REGULATION OF ELECTRICITY NETWORK SERVICE PROVIDERS

 INCENTIVES AND PRINCIPLES FOR REGULATION

DISCUSSION PAPER

INDEPENDENT PRICING AND REGULATORY TRIBUNAL OF NEW SOUTH WALES
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DISCUSSION PAPER
Submissions

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Submissions should have regard to the specific issues that have been raised. There is no standard format for preparation of submissions, but reference should be made to relevant issues papers and interim reports. Submissions should be made in writing and if they exceed 15 pages in length, should also be provided in computer disk in word processor, PDF or spreadsheet format.

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Such a claim for confidentiality should be clearly noted in a prominent position on the front page of the submission.

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<tr>
<td>AARR</td>
<td>Aggregate annual revenue requirement</td>
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<td>ACCC</td>
<td>Australian Competition and Consumer Commission</td>
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<td>AGL</td>
<td>Australian Gas Light Company</td>
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<td>Capex</td>
<td>Capital expenditure</td>
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<td>CAPM</td>
<td>Capital asset pricing model</td>
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<td>COAG</td>
<td>Council of Australian Governments</td>
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<tr>
<td>CPI</td>
<td>Consumer price index</td>
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<tr>
<td>CPI-X</td>
<td>Consumer price index less an efficiency factor</td>
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<tr>
<td>CRTC</td>
<td>Canadian Radio-Television and Telecommunications Commission</td>
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<tr>
<td>DAC</td>
<td>Depreciated actual cost</td>
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<tr>
<td>DEA</td>
<td>Data envelopment analysis</td>
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<tr>
<td>DORC</td>
<td>Depreciated optimised replacement cost</td>
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<tr>
<td>DV</td>
<td>Deprival value</td>
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<tr>
<td>GSN</td>
<td>Great Southern Networks</td>
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<tr>
<td>IPART</td>
<td>Independent Pricing and Regulatory Tribunal (the Tribunal)</td>
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<td>LIS</td>
<td>Line in the sand</td>
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<td>MAR</td>
<td>Maximum allowable revenue</td>
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<tr>
<td>MMC</td>
<td>Monopolies and Mergers Commission (UK)</td>
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<tr>
<td>NPV</td>
<td>Net present value</td>
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<td>NSP</td>
<td>Network service provider</td>
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<tr>
<td>ODRC</td>
<td>Optimised depreciated replacement cost</td>
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<tr>
<td>ODV</td>
<td>Optimised deprival value</td>
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<tr>
<td>OFFER</td>
<td>Office of the Electricity Regulator (UK)</td>
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<td>OFGAS</td>
<td>Office of Gas Supply (UK)</td>
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<tr>
<td>OFWAT</td>
<td>Office of Water Supply (UK)</td>
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<tr>
<td>Opex</td>
<td>Operating expenditure</td>
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<td>ORG</td>
<td>Office of the Regulator General (VIC)</td>
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<td>PCR</td>
<td>Price cap regulation</td>
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<tr>
<td>PV</td>
<td>Present value of future income streams</td>
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<tr>
<td>RAB</td>
<td>Regulatory asset base</td>
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<tr>
<td>RAT</td>
<td>Recoverable amount test</td>
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<td>RPI</td>
<td>Retail price index (UK)</td>
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<tr>
<td>RPI-X</td>
<td>Retail price index less an efficiency factor</td>
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<tr>
<td>SAIDI</td>
<td>System average interruption duration index</td>
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<tr>
<td>SCARM</td>
<td>Standing Committee on Agriculture and Resource Management of the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ)</td>
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<tr>
<td>TFP</td>
<td>Total factor productivity</td>
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<td>WACC</td>
<td>Weighted average cost of capital</td>
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1 INTRODUCTION

It is widely accepted that the form of regulation applied to network service providers is a critical factor in determining the overall performance of the industry, and the level of benefits delivered to customers. In its recent issues paper, *Pricing for Electricity Networks and Retail Supply*, the Tribunal briefly discusses the incentive regulation model and issues relevant to the operation of this model. The Tribunal sought comments on how and when the benefits of efficiency and other gains might be shared by network service providers (NSPs), owners and their customers.

Comments received from industry participants and other parties confirm the importance of clarifying the Tribunal’s chosen approach to these issues for the forthcoming review of distribution and transmission network prices in New South Wales. By more fully discussing the issues, reviewing the main options, and providing some preliminary recommendations, this paper is intended to inform the process of selecting a regulatory approach.

This paper does not seek to address all the issues involved in the design of regulatory arrangements. Its primary focus is the principles for sharing the benefits of efficiency gains, and the impact regulation has on incentives for a utility. Other discussion papers will focus on how the asset base should be rolled forward at each regulatory review, and whether a price or revenue cap should be adopted.

2 INCENTIVE REGULATION

2.1 General discussion

When a product or its economic means of supply establishes monopoly power, regulation may be required to prevent abuses of that power. Such abuses may include unjustifiably high prices to meet the demands of owners for maximum profits, poor levels of service, or a combination of these. Monopoly pricing reduces the effective income of consumers and hinders the efficient allocation of resources by reducing the competitiveness of downstream users.

The potential for abuses of monopoly power arises from the unequal balance of incentives that the monopoly supplier faces. In a competitive situation, the supplier’s desire to achieve maximum profits at minimum effort is constrained by the presence of other suppliers and the choice that this allows customers to make. Alternative suppliers are continually seeking for ways to improve their position by attracting the interest of customers or reducing their costs of production. Customers evaluate the choices and select the one that best meets their needs. This choice may, of course, have many more bases than simply price.

Although this description is greatly simplified, it is generally true that in competitive situations, firms are faced with incentives which lead them, over time, to drive costs down (that is, to improve efficiency), limit price and profit levels, and seek to meet customer preferences. The interaction of the various economic agents, (the owners, managers, suppliers of inputs, and consumers of the end product) each operating in response to the incentives created by the competitive environment, provides a mechanism for sharing the economic gains.
The role of incentives is clearly crucial to the effective functioning of the economic system. Take the element of competitive supply away, and the system soon becomes unbalanced. The different methods of dealing with this situation are well illustrated by the introduction and continuing evolution of economic regulation in the electricity supply industry.

For the greater part of its history, the provision and supply of electricity was regarded as having a high degree of natural monopoly. This was reflected in the organisation of electricity utilities around supply franchises, and the granting of exclusive supply rights within geographic regions to single, often vertically integrated utilities. In Europe and Australia such bodies were initially mostly government owned and controlled. Economic regulation was implicit, represented by retail price levels set by the responsible Minister, usually on the recommendation of the supply authority. In the United States, where a greater diversity of private and public ownership existed, retail price regulation was forced to be more explicit, since it had to deal with the rights, expectations and behaviour of the operators and providers of capital to the privately owned utilities.

Whilst there used to be substantial differences in the application of regulation across government and privately owned utilities, a number of basic similarities existed. In both cases, prices were based on the incurred costs of supply and, in the case of private utilities, some margin for profit (often set with reference to a rate of return on capital employed). In the case of government ownership, the public utility would advise the government of the appropriate price level commensurate with its costs. The private utility had to document its costs to the regulator (often in great detail, leading to the charge of ‘micro management’) and argue over what constituted reasonable profit. This became known as cost plus regulation.

In effect, cost plus regulation accepted the level of costs incurred by the utility (and sanctioned by the regulator) as a given. For a government utility those costs were determined by the diligence of individual managers operating within the constraints of the public system. Similarly in a private utility, provided that costs were not excessive, they were accepted. There was little incentive for managers to pursue lower costs, since any additional profits would be returned to customers by the regulator at the next, usually annual, price review. Investors in private utilities quickly recognised this, assessing utility equity shares as broadly equivalent to long term bonds, with relatively low risks and stable, low returns.

In Australia, profit related commercial objectives were introduced into the charters of government owned utilities, which were reorganised along private sector lines. These changes helped to increase the utilities’ internal focus on efficiency and established a surrogate equity holder with expectations of receiving a return. However, this did little to change the weak efficiency incentives inherent in cost plus regulation.

Cost plus regulation reached its furthest development in the United States, where variations are also known as cost of service or rate of return (ROR) regulation. As Crew and Kleindorfer (1996) comment:

ROR embodies micro management and is a form of cost plus regulation in that the company can normally only persuade its regulators to change, let alone raise, its prices and revenue if it can show that its costs have changed. Revenue, or “revenue requirements”, are derived from operating costs plus capital costs plus a return on capital, with the latter being the company’s source of profits. The incentives for cost economy in ROR are weak, and economists have criticised ROR’s efficiency properties in rather strong terms since the original paper on this topic by Averch and Johnson (1962).
In the 1980s utility regulation took a major step forward with the introduction of the England and Wales electricity market and the major structural changes that preceded this. The successful emergence of a competitive electricity market fundamentally changed the scope of the regulatory requirement by prospectively shrinking the natural monopoly element of the industry away from the retail boundary (for most, if not all customers) to the meshed high and low voltage wires network. Moreover, it gave impetus to the task of designing a regulatory approach to the remaining natural monopoly elements. This approach sought to reproduce, as far as possible, the positive efficiency incentives present in competitive markets. Reflecting its emphasis on creating stronger efficiency incentives, this broad approach became known generally as incentive regulation.

At its simplest, incentive regulation should be based on the application of two general principles:

- **Competition is preferable to regulation.**
  
  Wherever feasible, competitive solutions should be applied or promoted. Where elements of natural monopoly exist, the regulatory response must be careful to avoid entrenching or artificially prolonging the conditions that create the natural monopoly.

- **Regulation should seek to emulate competitive outcomes.**
  
  Abuses of monopoly power are defined by reference to the level of costs, prices and service that would be expected under competitive conditions. The competitive process is dynamic and its specific outcomes unforecastable. No regulator can accurately assess the levels of efficiency or service an industry is capable of over time. Hence, the regulatory framework should aim to create the conditions where the industry itself, in response to the incentives it faces, moves towards its continually shifting performance frontier.

This approach to regulation accepts that the regulated entities (in this case NSPs) are economic agents operating in accordance with their obligations to maximise the value of their shareholders’ investment. Such a position is consistent with the corporate form and responsibilities of NSW NSPs, all of which carry specific obligations to act commercially and in the interests of their shareholders.

The three key characteristics of incentive regulation are:

- **Regulation of prices or revenues, rather than profits.**

- **The use of price or revenue controls extending over several years, rather than annual reviews.**

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1. As Turvey (1995) points out, a form of incentive regulation, which he calls 'sliding scale regulation', was applied as early as the late nineteenth century to London gas utilities, but was then largely forgotten. In Burns (1995) the extension of this approach to the regulation of current monopoly enterprises is discussed.

2. It is assumed that non-commercial obligations imposed under the State Owned Corporations Act (SOC) are separately identified and funded. Ministerial powers to direct are present. However, their application is subject to the provisions of the SOC Act.

3. The nature of the shareholding is not discussed here. However, some observers have argued that the commercial incentives on a public sector corporation are inherently weaker than on a corporation with majority private shareholding.
• Incentives for the utility to pursue efficiency gains by providing an opportunity for it to retain the benefits of improved profitability for a period of time.

In the context of the price cap (PCR) form of incentive regulation, Crew and Kleindorfer (1996) comment:

PCR offers some clear incentives for efficiency that were not traditionally operating in ROR [cost plus] regulation. Under PCR, the company has an incentive to minimise costs and generally improve the efficiency of its operations over time, in that it pockets all the profits, at least for the period over which the price cap applies, known as the price-cap [or review] period.

Proponents of incentive regulation argue that this approach has the potential to significantly reduce transaction costs and to remove any constraints on innovation arising from the micro management of cost plus regulation. In principle, incentive regulation should be forward looking and top-down, rather than backward looking and bottom-up. It is argued that this approach maintains a focus on innovation, improvement and mutual benefit sharing.

There are, however, clear limitations on the extent to which this approach can emulate the incentives faced by a firm operating under competition. For example, a key incentive, that of loss of market share and subsequent financial decline, is missing. The regulator may eventually punish inefficiency, if evidence of this becomes available. However, this is likely to be a less effective penalty than would apply in a competitive market. As a result, incentive regulation relies heavily on a utility’s response to the offer of an upside gain, with a perhaps less effective incentive to avoid a downside penalty.

2.1.1 Cost links

The National Electricity Code calls for network regulation to be incentive based, applied via a cap on aggregate revenue with a CPI-X or similar, incentive based mechanism. Reflecting the approach taken in the UK, and also, in part, the industry’s often-stated concern to achieve a commercial rate of return and to accommodate variations in cost structures, discussions on the determination of revenue or price cap have focussed mainly on a disaggregated financial analysis of the components of, or requirement for, NSP total revenue. Most attention has been directed at the building block approach, under which the regulator sets the revenue requirement as the sum of estimated operating costs, depreciation (or return of capital), and a risk adjusted return on capital.

The cost based or building block approach is equally applicable to the examination of costs on an accrual or cash basis. However, this depends on detailed cost information being provided by the utility. This approach is attractive because it links revenues to costs, allowing for specific consideration of efficient costs, risk adjusted rates of return, and identification of outperformance benefits for sharing with customers. A framework for the assessment of costs and benefits can be established, and, theoretically at least, everybody knows where they stand.

Depending on how far this approach is pursued, however, the requirement for detailed company information, analysis and judgements about managerial competence can make incentive regulation seem more like cost plus regulation, albeit with a longer control period. To quote Crew and Kleindorfer (1996) again:

The problem of price cap renewal may introduce micro management, with the companies being asked for significant information by the regulator. Price cap renewal, in theory and practice, is recognised as the most likely time for PCR to adopt some of the inefficiencies of ROR.
2.1.2 General conditions

The logic of incentive regulation, relying as it does on behavioural responses, requires some conditions to be met. The requirement for utility managers to consistently act in the best interests of the company and its shareholders has already been mentioned. If the internal incentives for the managers to act in this manner are weakened, the relative attractiveness of the benefit being offered, and hence the response, may be reduced.

Of more direct relevance is to maintain NSPs’ confidence that the benefits of their extra efforts will not be confiscated, either during the review period, or at the next review (by means of a retrospective adjustment, or ‘clawback’). In other words, how much reliance should they place on the ‘regulatory bargain’ they enter into. This is a difficult area for both utility and regulator. There are various reasons why actual profits may be higher than expected, some of which may be genuinely economic, such as improved maintenance practices. Other factors may be quite outside the influence of the company, such as an unforeseen fall in the price of a key input (if this cheaper input can then be substituted for other more expensive inputs, so much the better). Further factors may be due to the regulator underestimating (or the company successfully obscuring) the scope for efficiency gains to be made within the company and the ease with which improvements can be made (information asymmetry).

How should the regulator react if higher profits are due to unforeseen changes in circumstances or a growing realisation that it has been excessively generous in its treatment of the company? For incentive regulation to be effective, the preferred review period must be of considerable length, in the order of five years or longer. However, whilst this allows the incentives time to work, it also increases the probability of significant deviations arising for other, less meritorious causes. If, in the face of windfall gains, the regulator does not step in during the review period, prices will persist at above efficient levels, perhaps for some years, and customers will be penalised. Irrespective of the principles that should or should not apply, the presence of large windfall gains or losses will result in stakeholders putting considerable pressure on the regulator to intervene.

Moreover, the utility could argue that it is being treated unfairly if it is only higher than expected profits that attract attention. If unforeseen events beyond the control of the company lead to sharply reduced returns (windfall losses), should the regulator intervene to increase prices and restore profit levels? If these changes are delayed until the end of the review period, should customers compensate the utility for the accumulated losses sustained? Whatever principle is adopted should be applied equally to variations in either direction.

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4 Laffont and Tirole (1993) have argued the importance of the regulator’s commitment to the ‘regulatory bargain’ if the efficiency benefits of incentive (price cap) regulation are to be achieved.

5 The reaction of the UK regulator, OFFER, to sustained adverse public comment on the apparent profit levels and executive salaries of some electricity distributors is a case in point. Following a detailed review OFFER proposed price caps and X factors in August 1994, only to step in and reset them in March 1995 in response to public pressure.

6 In the UK, the notion of error correction mechanisms (ECMs) has been raised as a means of dealing with windfall gains and losses within review periods. The specification of automatic ‘correction’ mechanisms in a manner consistent with CPI-X incentive regulation appears problematic. If the problems ECMs are directed at are seen as being of sufficient importance, they may be better addressed by alternative forms of regulation, such as profit sharing or sliding scale regulation. These are briefly described in section 6.5.
NSPs can draw some certainty from the provisions of the National Electricity Code on the circumstances under which the Tribunal may revoke a determination under the Code:

6.10.5(e) ... the Jurisdictional Regulator may revoke a determination during a regulatory control period only where it appears to the Jurisdictional Regulator that:

(1) the determination was set on the basis of false or materially misleading information provided to the Jurisdictional Regulator; or

(2) there was a material error in the setting of the determination and the prior written consent of parties affected by any proposed subsequent re-opening of the determination has been obtained by the Jurisdictional Regulator.7

Consistent with the objective of seeking to emulate competitive outcomes which underlies incentive regulation, one approach to this issue would be to attempt to mirror the treatment of exogenous factors in competitive situations. Essentially, this is a question about where, and to what extent, the risks of certain categories of events should lie: with the customer, or with the utility. Substantial uncertainty within the utility about the nature of its exposure to these risks will affect its response to the efficiency incentives on offer.

2.1.3 Benefit sharing

Similar questions will arise during future scheduled regulatory reviews, when the regulator is assessing the extent to which the current price or revenue cap will be reset for the subsequent review period. The company will want to know what proportion of the additional profit produced by its extra exertions it will retain at the end of each review period and for how long. If the benefits of all improvements are to be passed back to the customer in the form of a reduced price or revenue cap at the start of the subsequent period (a so-called P0 adjustment), it can be argued that the utility will have an incentive to delay introducing the improvements until after the review has been completed. This incentive will increase as the scheduled review approaches, creating the potential for distortions in the conduct of the business resulting from the timing of regulatory reviews.

If the company is allowed to retain the benefits of its additional efficiency gains for a period of time beyond the review period in which they arose, the potential for business distortions will be reduced. The regulator may allow the higher returns to continue into the following period, perhaps reducing over time according to a predetermined profile. This type of benefit adjustment is known as a glide path. In addition to reducing the potential for timing distortions, a glide path approach will increase the level of benefits retained by the company relative to a P0 adjustment. It may also allow for a smoother transition to new price levels. The increase in retained benefits will strengthen the company’s incentive to seek efficiency gains, and thus, may lead to increased customer benefit in the long term. Meanwhile, the short term impact is to reduce customer benefit relative to a P0 adjustment.8

2.1.4 Data and measurement issues

Underlying the building block approach which aims to benefit identification and sharing, lie some significant measurement issues. Decisions have not only to be made about what types of improved performance will qualify for extended benefit retention by the company.

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7 National Electricity Code, section 6.10.5(e). A similar provision applied to transmission NSPs under section 6.2.4(d). However, section 6.2.4(d)(3) contains an additional provision which allows the ACCC to revoke a revenue cap during a regulatory control period if there is a substantial change of ownership of the network assets which may lead to a material change in the revenue requirement.

8 This discussion is couched in terms of the utility earning increased returns through efficiency improvements or positive external factors. In deciding on the use of P0 adjustments or glide path approaches, the regulator must be cognisant of the need for fair reciprocal application of these principles.
Information and tools will be required to identify and measure qualifying benefits. The greater the level of ambiguity in measurement, the weaker will be the integrity of the system, and the higher the potential for disputes. Further, if, because of measurement problems or the potential for large apparent profits, the system cannot maintain the confidence of stakeholders or the regulator, reluctance to intervene – and willingness to maintain that commitment – will be reduced.

First and foremost, before any consideration of sharing can occur, the regulator will need to know whether the ‘product’ the customer has been receiving over the review period is consistent with the assumptions applied in setting the price or revenue cap at the start of the period. Savings that occur as a result of reduced standards of service should be reflected immediately in reduced prices, and not made available for benefit sharing. A measurement methodology and tracking mechanism for the standards of service provided by NSPs is a prerequisite for incentive regulation.

The Licence Compliance Advisory Board Annual Report for 1998 concludes that on the information available, NSW “remains the second-best jurisdiction in Australia (behind the ACT) with outage levels well below the national average”. However, the Board expresses strong concern about the adequacy of the current reporting of customer service standards. IPART is aware of developments currently underway to improve the information available. Importantly, the Department of Energy (DoE) has commissioned a review of the operation of the licensing arrangements and is planning to release a discussion paper on these issues. IPART will continue to work closely with the DoE on these and related issues.

If benefit sharing is to be tied to operational efficiency, measures of efficiency that can be readily tracked and compared with baseline efficiency levels will be required. Baseline efficiency levels, that is, the levels of efficiency determined by the regulator to be reasonably achievable by the utility, will need to be documented prior to the start of the control period as part of the review and price or revenue capping process. At the end of the period, actual performance can then be compared with the baseline assumption to determine whether any additional benefit has been created and is available for sharing.

A key issue for utility performance over the longer term is the trade-off between the timing of capital expenditure and its substitution by operating expenditure. For example, increased maintenance expenditure which allows capital expenditure to be deferred may create considerable economic benefit. Similarly, lower maintenance expenditure may bring about increased and uneconomic capital expenditure. Simple measures of operational efficiency may lead to the interpretation of higher maintenance costs as a sign of under performance, potentially creating perverse incentives. If efficiency measures are to be of most value, they should be capable of interpretation in the full context of the utility’s operations.

Similarly, if the effect of exogenous factors (those giving rise to windfall gains or losses) is to be subject to a full pass through into prices, the regulator will need to be confident not only that the impact has been estimated correctly, but that all material impacts from exogenous sources have been identified, including those that favour more than one party. Some key material inputs, such as copper and aluminium cable, for example, may be priced in US dollars. If the NSP adopts an unhedged position on its purchases of these materials, exchange rate fluctuations will lead to windfall gains and losses.

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10 Ibid, pp 31-33, pp 40-41, pp 46-49.
Full pass through of these and other windfall gains and losses would mean that customers, rather than the utility, carried the risks arising from exogenous factors. Regulators adopting this approach would need to accept that prices may move either up or down as a consequence.

2.1.5 Alternative approaches

Clearly there are a number of potential difficulties inherent in applying a ‘pure’ form of benefit identification and measurement for use within an incentive based approach to regulation. Despite the requirements of the National Code for ‘incentive based’ regulation, the use of detailed cost analysis may reintroduce many of the transaction costs and rigidities associated with cost plus regulation. Moreover, some of the key principles for the treatment of controllable and uncontrollable costs may simply prove too difficult to apply with consistency.

Detailed cost analysis is often regarded as a response by the regulator to the problem of information asymmetry. Faced with this problem, there may be a tendency to seek as much information as possible, and to adopt a cautious, perhaps even sceptical approach, which may lead to significantly higher transaction costs. One of the objectives of incentive regulation is to reduce the effect of information asymmetry. However, the form adopted can still place significant demands on the regulator to assess current and future performance levels. Demands on the regulator’s predictive abilities are maximised if it is restricted to a single estimate of baseline efficiency levels and X factors at the start of a lengthy review period.

The regulator may also be pushed in this direction by the actions of the NSPs in seeking regulatory adjustments to changes in their external circumstances (for example, adverse exchange rate movements). Individual cost movements cannot sensibly be examined in isolation. Experience has shown that it is impractical to maintain a capacity for one-off cost studies without having in place a system for overall cost monitoring and analysis. Despite the transaction costs, some stakeholders within the industry see an approach based on detailed cost analysis as the only way to ensure ‘fairness’. In practice, this may be seen to maintain the ability to shift risks which arise from the external environment to the customer.

One method suggested for reducing the risks of expressing the outcome of a regulatory review as a single X factor for each NSP (which may apply for five years or more) is for the regulator to structure a set of options combining different X factors and benefit shares. Lower X factors would be combined with lower sharing factors and vice versa. The utility would choose the option that maximised its position. In so doing, it might move closer to its optimal performance, with some net welfare gain for customers. While there is a continuing requirement for the options to be structured carefully, the regulator at least has the opportunity to apply a risk adjusted value analysis, potentially allowing better use of the information available to it.11

A second alternative is to simplify the glide path approach by not attempting to classify the sources of outperformance or underperformance as either controllable or uncontrollable. Instead, the difference between the aggregate revenue requirements of the current and prospective control periods would be phased in, effectively sharing all the gain or loss over the phase-in period, irrespective of its origin.

11 There is a question as to whether the legislation under which IPART operates would allow a menu-based approach that offered a choice of X factors and future benefit sharing rules.
A third alternative is to move away from the building block approach with its emphasis on detailed cost analysis, and to substitute more generalised measures of efficiency for setting the value of X. For example, total factor productivity (TFP) relates the level of output to the consumption of all inputs used in the production process, including capital. TFP has been used extensively in telecommunications regulation in the United States, primarily for establishing the value of X in the CPI-X price or revenue cap. Used in this way, X is said to represent a ‘productivity offset’, the argument being that the utility should be allowed to increase its prices by the general level of inflation, less an allowance for the margin by which its expected productivity performance exceeds the economy-wide growth in productivity. No direct link between costs and prices (as occurs under the building block approach) is maintained. Whatever profits the utility can make under its cap it keeps and the primary question to be answered at the next review is the relationship between industry TFP and economy-wide TFP.

A number of Victorian NSPs have expressed strong support for this approach, contending that it combines genuine incentives for long term cost minimisation and innovation with low regulatory costs (including a lower cost of capital due to reduced regulatory risk). Despite its use in the USA, opinions differ widely on the value of this approach. In addition to the theoretical issues, a key consideration here is Australia’s limited experience in constructing measures of TFP applicable to NSPs.

As an industry-wide measure of productivity, TFP is advocated by its proponents as having specific advantages in setting X factors. Other generalised measures of efficiency are available, which may also allow a reduced emphasis on detailed cost analysis and forecasting. Data envelopment analysis (DEA) uses a linear programming approach to estimate the efficient frontier of an industry, measured across a number of key indicators. It allows for the use of multiple outputs and the inclusion of factors in the operating environment of each utility that may affect the feasible costs. The position of individual companies, or of sub-sets of the total population, relative to the efficient frontier can be estimated. Efficiency benchmarks could thus be established for NSW NSPs, collectively or individually, based on performance relative to any other group within the database that is considered a valid comparator. An alternative approach, stochastic frontier analysis, uses statistical procedures to estimate the efficiency frontier and provide further estimates of efficiency benchmarks.

If DEA, TFP, or other benchmarking measures can be developed to the point where the results are generally accepted, then a less costly and less intrusive alternative to detailed cost analysis may be feasible.

2.1.6 Summary of main issues

From this discussion a number of issues can be identified that require consideration in the context of the forthcoming review of NSP prices in New South Wales:

- The underlying requirement to integrate standards of service into whichever form of economic regulation is adopted.

- The general conditions required for incentive based regulation to prove effective.

- The choice to be made between cost linked forms of incentive regulation, which incorporate the use of company-specific cost information, and unlinked forms that seek to avoid any direct reference to individual company costs. If a cost linked approach is adopted, there is a further choice to be made concerning the relative weight placed on company-specific cost analysis and more generalised benchmark information.
• The method and duration of benefit sharing.

*The Tribunal seeks comments on these issues.*

### 3 STANDARDS OF SERVICE

Irrespective of the regulatory approach taken – whether revenues and/or prices are linked to costs or to other measures – information on the service being provided is essential for the economic regulation of natural monopolies. In most, if not all, cases, the cost of providing a service is closely related to the standard or quality of the service in question. Trade-offs between costs and service standards are therefore a key area of decision-making for NSPs. This need not be interpreted only from a negative point of view. Whilst it is possible for cost savings to be made at the expense of network reliability, for example, this may accurately reflect customer preferences, as may service related increases in operating or capital expenditure. Similarly, increased operating or capital costs may quite justifiably reflect customer preferences for above average reliability or other aspects of service provision.

If the regulatory approach that is adopted links revenues to costs, information on service standards will form an integral part of the cost assessment and revenue determination process. Without this information, the relationship between cost and price cannot sensibly be considered. The situation is somewhat different if revenues are not linked to costs. This is a more light-handed form of regulation. In the absence of effective competition and customer choice, monitoring of service performance will operate as a more overt customer protection measure.

#### 3.1 Standard of service measures

It is desirable that measures of service performance:

• reflect the primary components, weighted from a customer perspective, of service provided

• reflect the primary components, weighted from a cost of supply perspective, of service provided (where these are different from the above)

• are capable of periodic monitoring at reasonable cost

• are capable of comparison across NSPs

• can be implemented through the existing NSP licence framework.

Measures that met these requirements would allow service performance standards for each NSP to be established at the beginning of the control period, projected over the period, and subsequently compared with actual performance. Variations in operating environments and customer preferences within and across NSPs would be reflected in the different weights applied to the component measures. Whilst the use of common primary components would assist comparisons across NSPs, the construction of standardised measures that allowed direct comparisons of service performance may add considerable complexity.

It is believed that sufficient scope exists within the current network licensing framework in NSW to require the participation and co-operation of NSPs in the development and
implementation of appropriate service performance measures. Desirable elements of such a process would include:

- the development of measures of service provision by a working group comprising representatives of NSPs and other stakeholders under the project management of an appropriate agency responsible for ensuring that regulatory objectives and project timelines were met
- a requirement for working group members (NSPs) to consult with customers on the selection and construction of measures of service provision, and subsequently on the standards that each NSP proposed to apply and the policies and procedures for varying them
- a requirement for each NSP to document and publish its service standards and related policies and procedures
- annual publication of comparisons of performance by an appropriate agency or regulator
- effective dissemination of performance information to customers and other network users.

Measures of service performance developed in this way could jointly meet the regulator’s requirement for a representative and accepted monitoring facility and the customers’ requirement, at least at a broad level, for a specified level of service as part of the contractual relationship with their NSP. This would avoid the duplication or proliferation of measures, which could lead to difficulties in interpretation and reconciliation.

Key issues in establishing a framework for setting and tracking standards of service include:

- establishing the initial and projected standards that are to apply and defining their relationship to the NSP’s cost base
- determining the process for varying established standards in response to changes in customer preferences or operational factors
- determining the consequences if established standards are not met. For example, the response may be left to the regulator’s discretion, or may take the form of a fixed financial penalty paid directly to affected customers, as occurs in some customer service guarantee policies.

Uniform standards across NSPs are unlikely to be economic and should not become a regulatory objective without a full and open debate on the costs of implementation. There may also be a case for differentiating regions and standards within NSPs, in situations where service conditions vary significantly. These are matters that the regulator and the working group would need to consider.

In its recent submission to the Tribunal, EnergyAustralia proposes establishing specific incentives for NSPs to improve their standards of service. EnergyAustralia envisages that service performance would be treated similarly to efficiency within the incentive framework. NSPs would receive increased profits through an increase in the revenue cap which allowed higher prices when key service performance measures increased. Allowed revenues (and prices) would decline if performance deteriorated. Service based benefits would also be available for sharing, presumably through the application of a glide path.

EnergyAustralia specifically proposes that a system reliability factor be included in the revenue cap formula. Reliability would be measured by the system average interrupt duration index (SAID index), with the revenue coefficient based on customer valuation of reliability improvements (for which the value of lost load set in the National Code could act as a proxy).

Some initial considerations regarding this approach include:

- double counting may occur if service improvements are incorporated into operating and capital cost projections as well as into the revenue cap formula
- understanding the causes and effects of potential movements in the SAID index
- clarifying customers’ service priorities and incremental price/service trade-offs
- assessing the value to be attributed to improved reliability by the regulatory formulae or in the evaluation of network investments.

The Tribunal strongly supports the involvement of the NSPs, customers and other stakeholders in the debate that must occur over the most effective method of integrating standards of service within the framework for economic regulation. A decision on this issue will be required as part of the 1999 price review.

The Tribunal seeks comments on approaches to include standards of service in the incentive regulation framework. The Tribunal also seeks comments on how the incentive regulation framework can accommodate the potential for NSPs to offer price\quality trade offs above minimum standards.

4 GENERAL CONDITIONS FOR INCENTIVE REGULATION

Incentive regulation focuses on establishing an environment in which a regulated firm freely chooses to pursue continuous improvements in efficiency and service performance, to the long term benefit of the customer. The drive for improvement within a firm is a dynamic process expressed through operational practices, investments in new technology, innovation and service development. In competitive situations, it occurs as a behavioural response to the incentives, both positive and negative, that are present. As far as can be achieved, incentive regulation seeks to reproduce this behavioural response, and the associated benefit, while at the same time providing fall-back protection against the abuse of monopoly power.

Regulated firms will respond not only to the positive incentives that flow from the regulator’s actions, but also to the disincentives. Recognising the potential disincentives to efficient, welfare maximising behaviour, is equally important to achieving improved regulatory outcomes.

For a Corporations Law firm operating under an obligation to act commercially and in the interests of shareholders, there is an incentive to pursue efficiency gains and make investments in the face of uncertainty and risk if the expected returns are judged to be sufficient. Success will depend on the level of commercial skill applied to the identification and assessment of profitable opportunities and their subsequent realisation.
4.1 Regulatory risk

In a regulated environment the actions of the regulator can influence the assessment of risk and expected returns by introducing significant new categories of uncertainty and risk. The history of intrusive cost-plus regulation is replete with examples of heavily regulated utilities that exhibit low levels of efficiency, poor investment practices and below average service performance. Both theory and experience indicate that repeated frequent confiscation of the benefits of efficiency improvements combined with uncertainty over future regulatory actions will lead to poor performance and welfare loss.

Concern over the effect of regulatory uncertainty is not confined to traditional cost plus systems. In the UK, where RPI-X price caps were developed for their incentive properties, regulatory uncertainty remains a contentious issue. As Shuttleworth (1998) comments:

... until now, regulators have not been required to agree and adopt consistent methods or principles at successive reviews... As a result, each regulator is free to respond to unsupported reports of excess profits by finding new ways to write off sunk costs. Such opportunism has effectively been declared illegal in the US (if it can be identified), because regulators are not allowed to pursue short term price cuts at the expense of long term costs for consumers. Long experience has taught the American legal profession that regulatory opportunism causes an increase in the cost of capital, which harms consumers' interests. American legal safeguards are intended to prevent regulators (who have short term objectives) from “playing the crowd”. Such safeguards are almost completely lacking in the UK.

Regulatory uncertainty weakens existing incentives for efficient behaviour and may create additional disincentives. Thus, regulatory commitment is a major issue that needs to be addressed when applying incentive regulation.

4.2 Regulatory commitment

The Tribunal is cognisant that regulatory risk can weaken the effectiveness of the incentive regulatory regime. However, the legal framework in which the Tribunal functions constrains its ability to provide the degree of regulatory certainty the utilities desire. The Tribunal of today is not able to bind or limit the discretion of the Tribunal of the future. As the Australian regulatory environment matures, the utilities will be able to draw some comfort from the precedents set by regulators. While not legally binding, statements about the approach to be taken at future reviews may help reduce regulatory uncertainly. Equally, regulators can help build confidence in regulatory regimes by not behaving opportunistically. The building of confidence in the regulatory regime also required that any commitments entered into are capable of being honoured, perhaps in changed circumstances in the future. This may make it more difficult to provide tightly prescriptive commitments.

A key issue will be the extent to which current determinations or statements of approach can or should bind the actions of future regulators. This has both legal and policy aspects. A determination applies to a specific time period (the review period). Within the review period, details of the regulatory contract can be delineated. However, many of the benefit sharing aspects of incentive regulation relate to regulatory actions at the following review. The form of regulatory commitment that can be made in order to ensure the effectiveness of the incentives offered will need to be explored. For example, it may be necessary to express benefit sharing and revenue reset commitments in terms of objectives and intentions rather than precise actions. This accords with a sensible approach to policy development over time. The opportunity to improve the efficiency of regulatory methods and measures in a
manner consistent with the overall framework should not be sacrificed to contractual rigidity.

The Tribunal considers that the legislative framework provides considerable certainty for utilities to operate. In the case of electricity NSPs, the National Electricity Code provides clear requirements for many regulatory issues. The National Third Party Gas Access Code provides similar certainty for gas NSP. In these cases, the regulatory commitment is provided within the regulatory frameworks.

The Tribunal is aware that the incentives offered under incentive regulation will be most effective, and the deemed benefits for customers will only be realised, if they can be identified and understood by the utility. This is a matter of the transparency, consistency and predictability of the regulatory system. Shuttleworth (quoted in United Energy, 1998) has noted that, because of the long life of capital assets, it is desirable for the regulatory framework to be stable over a number of review periods, so that investors have confidence of this stability in advance. The chief requirement at a price review, according to Beesley (1995), is to set the scene sufficiently far ahead to make sense of the main trade-offs occurring in utilities, namely, the timing of capital expenditure and its substitution by operating expenditure. Laffont and Tirole (1993) argue that for incentive regulation to be effective in increasing efficiency, the utility must have confidence that the regulator will not renege on the terms of the regulatory contract. Without this confidence, incentive regulation can lead to lower efficiency levels than the cost of service regulation. Shuttleworth (1998) goes as far as to conclude that this means the choice between regulatory forms is less important than the creation of a regime that supports credible long term regulatory commitments:

We believe it is unwise and inefficient to adopt any revenue formula that might be overturned in the future due to foreseeable problems. Overturning previously agreed methods and formulae simply creates unnecessary risk and discourages efficient investment. In the long run, this is not beneficial to either the regulated company or its customers.13

Both parties to the regulatory contract must be able to live with its terms. Thus, once an approach to benefit sharing has been agreed, the regulator must resist any pressure for retrospective adjustments (or ‘clawback’) if profit outcomes exceed expectations. An adjustment would be acceptable only if the possibility of profit exceeding expectations was contemplated in the approach adopted and a process and criteria set out. Similarly, if revenue cap adjustment mechanisms are agreed, they should be allowed to work symmetrically. Prices should be allowed to rise as well as fall.

A similar requirement for commitment will apply to the utility. For example, it should not expect to reopen a determination if circumstances move against it, except under the terms agreed. The regulator is not an underwriter of operating risk, except to the extent that this is made explicit. As with most contracts, it must also be recognised that not all aspects of the relationship will be capable of precise documentation. A commitment to the spirit of the contract will be as important as the explicit components.

The Tribunal seeks comments on the regulatory risks inherent in an incentive regulation framework.

5 THE CHOICE OF FORM – COST LINKED OR UNLINKED?

In the development of different approaches to incentive regulation over recent years, a primary source of differentiation has been the degree of emphasis placed on the relationship between regulated revenues and costs. Two approaches, which may be broadly described as ‘cost linked’, or ‘unlinked’, can be identified. Whilst these terms are not strictly accurate, since unlinked approaches are intended to maintain a broad relationship between revenues and costs, at least at the industry level, the differences in the role of individual company costs in setting revenues make this their chief distinguishing characteristic.

5.1 Unlinked forms

Unlinked forms allow the potential uncoupling of utility revenues from costs. Under this approach, regulated revenues are determined with reference to an independent measure of efficiency not directly related to the firm’s costs of operation. Whilst cost linked approaches may also incorporate independent efficiency measures, unlinked forms specifically exclude the use of company specific costs. The presence or absence of a company-specific cost link is a distinguishing characteristic that fundamentally changes the character, scope and conduct of the regulatory process.

The benefits of an unlinked approach have been argued by some Victorian distributors in recent submissions to the Victorian Regulator General regarding the 2001 price review (see, for example, the submission from United Energy). The submissions draw on a report prepared for the distributors by Laurits R. Christensen Associates (Kaufmann and Lowry, 1997). Under the distributors’ preferred approach, existing prices would be indexed by a CPI-X formula in which X was set with reference to the long term trend rate of productivity growth for the industry, relative to that of the economy generally. The preferred measure of productivity is total factor productivity (TFP) which, in theory at least, measures the relationship between the level of all input factors used in the production process, and the level of output. Setting prices by an index of the general movement in economy-wide prices less the differential rate of industry TFP growth is said to enable prices to track the long term trend in industry unit costs and thus meet price efficiency criteria.

The use of industry rather than individual firm productivity is important. Christensen (1997) quotes the Canadian Radio-Television and Telecommunications Commission (CRTC) as commenting in its 1997 regulatory decision that:

… an X-factor should be based on data that are independent of the actions of any one individual company…..the use of an industry-wide X-factor has major benefits to consumers and the general economy as it will enhance companies’ incentives to increase their efficiency. Further, the Commission notes that the use of an industry-wide X-factor rewards those companies that have achieved above-average productivity gains in the past and provides an appropriate incentive to those companies that have had below-average productivity in the past.

The focus on industry-wide measures removes most, if not all, of the direct scrutiny of individual company costs. In theory, price reviews become an exercise in updating TFP estimates in accordance with agreed methodology and data, with perhaps some consideration of external efficiency benchmarks. No detailed analysis or projection of individual company costs or profits occurs. Questions of cost allocation, differential treatment of operating and capital expenditure, the treatment of windfall gains and losses, and the identification of management controlled savings do not arise. However, the monitoring of standards of service would still be required.
Three main arguments are advanced in favour of this (TFP) approach:

- it has clear, unambiguous and powerful incentive effects
- it has a theoretical foundation and applies objective measures that are transparently based on external data rather than regulatory judgements
- it creates minimal regulatory risk and has low transactions costs, and low administration costs.

This form of regulation has been used extensively in the US, prompting Kaufmann and Lowry (1998) to characterise it as a US alternative to the UK building block approach. They document the use of this approach in a range of sectors including telecommunications (most commonly), transport and, more recently, gas and electricity. However, Shuttleworth (1998) argues that this has occurred over a period during which there has been considerable controversy surrounding the practicalities of deriving measures of TFP and the manner in which they are applied in the determination of X. The resolution of these difficulties according to Shuttleworth has taken place gradually with the accumulation of experience and a degree of trial and error - data and measurement issues have proved to be no less controversial or intractable because they are technical in nature.

Shuttleworth also raises questions about the stability (and hence, the usefulness) of TFP when applied to electricity, as opposed to telecommunications, networks. In particular, the use of TFP as a means of keeping revenues in line with costs is likely to be much less successful where investment is subject to a high degree of lumpiness, as occurs in electricity networks. This creates risks for both the regulator and the industry. A theoretically sound regulatory formula is unlikely to prove an adequate defence against criticism of excessive profits or revenue caps that do not cover investment funding needs.

Kaufmann and Lowry (1998) rebut the factual basis for these criticisms, arguing that, if anything, the nature of telecommunications capital expenditure is more demanding of the TFP methodology. Yet the TFP approach is now the dominant form of telecommunications regulation in the US and is becoming more widely used in the energy sector. Kaufmann and Lowry quote a 1997 paper by Makholm and Quinn from the Boston office of UK consultants National Economic Research Associates (NERA) in support of their argument for the use of industry rather than company specific performance measures. With reference to price cap plans for electricity distributors, Makholm and Quinn comment:

To provide incentives that mimic a competitive market, each company must be held to an industry, not individual company, productivity standard. Basing the productivity offset X on a company’s own productivity growth would destroy efficiency incentives.

To add to this debate, the economic basis for using TFP as an automatic mechanism for setting the value of X has been strongly criticised by Crew and Kleindorfer (1996):

The X factor is often misleadingly called the ‘productivity offset’. The latter is a self-serving term employed by economic consultants and companies in an attempt to bargain down the X factor…

Crew and Kleindorfer argue that standard measurement methodologies for TFP require the assumption of marginal cost pricing and the existence of normal profits. If revenue weights rather than marginal cost weights are used and economic profits exist, the TFP measure will be distorted. Profits can still increase in this case, even if the X factor exceeds both the measured and the true value of TFP. These outcomes are magnified if there is real growth in
demand or inflation is present. If historically extrapolated TFP is used to set X, benefits to the company from pricing flexibility and revenue growth will be underestimated:

The ability to price more flexibly, the ability to retain some or all of the benefits of more efficient operation, plus the underlying arithmetic properties of price indices and profits, mean that setting the X factor involves much more than a simple coupling with TFP.¹⁴

Crew and Kleindorfer conclude that setting X cannot be achieved by formula alone, but requires considerable judgement by the regulator. TFP may have value as an input to this process, but its use should be limited to setting a lower bound for X. Shuttleworth reaches a similar conclusion:

The decisions facing regulators concern what mixture of methods and data will provide a sustainable revenue allowance, which encourages efficiency without allowing excessive profits. Regulators have to make difficult compromises between all these objectives and no single method is a perfect solution. The major error of the [Christensen] report is to assume that these difficult problems can be dealt with by a purely technical solution.¹⁵

TFP can make a potentially significant contribution to the regulatory process (and one that may increase over time) by providing important information on operational efficiency, but it is not a ‘magic bullet’. Nor is it the only source of such information. Increasing use is being made of other techniques such as data envelopment analysis (DEA) or stochastic frontier analysis to derive information on operational performance from cross-sectional data. Both can provide estimates of the efficient frontier for a data set of companies within an industry. The performance of individual companies or groups of companies can be determined relative to the efficient frontier, creating the opportunity for benchmarking between appropriate comparators. The larger the number of companies included in the database, the better the chance of establishing valid comparators and benchmarks.

There are clearly grounds for arguing that the use of an approach based on industry-wide measures can make a potentially significant contribution to the regulatory process (and one that may increase over time). Similarly, there are a number of issues, both practical and theoretical, that would need to be worked through before a decision to rely entirely on such an approach could be made with confidence. To the extent that TFP, DEA and other external measures of efficiency can be developed and applied in a rigorous and non-controversial manner, they offer considerable scope for simplifying the regulatory process and increasing its transparency and predictability, to the benefit of all stakeholders. The limited experience that exists in the application of this approach to NSPs suggests that a systematic program of design, testing and evaluation would be a prudent step to take at this stage.

¹⁴ Crew and Kleindorfer, 1996, p 218. In at least one important sense, Kaufmann and Lowry would probably agree. In their 1998 paper they note that “the main source of [TFP] disagreement has not been with measuring the long term trend in TFP growth, but rather in how that trend may accelerate as utilities operate under the stronger incentives of price cap regulation. This is mainly a dispute about sharing the benefits created by price caps.” Kaufmann and Lowry (1998) pp 20-21. Hence, X may contain two components - historically extrapolated TFP and a “stretch factor”, with the latter based, at least in part, on the judgement of the regulator.

5.2 Cost linked forms

Cost linked forms of incentive regulation work from two premises: that the prevention of monopoly profits is a desirable and, from a practical viewpoint, inescapable objective of regulation; and that a reasonable prospect of cost recovery is essential to the long term performance of electricity networks. It may be that, with experience, concern over the possibility for monopoly profits or the under-recovery of long term investment costs may be diminished or allayed by the development of less intrusive regulatory measures (such as the use of external or industry-wide measures of efficiency or productivity - refined TFP or DEA measures, for example). The proponents of cost linked regulation would argue that electricity networks have not yet reached that stage. There is limited experience in developing and applying external measures to individual NSPs. Moreover, differences in operating environments between NSPs can lead to variations in costs that may not be reflected in purely independent benchmarks. Consequently, periodic reviews and resets of revenues that include an explicit consideration of individual company costs and performance may still be required if the objective is to keep individual utility revenues in line with efficient costs.\(^{16}\)

There is substantial debate over the means by which adequate safeguards against monopoly profits can be combined with effective efficiency incentives - that is, without returning to the costs and disincentives of cost plus regulation. The issues in this debate are given added force by the conclusions drawn from the discussion in section 4 – that if the regulatory contract is to be effective, regulatory risk must be held to reasonable levels. This is not to say that it should be minimised. Rather, it should reflect an appropriate trade-off between the costs of uncertainty, such as an increased cost of capital or adverse incentives, and the costs of a more certain mechanical approach, such as inflexibility and opportunities for gaming. As far as possible, the rules, procedures and supporting formulae should be comprehensible, implementable, and capable of responding to all reasonable scenarios without the need for serious revision. This suggests that significant trade-offs will be required between what is desirable, and what is practical.

5.2.1 Building block approach

Recent examples and descriptions of the building block approach can be found in the ACCC’s issues paper on the Regulation of Transmission Revenues (May 1998), the Tribunal’s issues paper on Pricing for Electricity Networks and Retail Supply (September 1998) and its draft decision on the access arrangement of Great Southern Energy Gas Networks. Consultation Paper Number 1, prepared by Victoria’s Office of the Regulator-General (ORG, 1998), sets out clearly the detailed cost linked method of revenue determination using a building block approach. The consultation paper is particularly useful in highlighting the issues raised by this approach. It will therefore be used to structure the following discussion.\(^{17}\) The Regulator-General has adopted a similar approach to the regulation of the Victorian gas industry.

For each distribution licensee, the proposed approach involves the following elements:

- **assess past performance** against the assumptions and targets built into the original determination, including differentiating between controllable and uncontrollable

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\(^{16}\) The relative weight placed on this objective of matching individual utility revenues with efficient costs is a major point of divergence with the unlinked approach. Proponents of the unlinked approach argue that, in pursuing this objective, the dynamic effectiveness of the incentive regulation model is substantially compromised.

\(^{17}\) The following description draws heavily on Consultation Paper Number 1.
outcomes (eg the identification and measurement of management-induced efficiencies -v- windfall gains)

- **establish an opening position** for the start of the next review period, by rolling forward regulatory asset values, calculating the rate of return implied by current revenues, operating and capital costs, and any adjustments for past underperformance against service standards
- **define future service standards** – and other network cost drivers, plus any uncontrollable factors that affect the performance of individual distributors
- **establish forward-looking revenue components** using building blocks which incorporate an efficiency carryover, forecast benchmarks for operating and capital expenditure, rolled forward asset values, and the allowed rate of return
- **profile annual revenues** by using an X factor to deliver the revenue requirement (in net present value terms).

This is an example of a thorough and systematic process, requiring considerable resources. Implementation would involve the development and documentation of an extensive suite of analytical methods, independent and company-specific performance measures, supported by detailed company information on past actual and projected operating and capital expenditure. Within this framework, two areas where the regulator may experience particular difficulty in maintaining a balance between analytical requirements and efficiency incentives are the separation of management-induced gains from windfall gains and the assessment of capital expenditure.

### 5.2.2 Windfall gains and losses

Windfall gains and losses can be of relevance for two main reasons. Firstly, to support an approach to benefit sharing which seeks to limit the benefit available for retention by the company to that derived from management-induced efficiency gains. Secondly, to support the use of error correction mechanisms within review periods. Error correction mechanisms have attracted attention in the UK as a means of dealing with events that may call for an immediate response. The principle behind both is that prices should reflect those factors that are beyond the control of the company, but savings that result from management initiative may be retained for a period. This is, in effect, a risk allocation principle, under which customers bear the risk of price rises/falls caused by cost movements that are deemed beyond the control of the company. This has pricing efficiency and financial effects.

Four main sources of costs may, to varying degrees, be outside management control: the legal operating environment, output growth, input prices, and the cost of capital. In setting revenue caps under the building block approach, each of these requires assumptions or forecasts that will inevitably contain errors.

Changes in law would include such matters as tightened or additional environmental standards and economy-wide changes to the tax system (the introduction of a goods and services tax, for example). In common with many contractual relationships, one option would be to treat changes in law as immediate pass-through items, following notification by the utility and agreement with the regulator on the financial effect.

Where a revenue cap formula is used to roll forward maximum allowable revenues during the review period, appropriate output related cost drivers can be included to capture the effect of variations between forecast and actual output growth. No further adjustment
should be required if this is a reasonably accurate reflection of the relationship between output variables and costs.

Given a review period of five years (or more), at each major review the regulator may seek to identify those differences between forecast and actual input prices that are based on sustained trends. The baseline revenue requirement for the subsequent period could then be adjusted correspondingly. If benefit sharing is to be restricted to management-induced efficiency gains, the contribution of management in selecting a more efficient combination of inputs, given the movements in input prices, would need to be separated out.

The case for adjustments within periods to correct for input price movements is not strong. It comes very close to replicating cost plus regulation and weakens incentives for price risk management. Input prices that rise one year may fall the next, with the potential for a cycle of revenue readjustments. Except where a company is a major user of a commodity subject to significant price volatility, it is unlikely that within period movements in input prices would threaten its financial viability. Where this may be the case, a guarantee of immediate pass through would weaken the incentive for prudent price risk management.

At regulatory reviews input price changes could, in principle, be subject to P0 adjustment. Such an approach would be based on the assumption that input price changes are largely outside the control of the NSP and that the NSP has limited scope to manage these risks. Implementation of this approach would require the availability of sufficiently detailed current and past cost information and the capacity to separate out management induced savings arising from more efficient input combinations. If these conditions cannot be met, it is unlikely that attempts to classify changes in input prices for the purposes of benefit sharing will add value to the outcomes from incentive regulation.

The cost of capital is comprised of the company’s cost of debt and equity weighted in proportion to the quantities used. While the cost of equity is entirely exogenous to the company, both the cost of debt and the company’s capital structure are, to a degree, subject to management influence. The cost of equity is an opportunity cost measure. As such, changes in the cost of equity do not have an immediate impact on the company’s financial position and may therefore best be considered at regulatory reviews. Market rates of interest are, like other input prices, exogenous to the company. However, a range of risk management options is available through which the level of interest rate exposure can be reduced significantly. Accordingly, changes in interest rates should also not be considered for within period adjustments. Given that debt costs and capital structure are subject to some degree of management control, best practice benchmarks may provide a sounder basis than company specific values for revenue cap reviews.

Efficiency arguments may suggest that changes in the cost of capital be applied through PO adjustments. Stakeholders would need to be aware that this could lead to large and sudden price movements between reviews. If the negative effects arising from a prospective price shock became of particular concern, a price transition path may have to be considered. However, to ensure transparency and predictability the trigger criteria and transition method should be clearly set out and applied consistently. A clearer, more certain alternative may be to phase in changes to the cost of capital as part of a pre-determined glide path.

In summary, the use of error correction mechanisms for mid-review adjustments does not appear to be justified at this stage. Changes in law, such as a GST for example, should be considered for immediate pass through. Resets following the provision of misleading
information, material error or change in ownership are already allowed for in the National Code.\textsuperscript{18} Events of a force majeur nature may also provide a basis for adjustment, but the qualifying criteria and adjustment process would need to be articulated.

5.2.3 Capital expenditure

Decisions on capital expenditure are the drivers for productivity gains, and are where most of the commercial and technical uncertainties and risks for a business lie. As Beesley (1995) observes, capital expenditure is the area of the main trade-offs in utilities, in particular, “the timing of capital expenditure and its substitution by operating expenditure”. The determination of capital budgets for utilities can be a particularly contentious area.

The assessment of past and projected capital expenditure is a key component of the detailed building block approach to revenue or price cap setting (as described by ORG, for example). The approach proposed by ORG, involves:

- **Reviewing past capital expenditure** – analysing the difference between proposed and actual spending, distinguishing between under-spending due to reduced service standards, price effects, volume variations and efficiency gains. Subject to this analysis, rolling forward regulatory asset values by the level of actual spending, less any disallowed expenditure that fails the efficiency test, plus a temporary credit for capital efficiencies resulting from specific management initiatives.

- **Assessing future capital expenditure forecasts** – using cost driver analysis and cross-company comparisons to assess capital asset management programs and to set capital expenditure commitments in the next price control period. ORG anticipates that projections of capital spending will need to be allocated to the following purposes:
  - maintaining of baseline performance standards
  - meeting increases in performance standards
  - meeting forecast load growth
  - connecting new customers to the network
  - meeting additional regulatory or legal requirements.

As part of the current review, IPART commissioned an independent analysis of projected capital expenditure by Worley International. The objectives of the study were to:

- assess and quantify the appropriateness of the infrastructure in terms of current and projected capacity and condition
- identify capital expenditure over a 10 year horizon and consider its appropriateness
- review and compare the NSPs’ capital expenditure assessment procedures and asset management policies
- consider how capital expenditure will affect efficiency and service standards.

In common with the ORG proposal, this study involved assessing baseline standards and the segmentation of capital expenditure into works required for renewal, augmentation of capacity, reliability and other purposes. An understanding of the asset management strategies, asset lives and the trade-off between capex and opex was critical for the consultant’s study.

\textsuperscript{18} See sections 6.2.4 and 6.10.5(5).
There is a difficult balance to be struck between: (a) the regulator’s responsibility to ensure that inflated estimates of capital expenditure are not rolled forward into the regulatory asset balance, lifting the revenue cap, and (b) the disincentive effects of a potentially intrusive approach that relies heavily on regulatory judgement. This trade-off is considered in more detail in IPART’s discussion paper on the rolling forward of the asset base.

The Tribunal seeks comments on the appropriateness of unlinked or cost linked incentive regulation regimes, and methodologies to incorporate capital expenditure incentives into the regime.

6 BENEFIT SHARING

Benefit sharing is central to the concept of incentive-based regulation. Decisions on the appropriate method of benefit sharing are required for both cost linked and unlinked forms.

6.1 Unlinked sharing mechanisms

With unlinked incentive regulation, sharing mechanisms are based on generalised measures of economic efficiency, rather than costs or earnings. According to Kaufmann and Lowry (1997):

A sharing mechanism that emulates the behaviour of competitive markets has three features. One is that it relies on data that is external to the utility. Second, benefits are distributed over time rather than immediately. Third, the mechanism allows utilities with superior performance to earn above normal returns.

Kaufmann and Lowry put forward two sharing mechanisms which they believe meet these criteria – rolling X factors and a consumer dividend. Both rely on adjustments to the X factor in response to productivity performance. Rolling X factors use a moving average of industry TFP to set the value of X, which therefore tracks actual TFP performance during the review period according to the moving average formula.

Consumer dividends are added to TFP-based X factors set for individual utilities at the start of each review period. The rate of increase in prices is thereby reduced by the amount of the dividend. The size of the dividend is at the discretion of the regulator. It may be linked to the productivity performance of the utility relative to industry norms, for example through the use of cross-sectional TFP indexes. Utilities that have below average productivity levels may be set higher consumer dividend values to reflect the faster productivity growth required to bring them up to target. Accordingly, the calculation of the TFP estimates would be likely to attract considerable attention. Alternatively, Kaufmann and Lowry suggest the dividend could be based on an assessment of what is fair, which seems to take this approach back into the realm of the regulator’s judgement.

In contrast to these proposals, the practice of US regulators, particularly in the energy sector, appears to favour combining indexed price caps with earnings sharing mechanisms. These are described in section 6.4 below. This combination is noteworthy for its failure to meet the ‘external data’ competitive market criterion set out by Kaufmann and Lowry. Earnings sharing mechanisms, with their tracking of individual company profits or return on equity, would appear to have more in common with the cost linked approach.
6.2 Linked sharing mechanisms

The primary decisions for cost linked benefit sharing mechanisms concern:

- defining the categories of gains/losses that will be recognised
- assessing the suitability of categories for immediate pass through, P0 adjustment or glide path adjustment
- determining the length and profile of glide paths.

For benefit sharing purposes, end of period gains and losses due to variations between actual and expected operating costs may be classified as either suitable for P0 adjustment, that is, to be fully reflected in the revenue cap from the first year of the new review period, or for a glide path adjustment (progressive phase-out). In section 5.2.2 the possibility that cost variations due to changes in law could be subject to immediate pass through and therefore excluded from the end of period assessment is mentioned. Assuming that service standards have been met, operating cost variations will reflect movements in input prices, variations in demand (output), and the effect of management decisions, including trade-offs with capital expenditure. Some input price effects and demand (output) effects could be considered exogenous and therefore suitable for P0 adjustment. If these elements can be identified, the residual gain (if any) may be regarded as an efficiency benefit suitable for a glide path adjustment.

However, the discussion in section 5.2.2 suggests that the conditions necessary to identify the truly exogenous component of input price changes are unlikely to be met in practice. If this view is accepted, a simplified approach to the classification of operating cost variations for the purposes of benefit sharing will be required.

As the ORG paper indicates, establishing the existence of a capital expenditure efficiency gain is a complex process. A simplifying assumption is to treat the difference between expected and actual spending as a measure of efficiency, subject to confirmation that program outcomes have been achieved as planned, and allow for sharing the benefit.

The approach most commonly adopted by utility regulators in the UK appears to be to roll forward the asset base using expected spending for a period of five years, and then to adjust for the actual expenditure if this is lower. This allows a return to be earned on the difference between expected and actual capital spending for a five year period and provides an incentive to come in under budget. However, it also creates an incentive to inflate the projected level of spending, placing added pressure on the assessment process. A question to be considered is whether the difference between expected and actual expenditure should be phased out under a glide path or be subject to a P0 adjustment.

The span of glide path adjustments is normally linked to the length of review periods. Thus, if a five year review period is used, the glide path will converge at year five. A simple profile such as proportionate rate of change or straight line would appear to be suitable in the absence of other considerations. However, these may emerge during the review process.

6.3 Illustrative Example

Following is a highly simplified example demonstrating the effects on revenues, prices and incentives of reset principles applying a P0 adjustment, a three year glide path, a five year
glide path, and a hybrid P0/five year glide path. For simplicity, this example assumes no load growth and no capital expenditure in the regulatory periods under examination.

Assume in the previous regulatory control period, the regulator found the NSP’s required revenue to be $125 million (see left scale, figure 6.1). It was the regulator’s judgement that, at this level of revenue, the NSP would be able to meet its obligations, maintain the system’s service capability, and attract capital on commercial terms. The NSP provided 100 units of service to its customers, resulting in a price of $1.25 per unit of service (see right scale in Figure 6.1).

During the previous regulatory control period, the NSP was able to achieve significant efficiency gains. The regulator’s assessment of the required revenue for the forward looking regulatory control period is that the NSP requires $100 million to meet its obligations, maintain the system’s service capability, and attract capital on commercial terms. For illustrative purposes, assume the NSP still provides 100 units of service, resulting in a forward looking price of $1.00 per unit of service.

In each case, the size of the incentive is related to the amount of revenue the NSP is allowed to retain in the next regulatory control period. In the case of the P0 adjustment, the NSP is allowed to retain none of the benefit of its efficiency initiatives into the next period. In the case of the three year glide path, the NSP retains some benefits into the third year of the regulatory control period. Under the five year glide path model, the NSP is allowed to retain a declining proportion of the efficiency benefits until the final year of the regulatory control period. In the case of the hybrid P0/5 year glide path approach, some of the benefits are passed to customers immediately in the form of price reductions, while a proportion is allowed to be phased out until the fifth year of the regulatory control period. This may be the case where exogenous gains can be identified as discussed in section 5.2.2.

The revenue paths for each option, and the amount of revenue retained by the NSP, are shown in Table 6.1.

<table>
<thead>
<tr>
<th>Year</th>
<th>P0 Adjustment</th>
<th>3 Year Glide Path</th>
<th>5 Year Glide Path</th>
<th>Hybrid P0/5 Year Glide Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>115</td>
<td>120</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>105</td>
<td>115</td>
<td>107.5</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>100</td>
<td>110</td>
<td>105</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>100</td>
<td>105</td>
<td>102.5</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

| Revenue Retained | 0 | 20 | 50 | 25 |

The affects of these alternatives are shown graphically in Figure 6.1.
As shown in Table 6.1, the greatest amount of revenue is retained by the NSP, and the strongest incentive to pursue efficiency gains arises, under the five year glide path alternative. Generally, incentives to pursue efficiency gains will be strongest where the NSP can retain the largest amount of revenue over the longest period of time.

### 6.4 Multiple choice X factors

Menu-based approaches to setting the value of X have been discussed in the literature, but have not been widely tested. They have been suggested as a response to concerns regarding the judgemental requirements in setting X (and criticism of the use of TFP as an automatic X-setting mechanism).

Crew and Kleindorfer comment:

> In view of the judgement required to set the X factor, and in view of the asymmetries of information, in that the company has better information in determining the X factor than the regulator, an alternative is to allow the company a more active role in setting the X factor.

Multiple choice menus have the potential advantage of reducing the risks of expressing the outcome of a regulatory review as a single X factor for each NSP (which may apply for five years or more). Instead, the regulator structures a set of options combining different X factors and benefit shares. Lower X factors would be combined with lower sharing factors and vice versa. The utility chooses the option that maximises its position. In so doing, it may move closer to its optimal performance with some net welfare gain for customers. Whilst there is a continuing requirement for the options to be carefully structured, the regulator at least has the opportunity to apply a risk adjusted value analysis, potentially allowing better use of the information available to it.

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21 If the utility is risk averse, perhaps because the requirement to operate commercially is weak, this approach becomes redundant.
6.5 Profit sharing and sliding scale

Two further approaches discussed in the literature are profit sharing and sliding scale adjustments. Profit sharing works on an annual basis within a CPI-X framework. A profit threshold is set for the company. If actual profit exceeds this, a proportion is returned to customers. The sharing mechanism is more immediate and prices more closely follow costs, limiting the risk of excess profits.

Profit sharing was considered by the UK water regulator, OFWAT, in 1997 and rejected. Among the reasons cited for rejecting profit sharing are:

- the weakening of incentives to reduce costs
- the costs of administration and the difficulty of determining normal profit levels, threshold levels and sharing formula
- the distractions to company management from the incentives to beat the system and the timing of savings programs around annual profit outcomes.

Sliding scale regulation was applied to privately owned London gas utilities in the late nineteenth and early twentieth century, before being largely forgotten. Dividend payments to shareholders were linked to prices. It allowed dividends to rise only if prices were reduced, and required dividend reductions if prices were increased.

Turvey (1995) and others have re-examined the merits of this approach. They have concluded that, in theory at least, it performs well in encouraging technical and allocative efficiency:

The scheme is flexible in that it minimises the need for regulatory intervention to either protect the firm when times are bad, or claw back its profits when times are better. The scheme does, however, depend on the regulator being able to observe when the firm tries to either disguise its profits or hand its profits back to shareholders in ways other than dividend payouts. In practice, the dividend sliding scale may be most relevant to cases where all the firm’s activities are regulated and will remain regulated.

The effect of sliding scale regulation is to share productivity increases between shareholders and customers each year in accordance with a formula determined by the regulator. As Turvey notes, this means that the need to predict achievable productivity growth cannot be avoided. Annual sharing also reduces the incentive to achieve productivity increases relative to CPI-X.

Earnings sharing mechanisms (ESMs) are similar to the form of sliding scale described by Turvey and have been used extensively in the US. Typically, a utility’s prices are adjusted by a preset amount in response to changes in the return on equity earned in the previous period. They may include a ‘deadband’ in which no change is triggered, restricting the operation of the mechanism to particularly high or low earnings outcomes. ESM formulae may be set for several years in advance and may operate with a considerable lag to minimise the negative effect on incentives.

The use of ESMs by regulators in the US that otherwise support indexed price caps not linked to individual utility costs may be explained by the pressure they face to avoid sanctioning ‘excessive’ individual utility profits, particularly if the indexed price cap leads to frequent price increases. These are similar to the concerns raised by Shuttleworth (1998) in

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his description of the ‘real world’ that regulators have to deal with. They raise once again the question of the extent to which the experience of an individual utility can be divorced from the regulatory framework. Proponents of the unlinked approach would start from the top-down, industry-wide approach, believing this to the economically correct first order decision (as it appears do the majority of US regulators but no UK regulators) and adjust only as circumstances require.

The Tribunal seeks comments on appropriate methods of benefit sharing under the incentive regulation framework.

7 SUMMARY OF ISSUES AND OPTIONS

The 1999 price review will establish the first five year revenue and price paths for NSW network service providers operating in the national electricity market, and set the direction for the future approach to network regulation. A recurring theme of this paper is that the 1999 review will influence what happens in 2004, at the conclusion of the review period, as much as it affects the current review period. Decisions taken in 1999 will provide a link between the Tribunal’s 1996 determination, its last under the previous arrangements, and the direction that regulation will take in the years to 2004 and beyond.

In practical terms, there are two sets of issues for the Tribunal to address:

• the form of regulation to apply in the period to 2004, including the rules for benefit sharing (if any) after 2004
• the transition between current revenue and price levels and post-1999 revenue or price caps.

7.1 Form of regulation

Four broad options for the regulatory form can be identified:

• unlinked

This approach would minimise the analysis of individual utility costs, relying instead on independent efficiency benchmarks or productivity measures to determine X factors. The use of a regulator-determined consumer dividend, applied via an adjustment to the value of X, is the preferred method of benefit sharing. Standard of service regulation is required as an explicit customer protection measure.

Advantages of the unlinked approach include:

− stronger long term efficiency incentives
− less likelihood of ‘micro-management’ by the regulator
− less information intensive for the utility
− less opportunity for information gaming by the utility.

Disadvantages include:

− high regulatory risk, given current knowledge and revenue position
− uncertainty about the reliability and accuracy of performance benchmarks
− consumer dividend reintroduces regulatory judgement.
• **cost linked, with P0 adjustment**
This approach combines some degree of utility-specific cost analysis with independent cost and efficiency benchmarks. No benefit sharing occurs beyond the review period. Therefore, there is no need to separate qualifying benefits from windfall gains and losses. All adjustments occur in the first year of the review period, increasing the risk of price/revenue shocks.

Advantages of this approach include:
- better initial matching of revenues and costs
- permits increasing reliance over time on external measures/benchmarks as expertise and confidence improve
- P0 adjustment is symmetrical and certain
- P0 adjustment is simple to apply.

Disadvantages include:
- the cost build-up is information intensive
- greater risk of ‘micro-management’
- reduced efficiency incentives.

• **cost linked, with P0/glide path hybrid**
In broad terms, this is the approach set out by the Office of the Regulator-General (ORG) in Consultation Paper Number 1. The desire to separate management-induced efficiency gains from windfall gains and losses, and to closely match revenues to costs leads to a greater emphasis on detailed cost analysis and forecasting. Windfall gains and losses and other exogenous effects (including movements in the cost of capital) are subject to P0 adjustment. Qualifying benefits are subject to a glide path adjustment.

Relative to a simple P0 adjustment, advantages of this approach include:
- appropriate matching of risks and benefits
- efficient pricing outcomes.

Disadvantages include:
- greater risk of micro-management
- information requirements and complexity in application
- greater scope for gaming
- possibility of asymmetrical application.

• **cost linked, with glide path**
With the exception of changes in law and defined events of a *force majeure* nature, which could be subject to immediate pass through or P0 adjustments, all other gains and losses (excluding any unambiguous noise, such as accounting changes) are subject to a glide path adjustment.

Relative to the other cost linked methodologies, advantages of this approach include:
- glide path adjustment is simple to apply and less information intensive
- glide path adjustment is symmetrical and certain
- stronger efficiency incentives than other cost-linked approaches
- reduced price and revenue shocks.

Disadvantages include:
- increased scope for extended revenue/cost dislocation
increased reliance on the revenue formula for tracking output driven cost variations.

In the NSW context, the last option appears at this stage to offer the best balance of benefits and risks for the various stakeholders. External efficiency measures and/or benchmarking are essential components of the unlinked approach. However, they are also important inputs to the cost linked approach. Customers expect to pay no more than the efficient prices and expect the regulator to demonstrate that efficient costs have been assessed in the regulator’s decision processes. Benchmarking is also important to ensuring the assessed X factors are achievable and will not result in either excessive profits or losses.

The Tribunal has commissioned a high level benchmark analysis of distributor performance and is examining trend productivity growth in Australia and overseas to assist it in forming a view on achievable productivity gains. However, there are significant risks for all stakeholders in basing the price paths on broad productivity comparisons and benchmarks alone. The requirements of the National Electricity Code and submissions from most stakeholders place considerable pressure on the Tribunal to undertake individual utility cost analysis. While accepting the need to carefully examine costs under the ‘building block’ approach, the Tribunal is keenly aware of the risks of micro-management and its potential for adverse effects on incentives. The Tribunal also notes that the problems arising from information asymmetry are maximised if decisions are based only on the utility’s own cost information.

If the outstanding concerns regarding the design and performance of a largely unlinked approach can be resolved, there would appear to be considerable potential advantages for all stakeholders in implementing such an approach in future regulatory reviews. However, this would require the establishment of a program to systematically address the design, testing and evaluation of the primary components of such an approach. The Tribunal is keen to explore these matters further with stakeholders.

### 7.2 1999 transition path

Once the 1999 price review has identified a new baseline Maximum Allowable Revenue (MAR) for each NSP, a decision will be required regarding the transition path between existing revenue levels and the new caps. The choices available are limited by the nature of the 1996 determination, which established the basis for current revenues. This took place during a period of substantial structural and economic change for the NSPs. As a result the information available was heavily qualified and the determination specified in general terms. It is unlikely that the data will support the kind of detailed assessment of actual and expected efficiency performance required to apply other than a very simple approach to benefit sharing.

A preliminary conclusion, therefore, is that the regulator’s options are limited to either a P0 adjustment or a simple glide path. Benefit sharing, in the form of a glide path adjustment, was not contemplated at the time of 1996 review. A glide path would allow revenues and prices to adjust more smoothly to their new levels, but it would prolong the period during which prices will vary from their efficient levels.
7.3 2004 regulatory reset

Consideration of the transition path reinforces the desirability of including reset principles to apply in 2004 within the scope of the 1999 review. In particular, the 1999 review should be structured to ensure that it is able to support the information requirements of the preferred approach to benefit sharing, if any, that is envisaged for 2004.

In foreshadowing the reset principles for the 2004 review, IPART will need to stress that:

- the current Tribunal cannot pre-empt the decisions of a future Tribunal, or fetter the discretion of a future Tribunal
- regulatory decisions taken in 2004 will need to be based on the information placed before the regulation in the course of that review.

The Tribunal appreciates the need for the next determination to set out more fully the basis for the determination. This will especially be the case if a hybrid P0 adjustment and glide path is implemented.

The assessment above suggests that if a cost linked approach is used, a simple glide path will be most appropriate for all variations, except in respect of a small number of explicitly identified costs.

*The Tribunal seeks comments on the options outlined above.*
REFERENCES


Independent Pricing and Regulatory Tribunal, (September 1998), Pricing for Electricity Networks and Retail Supply, Issues Paper.


