



Issues Paper

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**Electricity Distribution:  
Framework for Regulation**

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*December 1999*

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## SUBMISSIONS

The Queensland Competition Authority (the QCA or the Authority) considers public involvement to be an important element of its decision making processes. It therefore invites submissions from interested parties concerning the appropriate form of regulation of Queensland electricity distributors' prices, the preferred method of providing appropriate incentive regulation together with the optimum period for regulatory control and the separation of prescribed and excluded services.

To facilitate the publication of submissions on the QCA's website, it is preferred if submissions could be made electronically by disk or by email. However, if this is not possible, submissions can be made in writing. **Submissions, comments or inquiries regarding this paper should be directed to:**

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The **closing date** for submissions is **Friday 25 February 2000**.

### Confidentiality

In the interests of transparency and to promote informed discussion, the Authority would prefer submissions to be made publicly available wherever this is reasonable. However, if a person making a submission does not want their submission to be public, that person should claim confidentiality in respect of the document (or any part of the document). Claims for confidentiality should be clearly noted on the front page of the submission and the relevant sections of the submission should be marked as confidential, so that the remainder of the document can be made publicly available. Again, it would be appreciated if each version (ie. the complete version and another excising confidential information) could be provided electronically (whether or not with a printed copy). Where it is unclear why a submission has been marked 'confidential', the status of the submission will be discussed with the person making the submission.

While the Authority will endeavour to identify and protect material claimed as confidential as well as exempt documents (within the meaning of the *Freedom of Information (FOI) Act 1989*), it cannot guarantee that submissions will not be made publicly available. As stated in s187 of the *Queensland Competition Authority Act 1997*, the Authority must take all reasonable steps to ensure the information is not disclosed without the person's consent, provided the Authority is satisfied that the person's belief is justified and that the disclosure of the information would not be in the public interest.

### Public access to submissions

Subject to the above, submissions will normally be made available for public inspection at the Brisbane office of the Authority, or on its website at [www.qca.org.au](http://www.qca.org.au).

Information about the role and current activities of the Authority, including copies of reports, papers and submissions can also be found on the Authority's website.

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**GLOSSARY**

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
CAPELEC	Capricornia Electricity Corporation Limited
COAG	Council of Australian Governments
CPI	Consumer Price Index
DNSPs	Distribution Network Service Providers
DUOS	Distribution Use of System
ESI	Electricity Supply Industry
FNQEB	Far North Queensland Electricity Corporation Limited
IPART	Independent Pricing and Regulatory Tribunal, NSW
MEB	Mackay Electricity Corporation Limited
NCP	National Competition Policy
NEC	National Electricity Code
NORQEB	North Queensland Electricity Corporation Limited
NSP	Network Service Provider
OFFER	Office of the Electricity Regulator, UK
ORG	Office of the Regulator General, Victoria
OTTER	Office of the Tasmanian Electricity Regulator
QCA	Queensland Competition Authority
ROE	Return on Equity
ROR	Rate of Return
SAIIR	South Australian Independent Industry Regulator
SWP	South West Power
WACC	Weighted Average Cost of Capital
WBEC	Wide Bay Burnett Electricity Corporation Limited

## 1. INTRODUCTION

The Queensland Competition Authority (the QCA or the Authority) is a statutory body established under the *Queensland Competition Authority Act 1997* (the Act). The Act gives the Authority certain responsibilities and functions with respect to National Competition Policy (NCP). Broadly, these include:

- subject to reference or declaration by the Ministers (the Premier and the Treasurer), undertaking prices oversight of monopoly or near monopoly Government business activities;
- receiving and investigating competitive neutrality complaints against significant Government and local government business activities;
- overseeing and arbitrating third party access to infrastructure; and
- undertaking such other activities relating to NCP as the Ministers may direct.

The Authority's responsibilities with respect to electricity are set out in:

- the *Electricity Act 1994*, which provides that the Authority may prepare and enforce conduct rules, and requires the Authority to monitor standards of service quality if issued by the Minister for Mines and Energy;
- the *Electricity – National Scheme (Queensland) Act 1997*, which commenced on 22 May 1997 and gives effect to the National Electricity Code (the Code). The Code sets out the objectives for the National Electricity Market and provides for “a regime of light-handed regulation of the market to achieve the market objectives”. The Code provides for the Authority to regulate distribution prices from 19 December 2000, to prepare ring-fencing guidelines and to undertake several other roles eg. with respect to network connection; and
- the *Queensland Competition Authority Act 1997*, which provides that the Authority's functions include regulation of market conduct of electricity entities, development of conduct rules, monitoring of service quality standards and performing functions given to the Authority under another Act.

Chapter 6 Parts D and E of the Code outline the objectives, principles and processes in relation to distribution service pricing.

While it is open to the Authority to establish new prices from the date on which it becomes the jurisdictional regulator (19 December 2000), the Authority is aware that there are benefits in:

- avoiding two price changes in one year (thereby minimising regulatory compliance costs);
- ensuring that it has the best possible information base on which to base its assessments (which must apply for a minimum of three years) – in this regard, the amalgamated Ergon Energy was only established on 1 July 1999; and
- having price reviews which are aligned with standard accounting periods.

Accordingly, the Authority is currently minded to allow the prices expected to be established by the Queensland Minister for Mines and Energy as from 1 July 2000 to apply until 30 June 2001.

The Code requires that any jurisdictional regulator, in meeting its distribution pricing requirements, must publish full and reasonable details of the basis and rationale of the decision including:

- reasonable details of qualitative and quantitative methodologies applied including any calculations and formulae; and
- full reasons for all material judgments and qualitative decisions made and options considered, and all discretions exercised which have a material bearing on the outcome of a jurisdictional regulator's decision.

The Code also requires reasonable regulatory accountability through transparency and public disclosure of regulatory processes. The Authority therefore desires to provide an opportunity for distribution entities, their customers and other stakeholders to participate constructively and at an early stage in the development of the regulatory regime for distribution entities. The aim of this paper is to present a range of issues relevant to the framework for the regulation of electricity distribution pricing. These include:

- the form of regulation;
- the requirement for incentive regulation;
- the period for which it will apply; and
- separation of prescribed and excluded services,

with a view to seeking submissions from interested parties as an input to the preparation of the electricity distribution pricing determination. This paper should be read in conjunction with the Authority's paper titled "Electricity Distribution: Asset Valuation, Depreciation and Rate of Return".

## **1.1 Structure of the paper**

Section 2 briefly outlines the structure of the Queensland electricity industry together with the current regulatory environment.

Section 3 outlines the general regulatory principles of the Code together with the specific requirements applicable to Distribution Network Service Providers (DNSPs).

Section 4 discusses the background and need for regulation together with a broad outline of the principal approaches used for regulating utilities.

Section 5 discusses the options for the initial regulatory framework which might be applied to DNSPs within Queensland, given the constraints of the Code.

Section 6 outlines how incentive regulation can be integrated within the regulatory framework and discusses the length of the regulatory period.

Section 7 discusses the approach that might be applied to determine those elements of DNSPs which would be subject to the regulatory framework – that is, prescribed services.

## 2. THE QUEENSLAND ELECTRICITY INDUSTRY

### 2.1 Background

The electricity supply industry (ESI) plays a key role in the Queensland economy as electricity is a fundamental input to all aspects of economic activity. The successful introduction of competitive reforms to the ESI is important to provide incentives to participants to improve the efficiency of their production, resource allocation and investment decisions, and to minimise costs. Benefits from the successful introduction of competitive reforms flow to all electricity consumers, in particular, influencing the ability of firms to compete both domestically and internationally.

However, not all elements of the ESI can be successfully exposed to competitive pressures. In markets in which competition is unlikely, such as electricity distribution, there exists an imbalance in the relative bargaining position of providers of the service and users of the service. Consequently, prices can be distorted above economically efficient levels resulting in an adverse impact on economic efficiency. In such circumstances, governments have attempted to rectify these market failures by intervening through public ownership, regulation or some combination of both.

The network pricing chapter of the Code attempts to deal with these problems by removing from DNSPs a significant amount of discretion in terms of price setting. The Code proposes establishing uniform mechanisms for pricing access to distribution networks whereby the jurisdictional regulators will determine asset values, rates of return and revenue or price caps. The Code also outlines principles, objectives and cost allocation procedures to guide the regulators and the DNSPs through this process.

The overall aim of this regulatory regime is to remove the ability of DNSPs to charge monopoly prices, but at the same time provide the owners with a fair return on their investment and create the correct incentives for managers to pursue ongoing efficiency gains through cost reductions. In general, prices that reflect marginal costs are considered optimum and are generally referred to as efficient.

### 2.2 Restructuring of the Queensland ESI

The Queensland ESI commenced a period of major restructuring from 1 January 1995 under the *Electricity Act 1994* and the *Government Owned Corporations Act 1993*. These reforms involved separating the generation sector from transmission and distribution, with the generation assets being contained within a government owned corporation called AUSTA Electric.

The restructuring also established the Queensland Transmission and Supply Corporation (QTSC) as the holding company for eight subsidiary corporations including the Queensland Electricity Transmission Corporation (QETC) responsible for the operation, maintenance and development of the high voltage transmission system in Queensland, and seven distribution corporations, including Energex in south-east Queensland and six regional distribution entities, responsible for the low voltage networks and electricity retailing.

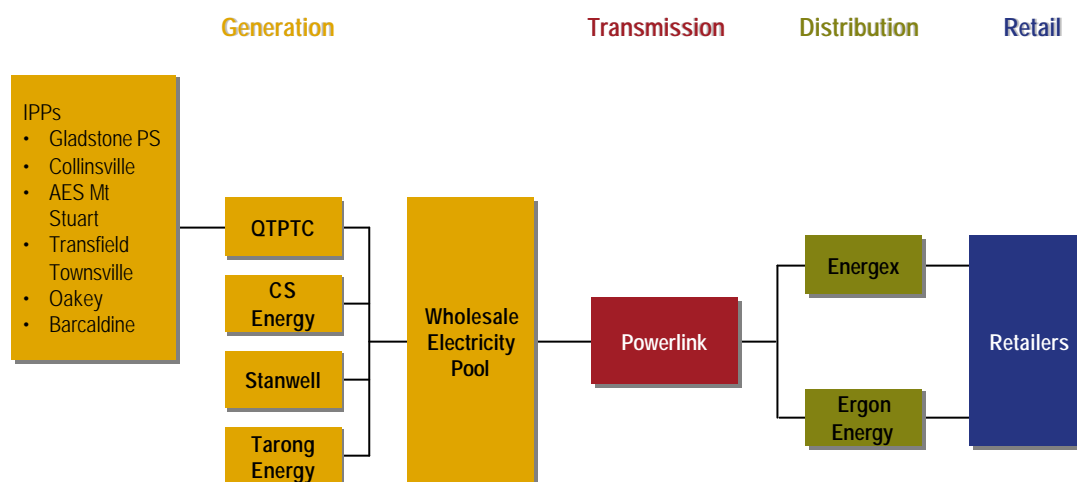
In May 1997, the *Electricity – National Scheme (Queensland) Act 1997* commenced, giving effect to the Code. In July 1997, the industry was further restructured in preparation for the competitive national electricity market. Under these reforms the State's major generator, AUSTA Electric, was separated into three independent and competing generating corporations, as well as an engineering services organisation, AUSTA Energy (which has subsequently been unwound). QETC (trading as Powerlink) and the seven distribution corporations became independent corporations, operating under the Corporations Law and reporting directly to the

shareholding Ministers (the Treasurer and the Minister for Mines and Energy). Retailing functions were removed from the distributors and three new retail trading corporations were created.

As of 1 July 1999, further restructuring has seen the six regional distribution corporations outside of south east Queensland amalgamated into a single entity called Ergon Energy. Along with Energex, there are now two distribution entities which cover all of Queensland. In addition, two of the retailers were amalgamated to create a new retailer, Ergon Energy Pty Ltd, a subsidiary of Ergon Energy. The remaining retailer, Energex Retail, is a subsidiary of Energex.

The following diagram illustrates the current structure of Queensland's electricity industry.

**Figure 1: Structure of Queensland's electricity industry**



### 2.3 Industry structure

Following the restructuring of the electricity industry, competition has been progressively introduced into those elements of the industry that were considered to be contestable, ie. generation and retailing, with a view to improving efficiency and lowering prices. However, the network components of the industry retain some elements which may not be contestable. These services are defined by the Code as prescribed services, and are to be subject to economic regulation under the Code.

In generation, licensing arrangements have now been introduced to allow new generating capacity to be privately built while ensuring that basic conditions (eg. safety) are met.

In transmission and distribution, one entity, Powerlink, now operates the high voltage transmission network in Queensland, while two distribution entities, Energex and Ergon Energy, operate all local distribution networks. These entities undertake the physical task of transmitting electricity from the generator to the end consumer.

The distribution entities have considerably different characteristics, with Ergon Energy having a very geographically dispersed network, and Energex having a significantly higher customer density.

The following table presents key data for the Energex and the six distribution entities that were the predecessors of Ergon.

**Table 1: Key data for Energex and predecessors of Ergon Energy (1997-98)**

Performance indicator	Energex	Ergon Energy predecessors
Customer numbers	994,000	533,000
Kilometres of lines	39,000	134,000
Customers per kilometre of line	25.5	4.0
Employee numbers	2,471	2,500

Source: Energex (1998), Ergon Energy website, CAPELEC (1998), FNQEB (1998), MEB (1998), NORQEB (1998), SWP (1998), WBBEC (1998)

Both existing distribution entities are owned by the Queensland Government, and have legally separate but subsidiary retailing operations. The role of retailers in the market is to undertake financial or risk management functions such as trading in the wholesale market and offering different price/service packages to consumers.

The retailing subsidiaries of Energex and Ergon Energy were initially given exclusive franchises to retail in specified geographic areas. However, licences for retailing have now been opened up to allow new retailers into the market, while at the same time franchises granting exclusive retailing rights to incumbent retailers have been progressively phased out through the introduction of customer contestability.

As of 1 July 1999, 6400 customers, with a average consumption of more than 0.2 gigawatts (GW) a year, became eligible to enter the competitive electricity market. This followed the initial introduction of contestability on 29 March 1998 (for the State's 43 largest customers) and a further tranche on 1 October 1998 (for 430 large electricity customers).

## 2.4 Existing regulatory regime

Distribution pricing is currently regulated under section 301 of the *Electricity Act 1994*. This section provides that the Minister for Mines and Energy may decide, in the way that the Minister thinks fit, the prices, or a methodology to fix prices, that:

- a distribution entity may charge to provide customer connection services; or
- a transmission or distribution entity may charge to provide other goods and services prescribed by regulation.

The most recent Ministerial determination of distribution prices was published on 25 May 1999. However, the period for which this determination applies is not stated.

This determination sets out prices for contestable customers based on:

- whether that customer is a demand customer (broadly a customer with annual load factors less than 15 per cent) or a volume customer (all other customers);
- the network charge category the customer falls into, ie. high voltage metered demand, large medium or small demand, high voltage metered volume, large medium and small volume; and
- the geographic area the customer is located in, based on fourteen zones defined under the determination.

The methodology for distribution and transmission pricing was published by Gazette notice on 19 November 1999. With regard to distribution, the methodology provides for:

- the form of economic regulation to be a revenue cap;
- distribution prices to be determined from an annual revenue cap amount;
- the revenue cap, for the first year of the regulatory period, to be determined by the ‘building block’ method which sums the return on assets, return of assets (depreciation) and operating expenditure (to cover efficient costs of operating and maintaining networks) with the deduction of capital contributions for the period;
- the allocation of the annual revenue amount between network users to be made in accordance with these pricing principles; and
- distribution prices determined under the methodology to be subject to approval by the Minister.

Bundled or final total energy prices charged to non-contestable customers are also regulated by the Ministers. In part, these prices are subsidised through a Community Service Obligation (CSO) arrangement which ensures that tariffs for non-contestable customers are uniform across the State, regardless of the cost of supply.

### 3. OBJECTIVES AND PRINCIPLES OF THE NATIONAL ELECTRICITY CODE

Chapter 6 Part D of the National Electricity Code (the Code) sets out the objectives and principles of the distribution pricing regulatory regime to be administered by jurisdictional regulators. These objectives and principles are reproduced at Attachment A.

With respect to the form and period of regulation and definition of regulated activities, the following outcomes that the regulatory regime must seek to achieve are particularly relevant (6.10.2):

- an efficient and cost-effective regulatory environment;
- an incentive-based regulatory regime which:
  - provides an equitable allocation between distribution network users and distribution network owners of efficiency gains reasonably expected by the jurisdictional regulators to be achievable by the distribution network owners;
  - provides for, on a prospective basis, a sustainable commercial revenue stream which includes a fair and reasonable rate of return to distribution network owners on efficient investment, given efficient operating and maintenance practices of the distribution network owners;
- prevention of monopoly rent extraction by network owners;
- an environment which fosters an efficient level of investment within the distribution sector, and upstream and downstream of the distribution sector;
- reasonable recognition of pre-existing policies of governments which are distribution network owners regarding distribution asset values, revenue paths and prices;
- reasonable and well defined regulatory discretion which permits an acceptable balancing of the interests of distribution network owners, distribution network users and the public interest; and
- promotion of competition in upstream and downstream markets and promotion of competition in the provision of network services where economically feasible.

Principles of the Code with respect to regulation of distribution network pricing (6.10.3) that are relevant to the form and period of regulation and definition of regulated activities, include that the regulatory regime must:

- wherever economically efficient and practicable address concerns over monopoly pricing in respect of the distribution network through the introduction of competition in the provision of distribution services;
- provide distribution network owners with incentives and reasonable opportunities to increase efficiency;
- take account of and be consistent with the allocation of risk between network owners and network users;
- provide a fair and reasonable risk-adjusted cash flow rate of return to distribution network owners on efficient investment given efficient operating and maintenance practices on the part of the distribution network owners;

- balance the interests of network users and network owners; and
- take account of relevant previous regulatory decisions made by authorised persons including:
  - the initial revenue setting and asset valuation decisions made by a government at a time at which that government was a distribution network owner in the context of industry reform pursuant to the Competition Principles Agreement;
  - decisions made by jurisdictional regulators and any regulatory intentions previously expressed; and
  - decisions made by ministers under jurisdictional legislation.

The Code (section 6.10.5) also requires that:

- economic regulation shall be of the prospective CPI minus X form, or some incentive-based variant of the CPI minus X form which is consistent with the objectives and principles outlined in clauses 6.10.2 and 6.10.3;
- the jurisdictional regulator shall specify the form of economic regulation to be applied to the Distribution Network Service Provider to be in the form of either:
  - a revenue cap; or
  - weighted average price cap; or
  - a combination of the above; and
- the jurisdictional regulator is to apply the form of economic regulation specified in clauses (a), and (b) of section 6.10.5 to each Distribution Network Owner for the regulatory control period which is to be a period of not less than three years.

## 4. ALTERNATIVE APPROACHES TO REGULATION

The need to regulate Distribution Network Service Providers (DNSPs) arises from their position as sole suppliers of network services within their area and the likely monopoly power associated with these services. As such, DNSPs are generally not directly subject to the rigours of the competitive market and the associated pressure to produce a product or service of a given quality at the lowest possible cost while charging a price commensurate with the marginal cost of production.

Therefore, they are in a position to potentially generate monopoly rents, through charging excessive prices for the given quality of service, thereby breaking the relationship between those costs and prices that would be efficient.

In any market, correct price signals are a key determinant of economic efficiency. Prices that accurately reflect costs of production encourage the efficient use of resources and efficient investment decisions. As such, the possibility of DNSPs wielding monopoly power may require regulatory intervention to minimise any negative effects.

As distribution costs can represent up to 40 per cent of the total delivered cost of electricity to the end user, they are clearly a critical factor in determining the comparative advantage of electricity versus other forms of energy and in terms of sending locational signals.

Given the monopoly characteristics of DNSPs, regulation of prices has been introduced in an attempt to ensure that prices set by the DNSPs are limited to recovery of efficient costs and reasonable profits for the given quality of service.

Any regulatory involvement in the market will have both intended and unintended consequences. If the intended consequences are overwhelmed by the unintended consequences, the interference may do more harm than good. For example, by allowing too low a rate of return, in an effort to eliminate monopoly profit, the regulator may create an environment in which the regulated business is unwilling to invest. The capacity restrictions that might result from congested infrastructure could be more costly to users than the original monopoly profits.

Different regulatory approaches will assign rights and responsibilities differently to the affected parties. This assignment of rights and responsibilities will affect the regulated organisation's risks and rewards and, in turn, its incentives. Accordingly, it is important when considering alternative regulatory approaches to be aware of the potential unintended effects of the assignment of rights and responsibilities implicit in those arrangements.

### 4.1 Rate of return regulation

Until recently, the dominant method of regulation has been the Rate Of Return (ROR) method, especially in the US where the mixture of private and public utility ownership resulted in early examples of regulation. Under traditional ROR regulation, regulators determine the revenue required in order to recover the organisation's costs including an allowed rate of return on its asset base.

ROR regulation has a number of advantages including:

- it limits excessive returns being earned;
- it ensures a reasonable financial return for the organisation, thereby helping ensure an adequate supply of services for consumers; and
- it provides a stable environment to attract investment.

However, ROR also has a number of disadvantages including:

- by linking allowed revenues to realised or estimated production costs, the regulated organisation is provided with relatively weak incentives to reduce operating costs. That is, under rate of return regulation both increases and decreases in costs are passed on to consumers at each regulatory review. Consequently, regulated monopolies have little incentive to manage inputs efficiently or to adopt cost-minimising innovations (eg. new technology); and
- ROR regulation can limit the organisation's incentive to develop and introduce new products and services. Because it links revenues to costs rather than to the value of the products and services produced, rate of return regulation generally provides poor incentives for the regulated organisation to discover and fulfil the needs of its customers.

## 4.2 Benefit sharing plans

In response to perceived and actual weaknesses of the standard ROR regulatory method, a number of alternative approaches have emerged. These alternatives may be thought of as different points on a continuum between rate of return regulation and pure incentive schemes, with differences limited to a matter of degree rather than fundamentals. One such alternative is the use of benefit sharing plans.

Benefit sharing plans aim to address the lack of incentives to improve efficiency inherent in ROR regulation by allowing regulated organisations to retain a portion of the profits (earnings sharing) or revenues (revenue sharing) generated beyond a threshold.

Examples of the application of benefit sharing plans include:

- Southern Bell Telephone: Initial allowed Return on Equity (ROE) of 13.2 per cent. Lower limit of 11.5 per cent. Returns up to 14.0 per cent retained by shareholders. Shareholders retain 40 per cent of earnings above 14.0 per cent up to 19.0 per cent. Earnings above 19.0 per cent returned to ratepayers.
- Illinois Bell Telephone: All earnings up to a 12.76 per cent ROE retained by shareholders. 60 per cent of earnings between 12.76 per cent and 14.0 per cent retained by shareholders. 30 per cent of earnings between 14.0 per cent and 15.0 per cent retained by shareholders. Earnings above 15.0 per cent ROE are returned to ratepayers.

This approach can suffer from a lack of incentives for the regulated organisation to enhance service quality. While this concern can be especially pronounced for revenue-sharing schemes, it is shared with most forms of price and revenue regulation. In addition, whilst these arrangements begin to overcome the incentive related limitations of ROR regulation, they may be less likely to provide as strong incentives to improve efficiency as more carefully designed incentive regulation schemes.

## 4.3 Incentive regulation

Incentive regulation developed out of dissatisfaction with the cost-plus approach encouraged by traditional ROR regulation. The key idea behind incentive regulation is that an organisation subject to regulatory intervention will always know more about its business and how to improve its business than the regulatory body. The effectiveness of any regulatory intervention is limited by the information available to the regulatory body. It is therefore important that the regulatory environment harnesses the regulated business' informational advantage to the wider benefit of the community as a whole (rather than purely to its own benefit – a situation that potentially arises in an unregulated monopoly environment). This is the central goal of incentive

regulation. Implicit in incentive regulation is that gains for all parties are possible if the organisation can be encouraged to increase the efficiency and effectiveness of its operations.

Typically, this is achieved through a process of encouraging the regulated entity to ‘outperform’ a benchmark set by the regulatory body by allowing it to retain part or all of the benefit from doing so. For example, if a regulator believes a regulated business should be able to improve its efficiency by 3 per cent each year, and the regulated business manages to improve by 5 per cent per annum, then the regulated business should retain a portion of the extra benefit from that superior performance.

Clearly, if the regulatory environment prevents the organisation from retaining the benefit of its efforts in this regard, it will have little incentive to devote managerial effort to achieve the gains. However, by allowing the regulated company to retain some of the benefit of its efforts, there is an incentive for it to invest the time, effort and expense, and accept the risk to seek to improve its performance. By providing this incentive, customers ultimately benefit by sharing in the gains that are realised over time. This way a ‘win-win’ environment is created.

There is a range of possible approaches to incentive regulation including:

- revenue capping; and
- price capping or price averaging for particular products.

Reflecting the approach taken in the UK, and also, in part, investors’ requirements to achieve a commercial rate of return while accommodating variations in cost structures, the approach to the determination of revenue or price caps has mainly focused on detailed financial analysis of the DNSP businesses using the building block approach. Under this approach, the regulator sets the revenue requirement as the sum of estimated operating costs, depreciation (or return of capital), and a risk adjusted return on capital. These issues are discussed further in a separate paper prepared by the Authority titled “Electricity Distribution: Asset Valuation, Depreciation and Rate of Return”.

Given the requirements of the Code outlined in Section 3 together with the background information provided above, the following section reviews alternative regulatory framework options and assesses the advantages and disadvantages of each.

## 5. ALTERNATIVE APPROACHES TO INCENTIVE REGULATION

As previously noted, the Code requires that economic regulation of DNSPs be in the form of either:

- a revenue cap; or
- weighted average price cap; or
- a combination of the above.

### 5.1 Revenue cap approach

Under this type of regulation, an organisation's gross revenues from prescribed services are limited to a fixed amount. The cap is usually subject to an annual adjustment for productivity gains and inflationary effects. Thus, in a typical revenue cap application, an initial revenue cap for a level of service is set according to traditional rate of return procedures (Armstrong, et al 1995). Thereafter, real revenue (ie. inflation adjusted revenue) is typically reduced each year by an adjustment factor until the next review.

The adjustment factor is generally called the 'X factor' and is a pre-determined annual scaler applied to the organisation's forecast revenue without reference to the organisation's actual earned rate of return. It represents the percentage reduction in revenue the organisation is deemed capable of achieving without jeopardising its financial integrity. If the organisation can realise efficiency gains at a faster rate then it can keep all or some percentage of such gains. If not, the organisation's profit suffers.

Revenue caps can be established for individual segments of the business or the entire business. Revenue caps may provide considerable discretion to regulated organisations to set prices for their products within the revenue cap. Under 'pure' revenue caps, the regulated organisation is free to set prices as it wishes. However, in practice, price caps on specific products often accompany revenue caps.

Revenue caps typically involve a fixed term and a preset revenue formula providing increased certainty with regard to retaining financial gains from productivity improving behaviour. This certainty provides an organisation with significant incentives to operate more efficiently.

However, a significant issue with pure revenue caps discussed by Crew and Kleindorfer (1996) is that they may, under certain conditions such as where demand is inelastic, offer incentives for the regulated entity to produce a lower level of output and a higher price than under an unregulated (monopoly) situation.

Revenue caps are often accompanied by an 'unders and overs' account. An unders and overs account allows the regulated organisation to increase or decrease its earnings in a given period subsequent to that in which its revenues fall short of or exceed the cap. Often an interest rate (at the risk free rate or the regulated organisation's weighted average cost of capital) is applied to the unders and overs account to address timing issues.

Revenue caps assign cost risk to the regulated organisation. However, revenue caps are typically less risky than price caps for a regulated organisation. Under revenue cap regulation, the regulated organisation is guaranteed the opportunity to earn a set level of income, regardless of the actual level of demand. This allows the entity a degree of flexibility in pricing to allow it to respond to changes in the external environment. Consequently, volume risk is passed to the customer through the ability of the regulated entity to adjust pricing to compensate for volume changes, especially if an 'unders and overs' mechanism is incorporated. This makes the process

of fixing future demand projections as part of the regulatory exercise less contentious for revenue caps than for price caps. In this respect, revenue caps differ from price caps which are highly sensitive to demand forecasts.

Revenue caps come in many guises including:

- pure or absolute revenue caps which can be applied at the level of a service basket, service classification or an entire regulated organisation; and
- flexible revenue controls such as revenue per customer caps where revenue is allowed to grow with the growth in customer base or can change depending upon a number of variables included within the initial forecast of revenue requirements. Basically, these are simply variations to pure revenue caps which relate changes in revenue to changes in the business environment.

#### *Pure revenue cap*

Under a pure revenue cap, a regulated organisation is free to set charges for services as it sees fit. That is, the organisation can differentially charge customers. Accordingly, unless specific price controls are established, the price risk is transferred to customers under pure revenue cap regulation.

For the DNSP, a pure revenue cap operates as both a guarantee of the opportunity to maintain future revenue and a ceiling. While a pure revenue cap will provide incentives to cut costs, the incentive to compete with other forms of energy is reduced as any reductions in output can be offset by increased charges for captive customers.

#### *Flexible revenue controls*

Flexible revenue controls allow total revenue to vary in line with the change in some underlying variable, most commonly by way of a revenue yield control which places a cap on the average revenue per unit over a given time period. This may then be allowed to vary over different time periods in line with the CPI-X formula (Section 6.2). The average revenue is calculated by taking total revenue from prescribed services and dividing by total output. This requires identification of a homogeneous unit of output. In practice, for electricity, regulators have typically used the volume of energy carried over the network, measured in kWh.

In order to comply with this form of control, the average revenue per kWh, calculated on the basis of the actual prices and quantities sold by the DNSPs, must be less than or equal to the maximum allowed average revenue. The amount of revenue earned on each individual unit (as opposed to the average revenue per unit) is not regulated. The entity therefore has a certain degree of flexibility in setting individual tariffs. This flexibility encompasses both the split between the fixed and variable elements of any one tariff category and the rebalancing of tariffs between different tariff categories.

Under this form of control, revenue varies directly with output as allowed revenues for a DNSP increase in line with the volume of energy transported over their network. Energy consumption therefore becomes a driver of revenues for the DNSP.

As such, DNSPs have an incentive to minimise costs, since the permitted average revenue per unit of output remains fixed whatever the cost of production thus any reduction in costs will directly boost the DNSP's profits. Similarly, DNSPs will also have an incentive to increase output. In some jurisdictions this approach has raised environmental concerns as it can be seen to promote increased consumption of energy.

### *Advantages and disadvantages of revenue caps*

Revenue cap advantages include incentives for cost reduction (an advantage shared by all forms of incentive regulation) and productivity improvements. Revenue caps may also be better suited to networks such as electricity distribution which exhibit relatively low incremental costs for additional throughput. This is because they can accommodate a situation where allowed revenues increase less than proportionately with increases in sales (in contrast to price caps which assume a direct relationship between total costs and total sales). Accordingly, revenue caps may allow a more direct means of passing the benefits of growth to customers.

However, there are also important disadvantages:

- if the revenue cap is not adjusted for customer numbers or output it provides limited incentives to expand services to new and existing customers (as increases will not be compensated by a proportional increase in allowed revenues). Indeed, revenue caps could provide incentives to restrict sales as this could lower costs and increase profits; and
- protection for captive (non-contestable) customers may still require some form of price control. Therefore, revenue caps often need to exist alongside price setting procedures.

## **5.2 Price cap regulation**

Price cap regulation aims to control the prices charged by the regulated organisation, rather than its revenue or rate of return. In a typical price cap application, for a given level of service, prices are set according to traditional rate of return procedures, similarly to the discussion of revenue caps except that the cap applies to particular prices rather than total revenues.

Price cap controls aim to assign any risks associated with the regulated entity's costs (other than inflation), including the risk that costs decline in line with the X factor, to the regulated organisation, in this case, the DNSPs. This risk may be ameliorated in relation to specific input costs if cost passthroughs are allowed (discussed in Section 6.3 below). Interest rate risk is another major risk for regulated organisations under this approach. However, the CPI passthrough implicit in CPI-X regulation substantially alleviates this risk (except that the CPI compensates for past inflation whereas interest rates are affected by inflationary expectations).

Further, under price cap regulation, the regulated organisation is exposed to volume risk (whether from the supply side or the demand side). Since the cost structures of regulated organisations typically exhibit reducing average costs as output increases (as is the case with DNSPs), profits can increase if the regulated organisation's sales increase beyond those forecast. Conversely, failure by the regulated organisation to secure the sales assumed in the forecasts will mean that profits fall.

While price cap controls can, in theory, be set as a series of separate price controls independent of any total revenue requirement, the Code requires that where a price cap is used, it should be in the form of a weighted average price cap. With a weighted average price, a number of weighted prices may be established for different sections of the regulated entity or else a single, high level, weighted average price may be established for prescribed services of the entity.

In deriving the weighted average price, the weights chosen may be based on a range of factors. They may be fixed in reference to the base year in which the control is set, either on a volume (kWh) or value (revenue) basis. Alternatively, the weights may reflect actual quantities with a lag, where the weights reflect the quantity or value of a service provided in a prior period. Such formulations break the link between allowed revenue and the volume distributed in the current year.

### *Advantages and disadvantages of price caps*

The key difference between the weighted average price cap and the revenue yield form of price control is that, potentially, under price cap regulation the allowed revenue received for each additional unit varies according to the actual tariff for that unit, rather than some 'average' tariff. It also allows for both fixed and variable charges (eg. a connection charge as well as a kWh charge).

To the extent that actual tariffs reflect marginal costs, there is therefore a systematic link between revenues and costs. The danger of the DNSP suffering sustained losses, or making sustained profits not anticipated by the regulator, due to changes in output, is reduced.

The key issue is the extent to which tariffs reflect marginal costs. For DNSPs, a large proportion of costs are either sunk (ie. costs associated with previous investment) or fixed (ie. do not vary with volumes). If the tariff structure adopted by the DNSP does not reflect these characteristics, then a distortion remains.

The implications for risk allocation under a weighted average price cap will depend on the precise tariff structure adopted by the DNSP. As noted above, where the tariff structure reflects underlying fixed and variable costs, revenues will move in line with costs as volumes change. The DNSP will not therefore be exposed to risk associated with changes in profitability as volumes change. However, if the tariff structure does not reflect marginal costs, then the DNSP will face profit risk as quantities change, since revenues and costs will vary in different proportions. The DNSP therefore has the means, and a potential incentive, to reduce the profit risk it faces.

As is the case with revenue yield controls, in circumstances where the DNSP is closely linked to a retail arm, and where prices under a weighted average price cap are set on a volume basis, incentives will exist to increase volumes.

A potential issue under a weighted average price cap is that the translation of revenue targets into weighted average price controls is often complex and may be subject to substantial error on the part of the regulator. This is especially likely to be the case where the regulator seeks to set multiple tariff baskets. In the presence of an unders and overs account, large ex post adjustments are likely to be required if substantial differences between actual and target revenues are to be avoided.

Also the manner in which the price cap is specified with respect to individual prices and weights in the revenue basket can constrain the development of new services and adjustment of existing prices. Where the structure and scope of services is relatively stable, this may not be a concern. In the context of the emerging market in energy and network services, it is arguably a relevant consideration although the higher the level at which tariff baskets are set the more likely the price cap mechanism will be to allow scope for new products.

In summary, price cap regulation has a number of advantages:

- it provides effective incentives for cost reduction and productivity improvements. It also provides an incentive for regulated organisations to invest in the adoption of technological improvements;
- it provides incentives to satisfy increasing demand as there is no limit to the revenue which a regulated organisation can generate;
- it provides price protection to individual users or purchasers of products and services; and

- it can provide a transitional mechanism to manage the reduction in rates over time if there is evidence that significant monopoly profits are being earned.

However, price cap regulation also suffers from disadvantages, since:

- the regulated entity may have reduced flexibility to adjust pricing in an attempt to maximise efficiency;
- translation of revenue targets into weighted average price controls is potentially complex and subject to errors; and
- service quality could be degraded under price cap regulation (similarly to under revenue controls) as incentives to cut costs through reduced service quality may be encouraged.

### 5.3 Hybrid forms of control

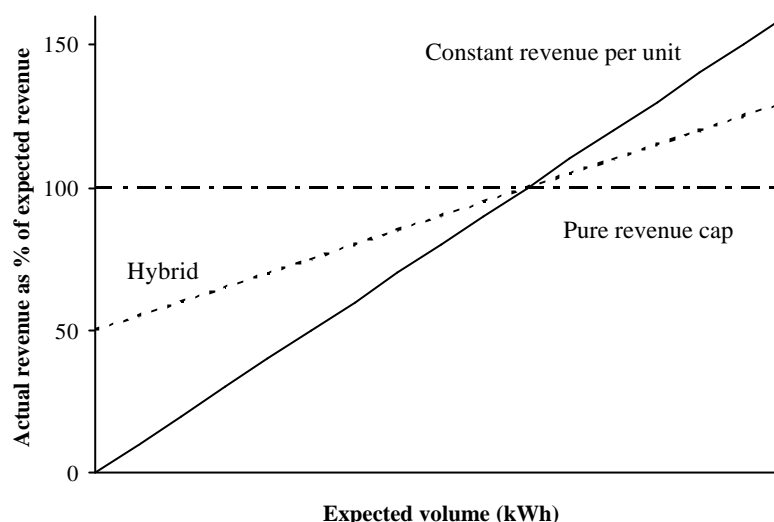
Hybrid controls come in a variety of forms. Typically, they contain a fixed revenue component combined with annual revenue drivers which may be based on service volumes, cost or performance related variables. They may be directed at revenue control and, by means of revenue incentives, specific aspects of DNSP performance. For example, customer numbers, energy consumption, energy demand, length of network lines and system losses are among the variables which can be included in the hybrid control formulae.

Variable revenue drivers are introduced into the control mechanism for two main purposes:

- to lessen the distortions created when customer driven changes in costs cannot be recovered by the DNSP, as occurs under a fixed revenue cap. Such costs include those associated with changes in the number and type of new connections, the volume of energy distributed and levels of peak demand; and
- to strengthen the incentives for particular outcomes (eg. in the case of reduced system losses).

Clearly there is a benefit/cost trade-off in the effort that may be required to develop a cost tracking formula which performs well. Most existing hybrid controls have very simple formulae, with no more than two or three service cost drivers.

As discussed below, the hybrid approaches adopted by electricity network regulators elsewhere are aimed at minimising the potential economic distortions created by the adoption of 'pure' forms of price control. In particular, a hybrid approach weakens the link between allowed revenue and volume, without eliminating it entirely. This is graphically presented in Figure 2.

**Figure 2: Comparison of alternative forms of price control**

The weakened link between volume and allowed revenue may provide incentives for participation in demand management programs in preference to network investment. This may be an important policy aim for governments where there are significant unpriced externalities associated with volume growth. However, it is likely that such policies are better implemented through more targeted mechanisms ensuring greater transparency and more efficient pricing. A benefit is that by retaining some link between allowed revenue and output, a hybrid control minimises the disincentive present under a pure revenue cap to encourage new connections and, potentially, to artificially discourage load growth.

The ‘weighting’ factor between the fixed and variable elements in some forms of hybrid controls are intended to reflect the cost drivers on the network business. For example, in the case of Northern Ireland where it was estimated that around 75 per cent of network costs were fixed, 75 per cent of allowed revenue was therefore fixed under the price control.

The advantage of this type of control is that total revenue is able to track total costs more closely than under a revenue yield or revenue cap approach, reducing the risk of persistently high profits or losses for the DNSP. This is similar to the potential benefit of the weighted average price cap which allows DNSPs to set tariff structures which better track costs. The main difference is that the hybrid system potentially makes this correlation explicit. Thus, where the variable costs of additional volumes largely matches the increase in revenues allowed under the form of regulatory control, the DNSP will be broadly indifferent to the volumes of units distributed.

The precise formulation of the hybrid control will determine the extent to which the DNSPs are able to structure and rebalance tariffs within the overall control.

Under a hybrid approach, the extent to which the allowed revenue of the regulated firm varies with output can be reduced. DNSPs are guaranteed a certain level of income, regardless of volumes distributed. This level of income can be chosen to reflect the fixed costs of providing the distribution service.

Additional volumes earn additional revenue at a level determined by the control. Where this variable revenue approximates the DNSPs’ variable distribution costs, profitability will remain broadly constant as volumes change. To the extent that the variable allowance under the control

does not approximate variable costs, the DNSP may retain some profitability risk, but this will be less than under a revenue yield control.

A negative factor is that pricing under a hybrid control is likely to less accurately track incremental costs than under a carefully structured price cap and the weakened link between allowed revenue and volume potentially reduces the incentive to maximise scale efficiencies compared to a weighted average price cap or revenue yield control.

The main advantages of a properly specified hybrid control therefore include:

- an increased incentive to participate in demand management programs compared to a pure revenue cap;
- the disincentive to expand distribution services in response to consumer demand is lowered;
- allowed revenues potentially move more closely in line with costs compared to revenue caps; and
- the financial risk borne by the distribution DNSP is lowered, since profits move more closely in line with volumes compared to revenue controls.

The main disadvantages of a hybrid control include the:

- potential difficulty and cost of developing an effective cost tracking formula;
- potential to less accurately track incremental costs than under a well specified price cap; and
- reduction in incentives to maximise scale efficiency compared to a price cap.

**The Authority seeks comment on the benefits of alternative forms of revenue or price control in the context of electricity distribution, and the preferred method for the current review.**

#### **5.4 Form of price control in other jurisdictions**

NSW distributors are currently subject to a hybrid revenue control. Allowed revenues are adjusted each year by a formula that takes into account energy distributed, customer numbers and, for the non-metropolitan distributors, changes in line length.

In Victoria the allowed revenue for the transmission NSP, GPU PowerNet, is dependent on the forecast of summer maximum MW demand. A revenue yield control is applied to the network operations of Victorian distributors. A maximum average charge in c/kWh is set by the regulator each year.

In the UK, in 1994 OFFER moved towards a hybrid revenue cap by varying the revenue formula, reducing the influence of volume to 50 per cent and introducing customer numbers as the revenue driver for the remaining 50 per cent.

## 6. KEY ISSUES IN INCENTIVE REGULATION

Incentive regulation is used as a substitute for the discipline of a competitive market and aims to replicate, as much as practicable, the beneficial effects of such a market. The form of regulation used, and the incentives it creates, will have a major impact on market outcomes. The regulatory regime used will be most effective where it provides positive incentives for DNSPs to improve efficiency and provides appropriate disincentives for inefficiency and poor quality of service.

As noted in Section 3, the Code requires that economic regulation of DNSPs be of the CPI-X form, or some incentive-based variant which is consistent with the objectives and principles outlined in the Code. Specifically, the regulatory regime should provide incentives for DNSPs to pursue efficiency gains by providing an opportunity to retain the benefits of improved profitability for a period of time.

Under a CPI-X formula, the revenue or price control cap set for each regulated DNSP will increase each year in line with general price increases (as measured by the CPI) but offset each year by the X factor, as determined by the Authority (Section 6.2).

Over time, improved efficiency will be translated into lower prices to system users. However, during the regulatory period, efficiency gains will translate into greater returns to shareholders as the entity's rate of return rises above that set initially by the regulator. An important balance must be struck to ensure gains are shared in a way that continues to provide appropriate incentives to management to improve performance, yet allows customers to benefit from reduced prices.

### 6.1 Regulatory risk

A major issue in incentive regulation is the commitment by the regulator to its revenue or price cap decision. In a regulated environment the actions of the regulator can influence the assessment of risk and expected returns by introducing significant new categories of uncertainty and risk.

Historically, under cost plus regulation, there were many examples of heavily regulated utilities that exhibited low levels of efficiency, poor investment practices and below average service performance. Clearly, repeated confiscation of the benefits of efficiency improvements combined with uncertainty over future regulatory actions will contribute to poor performance and welfare loss.

As the Australian regulatory environment matures, DNSPs will be able to draw some comfort from the precedents set by regulators. While not legally binding, statements about the approach to be taken at future reviews may help reduce regulatory uncertainty. Equally, regulators can help build confidence in regulatory regimes by not behaving opportunistically. The building of confidence in the regulatory regime also requires that any commitments entered into are capable of being honoured, perhaps in changed circumstances in the future. This may make it more difficult to provide tightly prescriptive commitments.

A key issue will be the extent to which current determinations or statements of approach can or should bind the actions of future regulators. This has both legal and policy aspects. A determination applies to a specific time period (the review period). Within the review period, details of the regulatory contract can be delineated. However, many of the benefit sharing aspects of incentive regulation relate to regulatory actions at the following review.

Both parties to the regulatory contract must be able to live with its terms. Thus, once an approach to benefit sharing has been agreed, the regulator should resist any pressure for retrospective adjustments (or ‘clawback’) if profit outcomes exceed expectations.

However, the regulator recognises that it is making decisions in an environment of information asymmetry, in which the regulated utilities will always have more information about their cost structures than the Authority. In recognising information asymmetry as an issue, the Code allows the regulator to revoke a determination based on false or materially misleading information, or if there was a material error in the setting of the revenue cap, and consent has been received from parties affected by the reopening of the revenue cap.

An adjustment other than that discussed above, would only be acceptable if the possibility of profit exceeding expectations was contemplated in the approach adopted and a process and criteria set out. Similarly, if revenue cap adjustment mechanisms are agreed, they should be allowed to work symmetrically. Prices should be allowed to rise as well as fall.

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

The form of regulatory commitment that can be made in order to ensure the effectiveness of the incentives offered will need to be explored. For example, it may be necessary to express benefit sharing and revenue reset commitments in terms of objectives and intentions rather than precise actions. This accords with a sensible approach to policy development over time. The opportunity to improve the efficiency of regulatory methods and measures in a manner consistent with the overall framework should not be sacrificed to contractual rigidity.

## 6.2 CPI-X incentive regulation

The Code requires that economic regulation of DNSPs be of the CPI-X form, or some incentive-based variant which is consistent with the objectives and principles outlined in the Code.

CPI-X approaches to regulation are formula driven, for example:

- price caps can be characterised as:  $P_{m,t} = P_{m,t-1} (1 + \text{CPI-X}) \pm Z$ ; and
- revenue caps can be characterised as:  $R_t = (R_{t-1} + \text{CGA} * \Delta \text{Cust}) * (1 + \text{CPI-X}) \pm Z^1$

or

$$R_t = R_{t-1} (1 + [\text{CGA} * \Delta \text{Cust}] + [\text{CPI-X}]) \pm Z^2$$

Where:

$P_{m,t}$  is the price for a prescribed market basket in time t;

CPI is the annual change in prices or price inflator/deflator;

X is the real reduction in prices that is imposed upon the regulated organisation;

<sup>1</sup> Applied when using a dollar basis for the customer growth factor.

<sup>2</sup> Applied when using a percentage basis for the customer growth factor.

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Z	is a cost passthrough variable;
$R_t$	is the authorised utility revenue for time t;
CGA	is a customer growth factor which can be expressed in either absolute dollar terms or in percentage terms;
$\Delta\text{Cust}$	is the annual change in the number of customers (or the annual change in output).

Consequently, for CPI-X incentive approaches to be implemented, the formulation of the control mechanism requires that the variables included in the formula be determined.

There are three generic sources of cost changes in a regulatory period with which price adjustment factors need to concern themselves. These are:

- cost inflation – external inflationary increases in the purchase price of inputs which the organisation uses in order to produce its output;
- productivity gains – whether from improved input productivity or growth; and
- cost passthrough – where the costs of external changes or shocks such as tax reform are passed through to customers.

#### *Cost inflation*

Ideally, different components of the regulated entities' cost base would be indexed using specific deflators so that the capital cost base might be adjusted using a relevant investment deflator while the operating costs base would use a relevant operating cost deflator.

However, traditionally, regulators have adopted the Consumer Price Index (CPI) as the inflator because it tends to be simple to apply and widely recognised and understood. Moreover, the regulated organisation cannot affect this measure, and it gives consumers clear and predictable signals about prices (Armstrong, et al 1995).

As the CPI is primarily designed to provide input into income adjustment processes, it is based on a representative basket of products and services for household consumption. Nevertheless, despite limitations such as an inability to properly account for quality changes, it remains a recognised measure of inflation for wider macroeconomic policy management (although underlying CPI is preferred for this purpose). In addition, it is used widely for general indexation of public and private sector contracts and charges. The ABS suggests that although the CPI is conceptually inappropriate for a large proportion of these applications, it does possess three features which satisfy the administrative requirements for indexation, namely, it is widely available, it is timely and it is not subject to revision.

Another concern is that the bundle of products and services used in determining the CPI may bear little resemblance to the inputs of the electricity industry. However, Kiss (1991), concluded that "...the experience of the telecommunications industry in the US has been that CPI provides a useful surrogate for the input price indexes of the regulated telecommunications carriers". Nevertheless, there is no electricity specific cost index in Australia, and even if there were, the relatively small number of DNSPs in Australia might compromise its efficacy.

### *Productivity gains and the X factor*

The key design issue for both price caps and revenue caps is the selection of X. X is the real (normally annual) reduction in price (or total revenue earned) by the regulated organisation. Often, when assigning an X factor to a regulated organisation, the X represents the anticipated efficiency improvement. However, in practice, a number of factors, beyond anticipated productivity improvement, could be considered in making an informed judgement about the quantum of X.

Indeed, it may be more useful to consider the X factor in the context of the underlying rationale for incentive regulation – which relates to providing incentives for the regulated organisation to improve its business. Often, investments in value adding initiatives and innovation that may be undertaken by a regulated organisation may have more to do with quality of service or minimising system losses rather than cost savings.

Determining an appropriate X value involves a trade-off. If customers are to benefit from the electricity reforms, and the regulatory framework is to protect them from the exercise of monopoly power, a forward-looking benchmark cannot depart too far from the costs of an efficient DNSP. But, if benchmarks are adjusted too quickly or too closely towards the efficient costs of a best practice DNSP, the incentive for out-performance against the benchmark will be lost or reduced substantially.

In striking a balance between setting prices that reflect costs and providing incentives to improve efficiency, the price review must also take account of some practical realities. The absence of competitive market discipline and information asymmetry between the DNSPs and the regulator make it difficult to establish with precision what the costs of an efficient DNSP actually are. Once benchmarks have been established, it may be difficult to distinguish between out-performance due to genuine efficiency improvements and that due to market and economy-wide developments beyond managerial control.

A further issue is that the DNSPs are relatively new so that limited reliable and comparable historical information is currently available to the regulator and the community about their financial performance and efficiency track record. The Authority will need to consider the relative merits of externally determined and DNSP-specific benchmarks in this context, as well the types of industry and DNSP-specific information it will need to have to evaluate appropriate financial and service quality performance benchmarks.

Methods for determining the value of X can be divided between cost linked (ie. an organisation specific standard) or cost unlinked (ie. an industry or economy wide standard not directly related to the regulated organisation's costs of operation) methods.

Given the aims of incentive regulation outlined above, the issues that might be considered in quantifying an X factor include:

- the capacity of the regulated organisation to reduce costs without compromising customer service quality requirements;
- the opportunities available to the regulated organisation to increase the value of its business;
- the advantages and opportunities to encourage growth in the market;
- the ability of the organisation to finance its operations;

- the impact of asset valuation approaches, in particular the impact of optimisation, on realistic productivity improvement capabilities; and
- desired transitional paths, eg. to allow a period of adjustment to new rates.

In translating anticipated cost savings to the determination of X (recognising the significance of the other factors mentioned above), regard should be had to the future scope for productivity improvements in the regulated organisation relative to productivity growth in the economy or industry as a whole. For example, consider a regulated organisation that is assessed as being operationally efficient, with input costs rising with CPI, and expected productivity growth in the industry of two per cent per annum. In such a case, an X factor of two might be expected (at least to the extent that expected productivity growth determines the X factor).

#### *Multiple choice X factors*

Menu-based approaches to setting the value of X have been suggested as a response to concerns regarding the judgement required in setting X (and criticism of the use of external benchmarks as an automatic X setting mechanism). Crew and Kleindorfer (1996) comment that in view of the judgement required to set the X factor, and in view of the asymmetries of information, in that the company has better information in determining the X factor than the regulator, an alternative is to allow the company a more active role in setting the X factor.

Multiple choice menus have the potential advantage of reducing the risks of expressing the outcome of a regulatory review as a single X factor for each DNSP (which will apply for a minimum of three years). Instead, the regulator structures a set (or menu) of options combining different X factors with different benefit shares in the future regulatory period (Section 6.6). Lower X factors in the current review period would be associated with lower sharing factors for the DNSP in the next review period and vice versa. The utility chooses the option that maximises its position. In so doing, it may move closer to its optimal performance with some net welfare gain for customers.

Whilst there is a continuing requirement for the options to be carefully structured, the regulator at least has the opportunity to apply a risk adjusted value analysis, potentially allowing better use of the information available to it.

#### *Use of CPI-X in other jurisdictions*

Overseas, a CPI-X approach has been adopted in regulatory regimes of the United Kingdom, New Zealand and in some areas of the United States. Nationally, the ACCC is using a CPI-X approach for regulating transmission network service providers and the State based regulators, including ORG, IPART and IPARC are also proposing to use some variant of CPI-X incentive regulation, as set out in their current regulatory review consultation papers.

**The Authority seeks comment on whether CPI-X is considered the most suitable approach to incentive regulation and on the most appropriate method for determining the X Factor.**

### **6.3 Cost passthrough**

A cost passthrough allows a regulated organisation to increase its price or revenue cap in response to an increase in an input cost that is typically beyond the regulated organisation's control and is readily observable. Cost passthrough can also equally apply to decreases in input costs. Cost passthrough arrangements shift the risk associated with a specific input cost from the regulated organisation to the customer. However, because cost passthrough usually only applies to costs that are beyond the regulated organisation's control, the approach could be seen as a way to avoid regulated organisations being subject to windfall gains and losses.

The ORG (1998) considers windfall profits (or losses) should be passed on to customers from the outset of the next price control period and is confident that doing so will not compromise long term efficiency incentives. However, the ORG considers that the identification of these windfall profits (or losses) could require significant regulatory intervention in the operations of the business as all relevant cost and revenue impacts need to be categorised as controllable or uncontrollable factors. This approach, if inappropriately applied, could increase regulatory risk and potentially lead to micro-management of the regulated organisation.

**The Authority seeks comment on the use of cost passthrough under an incentive regulation regime.**

#### 6.4 Quality standards

Under all forms of financial regulation of monopolies, there is a risk that the regulated business may try to reduce costs and hence increase profits through reducing the quality of services offered to users. In Queensland, Section 92 of the *Electricity Act 1994*, specifies that service standards may be set by regulation. The QCA's role is limited to monitoring, investigating and reporting on compliance with the standards. At present, no service standard regulations have been promulgated. Clearly, assessment of revenue requirements for DNSPs must take into consideration any service quality standards and, in particular, how such standards might require a change in the level of service by DNSPs compared to current arrangements and the cost impacts thereof.

As such, the Authority will seek clarification of this issue from the Department of Mines and Energy prior to finalising the price review.

#### 6.5 Period of regulation

In order to achieve efficiency gains, the regulatory period must be long enough for management initiatives to be implemented and take effect. The period must also be long enough to discourage measures to improve the profitability of the business in the short term at the expense of longer term considerations. For example, sharp reductions in system maintenance would increase the profitability of the network business in the short term, but at the expense of system degradation and risk of failure. Longer term objectives, such as more efficient network operation and utilisation, must be allowed a sufficiently long period to return benefits during the regulatory period. The extent to which benefits are rolled into the next regulatory period through benchmarking or 'glide paths' in price adjustments will have an important impact on incentives and risks (Section 6.6).

Efficiency gains made during the regulatory control period (over and above that reflected in the X factor) may be shared by owners and users at the end of the regulatory period, or during the following period. Again, the nature of the sharing mechanism will affect the amount of incentive provided to achieve efficiency gains, particularly those gains arising from 'out-performance' of the regulatory incentive regime. Generally, the longer management is able to retain the benefits of increased efficiency in the business through higher profits, the greater the incentive to pursue those initiatives but the longer customers must wait to share in the benefits.

A countervailing influence is that the incentive based regulatory regime for DNSPs in Australia is still very much in a formative stage and as such there is a degree of risk that a longer regulatory control period at this point in time may result in a significant disparity between costs and revenues towards the end of the period. Also, given the Authority's acceptance of the need for commitment to the regulatory compact while also needing to look after the interests of network users, it may be appropriate to set a shorter rather than longer regulatory control period for the current review. While this would minimise the effect of any information asymmetry, it would reduce the effectiveness of the incentive regime.

As noted in Section 3, the Code requires a minimum regulatory control period of three years for regulation of distribution businesses. The ACCC uses a five year control period for regulating transmission businesses (the minimum allowed under the Code for transmission businesses) while Victoria uses five years as mandated by the Tariff Order. NSW has indicated a preference for a period between three to five years.

**The Authority seeks comment on the optimum period for regulation for the first regulatory period.**

## 6.6 Future regulatory period adjustment process

The essence of incentive regulation involves offering the regulated organisation an incentive to outperform the X factor, as doing so will enable it to increase profitability. However, the incentive to outperform is likely to be undermined if the organisation believes its out-performance will be immediately returned to customers at the end of the period (especially if the regulatory review period is relatively short as discussed above).

Part of the desirability of incentive regulation stems from the fact that customers should ultimately share in any benefit of superior performance. Questions therefore arise as to:

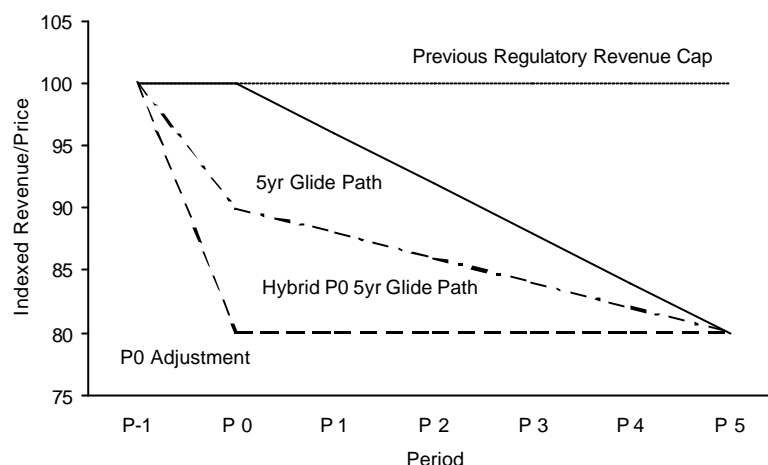
- the extent to which out-performance of the X factor benchmark should be shared with customers;
- the period over which it should be shared with customers; and
- the profile of the sharing arrangements.

However, different considerations could apply to the extent that the determination of the X factor is based on providing a transitional phase for the removal of monopoly profits.

There are several possible approaches that may be adopted to share the benefits of out-performance of X with customers, including:

- a glide path – gains are passed on to customers either entirely (full glide path) or partially (partial glide path) over time, thereby allowing the regulated organisation to realise profit benefits of efficiency gains for a period beyond the regulatory review period (eg. the out-performance may be spread over the next regulatory review period);
- one-off reductions – gains in excess of those stipulated by X in the previous period are passed directly on to consumers in the development of new service prices at the commencement of the next price review (a  $P_0$  adjustment); and
- gains maintenance – the full gains for each year are retained by the regulated organisation for a pre-specified time (eg. five to ten years) unconnected to any regulatory review whereupon gains are passed onto customers in a one-off or phased reduction.

In practice, there are many judgements to be made in applying a benefit sharing arrangement. This merely reflects the range of possible variations. For example, a glide path could incorporate a one-off reduction at the commencement of the following review period (a  $P_0$  adjustment). It could return the benefit of out-performance over a long period (say, ten years) or a shorter period (say, five years). A graphical presentation of some of these options is provided in Figure 3. The key issue to be considered is the trade-off between the passing on of benefits to customers in a reasonably timely fashion, against the risk of reducing the incentive for regulated organisations to pursue efficiency gains in excess of the X factor.

**Figure 3: Possible adjustment mechanisms**

In addition, it might be expected that the approach adopted would have some impact on the regulated organisation's incentive to pursue efficiency gains at the beginning and the end of regulatory review periods. For example, where out-performance is passed on to customers as a  $P_0$  adjustment, the regulated organisation will have little incentive to invest in efficiency enhancements towards the end of any regulatory period.

Gains maintenance offers the regulated organisation a certain period to retain the benefit of any out-performance it achieves. One advantage of this approach is that it may reduce the incentive for regulated organisations to defer the pursuit of cost savings until the beginning of the next regulatory review period.

The Office of the Rail Regulator (ORR) in the United Kingdom favours use of a glide path approach in order that incentives to reduce costs and improve efficiency are consistent across the control period. The Office of the Water Regulator (OFWAT) in the UK also favours a glide path mechanism whereby the regulated organisation retains the full benefit of its out-performance during the current control period, after which it is transferred to customers over the next ten years. IPART has favoured a combination of a glide path with a one-off adjustment.

Under the current price control arrangements the UK Office of the Electricity Regulator (now the Office of Gas and Electricity Markets) does not have an efficiency sharing mechanism (although error correction mechanisms or cost passthrough are allowed under some circumstances). However, at vesting, the Government put in place initial price controls on the electricity businesses for a period of five years. Over the period of these initial controls, it became apparent that the electricity businesses were able to cut their costs and increase profits to a degree much greater than expected. OFFER subsequently introduced revised distribution price controls for England and Wales in 1995 and 1996 which required cuts in real terms of 11-17 per cent in 1995-96 and further reductions between 10-13 per cent in 1996-97. Thereafter, charges were required to fall by 3 per cent per annum in real terms for the duration of the price control period (until March 2000).

**The Authority seeks comments on appropriate sharing mechanisms for incentive regulation, including mechanisms to share the benefits of reasonable efficiency gains achieved within the regulatory period, gains arising from 'out-performance' of the regulatory mechanism, and 'windfall gains'.**

## 7. PRESCRIBED SERVICES

Clause 6.10.4 of the Code requires the jurisdictional regulator to determine which, if any, distribution services are ‘prescribed distribution services’, and which are ‘excluded distribution services’. Prescribed distribution services are to be subject to regulation under the Code while excluded distribution services are those which it may be appropriate to apply a more light-handed regulatory approach.

In determining what constitutes prescribed and excluded services the Authority is required to have regard to:

- the principles for regulation of distribution service pricing described in clause 6.10.3;
- the extent of effective competition in the provision of the distribution service;
- whether sufficient competition exists to warrant the application of a regulatory approach which is more ‘light handed’ than the approach described in clause 6.10.5;
- the effectiveness of the form of economic regulation specified under clause 6.10.5 in achieving the efficiency objectives included in clause 6.10.2; and
- the form, if any, of that regulation.

Section 5 of Schedule 6.6 of the Code (Attachment B) lists services and activities that the Authority may define as excluded distribution services. Effectively, prescribed services are defined as those associated with the physical distribution infrastructure such as substations, wires and poles.

### 7.1 Definition of prescribed services in other jurisdictions

In its draft Statement of Principles for the Regulation of Transmission Revenues, the ACCC has not addressed the issue of prescribed services. As a result all services currently provided by TNSPs are to be treated as prescribed services.

The Independent Pricing and Regulatory Tribunal (IPART) has indicated its intention to define prescribed distribution services as those services performed by the DNSPs which are associated with, or ancillary to, access to the network and the delivery of electricity within each DNSP’s service area. Those services which are subject to effective competition will be eligible for exclusion. At this stage all network services are deemed to be prescribed distribution services and IPART will consider excluding services on a case by case basis upon request. The DNSP would need to demonstrate to the Tribunal that effective competition exists in that market – the presence of nominal competition is unlikely to be sufficient.

In Victoria, clause 5 (Distribution Network Tariffs) of the Victorian Electricity Supply Industry Tariff Order (the Tariff Order) regulates the Distribution Use of System (DUOS) charges for local distribution businesses, with clause 5.7 explicitly setting out the excluded services. This clause has the effect of allowing a distributor to levy additional charges for certain services and other matters relating to its distribution business excluded from the price controls specified in clause 5. Under clause 5.7.4, the following services are not excluded services:

- (a) the transportation of electricity (except for electricity not consumed in the distributor's distribution system and electricity to EHV Customers<sup>3</sup> and the distribution of electricity to customers connected to specific existing connection points);
- (b) the carrying out of works or the provision of maintenance or repair for the purpose of carrying out distribution of electricity; and
- (c) the provision, installation and maintenance of any meters, switchgear or other electrical plant (except the provision of pre-payment meters to customers and the charges for the provision of metering to a standard in excess of that required for the billing of Network Tariffs).

South Australia has received derogations from the Code allowing the South Australian Government to determine distribution pricing until 31 December 2002. After this date, distribution pricing will be regulated by the South Australian Independent Industry Regulator (SAIIR) as the jurisdictional regulator under the Code. The issue of prescribed distribution services has therefore not yet been addressed in South Australia.

In its draft report the Office of the Tasmanian Electricity Regulator (OTTER) has not specifically addressed the issue of prescribed distribution services. No reference has been made to either prescribed or excluded services.

## 7.2 The Authority's approach

The Code requires concerns over monopoly pricing, where economically efficient and practicable, to be addressed through the introduction of competition in the provision of distribution services. Where this is not practicable, economic regulation is to be applied.

Therefore, in determining what constitutes prescribed services, the Authority must initially aim to identify services where competitive pressures are absent, barriers to entry exist, or where the service provider can exercise substantial market power. Once identified, these non-contestable services will form the foundation of prescribed distribution services, with the assets required to deliver the prescribed distribution services forming the regulatory asset base.

### The Authority seeks comments on:

- **the appropriate methodology for determining prescribed distribution services and excluded distribution services; and**
- **the services to be included as prescribed distribution services.**

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<sup>3</sup> EHV Customer in relation to a Distributor means a Distribution Customer of the Distributor taking electricity at a nominal voltage of 66 kV or more.

**ATTACHMENT A****EXCERPTS FROM THE NATIONAL ELECTRICITY CODE****6.10.2 Objectives of the distribution service pricing regulatory regime to be administered by the Jurisdictional Regulators**

The distribution service pricing regulatory regime to be administered under Part D of the Code must seek to achieve the following outcomes:

- (a) an efficient and cost-effective regulatory environment;
- (b) an incentive-based regulatory regime which:
  - (1) provides an equitable allocation between Distribution Network Users and Distribution Network Owners of efficiency gains reasonably expected by the Jurisdictional Regulators to be achievable by the Distribution Network Owners;
  - (2) provides for, on a prospective basis, a sustainable commercial revenue stream which includes a fair and reasonable rate of return to Distribution Network Owners on efficient investment, given efficient operating and maintenance practices of the Distribution Network Owners;
  - (3) ensures consistency in the application of regulations applicable to:
    - (i) connection to distribution networks; and
    - (ii) distribution service pricing;
- (c) prevention of monopoly rent extraction by Network Owners;
- (d) an environment which fosters an efficient level of investment within the distribution sector, and upstream and downstream of the distribution sector;
- (e) an environment which fosters efficient operating and maintenance practices within the distribution sector;
- (f) an environment which fosters efficient use of existing infrastructure;
- (g) reasonable recognition of pre-existing policies of governments which are Distribution Network Owners regarding distribution asset values, revenue paths and prices;
- (h) promotion of competition in upstream and downstream markets and promotion of competition in the provision of network services where economically feasible;
- (i) reasonable regulatory accountability through transparency and public disclosure of regulatory processes and the basis of regulatory decisions;
- (j) reasonable certainty and consistency over time of the outcomes of regulatory processes, recognising the adaptive capacities of Code Participants in the provision and use of distribution network assets;

- (k) reasonable and well defined regulatory discretion which permits an acceptable balancing of the interests of Distribution Network Owners, Distribution Network Users and the public interest.

### 6.10.3 Principles for regulation of distribution service pricing

The regime under which the revenues of Distribution Network Owners and Distribution Network Service Providers (as appropriate) are to be regulated is to be administered by the Jurisdictional Regulators in accordance with the following principles:

- (a) Concerns over monopoly pricing in respect of the distribution network will, wherever economically efficient and practicable, be addressed through the introduction of competition in the provision of distribution services.
- (b) Where pro-competitive and structural reforms alone are not a practicable or adequate means of addressing the problems of monopoly pricing in respect of distribution services or protecting the interests of Distribution Network Users, the form of economic regulation to be applied is described in clause 6.10.5.
- (c) The form of economic regulation applied by the Jurisdictional Regulators must not be changed during a regulatory control period.
- (d) Subject to clause 6.10.3(c), if a Jurisdictional Regulator proposes to amend the form of economic regulation specified in clause 6.10.5 applied to a Distribution Network Owner, the Jurisdictional Regulator must:
  - (1) give two years prior notice to the Distribution Network Owner of the new economic regulation arrangements to apply from the commencement of the next regulatory control period; and
  - (2) publish a description of the process and timetable for re-setting the form of economic regulation at a time which provides all affected parties with adequate notice to prepare for, participate in, and respond to that process, prior to the commencement of the regulatory control period to which that form of economic regulation is to apply.
- (e) The regulatory regime to be administered by the Jurisdictional Regulator must be consistent with the objectives outlined in clause 6.10.2 and must also have regard to the need to:
  - (1) provide Distribution Network Owners with incentives and reasonable opportunities to increase efficiency;
  - (2) create an environment in which generation, energy storage, demand side options and network augmentation options are given due and reasonable consideration;
  - (3) take account of and be consistent with the allocation of risk between Network Owners and Network Users;
  - (4) take account of and be consistent with any obligations of Code Participants in relation to distribution networks under Chapter 5;
  - (5) provide a fair and reasonable risk-adjusted cash flow rate of return to Distribution Network Owners on efficient investment given efficient operating and maintenance practices on the part of the Distribution Network Owners where:

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- (i) assets created at any time under a take or pay contract are valued in a manner consistent with the provisions of that contract;
  - (ii) subject to clause 6.10.3(e)(5)(i), assets (also known as ‘sunk assets’) in existence and generally in service on 1 July 1999 are valued at a value determined by the Jurisdictional Regulator or consistent with the regulatory asset base established in the participating jurisdiction;
  - (iii) subject to clause 6.10.3(e)(5)(i), valuation of assets brought into service after 1 July 1999 (‘new assets’), any subsequent revaluation of any new assets and any subsequent revaluation of assets existing and generally in service on 1 July 1999 is to be undertaken on a basis to be determined by the Jurisdictional Regulator. In determining the basis of asset valuation to be used, the Jurisdictional Regulator must have regard to:
    - A the agreement of the Council of Australian Governments of 19 August 1994, that deprival value should be the preferred approach to valuing network assets;
    - B any subsequent relevant decisions of the Council of Australian Governments; and
    - C such other matters reasonably required to ensure consistency with the objectives specified in clause 6.10.2; and
  - (iv) benchmark returns to be established by the Jurisdictional Regulator are to be consistent with the method of valuation of new assets and revaluation, if any, of existing assets and consistent with achievement of a commercial economic return on efficient investment;
- (6) provide reasonable certainty and consistency over time of the outcomes of regulatory processes having regard for:
- (i) the need to balance the interests of Network Users and Network Owners;
  - (ii) the capital intensive nature of the distribution sector, the relatively long lives of distribution assets, and the variable and frequent augmentation of the distribution network;
  - (iii) the need to minimise the economic cost of regulatory actions and uncertainty;
  - (iv) relevant previous regulatory decisions made by authorised persons including:
    - A the initial revenue setting and asset valuation decisions made by a government at a time at which that government was a Distribution Network Owner in the context of industry reform pursuant to the Competition Principles Agreement;
    - B decisions made by Jurisdictional Regulators and any regulatory intentions previously expressed; and
    - C decisions made by ministers under jurisdictional legislation.
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**ATTACHMENT B****EXCLUDED DISTRIBUTION SERVICES (Section 5 of Schedule 6.6 of the NEC)**

Services and activities that the Jurisdictional Regulator may define as excluded distribution service may include but are not limited to the following:

- (a) the transportation of electricity not consumed in the Distribution Network Service Provider's system (ie. on behalf of another DNSP);
- (b) new connection and augmentation of existing connection to the distribution network;
- (c) services (including metering, electric lines or electrical plant) for the specific benefit of any network user requested by that network user and not made available by the DNSP as a normal part of prescribed distribution service to all customers. These services can include:
  - (i) charges for moving mains, services or meters forming part of the distribution network to accommodate extension, redesign or redevelopment of any premises;
  - (ii) the provision of electric plant (ie. mobile generators) for the specific purpose of enabling the provision of top-up or standby supplies of electricity; and
  - (iii) the provision of prepayment meters to customers, but only to the extent that the charge for the provision of standard meters for such customers;
- (d) the relocation of electric lines and plant and the carrying out of associated works pursuant to any statutory obligations imposed on the DNSP;
- (e) charges for temporary supplies;
- (f) capital contributions or other forms of prudential requirements for new works and augmentations;
- (g) charges for reserve and duplicate supply;
- (h) charges for supplies with higher quality and reliability standards than required by general practice;
- (i) charges for connection points requiring more than the least overall cost, technically acceptable assets;
- (j) charges for distribution services and system augmentation required to receive energy from an Embedded Generator;
- (k) charges for generator access for Embedded Generators under clause 5.5;
- (l) charge for non-compliance with the connection agreement, including but not limited to reactive power, power factor, harmonics, voltage dips and test supply requirements;
- (m) charges for multiple connection points to a single property not recovered through prescribed distribution service prices;
- (n) charges for public lighting;

- (o) charges for provision of metering to a standard in excess of that required for the billing of prescribed distribution network service.

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