words, there may be "market failure" for large and lumpy transmission investment, but before concluding that regulated transmission would be more efficient we need to consider the possibility of "regulatory failure". Similarly, there may be prospects that the market will 'work' for small and divisible transmission investment, but we need to consider the possibility that it may not, and that even if it does regulated transmission may work better there. If a 'bright line' is drawn, various bases deserve consideration – for example, between what Joskow and Tirole call independent network extension and market deepening investments. Australian experience suggests that interconnectors are entirely feasible as merchant plant but problematic as regulated investment. However, it is possible that interconnectors are not typical of transmission investments generally[82] and that Australian conditions are not typical of regulation generally. One would therefore like more comparative evidence about actual experience to support a policy decision that certain kinds of transmission investment should be reserved to each kind of approach.

Investment risks and information feedback mechanisms

Most contributors agree that at least some regulated transmission will be necessary. It therefore seems worth exploring whether some of the disadvantages of regulated transmission can be ameliorated by appropriate design of the regulatory framework. To that end it is helpful to examine a little more closely the source of one of the central disadvantage, namely the concern about investment appraisal.

Half a century ago, there was debate about the merits of marginal cost pricing for public utilities. The proponents urged that this policy would improve the allocation of resources. The sceptics argued that pricing policies had implications not just for outputs but also for obtaining information, particularly about whether customers valued the product more than the total costs involved in supplying it. Information feedback was therefore a consideration in the choice of pricing policy.[83]

So it is with transmission investment. As noted, several authors mention the advantage of merchant transmission putting the risks of bad decisions on investors, and the

[82] "I think that interconnectors between large regional markets that are often disconnected due to congestion have the best prospects for supporting merchant transmission because the property rights are easier to define credibly, the investments are not physically intertwined with existing facilities, the price differences are likely to be large and not much affected by a merchant line that is small relative to the sizes of the markets, and especially if the investors can support a significant portion of the debt with long term contracts for capacity." P. Joskow, personal communication, 8 June 2003.

[83] "None of the original advocates of marginal cost pricing seems to have given, in my view, sufficient weight to the stimulus to correct forecasting which comes from having a subsequent market test of whether consumers are willing to pay for the total cost of the product. I do not know how one could discover whether people would be willing to pay for something unless, from time to time, they are put in a position in which they can only obtain it by paying for it. Furthermore, it is easy to see that such estimates will be less carefully made in circumstances in which it was never possible to discover whether the estimate on which the decision was based was correct or not." Coase, 1970, p. 118.

corresponding disadvantage of regulated transmission putting such risks on consumers. This has implications for both distribution and resource allocation. There is, however, a further impact: on the ability to assess, monitor, and respond to the success or otherwise of the investment decisions. The Australian regulatory test illustrates this.

The ex ante appraisal of merchant investment requires an estimate of numerous factors, including demand, supply, costs, new generation, differential prices in different markets, the willingness of traders to contract ahead for interconnector capacity, and so on. This is difficult enough, and investors focus mainly on observable outcomes within a workably short planning horizon. Appraising regulated investment under the regulatory test requires this and more – including, for example, estimates of unobservable outcomes such as delayed investment and consumer surplus.[84]

A remarkably large proportion of the calculated benefits of the regulated or merchant interconnectors in Australia has been associated with estimates of unobservable *avoided* generation capacity. In the case of SNI, approximately 75% to 85% of the total benefits resulted from the projected deferral of investment in generation. Moreover, "Over 80% of the NPV of SNI comes from 'residual' benefits calculated in the period after Year 10, i.e., beyond any reasonable planning horizon and therefore of doubtful accuracy".[85]

Estimating the amount of generation that will be built in future is difficult enough; estimating the amount that will *not* be built seems heroic. Importantly, there is no obvious means to check the accuracy of the projections ex post. Whether projections underlying investment in merchant generation have been accurate shows up in the ensuing net revenues (or lack of them). But with regulated transmission, how is one to check the amount of generation that is not built and what it would have cost?[86]

The ability to learn from experience, and to take remedial action, depends on the ability to appraise investment decisions ex post. Reviewing the adequacy of merchant investment is a continual process for shareholders and analysts, with rewards in the event of success and severe consequences for managers and owners in case of failure. In

[84] The regulatory test normally requires a projection of "such benefits as lower average fuel costs, delayed investment in generation and increased consumer surplus associated with more efficient allocation of energy … Application of this test is a time consuming and intensive process with a need to model energy prices and generation investment under a range of scenarios. The test generally takes at least 1 year to finalize." TransGrid FERC Submission p. 8. Mountain and Swier 2003 identify a number of other problems of appraising transmission investment plans.

[85] Cook Statement para 215, cited in Minority Decision, Appendix 1, p. 30. In the case of QNI, the benefit of avoided generation capacity accounted for $571m out of total estimated benefits of $662m, or 86%. Benefits from energy trading were only $56m, or 8%. Cook and Coxe, p. 5, citing 1987 Submission by TransGrid and Powerlink to ACCC.

[86] To the extent that such a check has been attempted, it casts doubt on the original calculation for QNI. Cook and Coxe (pp. 5-6) note that the claimed $571m benefits of QNI derive from avoided generation of 400MW in Queensland in 2001-3 and 350MW in NSW in 2006/7. They point out that some 4510 MW of capacity additions were planned for Queensland by 2002, and suggest that QNI will provide little if any avoided generation benefit to Queensland. They argue that there is no reason the market would not respond with new generation projects in NSW too, calling into question the avoided generation benefits there as well.

contrast, the mechanism for reviewing regulated investment is occasional at best.[87] Whether the regulator could amass enough evidence to justify taking action, or would wish to, is a debateable question, but it is unlikely to be as effective as the actions of investors vis a vis merchant generation.

Are there perhaps other ways of achieving the advantages (and minimising the disadvantages) of regulated transmission? If the aim is to discover and respond to the needs of market participants, there is benefit in subjecting projects to market disciplines. FERC and others have considered a 'request for proposals' (RFP) process that could involve a 'competitive solicitation process'.[88] This could help secure innovative and efficient construction to meet identified needs, thereby reducing the scope for gold-plating. But does it ensure a prudent identification of those needs in the first place?

As has been recognised, arbitrage trading is not the only way of financing merchant projects. The potential beneficiaries of a transmission investment could finance its costs more directly, by agreeing to pay for its construction. Requiring the consent of users to 'user pays' financing could bring significant market discipline to bear on regulated transmission. It might also be adapted to assist in financing merchant transmission. Is it possible to find ways of facilitating and implementing such 'user pays' arrangements?

Organising such negotiations between market participants is perceived to be difficult or impossible.[89] It is suggested that experience in Argentina demonstrates this.[90] It therefore seems worthwhile to examine this experience a little more closely.

Transmission regulation in Argentina

[87] "The advantage of non-regulated network services to buyers and sellers of power is that the value of a non-regulated network service is effectively reviewed by the market place at every market interval (in the Australian market this corresponds to every five minutes). In essence, the spot market continuously values a non-regulated network service in accordance with the decentralised decisions of all market participants. In contrast, regulated network services are reviewed by the regulator (not the market), and the review is conducted only every five years (instead of every fifteen [sic] minutes). Thus if a non-regulated network service is not utilised or valued by the market there is no charge to the market participants, and the network service provider suffers financially. However, if a regulated network service is not utilised or valued by the market there is still a charge for the remainder of the regulatory review period, and the captive customers suffer from the cost of the underutilised asset." Cook and Coxe, 2001, pp. 2-3.

[88] Rotger and Felder 2001, p. 38

[89] "It is sometimes argued that the problems created by lumpy investments can be resolved through negotiations between the various market participants who will benefit from the investment. That is, that the 'Coase theorem' applies. There are many reasons … to believe that negotiations among the affected market participants is unlikely to solve the problems." The suggested reasons are: transactions costs (especially when the number of stakeholders is large), asymmetric information, absence of future players, non-excludability of winners and free riding, and hold-up of potential losers. Joskow and Tirole 2003 pp. 52-4. Also Hogan, 2003.

[90] "Mechanisms designed to aggregate stakeholder preferences to make choices about major transmission investments have not been particularly successful." Joskow and Tirole 2003, p. 51, citing Chisari et al 2001 on Argentina.

Under the present regulatory framework in Argentina, incumbent transmission companies are not responsible for expansion. Major new transmission investments take place only where users vote in favour of them, and are prepared to pay.[91]

There have been criticisms of Argentine experience with this approach, generally focusing on delay in securing investments.[92] Chisari et al (2001) attribute this to limitations in the design of the Public Contest payment mechanism.[93] They use some examples from a simulation model to identify flaws in that mechanism. In summary, these are the exclusion of consumers from the mechanism, the exclusion of market participants in the 'swing bus', the assignation of votes and fees based on usage rather than profit, and the possibility of strategic vetoes on expansion.

As ever, in evaluating any policy, the need is to look at what the alternative would have been or might be. Here, the context is very significant. The previous policy in Argentina was part of a "tremendously distorted regulatory regime" with investments based on political decisions, excessive investments in generation capacity and to a lesser extent also in transmission facilities, financed in large part through increased debts and transfers from the treasury, with tariff increases delayed to control inflation, thereby encouraging further consumption growth while distorted financial incentives favoured investment in new assets rather than operational expenses.[94]

In these circumstances the priority was to change all this, and to find a way of limiting transmission investment to what users wanted and were prepared to pay for. Some experienced participants in the process have suggested that, in many respects, the Argentine approach has worked quite well. For example, it did get lines built, broadly to

[91] "In high-tension transmission a single company has been created, that cannot buy or sell energy or deny access to any agent willing to pay the established non-discriminatory charges. This company is responsible only for the operation and maintenance of the lines and transmission facilities but not for expansion, and so earns a fixed remuneration subject to penalties. / Given that the transmission utility company is not obliged to invest to satisfy the growing demand, three mechanisms have been established to decide about expanding the grid. Two of these mechanisms are designed to provide the legal framework for minor and relative size expansions… The third one, called Public Contest, is designed to provide large investments needed to satisfy growing demand … / In the Public Contest method, expansions are decided and financed by the parties that the regulation considers to be the users of the grid: generation; distribution companies; and large users. To decide on possible expansions, these users must vote. If more than 30% of the votes are cast in favour of the expansion, and there is not a corresponding 30% of the votes against it, the expansion is passed. If votes favour expansion, the regulatory agency calls for a public bidding for the construction, operation and maintenance of the new line. The company receives a fixed annual fee over a 15 year period for the construction and operation of the line and earns transmission fees similar to the original high-tension transmission utility. / These fees are paid by parties that the regulation considers to be users of the new line." Chisari et al (2001), pp. 699-200

[92] "Much needed investments (construction of a fourth transmission line linking the main generation center to the main load center, the city of Buenos Aires) have been retarded by many years." Leautier 2001, p. 45.

[93] "While the transformation of the Argentine electricity market in the last decade has positively affected generation and distribution performance, most agree that current regulation has failed to spur needed investments in high-tension transmission. The lack or delay of such investments arises from problems in the willingness-to-pay revelation under the Public Contest mechanism." Chisari et al, 2001, p. 713.

[94] Spiller and Viana (1996)

the extent that users wanted, and it allowed effective competition to build them.[95] Another participant confirms that "In spite of the inability to hedge benefits from transmission investments, the Argentine system of encouraging transmission investments did work albeit slowly."[96] He welcomes the 'user pays' principle.[97] He points out additional merits of the process – for example, it has incentives not only to use known methods to improve reliability but also to discover new opportunities for improving performance, with consequent improved information about the transmission system.[98] The arrangement also facilitates financing of large projects.[99] Interestingly, in light of the 'bright line' proposal discussed above, the arrangement does not insist that smaller transmission projects have to go through this Public Contest mechanism.

Of course, these observations from experience do not carry the status of documented research. There is also general agreement that the mechanism is not perfect. But the aim has so far been to improve it rather than to replace it.[100] Some remedial measures may

[95] "Transener [the Transmission company] could participate in the construction of the grid (of the lines required by the Market) only through competitive bidding. Some 2500km of new lines were built under this regulation in five years. Transener won the expansions along its existing corridors (where it had an advantage) and lost the expansions along new corridors (where the field was leveled)…. / I don't really agree with those who think 'that current regulation (in Argentina) has failed to spur needed investments in high tension transmission'. Actually I think that the transmission regulation in Argentina has been rather successful in promoting private investment in transmission, in a competitive environment, and providing appropriate economic signals to agents, both to build and to stop building. The result is a grid transmission capacity fairly [well] adapted to what the market needs and (very important) was willing to pay to meet the quality of service standards required by the regulation. There were of course problems that the regulation didn't solve or solved poorly. But as far as I know those problems haven't been solved in any other regulatory system elsewhere." L M Caruso, formerly National Director of Coordination and Regulation at the time of restructuring, later first Executive Director of the Independent System and Market Operator (CAMMESA), now Director General, Mercados Energeticos, personal communication, 15 May 2003.

[96] J D Roark, formerly Power Market Analyst, Southern Electric International (involved in building the 'fourth line'), now Senior Strategic Planning Advisor, Tennessee Valley Authority, personal communication to W W Hogan, 24 April 2003.

[97] "The key is that it lays the responsibility for proposing projects on the market participants that would have to pay their revenue requirements. Those who don't benefit from the project don't have to pay for it." Roark, personal communication to Hogan.

[98] "Capacity prices in the outlying regions were penalized if the connections to the market were not reliable, thereby adding a price signal to encourage participants to improve system reliability. Consultants would crawl the system looking for places to install things that would improve stability and eliminate constraints, or that would improve the unreliable links. You end up with a lot of people knowing quite a lot about the transmission system." Roark, personal communication to Hogan.

[99] "I have always admired the transmission enhancement feature of the Argentine market. It needs financial rights to make it complete, but it works as it is. Though it is facilitated by the relatively simple spider-radial nature of the Argentine system, there are some very important features of this procedure that modern-day proposals lack. In particular, when a line is accepted as a legitimate system procurement by CAMMESA and by (at least 70% of) the beneficiaries, it takes on an official stature. It will have the same revenue-collection status as any regulate line; its costs will be billed out over time, and they will be collected under the existing transmission tariff. The credit of the market stands behind the project, and this makes the project financeable. … In short, for me it stands out as a better thought-out idea than most of the modern day proposals." J D Rourke, personal communication, 23 May 2003.

[100] "Informed commentators (e.g. Spiller and Torres 1996) have attributed this delay [in constructing the fourth line] to institutional features: difficulty in coordinations, free-rider problems, inappropriate measure

have been implemented since the cited research and experience identifying the problems of incentives and delay; other reforms may themselves have been delayed[101]; yet other reforms may be needed. But I am not aware that anyone is suggesting changing the system to the more conventional regulated transmission model or restricting it to merchant generation in terms of arbitrage trading. Certainly the authors of the most thorough study to date are looking to improvements and not to abolition.[102] The Argentine model therefore deserves further examination and research as a possible alternative (or complement) to regulated and merchant transmission models.[103]

Conclusions

Australian experience with regulated and merchant transmission lines has indeed been characterised by "controversies, litigation, delays and inefficiencies". A widespread perception is that the merchant line Murraylink was able to use litigation to delay the implementation of an economically desirable regulated line SNI, hence the inefficiencies.

It has been argued here that the reality is the opposite. Views differ about the extent of market power of the merchant line, and about whether this would cause stranding risk if the incumbent transmission company were to invest in reinforcing the transmission system alone. However, regardless of what view is taken on those issues, the modelling

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of benefits, etc. – and have suggested remedial measures to foster transmission investments by groups of users." Leautier, 2001, p. 45.

[101] "Of course investment in new lines stopped because of the collapse of the Argentine economy at the end of 2001 and therefore the changes introduced that year to increase the incentives to invest in transmission are not proved yet." Caruso, personal communication.

[102] "We still maintain that the problems with the present system are basically those summarized from our paper. We think the system can be improved, not necessarily abolished; some of the corrections are purely technical. Exclusion of consumers and markets participants in the 'swing bus': this is just a matter of correcting the present mechanism (to include Buenos Aires). We think that if those gains had been computed earlier, the fourth line would have been constructed some years before it was. Assignation of votes and fees based on usage rather than profits: again, this can be corrected with a good estimate of true economic incentives (or perhaps including the 'swing bus' in the calculations is enough as a proxy for economic incentives). Strategic vetoes: this problem can be addressed from the perspective of competition policy. The same problem would be present in several other mechanisms. However, there are problems that influence transmission investments but that are not intrinsic to the decision methodology. On the one hand, Distribution Companies under the present tariff regulation (full pass-through of cost of energy to customers) do not have the incentive to look for better prices or to establish contracts with generators and therefore to invest in transmission. On the other hand, uncertainty and lack of agreement about the growth of demand, investment indivisibilities and capital market imperfections tend to delay investments. Transmission rights do not seem to be a solution. Those same problems of imperfections in capital markets justify our scepticism on physical or financial rights to foster investments. The present mechanism, corrected, can get the same results without paying the costs of dealing with a new market of uncertain efficiency and competition policy problems (in a "small numbers" economy). Of course, several of these issues deserve more discussion and research." Omar O. Chisari and Carlos A. Romero, personal communication, 9 June 2003 (abbreviated with the agreement of the authors).

[103] For example, it would seem of particular interest to understand how far distribution companies can be taken as representing the interests of smaller customers. If they can pass through additional transmission costs to customers, why would they care about costs? If they cannot, why would they support an investment? The nature of regulation is clearly important in this.

evidence put forward by the incumbent transmission company itself shows that the network reinforcement part of the proposed investment was potentially economic but the interconnector part, which duplicated the merchant interconnector, was uneconomic.

The Tribunal Majority Decision recognised this, but unfortunately failed to examine how the alleged stranding risk could be removed, either by reconfiguring the investment or by contractual arrangements. By default, the Tribunal Majority was led to conclude that the proposed investment as a whole was justified. Separate calculations by the ACCC have subsequently confirmed the uneconomic nature of the proposed regulated interconnector.

This has implications for the analysis and evaluation of alternative modes of transmission investment. Much of the literature has focused on whether or not there is 'market failure' and, separately, on possible methods of regulation. Since each mode has advantages and disadvantages, it is ultimately necessary to consider the pros and cons of each mode relative to each other. It is therefore important to establish what attributes of each mode are important in practice.

Australian experience suggests that inefficiencies due to gold-plating by regulated transmission, to which the Tribunal Minority drew attention, are a real concern. This means that there is likely to be too much rather than too little regulated transmission investment, from the perspective of users of the system. But in some circumstances merchant transmission may be infeasible or more costly, in which case the question may well be how best to provide for regulated investment. Clearer obligations and restraints on incumbent transmission companies and regulatory bodies would be helpful where these are lacking, but may not be sufficient.

There would seem merit in requiring approval and financing of investments by potential users rather than by the regulator. This could bring more market discipline to bear on regulated transmission, and also possibly facilitate merchant transmission. There is a perception that it is difficult or impossible to organise negotiations between market participants, and that experience with such a system in Argentina demonstrates this. However, although there have been problems there and no doubt still are, the system has undoubtedly worked and has certain advantages over other approaches. Present thinking seems to be to improve rather than to replace it. This approach merits further research.

Which type of approach is preferable thus depends not only on the technicalities of electricity markets and transmission operation, but on how well each type of approach copes in practice with the problems involved. It is also relevant to consider whether development of the transmission system should be primarily responsive to customers and transmission users or to regulators and transmission providers. As Humpty-Dumpty said to Alice, "The question is, which is to be master - that's all".[104]

[104] Lewis Carroll, *Through the Looking-Glass*, London: Andrew Dakers Limited, p. 149.

Appendix 1: The historical background

TransGrid, SNI and the Regulatory Test[105]

TransGrid is the publicly owned Transmission Network Service Provider (TNSP) in New South Wales. The intention of TransGrid and its predecessor to consider building an interconnector between New South Wales (NSW) and South Australia (SA) dates back to at least 1994. In 1996 the relevant Ministers from those two states signed a Memorandum of Understanding for a feasibility report of the benefits of such an interconnector. In 1997 this report found that there would be benefits.

In the meantime, the Australian Competition and Consumer Commission (ACCC) was considering how best to discharge its impending responsibility for regulating transmission revenues in the National Electricity Market (NEM), as provided for in the National Electricity Code (the Code). Part of that Code deals with the criteria under which transmission augmentations may become part of the regulated asset base of a TNSP and earn a regulated return thereon. At that time the criteria were set out in a "Customer benefits test".[106]

In 1998 TransGrid and its South Australian counterpart ETSA Transmission Corporation[107] applied for a project called SANI (formerly called Riverlink) to be assessed under the Customer benefits test. This project consisted of a 250MW interconnector between Buronga in NSW and Robertstown in SA, plus certain reinforcement work to the NSW transmission system. "The objective was to ensure that the project was justified under the … Code and would enter the relevant regulated asset base."[108]

On 15 June 1998 the National Electricity Market Management Company (NEMMCO) published its review of this interconnector. It noted certain problems with the Code and the test. It found that SANI was not justified. By implication, SANI was not justified in becoming part of the regulatory asset base.[109] The ACCC was asked to review the consumer benefits test.[110]

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[105] Unless otherwise attributed, material in this and the next two sections are taken from various sources including ACCC and NEMMCO publications, FERC Comments of TransGrid and Murraylink, and witness statements to the Tribunal. See also Mountain and Swier 2002.

[106] "The Customer benefits test was designed to ensure that network investment would only be undertaken if customers benefited from that investment." ACCC Issues Paper, p. 2

[107] ETSA Transmission was later split into ElectraNet SA (a transmission company) and ETSA Utilities (a distribution company).

[108] ACCC Issues Paper p. 2

[109] ACCC Issues Paper p. 2. See also Ernst and Young, "Review" para 1.1.2. TransGrid FERC comments contain the extraordinary claim that SANI "initially failed the regulatory test due to a technical flaw in the legal drafting of that test" and that "Specifically, the test excluded the inclusion of infra-marginal benefits to generators due to a drafting error" p. 18 and fn 14. It references the ACCC Issues Paper. There is no basis there (or elsewhere to my knowledge) for this interpretation.

[110] "… the NSW believed the test was deficient and placed it on the issues register, meaning the National Electricity Market (NEM) would not commence until the issue was resolved to their satisfaction". ACCC

The ACCC initiated a review of the criteria by Ernst and Young, which reported in March 1999.[111] After a period of consultation, the ACCC published revised criteria on 15 December 1999.[112] Amongst other things, these changed the "Customer benefits test" to a "Regulatory test" based on net public benefits or market benefits instead of net customer benefits.

Meantime, on 29 October 1998 TransGrid had submitted a second application to NEMMCO's Interregional Planning Committee (IRPC) for approval of a revised version of SANI called SNI. On 28 April 1999 the proposal to develop Murraylink was announced. On 30 July 1999 TransGrid requested NEMMCO to suspend consideration of SNI pending finalisation of the revised regulatory test. As noted, that happened in December 1999. On 6 March 2000 TransGrid requested NEMMCO to recommence evaluation.

In December 2000 TransGrid supplied to the IRPC an assessment by its consultants Intelligent Energy Systems (IES) concluding that "SNI has a positive market benefit in all scenarios except those that assume Murraylink is committed." The IRPC had already stated back in July 2000 that in its view Murraylink should be regarded as a committed project.[113] In March 2001 TransGrid modified the work to be carried out under SNI, so that it now included an upgrade to the NSW/Snowy - Victorian interconnection.

On 19 September 2001 the draft report of the IRPC recommended that SNI did not satisfy the regulatory test. In October TransGrid further revised SNI to include more transmission reinforcement works in NSW. On 1 November the IRPC's final report recommended that SNI now satisfied the regulatory test. NEMMCO confirmed this in its Determination on 6 December 2001.

QNI and Directlink[114]

In 1997 the NSW and Queensland governments announced and approved a new regulated line between those two states, called QNI.[115] This is an overground AC interconnector

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Regulatory Test for New Interconnectors and Network Augmentations, 15 December 1999. "NEMMCO also concluded that the test, as it stood, might make it difficult for any inter-regional augmentation to satisfy the criterion. / Reflecting this concern, the NSW Government lodged this issue on NEMMCO's Issue Register requiring it to be resolved prior to the commencement of the NEM. Consequently, the Commission was asked, as an independent party, to review the test and recommend changes to the test to overcome the perceived inadequacies." ACCC Issues Paper p. 2

[111] Ernst and Young, "Review of the Assessment Criterion for New Interconnectors and Network Augmentation: Final Report to ACCC", March 1999.

[112] ACCC, "Regulatory Test for New Interconnectors and Network Augmentations". 15 December 1999

[113] Details in TransEnergie Comments pp. 20-1

[114] Sources: FERC evidence of TransGrid and TransEnergie, and Gordon Jardine, "Regulated vs Non-Regulated Interconnectors … there is a case study!!!!", submission to the COAG Energy Markets Review, April 2002. (Mr Jardine is CEO, Powerlink Queensland)

[115] See "Interconnection of the NSW and Queensland Eletricity Grids, submission to the ACCC", 24 September 1997, TransGrid (NSW), Powerlink Queensland, NSW Electricity Reform Taskforce and

that covers a distance of about 550 km and has a present transfer capability of about 700/750 MW.

In 1998 TransEnergie proposed DirectLink, a 65 km underground HVDC unregulated interconnector (ie merchant transmission line) between the two states, with a capacity of 180 MW. TransEnergie is the transmission subsidiary of Hydro Quebec, a publicly-owned electric utility company in Quebec. TransEnergie Austalia Pty Ltd (TEA), formed in September 1998, is an Australian subsidiary. Hydro Quebec's policy is to work with a local partner. Accordingly, Directlink is jointly owned by TransEnergie and Country Energy, a state-owned corporation in NSW.

Construction of QNI began later in 1998. Directlink began operation in June 2000. QNI went into initial operation in February 2001 at a reduced transfer rate of 350 MW, increased to about 700/750 MW over the next few months.[116]

Murraylink and the National Electricity Tribunal

On 29 April 1999 TransEnergie announced its intention to build a new unregulated (merchant) interconnector called Murraylink between Victoria and SA. This is a 220 MW underground HVDC link. The target at that time was to be operational by January 2001. There was a delay in obtaining all the planning permits in Victoria, which involved an appeal process.

A press release of 13 March 2001 announced a contract between TransEnergie and SNC Lavalin, a privately owned company quoted on the Canadian (Toronto) Stock Exchange, to finance the interconnector. Construction of Murraylink commenced in April 2001, and was completed in June 2002. Commissioning and testing commenced in July 2002, and Murraylink entered commercial operation on 4 October 2002.

Murraylink extends from Red Cliffs in Victoria, which is only 15 kilometres from SNI's terminal in Buronga in NSW, westwards to Monash in SA, which is about halfway to SNI's western terminal in Robertstown SA. Murraylink and SNI are both high voltage links, but the technologies are somewhat different in that Murraylink is an underground direct current (DC) link whereas SNI is an overground alternating current (AC) link. Nevertheless, the SNI and Murraylink interconnectors are of similar capacity and would largely duplicate each other.

Between August and October 2001, the managing director of TransEnergie Australia wrote a series of letters to NEMMCO, expressing concern about the assessment by the IRPC and NEMMCO of the SNI project. Murraylink[117] was not satisfied that

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Queensland Electricity Reform Unit. "Applications for Authorisation, National Electricity Code", ACCC, 10 December 1997.

[116] "The southwards capacity is expected to reach 1000 MW in 2002 following the commissioning of the Millmerran power station." Jardine p. 4.

[117] Murraylink Transmission Company (MTC) is an affiliate company of TransEnergie Australia established to manage and operate the Murraylink facilities.

NEMMCO's 6 December 2001 decision took adequate account of these concerns, and on 21 December applied to the National Electricity Tribunal for a review of this decision. The function of the Tribunal is not simply to adjudicate on due process: it is authorised (as the Tribunal puts it) to make the decision that NEMMCO could and should have made. After a process of submitting and responding to evidence, the Tribunal heard the case in August 2002.

On 31 October 2002 the National Electricity Tribunal upheld NEMMCO's decision by a 2-1 majority.[118] On 28 November 2002 Murraylink appealed this decision to the Victoria Supreme Court. That appeal is presently underway.

On 18 October 2002 (before the Tribunal had given its verdict) Murraylink applied for conversion to regulated status.[119] The ACCC set in train a consultation process to consider Murraylink's application, which was contested by TransGrid and some other parties. The ACCC issued its Preliminary View on 14 May 2003, confirming that Murryalink could have regulated status and indicating the value of its regulatory asset base and allowed revenue.[120]

Other related reviews are also in train. On 19 June 2001, the ACCC and the National Electricity Code Administrator (NECA) announced their commitment to review the framework for essential new investment. They noted that the arrangements for planning and approval of regulated network investments had been widely criticised. The ACCC said that it would review the regulatory test and consult widely on this. That review continues.[121]

Appendix 2: Market Power and the Risk of Asset Stranding

The Tribunal's reasoning may be analysed in terms of four main propositions:

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[118] Reasons for Decision: The Hon Jerold Cripps QC (Chairperson) and Professor Douglas Williamson RFD, QC (Member) 31 October 2002 (henceforth Majority Decision). Reasons for Decision: Professor Favan McDonell FTSE (Member) 31 October 2002 (henceforth Minority Decision). Application 1 of 2001. Available at www.netribunal.net.au

[119] "Over the past three years, during Murraylink's development, the NEM has experienced a high level of uncertainty particularly in relation to the interaction between the competitive and the regulated segments. As a consequence of that uncertainty, MTC now believes that Murraylink is now most appropriately operated to provide a prescribed service in the same manner as most other transmission assets in Australia." Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue for 2003-12, Murraylink, 18 October 2002, p. ii. Murraylink also pointed out that "According to the Safe Harbour Provisions, one purpose of the conversion process is to assist non-regulated interconnectors to avoid 'no-commercial market design risks'. In fact, the Murraylink Transmission Partners would not have decided to invest in Murraylinkhad it not been for the explicit opportunity stated in the Code for Murraylink to b converted to a prescribed service." Murraylink Letter to ACCC (re Application), 8 April 2003, pp. 2,3..

[119] Murraylink Transmission Company Application for Conversion and Maximum Allowed Revenue: Preliminary View, ACCC, 14 May 2003.

[120] Murraylink Transmission Company Application for Conversion and Maximum Allowed Revenue: Preliminary View, ACCC, 14 May 2003.

[121] E.g. ACCC, Issues Paper, and ACCC "Discussion paper: Review of the regulatory test, 5 February 2003.

- that generating costs are, and are likely to remain, higher in SA than in Victoria and NSW
- that Murraylink would have non-trivial market power as a result
- that Murraylink would have the ability and incentive to exploit this market power by significantly restricting the flow on the interconnector
- that this would in turn expose TransGrid to a significant risk of "asset stranding" if it invested in unbundled SNI.

This Appendix takes these in turn.

Generating costs in South Australia

There seem to have been only two pieces of testimony on the present or future level of generating costs in SA. Professor Kahn assumes

> … that the long run … electricity supply situation in South Australia is one of increasing cost; that increased importation of power from the low-cost production facilities in New South Wales and Victoria is the next – i.e. lowest-cost – source of additional or incremental supply; and as a corollorary, that the alternative – expansion of generation in South Australia itself – would entail higher long-run marginal costs.

However, Professor Kahn immediately refers to "My understanding of the situation in South Australia – which I, admittedly, did not attempt to verify empirically."[122]

TransGrid refers in its opening submission to "the higher generating costs in SA than in NSW and Victoria".[123] It cites as evidence for this two recent studies[124]. However, neither of these studies has anything to say about the level of generating costs in SA relative to elsewhere.[125]

It seems then, that no empirical evidence was submitted to support the proposition that generating costs in South Australia are "significantly greater" than the cost of generating in Victoria plus the cost of transmitting to South Australia, or the proposition that this state of affairs is likely to continue for some time into the future.

Some witnesses expressed concern about the effectiveness of competition in the generation sector in SA, and the possible impediments to new entry and competition there because of difficulties in securing additional supplies of natural gas to fuel new generation.[126] These factors could arguably explain why electricity *prices* in SA would be higher than elsewhere, even if generating costs were not.

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[122] Kahn, Reply, p. 9

[123] TransGrid, Opening Submissions, p. 8

[124] Reforming Australia's Energy Markets – ACCC Submission to the COAG Energy Market Review, [10 May] 2002. ABARE Current Issues, January 2002 [Christopher Short and Anthony Swan, "Competition in the Australian national electricity market"]

[125] The nearest to this seems to be is a bar chart in the first (ACCC) study showing higher electricity prices in SA post-reform compared to pre-reform, and a discussion in the second (ABARE) study of the mark-ups of prices to cost.

[126] Eg Houston Statement para 356, Bishop Statement para 5.32

However, testimony showed empirical evidence against these claims.[127] At least one and perhaps two substantial gas pipelines were already being built to SA. The detailed studies by IES and ROAM made no mention of barriers to entry in SA. On the contrary, they noted that generating capacity is already being expanded there, and envisaged the construction of significant further new generation capacity there (several thousand MW) over the duration of the IES study, as and when it was profitable to do so.[128]

If imports were indeed cheaper than expansion of generation in SA, one would expect to see investors and market participants seeking to build more interconnectors. There is no evidence that they are doing so. On the contrary, it is said that "Neither [merchant] interconnector appears to be profitable"[129] and Murraylink subsequently applied for regulated status, proposing a regulated value below the cost of construction. The IES study suggests that the conventional interconnector component of SNI would be highly unprofitable without regulated income. At the same time, new generation is actually being built in SA and this is forecast to continue into the future. So there seems to be no empirical basis underlying TransGrid's assertions about interconnector and generation costs on which certain witnesses and the Tribunal relied.

Murraylink's market power and potential restriction of flow

Murraylink's market power is often referred to in the testimonies, but evidence for the substantiality of it is more difficult to find.[130] For example, Professor Kahn asserts that Murraylink has monopoly power but acknowledges that "I made no quantitative or quasi-quantitative assessment of that asserted market power". Indeed he refers to "the 'monopoly power' the substantiality of which I admittedly was assuming".[131] Mr Houston also asserts that Murraylink would have market power, and cites as evidence the IES study.

Dr Bishop cites three pieces of evidence to support a conjecture that there might be market power. The first is a claim that Murraylink will have a prospective 18% share of flexible supplies in SA. The second is the (alleged) constraint on gas-fired generation in SA. The third is that the only other unregulated interconnector currently operating in the Australian electricity industry did not always bid in its capacity at marginal cost. On the basis of these considerations Dr Bishop concludes that "Murraylink may have sufficient

[127] Littlechild, Reply pp. 29-32. See also "Pipelines proposed include the Duke Energy/Gas Net proposal to construct a $250m pipeline from Victoria to South Australia." ACCC submission to COAG Energy Market Review, p. 117.
[128] See also ACCC submission to COAG, Table 8 p. 118, which cites NECA, Interim Report on the National Electricity Market, December 2001, as envisaging proposed or committed investment in generating capacity of 2500 MW - 3000 MW in SA.
[129] Joskow and Tirole, 2003, fn. 3, p. 7, presumably based on calculations and conjectures about Murraylink by TransGrid, FERC Comments, pp. 19-20
[130] Whether it was appropriate to regard a new entrant with a relatively small capacity as having market power, when any output (albeit restricted) would reduce monopoly power in the market as a whole, was debated in the testimonies, but not taken up by the Tribunal.
[131] Kahn Reply p. 8

market power, at least at certain times, to give it an incentive to restrict the amount of energy it transmits to below the competitive level". He acknowledges that " I cannot predict with certainty that this will occur" and that "it is unclear whether Murraylink would be regarded as having a 'substantial degree' of market power."[132]

The alleged constraint on gas supplies has been dealt with above. If there were substance in the other two of Dr Bishop's points then the IES study should reveal it. That study is also the only source for Mr Houston's belief in Murraylink's market power.

TransGrid refers to "specific quantitative modelling which shows that if generators in SA bid at realistic levels above SRMC, Murraylink will have a real commercial incentive to reduce the flow of electricity from Victoria by an average of between 1% and 16%".[133] It gives the source of this as Mr Houston's evidence. Mr Houston in turn says that "IES' results show Murraylink restricting the flows over its link between 62% and 64% of the time in which Murraylink is expected to have flows, with the average reduction in the flow being of the order of 15-16%".[134]

This 15-16% finding by IES assumes that Murraylink has no contracts in place. However, it was generally accepted (not least by Mr Houston and IES) that Murraylink would have an incentive to sign contracts, and that if it had contracts in place it would have correspondingly less incentive to restrict output.

The IES study quantified this. It examined the implications of Murraylink being contracted for 75% of its output, as envisaged in Murraylink's stated business policy. Under this condition, in the IES Base case and under the bidding strategy that IES considered most realistic, the IES modelling suggested that Murraylink would find it profitable to limit output in less than 5% of the hours in the year, and then only by an average of one MW. The latter is about half a percent of Murraylink's available capacity, and less than 0.03% of the total generating capacity in the SA market. It is difficult to see that, on the basis of Murraylink 75% contracted, the monopoly power proposition can be taken seriously[135].

The Tribunal said "We accept Mr Campbell's analysis" i.e. the IES study. But which of the two sets of figures – with 0% or 75% contracts - did the Tribunal consider more plausible? It seemed to regard either outcome as possible.[136]

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[132] Litlechild Reply p. 22
[133] TransGrid's Opening Submissions p. 9.
[134] Houston, Statement para 105, p. 18.
[135] Littlechild Reply p. 28
[136] "It is true that Murraylink has asserted it would have no interest in restricting flow because it hopes to supply 75% of electricity to South Australia pursuant to contracts. We note that at the present time there are no contracts. That is, of itself, perhaps not so significant because Murraylink has only recently commenced operations. However, it is not without significance to note that the unregulated interconnector between New South Wales and Queensland has been operating for approximately two years with no contracts." Majority Decision, p. 52

The plausibility of each was a point addressed in the evidence.[137] The unregulated interconnector between NSW and Queensland (DirectLink) is owned by two publicly owned electric utility companies. They may not have a strong incentive to contract capacity. In contrast, Murraylink is part owned by a privately owned and quoted company. Experience in the UK and elsewhere suggested that a position of zero contracting was likely to be untenable for a commercial generator or interconnector on other than a temporary basis. It would be far too risky. Private investors would be unwilling to accept such risks, and would insist on a high level of contract cover. Experience suggested that 75% contract cover was not unreasonably high.

The cited IES figures that assumed 0% contract cover thus seem unrealistic. The only other relevant and available scenario was that based on Murraylink 75% contracted. To my knowledge no evidence contradicts the need for private investors to secure contract cover, and arguments from economics[138] and finance[139] support it. On this basis the evidence suggests that Murraylink's alleged market power would indeed be trivial, and so too would be the feared extent of restriction in flow along Murraylink.

The risk of asset stranding

On the potential for stranding, Professor Kahn says "Whether or not NEMMCO has indeed 'provided no evidence' I must leave to others, but I find persuasive Mr Houston's explication …"[140]. Mr Houston and NEMMCO offered a similar argument to TransGrid, which summarised its asset stranding concern as follows:

1) TransGrid is limited to achieving a regulated return on the value of its regulated asset base as determined by the ACCC under Ch 6 of the Code;
2) the ACCC can, and has indicated a willingness to, reduce the value of assets included in the asset base if those assets are found in practice not to be used optimally;
3) to ensure the optimal use of unbundled SNI TransGrid would need to depend on Murraylink (i) staying in business and (ii) always bidding into the SA electricity market so as not to restrict the flow of electricity.

[137] Littlechild Reply p. 25

[138] E.g. "Merchant investment is a high-powered-incentives activity. Merchants thus bear a substantial long-term risk. To obtain financing, they probably will want to offload a good part of this risk. One technique for doing involves entering into financial arrangements with generators and load-serving entities." Joskow and Tirole, 2003, p. 55

[139] An early public statement by TransEnergie said that it had "no commercial interest in energy production or trading" and that Murraylink offered "potential for capacity auction or anchor tenant". The SNCLavalin press release said that Murraylink would be financed through equity and non-recourse debt. In contrast to allegations about the profitability of restricting capacity or availability in order to exploit periods of high price differences as and when they occur, investment companies such as SNCLavalin are not attracted to the risks that this short-term speculative policy entails. Rather than tie up their own equity to finance a whole project, they find it more profitable to sign contracts for capacity in order to remove or reduce the income risk. This enables them to replace a proportion of their own initial equity by debt finance, and use the released equity to finance other projects.

[140] Kahn Statement, p. 4

As regards point 3i), no evidence seems to have been put to the Tribunal about the risk of Murraylink not staying in business, and the Tribunal did not refer to this. As to 3ii), it has been argued above that there is no plausible evidence that Murraylink would seek to restrict the flow of electricity in a significant way. On this basis, any non-optimal use of unbundled SNI assets would not be attributable to Murraylink. Nonetheless, consider now the plausibility of the claim in point 2) that the ACCC could reduce the value of TransGrid's regulated asset base if the latter were to go ahead with unbundled SNI.

On the bidding strategy that IES considers most realistic, IES projects that unbundled SNI would be in use just 2.5% of the time. It also calculates that if Murraylink were 75% contracted, it would have an incentive to restrict output just 7% of the times that the interconnector has a positive flow (which is only 71% of all hours in the year). Given that the average reduction is estimated as only 1 MW out of Murraylink's registered capacity of 220 MW, assume conservatively that the average reduction in flow, when this does occur, is 1%. On this basis, the reduction in flow along unbundled SNI as a result of alleged restrictions in flow along Murraylink would be of the order of 2.5% x 7% x 1% = 0.00175% of the total capacity on unbundled SNI. In terms of equivalent hours, unbundled SNI would operate 2.498% of the time instead of 2.5%. Even if the figures for Murraylink 0% contracted were used, unbundled SNI would operate at 2.244% of the time.

Even if these "back of the envelope" calculations are out by an order of magnitude, certain practical questions spring to mind. Is it argued that even TransGrid (let alone the ACCC) could even discern (let alone identify the likely causes of) such a trivial difference in the utilisation of just a few of the many substations and transformers embedded in the transmission network? Does TransGrid in practice measure and monitor the utilisation of its existing substations and transformers in this detailed way, and routinely attribute the reasons for variations to particular generating stations and consumer demands? And even if it did, would the ACCC be minded to penalise such a magnitude of variation?

Dr Thomas put forward similar arguments in his testimony.[141] According to him, it would be highly unusual for any transmission line to be fully utilised given the load shape in the NEM. The interconnectors are alleged to be valuable because of their ability to contribute power at times of peak demand and to enable the deferral of peak capacity and the maintenance of reserve sharing capability. Murraylink has no incentive to stifle flows on its line at the expense of generation or demand side entry. Any risk of stranding would most likely be in the nature of "timing" risk in which case a value that was optimised out would be eligible to be re-optimised back in during a subsequent period. He concluded that, overall, the materiality of stranding risk to TransGrid is extremely small and likely to be indistinguishable from the normal commercial risk to which TransGrid is ordinarily exposed.

The risks of stranding SNI itself

[141] Thomas Reply, pp. 41-7

The Tribunal essentially based its rejection of unbundled SNI on the alleged asset stranding risks to TransGrid. It did not comment on the asset stranding risks to TransGrid that full SNI would entail. Several witnesses drew attention to these risks. Although one witness claimed that unbundled SNI was more risky than SNI because of the stranding risk[142], others argued that to make the investment in full SNI was in fact more risky because the interconnector part of SNI was at greater risk of asset stranding than unbundled SNI.

Dr Thomas notes the 1% to 15% range of possible reductions in Murraylink's flow, and suggests that to assign even a 10% probability to the ACCC reducing TransGrid's asset value by this much seems excessive. But even assigning such a probability, and assuming no contracting at all by Murraylink, this would imply an assessed risk of the order of up to 1.5% of the asset value. This would be in the range $0 to $0.5 million[143] against a project (unbundled SNI) valued at approximately $40 to $50 million.

Compare this to the additional cost of the interconnector part of SNI, over and above the system reinforcement part (unbundled SNI), which was estimated at $64 million undiscounted. Alternatively, in discounted terms, the additional cost to build and operate this interconnector was $57 million, and the additional benefit was negative, at -$87 million, making a total net social loss of $144 million on this interconnector component (under the consultants' preferred bidding scenario). The costs and risks of SNI were fully spelled out to the Tribunal, by at least two witnesses.[144]

Appendix 3: ACCC and Murraylink's application for conversion to regulated status

The ACCC decided to assess Murraylink's proposal as a new investment under the regulatory test. To that end, the proposal had to demonstrate that it maximised the net present value of the market benefit having regard to a number of alternative projects, and the opening regulated asset base would be determined accordingly.

Murraylink proposed the following procedure for determining the initial regulatory asset base.

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[142] "The asset stranding risk faced by TransGrid in relation to the Unbundled SNI project is likely to be significantly higher than that for SNI and for many other elements of the transmission system, for two reasons. First, the Unbundled SNI assets would serve both the Robertstown to Buronga [SNI] and the Monash to Redcliffe [Murraylink] links, and if only Murraylink is in place, then I understand that the utilisation of the Unbundled SNI assets will be lower. / Second, the utilisation of the Unbundled SNI assets alone would be highly dependent on the bidding behaviour of Murraylink. This places the risks to TransGrid in the hands of one single, third party, which has no particular interest in managing its utilisation of those assets in line with the interests of the market as a whole." Houston Statement, para 184-5, p. 33

[143] Strictly, 1.5% of $46m = $0.69m

[144] "NEMMCO effectively has approved the addition [of] approximately $60 million to TransGrid's RAB [Regulatory Asset Base] on the apparent basis that TransGrid wishes to avoid a commercial risk with an expected value in this example of considerable less than $1 million. / … If the ACCC is at all inclined to optimise asset valuations downward, it would be hard to think of anything more obviously "imprudent" than an incremental expenditure on the Buronga to Robertstown transmission line given that it has been clearly identified as almost entirely redundant ('duplicating") in the course of this debate." Thomas Reply, pp. 46-7. Also Littlechild Reply, p. 45

> The regulatory cost for an interconnector is the sum of its [initial] regulatory asset value and the net present value of its future operating and maintenance costs. / For an interconnector to satisfy the Regulatory Test its regulatory cost must be less than or equal to, the lesser of
> - the value of the gross market benefits the interconnector provides
> - the full life-cycle cost of the lowest cost alternative project, and
> - the estimated life-cycle cost of the existing interconnector itself.
>
> …
> The regulatory asset value of the interconnector is [set] equal to its regulated cost minus the net present value of its future on-going operating and maintenance costs.[145]

Murraylink put forward studies showing that the gross market benefit of Murraylink would be $212.240m. It put forward another study that identified and assessed six possible alternatives to Murraylink (of which two were generation and demand side). Alternative 3 was the lowest cost alternative, with a total cost of $240.40m ($189.38m capital + $51.02m life-cycle opex).

Since the gross market benefit was lower than the lowest cost alternative, Murraylink proposed that the regulatory cost be set equal to the gross market benefit of $212.24m, hence the initial regulatory asset value be set equal to $212.24m less Murraylink's life-cycle operating and maintenance costs of $37.334m, ie to $176.906m. It commented that this initial value was below the actual capital cost of Murraylink.

The ACCC adjusted the estimated costs of the alternative projects, primarily (but not only) to reduce or eliminate the extent of undergrounding assumed by Murraylink. As a result, the ACCC estimated that the lowest cost project (Alternative 3) had a capital cost of $114.4m (rather than Murraylink's estimate of $189.38m). This was below Murraylink's proposed regulatory asset value of $176m. The ACCC estimated that "Murraylink's gross market benefits fall within the range from $136m to $300m, with the median value around $190m" (p. vii) and effectively assumed that other projects would have comparable gross benefits. It found that Alternative 3 delivered net market benefits under most credible scenarios, ranging from $5m to $269m with a median close to $60m.[146] Since the cost of this lowest cost alternative was lower than the gross market benefit, the ACCC took $114.4m (rather than the proposed $176.9m) as the basis for Murraylink's opening regulatory asset value. It then made an allowance for lifetime opex also based on its own calculation for Alternative 3 ($51.02m adjusted to $16.95m).

[145] Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue for 2003-12, Murraylink, 18 October 2002, pp. v, vi

[146] ACCC calculates life cycle project cost at $114.42m capital + $16.95m opex = $131m. (Table 1) Net benefit range: $5m = $136m gross - $131m; $269m = $310m gross - $131m. (Fns 2,3 p. x) (It is unclear why this calculation uses $310m while Murraylink is attributed $300m.) Median net benefit is presumably $190m - $131m = $59m.

Alternative 1 is essentially the interconnector part of SNI.[147] Yet far from this being the most economic alternative, the ACCC found that it was the least economic of the four transmission alternatives examined. Its calculated regulatory cost was $243m ($212.66m capital plus $30.65m opex) compared to the $131m ($114.42m capital plus $16.95m opex) of Alternative 3.

Reducing the ACCC's estimate of $243m by 6% to allow for inflation[148] implies about $229m at the time of NEMMCO's determination. This is four times the $57.2m cost implicit in the TransGrid/IES assumption (Table 1 above). One reason for the higher cost is the undergrounding of 30km of line for environmental reasons, costed at about $68m. Certain other costs were included (e.g.interest during construction and contingencies) that seem to have been omitted from the earlier calculations.[149]

Adding the TransGrid/IES assumption of $41.2m for the network reinforcement part (unbundled SNI) gives a total cost of $270m (=$229m + $41m) for full SNI.[150] This is above the top ends of the ranges of benefits in the IRPC report ($33.6m to $134.5m)[151] and in the IES calculations ($112.3m under Realistic Bidding scenario 1 and $264.5m under Realistic Bidding scenario 2, per Table 1 above).[152]

[147] Alternative 1 is "mostly overhead transmission line with … undergrounding through the Bookmark Biosphere, following a similar route to the interconnector portion of the SNI" (p. vii), and "the Commission believes that the main elements of SNI are captured in alternative 1". (p. ix).

[148] From December 2001 to May 2003. See Murraylink Transmission Company: SNI Option Cost Estimate, Document No. 45003-04, Burns and Roe Worley Pty Ltd (BRW), 16 April 2003, being Attachment 6 to Murraylink Letter to ACCC, 8 April 2003.

[149] Deduced from ACCC Preliminary View and SNI Option Cost Estimate (BRW). Another factor is presumably that the IES figure is the incremental cost of the interconnector component given that unbundled SNI were built, whereas the present figure is the standalone cost of the interconnector component without unbundled SNI.

[150] The BRW calculations suggest that the cost of unbundled SNI would be significantly higher than the TransGrid/IES assumption. I calculate about double, even allowing for some possible reduction as a result of certain Murraylink augmentations.

[151] SNI Stage 2 Report, Inter Regional Planning Committee, version 07, 26 October 2001, p. v. Remarkably, NEMMCO did not report any gross or net or median benefit figures in concluding that SNI passed the regulatory test.

[152] The gross benefit figures in the ACCC report are not comparable with these because they refer to the value of a first interconnector rather than a duplicate one. Since the ACCC "understands that SNI, running in parallel with Murraylink would not deliver any more capacity than either one of these options operating in isolation". (p. vii) it seems difficult to attach much if any incremental benefit to the interconnector part of SNI. The ACCC report does not estimate benefits for the network reinforcement part (unbundled SNI).

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