NATURAL GAS PIPELINES: ECONOMICS OF INCREMENTAL CAPACITY

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Natural gas pipelines are regarded as "natural monopolies" because they often provide the only means by which gas can be transported from its source to a market. This has generally been the case in Australia, where small markets and remote supply basins make only one pipeline economic, or where parochial interests have dictated that resources should be confined within a single state.

Pipelines also qualify as natural monopolies because they are perceived as having the characteristic of a very low short run marginal cost. This is certainly the case for pipelines which have been designed with capacity[2] in excess of that contracted. However, the marginal cost of providing additional capacity where it can only be provided by adding new compressors can be quite high, particularly on a long pipeline with many compressor stations. When all optimum opportunities for installing additional compressors have been exhausted, extra capacity can only be achieved by "looping" – that is, construction of a new parallel pipeline for some or all of the distance between compressor stations throughout the length of the pipeline. As a result, the marginal cost of that new capacity is very high.

This issue is a real one and applies to at least one transmission pipeline in Australia – the Moomba to Adelaide pipeline. It could also apply to the Roma to Brisbane and the Dampier to Bunbury pipelines. In each case, the existing firm capacity has been contracted for, and new firm capacity can only be provided by extensive additions of capital equipment – including both compressors and looping.

The authors of the National Third Party Access Code for Natural Gas Pipelines (Code) anticipated that pipeline operators and their customers might face the issue of rising marginal costs at some time in the lives of pipelines, and incorporated a requirement that an Access Arrangement must include a Queuing Policy (Sections 3.12 – 3.15) and an Expansions Policy (Section 3.16). The financial implications of these policy requirements are addressed in Sections 8.15 to 8.25, which allow the regulator to determine whether the new facilities (additional compression and/or looping) can be included in the capital base and thus be recovered from users. Presumably, a Regulator would permit inclusion of the capital cost of new facilities in the capital base only if this meant that tariffs for existing users did not rise or that the new users served by the new facilities were prepared to pay a surcharge for their services – which might be identical with the services provided to the existing users.

The Code does not acknowledge that capacity constraints should provide price signals to either the service providers or users as a means of highlighting the value of new or

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[2] The term "Capacity" of a transmission pipeline is frequently misused and misunderstood. Capacity is determined by complex transient thermodynamic analysis and will change significantly with variations in supply and delivery pressures, ambient, ground and gas temperatures, gas specification, and performance and quality of gas turbines and compressors.

additional capacity, except via the secondary market. The secondary market for pipeline capacity is not well developed in Australia and hence does not yet provide the proper price signals. Under current arrangements, service providers do not benefit from price rises due to capacity constraints, presumably because the authors of the Code felt that service providers could not be trusted and would "engineer" constraints to increase prices. This is unfortunate, because it represents a severe impediment to the development of new capacity. In such circumstances, there is no incentive for the owner of the Moomba to Adelaide pipeline to provide capacity enhancement for small quantities of gas.

A further impediment to the provision of incremental capacity is the Code's (and its implementation agents') lack of recognition of the relationship between risk and reward. A service provider may be prepared to take on a higher level of risk of filling new capacity, if, in the longer term, it received a commensurate rate of return to provide an incentive to invest in new capacity. So far, there has been no precedent for this solution. Indeed, a number of recent regulatory decisions have provided evidence to the contrary. Further, the Code does not recognise the increasing volatility of the energy market, where shippers now demand contracts for firm service for periods as short as one year, compared to the 10 to 20 years which was standard in the recent past. This trend has been noted in the United States as well[3]. This adds further uncertainty for the service provider and its financiers. Lending margins and required returns to equity must rise in these circumstances.

The concept of capacity constraint and the development of the resulting proper price signals are not contemplated by the Code. There is no regulatory compulsion, nor should there be, on service providers to augment pipeline capacity in the absence of spare capacity if it is needed by users. This means that access to pipelines by potential users can be prevented by incumbent users if they choose not to participate in a secondary market.

A method to overcome this problem and to provide proper price signals is that being adopted in the United Kingdom. It is worthy of consideration in the Australian context. Currently the majority of gas transport services in the United Kingdom are provided by Transco. Severe capacity constraints have been found to occur, particularly at the receipt points. The regulator, OFGEM, has introduced a market based system which requires Transco to auction spare or unused capacity on a daily basis, thus allowing Transco to maximise the available capacity on that day. The auction prices also provide insight into the true value of incremental capacity. Successful purchasers of capacity that do not use it are required to return it to Transco, which auctions it again as interruptible capacity. This achieves, in a more formal way, the outcomes from a secondary market, and provides a clear indication of the market drivers for capacity enhancement.

In the United States, pipeline capacity constraints are highlighted in a robust secondary market and provide the pipeline companies with an indication of demand and price. Pipeline companies can respond with a proposal to augment capacity by holding an auction for capacity during an "open season", where existing capacity holders can sell their

[3] See: Andrej Juris, *Development of Natural Gas and Pipeline Capacity Markets in the United States*, The World Bank Policy Research Working Paper #1897, March 1998, p38 – "Shippers' unwillingness to sign long-term transportation contracts has created serious problems for interstate pipeline companies in the United States. Long-term contracts for about 50 percent of available pipeline capacity will expire by 2002. …… pipeline companies will not be able to sell long-term contracts in regions or pipeline corridors with excess capacity. This will expose them to substantial revenue risk……"

entitlements and prospective users can bid for capacity. Based on the responses, the pipeline company can determine whether it would be prudent to augment capacity. The Australian gas transmission market has no equivalent system, but there is no reason why any pipeline owner cannot carry out such a process. However, one would suspect that it may be regarded with suspicion by some of the incumbent pipeline companies and most regulators.

In summary, a number of gas transmission pipeline systems in Australia exhibit capacity constraints, and yet there is little evidence of creative or innovative processes from either the service providers or the regulators which might provide a market-based response to these constraints. There is no provision in the Code in its current form to allow it to accommodate these processes. This aspect is one of many that require review to make the Code work. It is unlikely that the current members of the National Gas Pipeline Advisory Committee (NGPAC) or its advisers have sufficient understanding of the analysis of risk and the consequential commercial drivers to implement the necessary changes. As a result, the Code will increasingly lose touch with the commercial realities of the energy market and will continue to inhibit investment in new and expanded infrastructure where market risk is present. The recent report[4] prepared for the Business Council of Australia indicates a need to re-vitalise the energy reform process. It is important for the Australian energy industry to provide leadership and advice to governments to continue the process of reform, and, in particular, to amend the Code to make it more relevant. These amendments must include a mechanism by which price signals can be generated to provide timely and effective information for existing service providers or new entrants to install incremental pipeline capacity.

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[4] Port Jackson Partners, *Australia's Energy Reform: an Incomplete Journey – a report for the Business Council of Australia*, 14 March 2000