



FINAL REPORT

Response to Gas Control Inquiry Draft Framework Paper

Submitted to

**NGC
Wellington**

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1. INTRODUCTION AND EXECUTIVE SUMMARY

1.1. INTRODUCTION

The purpose of this paper is to examine the Commission's proposed framework for assessing the benefits and costs of regulating the markets relating to distribution and transmission of gas.

The report is set out as follows:

- First, we set out the principles that the Commission should consider in its competition analysis;
- Second, we develop a theory of organisational behaviour of a business operating under the threat of regulation, relative to a business subject to formal price control;
- Third, we examine the approach the Commission intends to take in evaluating whether monopoly profits exist, and its proposed approach to assessing productive and dynamic inefficiency in the counterfactual; and
- Finally, we evaluate the Commission's proposed approach to weighing up the benefits and costs of control.

1.2. EXECUTIVE SUMMARY

1.2.1. Regulation of Gas Versus Electricity Networks

The Commission has been tasked with evaluating whether the acquirers of gas services, and the public more generally, would benefit from control of gas services. Currently gas service providers are constrained by the threat of regulation as well as other disciplines on price setting and quality provided to customers.

Before delving into the Commission's proposed framework for evaluating the costs and benefits of control, it is important in our view to establish the nature of the service being provided by gas, and the terms and conditions on which gas services are provided.

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Gas is used in a multitude of settings ranging from electricity generation to commercial and industrial heating processes, to domestic use. Unlike electricity, there is no obligation on gas suppliers to provide customers with gas connections, and gas does not provide an essential service to customers, who can and do choose alternative fuel sources, including electricity, coal, fuel oils, wood-waste and other bio-mass sources. There are numerous examples of customers switching to alternative fuels (or threatening to switch) to gain more favourable gas pipeline charges. Similarly, NGC has pursued customers currently using other fuels through discounted charges.

In our view, it is essential that the Commission carefully considers the implications of the absence of a legislative requirement to provide gas. Regulation is an entirely different proposition if the utilities are under no obligation to accept customers. For example, under price cap regulation the business would not invest in new pipeline assets if incremental revenue flows arising from new customers do not exceed the incremental costs of supply. Even worse, under a revenue cap the business would cease all new and replacement pipeline investments since costs would go up, but no additional revenues would be permitted unless new services were excluded from the ambit of regulation. Accordingly, regulation could mean that some customers who would be willing to pay more than the incremental cost for gas services would be denied service or be forced to self-provide.

In contrast, electricity lines businesses are required by legislation to maintain existing services to customers, so the consequences of regulation for investment in electricity lines may be more limited. Given relatively low levels of gas penetration, if incentives to invest are blunted by regulation, the dynamic efficiency consequences could be severe.

Of course, legislation could force gas service providers to connect any customer who requires service, but because gas networks are not ubiquitous this could potentially require the regulator to undertake cost-benefit analyses to determine whether new or replacement connection requests are economically viable and what revenue recovery profile would provide a reasonable return to the pipeline provider, accounting for risk. The role of the regulator is manifestly different when the business is not obliged to extend the gas network.

1.2.2. Competition Analysis

The current dynamics of the gas production market mean that there is significant uncertainty about future gas prices in New Zealand, although there is little doubt that prices will continue to rise. These dynamics imply that gas transporting firms are facing greater pressure on their behaviour, as more of their customers switch or credibly threaten to switch to alternative fuels. In light of these circumstances, the Commission's inquiry should focus carefully on the inter-fuel competition issue – court and regulatory decisions made even just a year or two ago are no longer likely to be relevant to this issue.

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In addition to the important constraint provided by the inter-fuel competition, bypass (and the threat of bypass), and countervailing power of customers, adds to competitive disciplines on pipeline pricing and service. Taken together, an empirical consideration of these factors may challenge the view that gas sits in a separate market. At this stage of the inquiry, where detailed evidence has yet to be considered, we are of the view that the question of market definition requires thorough re-examination in light of significant changes in the gas production market.

1.2.3. Impact of Regulation on Efficiency

As a starting point we consider that it would be helpful to develop a richer story about how regulation works in practice, and what difference it makes to the incentives of businesses under control relative to a situation of light-handed regulation. In our view, the Commission has provided a technical discussion of a method for estimating the benefits and costs of control, but there does not appear to be any detailed recognition of the actual realities and risks facing gas pipeline businesses. A proper consideration of these issues in the inquiry would materially affect the interpretation of the results of the Commission's analysis.

Economic theory and practical experience suggests that an unregulated private monopoly has strong incentives to be efficient, since shareholder returns can be enhanced through improvements in pricing methods (e.g. Ramsey pricing, multi-part tariffs), through cost reductions and investment and innovation. Gas pipeline businesses in New Zealand are currently subject to the threat of regulation, which we acknowledge is different to a situation of no regulation. Under light-handed regulation, the productive and dynamic efficiency incentive is probably dampened somewhat as the firm undertakes various activities geared to manage the risk of more heavy-handed forms of regulation. Investment incentives may also be affected by uncertainty about the stability of the regulatory regime. The threat of regulation, however, is also likely to diminish the incentive to pursue excessive profits through increasing tariffs to monopoly levels.

At this stage, as far as we can ascertain there is no empirical evidence available which enables comparisons of businesses under light-handed regulation relative to price or revenue cap regulation. New Zealand is unique in its use of threat-based regulation. Accordingly, in this paper we use a comparative institutional approach to describe differences in business organisation and incentives under light-handed regulation versus price caps¹. The following table sets out the key points of difference, and these are developed further in section 3 of this paper:

¹ In the remainder of this document we tend to refer to incentive-based regulation which encompasses regulatory forms such as price and revenue caps that are set for multi-year periods and businesses are entitled to keep (bear) revenues that are above (below) costs.

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Table 1: Comparison of the Effects of Light-Handed Regulation and Incentive-Based Regulation on Organisational Behaviour

Function Within Regulated Business	Under Light-Handed Regulation	Under Incentive-Based Regulation
Regulatory division	Small or non-existent.	A formal regulatory division is required to manage regulatory strategy and the information requirements of the regulator, which will typically take a more adversarial position given the plausibility of gaming information to maximise benefits under a price control regime. Senior management and Board of Directors can be intensely involved in regulatory process during price cap establishment/reset.
Forecasting	Focussed on business development, asset management.	<p>There are generally significant regulatory process management benefits from building up forecasting capability to improve both regulatory strategy development and regulatory compliance and credibility.</p> <p>Under incentive-based forms of regulation, forecasts of capital expenditure, technology growth, operating expenditure, input price inflation, demand etc must be forecast as plausibly and credibly as practicable, since prices are locked in place for up to 5 years. Small deviations in actuals from forecast can lead to significant over or under-recovery of revenues by the end of a regulatory period.² Forecast error risks are increased because there is less flexibility to alter price.</p>

² For example, in New South Wales, electricity distribution businesses and the regulator underestimated peak demand growth. Forecast capital expenditure was \$1.6 billion over the most recent regulatory period, but to meet peak demand growth distributors were forced to invest \$3.1 billion. Consequently returns have been significantly below WACC. See distributors submissions to IPART <http://www.ipart.nsw.gov.au>.

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Function Within Regulated Business	Under Light-Handed Regulation	Under Incentive-Based Regulation
Cost management	<p>Incentives to cut costs as returns are kept by the firm.</p> <p>Information asymmetry between Board, management and staff may lead to some X-inefficiency, which can be partly mitigated by benchmarking, competitive out-sourcing, incentive contracts, share options, etc.</p> <p>Uncertainty about the trigger point for regulation, could lead businesses to be less aggressive in seeking efficiency gains for fear that resulting high profits may trigger intervention.</p>	<p>Mixed incentives to cut costs.</p> <p>Information asymmetries still exist between board, management and staff. Regulator in worse position to judge inefficiency and design incentive contracts.</p> <p>Regulatory focus one year out of every 3-5 years, distracts from ordinary operation of business leading to delays in efficiency gains.</p> <p>Incentive to withhold efficiency gains during the final years of the regulatory period in order to maximise returns during next regulatory period.³</p>
Price setting	<p>Incentive to set efficient and cost-reflective tariffs in order to improve returns by improving asset utilisation.</p> <p>May be some disincentive in pursuing Ramsey-like prices since aggrieved price-inelastic customers would have stronger incentives to lobby for regulatory relief.</p>	<p>Mixed incentives to set efficient tariffs.</p> <p>Regulators can impose side-constraints on tariff restructuring to prevent regulated businesses from circumventing the intentions of price control by restructuring charges so that the fastest growing, least elastic customer segments face higher charges. Regulation may therefore reduce the potential for allocative efficiency gains if there are constraints on individual tariff movements.</p> <p>May be weaker incentives to set efficient tariffs if this increases revenue risks. For example, differential time of use rates might increase revenue risks relative to a flat tariff structure.</p>

³ See Erhardt, (2000). He finds that water and electric utilities in the UK often engaged in major cost cutting exercises immediately after regulatory resets.

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Function Within Regulated Business	Under Light-Handed Regulation	Under Incentive-Based Regulation
Investment decision-making	<p>Would consider full set of investment opportunities as returns not constrained to WACC. Incentives exist to take on risky investments, although uncertainty about the trigger point for regulatory intervention may deter or delay some investments that would require high returns to justify the investment.</p>	<p>Investment choice narrowed to investments with no material stranding/optimisation risk (under ODV method). Restriction of profits to WACC will significantly reduce investment, as internal hurdle rates are likely to exceed WACC.</p>
Customer focus – quality improvement	<p>No disincentive to provide additional quality that the customer is willing to pay for.</p> <p>Over-provision of quality constrained by the threat of bypass, or customer switching to alternative fuels.</p> <p>It is still relatively difficult for network businesses to determine the “right” level of quality for mass-market consumers, since aggregate preferences are difficult to measure.</p>	<p>Because prices or revenues are constrained under incentive regulation, the regulated business has incentives to cut the level of quality or not provide additional quality if the customer demands it, because a financial return cannot be earned.</p> <p>In response, the regulator must also set quality levels, however is at a significant information disadvantage in performing this task.</p> <p>Regulators typically are at more of a disadvantage than the utility in determining quality standards that should apply to mass-market consumers, but must set standards to prevent declines in quality.</p>

Overall, in a qualitative sense it is difficult to mount an efficiency case for moving from light-handed regulation to incentive-based regulation.⁴ Although regulatory uncertainty under light-handed regulation may not generate the perfect level of efficiency, there appears to be a much stronger case that light-handed regulation would likely result in efficient commercial decision-making and responsiveness to customer demands than more intensive forms of regulation.

⁴ See also Erhardt (2000) for a discussion of the absence of efficiency justification for regulation.

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The danger in moving from a light-handed regulatory regime to more heavy-handed forms of regulation is that regulation chills investment, narrows the opportunities to the businesses, risks providing incentives to cut quality (which is often more important to the customer than price), potentially creates perverse incentives to withhold efficiency gains, (therefore delaying efficiency benefits to society) and potentially reduces incentives to set efficient tariff structures if this creates financial risks of not earning sufficient returns. More heavy-handed forms of regulation tend to switch the focus of the businesses from customer needs to satisfying the needs of the regulator.

Where there is no obligation on a utility to invest in new pipelines, under price or revenue cap regulation there are incentives to restrict investments in order to maximise returns. This means that some customers who would otherwise be willing to pay for new services could be denied service or be forced to provide their own pipeline services.

As New Zealand moves into a post-Maui environment where gas prices are likely to increase significantly, forecasting derived demand for gas transport services and therefore efficient tariffs will be exceptionally difficult. It is implausible that there will be no demand-side response to higher wholesale gas prices and accordingly setting price or revenue caps for any lengthy period could have potentially serious financial consequences for customers and regulated businesses. In our view the Commission needs to factor into its analysis of the costs of control the potential for harmful effects arising from forecast inaccuracy.

1.2.4. Efficiency and Wealth Transfer Analysis

A number of issues arise which make the process of comparing the efficiency of a gas pipeline business with the notional workably competitive entrant very difficult. These issues predominantly relate to the difficulty of measuring the efficient costs of an entrant and comparing these with the actual performance of pipeline businesses on a backward looking basis.

- Variations in the economic cycle mean that over short periods of analysis high returns might simply arise because demand for gas services was higher than expected.
- Pipeline businesses may have hurdle rates of return that exceed WACC to account for investment-specific risks.
- Efficient revenue recovery profiles may lead to low rates of profitability during the early stages of asset lives with compensatory high returns during the latter stages.

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These factors and others developed in this report mean that it would be easy to misdiagnose a short period of high profits as evidence of monopoly pricing, when it simply reflects the result of uncertain outcomes when viewed on an *ex ante* basis. Setting aside issues relating to the profile of revenue recovery and hurdle rates, even a business that aimed to only earn WACC each year would be unlikely to hit that target due to demand forecast error.

Measuring productive and dynamic efficiency levels under the light-handed regime is an even more difficult proposition. It seems reasonable to assume that privately owned, profit-maximising pipeline firms will be relatively productively and dynamically efficient. Shareholders and management are incentivised to make efficiency gains and can use performance management incentives (e.g. staff bonuses) or contract out potentially contestable functions such as asset maintenance. Competitive pressures and profit incentives will compel these firms into making efficient investments.

Nevertheless, carefully designed benchmarking studies may assist the Commission to test aspects of this assumption.

Furthermore, there are techniques the Commission can use to estimate the potential orders of magnitude of efficiency losses arising with control.

Overall, we consider that in assessing performance against the notional workably efficient entrant, the Commission should be cautious in interpreting quantitative results that are likely to be imprecise estimates and not determinative measures.

1.2.5. Regulatory Tests

The Commission has proposed to examine the benefits and costs of control by comparing the factual (declaration of control) and counterfactual (continued light-handed regulation) against a notional workably competitive benchmark. The Commission intends to estimate the benefits of control and deduct from it the direct and indirect costs of control.

Benefits of Control

The Commission suggests that the benefits of control include potential reductions in transfers (in the benefits to acquirers test), and improvements in allocative, productive and dynamic efficiency. As we argue above, it is difficult to mount an argument that control would improve productive and dynamic efficiency, so we suggest that the potential benefits of control be restricted to potential reductions in transfers or improvements in aspects of allocative efficiency (and even this is debatable). In undertaking quantification of these benefits the Commission should also take account of forecast and estimation error.

Costs of Control

As argued above, control is likely to reduce productive and dynamic efficiency and aspects of allocative efficiency (e.g. provision of appropriate levels of quality). However, measurement of likely productive and dynamic inefficiency under heavy-handed versus light-handed regulation is an extremely difficult and approximate task.

In quantifying the indirect costs of control (losses of allocative, productive, and dynamic efficiency), which are potentially very significant, the Commission proposes an approach that simply scales down the benefits of control. We strongly disagree with this approach, as there is no reason why the level of dead-weight losses or transfers should in any way be related to levels of operating cost inefficiency or losses of dynamic efficiency.

A superior, although more analytically difficult approach, would be to attempt to estimate productive and dynamic efficiency losses directly. Section 5 of this report suggests quantitative approaches the Commission could employ to derive estimates of the indirect costs of control. At a high level, this would involve modelling:

- Productive efficiency losses by assuming that operating costs would be higher under control by certain plausible percentages;
- Dynamic efficiency losses of “missing services” through avoided or delayed investments; and
- Allocative efficiency losses through reduced levels of quality under control, using empirical estimates of the value of lost load to derive estimates of the costs of increased risk of load shedding.

While these exercises will necessarily involve making a number of judgement calls, they will provide the Commission with a feel for the potential order of magnitude of efficiency costs of control.⁵

⁵ The Commission has experience using these approaches in deriving the detriments and benefits of the Electricity Governance authorisation.

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Weighting Process

Economic theory and evidence demonstrates that dynamic efficiency is of greatest significance to consumers. More heavy-handed forms of regulation (such as incentive-based price or revenue caps) weaken dynamic efficiency incentives by reducing the returns available to investors. The expected increase in wholesale gas prices is likely to have a material impact on the derived demand for gas services, which in turn would materially increase the risks of regulation on pipeline investors, since forecasts of demand for gas services could be wrong by substantial margins. Accordingly, regulation could easily lead to significant deviations of efficient revenues from costs.

In our view, the Commission should adopt a cautious approach in weighing up the benefits and costs of implementing more heavy-handed forms of control. The acquirers test requires the Commission to be satisfied that control is necessary or desirable in the interests of acquirers. Given potentially significant investment requirements to increase reticulation and penetration of gas to a larger number of consumers, it appears that dynamic efficiency losses could well be significant under more heavy-handed forms of regulation. Because of the difficulties in developing more than broad estimates of likely productive and dynamic efficiencies under control versus the counterfactual, the Commission should only make a control recommendation where it finds that estimated benefits exceed estimated costs by a significant margin.

2. COMPETITION ANALYSIS

2.1. INTRODUCTION

In this section, we outline the competitive constraints that gas pipeline operators are subject to. In the time available, we have not formed any strong views on market definition and the materiality of the competitive processes at play in the relevant markets. However, we have analysed enough information to persuade us that a thorough investigation of these competitive forces is justified. In particular, it is our view that changes in the gas production market and in policy settings (notably those related to the Kyoto Protocol) make the threat imposed by alternative fuels on gas pipeline operators very real.

2.2. INTER-FUEL COMPETITION

In the past, the Commission has relied on court judgements to assert that gas falls within a separate product market. These judgements occurred during an era of low gas prices resulting from the bountiful supply of cheap Maui gas. That era is at an end, calling into question continued reliance on court statements that gas and other fuels only compete at the margins. We understand from NGC that over the past 18 months the energy component of delivered gas prices has almost doubled for some industrial customers, exposing gas to a much greater degree of competition from alternative fuels including coal, wood-waste, fuel oils and other energy sources. In response to recent and prospective price increases there is already evidence of commercial and industrial customers from a range of sectors investigating options, including acquiring necessary resource consents, and pricing alternative technologies in order to shift to alternative fuel sources as supply contracts expire.

Other relevant factors include:

- There is currently significant uncertainty about future gas prices, which raises the risk that in future there may be asset stranding as customers do not wish to take on fuel price risk. Given that customers are making long-term decisions on generation technology or appliances, security of supply and price uncertainty issues make other fuels a more competitive option taking into account both price and quality (availability of supply);
- We are advised that customers are currently generally unable to obtain contracts for gas supply for more than two years because of price and supply uncertainty. This creates significant price risk for customers replacing existing gas-using assets and may even bring forward asset replacement decisions. In contrast, there is little difficulty negotiating long-term coal contracts providing customers with the ability to invest with secure energy prices;

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- Changes in the policy environment (e.g. carbon charge) are likely to decrease the attractiveness of fossil fuels and improve the competitive position of renewables (e.g. wind, solar, biomass). More generally, uncertainty about future climate change policy affects investment decision making;
- Downstream gas retailers are also horizontally integrated with electricity retailing and, in turn, vertically integrated with gas-fired electricity generation. We understand that under current market conditions some customers are unable to renew gas supply contracts, and gas is being diverted to generation uses; and
- Technological improvements in generation equipment means that for many large customers, biomass and coal are increasingly available in competition to new sources of gas for New Zealand.

2.2.1. Commercial and Industrial Customers

We are advised by NGC that there is evidence of customer switching between fuel sources in order to reduce overall fuel costs. NGC has negotiated a number of special transport deals with retailers where customers have provided direct evidence of an ability to switch to alternative fuel types. Examples come from forestry, dairy, meat processing, food manufacturing, food-growing (glass-houses), grain drying, asphalt, hospitals, electricity generation, etc. There are also examples where NGC has actively sought to attract price sensitive customers to connect to the gas network through discounting transmission and network charges, but have been unable to economically reduce prices sufficiently to convert the customer from an alternative fuel source. This suggests that gas does not always have an advantage over other fuels.

While currently the number of special deals negotiated to keep customers on the network and to attract new customers is relatively small as a proportion of customers on posted terms and conditions, the factors listed above (especially gas price uncertainty and the likelihood of material price increases) is likely to increase the number of customers that can economically switch to alternative fuel sources.

As noted above, we understand from NGC that the energy component of delivered gas prices has almost doubled for some industrial customers, leading to all major customer segments investigating opportunities to switch from gas to coal or wood-waste. Given that coal prices are relatively stable within the \$2-\$4 GJ range (depending on mine location and coal type) and that coal boiler technology has vastly improved so that particulates emissions fall within environmental standards, the barriers to commercial and industrial customers switching to alternative fuels sources, such as coal, have reduced.

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We also understand from NGC that customers are currently unable to procure gas supply contracts for more than 1-2 years. As a result, this provides customers with significant uncertainty about lifetime costs of running heating equipment. In contrast coal and other fuel supplies can be procured on long-term contracts, providing customers with certainty as to costs. This increasingly is placing gas at a competitive disadvantage, particularly with customers that desire price certainty moving forward and are investing in relatively long-lived assets with elements of sunk costs, e.g. boilers that last 10+ years.

2.2.2. Household Sector

In the past, gas was seen as a cheaper alternative to electricity. Nevertheless, constraint is provided by alternative fuels such as bottled LPG, and wood heating. The ACIL report (Appendix A) notes that household consumers would pay the following annual costs for various combinations of fuel:

Table 2: Annual Household Energy Costs

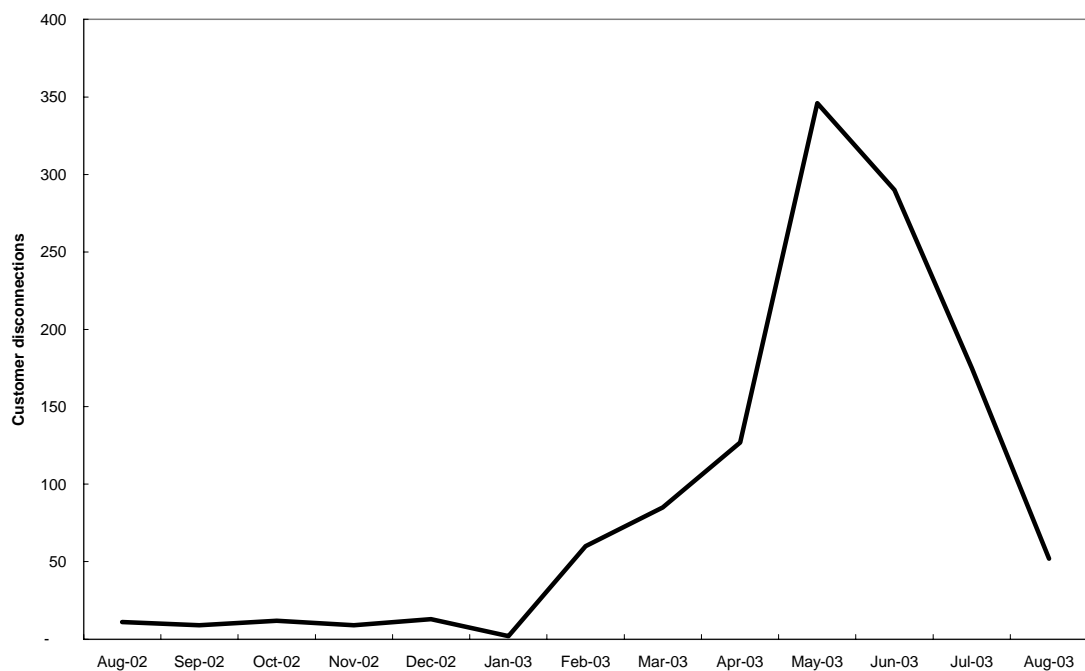
Heating Types	Total Annual Energy Costs
All electric	\$1,587
Gas Heating + Hot water	\$1,217
LPG Heating and Hot water	\$1,224
Wood heating and gas hot water	\$1,213

Source: ACIL (2001) Appendix A4, p9

The price comparisons indicate that inter-fuel substitutes were competitively available to gas in the environment of low Maui gas prices. There also appear to be relatively low barriers to marginal customers diverting from gas to alternative fuel sources.⁶ For example, we are advised that when Genesis rebalanced gas retail tariffs to include a daily fixed charge, a significant number of customers disconnected from the network, and presumably would have switched to alternative fuels. Presumably such customers were relatively marginal customers and may not have been using significant quantities of gas, but nevertheless, this evidence suggests that over a relatively short time horizon customers can switch to appliances that use alternative fuel sources.

⁶ The behaviour of marginal consumers can keep prices competitive not only for themselves, but also for the inframarginal consumers (assuming that the hypothetical monopolist cannot price discriminate). In other words, substitution by a fraction of consumers can be enough to make a snippet unprofitable. Critical loss analysis is a technique that has been developed to estimate the required fraction of customers that would cause a price increase to be unprofitable.

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Figure 1: Customer Disconnections⁷

Source: NGC data

As with other customer groups, household customers are likely to experience increases in gas retail tariffs as a result of the decline in Maui and the increase in wholesale gas costs. This will increase the incidence of households considering switching to alternative fuels, including to electricity.

2.2.3. Summary

In our view, the Commission should appropriately acknowledge that gas pipeline businesses are likely to face increasing competitive threats from alternative fuel sources. It is simply not appropriate to rely on past court statements that inter-fuel competition is limited when wholesale gas prices were half what they are now (and were more certain), especially in light of evidence that customers from a whole range of segments of the economy are looking at options to convert to alternative fuels. If fuel switching leads to material reductions in the number of customers and volumes, the risk of losing customers may be exacerbated if pipeline businesses attempt to recover fixed network costs from fewer customers and/or smaller volumes.

⁷ Customers received notification of the imposition of the daily fixed charge in February 2003.

Even if the Commission does not ultimately accept that inter-fuel competition is a sufficient constraint on pricing, there must be some consideration of how the risk of inter-fuel competition would affect future investment decision-making. The risk of asset stranding is likely to materially increase in future with higher gas prices. Accordingly, limiting returns to even close to WACC through price or revenue cap regulation could deter pipeline businesses from making new pipeline investments given the irreversibility of pipeline investment. We return to this crucial issue below.

2.3. BARRIERS TO ENTRY

There are characteristics of the gas transport industry that may constitute barriers to entry, particularly the extent of sunk costs and regulatory issues (e.g., resource management and easement negotiation issues). However, as the Commission notes, the fact is that entry has occurred into sections of the market. This suggests that these entry conditions are not insurmountable. Factors facilitating entry into this type of industry include:

- Techniques to manage sunk cost risks, e.g., contracts with customers or vertical integration;
- Network expansion opportunities into currently unreticulated areas; and
- A relatively large load compared to the level of sunk costs, e.g., a concentration of medium to large customers.

These factors appear to be present in a number of areas and accordingly, at least for sections of their network, incumbent gas providers are likely to feel pressure from the threat of entry. As a single discipline on pipeline providers, the threat of bypass competition may or may not be sufficient to constrain the overall level of prices, but taken together with inter-fuel competition and the countervailing power of purchasers, the threat of bypass may well provide a workable level of competition.

In the context of developing a framework for evaluating whether competition in limited, the Commission should give further consideration to the extent to which bypass competition adds to the discipline created by inter-fuel competition.

2.4. COUNTERVAILING POWER OF BUYERS AND LONG TERM CONTRACTING

The Commission notes at paragraphs 5.69 to 5.70 that in some cases where there are large customers with credible threats to switch to alternative sources of supply, or who are able to foster or own-supply, there may be constraints on pricing practices of pipeline owners. The inter-fuel competition discussion and the bypass discussion above highlight the practical constraints being imposed by customers on gas pipeline owners in New Zealand.

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In our view the Commission should also consider the ability of large customers to enter into long-term contracts prior to committing to investing in assets that use gas. For example, electricity generators or other large industrial and commercial customers have locational choices before they enter. Prior to building long-lived assets, customers would seek to negotiate a long term contract for gas supply and can credibly exercise the threat that they need not locate on any particular gas network, or indeed use gas as a fuel source. We understand that all electricity generation plants built recently negotiated long-term supply contracts for gas supplies and delivery for the life of the assets prior to committing to build the new plants.

The Commission should also add to the list of constraints through countervailing power those price sensitive customers constrained in their ability to pass-through gas price increases by the threat of imports. The threat that they pose to gas pipeline providers is not simply switching to other fuel sources, but exiting New Zealand entirely. We understand from NGC that examples include, a food manufacturer, for which gas costs are a high proportion of manufacturing costs and is constrained by the threat of imports, and a chemical producer for which natural gas is an essential input.

In terms of developing the framework for the inquiry, the Commission should also consider evidence on the negotiation of gas supply deals prior to making long-term decisions on whether or not to invest in assets that use gas as a fuel.

2.5. GEOGRAPHIC MARKET DEFINITION

In most geographic areas, there is a single pipeline for the transport of gas. However, the level of competitive pressure on that pipeline does vary by geographic region, depending on (among other things) the strength of the threat of entry (or bypass). Furthermore, in some areas there is an alternative pipeline.

It will be appropriate to define separate geographic markets for areas where the competitive pressures materially vary. For example, some parts of the network will be more subject to entry threat than others, e.g. those parts that service a large load or are reaching capacity constraints.

One of the points of our discussion on competition in this report is gas pipeline operators are subject to a variety of competitive pressures, e.g., from other fuels, the threat of entry, countervailing power, etc. The Commission needs to take a holistic approach to determining whether any sub-national geographic boundaries are appropriate.

3. IMPACT OF REGULATION ON EFFICIENCY

3.1. INTRODUCTION

Calculating the net benefits of control is a difficult area, not readily amenable to direct quantification. The Commission acknowledges that heavy-handed forms of regulation can interfere with normal business processes and may deter efficient behaviour. However, in our view the Commission has underestimated these negative effects of regulation, which are likely to impose significant costs on the economy, as businesses become regulator focussed, rather than customer-focussed.

Importantly in the gas sector where there is no obligation on gas pipeline businesses to extend the gas network to serve new customers, there is the potential for some economically efficient investments to not be made, as gas businesses act to minimise costs under a price or revenue cap. The dynamic efficiency costs of delayed or avoided investment can be significant as both consumer and producer surplus are missing. These costs must be balanced against any static efficiency gains from lower prices, which are likely to be small because of the existing use of multi-part tariffs.

In this section we provide a qualitative account of likely organisational behaviour of utilities under price or revenue cap regulation, relative to the current light-handed approach. We start by emphasising the importance of dynamic efficiency versus static efficiency.

3.2. DIMENSIONS OF EFFICIENCY

The Commission recognises that there are several dimensions to efficiency, and also notes that (paragraph 5.6):

Where there are tensions between short-term allocative efficiency and long-term dynamic efficiency, the Commission takes the view that the latter will generally better provide a long-term benefit to acquirers and the public and will therefore be given greater weight when considering efficiency tradeoffs.

We agree with this sentiment, although we would make the point even more strongly. Empirical evidence indicates that allocative inefficiency is trivial compared with productive inefficiency,⁸ and that dynamic efficiency gains swamp static efficiency improvements.

⁸ See footnote 5 of Alam and Sickles (2000) for relevant references. The intuition is that the productive inefficiency is present for each unit produced, while the deadweight loss triangle representing allocative inefficiency only applies to consumers who do not receive the product because of higher prices. Also see Goolsbee, A. (2000) for a discussion of the welfare foregone in missing markets.

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A frequently cited analysis of the magnitude of dynamic efficiency gains is that of Hausman (1997). Hausman develops a technique to measure the consumer surplus that arises from a new product. He applies this technique to voice messaging services and cellular telephone services, and estimates that the gain in consumer welfare from the introduction of cellular telephone services in the USA was about US\$50 billion per year (for the period 1989 to 1993).

Scherer & Ross (1990) conduct an empirical analysis on the trade-off between static and dynamic efficiency, showing that small gains in dynamic efficiency outweigh significant losses in static efficiency.

The importance of dynamic efficiency was also illustrated by the classic work of Robert Solow.⁹ In his study of the determinants of economic growth, Solow concluded that most of the source of economic growth in the United States in the first half of the 20th century could be explained by investments in research and development and education, rather than by increases in capital and labour. Gilbert and Sunshine (1995) further note that while other researchers disagree about the quantitative effects of research and development spending on economic activity, there is general agreement that such effects are substantial.

Porter (2001) refers to the work of Solow and Schumpeter on the importance of innovation. He argues that:

While protecting short-run consumer welfare measured by price-cost margins is undeniably important, the benefits of healthy competition are in fact broader and more essential to consumers and to society. The fundamental benefit of competition is to drive productivity growth through innovation, where innovation is defined broadly to include not only products, but also processes and methods of management. Productivity growth is central because it is the single most important determinant of long-term consumer welfare and a nation's standard of living (page 922).

Since the contributions of Schumpeter and the Austrian school fifty years ago, economists have continued to argue the large benefits of innovation relative to price competition. For example, Shapiro (2000) states, “[u]ltimately, performance is driven by innovation, not pricing. Competition is typically Schumpeterian in character, with a fierce struggle to be the next temporary monopolist” (page 3). Baumol et. al. (2001:614) state:

In a dynamic economy competition in product and process innovations may have a more significant effect on welfare, at least in the long run, than does any likely variation in price.¹⁰

⁹ Solow (1957).

¹⁰ Nelson and Winter (1982) stated that, “over the long run the gains to society from continuing innovation are vastly greater than those associated with competitive pricing.”

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As we argue in this report, regulation is likely to be detrimental to all dimensions of efficiency, particularly dynamic efficiency. Given the importance of dynamic efficiency to the welfare of consumers and economic growth, it is critical that the dynamic efficiency impact of regulation is understood. Much of our report attempts to do this.

3.3. RECENT NEW ZEALAND EXPERIENCE

The Commission's paper largely focuses on the technical details of measuring prices against costs and/or measuring economic profits against WACC.

What the paper does not give regard to is developing a comprehensive or robust theory of institutional behaviour of a monopoly under regulation versus the threat of regulation. A regulator would face very real difficulties regulating pipeline owners, particularly when it comes to forecasting future price or revenue paths in the post-Maui environment, and where the geographic network is limited in scope and pipeline providers have the choice of whether or not to invest.

As the Commission has discovered, regulation is by no means an easy task. It is highly information demanding but, in the end despite advances in analytic methods, requires a large number of relatively arbitrary judgements to be made. For example, under the inter-connection cost determination for Telecom, the Commission chose an inter-connection charge that fell within a large range.

In the wholesale price determination for Telecom, the Commission determined that a discount of 16% on retail prices would be appropriate bearing in mind factor cost differences between New Zealand and the US and the importance of preserving dynamic efficiency incentives. The Commission selected the 25th percentile of the US retail discounts, which extended over a wide range between 8.5% and 29.5%. While the Commission obviously had to come to decision on the wholesale discount to apply, there is no real "science" to choosing the 25th percentile. The decision is ultimately fairly arbitrary.

These examples serve to illustrate that regulation is not an easy task and ultimately a number of difficult decisions have to be made based on extremely imperfect information. Only in the fullness of time will the Commission be able to discover whether the decisions it makes are "right", but there is potential for imperfect information to lead to costly mistakes. In assessing the costs and benefits of control, particularly with price or revenue cap decisions that endure for lengthy periods, the Commission must factor into its analysis the costs associated with regulatory error, which can never be completely eliminated.

3.4. BEHAVIOUR UNDER LIGHT-HANDED REGULATION

3.4.1. Tariff Setting Behaviour

Under light-handed regulation, gas services providers have incentives to set tariffs in an allocatively efficient manner. As the Commission recognises this may involve elements of Ramsey pricing, where more price-inelastic customers pay higher charges and price-elastic customers pay lower charges, or through multi-part tariffs, where combinations of usage and fixed charges recover the utility's overall revenue requirements.¹¹

This charging behaviour is constrained by the information requirements of Ramsey pricing. As Baumol and Sidak establish,¹² Ramsey principles are a source of qualitative guidance to regulated businesses, but are practically difficult to implement.

Under light-handed regulation, however, there may be some disincentive for gas pipeline businesses to push Ramsey-type pricing too far. Those customers that are price inelastic would likely lobby for regulatory intervention to eliminate practices that are perceived to be unfair (even though they are quite efficient).

In any case, Ramsey prices are shown to be relatively inefficient when compared with multi-part tariffs which are commonly used in the gas sector to recover required revenues.¹³ For example, NGC uses a capacity reservation system to allocate the capacity of existing transmission pipelines, with penalty charges if customers exceed their maximum daily allowances and per-unit through-put fees to recover operating costs. This tariff approach for transmission encourages effective utilisation and management of pipeline assets, and provides a signal to users of the higher long-run marginal costs of building additional capacity to meet higher peak demands. NGC also permits customers to trade reserved pipeline capacity: both intra-firm trading (where customers at different points on the network can trade capacity); and inter-firm trading, where retailers and major customers can trade imbalances in different periods, further enhancing the allocation of pipeline resources.

¹¹ There is also no reason in economic theory not to apply Ramsey pricing principles over time. For example, it may be more efficient to recover more capital costs during an economic upswing, when customers may be more able to contribute to the fixed capital costs of the gas network, than during downswings where customers may be less able to pay. We understand that NGC is prepared to negotiate discounts to customers.

¹² Baumol and Sidak (1995) *Transmission Costs and Stranding in the Electric Power Industry* American Enterprise Institute p30.

¹³ See Brown and Sibley (1986), Chapter 4.

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The ACIL report for MED notes that NGC's pricing mechanism may not be suitable over the medium term, when capacity constraints or field diversity may become important issues, however, there is nothing to suggest that NGC would not seek to improve the efficiency of pricing arrangements in light of market developments, since it would benefit from improved capacity utilisation:

The NGCT pricing arrangement for access to its transmission pipeline system is cost reflective and meets the efficiency needs of a system with a limited number of injection points. However, international experience shows that the capacity services offered will need to become more complex as new fields are developed and market demands become more sophisticated, in order to facilitate efficient outcomes. Aspects of these services (e.g. pricing to reflect future cost drivers and new injection points, contract period) could be considered within the industry, with government facilitation or milestones if necessary (as part of a wider consultation process referred to below).¹⁴

Overall, gas service providers do face incentives to set allocatively efficient tariff structures under light-handed regulation. Suppliers of gas services have strong incentives to price discriminate to ensure that marginal customers join the network to make some contribution to fixed costs. By building a more diverse customer base, utilities are better able to spread risks. As we noted earlier, NGC currently provides a number of customers with discounts on posted terms and conditions in order to maintain the connection, as customers would either exit completely due to competitive conditions in downstream markets or switch to alternative fuels.

Of course, there are incentives under light-handed regulation to attempt to set tariffs in a manner that increases profitability and there is likely to be some allocative efficiency costs associated with prices being above costs, if only because of the impracticability of perfect price discrimination. However, this effect does not appear to be pronounced.

¹⁴ ACIL Consulting (2001) *Review of the New Zealand Gas Sector: A Report to the Ministry of Economic Development* p xiv.

3.4.2. Cost Efficiency Incentives

Unregulated businesses are presumed to face strong incentives to make efficiency gains, since value is created for shareholders in improving productive and dynamic efficiency. The Commission notes, however, that productive inefficiency (often referred to as X-inefficiency) can creep into organisations not constrained by the discipline of competition. This occurs because shareholders and management face information asymmetries in monitoring behaviour. These information asymmetries can be mitigated by benchmarking functional activities (e.g. is the treasury function as efficient as treasury functions in other organisations in competitive industries; is the number of people in the call-centre and their pay-rates the same as those in, say banks, etc). Information asymmetries can also be mitigated by competitively out-sourcing functions, and providing performance bonuses for improvements in performance. We understand, for example, that NGC contracts out a number of maintenance and network expansion activities and uses performance bonuses to incentivise staff performance, with the total bonus pool tied to overall financial performance.

While of course it is true that those information asymmetries cannot be entirely eliminated, we do note that there are strong incentives to improve efficiency over time and that shareholders and management have much greater access to information to make those improvements relative to a regulator.

In the case of NGC, it also has a 15 year history of large and active shareholders (Fletchers and AGL) which have placed pressure on the business to improve efficiency.

Potentially offsetting the profit motivation to improve efficiency is uncertainty about the trigger point for regulation. Businesses may be concerned that if they appear too profitable that regulation would become more likely. It is not clear that this has been of practical significance however, as both commercially operated electricity lines and pipeline businesses appear to have made improvements in cost efficiency during the period of light-handed regulation.

3.4.3. Incentive to Provide the Right Level of Reliability

For many customers, reliability of service is of at least equal importance as price. Outages can be hugely disruptive of business operations, so if gas service providers were to fail to provide a reliable service then this would provide a strong inducement for customers to switch to other more reliable fuels even if they were more expensive on a per unit basis.

In the absence of regulation or competition, there is no strong reason to believe that gas service providers would not provide reliability at a level that customers desire. Provided that customers are willing to pay for the level of quality provided we see no reason why commercially satisfactory deals would not be struck, since the gas service provider can get a return on the investment. NGC also conducts an annual customer survey to determine what customers think of NGC's performance and how it could be improved.

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In the case of mass-market customers it may be difficult for gas utilities to provide the efficient level of quality because customers are unlikely to have uniform preferences, yet generally receive the same standard of service. There is some possibility that quality may be over or under-provided since the utility must make a decision on what the customer actually prefers in terms of reliability standards. However, the point we would make here is that this problem also applies to a regulator who would likely be in a worse position to judge the right level of quality to such customers and has a smaller incentive to determine the right level of quality, since it does not feel the financial impacts of reduced quality.

The Commission suggests that quality could be over-provided by an unregulated monopoly, however, it is difficult to see why this would occur. There is no artificial incentive to inflate the asset-base to earn higher returns as occurs with rate-of-return regulation, since the gas service provider could simply get the higher return in any event without gold-plating the assets. We also note that if there is over-provision of reliability, the efficiency consequences would be much less than under incentive-based regulation where there are incentives to either reduce quality, or only provide quality at the standard set by the regulator.

If gold-plating is observed, then pipeline providers become a takeover target, since investors observing gold-plating would be able to realise greater value from the business, by eliminating such wasteful activities. So competition for the firm can also create disciplines that mitigate against gold-plating.

Finally, given the constraints of potential bypass competition, the incentive to over-provide quality by gold-plating assets would increase the possibility of bypass which, as we argue earlier, is a material constraint. NGC is not a textbook monopoly, as it does face competitive constraints which would weaken incentives to gold-plate as it increases the costs of asset stranding in the event of customer switching to alternative fuels.

3.4.4. Business Development / Investment

In section 3.5.4 of this report, we explain why it is that the internal investment hurdle rate for a firm tends to exceed its WACC. As we describe, regulation that attempts to keep profits close to WACC therefore cuts off socially desirable investment. A firm under the existing light-handed regime does not face this constraint (at least not to the same degree) and accordingly is more likely to be dynamically efficient.

Having said this, we do recognise that a light-handed regulatory regime does imply some level of investment uncertainty, as investors may be concerned about the political sustainability of it. Nevertheless, the literature we discuss below implies that more intensive forms of regulation entail greater risks for dynamic efficiency.

3.5. WHAT CHANGES UNDER PRICE CAP REGULATION?

Clearly CPI-X regulation has generated significant price and cost reductions overseas. Downwards price adjustments of 10% or more have been observed,¹⁵ but it is critical to put this into context. Overseas businesses subject to CPI-X regulation were previously regulated under rate of return regulation or public ownership. We know of no instances where unregulated monopolies have become subject to CPI-X regulation, so actual empirical evidence is not available to judge whether these businesses would have become even more efficient if they had been subject to light-handed regulation.

In the following sections we outline the impact that incentive-based regulation has on organisational behaviour.

3.5.1. Price Setting Behaviour

The tariff-setting function is largely removed from the regulated business, and is replaced by a regulatory unit that must furnish information to the regulator and make projections for up to five years into the future about capital expenditure, operating expenditure, input price inflation, customer numbers, energy volumes and any other metrics which attract a charge (e.g. capacity reserved). The regulator then makes a decision on allowable tariff or revenue paths.

The forecasting role takes on greater prominence under CPI-X regulation since prices or revenues are locked down for up to five years, so it is critical that forecasts are as accurate as possible. Small, but cumulative deviations from forecasts over five years can make a significant difference to returns. For example, IPART rejected NSW distributors' capital expenditure claims at the last regulatory reset. Actual capital expenditure over the past regulatory period have exceeded the regulator's forecast capital expenditure by \$100's of millions of dollars, (and reliability has still fallen). Consequently, a number of Australian distribution utilities have failed to earn their WACC because of forecast error.

Forecast Risk

The Commission devotes four very short paragraphs to regulatory risk, noting that it will be managed by the Commission's integrity, transparency and thoroughness. While some regulatory risks can be managed by following these principles, the Commission must acknowledge that some risks cannot be readily managed, regardless of the effort that goes into determining allowable prices or revenues.

¹⁵ Although, it is more important to observe actual performance of businesses than the P_0 adjustments regulators have made. For example, IPART reduced prices by 5 to 10% at the 1999 reset, but it appears that it will have to reverse that during the 2004 reset because it was over-optimistic about efficiency gains that could be made.

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In particular, the most unmanageable and financially material risk that is imposed by regulation is forecast risk. In setting prices and or revenues under a cap the regulator must forecast future:

- Input prices;
- Demand;
- Technology growth¹⁶;
- Capital investment; and
- Operating expenditure.

There are inherent uncertainties and inaccuracies that inevitably affect forecast accuracy. If forecasts deviate materially from actuals (which they can) then the regulator may find that the regulated business over or under-recovers its revenue requirement. The Commission need only look at the experience in New South Wales to observe that forecast risks imposed on electricity network businesses can be material. IPART rejected one network businesses' capital expenditure forecasts in the 1999 regulatory review, but it turned out that even the network businesses' forecasts of capital expenditure were inadequate. Over the past regulatory period distributors in NSW have under-recovered required revenues by tens of millions of dollars, and IPART now has to set an increasing price path to realign prices to actual costs to account for the past forecast error (although there is to be no compensation for revenue under-recovery during the previous regulatory period).

If forecast risks are to be imposed on a regulated business then they must be compensated through a higher return on capital. This risk, which is relatively less material when the network business has more flexibility to adjust prices in response to changing economic and demographic circumstances, is an additional cost imposed on society through regulation, which the Commission must measure and account for in its calculation of the costs and benefits of control.

Note also that risks are also imposed on customers if the regulator over-forecasts revenue requirements or under-estimates demand growth. Customers may end up paying more for gas delivery than it actually costs the business to provide.

To get an appreciation for the potential magnitude of forecast error risk, the Commission could examine the accuracy of various forecasts in the Ministry of Economic Development's *Energy Demand and Supply Forecasts to 2020*.¹⁷

¹⁶ For example, advances in materials sciences and network control systems.

¹⁷ Although, given the major structural adjustments that may occur as a result of the decline of the Maui field and significant changes in relative prices, we would expect forecast error to increase over the next few years.

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Tariff Restructuring

Once a weighted average price cap has been set, the regulated business faces an incentive to rebalance tariffs to be Ramsey efficient, since returns can be improved by charging fast-growing customer segments higher tariffs, and slower growing segments pay lower tariffs. This circumvents the regulator's intention of constraining profits to WACC, so typically side constraints are imposed which prevent the business from changing individual tariffs by more than a certain percentage. Accordingly, regulation often prevents more efficient tariffs from being imposed.

The process of setting efficient tariffs is a difficult one. Businesses are constrained by imperfect information on the likely behaviour of customers and other legislative or regulatory disciplines (e.g. requirement for lines businesses to offer a low user tariff option with low fixed charges). However, it is difficult to envisage why price cap regulation would increase the incentive to set efficient tariffs.

Overall, we question whether price control would in fact improve incentives for regulated businesses to set a more efficient structure for prices. It would be appropriate for the Commission to survey the behaviour of regulated businesses under price cap regulation to determine whether in fact such businesses have improved the cost-reflectivity of charges, or set charges more consistent with Ramsey prices.

3.5.2. Cost Efficiency Incentives

As noted earlier under light-handed regulation businesses face strong incentives to pursue efficiency gains. The purpose of price cap regulation is to replicate the incentives that would face a profit-maximising business in a competitive environment. However, there is evidence that price cap forms of regulation do not perfectly replicate that process because of perverse incentives created by regulatory resets, and the diversion of attention from efficient running of the business during regulatory hearings.

Once prices have been set, the regulated business has incentives to pursue efficiency gains, for which it can achieve a payback within the regulatory period. Depending on the approach taken to carry-over of efficiency gains, the regulated business may withhold making efficiency gains in the final years of the regulatory period, in order to gain maximum benefit during the following regulatory period.

Erhardt (2001) notes:

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For example, water and electricity utilities in the UK have tended to announce very large staff reductions shortly after new price caps are set. While hard to prove, it seems likely that some of these reductions could have been implemented earlier. But this is not done, since reducing labour costs before a periodic review would result in a lower tariff for the coming five years. By 'storing-up' cost savings until just after a review, the utility is able to keep the benefit of the reduction for five years (as well as being able to blame the regulator of the unpopular layoffs). The implication is that regulation acts to delay cost-cutting measures, and thus reduce productive efficiency.¹⁸

It is also important for the Commission to note that regulatory resets are can be very demanding on the senior management and Boards of regulated businesses. Typically establishing a price or revenue path takes nine months to a year of intense exchanges between the regulator and the regulated businesses. Management attention is diverted from the running of the business and this spans all aspects of the organisation, which must coordinate inputs into the regulatory submissions. It is difficult to believe that this would not have a significant impact on the ability of the organisation to seek efficiencies during such an intensive process.

3.5.3. Incentive to Provide the Right Level of Quality

Under incentive based regulatory regimes, businesses face strong incentives to minimise costs. This can potentially be achieved by reducing the level of quality provided. Regulated businesses typically face no incentive to improve quality since a financial return cannot be earned on the quality improvement.

To compensate for this deficiency, regulators have sought to mandate particular levels of quality, or provide additional inducements for businesses to provide the right level of quality. The problem that regulators have struck is determining what the right level of quality is.

An unregulated business, has incentives to negotiate quality improvements on a commercial basis, and has the incentive to strike a deal whenever the costs of the extra quality are justified by the additional revenues.

In contrast regulators have no real ability to engage in such a meaningful commercial process. Inevitably they set average levels of quality which must be provided, or compensation payments for excessive numbers of outages or durations of outages. These one-size-fits-all approaches are unlikely to provide the efficient levels of quality which would vary markedly over customers. Accordingly, the Commission should factor into its analysis that under price cap regulation, quality standards are likely to be inferior to that provided by an unregulated business that can earn a return on quality improvements.

18 Erhardt (2001) p5.

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Furthermore, some quality or reliability standards cannot be readily measured. For example, security of supply is a difficult concept to measure and set standards for. It would have been impossible for a regulator to measure and set standards which would have prevented the Auckland CBD outage. Accordingly, where a regulator would be unable to set quality standards, there would be an incentive on the regulated business to cut costs in that area. If subsequently significant quality issues do arise, the regulated business can deflect part of the criticism to the regulator for squeezing costs too hard with regulation.¹⁹

3.5.4. Business Development / Investment

Price cap regulation is likely to be detrimental to dynamic efficiency for several reasons. We outline key mechanisms here.

Asset Stranding

Given the capital intensity and irreversibility of gas pipeline businesses, of critical importance to dynamic efficiency is appropriate allowance for risky investments. It is not true to say that pipeline businesses are not risky at all. Although asset lives may be measured in decades, the customer base may not be so stable. For example, consider the Huntly electricity generation plant. Genesis is currently rebalancing fuel use to a mix of 80% coal to 20% gas. At some point paying the costs of the Maui pipeline would mean that it is economic to switch entirely to coal, potentially leaving stranded (or partly stranded) the Maui pipeline.

Under a CPI-X regime where returns are periodically set to WACC, gas distributors would generally be discouraged from investing in new assets where there is risk of asset stranding before the end of the economic life of the assets. The extent of under-investment would also be affected by the regulator's treatment of the rate-base as well.

Uncertainty Surrounding Expected Returns

The table below shows a hypothetical infrastructure investment (the example is from Brian Williamson and David Erhardt (2001) "Regulation & Dynamic Efficiency", report to the New Zealand Treasury, and was used in the Commission's 21 March 2002 regulation of electricity lines businesses discussion paper). Assume that the firm's WACC is 16 percent. There are three possible outcomes of the investment: failure, moderate success and best case. Each outcome is equally likely. There are two possible policy settings: unregulated or regulated.

¹⁹

For example, subsequent to the Hatfield rail derailment in England which claimed four passenger's lives, there has been criticism that the Office of the Rail Regulator may have contributed to incentives which delayed appropriate levels of track maintenance. See Howell., B and J. Kavanagh (2001) "The Costs of Running Scared of Running Late" *Competition and Regulation Times* ISCR Issue 4, March 2001.

Table 3: Illustration of Investment Decision-Making Process

Scenario	Likelihood of Each Scenario	Expected Return (percent)	
		Unregulated	Regulated
Failure	0.33	0	0
Moderate success	0.33	12	12
Best case	0.33	36	16
Expected return		16	9.33
Investor's WACC		16	16
Investment decision		Invest	Do not invest

Under the regulated scenario, assume that the provider will not be allowed to earn a return in excess of its WACC. The two right-hand columns show the returns the investor expects under each scenario. For the failure and moderate success scenarios, the returns are below the WACC, so the regulator would not intervene. Under the best-case scenario, the unregulated profit would be 36 percent. However, in the regulated scenario, this would be limited to 16 percent. This example illustrates that defining a profit to be excessive simply because it exceeds an estimate of the firm's WACC *ex post* would lead to reduced investment *ex ante*, and consequently dynamic efficiency losses.

The impact of regulation on dynamic efficiency becomes even more pronounced when it is recognised that internal investment hurdle rates are frequently significantly higher than the WACC, as discussed next.

Hurdle Rates in Investment Decision Making

The NPV criterion is a standard tool in business practice. However, NPV is deficient in one crucial way: it fails to recognise the value of delaying the investment until new information arrives. The NPV rule – invest if discounted cash flows are positive – implicitly assumes that either the investment is reversible, or the investment is a now-or-never proposition. In practice this is rarely the case, and projects will generally require a return in excess of the basic cost of capital of firms, particularly a firm's weighted average cost of debt and equity, to compensate investors for giving up the option to delay and wait for new information.

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In general, when an investment is made, it is usually partly, or entirely, irreversible. When the investment is made, the firm loses the option to wait for better information or, equivalently, if the market subsequently has a downturn, the firm loses the opportunity to “disinvest”. The option to wait is valuable to firms. When an investment is made, that option is eliminated, the effect of which is to raise the cost of investment over and above more tangible costs, such as the cash cost of the investment and the opportunity for returns foregone elsewhere in reversible investments (this is the cost of capital). This additional cost is the option cost.

The use of “hurdle” rates is widespread in business, and these rates generally exceed the cost of capital.²⁰ In other words, firms will not invest in projects unless the price exceeds long run incremental costs of the investment, and by a significant margin. Studies have also found that while the basic NPV model using WACC as a discount rate explains observed investment patterns poorly, the integration of option values into investment models improves explanatory power tremendously. A number of studies have found the option cost is around *three to four* times the cost of capital.²¹

A further consideration is that pipeline businesses must compete for limited investor funds. This may occur within the business between regulated and unregulated business units, and externally with investors considering a portfolio of investments. If the Commission constrains returns over the longer term to be roughly equal to WACC, the optimal response of regulated businesses should be to either to delay investment until certain that the risk of stranding is negligible, or divert investment to potentially more profitable opportunities. Customers would bear the risk that delays in investments could lead to higher congestion prices, or load shedding if demand for capacity exceeds supply. Optimisation risk under ODV or *ex post* prudence tests with historic cost would further risk the possibility of gas businesses delaying investments.

Accordingly, the Commission must recognise that regulation would necessarily limit the investment opportunity set that gas services businesses would consider. Therefore from society’s point of view there is a dynamic efficiency loss as some customers who would be willing to pay for a new investment would not be served because of the riskiness of the investment. This consideration is likely to be important in the gas pipeline sector, since gas pipeline businesses are under no obligation to extend networks to include new customers.

²⁰ Businesses use hurdle rates as a threshold rate of return, below which investment in a project will not occur. A study by Summers (1987) found hurdle rates ranging from 8 to 30 percent. Though the presence of systematic risk means the cost of capital will be expected to exceed the risk-free interest rate, this risk premium is not enough to justify the observed hurdle rates.

²¹ Dixit and Pindyck (1994), p. 7.

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3.6. SUMMARY

Incentive-based regulation is an improvement on rate-of-return regulation and public ownership. But it is important for the Commission to recognise that because of the severe information disadvantages of regulators, incentive regulation can still lead to perverse, and highly inefficient outcomes. Regulated businesses face incentives to reduce reliability, avoid socially desirable but risky investments, withhold efficiency gains and, one year out of every three to five years are diverted from the efficient management of the business to meeting the information demands of the regulator.

Clearly light-handed regulation can also lead to inefficient outcomes, because there may be uncertainties about the trigger point for regulatory intervention, and businesses may feel constrained from appearing too profitable, or aggressively setting Ramsey efficient tariff structures which could lead to price inelastic customer groups lobbying for regulatory intervention. But overall, it appears to us that there is unlikely to be an efficiency case for moving from light-handed regulation to more heavy-handed forms of regulation.

Given that on a forward-looking basis there are competitive disciplines created by enhanced inter-fuel competition in the post-Maui environment and associated risks of asset stranding, the efficiency case for regulation in the pipeline sector seems to us to be particularly unfounded.

Regulation is not easy, and the Commission's assessment of the costs and benefits of control must acknowledge that even so-called incentive-based regulatory processes can create quite perverse outcomes. The greatest risks created by price cap regulation appear to be the incentives to cut quality and delay or avoid making new investments because returns are limited to some allowed rate of return.

4. MEASURING INEFFICIENCY IN THE COUNTERFACTUAL

4.1. INTRODUCTION

The Commission is required to report to the Minister on two tests, the statutory requirement to assess whether the benefits to acquirers would make control necessary or desirable, and a request by the Minister of Energy for the Commission to report on a public benefits test.

Under the Commission's benefits to acquirers test, wealth transfers from consumers to suppliers of gas services are considered a detriment, in addition to efficiency considerations. The public benefits test only considers economic efficiency.

The Commission's overall approach is to:

- use a building blocks analysis to determine the theoretically efficient level of revenues and therefore prices of a gas services business;
- assess the current and expected behaviour of suppliers of gas services against the efficient prices standard; and
- analyse the net benefit to acquirers of imposing control relative to a counterfactual.

4.2. DETERMINING THE COSTS OF PIPELINE BUSINESSES

The building blocks analysis requires the Commission to determine the efficient entrant's business structure and level of operating costs, capital costs, and relevant pricing principles. The complexity of this exercise should not be underestimated.

In our view, the stand-alone costs of providing pipeline services is the appropriate standard for assessing the efficient costs a new entrant would incur in developing a pipeline business. What this means is that if pipeline businesses were to be integrated with other business units (e.g. retailing, wholesale trading) then economies of scope (if any) would accrue entirely to the incremental business and their customers, rather than the regulated business. However, this is quite appropriate. If there are economies of scope that can be achieved through integration with other businesses then competition in the incremental activities would tend to compete away those scope economies over time as the efficient business model is adopted. For example, other pipeline owners or infrastructure providers, such as electricity lines businesses, could integrate with gas retailing or wholesaling operations to efficiently compete in these contestable markets.

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Put another way, if regulation was imposed on the basis of anything other than a stand-alone cost basis, this could limit the potential for efficient business structures to emerge, as pipeline owners would be forced to retain incremental business units to spread costs. For example, if retail services could ultimately be provided more efficiently by a stand-alone multi-utility retailer, then regulation should not artificially prevent that business model from arising. Furthermore, if regulation confiscates the benefits of economies of scope, this would discourage further efficient integration, since the benefits would accrue to the customers of the regulated business rather than investors.

To calculate the stand-alone costs of pipeline businesses, the Commission will need to derive the costs from accounting information. As we understand it the Information Disclosure Regulations for gas pipeline businesses do not currently mandate any particular methodology for allocating costs between businesses units (unlike electricity lines businesses, in respect of which an avoidable cost allocation method (“ACAM”) is mandated). Accordingly, stand-alone cost information may not currently be available to the Commission.

In general, the ACAM method is preferable to other more arbitrary cost allocation methods.²² The starting point for application of the ACAM method is to define the business units potentially subject to regulation and define those as the stand-alone business, with other activities (e.g. retailing, gas production) defined as incremental businesses. Application of ACAM then requires costs that would not be avoided if the incremental business was ceased to be allocated to the pipeline business, and costs that would be avoided to be allocated to the incremental business.

In summary, building blocks analysis is most appropriately undertaken by using ACAM to determine the stand-alone costs of pipeline businesses. Once the stand-alone costs of the pipeline businesses have been calculated, the techniques for assessing transfers, allocative, productive and dynamic efficiency can then be applied. Before considering the analytic methods the Commission has proposed for assessing performance, we first examine the potential for benchmarking to be used in the inquiry.

4.3. USE OF BENCHMARKING IN THE INQUIRY

An alternative or complement to a building blocks analysis of a gas service provider’s costs is to use benchmarking to determine levels of efficiency (both allocative, in terms of the structure of charges, and productive, in terms of the level of costs). This would involve making comparisons between New Zealand pipeline businesses and potentially overseas pipeline businesses.

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In the presence of common costs, other accounting approaches, such as Fully Distributed Costs are generally economically meaningless, and accordingly can lead to management and regulatory errors.

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The difficulties of benchmarking are well-known. It is important that comparisons are made on a 'like-with-like' basis, which requires normalisation for factors outside businesses' control. For example, connection density and load factor will drive differences in costs. Comparison with overseas businesses involves additional normalisation for differences in local wage rates, exchange rates, taxes etc. that may further complicate the analysis.

Despite these difficulties, benchmarking could provide the Commission with a tool to help assess whether any finding of high profits using a building blocks approach is a result of superior efficiency of New Zealand businesses relative to overseas businesses or monopoly pricing. We do note, however, that benchmarking could prove inconclusive depending on the ability to measure and control for important cost drivers.

Overall, we consider that it would be appropriate for the Commission to undertake a benchmarking analysis in addition to the building blocks approach. As we discuss below, the building blocks approach provides its own set of challenges, particularly when it comes to interpretation of results. Using both approaches will provide a check on each other.

The Commission's framework paper separates efficiency into its three component categories: allocative, productive and dynamic. In the remainder of this section we consider each of the components of the Commission's proposed efficiency and transfer analysis and make recommendations as to how the Commission could improve the framework adopted, or interpret results, in light of uncertainty about exactly what is being measured.

4.4. WEALTH TRANSFERS

At a practical level, the Commission faces numerous difficulties attempting to discern whether revenues that might nominally appear different to building blocks revenues are:

- A result of efficiency gains;
- Demand being different to that expected;
- Monopoly pricing;
- Compensation for risks taken that are not necessarily taken account of in beta estimates; and
- Pattern of revenue recovery / depreciation approach.

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What this suggests is that the Commission should be very cautious in applying the building blocks approach, particularly over a short time period. It would be extremely difficult for the Commission to discern in the presence of all these factors whether revenues above building-block costs are reasonable, given the multitude of perfectly acceptable reasons to find revenues above costs over a short measurement period and the fact that what is reasonable depends on expectations of the future.

Volatility and revenue recovery patterns will affect different assets in different ways. For example, a new subdivision where there is significant uncertainty about gas uptake could potentially have a different overall revenue recovery profile than a dedicated pipeline to a customer that signs a 10-15 year contract for the use of the asset. Furthermore, depending on how the asset is depreciated, profits may exceed WACC simply because there is uncertainty about whether a major customer would wish to renew the contract. With significant uncertainty about future gas prices in New Zealand, and the overall availability of an economic gas supply, which may not be a material risk in other markets (e.g. Australia) one would expect that further pipeline investment would not occur unless the asset costs could be recovered before the end of the useful physical life of the asset. Under such circumstances, we would expect to see profitability exceeding WACC if accounting rates of depreciation over the physical lifetime of the asset, potentially exceed the economic usefulness of the assets by decades. Indeed the possibility of economic depreciation that is much less than the physical lifetime of the asset implies variations of actual depreciation from expected depreciation, which should also be reflected in the reasonable rate of return.

4.4.1. NPV Framework

The Commission notes that capital charges over the lifetime of the asset should equal normal returns on the asset base. Returns may be measured to be above WACC over a short time period simply because:

- *Volatility in the economic cycle creates variation in revenues:* because a significant proportion of revenues are recovered through variable charges, the state of the economic cycle influences revenue recovery.²³ Prices are not continuously varied to adjust for volumes movements, they are set for at least a year and, if customers request, for longer periods to provide certainty over the amounts payable;

²³

For example, the forestry sector is a significant gas user, but is subject to large swings in prices and volumes.

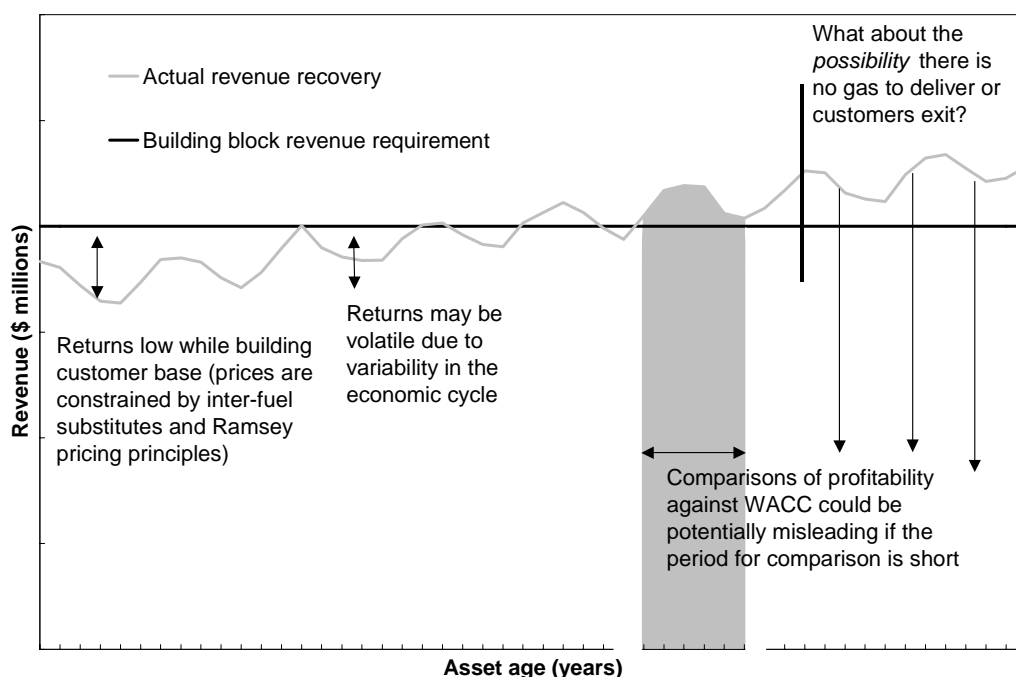
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- *Capital cost recovery takes place over a long time frame:* gas utilities may not be able to recover from customers the full economic costs of providing the assets in the early stages of the asset lives. In general, pipeline assets will be built to cater for future demand looking forward over a reasonable time horizon (10-15 years). If demand is expected to grow over that time, then it may not be appropriate to try to recover the annuitised cost each year of the asset's life, since this could provide a deterrent to customers to connect to the network in the early years of the asset's life. As a result, there may be under-recovery of revenues during the early part of the asset life and compensatory over-recovery later on; and
- *Returns are measured ex post rather than ex ante:* if the world had turned out differently profits could end up being much worse. Consider, what the value of pipeline businesses would be if Pohokura had not been discovered, or if, by bad luck when Pohokura is depleted there is no replacement. In contrast, the risk profile associated with gas pipeline development in Australia, where known reserves exceed 100 years would be considerably less.

These *ex post* outcomes are just a manifestation of what must, for dynamically efficient investment, be accounted for *ex ante* in the reasonable rate of return. That is even if profit exceeds the WACC for the period of analysis there may be no "excess profit".

Figure 2 illustrates these potential impacts over the course of the lifetime of gas assets.

Figure 2: Revenue Recovery Over Asset Lifetime

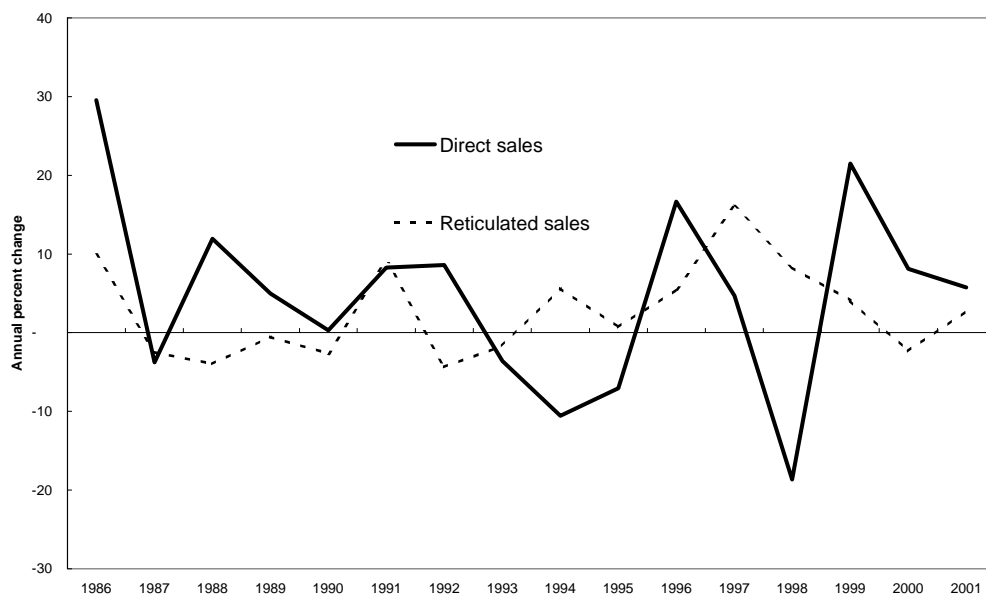


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What this suggests is that the Commission should be cautious in interpreting the results of any short period of comparison of revenues against so-called “efficient costs” determined through a building block method. The shorter the period of comparison, the greater the danger that the Commission mis-diagnose a period of profitability above WACC as evidence of monopoly pricing. It may simply reflect the approach taken to revenue recovery, or volatility in the economic cycle.

The following chart shows actual volatility in total gas sales to direct customers and reticulated sales over the period 1986 to 2001. There is clearly significant volatility in sales, which emphasizes the point that measuring profitability over short periods could potentially lead to a misleading picture of profitability:

Figure 3: Gas Sales to Direct and Reticulated Customers, Annual Percent Change²⁴



Source: Energy Data File (2003) p91.

²⁴

Direct sales are to customers directly served from the transmission grid. Reticulated sales are from distribution networks.

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Finally, the Commission also needs to consider whether transfers²⁵ would necessarily decline under regulation. As we discussed earlier, under incentive based-regulation the Commission would need to set prices for 3-5 years based on uncertain forecasts of the future. There is a possibility that the Commission could inadvertently increase transfers from acquirers to suppliers (or vice versa) if forecasts are materially wrong. This phenomenon has occurred in other jurisdictions where the regulator has had to make large P_0 adjustments to compensate for forecast errors at previous regulatory resets. Accordingly, the Commission must also evaluate the costs associated with forecast risk imposed on regulated businesses and customers. In the current environment where there is significant uncertainty about delivered gas prices, forecasting is likely to be an extremely error-prone undertaking.²⁶

Clearly, there is no easy answer to determining whether actual revenues above building blocks costs measured over a short period are wealth transfers or a result of the factors listed above. We suggest that the Commission complement this analysis with international benchmarking, as a check on the reasonableness of pipeline tariffs, revenues and tariff structures.

4.5. ALLOCATIVE EFFICIENCY

At para 5.73 the Commission considers that, as part of its analysis it must determine whether prices meet an 'efficient prices' standard. "The Commission considers that the process of forming such a judgement makes the costs of the current situation and the potential benefits of control more apparent." While there is an arguable case that this process might highlight inefficient pricing practices, it is not clear how the benefits of control would become apparent, since it is unclear why control would improve on incentives to set an efficient structure of charges.

We also note that the Commission at this stage only intends to focus on the efficient level of average prices (5.117), "but may also consider the efficiency of specific pricing methodologies, if warranted."

25 Where transfers are defined as profits differing from reasonable rate of return multiplied by allowed the rate base.

26 A suitable comparison would be likely macroeconomic forecasting accuracy at the start of the Asia currency crisis during 1997-98.

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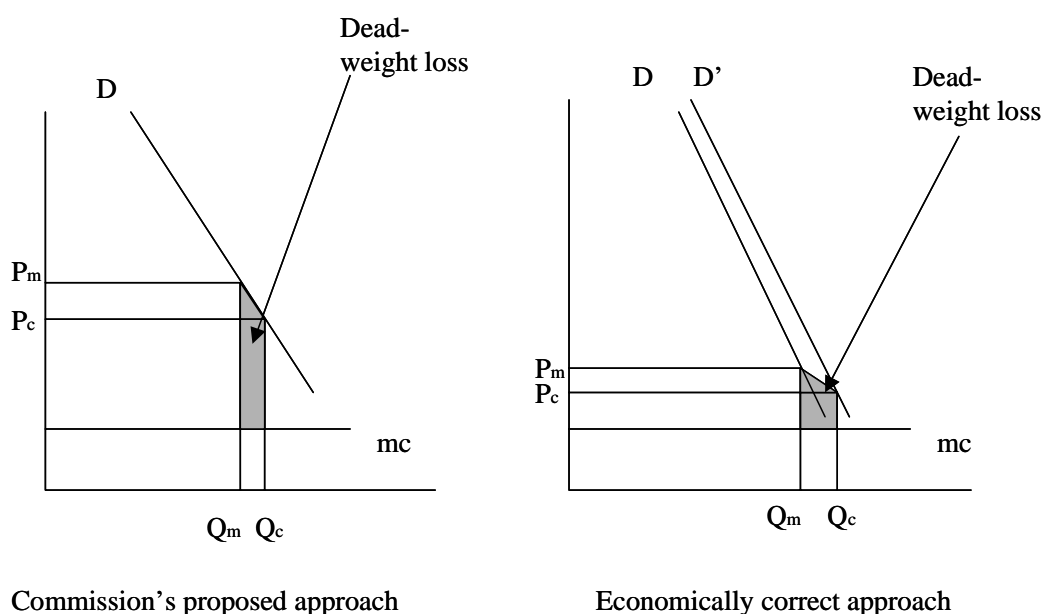
At paragraphs 5.256 to 5.261 the Commission suggests a framework for estimating the benefits of reduced average prices. It is a little unclear from the text exactly how the Commission would calculate prices and the corresponding marginal and average costs. We note that if the method is to simply take the businesses' reported revenues and the building blocks 'efficient revenues' and divide by total delivered volumes to generate prices and efficient average costs then this would likely overstate the dead-weight losses of higher charges. It would also yield prices that consumers do not face. The comparison of welfare under different sets of multi-part charges is complicated and not given by the value of a standard level of consumption.²⁷

Suppliers of gas services do not simply use average cost-based tariffs to recover revenues. There is extensive use of multi-part charges, which would tend to reduce deadweight losses. Any approach to calculating dead-weight losses based on simple averaging would upwardly bias the results. The following diagram illustrates the more accurate method for estimating dead-weight losses in the presence of multi-part tariffs.

27

See Evans, Lewis (1999) *International Benchmarking* Presentation to the Voorberg Group of Official Statisticians. See www.iscr.org.nz for presentation.

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Figure 4: Methods of Calculating Dead-weight Loss

If businesses recover their revenues through a combination of fixed and variable charges, then there are two possible causes of inefficiency. The first is that customers decide not to join the network because fixed costs are too high relative to the benefits derived, and the second is that even if they do join up marginal usage charges encourage reduced levels of consumption. The diagram labelled 'Economically correct approach', illustrates this effect. If fixed charges are too high because of monopoly pricing then the demand curve (D) sits inside the efficient level of demand for the service (D'). If usage charges are above marginal costs there is a further dead-weight loss caused by under-consumption.²⁸

If the Commission considers that inter-fuel substitution is a weak discipline on pricing (which seems unlikely), then the demand curve shift from D' to D, would be a relatively small effect and accordingly, dead-weight losses from above marginal cost pricing would be much smaller than the Commission would calculate using its proposed method.

We reiterate that NGC negotiates special deals with marginal customers to ensure that they remain on the network, thereby making some contribution to fixed costs and reducing all other customers bills over time. The deterrent effect of fixed charges is mitigated by NGC's charging behaviour and the line D' would be very close to D.

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Optimal two-part tariffs may still include a mark-up on marginal costs in order to optimise the number of customers connecting to the network. In other words, the principles of Ramsey pricing also apply to the relative proportions of fixed and variable proportions of two-part tariffs. Accordingly P_c may still be above marginal costs.

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Overall, this analysis demonstrates that where multi-part tariffs are used, and where there is price discrimination to ensure that marginal customers remain on the network or switch to gas, allocative efficiency losses are likely to be significantly smaller than what the Commission would likely calculate using the approach set out in its framework paper.

The data requirements to carry out the more correct analysis of allocative efficiency losses are not significantly more onerous than the Commission's proposed approach since customer numbers, volumes and tariff levels should be available to the Commission.

4.6. PRODUCTIVE EFFICIENCY CALCULATIONS

At paragraphs 5.264 to 5.268 the Commission develops a framework for considering productive efficiency gains. The Commission concludes that it will conservatively estimate productive efficiency losses because it would be too difficult to measure the slope of the average cost curve.

While this method is reasonable, it is important to recognise the distinction between fixed and sunk costs. In the latter case improvements in productive efficiencies are impossible, since, for example, a pipeline that is too big cannot be altered once laid. Costs potentially susceptible to productive inefficiency would only be those costs that can be potentially avoidable by changes in behaviour. The Commission's paper remains silent on the sunk-fixed cost issue, so we merely point this out for completeness.

We note that in the Commission's draft report on Airports, it calculated likely productive inefficiency as a percentage of operating costs to stimulate debate on the likely productive inefficiency losses caused by managerial slackness, as the Commission was unable to directly measure productive inefficiency.

The reason that regulators moved to incentive-based²⁹ forms of regulation is that the potential for productive efficiency gains by state-owned monopolies or rate of return regulated monopolies is unobservable and not incentivised by rate of return regulation. The profit motivation provided by price caps induces the business to reveal those efficiencies over time. So it would be difficult for the Commission to directly measure productive inefficiency unless it carries out some form of benchmarking analysis.

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By incentive based we refer to forms of regulation where prices and or revenues are set for multiple years and businesses are entitled to keep the benefits of higher returns from efficiencies.

4.7. DYNAMIC EFFICIENCY

The Commission notes in the dynamic efficiency effects section (para 5.273) that control may risk affecting dynamic efficiency because the business may keep a smaller share of the profits from investments. However, the Commission also claims that a reduction in price might have beneficial dynamic efficiency impacts on downstream industries. We question this latter contention – in our view it is not dynamic efficiency but static efficiency gains if anything, and it is a double counting of static effects.

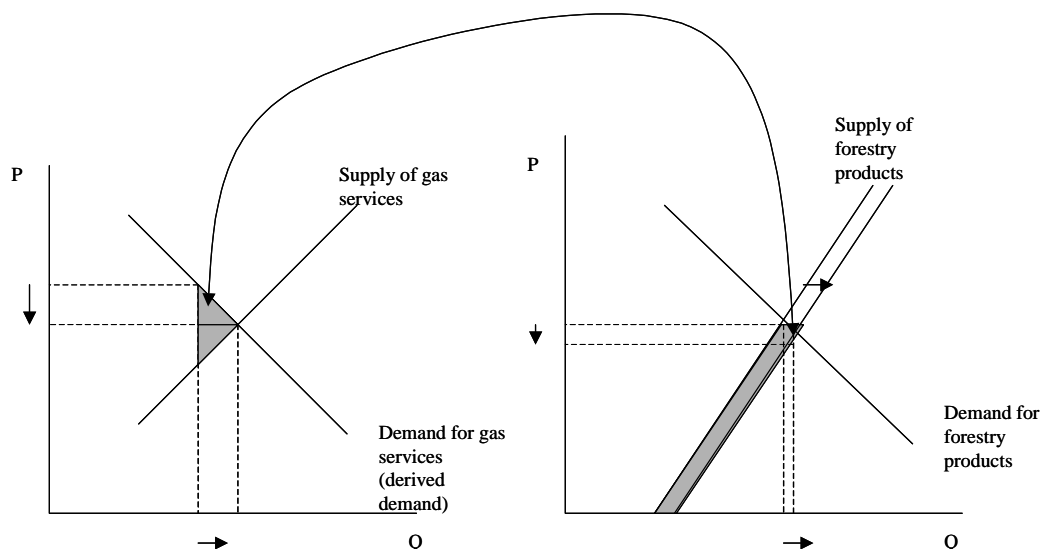
It is not dynamic efficiency because it does not go to the framework for facilitation of appropriate investment over time, rather it may affect a level of prices at one static point in time.

An important general result in the welfare economics literature is that, in a set of vertically related markets, the welfare changes in any one of those markets arising from a change in supply or demand conditions are equivalent to the welfare changes to society. In other words, by quantifying the consumer and producer welfare effects arising from a policy intervention in respect of gas transport services, we also capture the net welfare effects in all vertically related markets. This result is convenient because the quantification of welfare changes in all markets influenced directly or indirectly by natural gas is likely to be a complex exercise.

The concept of an equilibrium demand curve is central. Equilibrium demand is different to ordinary demand: the latter reflects an equilibrium without regard to other affected markets. On the other hand, an equilibrium demand curve captures the equilibrium changes in vertically related markets. Changes in up- and downstream markets feed back into the market where the original change occurred, further adjusting the equilibrium. The equilibrium demand curve reflects these feedback effects, and therefore captures net welfare effects in related markets.

The following diagram helps illustrate the potential for double counting of welfare gains if welfare improvements are measured separately in other markets:

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Figure 5: Welfare Changes in Vertically Related Markets

Welfare improvement from reduction in delivered gas prices in forestry product sector is already captured in the analysis of the welfare analysis of the gas services market because the demand curve embodies all the information about willingness to pay for gas services. Adding the welfare improvements in the gas services market and forestry product market would lead to double counting of welfare improvements.

Figure 5 shows what might happen with a reduction in gas services prices. The reduction in delivered gas prices means that the supply of forestry products can now be provided more cheaply at each quantity of output. This improves welfare in the forestry product market by the grey shaded area. The increase in demand for gas services as a result of the increase in forestry output, is however captured in the equilibrium demand curve for gas services, since the demand curve captures all sectors' willingness to pay for gas services at each level of price. The grey-shaded triangle in the gas services market captures all the downstream benefits in the downstream sector. Accordingly, it is only necessary to calculate the welfare gain in the gas services market, and not all vertically related markets.

In CRA's submission to the Commission on the welfare impacts of delay in development of Pohokura (dated 20 December 2002), we demonstrated that welfare impacts can simply be measured in one of a set of vertical related markets. For further technical detail of that analysis the Commission could refer to Appendix B of CRA's report on the welfare impacts of authorisation of Pohokura, or Just, R, D Hueth and A Schmitz (1982) *Applied Welfare Economics and Public Policy*, Prentice-Hall, chapters 9 and Appendix D.

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In our view, it is difficult to construct a theory of why a pipeline business facing uncertainties about the extent of inter-fuel competition, bypass threats and countervailing power from customers would be dynamically inefficient when compared with the workably competitive standard. New investments to meet market demands typically take place in a competitive environment, since customers may choose alternative providers if not satisfied with prices offered, and pipeline businesses themselves have incentives to minimise the costs of new pipeline investments, since this will improve overall returns on the investment. There are also numerous examples across the gas pipeline sector and electricity lines businesses of contracting out to competitive providers to ensure that new investments are cost efficiently supplied.

5. WEIGHING UP BENEFITS AND COSTS OF CONTROL

5.1. INTRODUCTION

The Commission has proposed to examine the benefits and costs of control by comparing the factual (declaration of control) and counterfactual (light-handed regulation) against a notional workably competitive benchmark. This approach seems reasonable.

The key point we draw out in the remainder of this section is that estimates of the benefits and costs of control can only be broadly calculated, given the absence of empirical studies of the relative efficiency impacts of light-handed and heavy-handed forms of control. Accordingly, in determining the net benefits of control the Commission should be cautious in putting too much weight on what in reality are imprecise estimates of benefits and costs.

5.2. CHOICE OF CONTROL METHOD AND COUNTERFACTUAL

To estimate benefits and costs the Commission must choose a method of control and a likely counterfactual if control is not applied. The Commission proposes to use price cap regulation as the means of evaluating the potential benefits of control. We agree with the use of price cap as a potential means of control, but would perhaps use the more generic term “incentive-based regulation”, where allowed prices or revenues are set for multi-year periods based on forecasts of likely future costs and demand levels. Incentive-based regulation encourages utilities to cut costs by reducing reliability, so it also requires regulators to set quality standards.

The Commission proposes that the counterfactual would be a continuation of the status quo of light-handed regulation. We consider that this is an appropriate benchmark. The Commission suggests that a finding that control should not be declared, however, might weaken the constraint provided by the threat of regulation on pipeline owners’ behaviour.

We understand that NGC is to make detailed submissions on the nature of the gas industry going forward, but we note that additional information disclosure requirements and the potential for increased industry oversight by the Electricity Commission is likely to provide additional checks on pipeline owner’s behaviour, including the potential for review of pricing methods. More importantly, if the number of reviews of the infrastructure sector, and increase in regulatory oversight, is indicative of the future scope for review, pipeline owners would be irrational to consider that the threat of regulation is any weaker. Furthermore, thresholds implemented for electricity lines businesses will naturally invite comparisons to the gas pipeline sector, providing de facto standards for behaviour.

5.3. APPLICATION OF REGULATORY TESTS: QUANTITATIVE APPROACH

The Commission is required to be satisfied that competition in the gas services market is limited and that acquirers would be better off with control before recommending that the Minister declare control. Under the public benefits test, the ‘acquirers’ test is replaced with a ‘net public benefits’ test, which excludes transfers. The following table sets out the potential sources of benefits and costs of control under the two tests:

Table 4: Regulatory Tests:

Test	Potential Benefits of Control	Potential Costs of Control
Benefits to acquirers	Reduced transfers, potentially improved allocative efficiency ³⁰	Reduced productive and dynamic efficiency, reduced quality ³¹
Public benefits	Potentially improved allocative efficiency	Reduced productive and dynamic efficiency, reduced quality

Quantification of efficiency effects is necessarily a relatively judgemental process. The measurement of transfers and allocative efficiency losses, on a backward looking basis is likely to be problematic because of short measurement periods, and the *ex post* nature of the exercise. Similarly, with productive and dynamic efficiencies, it is very difficult to derive more than broad estimates of potential efficiencies, especially on a forward looking basis.

The Commission has proposed that the net benefits of control would be calculated by deducting from the calculated benefits of control the direct costs (additional compliance and administration costs) and indirect costs of control (reduced productive and dynamic efficiency).

Direct costs should be relatively amenable to quantification by reference to costs of control in other jurisdictions (e.g. costs of regulatory bodies in Australia, UK). Contacting regulated businesses in other jurisdictions should provide the Commission with a guide to likely compliance costs of regulated businesses. In any event direct costs are likely to be small relative to indirect costs.

³⁰ At paragraph 5.252 the Commission takes the preliminary view that control would bring productive and dynamic efficiency closer to the workably competitive benchmark. As we argue earlier, regulation is unlikely to improve investment decision-making or incentives to make efficiency gains relative to light-handed regulation.

³¹ Holding prices constant, a reduction in quality would be an allocative efficiency loss if customers would be willing to pay for higher quality, but because the regulator restricts prices or revenues, additional quality is not provided.

The approach that the Commission used to estimate the indirect costs of control in Airports³² was to take the benefits of control and scale them back by a certain percentage. The Commission has also proposed to use this method for evaluating the indirect costs of controlling pipeline businesses.

While the scaling approach obviously has the attraction of simplicity, there is nothing else to commend it. In our view this approach is economically indefensible. There is no reason to believe that productive or dynamic efficiency losses under regulation should be proportional to, or in any way related to the extent of any allocative inefficiency that might exist prior to regulation. In fact, theory and evidence would suggest that dynamic efficiency losses alone are likely to dwarf allocative efficiency gains.

The Commission suggests (para 138) in its draft guidelines for threshold assessment and inquiry process for electricity lines businesses, that it could consider the strength of incentives under control versus the counterfactual to derive quantitative estimates of the indirect costs of control. In our view, this is an appropriate approach, since it at least attempts to link the potential for dynamic and productive efficiency to the actual and forward-looking costs of the business and to incentives.

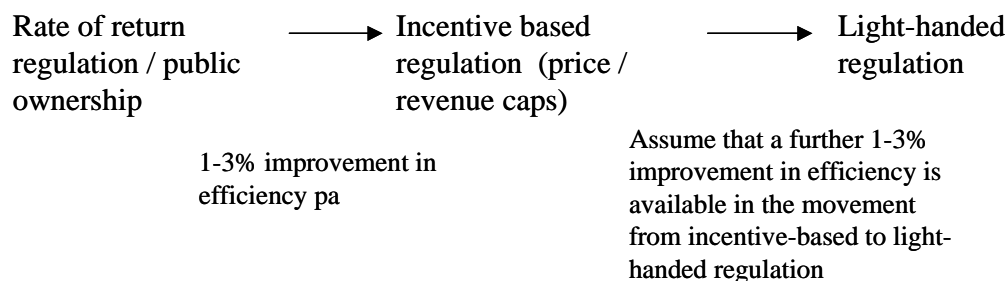
In the following sections we outline potential methods the Commission could use to estimate the potential magnitude of productive and dynamic efficiency losses under control and the impact of reduced quality.

5.4. PRODUCTIVE EFFICIENCY LOSSES UNDER CONTROL

To get a ball-park estimate of productive efficiency losses, a reasonable approach might be to assume that if the movement from rate of return regulation to incentive regulation resulted in efficiency improvements of 1-3% (a typical X-factor range used by overseas regulators³³) that a further move to light-handed regulation might induce a further 1-3% of efficiency gains per annum. Therefore a movement from light-handed regulation to more heavy-handed control could reduce efficiency by 1-3% per annum. We emphasize that this approach is entirely based on assumption and is not a “measurement” approach.

³² The scaling approach has also been proposed in the Commission’s draft inquiry guidelines for electricity lines businesses (para 137).

³³ And is also justifiable on total factor productivity gain estimates, e.g. Diewert and Lawrence (2000).

Figure 6: Efficiency Potential Under Different Regulatory Approaches

As a further alternative, we also understand that the Commission has engaged consultants to examine the efficiency performance of electricity lines businesses. If meaningful information on efficiencies made by lines businesses under light-handed regulation comes out of that process, the Commission could discount the efficiencies made as an indicator of the potential loss of productive efficiency under price control for suppliers of gas services. Comparing productivity differentials between different types of businesses (e.g. trust, council and investor owned businesses) might also provide insights into the likely superior cost efficiency incentives facing profit motivated utilities.

5.5. VALUING DYNAMIC EFFICIENCY COSTS UNDER CONTROL

As the Commission notes, dynamic efficiency in network industries is generally concerned with making investments at the right time. Under price cap forms of regulation, the regulator attempts to set prices so that returns are likely to be equal to WACC over the course of the regulatory period. This would tend to decrease incentives to invest in more risky investments that require the prospect of higher returns than WACC to justify the investment, as we discuss elsewhere in this report.

Further if optimisation risk is imposed under the regulatory approach without sufficient compensation, regulated businesses would not make new investments where there is a risk that optimisation could occur during the lifetime of the asset. The business would face all the downside risk with optimisation, but would not expect to benefit through upside returns.

The Commission does not provide any framework for considering the dynamic efficiency costs of control. One potential method the Commission could use would be to take recent investment levels as an indicator of likely future investment levels in gas services. Using those figures the Commission could estimate the welfare costs of delay in those investments as a result of gas service providers having to wait longer to make new investments. In considering possible methods of quantification, it is worth conceptualising a dynamic efficiency gain (and correspondingly loss) as the area created by an investment between the resulting demand and supply curves.

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There could be two potential methods used to calculate dynamic efficiency losses through delays or foregoing new pipeline investments.

The first occurs when customers have to substitute to alternative fuel sources because investments are not made. For example, consider a new connection to the network. A customer will have a willingness to pay for this connection, but will receive no benefit unless the connection is actually built. There will be a cost to building the connection, but if the willingness to pay exceeds that cost, then the resulting surplus (i.e., difference between willingness to pay and cost) is an efficiency gain, to be shared between the producer and consumer.

In the second case, where investments are delayed or foregone because compensation for stranding risk is inadequate, regulation may lead to capacity constraints on the pipeline network leading to some customers not being served, or load shedding at particular times. Using empirical studies of the value of lost load, it could be possible to run scenarios where for a certain percentage of the time some customers are constrained in the amount of gas that can be consumed.

Such calculations suggested above are not easy, but they are possible, and given the relative importance of dynamic efficiency, we would argue it is essential that the Commission directly derive estimates of the potential orders of magnitude of dynamic efficiency losses under control.

5.6. VALUING REDUCED QUALITY UNDER CONTROL

The Commission remains silent on the issue of valuing different levels of quality under regulation.³⁴ The costs of poor quality supply may be significant, therefore an attempt should be made at estimating the potential magnitude of these effects.³⁵

Under price cap regulation, utilities face incentives to reduce the level of quality in order to reduce costs. Regulators can only imperfectly set quality standards and for some dimensions of quality may not be able to set standards at all. So it is likely that under price cap regulation, relative to light-handed regulation sub-optimal levels of quality would be provided.

³⁴ Although the Commission does note that regulation may have unintended consequences on downstream markets (para 5.9). Reduction in quality is one potential area where unintended consequences may manifest.

³⁵ In the electricity sector, value of lost load estimates range from \$1,500 to \$14,300 per MWh of lost load (compared to delivered electricity prices of the order \$100-\$150 MWh). See FSWG Preliminary Report to the GSC Appendix Four Cost / Benefit Analysis Report, 21 June 2001 <http://www.gsp.co.nz>.

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The key quality issues with gas networks arise with pressurisation. For example, if compressors fail and pressure in the network starts to drop, then contingency plans are actioned to shed load to customers to prevent total system depressurisation. Restoring supply after load shedding is an extremely costly and time consuming exercise because each customer must be individually reconnected.³⁶

One potential approach to measuring the value of sub-optimal quality under regulation is to follow a similar approach to the dynamic efficiency measurement, where empirical estimates of the value of lost load are used to determine what reduction in welfare there might be with different plausible percentage reductions in quality of supply.

5.7. CONCLUSIONS: WEIGHING UP BENEFITS AND DETRIMENTS

Overall, the measurement of likely inefficiency under heavy-handed versus light-handed regulation is an extremely difficult and approximate task. There is no easy method for quantifying these effects, but rules of thumb based on “what seems reasonable” can be applied to get a feel for the magnitude of the potential effects. When the Commission comes to weighing up the benefits and costs of control, a reasonable approach would be to consider the degree to which the Commission can be certain about the quantification of costs and benefits and how sensitive results are to variations in assumptions made in deriving quantitative results.

Economic theory and evidence demonstrates that dynamic efficiency is of greatest significance to consumers over time. More heavy-handed forms of regulation (such as incentive-based price or revenue caps) weaken dynamic efficiency incentives by reducing the returns available to investors. The expected increase in wholesale gas prices is likely to have a material impact on the derived demand for gas services, which would materially increase the risks of regulation on pipeline investors, since forecasts of demand for gas services could be wrong by substantial margins. Accordingly, regulation could easily lead to significant deviations of efficient revenues from costs.

In our view, the Commission should adopt a cautious approach in weighing up the benefits and costs of implementing more heavy-handed forms of control. The acquirers test requires the Commission to be satisfied that control is necessary or desirable in the interests of acquirers. Given potentially significant investment levels to increase reticulation and penetration of gas to a larger number of consumers, it appears that dynamic efficiency losses could well be significant under more heavy-handed forms of regulation. Because of the difficulties in developing more than broad estimates of likely productive and dynamic efficiencies under control versus the counterfactual, the Commission should only make a control recommendation where it finds that estimated benefits exceed estimated costs by a significant margin.

³⁶

A further source of sub-optimal network pressure could arise if there is pressure to cut costs by delaying network reinforcement, so that there is inadequate storage in the system to meet peak demands.

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