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Discussion paper

Incentive Mechanisms

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The Independent Competition and Regulatory Commission (the Commission) was established by the *Independent Competition and Regulatory Commission Act 1997* (ICRC Act) to determine prices for regulated industries, advise government about industry matters, advise on access to infrastructure and determine access disputes. The Commission also has responsibilities under the Act for determining competitive neutrality complaints and providing advice about other government-regulated activities.

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Foreword

The Independent Competition and Regulatory Commission (the Commission) is responsible for the regulation of monopoly distribution networks in the ACT. These include ActewAGL's electricity and gas networks, as well as ACTEW's water and wastewater network.

In the regulation of these monopoly distribution networks, the Commission is responsible for conducting periodic reviews to determine the revenue requirement for the relevant utility. In the past twelve months, the Commission completed reviews into all three distribution networks.

In completing these reviews, the Commission discussed with ActewAGL and ACTEW the possibility of introducing an efficiency carryover mechanism and/or a service incentive scheme. Both businesses committed to working with the Commission in an attempt to evaluate the benefits from the possible introduction of either an efficiency carryover mechanism and/or service incentive scheme.

The Commission is releasing this discussion paper as the first step in consulting interested parties over the possible introduction of such a mechanism or scheme. In the paper, the Commission has attempted to identify various issues associated with both options.

The Commission is seeking views from the community, service providers and other interested parties on the benefits or otherwise of the possible introduction of an efficiency carryover mechanism and/or a service incentive scheme.

The Commission will receive written submissions or arrange to meet with persons wishing to contribute to this process. The Commission will ultimately determine an approach that, in its view, will act to maximise the effectiveness of the regulatory approach adopted in the ACT.

Paul Baxter
Senior Commissioner
31 March 2005

Contents

Tables

Figures

1 Introduction

The Independent Competition and Regulatory Commission (the Commission) released its final decisions on electricity distribution prices and water and wastewater service prices in March 2004 and on gas distribution prices in November 2004.[1]

In the process of conducting these investigations, the possibility of introducing some form of efficiency carryover mechanism and/or a service quality incentive scheme was raised.

While the Commission decided against adopting either an efficiency carryover mechanism or a service incentive scheme for the current regulatory periods, the Commission committed to investigating the potential benefits of the introduction of such a mechanism or scheme in the future. Both ActewAGL and ACTEW, the regulated businesses operating in the ACT, have also stated a willingness to work with the Commission in determining whether the introduction of either incentive mechanism would lead to greater efficiency.

An efficiency carryover mechanism aims to provide a continuous incentive for a regulated business to seek efficiencies over the whole of the regulatory period. That is, it creates a situation in which the regulated business has a constant incentive to achieve efficiency gains throughout the regulatory period, as any efficiency gains are maintained by the business for a predetermined length of time. Under the current methodology adopted in the ACT, the regulated business may have a greater incentive to achieve efficiency gains in earlier rather than later years of the regulatory period, because the regulated business can maintain these gains for the remaining length of the regulatory period.

A service incentive scheme aims to create a link between service quality and revenues. Currently, there is little incentive for a regulated distribution business to improve service quality. In fact, the only incentive at the moment is for a regulated business to reduce costs, which may be to the detriment of service quality. A service incentive scheme aims to create a situation in which revenues adjust in response to changes in service quality, and hence provide the business with an incentive to improve service levels.

The Commission acknowledges that incentive mechanisms for either efficiency savings or service quality improvements cannot be analysed in isolation. The Commission also notes that there is a great deal of interrelation between issues arising from efficiency carryover mechanisms or service incentive schemes and other aspects of utility regulation. These issues include, but are not limited to, the methodology the regulator uses to calculate the 'X' factor and how the regulator determines forecasts for operating and capital costs. These and other issues are raised in the discussion paper for comment from interested parties.

The Commission has prepared this discussion paper as the first step in determining if any form of efficiency carryover mechanism or service incentive scheme would be beneficial in the ACT and is seeking input from interested parties.

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[1] These documents can be accessed on the Commission's website: www.icrc.act.gov.au.

2 Efficiency carryover mechanisms

2.1 Aims of efficiency carryover mechanisms

The whole basis for the current approach to regulation, utilising a 'CPI minus X' adjustment process as applied by the Commission to gas, electricity, and water and wastewater, is to provide the regulated business with the proper incentive to produce efficiently. One of the main goals of the current regulatory proposal is to create an additional incentive for the regulated business to become more efficient.

In standard consumer and intermediate goods markets, competition from rivals drives businesses to become more efficient.[2] A business that fails to become efficient quickly loses market share as its more efficient rivals undercut its prices and lure its customers away. In regulated industries such as gas and electricity distribution services, and the distribution and retailing of water and wastewater services, there are no competitors or prospects of future competition. Thus, the natural pressure that competition puts on businesses to become efficient does not exist. Incentive regulation attempts to solve this problem by setting prices for several years (usually five years) and allowing the regulated business to keep any efficiency gains made during the period.

Incentives to reduce costs and keep those efficiency gains are created because there is no linkage between actual costs, or short-term forecasts of costs, and prices. This was a common critique of rate-of-return regulation, with its short-term regulatory periods (often only one year). Under rate-of-return regulation, prices were set to cover a short-term expectation of costs plus a 'fair' return on capital. If the business reduced costs through the introduction of a more efficient means of production, the business only kept these gains for a short term before its costs and consequently its prices were ratcheted down in the next review, as the cost savings were passed on to consumers. Incentive regulation differs primarily from rate-of-return regulation in that the time period between regulatory reviews is longer and an adjustment mechanism for changing prices over time is specified. Although expected costs are estimated for the duration of the regulatory period, efficiency gains where actual costs are lower than forecast costs are kept by the business for the duration of the regulatory period.

Regulators and utilities have recognised that the incentives to put effort into reducing costs differ over the duration of the regulatory period. Cost reductions achieved in the first year of the regulatory period that can be maintained throughout the duration of the regulatory period yield a greater return than cost reductions achieved during the last year of the regulatory period that may be kept for only one year. Thus, efficiency carryover mechanisms were proposed, and in some jurisdictions adopted, prescribing a manner in which later-year efficiency gains could be preserved in the subsequent regulatory period. The adoption of such a scheme appears to be the elegant solution to the problem of diminishing incentives over the course of the regulatory period.

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[2] It is also true that the market for corporate control imposes discipline on the performance of managers. Inefficient management attracts investors who have the willingness to replace the current management and institute efficiency-generating changes. Note that there is a subtle relationship between the power of the market for corporate control and incentive mechanisms. The greater the proportion of efficiency gains that can be retained by the new owners of an inefficient business, the greater the influence the market for corporate control will have in ensuring efficient production.

The common mechanism employed by Australian regulators who have adopted an efficiency carryover mechanism is to base the mechanism on operating costs. That is, the business keeps efficiency gains across regulatory periods when actual operating costs are lower than forecast operating costs.

2.2 Efficiency carryover mechanisms in other jurisdictions

2.2.1 Australian Competition and Consumer Commission

The Australian Competition and Consumer Commission (ACCC) has recently released its paper entitled 'Statement of principles for the regulation of electricity transmission revenues'.[3] Among other things, the report outlines the ACCC's approach to efficiency carryover mechanisms to apply to transmission businesses.

In relation to capital expenditure, the ACCC has adopted an 'ex ante' approach to ensure that transmission network service providers (TNSPs) select efficient capital projects and develop them at the lowest sustainable cost for a given level and quality of service.[4] Under an ex ante approach, the ACCC agrees with the business in advance the capital expenditure that will be included in setting prices for the regulatory period. The agreed forecast capital expenditure is then set for the period, and efficiency gains are achieved by the business if actual expenditure is less than the forecast level.

In addition to the main ex ante incentive, the regime provides for separate incentives on excluded projects. The excluded project ex ante incentive is an allowance for significant capital projects that may be developed during the regulatory period, but the likelihood and cost of which is difficult to predict with certainty at the time that the main ex ante incentive is established. Excluded projects are subject to their own regulatory incentive period of five years, which is established shortly before the project is commenced. The ACCC also proposes a symmetrical treatment of underspends and overspends.

In relation to operating expenditure, the ACCC has adopted a mechanism that will result in TNSPs retaining the benefit or cost of incremental efficiency changes for five years after the year in which the incremental change is made, with the aim of creating a mechanism that produces a nearly constant incentive to make efficiency improvements over the course of the regulatory period.

The ACCC is also proposing to adopt an approach that would allow the revenue cap to be reopened should unexpected events have a material impact on TNSP costs. The ACCC is also seeking to improve transparency of TNSP cost and service performance through the development of improved regulatory accounts and through the publication of service-standard transparency measures.

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[3] Australian Competition and Consumer Commission, *Statement of principles for the regulation of electricity transmission revenues*, Decision, December 2004. See also Australian Competition and Consumer Commission, *Statement of principles for the regulation of electricity transmission revenues – background paper*, Decision, December 2004.

[4] The ex ante incentive mechanism for capital expenditure contrasts with the Commission's 'ex post' prudency approach. In this case the Commission applies a prudency test to all capital expenditure in the previous regulatory period at the beginning of the next regulatory review.

2.2.2 Queensland

The Queensland Competition Authority (QCA) released an issues paper on efficiency carryover mechanisms in September 2004.[5] In this document, the QCA sought views on the respective benefits of a 'glide path' or 'rolling carryover' mechanism.

The QCA example of a glide-path mechanism assuming a five-year regulatory period is reproduced in Table 1.[6]

Table 1 QCA operating cost glide-path mechanism ($)

		Regulatory period 1					Regulatory period 2				
	Year	1	2	3	4	5	6	7	8	9	10
a	Forecast expenditure	100	100	100	100	100	70	70	70	70	70
b	Actual expenditure	100	90	95	80	70					
c	Underspend/ (overspend) (a – b)	0	10	5	20	30					
d	Incremental efficiency gain/(loss) ($c_t - c_{t-1}$)	0	10	(5)	15	10					
e	Percentage of gains/(losses) retained by the business						100%	80%	60%	40%	20%
f	Efficiency carryover						30	30	30	30	30
g	Retained efficiencies (e × f)						30	24	18	12	6
h	Expenditure used for pricing purposes						100	94	88	82	76

Forecast expenditure is shown in row (a) with actual expenditure in row (b). The level of underspend (or overspend) is the difference between the two, and is shown in row (c).

The incremental efficiency gain (or loss) is the difference in actual expenditure from one year to the next and is calculated in row (d) as the difference in any underspend (overspend) from the previous year. The total incremental efficiency gain is $30 and is the sum of row (d): (10 – 5 + 15 + 10 = 30).

Under the QCA glide-path mechanism, the total incremental efficiency gain in the first regulatory period is allocated to consumers over the following regulatory period, in this case five years. In year 6, the first year of regulatory period 2, the business retains 100% of the $30 total incremental efficiencies gained in regulatory period 1. This is reduced by 20% in each of the years of

[5] Queensland Competition Authority, *Efficiency carryover mechanism,* Issues paper, September 2004.
[6] The Commission has made some slight alterations to the QCA's tables.

regulatory period 2, as shown in row (e), until all the efficiency gains generated in regulatory period 1 are passed on to consumers by the first year of regulatory period 3.

The efficiency carryover, row (f), for years 6 through 10 is equal to the sum of the incremental efficiency gain over the first regulatory period. This represents the total efficiency gains generated in the first regulatory period. The business does not retain the full efficiency carryover in each year of the subsequent period; rather, the business retains a diminishing proportion of the efficiency carryover. Therefore, retained efficiencies, row (g), are the efficiencies generated by the business in regulatory period 1 that are retained by the business into regulatory period 2. The retained efficiencies equal the efficiency carryover, row (f), multiplied by the percentage of gains retained by the business in each year, row (e).

These efficiency gains maintained by the business are included in the calculation of expenditure used for pricing purposes, row (h), in regulatory period 2. The expenditure used for pricing purposes in regulatory period 2 is the sum of forecast expenditure, row (a), and retained efficiencies, row (g).

It should be noted that the forecast expenditure in row (a) is adjusted in regulatory period 2 to reflect the efficient costs established by the end of the first regulatory period (that is, $70).

The alternative approach suggested by the QCA is a rolling carryover mechanism. This also assumes a five-year regulatory period (see Table 2).

Table 2 QCA rolling carryover mechanism ($)

		Regulatory period 1					Regulatory period 2				
	Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
a	Forecast expenditure	100	100	100	100	100	70	70	70	70	70
b	Actual expenditure	100	90	95	80	70					
c	Underspend/(overspend) (a – b)	0	10	5	20	30					
d	Incremental efficiency gain/(loss) ($c_t - c_{t-1}$)	0	10	(5)	15	10					
	Efficiency carryover from:										
e	Year 1						0				
f	Year 2						10	10			
g	Year 3						(5)	(5)	(5)		
h	Year 4						15	15	15	15	
i	Year 5						10	10	10	10	10
j	Retained efficiencies (sum (e to i))						30	30	20	25	10
k	Expenditure used for pricing purposes (a + j)						100	100	90	95	80

Under a rolling efficiency carryover mechanism, any efficiency gains are retained by the business for a set period of time (five years in the example in Table 2) before being allocated to consumers. This allocation can be a one-off price reduction or phased in over time; the example in Table 2 assumes a one-off price reduction.

In Table 2, an efficiency gain of $10 is achieved in year 2. This efficiency gain is the difference between forecast and actual expenditure. As can be seen in row (f), the $10 efficiency gain is maintained by the business for a period of five years but only applies in the subsequent regulatory period (years 6 and 7) before being allocated to consumers. A similar situation exists for efficiency gains in subsequent years.

The retained efficiencies shown in row (j) are the sum of efficiency carryover shown in rows (e) through (i).

The expenditure used for pricing purposes is the forecast expenditure plus any retained efficiencies from the previous regulatory period that are carried over. As can be observed in row (k), the expenditure used for pricing purposes in regulatory period 2 is the sum of forecast expenditure, row (a), and retained efficiencies, row (j), from regulatory period 1.

2.2.3 New South Wales

The New South Wales Independent Pricing and Regulatory Tribunal (IPART) has decided against the adoption of an efficiency carryover mechanism of the type adopted by, for example, the Essential Services Commission in Victoria. Rather, in its June 2004 final report on electricity distribution pricing[7], IPART restated its view that an X-factor 'glide path' approach to creating incentives for efficiency improvements is superior to other efficiency carryover mechanisms because it:

- is simple to apply and less information-intensive than other carryover mechanisms
- is symmetrical and certain
- offers stronger incentives than other cost-linked approaches to efficiency carryover
- reduces price and revenue shocks
- is likely to offer the best balance of benefits and risks for various stakeholders.

The IPART approach sets an initial P_0 ('P-nought') price change in the first year of the regulatory period, followed by a single 'glide path' X factor that ensures that prices change smoothly over the regulatory period, such that the business's expected revenue in the final year of the regulatory period equals the notional revenue requirement for that year.

Under this methodology, an initial X factor is set for the first year of the regulatory period to adjust expected revenue closer to the notional revenue requirement. A second X factor is then set for the remaining regulatory period, and acts to equate expected revenue and the notional total revenue requirement in the final year of the regulatory period.

[7] Independent Pricing and Regulatory Tribunal, *NSW Electricity distribution pricing 2004/05 to 2008/09*, Final report, June 2004.

2.2.4 Victoria

In December 2004, the Essential Services Commission (ESC) of Victoria released its issues paper on electricity distribution prices for the period 2006 to 2010.[8] Under existing Victorian arrangements, the efficiency carryover amount to be carried forward from the 2001–05 regulatory period is calculated for each year both for operating and maintenance expenditure and for capital expenditure.

An efficiency gain (or loss) in operating and maintenance expenditure in any year is based on the difference between the expenditure and forecast in that year and the expenditure and forecast in the previous year. A growth adjustment also exists whereby forecast operating and maintenance costs are adjusted based on customer numbers.

An efficiency gain (or loss) in capital expenditure is calculated as the regulatory weighted average cost of capital multiplied by the reduction (or increase) in capital expenditure against the capital expenditure forecast for that year. Capital expenditure forecasts associated with new customer connections are adjusted based on customer-initiated connections, and demand-related reinforcement is adjusted based on peak demand. No adjustment is included for differences in depreciation.

To calculate the carryover amounts to be incorporated in the 2006–10 regulatory period revenue requirements, the efficiency carryover amounts for operating and maintenance expenditure and capital expenditure accrued over the 2001–05 regulatory period are added together. Where the sum of these amounts is positive in net present value terms over the 2001–05 regulatory period, the amount is added into the revenue requirement for the 2006–10 regulatory period. Where the sum is negative in net present value terms over the 2001–05 regulatory period, the amount of the carryover is set equal to zero, with the accrued negative carryover taken into account in setting the benchmarks for the next regulatory period (2011).

The ESC is currently reviewing the operation of the efficiency carryover mechanism as part of the 2006 electricity review.

2.2.5 South Australia

The Essential Services Commission of South Australia (ESCOSA) released a discussion paper on efficiency carryover mechanisms in December 2002 which was followed by the release of its 'Working Conclusions' in April 2003. ESCOSA's draft electricity distribution price determination released in November 2004 adopted the approach outlined in its working conclusions paper. [9]

The approach adopted allows for both operating and capital expenditure efficiency gains or losses to be carried forward using a rolling carryover mechanism, although each is treated differently.

Operating expenditure is treated in an incremental manner whereby only the additional improvements in efficiency in a given year, over and above the improvements that have been achieved in previous years, are included in the efficiency carryover adjustment. The incremental

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[8] Essential Services Commission, *Electricity distribution price review 2006–10*, Issues paper, December 2004.
[9] Essential Services Commission of South Australia, *Draft 2005–10 Electricity distribution price determination Part A – statement of reasons,* November 2004.

approach is used to counter the possibility that the business would receive any temporary underspend in perpetuity, with none being shared with consumers.

Capital expenditure efficiency gains are computed against the benchmark cost estimates in each year, regardless of the previous years' capital expenditure level. The business is allowed to earn a return on any efficiency gain over a five-year carryover period.

Efficiency gains or losses are treated differently in the final year of the regulatory period, for which assumed operating and capital figures must be used because the actual expenditure is not known prior to the end of the regulatory period.

2.2.6 Tasmania

In its 2003 decision on electricity prices, the Office of the Tasmanian Energy Regulator (OTTER) included an efficiency carryover mechanism for Aurora's distribution services.[10] The scheme only applies to operating and maintenance expenditures, with incremental efficiency gains being retained for a period of five years. This results in any efficiency gains made during year 1 of the determination being retained until the end of the first year of the next regulatory period, with any additional savings made during year 2 being retained until the end of the second year of the next regulatory period and so on. In calculating efficiency gains, it should be noted that a 1.0% efficiency factor was applied to the final forecast operating and maintenance costs from 2005.

2.2.7 United Kingdom

The scheme developed by the Office of Water Services (OFWAT), the water services regulator in the United Kingdom, utilises as part of its overall scheme an incentive mechanism based on underspending of operating costs and capital costs, as used by Australian regulators. This is only one component of the scheme, as it also employs comparative competition to drive efficiency gains. The OFWAT scheme has been in practice since 1995 and is currently in the process of being modified.[11] While the scheme has some similarities to schemes employed by Australian regulators, the big difference is the use of comparative competition. The advantage OFWAT has in employing a scheme such as this derives from the fact that OFWAT regulates 16 water businesses in the United Kingdom.

The comparative competition portion of the scheme involves assessing productivity for a variety of outputs both for water and for wastewater services. The measures of productivity are determined using econometric modelling. The businesses are then banded according to performance, with businesses that exceed the average being rewarded and those that are below the average being punished. The motivation for a scheme based on comparative competition is that it mimics the competitive effects that businesses face in markets with many businesses in the market.

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[10] Office of the Tasmanian Energy Regulator, *Investigation of prices for electricity distribution services and retail tariffs on mainland Tasmania Final report and proposed maximum prices*, September 2003.
[11] OFWAT, *Future Water and Sewerage Charges 2005–2010: Final Determinations*, 2004.

2.3 Issues in designing efficiency carryover mechanisms

The Commission has identified several issues and questions whilst analysing the potential adoption of an efficiency carryover mechanism. It needs to be restated that the Commission has not yet decided whether to adopt a mechanism, or the form the mechanism would take if adopted. The Commission is seeking public input on these issues.

The following issues and questions are discussed in the remainder of this section.

- Are there significant efficiency gains that can be realised in the future?
- Is there a relationship between efficiency carryover mechanisms and the Commission's approach to regulation?
- Should the Commission be concerned about service quality degradation?
- How should efficiency gains be measured?
- How should efficiency losses be treated?
- How should efficiency gains be shared between consumers and the business?
- Are there serious flaws in the incremental method of determining efficiency gains?

2.3.1 Efficiency and the current regulatory regime

The current regulatory approach, with its usual five-year regulatory period and adjustment process, is designed to encourage efficiencies by allowing the business to retain efficiencies for the duration of the regulatory period. The issue at hand is to take a higher-level view of the need for efficiency gains. In the Australian context, very little research or analysis is being undertaken to determine, for example, whether regulated businesses are close to, or far from, the 'efficient production frontier'.

If a regulated business is close to 'world's best practice', the scope for future efficiency gains may be small. This implies that the regulator's focus should not be on designing efficiency schemes but rather directed to other areas of greater benefit to the business and consumers. One such avenue could be for the regulator to strive to reduce the regulatory burden placed upon regulated businesses, and also attempt to reduce the potential for regulatory risk and uncertainty.

On the other hand, if the regulated business is a long way from the efficient production frontier, as determined by comparison either domestically or internationally, then an incentive scheme has potential to yield benefits both to the business and ultimately to consumers. Unfortunately, there is a general lack of information within Australia on the relative and absolute levels of productivity across regulated industries.

The only study the Commission is aware of is the recent research by Pacific Economics Group, which estimated the total factor productivity for the four distribution businesses in Victoria.[12] While the focus of this research was not on the level of relative productivity, it would be possible to utilise the study's methodology to benchmark businesses across Australia. With concrete measures of productivity, it would also be feasible to make international comparisons.

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[12] Pacific Economics Group, *TFP Research for Victoria's Power Distribution Industry*, December 2004.

2.3.2 The regulatory approach and carryover mechanisms

There exist interaction effects between efficiency carryover mechanisms and both the approach adopted to calculating the X factor and the methodology for determining cost forecasts.

There are two commonly used methods for calculating a constant X factor: straight-line smoothing and net present value (NPV) smoothing. They are calculated in a similar fashion and require similar information. To determine the X factor using either methodology requires the calculation of cost building-blocks, forecast customer numbers and the average revenue for the last year of the previous regulatory period.

NPV smoothing solves for the level of X such that the net present value of building-block costs equals the net present value of the smoothed revenue where average revenue grows by CPI minus X every year.

Straight-line smoothing solves for the level of X such that the building-block cost in the last year of the regulatory period equals the smoothed revenue in that year. The business's total revenue requirement may be higher or lower than the building-block cost over the intervening years, depending primarily upon the relative cost and revenue position in the last year of the previous regulatory period.

To both NPV smoothing and straight-line smoothing there is the additional possibility of adding a P_0 adjustment. A P_0 adjustment results in most of the cumulative effect of the X factor being applied in the first year of the regulatory period rather than being spread out over the course of the regulatory period. The P_0 adjustment can be for the entire effect or just a partial adjustment.

The Commission has adopted NPV smoothing for its electricity, gas, and water and wastewater decisions. In its gas and electricity decisions, the Commission adopted a P_0 adjustment with a subsequent X factor of zero. The P_0 adjustment was negative in both cases. In the Commission's water and wastewater decision, a positive X factor was set for both water and wastewater.

IPART adopted straight-line smoothing to calculate X factors in its 2004 electricity distribution pricing decision.[13] IPART applied a partial P_0 adjustment as well. One of the arguments IPART gives for adopting straight-line smoothing is that it encourages the business to achieve efficiencies, while the NPV approach does not. Straight-line smoothing may have greater efficiency power than NPV smoothing, but the degree of extra efficiency benefit may be mitigated by the methodology for determining operating costs.

A simple example demonstrates this effect. Suppose that a regulated business has forecast operating costs of $100 per year and no capital costs. Suppose also that in the last year of the regulatory period the business lowers its operating costs to $90, a $10 efficiency gain. A prudent regulator would then forecast operating costs of $90 for the next regulatory period of, say, five years. Straight-line smoothing would see revenue glide from $100 in the last year of the current period to $90 by the last year of the subsequent period. Thus, there is a strengthened incentive for reducing costs because the business keeps $10 in the last year of the current regulatory period and

[13] IPART June 2004

glides to zero in the next five years.[14] This benefit is potentially dominated by the gain the business could earn if it postponed the efficiency gain until the first year of the next period. If its forecast costs remained at $100, as they would if the regulator were unaware of the efficiency gain, then the business could earn an extra $50 over the five years of the next regulatory period, and in this case the incentive power of straight-line smoothing would be diminished.

The relationship between determining the forecasts of efficient costs for the next regulatory period and the power of an incentive mechanism has not been well explored but is a crucial issue. All regulators claim that the forecast operating and capital costs are 'efficient' estimates of future cost, especially when determining forecasts of operating costs. If forecasts for operating costs depend in any way on historical actual costs, the power of an incentive mechanism is reduced. The tighter the relationship between actual costs and future forecast costs, the less powerful the incentive becomes. One of the basic tenets of incentive regulation is that incentive regulation allows the regulator to 'learn' the regulated business's costs over time. When evaluating the relationship between how operating costs are determined and the power of incentive mechanisms, one needs to consider the extent to which the regulator is attempting to 'learn' the business's actual costs, as opposed to the regulator's perception of the 'efficient' level of costs. The more forecasts of operating costs are based on historical costs, the weaker is the power of incentive mechanisms.

2.3.3 Efficiency gains and service quality

It is clear that strengthening the incentives to reduce costs in isolation could have a potential adverse effect on the long-term level of the quality of service. It is generally believed that increases in efficient expenditure on both capital and operating expenses will result in an increase in service quality. However, this relationship is difficult to quantify. This leads to several potential problems in the relationship between incentive effects of carryover mechanisms and service quality.

The trade-off between expenditure (both operating and capital) and service quality is not a simple relationship. Firstly, there are difficulties associated with measuring service quality. There is no simple measure of service quality, as there are myriad service quality indices and aggregating them into a single measure of service quality is not straightforward. If service quality cannot be accurately measured, the trade-off is difficult to quantify.

Secondly, there is also the problem of measuring the relationship between actual expenditure and service quality, current or future. Hence, regulators cannot accurately predict the effects of changes in expenditure on service quality.

Finally, there is a lag between changes in expenditure and the effect on service quality. It may be several or many years before reductions in operating expenses on maintenance result in a noticeable diminution in service quality.

The absence of a quantifiable relationship between expenditure and service quality poses a problem for the regulator. Ideally, the regulator would like to balance the incentive for the business to become more efficient with the incentive for the business to continue to supply at the optimal

[14] Note that the business earns additional profits of $8 in year 1, $6 in year 2, $4 in year 3 and $2 in year 4 of the next regulatory period. The additional $20 is less than the $50 that would be implied by an efficiency carryover mechanism based on incremental costs.

level of service quality. If the incentive to reduce costs is greater than the benefit of maintaining the right level of service quality, the business may run down service quality in an attempt to capture short-term benefits of the incentive gains at the expense of future service quality reductions. In fact, consumers could potentially face at the same time the twin problems of a fall in service quality due to a reduction in expenditure and an increase in price as a reward to the business for supposed efficiency gains.

2.3.4 Measuring efficiency gains—theory and practice

A business is considered to be producing efficiently if, given its level of inputs, it is producing the maximum amount of output.[15] Alternatively, productive efficiency exists when a business minimises the wastage of resources in its production processes.[16] Either definition of productive efficiency does not require any knowledge of input prices or costs. However, it does require a detailed understanding of the relationship between the inputs used and the output produced by the business. This approach to productive efficiency is based on production functions.[17]

An alternative approach holds that productive efficiency exists when, for a given level of output and for given levels of input prices, the business is producing at least cost. The implication is that the firm cannot rearrange its input choices to achieve a lower cost method of attaining the same level of output. This requires a detailed understanding of the level of outputs and total cost of production. This approach to productive efficiency is based on cost functions.[18]

Both these approaches have different interpretations when efficiency gains are being discussed. In the first approach, an efficiency gain is the ability to produce additional output with the same level of inputs, or alternatively the same level of output with fewer inputs.

The second approach has a different interpretation with an important qualifier. Under this approach, the efficiency gain is interpreted as lower cost of production of a fixed level of output given fixed input prices. It is important to note that the distinction between the first and second approaches is that measures of efficiency gains at the theoretical level based on a cost function approach require fixed input prices.

It is generally accepted by economists that efficiency gains can be measured either through production functions (that is, the relationship between inputs and outputs), or through cost functions (the relationship between the level of output and total cost). Both approaches are sound; to correctly measure the true efficiency gain requires following either approach and meeting all of the concomitant data requirements.

An important point that must be made is that a cost reduction does not necessarily imply that an efficiency gain has been achieved. The cost reduction could occur because of a reduction in input costs or a reduction in the level of output. Indeed, the common Australian approach of measuring efficiency gains based on deviations from forecast costs may not accurately identify actual

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[15] Additional efficiency concepts include allocative efficiency and dynamic efficiency.
[16] If a firm produces multiple outputs then productive efficiency implies that the firm cannot produce more of one output without producing less of another output given fixed levels of all inputs.
[17] The classical discussion on productive efficiency can be found in Koopmans, T., *Three Essays on the State of Economic Science*, McGraw-Hill 1957. All intermediate or advanced microeconomic textbooks have a discussion on production functions.
[18] See any intermediate or advanced textbook on microeconomics for a discussion on cost functions.

efficiency gains. However, this does not negate the value of such a technique. Awarding a business benefits from beating operating cost targets does encourage the business to adopt efficiency gains that result in cost reductions.

However, the potential negative implications of awarding benefits for beating cost targets needs to be recognised. If a business is rewarded for beating cost forecasts, it may also have incentives to engage in potentially welfare-reducing activities such as reducing service quality, employing inefficient input levels or 'gaming' the system. Focusing on the cost level alone may create as many negative side effects as positive benefits.

As a practical matter, to follow either a cost or production approach faithfully would require enormous amounts of data. To estimate the cost function or production function of a business requires years of detailed data. To get around the necessary data requirements, performance measures can be used. Labour productivity or capital productivity measured by the ratio of output to units of labour or units of capital, respectively, can proxy a production function approach. If total output divided by number of employees is growing, efficiency gains are indicated. Of course, there is a natural labour productivity growth in the economy, and the measured rate should exceed this. Different sectors of the economy have different labour productivity measures, and a dedicated measure of labour productivity for regulated industries does not exist.

Alternatively, total cost divided by units of output could be used as a measure to calculate efficiency gains. Unfortunately, a business that possesses economies of scale will appear to be becoming more efficient, when in reality it is not, if output grows over time. Other potential measures are possible, for example total costs divided by kilometres of pipes as used in the gas industry. Improvements in such a ratio could be seen as an efficiency gain.

Within the Australian context, efficiency gains have been measured by comparing actual operating and capital costs to those forecast in the relevant price direction. The ACCC proposes to determine efficiency gains from the difference between actual operating costs and forecast operating costs.[19] Efficiency gains are carried over permanently while transitory or one-off gains do not carry over. The ESC calculates efficiency gains on operating costs as the ACCC proposes, but also allows carryover of capital expenditure efficiency gains. In this case, efficiency gains are captured by the business if its actual capital spend for the entire regulatory period is less than the forecast capital spend. Efficiency gains accrue to the business, as the roll-forward calculation of the asset base is assumed to be the amount implied by the forecast capital expenditure.

The approach used by the ACCC, the ESC and ESCOSA depends on the incremental efficiency gains. The ACCC incentive carry-over mechanism is characterised by the equation:

$$E_t = (A_{t-1} - A_t) - (F_{t-1} - F_t) \qquad \text{Equation 2.1}$$

where

E_t is the efficiency benefit/loss in period *t*,

A_t is the actual operating cost in period t and

F_t is the forecast cost in period *t*.

[19] ACCC Transmission principles

Rearranging the equation yields a more intuitively appealing representation of the incremental efficiency gain:

$$E_t = (F_t - A_t) - (F_{t-1} - A_{t-1}) \qquad \text{Equation 2.2}$$

E_t becomes the adjustment to allowed costs until year $t + 5$. This amount is added to the forecast operating costs for those upcoming years when determining the price path. Note that it is the years during the next regulatory period for which the efficiency benefit is applied. The business does not get an extra boost during the current regulatory period, as it currently retains these efficiencies until the beginning of the next regulatory period if the efficiency gain is permanent.

The important contribution of a scheme such as this one is that transitory efficiency gains are not rewarded. An efficiency gain that lasts for one period would be rolled in and then rolled out of future cost adjustments. This represents an approach that only rewards permanent gains.

The mechanics for calculating efficiency gains from operating costs can easily be described by means of example. Suppose that for years 1 through 5 of the current five-year regulatory period the business has forecast operating costs of 100, and actual operating costs of 100, 90, 95, 90 and 85 occur during the period. This situation is demonstrated in Table 3.

Table 3 Operating cost efficiency gains

		Regulatory period 1					Regulatory period 2				
	Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
a	Forecast expenditure	100	100	100	100	100	85	85	85	85	85
b	Actual expenditure	100	90	95	90	85					
c	Underspend/(overspend)	0	10	5	10	15					
d	Incremental efficiency gain/(loss)	0	10	(5)	5	5					
	Efficiency carryover from:										
e	Year 1						0				
f	Year 2						10	10			
g	Year 3						(5)	(5)	(5)		
h	Year 4						5	5	5	5	
i	Year 5						5	5	5	5	5
j	Retained efficiencies						15	15	5	10	5
k	Expenditure used for pricing purposes						100	100	90	95	90

Several interesting observations can be made from Table 3.

The incremental efficiency gain is calculated using equation 2.2. For example, in year 5, while the underspend in row (c) is 15, the incremental efficiency gain in row (d) is only 5. This is a result of the underspend of 10 in year 4 and is calculated below using equation 2.2:

$$E_t = (F_t - A_t) - (F_{t-1} - A_{t-1})$$

$$E = (100 - 85) - (100 - 90)$$

$$E = 5$$

The total efficiencies retained from regulatory period 1, which are taken into account in determining the expenditure used for pricing purposes in regulatory period 2, are 50. This is calculated as the sum of retained efficiencies, row (j), for each year of regulatory period 2. Of these retained efficiencies, 25 are generated in year 5. This is a result of the incremental efficiency gain of 5 in year 5 being retained by the business for the whole of regulatory period 2, a length of five years.

Another point that needs to be made about incentive schemes based on operating costs is that the incentive to reduce costs is actually independent of the level of forecast costs. For instance, suppose the level of forecast costs were 110 for years 1 through 5 and the actual operating costs were those as given in row (b) of Table 3. This situation is shown in Table 4.

As can be observed by comparing Table 3 and Table 4, the incremental gains are the same for years 2 through 5.[20] The benefit to the business of the effort to reduce costs are the same regardless of the level of forecast costs.

Table 4 Incremental costs

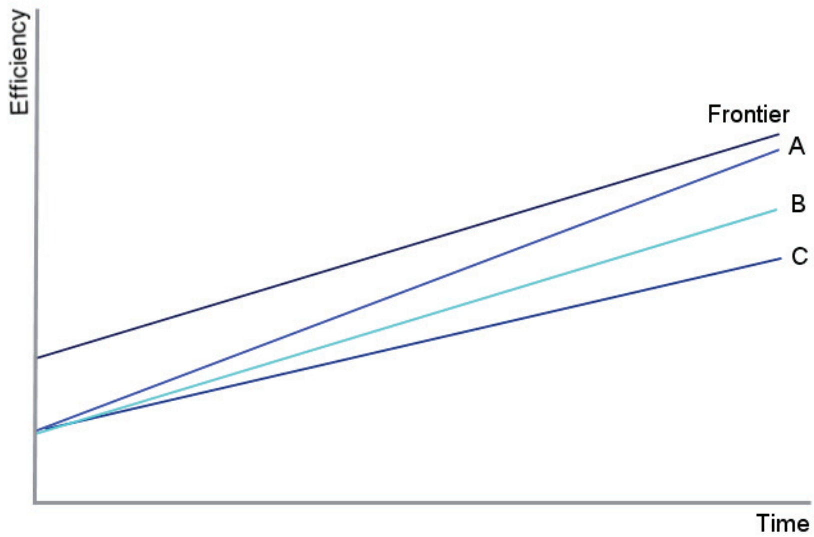
		Regulatory period 1				
	Year	**1**	**2**	**3**	**4**	**5**
a	Forecast expenditure	110	110	110	110	110
b	Actual expenditure	100	90	95	90	85
c	Underspend/(overspend) (a – b)	10	20	15	20	25
d	Incremental efficiency gain/(loss) ($c_t - c_{t-1}$)	0	10	(5)	5	5

The same result holds if the forecasts were 90 for years 1 through 5. The surprising result is that forecast costs have no effect on the business's incentive to reduce costs.

In contrast, OFWAT employs a complex scheme that involves not only measures of actual operating and capital costs compared to forecasts, but also econometrically derived measures of productivity that are then benchmarked against other water utilities. As there are 16 water utilities in the United Kingdom regulated by OFWAT, there is a large sample for benchmarking exercises. The OFWAT scheme is data intensive compared to schemes based on operating and/or capital expenses. The illustrative value of the scheme is that it demonstrates that a scheme that incorporates some degree of benchmarking is possible and potentially effective. It is possible to explain this result and the potential complications of adopting a mechanism such as the OFWAT scheme by means of a simple chart of efficiency over time for three possible scenarios, as shown in Figure 1.

[20] Year 1 incremental gains are ignored as year 0 costs have not been reported.

Figure 1 Efficiency over time—three scenarios



Given the scenarios in Figure 1, it is possible to describe how incentive schemes based on productivity measures could be designed. The vertical axis measures the level of efficiency for the business, with higher levels representing increased levels of efficiency. The horizontal axis measures time. The three scenarios are labelled A, B and C, and there is assumed to be an efficiency frontier. In all three scenarios, the business is assumed to start below the efficiency frontier. In case A, the business's efficiency level is growing at a faster rate than the frontier; in case B, the business's efficiency level is growing at the same rate as the frontier; and in case C, the business's efficiency level is growing slower than the frontier.

The frontier, which represents the hypothetical most efficient outcome, could be viewed in two ways. One interpretation would be to consider the frontier as 'best practice', which would need to be identified by examining the efficiency performance of a large number of potential comparators. Due to the relatively small number of potential comparators in Australia, this may necessitate international comparisons. An alternative would be to consider the frontier as simply the most efficient from a relatively small set of comparator businesses. If this were the case, most if not all potential Australian comparators could be used. The frontier level of efficiency is rising over time, consistent with natural productivity gains.

An important potential issue in applying this type of efficiency mechanism is how to determine the level or the rate of growth of the frontier (and the business as well). This can be achieved by a variety of methods, as evidenced by OFWAT's scheme and, potentially, the total factor productivity modelling by Pacific Economics Group in Victoria.

In designing an efficiency carryover mechanism based on productivity measures, the approach taken by OFWAT involves comparing the business's efficiency growth with that of the frontier. If the business is outperforming the frontier (that is, 'catching up' to the frontier), there is an efficiency benefit; if the business is underperforming the frontier, there is a penalty. In Figure 1, business A would receive an incentive benefit, business C would incur an incentive penalty, and business B would have no benefit or penalty. Note that a business that started on the frontier and remained on the frontier would neither receive a benefit nor incur a penalty. However, if a business has achieved 'best practice', one would assume that it has been rewarded with efficiency gains in the past sufficient to compensate it for the effort required to have achieved this outcome. The expectation that the business will remain at the frontier is purely natural, as the business should achieve productivity gains over time consistent with national productivity gains.

To summarise: an efficiency mechanism based on productivity measures could be designed, but this would be a data-intensive process. The design of the mechanism could be thought of as a 'tournament' among the appropriate businesses. In this case, relative performance matters—just as is the case in competitive markets.

2.3.5 Sharing efficiency gains

An issue that needs to be examined is the pace and extent of sharing of efficiency gains (or losses) between the business and consumers. Economic theory and empirical evidence provide some explanation as to how this distribution should potentially be split between business and consumers, or at the very least give an indication of how these gains are split in other markets.

The sharing of the gains between business and consumers is dependent upon the length of time the efficiency gains are retained by the business before being removed from allowable costs.

Consider the two extreme cases. In the first, the business is allowed to keep efficiency gains in perpetuity. This is the base case. Ignoring the issue of measuring and verifying efficiency gains, if the business generated a genuine efficiency gain, this efficiency gain would be quarantined from any future cost forecasts. The other extreme case would be for all unanticipated efficiency gains to be retained by the business for only the current year and then returned to consumers through lower prices in subsequent years.

It is a simple matter to calculate the percentage of the total returns retained by the business in present value terms as a fraction of the base case. Table 5 gives these percentages for each of the years 1 through 10 and the base case where the benefits are retained forever.

Table 5 Retention of efficiency gains by business over time (%)

Number of years returns retained	1	2	3	4	5	6	7	8	9	10	∞
Percentage returns retained by business	6.50	12.70	18.40	23.70	28.70	33.40	37.80	41.80	45.70	49.20	100.00

Allowing the business to retain efficiency gains for five years results in a sharing rule of 29% of the efficiency gains going to the business and 71% being returned to consumers. Businesses clearly would argue that retaining around 30% of the efficiency gains is not sufficient. This is the case in a five-year efficiency carryover mechanism. Indeed, in the ESC's 2000 price determination for electricity distribution, it is reported that the businesses submitted that 50/50 sharing rules would be the 'fair' outcome.[21]

[21] Page 90 of ESC 2001 Price Direction.

To get a perspective on the sharing of benefits, consider an unregulated monopolist. Suppose this monopolist developed an efficiency gain that reduced its cost of production. The unregulated monopolist would not retain 100% of the total benefits of this innovation, but would share those benefits with consumers. The reason for this behaviour would be that a profit-maximising monopolist would lower its price because it could profitably seek new customers given the increased margin that the innovation has allowed between price and cost. The monopolist would lower the price as long as the incremental increase in profits from additional customers exceeded the incremental reduction in the margin earned from its existing customers. General results from economic theory indicate that price falls by half of the reduction in costs.[22] Table 5 demonstrates that a 50/50 sharing rule would result from a ten-year quarantine on efficiency gains.

The other extreme is a perfectly competitive market. In a perfectly competitive market, efficiency gains that can easily be duplicated by other businesses provide the business with a transitory benefit that lasts as long as it takes for the its competitors to match the gains.[23] Thus, consumers receive the lion's share of the benefits in a competitive market. Intermediate market structures such as duopolies or oligopolies result in most of the share of efficiency gains accruing to the consumers.

One simple implication is that, if the goal in developing an efficiency carryover mechanism is to 'imitate competition', most of the efficiency gains should go to the consumers. This simple implication ignores a fundamental difference between competitive markets and a regulated monopolist. It is competition that drives the incentive to produce efficiency, even though most of the benefits may accrue to consumers and not to the business. A competitive firm (even one from an oligopoly) faces losses if it does not remain as efficient as its rivals. Market share could be lost and profits will fall. A regulated monopolist does not face competition and hence does not suffer as much as a competitive business would if it failed to be efficient. Thus, it may be the case that the incentive to become more efficient is low and the sharing ratio should be tipped in favour of the business to encourage greater efficiencies.

One solution to this problem is to benchmark efficiency gains. Indeed, a tournament between regulated businesses with respect to efficiency gains could mimic the pressures that competitive businesses face from rivals. If this were the case, sharing rules biased towards the business as opposed to consumers would be unnecessary. The difficulties of benchmarking efficiency gains have been discussed above, but one of the advantages of benchmarking could be that any gains would be transferred to consumers faster, as is observed in competitive markets.

The mechanics of benchmarking efficiency gains across firms are complex, but the implication for sharing is that benefits accrue to consumers much quicker than under alternative approaches for the same level of power of the incentive mechanism.

[22] Since a monopolist prices where marginal cost equals marginal revenue and the marginal revenue curve is on average twice as steep as the demand curve, it is not unreasonable to assume that the price would fall by half of the reduction in marginal costs.

[23] Note that the Commission is assuming that efficiency gains are different from technological advances that are often patentable. Patentability destroys imitability.

2.3.6 Treatment of efficiency losses

One issue that needs to be addressed is whether an efficiency carryover mechanism should be symmetrical; that is, whether the carryover mechanism should treat cost overruns as an inefficient outcome, and penalise the business for these in the same way it rewards the business for beating the forecast cost level. The current regulatory regime treats cost overruns as an inefficient outcome in the sense that the regulatory regime does not guarantee a particular level of profit. If operating costs are higher than expected during the regulatory period, in the absence of increased revenues, the business does not earn its expected rate of return. One exception is the case in which the cost overrun is due to an extraordinary event that triggers a cost pass-through. Other than cost pass-throughs, the business losses when its actual costs exceed the forecast costs, revenue being held constant.

Carrying over the efficiency losses into the next regulatory period penalises the business, just as carrying over efficiency gains rewards it. This strengthens the incentive for the business to produce as efficiently as possible, effectively strengthening the power of the efficiency carryover mechanism. If it is assumed that the business would never knowingly decide to be inefficient, then the source of the efficiency losses would most likely be errors in the forecasting of costs. However, it is conceivable that the business may become less efficient over time, and the question that needs to be addressed is whether the penalty for that inefficiency should carry forward into a future regulatory period.

2.3.7 Problems with operating cost measures

The incentive carryover scheme proposed by the ACCC, which utilises a rolling incentive mechanism, determines efficiency gains based solely on operating costs.[24] The Commission has identified several potential concerns with this approach.

Under the current regulatory approach, efficiency gains are retained for the duration of the regulatory period regardless of their source. A general principle for rewarding efficiency gains should be that only those gains that truly arise from effort undertaken by the business should be rewarded above and beyond the temporary gain the business receives. A perceived efficiency gain that arises due to a reduction in the cost of an input to the production process should not be rewarded, but a new technique that uses fewer inputs to produce the same amount of output should be rewarded.

The downsides of an operating cost-only efficiency carryover mechanisms (that is, those with no efficiency carryover for capital costs) are:

- capitalisation of operating expenses
- magnification of forecasting errors
- potential for manipulation
- interaction with operating cost forecasting

[24] The ACCC has also proposed to evaluate capital costs in an ex ante approach which results in a de facto carryover mechanism for capital cost efficiencies. The Commission in its electricity, gas and water and wastewater decisions has adopted an ex post prudency test for rolling in actual capital expenditure. While the business is earning a return on the forecast capital expenditure during the regulatory period, rolling actual capital expenditure implies that efficiencies in capital expenditure are not retained in subsequent regulatory periods.

The main advantage of focusing on operating costs for determining efficiency gains is the simplicity and ease of calculation. Assuming that actual operating costs can be easily audited and verified after the fact, it is a relatively simple matter to determine the carry-forward adjustments to operating costs.

Capitalisation of operating costs

The Commission has identified two possible issues relating to capitalisation of operating costs with efficiency carryover mechanisms that are calculated on the basis of operating costs only. The first is the possibility of the business claiming operating expenses as capital expenses. The second is that an efficiency carryover mechanism that focuses only on operating costs may encourage substitution from genuine operating costs to capital costs. There is a subtle distinction between these two issues. In the first, the business is claiming costs as capital cost that should be labelled as operating costs. The second involves inefficient substitution from operating costs to capital costs. Although these incentives exist under the current regime, the Commission believes that the introduction of a carryover mechanism may increase them.

A necessary consequence of introducing efficiency carryover mechanisms is that the audit process of a regulated business must be intensified. In its gas, electricity, and water and wastewater decisions, the Commission carefully examined the capital costs of the business over the previous price determination, checking the prudence of capital decisions before agreeing to the capital costs being included in the regulatory asset base. The Commission's examination of historical operating costs was less intrusive than the review of capital costs, under the assumption that there was little incentive for a business to misrepresent its historical costs. If an efficiency carryover mechanism relating to operating costs were introduced, a more rigorous approach would be needed. A detailed audit of historical operating costs would be required. This would need to be done in order to verify that there is no shifting of operating costs into capital costs. The possibility would also exist that operating costs could be shifted across years or underreported in any given year.

The second issue, of the substitution of capital expenditure for operating expenditure, harks back to the criticisms of rate-of-return regulation prevalent in the United States before 1990. More powerful incentives to reduce operating costs than to reduce capital costs, can distort the optimal input decision for the business. This can lead to the over-capitalisation effect (also known as the Averch–Johnson effect). If a business uses two inputs in production, say capital and labour, increasing the incentive to use less labour is akin to increasing the price of labour, thus distorting the optimal input decision towards excessive capital use. This would be very difficult to measure or detect unless a detailed audit were conducted.

One solution is to ensure that equal incentives exist to be efficient in both the level of operating costs and the employment of capital.[25] Balancing these incentives reduces the likelihood of substitution of operating costs for capital costs or the capitalisation of operating costs, but this would not absolve the Commission from doing a thorough audit of operating costs to determine the level of incentive carryovers.

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[25] This, of course, is predicated on the maintenance of the appropriate level of service and no sacrifice of future service levels.

Magnification of forecasting errors

The second area of concern with incentive schemes based solely on operating costs is that the current approach, as applied by the ACCC among others, relies on forecast operating costs. All regulators who calculate an X factor within incentive regulation must forecast operating costs, as such forecasts are needed to determine the X factor regardless of whether straight-line or NPV smoothing is adopted. If there are consistent forecasting errors in future costs, an efficiency carryover mechanism magnifies those errors in the absence of efficiency gains.

Suppose operating costs are forecast to rise by $10 a year due to increased market growth. If actual growth is lower and costs rise by $5 per year, then by the last year of a five-year regulatory period actual operating costs will be $25 less than forecasted operating costs. No real efficiencies have been generated, but the business would carry over up to $25 into the next regulatory period as an efficiency benefit. Of course, with a symmetrical efficiency carryover mechanism, unanticipated losses due to underforecasting of operating costs would have a negative impact on the business. As the regulatory structure stands now, the business bears the risk of forecast errors. Under an efficiency carryover mechanism based on forecast operating costs, future consumers also bear some risk for errors in forecasts. This is due to the fact that if, for example, actual costs were lower than forecast costs then consumers would face higher prices than otherwise expected in the next regulatory period, as the business would be receiving this overforecast of costs as an efficiency carryover.

In the discussion above on the incentives for reducing costs under an operating cost measure, it was stated that the incentive to reduce costs is independent of the level of forecasts. This does not imply that forecasts are immaterial. The point made in the discussion in this section is that the effects of incorrect forecasts of operating costs may be carried into the next regulatory period through an efficiency carryover mechanism.

Potential for manipulation

The third area of concern with an efficiency carryover mechanism based on operating costs is the possibility that it might be manipulated. This can be elucidated by a simple mathematical example of shifting costs between periods.

For the purposes of the example, assume that forecast operating costs are $100 per year. If the business has actual operating costs of $100 per year, there is no incentive carryover.

However, suppose the business's operating costs are $100, $102, $98, $102 and $98 over the five-year regulatory period, noting that average operating costs are $100.[26] This results in a windfall gain to the business, as is demonstrated in Table 6.

[26] Note that this example assumes that the forecast future operating costs are equal to the average of historical operating costs. The ability to manipulate the incentive mechanism may be lessened in this example if the forecast of operating costs were set to the minimum of the operating costs during the first regulatory period. Even if this were the case it would still be possible to manipulate the incentive scheme.

Table 6 Illustration of windfall gain

		Regulatory period 1					Regulatory period 2				
	Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
a	Forecast expenditure	100	100	100	100	100	100	100	100	100	100
b	Actual expenditure	100	102	98	102	98					
c	Underspend/(overspend) (a – b)	0	(2)	2	(2)	20					
d	Incremental efficiency gain/(loss) ($c_t - c_{t-1}$)	0	(2)	4	(4)	4					
	Efficiency carryover from:										
e	Year 1						0				
f	Year 2						(2)	(2)			
g	Year 3						4	4	4		
h	Year 4						(4)	(4)	(4)	(4)	
i	Year 5						4	4	4	4	4
j	Retained efficiencies						2	2	4	0	4
k	Expenditure used for pricing purposes						102	102	104	100	104

As can be observed in Table 6, simply shifting costs across years can create a net benefit to the business. If actual expenditure were $100 each year, no carryover would exist and the expenditure used for pricing purposes in regulatory period 2 would be $100 in each year. However, because the expenditure used for pricing purposes in regulatory period 2, row (k), is greater than $100 in years 6, 7 and 8, the business has gained a net benefit as a result of shifting costs between years.

This example demonstrates that it is not difficult to construct a scheme that can manipulate an incentive mechanism.[27] In fact, the more complex the incentive mechanism becomes, the more difficult it will be to detect manipulation.

The Commission is concerned that efficiency carryover mechanisms lend themselves to the opportunity to be manipulated and that the more complex a scheme, the more difficult this manipulation may be to detect.

Interaction with operating cost forecasting

There is an implicit argument that the introduction of an efficiency carryover mechanism provides a continuous incentive to achieve efficiencies across the regulatory period. However, if operating cost forecasts for the next regulatory period are based on actual operating costs during the current regulatory period, the incentive to achieve efficiencies towards the end of the current regulatory period is still reduced.

Consider an example. If the business is able to achieve an efficiency saving of $5 in the first year of a regulatory period, it gets a benefit of $30. The $30 consists of the $5 saved through the increased efficiency and the efficiency carryover of $5 for five years ($25). In effect, the incentive

[27] In the economics literature on mechanism design, manipulability is defined as inducing truth telling. An incentive mechanism is nonmanipulable if it induces the agent (the business in this case) to truthfully report its private information (its costs). The classic result in mechanism design is the Gibbard-Satterthwaite Theorem which gives the conditions under which an incentive mechanism can be manipulated. Mas-Colell, A., Whinston, M., and Green, J., *Microeconomic Theory*, Oxford University Press, 1995 contains a thorough mathematical presentation on incentive mechanisms including the Gibbard-Satterthwaite Theorem. In terms of efficiency carryover mechanisms one possible means of manipulating the mechanism (i.e. not reporting the truth to attain a benefit) would be to shift cost between periods.

to achieve efficiencies is $30. However, if the efficiency saving of $5 is achieved in the final year of regulatory period 1 then the incentive to achieve the efficiency saving is not $30 but $5. In the example in Table 3, this consists of the reduction in expenditure from $90 to $85 in period 5. Table 7 reproduces Table 3, with the exception of actual expenditure in year 5 of $85, which has been changed to $90. The resulting differences from figures in Table 3 are highlighted in bold.

Table 7 Operating cost efficiency gains

		Regulatory period 1					Regulatory period 2				
	Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
a	Forecast expenditure	100	100	100	100	100	**90**	**90**	**90**	**90**	**90**
b	Actual expenditure	100	90	95	90	**90**					
c	Underspend (Overspend)	0	10	5	10	**10**					
d	Incremental Efficiency Gain (Loss)	0	10	(5)	5	**0**					
	Efficiency carryover from:										
e	Year 1						0				
f	Year 2						10	10			
g	Year 3						(5)	(5)	(5)		
h	Year 4						5	5	5	5	
i	Year 5						**0**	**0**	**0**	**0**	**0**
j	Retained Efficiencies						**10**	**10**	**0**	**5**	**0**
k	Expenditure used for pricing purposes						100	100	90	95	90

Note that the same expenditure used for pricing purposes results as in Table 3. This lack of change to the expenditure used for pricing implies that there is no gain from reducing costs in year 5 carried through to years 6 through 10. The incentive is not $30, as in Table 3, because the result of the efficiency gain achieved in year 5 is that forecast operating costs are reduced to $85 (from $90) for years 6 through 10. This has the effect of reducing allowed operating costs by $25 over the length of regulatory period 2, effectively cancelling out the impact of the efficiency carryover of $5 for each year of that period. The example demonstrates that the incentive effects of efficiency carryover mechanisms are reduced if actual costs are used to forecast future costs.

2.4 Options for efficiency carryover mechanisms

The Commission has identified a set of possible options for efficiency carryover mechanisms that could be adopted as a 'paper trial' beginning 1 July 2005, or fully adopted at the beginning of the next regulatory period. Included among the options is the possibility of adjusting the form of regulation used in setting the price path, rather than adopting an explicit efficiency carryover mechanism. The Commission is seeking responses from all interested parties on these options. The options the Commission has identified are to:

- retain the status quo
- change the form of regulation
- adopt a mechanism for operating costs only
- adopt a mechanism for both operating costs and capital costs.

Although these are the main options identified thus far, the Commission would also welcome submissions on alternative options.

2.4.1 Retain the status quo

The Commission defines 'retaining the status quo' as not adopting any direct efficiency carryover mechanism or changing the Commission's approach to regulation. There are valid reasons for taking this approach. The Commission's current methodology for regulation (that is, the NPV smoothing approach to calculating the X factor, the 'ex post' prudence test for capital expenditures and the forecasting of operating costs) is relatively straightforward and requires much less regulatory oversight, auditing and compliance checking than would be necessary even for an efficiency carryover mechanism based only on operating costs. There is a definite benefit to society from reducing the regulatory burden and keeping the regulatory process as simple as possible.

Another reason for retaining the status quo is that there is no evidence from detailed empirical studies demonstrating that efficiency carryover mechanisms generate genuine efficiency gains. It has also not been demonstrated that there is a great need for, or the possibility of, future efficiency gains. Aside from the Pacific Economics Group study performed in Victoria, there has been very little detailed research on the current efficiency levels of regulated businesses in Australia. As discussed above, it may be the case that the incentive effects of efficiency carryovers may be reduced by a cutback in future forecasts of operating costs.

If there are significant efficiency gains that would not be realised without proper incentives, retaining the status quo could result in a long-term diminution of social welfare. This would arise if the relevant businesses made insufficient effort to achieve efficiencies.

> The Commission invites comment on the merits of retaining the status quo as the most appropriate option to adopt.

2.4.2 Change the form of regulation

The next alternative would involve not adopting a direct efficiency carryover mechanism but rather modifying the Commission's current approach to regulation to induce the business to achieve greater efficiencies. Possible alterations could include increasing the length of the regulatory period, moving to straight-line smoothing for calculating the X factor (as used by IPART), or moving to an 'ex ante' approach for capital expenditure.

Currently, the length of the regulatory period is four years for water and wastewater, five years for electricity distribution and five-and-a-half years for gas distribution. All three reviews were completed during 2004; therefore, water and wastewater is due for review in 2008, electricity in 2009 and gas in 2010.

The current Australian standard for the length of time between regulatory reviews is five years. While the Gas Code is explicit about five years as the maximum without proper justification, the National Electricity Code merely states that a minimum of three years is necessary. The *Independent Competition and Regulatory Commission Act 1997* (ICRC Act) and the *Utilities Act 2000* (Utilities Act) are silent on the length of the regulatory period for water and wastewater. Increasing the length of the regulatory period from five to seven years, for example, increases the incentives for the business to engage in efficiency-seeking behaviour. The potential downside is that the longer the regulatory period, the further into the future costs must be forecast. If one accepts that the magnitude of forecasting error increases with the duration of the forecast, increased forecasting periods expose the business to additional risk. The consensus among regulators is that five years balances these benefits and costs.[28]

In addition to changing the length of the regulatory period, the Commission could also change its approach to regulation. For example, rather than calculating the X factor using NPV smoothing, the Commission could move to calculating the X factor using straight-line smoothing, as used by IPART. The Commission could also change its approach to regulating capital expenditure to an ex ante approach, as opposed to the current ex post approach. Both these changes might result in additional incentives to achieve efficiencies.

> The Commission invites comment of the possible adopting of an alternative form of regulation as a means to ensure that the appropriate incentives for efficiency are provided.

2.4.3 Adopt an operating cost mechanism

A further option would be to adopt an efficiency carryover mechanism that applies to operating costs only. If this approach were to be adopted, there are several options that could be considered. First, a choice would need to be made between basing the mechanism solely on the difference between actual and forecast operating expenditures, and basing it on estimates of actual productivity changes (calculated in a similar way to the Pacific Economics Group study of Victorian distribution businesses).

If an efficiency carryover mechanism were based on actual and forecast operating expenditures, the Commission would need to consider the methodology used to reward carryover credits. The ACCC and ESC base their schemes on incremental efficiencies but, as the QCA has pointed out, an incentive carryover scheme could be based on total efficiencies generated during the past regulatory period and phased out during the current regulatory period. Both schemes potentially provide additional incentives for the businesses to become more efficient.

Additional issues that need to be addressed include the appropriate sharing rule and the treatment of efficiency losses. The Commission is open for discussion on these topics as well.

> The Commission invites comment on the possible use of an operating cost carryover mechanism and how this might be applied.

2.4.4 Adopt an operating and capital cost mechanism

If an incentive mechanism were adopted for operating costs, the Commission would have to decide whether to adopt a mechanism for capital expenditure as well.

The ESC in Victoria has adopted a capital cost based scheme as well as an operating cost scheme. In this situation, operating and capital cost efficiency gains are treated differently. As stated above, operating cost efficiencies are calculated as the reduction in the level of recurrent operating

[28] There is no academic research to support five years as opposed to six or four or even ten years.

expenditure compared to the forecast for that year. Capital cost efficiency gains are calculated as the regulatory weighted average cost of capital multiplied by the reduction (or increase) in capital expenditure against the capital expenditure forecast for that year.

The Commission invites comment on the use of a capital cost efficiency mechanism and how this might be used in conjunction with the regulatory process adopted.

3 Service incentive schemes

3.1 Aims of service incentive schemes

In the ACT, as in other jurisdictions, distribution networks for electricity, water and wastewater, and gas supply are provided under monopoly conditions. The Commission regulates these services using an incentive-based regulatory approach that includes a CPI minus X adjustment process. One of the main goals of this approach is to create an incentive for the regulated business to become more efficient over the regulatory period.

Another aspect of regulation with which the Commission is involved is the monitoring of compliance with service standards. In a ‘competitive’ market there is an incentive for a business to ensure efficient levels of service. A reduction in service standards without a corresponding reduction in price may lead to reduced market share and a subsequent reduction in profits. Conversely, an increase in service levels may lead to increased prices and profits.

However, in a regulated distribution market where prices are calculated to cover costs and provide a ‘fair’ return on capital, the incentive to maintain or increase service standards is reduced because there is no direct link between revenue and service levels. It is possible that a distributor could increase profits by reducing expenditure incurred in maintaining adequate service levels.

In response to this reduced incentive to maintain service standards, the Commission monitors the compliance of distributors against service standards that are included in the ICRC Act, the Utilities Act and various industry codes. If the distributor fails to meet these requirements, it may be liable to compensate consumers through ‘rebatable performance standards’.

Forms of service incentive scheme, with a link to revenues, have been adopted in South Australia, Victoria and Tasmania. Schemes have been proposed but not adopted in New South Wales and Queensland. These schemes make adjustments to revenue via either a direct revenue adjustment or by adopting an ‘S’ factor.

A direct revenue adjustment rewards or penalises the regulated business by directly adjusting allowed revenue in response to differences between the expected or target level of service and the actual level of service.

If an S factor is adopted, the annual price adjustment factor of (1 + CPI – X) is expanded to include an adjustment for service levels, and thus becomes (1 + CPI – X + S).

The aim of introducing a service incentive scheme, via either a direct revenue adjustment or an S factor, is to increase the incentive for a regulated business to improve its level of service by increasing the link between service levels and revenues.

3.2 Service incentive schemes in other jurisdictions

3.2.1 Australian Competition and Consumer Commission

The ACCC has adopted a service incentive scheme for electricity transmission networks in both South Australia and Victoria.[29]

The scheme adopted in South Australia in regard to the transmission network revenue cap for 2003 to 2007–08 has a maximum revenue adjustment of 1% of allowed revenue. That is, the maximum reward or penalty is capped at 1% of allowed revenue per year, and the scheme can therefore be thought of as having upper and lower 'bounds'. The ACCC believed that 1% of revenue at risk currently provides a large enough financial incentive for the transmission network, but states that there is scope to increase the revenue at risk once greater experience in dealing with the scheme has been gained both by the ACCC and by the regulated business.

The 1% of revenue at risk is based on the performance of the business against four indicators. These four indicators are individually weighted and performance is measured against targets based on historical data.

The scheme adopted is also non-symmetrical, in that the incentives for improvements in performance are greater than the penalties for declining performance. The ACCC states that this recognises that the network provider is currently providing a high level of service.

Another feature of the scheme is that for some indicators a 'deadband' exists. For example, in relation to outage duration a deadband exists from 100 to 110 minutes per year. This means that there is no reward or penalty associated with achieving a performance result within this range. The business is only rewarded for reducing the outage duration per year to less than 100 minutes, and is only penalised if the outage duration is more than 110 minutes.

Any reward or penalty is calculated on a calendar-year basis, is simply added to or subtracted from the maximum allowed revenue for the following financial year, and is only retained for one year.

The scheme adopted in Victoria for transmission network revenue caps from 2003 to 2008 is not identical to that adopted in South Australia, but has similar characteristics. The scheme has seven instead of four indicators and is capped at 0.5% of allowed revenue instead of 1%.

Both schemes are non-symmetrical, and bounds and deadbands also exist for each. Revenue adjustments are also made in a similar manner.

3.2.2 Victoria

The Essential Services Commission introduced an S factor in its electricity distribution price determination for 2001–05.[30] The S factor is calculated by multiplying each year's *performance gap* for each *key indicator* by an *incentive rate* for that key indicator.

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[29] Australian Competition and Consumer Commission, *South Australian transmission network revenue cap 2003-2007/08,* Decision, December 2002. See also Australian Competition and Consumer Commission, *Victorian transmission network revenue cap 2003–2008,* Decision, December 2002.

The performance gap is the difference between the actual improvement and the target improvement in the key indicators listed below. A positive performance gap indicates that an increase in performance has occurred, and the distributor is rewarded with an increase in prices.

The key indicators of an improvement in service levels are calculated separately for the three network types (CBD, urban and rural) and consist of the following measures of service:

- unplanned interruption frequency (known as SAIFI, or system average interruption frequency index)
- unplanned interruption duration (CAIDI, or customer average interruption duration index)
- planned minutes off supply (SAIDI, or system average interruption duration index).

The incentive rates are based on the marginal cost of improvements required to meet service targets, with the indicators weighted according to consumer preferences. Improvements above the minimum standard weighted by consumer preferences attract the additional price adjustment known as the S factor.

The Victorian scheme also includes guaranteed service level payments.

3.2.3 New South Wales

In its final report on NSW electricity distribution pricing from 2004–05 to 2008–09, the Independent Pricing and Regulatory Tribunal decided against the introduction of an S factor that was linked to monetary incentives for service quality.[31] Instead, the tribunal has introduced a 'paper trial' S factor for the length of the regulatory period.

As well as the paper-trial S factor, IPART has stated that it will continue to collect and publish performance statistics on service standards and, subject to ministerial approval, expand the set of guaranteed customer service standards.

The paper-trial S factor focuses on reliability measures. IPART collects data on SAIDI, SAIFI and CAIDI. Data for MAIFI (momentary average interruption frequency index, or the average number of momentary interruptions per customer) are currently limited, but will be collected and included in the paper trial to the extent that this is possible in the coming years.

IPART originally intended introducing monetary incentives for the scheme from July 2006 but decided against this, instead opting for a paper trial because of concerns raised by distributors about the accuracy and availability of data. A primary concern was the possible creation of perverse incentives. The proposed incentive rates were based, due to data constraints, on the distribution system as a whole. There were concerns that such a scheme could lead distributors to focus on 'easy wins' rather than on improving the reliability of the worst performing parts of the network. Other concerns were that variation in annual performance standards might be outside the control of distributors and that data accuracy improvements might lead to a worsening of reported reliability levels because of increased capacity to record outages. Based on these concerns, monetary incentives were not adopted.

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[30] Office of the Regulator-General, Victoria, *Electricity distribution price determination 2001–05, Volume 1 – Statement of purpose and reasons,* September 2000.
[31] Independent Pricing and Regulatory Tribunal, *NSW Electricity distribution pricing 2004/05 to 2008/09*, Final report, June 2004.

3.2.4 Queensland

In April 2004, the Queensland Competition Authority released its final decision on a service quality incentive scheme for electricity distribution services in Queensland.[32] In that decision, the QCA stated that it would develop a service quality incentive scheme with each distributor, to be incorporated into the regulatory arrangements commencing on 1 July 2005.

However, in the draft determination released in December 2004, the QCA decided against the introduction of an S factor. A review of the distributors' current level of service quality determined that current levels of service were less than satisfactory. The review also noted that there was a lack of minimum service standards.

The QCA stated that an implicit assumption of a service quality scheme is that the current level of service is 'about right' and that, as the distributors were currently below a satisfactory level, the introduction of an S factor would be inappropriate.

Rather, the QCA believes that the commitment to set compulsory minimum service standards which are tied to distribution licences should ensure that distributors have sufficient incentive to increase service levels.

Despite the fact that the scheme proposed by the QCA has not yet been adopted, a brief description of the scheme may prove useful for comparison.

The proposed Queensland scheme involves the distributor submitting forecast operating and capital cost building blocks for three scenarios:

- tier (a) — maintaining the current service quality level
- tier (b) — improving service quality, aimed at delivering an agreed average level of service (which may be somewhat higher than current service levels)
- tier (c) — specific additional commitments, aimed at improving service quality in specific parts of the network or addressing identified customer requirements, and including clearly identified service quality outcomes.

No rewards or penalties would apply to achieving outcomes under tier (a). However, a contract between the QCA and distributors would identify the service quality outcomes to be achieved under tiers (b) and (c) by the end of the regulatory period and the rewards and penalties to apply to success or failure to meet these outcomes.

3.2.5 South Australia

In its 2000–01 electricity distribution decision, the Essential Services Commission of South Australia was the first regulatory body in Australia to introduce some form of service incentive scheme. Under this 'performance incentive' scheme, maximum average distribution revenue was increased or decreased depending on actual performance measured against baseline targets for:

[32] Queensland Competition Authority, *Service quality incentive scheme for electricity distribution services in Queensland,* Final Decision, April 2004.

- SAIDI
- SAIFI
- CAIDI
- time to restore supply to not less than 80% of interrupted customers
- operating cost per customer.[33]

For the following regulatory period (2005–10), ESCOSA reviewed the scheme and decided to focus attention on improving the reliability of service to the 15% of consumers who were worst served.[34] Service measures are based on two indicators: the first indicator is based on total duration of interruptions to supply received by the worst served 15% of customers, and the second is based on the percentage of telephone calls responded to within 30 seconds.

Similarly to the original scheme, points are awarded (positive or negative) based on the performance indicator results compared to the selected benchmark. A total score is calculated and is applied when calculating allowable revenue.

The Commission notes that operating costs per customer were not included in the revised service incentive scheme.

The revised scheme also incorporates guaranteed service level payments for customers whose service levels fall below a certain threshold.

3.2.6 Tasmania

In its 2003 decision on electricity prices, the Office of the Tasmanian Energy Regulator incorporated a service quality incentive scheme for Aurora's distribution services.[35] In this decision, OTTER included incentives for SAIDI (the duration of outages) and SAIFI (the number of outages). Baseline performance targets for each were calculated using historical performance, and the rewards or penalty payments were based on customers' willingness to pay, which was determined from a customer value study. The total bonus or penalty amount is capped at $1.6 million, which represents approximately 1.25% of Aurora's annual revenue requirement.

Prices are regulated as maximum annual revenues on a per calendar year basis, whereas performance reporting is based on the financial year beginning 1 July. Any reward or penalty payment is calculated against the baseline performance targets for a financial year, and the adjustment is made to maximum annual revenue in the following calendar year price adjustment. The first revenue adjustment in the regulatory period took place on 1 January 2005 for performance during the year from 1 July 2003 to 30 June 2004.

The Tasmanian scheme also incorporates guaranteed service level payments.

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[33] Essential Services Commission of South Australia, *Electricity Distribution Code,* January 2003.
[34] Essential Services Commission of South Australia, *Draft 2005–10 Electricity distribution price determination Part A – statement of reasons,* November 2004.
[35] Office of the Tasmanian Energy Regulator, *Investigation of prices for electricity distribution services and retail tariffs on mainland Tasmania Final report and proposed maximum prices*, September 2003.

3.3 Issues in designing service incentive schemes

3.3.1 Is a service incentive scheme required in the ACT?

It is an implicit assumption of the service incentive schemes proposed and adopted in other jurisdictions that there is a need to improve service quality. In order to achieve this, a service incentive scheme is developed which creates a link between revenue and service quality, in an attempt to increase the incentive for the business to improve service quality.

However, before a service incentive scheme is adopted in the ACT it is first necessary to ask the question: Is a service incentive scheme appropriate for the ACT?

Current service requirements in the ACT

Currently, performance and supply standards in the ACT are set under the ICRC Act, the Utilities Act and various industry codes, the design of which is such that the targets and performance standards are consistent. The Commission's role is to monitor compliance against the targets and standards. The Commission releases an annual compliance and performance report that sets out how the relevant utilities have performed.

It should be noted that the nature of some of the performance standards set out in the Consumer Protection Code is such that customers may be rebated a predetermined amount if certain performance criteria are not met. These are referred to as 'rebatable performance standards' and are similar to the guaranteed service level payments that exist in other jurisdictions.

What are current service levels in the ACT? Are these service levels adequate?

Distribution utilities in the ACT generally have a good record of meeting the required performance standards. Reviews of the performance of distribution utilities against the relevant performance standards are contained in the Commission's 2001–02 and 2002–03 compliance and performance reports (the 2003–04 reports will be released shortly).

The reasonably high level of performance has been achieved despite minimal penalties applying for non-compliance with the standards. For example, there are no penalties associated with failure to meet the minimum supply reliability targets as set out in the Electricity Distribution (Supply Standards) Code. In regard to rebatable performance standards, consumers are required to lodge an application against failure to meet these standards. In reality, consumers appear to be unaware that such standards exist, as few claims are made. The Commission is currently empowered to improve the incentive value and effectiveness of the current arrangements by changing the extent of the penalties that apply and the effectiveness of their application to underperformance or non-compliance.

Despite this lack of financial incentives to meet service standards, the willingness-to-pay study conducted on behalf of ACTEW (the distributor for water) and ActewAGL (the electricity and gas distributor) reveals a high level of satisfaction with the standard of service received by customers in the ACT. For residential customers, 95% reported electricity and water supply to be 'good' or better, and 98% reported natural gas supply to be 'good' or better.

In the Commission's recent decision on water and wastewater services, the Commission noted that ACTEW's 'current service standards' in many cases exceed the minimum standards contained in the joint venture agreements.

Also, in its review of electricity distribution pricing, the Commission noted that ActewAGL currently meets or exceeds all its service standard requirements.

The Commission also notes that ActewAGL in many cases exceeds the minimum standards in relation to gas distribution. This is another indication that the current level of service in the ACT is of a high standard.

Based on the high level of satisfaction with services and performance against standards, it appears that the current level of service received by consumers in the ACT is of a high quality. Due to the current high level of service, the introduction of some form of service incentive scheme may not have as great an impact on service standards as it would if there were an urgent need to improve service levels.

Achieving an 'efficient' level of service

Theoretically, the 'efficient' level of service is that level at which the gain to consumers from an increase in service levels equals the cost to the business of achieving the increase. An explicit aim of any service incentive scheme should be to achieve such an outcome.

The willingness-to-pay study reveals that a high proportion of ACT residents rate the utility distribution services they receive as being of a 'good' or better standard. However, the study does not shed any light on whether the current level of service is at an efficient level. It is possible that the current service level may be too low, too high or at an efficient level. Calculating the actual efficient level of service is extremely complex.

As stated above, an aim of any service incentive scheme should be to achieve an outcome in which the cost of achieving an increase in service equates to the benefit from the increase in service quality. A way to achieve this outcome, assuming that the current level of service in comparison with the efficient level is unknown, is to allow service levels not only to rise but also to fall. This raises the issue of symmetry in the design of any service incentive scheme.

A symmetrical scheme allows both increases and decreases in service levels, and equates the rewards and punishments for both.

Generally, a symmetrical scheme provides financial incentives for increases in service levels but provides financial disincentives for reductions in service levels. Initially, this appears to create a situation in which, if service levels are currently above the efficient level, there will be no incentive for the business to reduce these levels to the efficient level. However, it is necessary to understand that service levels are dependent upon costs. Because of this, the design of any service incentive scheme should ensure that any cost savings obtained by reducing service levels to the efficient level are greater than the financial penalties imposed by the scheme for reducing levels, until an efficient level of service is achieved.

The opposite is also true, in that the increases in costs incurred to improve service levels should be outweighed by the reward obtained from the service incentive scheme, up to the point at which efficient service levels are achieved.

Therefore, it is necessary to calibrate any service incentive scheme with costs so that the efficient level of service and costs can be achieved.

A symmetrical scheme has been adopted in Victoria. The scheme adopted in Tasmania is also symmetrical but has upper and lower bounds such that the impact cannot exceed $1.6 million.

The proposed scheme in NSW has a similar arrangement which caps the value of the S factor to +/–0.005. The adoption of upper and lower bounds may act to provide an increased level of certainty for the business in terms of revenue projections. However, upper and lower bounds may also hinder the ability of a scheme to achieve an efficient level of service if the current level is outside the bounds specified.

An alternative is to adopt a non-symmetrical scheme. A non-symmetrical scheme may either:

- only reward or punish a business for changes in service quality, as opposed to the possibility of both

  or

- reward or punish a business for changes in service quality by differing degrees.

A scheme such as this may be designed in an attempt to create differing incentives for the business to achieve changes in service quality. For example, a scheme could be designed only to reward a business for service quality improvements, and not to penalise it for decreases in service. It is also possible to design a scheme with a lower, but not an upper, bound. This would act to minimise the impact of a fall in service quality on the business's revenues but allow possible increases in revenue in line with increases in service quality.

The possible adoption of upper and lower bounds also relates to whether the scheme involves any exclusions. Exclusions relate to the events used when calculating movements in service standards between years. For example, if certain events are not excluded from the calculation of service standards, there may be an argument in favour of including either upper or lower bounds on the possible impact of the service incentive scheme to minimise the impact of events beyond the control of the business. A discussion of exclusions is included later in this discussion paper.

Increase in regulatory burden

Another issue that must be addressed is that of increased regulatory burden due to the adoption of a service incentive scheme. If the increase in costs caused by the introduction and inherent complexity of a service incentive scheme outweigh the potential benefits of the scheme, the adoption of the scheme may in fact lead to a reduction in welfare.

Therefore, the need to introduce some form of service incentive scheme should be carefully considered. If it is decided that the benefits of such a scheme outweigh the costs of its increased complexity, the scheme should still be designed to be as simple as possible.

Manipulation

Another desirable feature of any scheme is that it should create clear incentives for the business to improve service standards. As demonstrated in Section 2.3.7 of this paper, it is possible to manipulate schemes in such a way that a business can 'game' the system. Any service incentive scheme should be designed in such a way as to eliminate the possibility of gaming.

Who pays for a service incentive scheme?

A conclusion of the willingness-to-pay study is that customers may be willing to pay more for increased reliability. However, the opposite is also true: customers may be willing to accept a decrease in reliability for a reduction in prices.

It is important to recognise that consumers end up paying for any improvement in service quality through an increase in prices. While intuitively this sounds appealing, if a large proportion of customers are currently satisfied with the level of service they receive, as may be concluded from the willingness-to-pay study and the performance of distribution utilities against the relevant performance indicators, is it appropriate to 'force' an increase in service and prices on them?

3.3.2 Possible indicators

If it is decided that some form of service incentive scheme is required in the ACT, a range of possible indicators could be used for calculating performance. As discussed in Section 3.2, different jurisdictions have adopted different measures of performance. The performance indicators adopted in relation to electricity distribution (although similar indicators exist for other utility services) generally relate to reliability of supply, quality of supply or customer service.

Reliability of supply

Reliability of supply is one of the most important distribution service characteristics. The most common performance measures in relation to reliability of supply are

- *average interruption frequency* (SAIFI, or system average interruption frequency index)[36]
- *average interruption duration* (CAIDI, or consumer average interruption duration index)[37]
- *average minutes off supply per consumer* (SAIDI, or system average interruption duration index)[38]
- *average number of momentary interruptions per consumer* (MAIFI, or momentary average interruption frequency index).[39]

Perfectly reliable supply means that supply is available whenever a customer seeks it. In practical terms, supply is never perfectly reliable. Supply may be unavailable to customers for a variety of reasons and regardless of the amount of money that is spent on the network to ensure reliability. External or unexpected events may cause service interruptions or outages, as may maintenance or other forecast events. Outages are generally classified into planned or unplanned outages.

Planned outages occur when the distributor disconnects supply to carry out maintenance or other works on the network. Planned outages are subject to requirements that the distributor give notice to consumers.

Unplanned outages occur as a result of storms, lightning, tree branches falling on lines, birds, motor vehicle accidents and vandalism. They can also be the result of equipment failures, such as temporary surges, or inadequate maintenance.

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[36] SAIFI – the total number of planned or unplanned distribution consumer interruptions divided by the total number of connected distribution consumers averaged over the calendar year, excluding momentary interruptions of less than one minute duration.
[37] CAIDI – the sum of the duration of each unplanned distribution consumer interruption (in minutes) divided by the total number of unplanned distribution consumer interruptions in that year, excluding momentary interruptions.
[38] SAIDI – the sum of the duration of each planned or unplanned distribution consumer interruption (in minutes) divided by the total number of connected distribution consumers averaged over the calendar year.
[39] MAIFI – the total number of momentary distribution consumer interruptions (less than one minute) divided by the total number of connected distribution consumers averaged over the calendar year.

Quality of supply

Service quality is about the characteristics of the energy supplied, rather than about the physical properties of the network that affect availability. Not all electricity supplied is the same: the frequency, density and intensity of supply may all vary.

Minor variations may not be noticeable, but other levels of variation may be associated with minor impacts such as flickering lights or temporary lowering of brightness. These impacts are not necessarily damaging, but are short-duration inconveniences that have a bearing on perceptions of value for money.

More serious variations in supply quality can have substantial and costly effects on household and industrial equipment. Electric motors may be damaged, and plant and equipment may either fail or cease to operate, which in some circumstances may cause risks to consumer safety.

Variations in supply quality are usually caused by:

- surges — short-term voltage increases (eg sudden brightening of lights, may damage computers or other electrical equipment, cause overloads)

- sags — short-term voltage reductions (eg dimming of lights, may cause equipment to cease operating or plant to shut down)

- harmonic distortion — disruptions to the frequency waveform of the electricity in the network (use of heavy equipment in industrial installations or TV or computers in homes may produce distortions; electronic equipment is more susceptible to harmonic distortions than electromechanical equipment).

These indices are measured in the ACT and reported annually in the compliance reporting process. However, unlike Victoria and NSW, the ACT does not attach mandatory automatic financial penalties to the incidence of these service-quality events. Managing and controlling surges, sags and harmonic distortions is very difficult and consequently is an area where standards for performance and effective compliance reporting with attached rewards and penalties need to be carefully considered and implemented.

Consumer service

All jurisdictions in the electricity market have requirements, whether in codes or regulations, for distributors to provide timely responses to consumer enquiries and complaints, and attendance at customers' premises to make connections and disconnections or to address service faults or failures. These requirements are important to consumers and have a cost implication. The ACT has such standards set out in the Consumer Protection Code and in the standard customer contracts between franchise customers and the distribution business, and requires that annual reports be provided on these measures.

There is, however, no system of rewards for good service or penalties for persistent failures. Improving performance on these indices is important to improving overall service to consumers. For retail supply, competition in the market and the threat of losing market share are incentives for maintaining performance standards when dealing with customers. For distribution businesses, shielded by their monopoly position, the regulator needs to ensure that a substitute pressure for continued good performance is provided by regulated standards that have some real consequences for failure and benefits for service improvements.

In South Australia, ESCOSA in its draft 2005–2010 electricity distribution price determination has included customer service in its service incentive scheme. ESCOSA proposes to introduce a measure based on the percentage of telephone calls responded to within 30 seconds. The ESC in Victoria has also proposed to include a measure of call centre performance for its 2006–10 electricity distribution price review.

3.3.3 How is a service incentive scheme applied?

There are two closely related issues dealing with the calculation of a service incentive scheme. The first is how the scheme is applied. This refers to whether the scheme affects revenue directly or indirectly, through an S factor. The second issue is how the resulting scheme is calibrated and calculated.

The service incentive scheme could involve a direct revenue adjustment. This is the simplest method, as it requires less calibration. The mechanism operates quite simply. If the business beats the expected or target outcomes, an amount is added to the revenue requirement before prices are determined. If the scheme is symmetrical, there will be a penalty for not meeting the target. Calculation of the direct revenue adjustment is straightforward. The business gets an increase (or decrease) in its revenue requirement directly proportional to the level of service. There are two possible modifications. There could be an acceptable service band rather than a target, with increases or decreases in revenue occurring only for performance outside the band, or there could be a cap on the amount of revenue at risk. In the latter case, the business's potential losses from deteriorating levels of service are limited. This links back to the issue of whether or not to exclude service outages caused by exceptional events such as storms and other natural disasters from the service incentive scheme. Tasmania has adopted a direct revenue adjustment for its service incentive scheme and has also adopted upper and lower bounds on the revenue adjustment.

The other approach for applying the service incentive scheme is to calculate an S factor. This S factor is then included in the adjustment mechanism used in the pricing methodology. Currently, under the Commission's form of regulation adopted in electricity and water and wastewater, maximum allowable average revenue (MAAR) adjusts each year by CPI minus X, where X has been predetermined in the Commission's determination. MAAR in year t is equal to average revenue in year $t - 1$ multiplied by (1 + CPI – X). An S factor is included by expanding the adjustment factor to (1 + CPI – X + S).[40] The details of how the S factor is calculated are in the next section.

3.3.4 How is a service incentive scheme calculated?

In this section, the Commission first details an S-factor approach. Calculating the S factor of a service incentive scheme is not straightforward, as several concerns need to be addressed. Indeed, this is evidenced by the fact that no two of the other regulatory jurisdictions in Australia have adopted identical schemes. This provides the Commission with no guidance, which is not the case with the efficiency carryover mechanism.

[40] The ESC in Victoria uses the adjustment factor of (1 + CPI)(1 - X)(1 + S) rather than (1 + CPI – X + S). When the CPI, X factor and S factor are small in terms of percentages these two approaches yield virtually the same adjustment.

The basic building blocks used for calculating an S factor in the service incentive scheme are the actual level of service (as measured by indicators described previously) and target levels of indicators determined by the regulator.[41] The difference between the target and the actual level of service is termed the 'gap'. There are three reasonable outcomes on which the S factor can be based. The S factor could be based only on the gap, on the incremental change in the actual indicators, or on the incremental change in the gap.[42] This is represented in the following three equations:

$$S_t = s(TAR_{t-2} - ACT_{t-2}), \qquad \text{Equation 3.1}$$

$$S_t = s(ACT_{t-3} - ACT_{t-2}), \text{ and} \qquad \text{Equation 3.2}$$

$$S_t = s(GAP_{t-2} - GAP_{t-3}). \qquad \text{Equation 3.3}$$

where

S_t is the S factor for period *t*,

s is the scaling parameter,

TAR_t is the target service indicator for period *t*,

ACT_t is the actual level of the indicator for period *t*, and

$GAP_t = TAR_t - ACT_t$ is the difference between the target and the actual in period *t*.

The first thing to note is the level of the time subscripts in the three equations. There is a two-year lag between the actual level of the indicator and the year in which it is applied. This is because one cannot determine the outcome of the indicators until after the close of a year, and they cannot be applied until the following year. The other interesting point to note is that, if the targets do not change over time, the equations 3.2 and 3.3 are identical. That is, the incremental change in the gap is simply the incremental change in the actual levels of the indicators.

Basing the S factor solely on the difference between the target level and the actual level as represented in equation 1 has the potentially adverse outcome of causing a permanent increase in prices for a transitory increase in service levels. To understand this, first recall the Commission's approach to the CPI minus X adjustment factor. Suppose that the business beats the target in only one year and its indicator is exactly equal to the target in all other years. Two years later, due to the delay in rewarding service changes because of observational requirements, the MAAR will rise by S% above what it would have been if there had been no transitory increase in service. This would continue in the next year as well, as the MAAR would adjust by (1 + CPI – X) and would still be roughly S% higher than if the transitory service improvement had never happened. The conclusion is that basing the X factor on only the most recent gap, as demonstrated in equation 3.1, implies that transitory service improvements will result in permanent MAAR increases and ultimately in price increases. This is contraindicated, as permanent increases in service should be rewarded permanently but temporary increases in service should be rewarded at most temporarily.

[41] To begin the analysis, assume that there is a single measure of service and lower numbers of this measure indicate better service outcomes.
[42] It appears that IPART uses the first, OTTER the second and ESC the third.

The calculation of the S factor based on incremental changes results in transitory increases in service levels generating transitory changes in the MAAR. This occurs because, while the S factor will be positive when service levels improve, there will be a corresponding reduction in the MAAR the next year because the incremental effect will be negative. Thus, there would also be a transitory increase in relative prices. This is a potentially desirable property of any service incentive scheme.

Permanent increases in service levels create an additional complication. Should a permanent increase in service standards be accompanied by a permanent increase in the MAAR and subsequently in prices? The ESC in Victoria has determined that the answer to this question is ‘no’. In the ESC’s scheme, the price adjustment process is multiplied by the factor:

$$\frac{(1+\mathrm{CPI})(1-\mathrm{X})(1+\mathrm{S}_t)}{(1+\mathrm{S}_{t-6})}.$$

Inspecting this factor yields the observation that that, while a positive S factor increases the MAAR in year *t*, this effect is rolled out of the MAAR in six years by the portion in the denominator. Thus, the business only gets to keep its permanent service improvements for six years.

This adjustment adopted by the ESC demonstrates that there is a potential interaction effect between service incentive schemes and the setting of operating costs. Presumably, a permanent increase in the level of service would require a permanent increase in costs for the business, all other things held equal. That is, if service levels rise permanently then costs may also be expected to rise permanently compared to the costs needed to maintain the level of service at a lower level. If this presumption is correct, it follows that it may be the case that permanent increases in the level of service should be rewarded with permanent increases in the MAAR. Alternatively, if permanent increases in service levels are attainable through a one-off increase in expenditure (or an increase over only a few years), the resulting S factor may be optimally rolled in and subsequently rolled out, as in Victoria.

The Commission has made no conclusion on the design of the S factor and seeks input on this issue.

The above discussion highlights the potential interaction between service incentive schemes and forecast costs. If a permanent increase in service standards occurs only with a corresponding permanent increase in costs but the S factor is rolled out as in Victoria, future forecasts of prudent operating costs may need to reflect this upward shift in costs because the business will no longer be receiving any benefits from the service enhancement through the S factor mechanism but will still be bearing the costs. This is an issue that needs to be examined when designing service incentive schemes.

So far, the discussion of the determination of the S factor has focused on the structure of the calculation and not on the calibration. In each of equations 3.1, 3.2 and 3.3 there is a small ‘s’ term representing the scaling parameter. This is the factor that translates the incremental change in the gap, for example, into the S factor. Determining the magnitude of this scaling factor is not a trivial exercise. Economic theory does provide some guidance on this matter, but determining a precise value requires some degree of understanding or estimates of consumers’ values for service levels. If the premise behind the value of the scaling parameter is to provide the business with the incentive to provide a level of service that takes into account the consumers’ value for service, the scaling parameter needs to be calibrated to consumers' values. To do so requires information on consumers' values for service. The willingness-to-pay study as discussed above provides evidence on the value consumers place on service.

The next step in the analysis is to allow for several service indicators and types of networks to be included in the calculation. This is the approach taken by all the jurisdictional regulators who have adopted service incentive schemes. For example, in Victoria the S factor is calculated from the equation:

$$S_t = \sum s_{r,n} (GAP^{r,n}_{t-2} - GAP^{r,n}_{t-3}) . \qquad \text{Equation 3.4}$$

where

$s_{r,n}$ is the scaling parameter for indicator *r* for network type *n* and

$GAP^{r,n}_{t}$ is the gap between the target and actual level of indicator *r* in network *n*.

Determining the individual scaling parameters involves weighting the key indicators based on revealed consumer preferences, as potentially determined in the willingness-to-pay study. It is also possible that the relative weights of the indicators could vary across network types. SAIDI may be relatively more important than SAIFI in urban networks as compared to rural networks. If the Commission were to adopt a service incentive scheme based on an S factor, the most likely method for determining these scaling factors would be for the Commission to instruct the relevant business to propose parameters. The Commission would then judge the appropriateness of the proposed parameters.

3.4 Options for service incentive schemes

The Commission has identified a variety of possible options for service incentive schemes. The options the Commission has identified are to:

- retain the status quo
- revise current regulatory arrangements

  or

- adopt some form of service incentive scheme.

If some form of incentive service scheme is adopted, the form of scheme needs to be examined.

The Commission is seeking responses from the community on these options. Although these are the main options identified by the Commission thus far, the Commission would also welcome submissions on alternative options.

3.4.1 Retain the status quo

The first option is to refrain from introducing a service incentive scheme and maintain the current arrangements.

This may be a reasonable course if current service standards and penalties are appropriate. If this is the case, the introduction of incentives aimed at increasing service levels may lead to a distortion of investment decisions by the business. Also, electing not to introduce a service incentive scheme and maintaining the current arrangements may reduce the regulatory burden faced by the business, the regulator and the community.

However, if maintaining the current arrangements fails to incorporate an element into the pricing of utility services that would lead to an increase in social welfare, an opportunity has been missed.

> The Commission invites comments on whether there is a need to alter the current regulatory arrangements to incorporate some form of service incentive scheme.

3.4.2 Revise current regulatory arrangements

Another option is to revise the current regulatory arrangements so as to increase the incentive to maintain and improve service standards without the specific introduction of a service incentive scheme.

As discussed, there is currently little financial incentive for a distribution business to comply with performance and supply service standards. An option would be to strengthen the link between non-compliance and financial penalties. For example, if minimum supply reliability targets were linked to compulsory financial penalties, this would increase the incentive for the business to ensure that targets are met.

> The Commission invites comments on the need for additional penalties for non-compliance with performance and supply service standards.

An approach such as this could also lead to an increase in performance. As there is a level of ‘natural’ variation in the supply of services, the business would have an incentive to ensure that the level of service is above the minimum standard. This is because the business would wish to ensure that a reduction in the level of service due to this ‘natural’ volatility does not cause the business to drop below the minimum standard.

Another possible option would be to gradually increase the minimum standards over time. This alternative, linked with financial penalties for non-compliance, could lead to a gradual improvement in service standards.

> The Commission invites comments on the level of the minimum standards and the option of increasing the standards over time.

Another way to increase the financial incentive faced by the business to ensure adequate service levels would be to enforce the payments due in relation to rebatable performance standards. Currently, few payments are made. This appears to be due to a lack of community awareness about the existence of such a scheme and to the fact that the onus is on the customer to make a claim. An option would be to place the responsibility for making relevant payments on to the utility.

Compliance with this obligation would be enforced by the Commission as part of its annual compliance review. This may increase the level of payments made and thereby increase the incentive for the business to ensure that service standards are met.

> Should the business be responsible for making rebatable performance standards payments?

3.4.3 Adopt some form of service incentive scheme

If it is decided that some form of service incentive scheme is required, there is a need to establish the most appropriate indicators.

Which indicators are most relevant?

The discussion here relates to measures associated with electricity distribution, but comparable measures can be determined for other utility services. As discussed above, a variety of indicators may be used to measure electricity distribution service performance. These can be broadly grouped into three categories—reliability, quality and customer service—with different jurisdictions adopting different measures depending on the aim of the adopted or proposed scheme.

For example, the original scheme proposed by IPART only included comparing actual SAIDI against target SAIDI, whereas the original ESCOSA scheme consisted of five indicators.

> Which service indicators are most relevant for electricity distribution in the ACT? Which service indicators should be developed and used for water and wastewater services, and potentially for natural gas distribution?

If more than one indicator is selected, the issue of the relative importance of each must be addressed.

For example, the scheme adopted by the ESC attached weightings of 100% to SAIFI, 65% to CAIDI and 25% to SAIDI. The weightings reflect the importance customers place on each.

> If more than one indicator is thought necessary for the ACT, how should they be weighted?

Another issue that arises if more than one indicator is used is that it may be possible for the business to simply focus attention on increasing the performance of the ‘easiest’ indicator to the detriment of the remaining indicators.

For example, ESCOSA has modified the South Australian scheme so that it only uses two indicators: total duration of interruptions to supply received by the worst served 15% of customers and the percentage of telephone calls responded to within 30 seconds.

It is possible to envisage a situation in which the business may focus attention on improving standards for one of the indicators at the expense of the other, and achieve an ‘apparent’ improvement in service standards.

How should any scheme be designed to encourage the business to improve service standards across the board?

Exclusions

Once appropriate indicators have been selected, an issue arises in relation to the possible exclusion of certain events from the performance indicators. For example, a possible option is to exclude unplanned outages that are beyond the control of the business. Possible events that might be excluded include:

- natural disaster events such as bushfires or floods in which a distributor is required to turn off supply by an external body, such as NEMMCO or an emergency organisation
- generation and transmission outages.

However, it is important not to exclude events that the business could conceivably have made allowances for. If such events are excluded from the performance measure, the business may have an incentive to underinvest in ensuring adequate performance of the distribution network.

Which events, if any, should be excluded from the recommended indicators?

Direct revenue or S factor adjustment

Once the most appropriate indicators are selected, the actual design of the service incentive scheme becomes important. As discussed above, revenue adjustments can be made by way of either a direct revenue adjustment or an S factor.

The Commission invites comments on whether a direct revenue adjustment, or an S factor which adjusts the maximum allowable average revenue by (1 + CPI – X + S), is the most appropriate mechanism for a service incentive scheme.

If an S factor is to be used, the method adopted to calculate the S factor must be examined. The Commission has identified three approaches used in different jurisdictions: an S factor based simply on the gap between target and actual service levels; an S factor based on the incremental change in the actual indicators; and an S factor based on the incremental change in the gap. Although these are the main approaches identified thus far, the Commission would also welcome comments on other possible approaches.

The Commission invites comments upon the most appropriate methodology to adopt to calculate an ‘S’ factor.

Treatment of transitory gains

The Commission has also identified the issue of whether transitory gains should result only in transitory increases in revenue. The Commission highlighted that this is a result of the methodology adopted to calculate any adjustment. A related issue is that of the length of time that a regulated business should keep any price increases due to rewards for beating required service levels. The Commission has noted the methodology adopted by the ESC in Victoria, which only allows the regulated business to keep price increases for a set period.

> The Commission invites comments on the issue of transitory or permanent rewards and the length of time that rewards may be retained by the business.

The Commission has also identified issues concerning whether a symmetrical scheme is the most appropriate type. For example, should a business not only be rewarded for beating the minimum service levels but also punished to the same extent for failing to meet them?

> The Commission invites comments on whether rewards and penalties in any scheme adopted should be symmetrical.

The Commission has also raised the question of the requirement for bands or bounds in a service incentive scheme. Bands may be used instead of point estimates. For example, there could be an acceptable service band rather than a point target, and increases or decreases in revenue could occur only for performing outside the band. An upper or lower bound could also be employed. The adoption of upper and lower bounds could provide an increased level of certainty for the business's revenue projections, but might reduce the incentive properties of the scheme by constraining possible rewards or penalties.

> The Commission invites comments on the appropriateness of adopting either bands or bounds when determining the possible revenue impact of any service incentive scheme.

4 Call for submissions

The Commission has identified and discussed the issues that it believes to be most relevant in considering whether to introduce some form of efficiency carryover mechanism and/or service incentive scheme, and welcomes comments from interested parties on the issues raised in this discussion paper.

The Commission acknowledges that there may be issues it has neglected to consider, and therefore welcomes comments any such matters that interested parties consider relevant.

The Commission would like to receive submissions on the discussion paper no later than 13 May 2005. The Commission proposes to adopt the following timeframes for the remainder of the process:

Submissions on discussion paper due:	13 May 2005
Release of draft decision:	30 June 2005
Submission on draft decision due:	31 August 2005
Release of final decision:	31 October 2005

Submissions, correspondence or other enquiries may be directed to the Commission at the following addresses.

The Independent Competition and Regulatory Commission

PO Box 975
CIVIC SQUARE ACT 2608

Level 7 Eclipse House
197 London Circuit
CIVIC ACT

The secretariat may also be contacted by telephone on 6205 0799 or by fax on 6207 5887. The Commission's website is at www.icrc.act.gov.au and its email address is icrc@act.gov.au

For further information on this matter, please contact Ian Primrose, Chief Executive Officer, on 6205 0779.

The Commission reiterates that it is yet to make a decision on whether to adopt an efficiency carryover mechanism and/or a service incentive scheme, and that the submissions it receives in relation to this discussion paper will play an important role in its eventual decision.

Glossary and abbreviations

ACCC	Australian Competition and Consumer Commission
CAIDI	customer average interruption duration index
Commission, the	Independent Competition and Regulatory Commission
CPI	consumer price index
ESC	Essential Services Commission (Victoria)
ESCOSA	Essential Services Commission of South Australia
ICRC Act	*Independent Competition and Regulatory Commission Act 1997*
IPART	Independent Pricing and Regulatory Tribunal (New South Wales)
MAAR	maximum allowable average revenue
MAIFI	momentary average interruption frequency index
NPV	net present value
OFWAT	Office of Water Services (United Kingdom)
OTTER	Office of the Tasmanian Energy Regulator
QCA	Queensland Competition Authority
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
TNSP	transmission network service provider

Index