



Discussion Paper

**Review of the Form of Regulation of
Electricity Distribution**

October 2002

SUBMISSIONS

Public involvement is an important element of the decision-making processes of the Queensland Competition Authority (the Authority). It therefore invites submissions from interested parties concerning its review of the form of regulation of Queensland electricity distribution prices.

Written submissions should be sent to the address below. While the Authority does not necessarily require submissions in any particular format, it would be appreciated if two printed copies are provided together with an electronic version on disk (Microsoft Word format) or by e-mail. Submissions, comments or inquiries regarding this paper should be directed to:

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The **closing date** for submissions is 31 December 2002.

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 that 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. It would also be appreciated if two copies of each version of these submissions (that is, the complete version and another excising confidential information) could be provided. Again, it would be appreciated if each version could be provided on disk. 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. Notwithstanding this, there is a possibility that the Authority may be required to reveal confidential information as a result of an FOI request.

Public access to submissions

Subject to any confidentiality constraints, submissions will be available for public inspection at the Brisbane office of the Authority, or on its website at www.qca.org.au. If you experience any difficulty gaining access to documents please contact the Authority on (07) 3222 0555.

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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1. INTRODUCTION

The Queensland Competition Authority's responsibilities with respect to electricity are set out in the *Electricity – National Scheme (Queensland) Act 1997*, which gives effect to the National Electricity Code (the Code). The Code sets out the objectives for the National Electricity Market, and in particular 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 and to prepare ring-fencing guidelines. The Authority also has responsibilities under 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 Treasurer.

1.1 Current regulatory arrangements in Queensland

The Authority's Final Determination on the Regulation of Electricity Distribution (QCA 2001) sets the regulatory framework for 1 July 2001 to 30 June 2005. In preparing its Determination, the Authority considered submissions from the distributors (ENERGEX and Ergon Energy) and other interested parties in response to a series of Issues Papers (released during 1999 and 2000) and a Draft Determination released by the Authority in December 2000. The Authority also relied on data supplied by the distributors and on analysis undertaken by a number of independent consultants with specialist skills in various areas. All of these documents are available on the Authority's website at www.qca.org.au.

Under the Code, the Authority is responsible for ensuring that the prices ultimately charged to customers for services provided by the electricity distribution networks reflect the efficient costs of providing those services. In its Final Determination, the Authority opted to regulate the Queensland electricity distribution networks by setting a fixed revenue cap for each of the four years of the proposed initial regulatory period, along with some secondary price controls to limit price shocks to customers. By controlling the amount of revenue each distributor is able to raise during a year, the Authority aimed to remove the possibility for the distributors to use their monopoly position to extract more than a fair price for the services they provide. In setting the revenue caps, the Authority was required to determine what would be a fair and reasonable level of revenue, balancing both the interests of the businesses and the interests of the broader community.

As the current (initial) set of regulatory arrangements only came into effect from 1 July 2001, the Authority is yet to accumulate the information necessary to assess the outcomes of the current arrangements. For example, the first set of regulatory accounts for 2001-02 will not be available to the Authority until the end of October 2002. However, the current arrangements appear to be operating smoothly with no indication of pending problems in terms of implementation or outcomes.

1.2 The current review

Section 6.10.3(d) of the Code requires:

(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.

In accordance with these requirements, the Authority is conducting a review to decide whether it will retain the current form of economic regulation or adopt an alternative form. If the Authority should decide to amend the current form of regulation, the Authority would need to inform stakeholders by 1 July 2003 of any proposed amendments to the current form of regulation. As required by the Code, the following timetable provides an overview of the process for re-setting the regulatory arrangements at the end of the current regulatory period.

Action	Date
Release discussion paper on form of economic regulation	Before end October 2002
Receive submissions from interested parties	31 December 2002
Decide form of economic regulation and inform stakeholders	By 30 June 2003
Release discussion papers on 2005 price determination	From 1 July 2003
Release 2005 price determination	March 2005

The purpose of this discussion paper is to assist stakeholders in making submissions to the Authority in relation to its review of the form of economic regulation for Queensland distributors. It draws on relevant material presented previously by the Authority and by other regulators, particularly IPART in its recent review of the form of regulation for distributors in New South Wales (IPART 2001, 2002).

2. SCOPE OF THE REVIEW

The Authority's *Regulation of Electricity Distribution: Final Determination* established a regulatory regime based on a fixed revenue cap, with side constraints on prices, to regulate the prices charged by Queensland distributors for network services. The purpose of this review is to decide whether the Authority should retain the current form of regulation or adopt an alternative form for the next regulatory period commencing July 2005.

2.1 Options for the form of economic regulation

The forms of regulation the Authority can consider, and its objectives in selecting the most appropriate one, must comply with clause 6.10.5(a) of the Code, which prescribes 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 of the Code.

This limits the Authority to using a CPI – X approach, whereby the allowed revenue or prices that are established at the start of the regulatory period are adjusted each year by inflation, as measured by the consumer price index (CPI), minus an adjustment factor 'X'.

Clause 6.10.5(b) further stipulates that:

- the jurisdictional regulator shall specify the form of economic regulation to be applied to the distributor to be in the form of either:
 - a revenue cap; or
 - weighted average price cap; or
 - a combination of the above.

The aim of the current review is to decide which of these three forms of regulation the Authority will use in the next regulatory period. While the objective of the current process is to determine the form of regulation to apply from July 2005, the specific details of how that form of regulation is to be implemented, including issues associated with establishing the initial level of allowed revenues or prices and the X factor, will be decided subsequently as part of the process of preparing the Authority's 2005 determination of electricity regulation. Issues that will be considered as part of that process include:

- appropriate rates of return on and of assets;
- operating and maintenance expenditure and the scope for efficiency improvements;
- capital expenditure requirements over the regulatory period; and
- forecast changes in demand for distribution services.

Finally, the Authority, in its Final Determination (2001), stated its intention to incorporate some form of service quality incentive mechanism into the regulatory arrangements for the next regulatory period. Work is being undertaken separately to investigate possible means of achieving this objective. Possible approaches may include the use of a second adjustment factor, 'S', in the CPI – X mechanism, to adjust allowed revenues or prices for service quality performance over the regulatory period. However, the Authority does not consider that, of

itself, including a service quality incentive mechanism in the regulatory arrangements applying in the next regulatory period would constitute a change in the form of regulation.

2.2 Objectives in selecting the most appropriate option

Clauses 6.10.2 and 6.10.3 of the National Electricity Code set 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.

The objectives and principles set out in the Code are quite lengthy and general in nature and, as a consequence, are at times open to differing interpretations. Nevertheless, there are a number of central themes contained in this section of the Code that provide guidance for establishing a regulatory framework. These include implementing:

- an efficient and cost effective regulatory environment which ensures that network owners do not exploit their position as monopoly service providers;
- an incentive-based regulatory regime which will equitably distribute efficiency gains between stakeholders while providing sustainable commercial returns to network owners;
- a regime which fosters competition in the provision of distribution services as a means of addressing concerns over monopoly pricing wherever economically efficient and practical to do so; and
- an environment which fosters an efficient level of investment within the distribution sector.

Not all of the objectives and principles in Clauses 6.10.2 and 6.10.3 of the Code are of concern for the purposes of the current exercise, which is limited to deciding which of the three forms of regulation stipulated in the Code will be used in the next regulatory period. For example, objectives in relation to prevention of monopoly rent extraction (clause 6.10.2(c)), rates of return (clause 6.10.2(b)(2)), and the efficiency of operating and maintenance expenditure (clause 6.10.2(b)(2)), are more relevant to decisions about other aspects of the regulatory framework, such as how the initial level of allowed revenues or prices are determined and the magnitude of the X factor. While these issues will be dealt with as part of the subsequent development of the next regulatory arrangements, the Authority welcomes any comments that stakeholders wish to submit in relation to the broad objectives of regulation and the choice of the form of regulation in the next regulatory period.

With respect to which of the three forms of regulation stipulated in the Code is most appropriate, a number of objectives have traditionally been given high priority by regulators (for example, IPART, 2001), as follows:

- minimise the overall cost of volume risk;
- provide distributors with incentives to set efficient prices;
- provide flexibility in pricing design;
- not be highly sensitive to inaccurate volume forecasts;
- provide incentives to reduce costs;
- not constitute a barrier to demand management;

- minimise problems associated with reconciling forecast and actual volumes of electricity distributed;
- be transparent; and
- require minimal mid-period adjustments of the revenue or price caps.

The Authority seeks the views of stakeholders on what criteria the form of regulation should be assessed against and the relative importance of each of these.

3. OPTIONS FOR THE FORM OF REGULATION

This chapter provides a brief explanation of different forms of regulation available to the Authority for use in the next regulatory period. In an earlier Issues Paper (*Electricity Distribution: Framework for Regulation*, 1999) and in its Draft and Final Determinations on *Regulation of Electricity Distribution* (2000 and 2001), the Authority described in some detail the alternative forms of regulation that could be applied to the regulation of electricity distribution. Much of that discussion is reproduced in this chapter.

3.1 Revenue cap approach

Fixed revenue cap

Under a fixed revenue cap, a distributor's gross revenues from prescribed distribution services are limited to a fixed amount. The cap is usually subject to an annual adjustment for productivity gains and inflationary effects. In a typical revenue cap application, an initial revenue cap for a level of service is set according to traditional building block procedures (Armstrong, 1994). Thereafter, real revenue (inflation adjusted revenue) is typically reduced each year by an adjustment or 'X' factor until the next review. This is the approach that the Authority implemented for the current regulatory period.

The X factor is a pre-determined annual scaler applied to the distributor's forecast revenue without reference to its actual earned rate of return. It represents the percentage reduction in revenue the organisation is deemed capable of achieving, taking account of efficiency improvements, without jeopardising its financial integrity. If the distributor 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.

Fixed revenue caps can be established for individual segments of the business or the entire business. Fixed revenue caps may provide considerable discretion to distributors to set prices for their services within the revenue cap. Under 'pure' revenue caps, the distributor is free to set prices as it wishes. However, in practice, prices are often subject to side constraints to minimise price shocks for customers or groups of customers, particularly in the early years of regulation.

Fixed revenue caps are generally accompanied by an 'unders and overs' account which allows the distributor 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 distributor's weighted average cost of capital, is applied to the unders and overs account to address timing issues.

Average revenue cap

Under an average revenue cap (or revenue yield) approach, the regulator sets a cap specifically on average revenue per unit of output (total revenue divided by total output). Under this approach, revenue varies directly with output, as allowed revenues for a distributor vary in line with the volume of energy transported over their network. In effect, allowed revenue is a product of the average revenue cap and actual output. Energy consumption becomes a driver of revenues for the distributor.

Unlike a fixed revenue cap, an average revenue cap provides incentives for distributors to satisfy increasing demand, as there is no limit to the total revenue that a distributor can generate. However, as there is a link between revenues and output, which in turn will be linked to some extent to costs, the danger of the distributor suffering sustained losses, or making sustained profits not anticipated by the regulator, due to changes in output, is reduced.

3.2 Weighted average price cap

Price cap regulation aims to control the prices charged by the distributor, rather than its total or average revenue. In a typical price cap application, for a given level of service, prices are initially set according to traditional building block procedures, similar to the revenue caps except that the cap applies to particular prices rather than total revenues.¹

With a weighted average price cap approach, a number of weighted prices may be established for different sections of the distributor or a single, high level, weighted average price may be established for prescribed services of the distributor. In deriving the weighted average price, the weights chosen may be based on a range of factors. They may be fixed by 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.

3.3 Combinations of revenue and weighted average price caps

Hybrid revenue cap

A hybrid revenue cap is effectively a combination of a price cap and a revenue cap. A hybrid revenue cap combines a fixed revenue component with variable components that reflect annual revenue drivers. The fixed and variable components can correspond to fixed and variable cost components. Variable revenue drivers are introduced for two main purposes:

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

Hybrid arrangements require considerable information with respect to calculating the fixed and variable components of the hybrid revenue cap. 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. As there is a benefit/cost trade-off in the effort that may be required to develop and utilise a cost tracking formula which performs well, in practice, hybrid controls seldom include more than two or three cost drivers.

The Authority seeks comments from stakeholders on the broad form of regulation most suited to regulating Queensland distributors in the next regulatory period.

The Authority would welcome comment on alternative regulatory models that meet the requirements of the Code and that stakeholders believe warrant consideration.

¹ *Pure* price controls assume that starting prices are efficient and allow price movements according to independent measures of efficiency that are not directly related to the distributor's own costs. Prior to 2000, no Australian regulator of electricity distribution had adopted a pure price control approach, and the Office of the Regulator General's tariff basket approach since then has been based on an assessment of each distributor's own costs.

4. OTHER JURISDICTIONS

The forms of regulation allowed under the Code have been used to varying degrees in other jurisdictions in Australia and overseas to regulate electricity network services.

4.1 New South Wales

Distributors in NSW are currently regulated by the Independent Pricing and Regulatory Tribunal (IPART) with a fixed revenue cap (IPART, 1999). As part of its review, *The Form of Economic regulation for NSW Electricity Network Charges* (2001), IPART identified problems in relation to the operation of the unders and overs account, including actual volumes that varied markedly from the volume forecasts used in setting allowed revenue, leading to large over and under recoveries, and concerns about how some distributors have managed their unders and overs account balances. IPART issued a *Notice under clause 6.10.3 of the National Electricity Code* in June 2002, stating that it will use a weighted average price cap in the next regulatory period commencing 1 July 2004.

IPART used a hybrid revenue cap in its 1996 and 1997 determinations. During its review for *Regulation of New South Wales Electricity Distribution Networks* (1999), IPART decided to switch to a fixed revenue cap, mainly because the vast majority of the hybrid revenue cap was fixed, with only a very small component allowed to vary on the basis of volume of electricity distributed. As a result, the hybrid revenue cap strongly resembled a fixed revenue cap, but with the added complexity of having to recalculate the hybrid revenue cap, taking account of updated volume forecasts, on an annual basis. In addition, distributors had started to accumulate significant unders and overs account balances under the hybrid revenue cap, and IPART cited industry support for a fixed revenue cap at that time as another important factor in its decision (IPART, 2002).

4.2 Victoria

The Essential Service Commission (formerly the Office of the Regulator General – ORG) adopted a weighted average price cap approach for its second regulatory period which commenced in 2001 (ORG, 2000).

Prior to the current regulatory period, ORG used an average revenue cap to regulate Victorian distributors for several years. ORG decided to switch to a weighted average price cap approach because it believed the average revenue cap approach:

- did not provide an incentive to set efficient prices;
- discouraged appropriate demand management practices;
- created incentives for strategic forecasting;
- led to volatility in profits resulting from changes in demand; and
- relied on forecasts and a correction mechanism, which were complex to develop and administer (ORG, 2000).

4.3 South Australia

The South Australian Independent Industry Regulator (SAIIR) currently uses an average revenue cap to regulate the electricity distribution industry in South Australia, as required under the Electricity Pricing Order.

4.4 Tasmania

The Office of the Tasmanian Electricity Regulator, in its *Investigation into Electricity Supply Industry Pricing Policies, Final Report* (1999), decided to use a fixed revenue cap to regulate the electricity distribution industry. Prior to this, the Government Prices Oversight Commission set maximum *retail* prices that the vertically integrated Hydro-electric Corporation could charge.

4.5 The Australian National Electricity Market

The Australian Competition and Consumer Commission (ACCC) currently uses a fixed revenue cap approach to regulate electricity transmission services in New South Wales, the Australian Capital Territory and Queensland, and has proposed using a fixed revenue cap when it implements new regulatory arrangements in Victoria and South Australia from 1 January 2003

The National Electricity Code (Sections 6.2.2 to 6.2.5) requires the ACCC to set fixed revenue caps for the noncontestable elements of transmission networks. However, if the ACCC considers there is sufficient competition to warrant a more light handed regulatory approach, it may determine and apply such an approach.

The ACCC commenced administration of the existing transmission regulation arrangements in Victoria and South Australia on 1 January 2001. The arrangements were prescribed in the Victorian Tariff Order and the South Australian Pricing Order, and consist of a fixed revenue cap approach and an average revenue cap approach respectively.

4.6 International experience

A number of countries have adopted an incentive-based, CPI – X approach to regulation, using fixed revenue caps or weighted average price caps.

United Kingdom

- Incentive based, CPI – X regulation, using a weighted average price cap was first adopted in the UK, following explicit rejection of rate of return regulation (Berg and Blake, 1999). This approach has been the common regulatory instrument across all sectors in the United Kingdom, including electricity, gas, telecommunications, and water and sewage. The Office of Gas and Electricity Markets has adopted a weighted average price cap approach for the electricity industry for the five year regulatory period ending 2005 (Office of Gas and Electricity Markets, 2002).

United States

- The regulatory structure in the US has been established over a long period of legal procedure dating back to the late nineteenth century, and is very different from that in Australia and the UK. In particular, utility operations tend to be privately owned rather than government owned, and have been subject to rate-of return style regulation by specific rate commissions rather than ‘internally’ by a department and Minister as in Australia (Utility Regulator’s Forum, 2000). While rate of return regulation has limited excess profitability in regulated industries, the relatively weak incentives to reduce operating costs, develop and introduce new products and services, and to discover and fulfil the needs of its customers, has prompted moves to more incentive based approaches. For example, in the telecommunications sector, benefit sharing plans, in which regulated organisations were allowed to retain a portion of the profits (earnings sharing) or revenues (revenue sharing) generated beyond a threshold were introduced to

address the lack of incentives to improve efficiency inherent in rate of return regulation. More recently, several electricity network regulators in the United States have adopted a fixed revenue cap approach. There has also been increased use of weighted average price caps in the United States (Kaufmann and Lowry (2000) argue that the United States actually has a longer history with this form of regulation than does the United Kingdom).

Ireland

- In Ireland, the Commission for Electricity Regulation, in its *Determination of Distribution Allowed Revenues* (2001), implemented incentive based, CPI-X regulation using a fixed revenue cap approach for the period 2001 to 2005.

Norway

- Similarly, the Norwegian Water Resources and Energy Administration (1999) has used a fixed revenue cap to regulate distribution services since 1997.

Netherlands

- The Netherlands electricity regulator has adopted a weighted average price cap approach for its regulatory period 2000 to 2003, with a view to adopting a ‘yardstick’ approach once that regulatory period has expired (Netherlands Electricity Regulatory Service, 2000). The proposed yardstick approach is similar to a pure price cap where a link between individual prices and industry costs is established.

5. COMPARISON OF OPTIONS

Each of the options for the form of regulation above has advantages and disadvantages in terms of meeting the objectives identified in the Code, as outlined in section 2.2. IPART (2001) identified eight criteria that have traditionally been given high priority by regulators. This chapter provides a brief comparison of the advantages and disadvantages of the different forms of regulation.

5.1 The allocation of volume risk

Each of the forms of regulation described in the previous chapter requires forecasts of the volume of electricity that distributors are expected to distribute during the regulatory period. These forecasts underpin assessments of allowed revenue and the X factor.

There is a financial risk associated with these forecasts which either distributors or customers must bear, depending on what regulatory approach is adopted. Most of a distributor's costs are fixed, no matter what volume of electricity it distributes. However, a significant proportion of revenue is usually derived from volume-based charges. Since the difference between total revenue and total cost will vary as volumes change, there is financial risk associated with changes in volumes. Depending on the form of regulation, if a distributor's actual volume differs from that forecast, either the distributor or its customers will receive a windfall gain or loss. For example:

- Under a weighted average price cap or an average revenue cap, the distributor bears the volume risk. Under either approach, if the volume of electricity actually distributed is greater than that forecast, the distributor will receive higher than expected profit. Conversely, if the actual volume distributed is below that forecast, the distributor will receive lower profit;
- Under a fixed revenue cap, a distributor's allowed revenue remains the same, regardless of the volume actually distributed. In this case it is the customers who bear the volume risk. Any under or over recovery of revenue will be compensated for by higher or lower prices in subsequent years; and
- Under a hybrid revenue cap volume risk is more likely to be shared between the distributor and its customers. The risk borne by customers will be directly related to the proportion of revenue that is fixed.

5.2 Incentive to set efficient prices

Because the different forms of regulation allowed by the Code control different aspects of business decision making, and allocate risks differently between distributors and their customers, they will in turn provide differing incentives when it comes to setting prices.

Efficient prices will reflect the marginal costs incurred in providing services. Efficient prices are desirable because they promote an efficient allocation of resources.

Under a fixed revenue cap, a distributor's income is fixed, regardless of how much electricity it distributes. As a result, distributors do not have a strong incentive to maximise throughput by pricing services efficiently. To the contrary, a fixed revenue cap may, under certain conditions such as where demand is inelastic, offer incentives for the distributor to produce a lower level of output at a higher price than under an unregulated (monopoly) situation (Crew and Kleindorfer, 1996).

Increasing the amount of electricity distributed under a weighted average price cap will lead to rising profits since the cost structures of distributors exhibit reducing average costs as output increases. This creates a relatively strong incentive for distributors to set prices efficiently since lower (more efficient) prices will increase throughput and profitability.

Profits are also linked to volume distributed under an average revenue cap, providing a better incentive for efficient pricing than under a fixed revenue cap. However, this incentive is still likely to be weaker than under a weighted average price cap, because allowed revenue per additional unit sold is fixed under an average revenue cap, and hence limits the amount of extra profit the distributor can earn on additional electricity distributed. As a result, distributors may have an incentive to price below cost to segments of the market to which they can provide more electricity for low incremental cost.

The incentive for efficient pricing under a hybrid revenue cap will vary depending on the formula that is used to set the cap. For example, if the hybrid revenue cap is comprised mainly of a fixed revenue component, with only a small variable component, the hybrid revenue cap will resemble a fixed revenue cap, and therefore offer relatively weak incentive for efficient pricing. In contrast, if the majority of the hybrid revenue cap is accounted for by a variable component dependent on the volume of electricity distributed, then the hybrid revenue cap will increasingly resemble a price cap, which provides stronger incentive for efficient pricing.

The form of regulation is not the only factor influencing pricing decisions. Recent research in the United Kingdom found that businesses subject to CPI – X regulation tend to focus on maximising revenue at the time of the regulator’s decision rather than setting prices in response to short-term signals (Giulietti and Waddams Price, 2000).

5.3 Flexibility of pricing

If the form of regulation allows flexibility in pricing, distributors can restructure existing charges and introduce new ones. This improves their ability to provide services that customers find attractive, and to match prices to marginal costs.

Under fixed revenue caps or a hybrid revenue cap, it is relatively easy to incorporate new pricing structures within a given regulatory period. This is because distributors are (relatively) free to set prices to recover allowed revenue, subject to any side constraints that may be imposed on maximum changes in the price faced by individual customers.

In contrast, under weighted average price caps and average revenue caps, changing price structures may be problematic depending on how volume forecasts are treated. If volume forecasts are re-calculated annually it would be relatively easy to introduce new pricing structures. However, if volume forecasts are made for the entire regulatory period, and are not re-calculated each year, or are based on historical data, it becomes more difficult for distributors to introduce new prices and services.

5.4 Sensitivity to inaccurate forecasts

The forms of regulation allowed by the Code differ in the extent to which they link the revenue a distributor is allowed to earn to the volume of electricity distributed. As a result, the different forms of regulation will vary in their sensitivity to the accuracy of volume forecasts that are used in determining the revenue and/or price caps at the start of the regulatory period.

For example, under a fixed revenue cap, the accuracy of volume forecasts is not critical because regulated revenue is not linked to the volume of electricity distributed – distributors are guaranteed the opportunity to earn a set level of income, regardless of the level of actual demand. If demand diverges from the level that is forecast, such that revenues fall short of or exceed the cap, an unders and overs account allows a distributor to increase or decrease its earnings in subsequent years to compensate. A problem that may then arise is volatility in prices, which are adjusted to meet the revised revenue requirements, although this can be mitigated with side constraints on price movements and smoothing of any under- or over-recovery over more than one year.

In contrast to a fixed revenue cap, under a weighted average price cap and average revenue cap, allowed revenue depends on the volume of electricity distributed. Since the cost structures of distributors exhibit reducing average costs as output increases, profits can increase if the distributor's volumes increase beyond those forecast. Conversely, failure by the distributor to secure volumes assumed in the forecasts will mean that profits fall. As a result, accurate forecasts are critical to the profitability of distributors under a weighted average price cap and an average revenue cap.

Under a hybrid revenue cap, allowed revenue is related to the actual volume of electricity distributed. However, because the allowed revenue is adjusted over the course of the regulatory period, the accuracy of volume forecasts at the time of the regulatory reset is less important than it is under a weighted average price cap.

5.5 Incentive to reduce costs

Because the different forms of regulation allowed by the Code control different aspects of business decision making, and allocate risks differently between distributors and their customers, they will in turn provide differing incentives when it comes to minimising costs.

Under a fixed revenue cap, a distributor's income is fixed, regardless of how much electricity it distributes. As a result, the distributor has to absorb any increase in costs and is unable to pass such cost increases on to customers. An advantage of this is that it provides a significant incentive to distributors to minimise costs. A disadvantage is that it could provide an incentive to distributors to restrict sales, as this could lower costs and increase profits. Also, there is a risk that assigning cost risks entirely to a distributor could threaten its financial viability because electricity distribution exhibits incremental costs, albeit at a relatively low level, for additional throughput.

Under a weighted average price cap and an average revenue cap, the incentive to reduce costs is not as strong as under a fixed revenue cap because revenue is allowed to vary with the volume of electricity distributed. As a result, the distributor is able to recoup from customers any increase in costs associated with increased volume of electricity distributed. Nevertheless, the distributor still has an incentive to reduce costs because allowed revenue varies according to the price of extra units of electricity distributed in the case of a weighted average price cap, or average revenue in the case of an average revenue cap. As a result, cost reductions will increase the distributor's profit.

This is not likely to be the case under a hybrid revenue cap because the variable component of the cap is designed to reflect variable costs. To the extent that this aim is achieved, changes in the distributor's costs will be reflected in changes in allowed revenue, removing the incentive to decrease costs in order to increase profits.

5.6 Demand side management

Demand side management refers to measures designed to reduce demand for energy and hence reduce the need for further investment in generation, transmission, or distribution infrastructure. For example, water heaters that use off-peak electricity supply will reduce the capacity of generation, transmission and distribution that is required during peak-load times. It is important that the form of regulation does not create a bias against demand side management by introducing incentives to expand volumes as demand management may, in some cases, be the most efficient option for meeting customers' energy requirements.

Under a fixed revenue cap, a distributor's allowed revenue is completely independent of the volume of electricity distributed, so this form of regulation is not biased against demand management.

In contrast, both the weighted average price cap and average revenue cap provide a disincentive for distributors to use appropriate demand management practices because, under these forms of regulation, their income is linked to the amount of electricity they distribute. As a result, distributors may choose to augment their network and increase throughput even though demand management strategies may be more efficient.

Under a hybrid revenue cap, the link between allowed revenue and the volume of electricity distributed is determined by the formula that is used to set the cap. For example, if the hybrid revenue cap is comprised mainly of a fixed revenue component, with only a small variable component that is dependent on volume distributed, then the hybrid revenue cap will resemble a fixed revenue cap, and therefore will be relatively unbiased towards demand side management. In contrast, as more of the hybrid revenue cap is accounted for by a variable component dependent on the volume of electricity distributed, then the hybrid revenue cap approach becomes more biased against demand side management for the same reasons that the weighted average price cap and average revenue caps are.

While the weighted average price cap and average revenue cap provide a disincentive for distributors to use appropriate demand management practices, they provide an incentive for efficient pricing. The Authority notes that in choosing one form of regulation over another, there may be a direct trade-off between pricing efficiency and demand management, in that the options that provide incentives for pricing efficiency for network services are biased against demand management and vice versa.

5.7 Transparency

The complexity of all of the forms of regulation outlined can vary depending on the approach taken on specific issues, such as whether or not allowed revenue is calculated on a cost-linked basis or a service quality incentive regime is incorporated into the framework. However, other things being equal, it is generally the case that fixed revenue caps are less complex than the other forms of regulation outlined. This is because weighted average price caps and average revenue caps use algebraic formula, which can be complex and difficult to understand. Hybrid revenue caps involve aspects of both revenue and price cap approaches, as well as a large number of variables, and can also be complex and difficult to understand as a result.

5.8 Need to re-set the cap each year

Under a weighted average price cap, a fixed revenue cap and an average revenue cap, the cap is set for the duration of the regulatory period at the time of the regulatory reset. While the cap in any given year may be adjusted to allow for unforeseen cost pass-throughs that are approved by

the regulator, or for discrepancies between actual and forecast volumes, the underlying level of allowed revenue that is decided at the start of the period is not re-considered each year.

However, this is not the case under a hybrid revenue cap because it is adjusted in line with actual volumes throughout the regulatory period. While this reduces the need for accurate forecasts at the time of the regulatory reset, it creates an ongoing requirement to reset the cap each year. As a result, distributors' annual regulatory accounts become an important input to the calculation of allowed revenue throughout the regulatory period. The importance of obtaining reliable and consistent data for the various parameters on an annual basis means that a hybrid revenue cap is likely to result in higher ongoing compliance costs during the regulatory period compared to other forms of regulation.

The Authority notes that in choosing one form of regulation over another, there may be a direct trade-off between minimising sensitivity to inaccurate forecasts and administrative simplicity.

The Authority seeks the views of stakeholders on the most appropriate form of regulation generally and, in particular, on which form of regulation:

- **is likely to deliver the most appropriate allocation of risk between distributors and customers;**
- **provides the most appropriate incentive for efficient pricing and scope for pricing flexibility;**
- **is least sensitive to inaccurate volume forecasts;**
- **provides useful incentives to reduce costs;**
- **is most appropriately weighted to recognising the role for demand side management; and**
- **provides the most acceptable degree of transparency.**

The Authority would welcome comments on any other criteria that stakeholders believe warrant consideration in comparing the different forms of regulation allowed under the Code.

6. OTHER ISSUES

6.1 Managing differences between forecast and actual volumes

Under all of the forms of regulation outlined, the extent to which a distributor complies with the regulatory cap for a particular year depends on how much electricity it distributes. In any given year, a distributor must set its prices so that it will comply with the cap before it knows what volume of electricity it will distribute at each price. Inevitably there will be some difference between its actual and forecast volumes, and therefore a risk of exceeding the revenue or price cap (which constitutes non-compliance), or not meeting the revenue or price cap (which represents foregone revenue for the distributor).

A number of approaches are available to minimise the discrepancy between actual and forecast volumes. For example, the Authority could develop its own volume forecasts against which to assess the volumes that distributors submit with their proposed prices each year, whether under a revenue cap or price cap. The key problem with this approach is that the Authority's information may be inadequate for the task, or at least inferior to that held by distributors. Addressing this problem may require a more intrusive approach to regulation than desired.

Alternatively, distributors could be permitted to calculate their own forecasts on the basis that a correction mechanism be used to reconcile variances between the allowed revenue or price cap and the actual revenue or price cap achieved in a particular year. This approach would ensure that the parties with the best information determine volume forecasts, and that deviations from revenue or price caps are compensated for in later periods.

A correction mechanism is a common feature of a fixed revenue cap, in the form of an unders and overs account, which is used to reconcile variances between allowed revenue and the actual revenue earned in a particular year. The unders and overs account guarantees the level of revenue that a distributor can expect to recover over the course of a regulatory period, smoothing out year-to-year variability that can arise due to variability in the volume of electricity distributed.

In contrast, a correction mechanism is not a central feature of the other forms of regulation permitted under the Code because they allow revenue to vary with volume to different degrees. As a result, a correction mechanism may or may not be included in the regulatory framework. For example, the Office of the Regulator General in Victoria included a correction mechanism under its average revenue caps from 1996 to 2001, but did not incorporate a correction mechanism for its weighted average price caps since then, relying instead on historical volumes to set the weights as a means of mitigating the inevitable discrepancy between forecast and actual volumes. Where a correction mechanism is not used, the discrepancy between forecast and actual volumes could still be scrutinised with a view to adjusting the revenue or price caps if the discrepancy is deemed to be large enough.

The Authority could use a proxy, such as historical volumes (as used by the Office of the Regulator General), to estimate future volumes rather than relying on forecasts. This approach would eliminate the need for forecasts (except where new tariffs are introduced). A problem with this approach is that it would be more difficult for distributors to introduce new tariffs, as there would be no historical data available for these.

6.2 Uniformity of regulation

The two incumbent distributors in Queensland are very different organisations operating very different networks. These differences suggest that a common regulatory approach may not be ideally suited to both organisations. Ergon Energy and ENERGEX differ in terms of the

physical characteristics of the networks they operate as well as their organisational histories and structures. For example, ENERGEX was incorporated under the Corporations Law on 1 July 1997 and operates a distribution network that is geographically located in the urban area of South East Queensland, and which was previously operated by a single organisation. In contrast, Ergon Energy was created effective 1 July 1999 as a result of the amalgamation of a number of government owned electricity entities and operates a distribution network spread across the remainder of Queensland. As a result of these differences, ENERGEX and Ergon Energy face quite different operational and management environments. It may therefore be appropriate to use different forms of regulation for the two distributors.

For similar reasons, it may even be appropriate to apply different forms of regulation within the one organisation, specifically Ergon Energy, which has two very distinct zones. While the eastern part of Ergon Energy's franchise area includes a number of relatively large coastal towns and cities, where population growth is likely to be a key driver of energy demand growth in the future, the western part covers a very large, sparsely populated area, where energy demand growth is more likely to depend on the exploitation of natural resources.

The Authority seeks comments on the approach that should be used to minimise the difference between forecast and actual volumes, and where this includes a correction mechanism, what form this might take.

The Authority seeks comments on the possibility of using more than one form of regulation in the next regulatory period.

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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:

(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.