

**NETWORKS PRICING:
2004 REGULATORY RESET**

ISSUES PAPER

JULY 2003



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CHAPTER**1****INTRODUCTION****Background**

1.1 Prices paid by network users for the conveyance of electricity through a prescribed electricity network in the Northern Territory are regulated under the Electricity Networks (Third Party Access) Code (“the Code”)¹ which is a schedule to the *Electricity Networks (Third Party Access) Act 2000*.

1.2 Granting third-party access to an electricity network involves an unbundling of electricity supply into:

- generation services (relating to the production of electricity);
- retail services (relating to the sale of electricity to end-use customers); and
- network services (relating to the transportation of electricity from generators to end-use customers via network infrastructure (or ‘facilities’), being the system of poles and wires operated for this purpose).

1.3 Network infrastructure providing the transportation of electricity displays economies of scale and scope and cannot economically be duplicated. The owner or operator of network infrastructure (“network provider”) occupies a strategic position in the supply chain, since a generator or retailer can only supply electricity to its customers if it can transport this electricity via the network. For effective competition in upstream and downstream markets with a transportation requirement, all parties – irrespective of their affiliation with the network provider – must have access to the network.

1.4 Part 3 of the Code specifies the price regulation framework to be observed by the Commission and by the network provider when setting the prices to be paid by network users for the conveyance of electricity through the electricity network.² Specifically:

- Chapter 6 sets out the approach that the Commission is to use when determining the network provider’s annual network revenue cap;
- Chapter 7 regulates the structure and level of individual network tariffs within the revenue cap established under chapter 6 of the Code; and
- Chapter 8 provides for regulatory oversight of capital contributions expected of network users.

1.5 The Commission has been undertaking price regulation under these provisions of the Code since 1 April 2000 based on a price regulation methodology that

¹ The Code can be viewed on the legislation page of the Commission’s website (www.utilicom.nt.gov.au).

² This Paper does not deal the regulatory oversight of the setting of out-of-balance energy prices also regulated under chapter 9 of the Code. These matters are subject to separate processes.

has been constant during that time. The first regulatory control period is due to end on 30 June 2004. A regulatory control period is defined in clause 3 of the Code as the period between major price reviews (or ‘resets’) during which time the price regulation methodology used in setting prices is held constant.

1.6 In the lead-up to the commencement of the second regulatory control period (the five-year period commencing 1 July 2004), the Code requires the Commission as regulator – in consultation with interested parties – to review the price regulation methodology used in the first regulatory control period with a view to modifying the methodology as appropriate. The Commission is referring to this review and consideration of the price regulation methodology to apply from 1 July 2004 as the “2004 Regulatory Reset”.

Purpose of this Paper

1.7 This Paper initiates the 2004 Regulatory Reset. It seeks to identify the main issues to be dealt with and invites interested parties to add to or modify that list as well as to put forward preferred approaches.

1.8 To facilitate public consultation, this Paper is designed to identify the key issues within the scope of the reset and to invite submissions on these issues.

1.9 As such, this Paper does not aim to provide answers, but to pose questions for consideration. The Commission’s hope is that the issues it has identified in this Paper will both:

- directly elicit answers from interested parties; and
- in turn, suggest related or alternative questions (or issues) that interested parties might wish to explore.

Anticipated amendments to the Code

1.10 In April 2003, the Commission conveyed certain recommendations to the Treasurer as Regulatory Minister (“the Minister”) following an Inquiry into the Code’s effectiveness under section 31 of the *Utilities Commission Act 2000*. Of those recommendations involving changes to the Code, several related to the pricing regulation provisions of the Code (and associated schedules).³

³ Specifically, the Commission has recommended amendment of:

- clause 63 of the Code, to include an additional paragraph referring to such other outcomes as the regulator determines are consistent with the objects of the Code (recommendation 46);
- clause 63 of the Code, to explicitly include in the pricing principles that regulated access prices are to be set so as to generate expected revenue for a regulated service or services that is at least sufficient to meet the efficient long-run costs of providing that regulated service or services, and includes a return on investment commensurate with the regulatory and commercial risks involved (recommendation 47);
- clause 72(2)(b) of the Code, (a) to include within the class of ‘included services’ those services provided by the network provider which in the regulator’s opinion do not lend themselves to being regulated via the general price control mechanisms set out in chapters 6 and 7 of the Code; and (b) to provide that (i) a network provider should be required to provide these types of ‘included services’ to network users on fair and reasonable terms and (ii) the regulator may determine the fair and reasonable terms which should apply to the provision of such an ‘included service’ if the network user and the network provider are unable to reach agreement (recommendation 49);
- the definition of ‘regulatory control period’ in clause 3 of the Code, to remove any doubt that such periods in future are to be five years in length (recommendation 50); and
- Part 3 of the Code (and associated schedules), to remove any doubt that the price control methodology to be used in the second and subsequent regulatory control periods is to be determined by the regulator, in consultation with interested parties, in accordance with generally accepted regulatory best practice current at the time (recommendation 51).

1.11 As noted at relevant parts of this Paper, the Commission intends to undertake its deliberations for the current review on the basis that these amendments are made to the Code. The Commission understands that the Minister will be in a position to amend the Code prior to the publication of the Commission's final report on the pricing regulation methodology expected by end October 2003.

Consultation process and timetable

1.12 When reviewing the price regulation methodology, clause 62(2) of the Code requires the Commission:

"...to conduct all its determination and approval processes in an open, transparent and competitively-neutral manner, including by consulting with network users, end-use customers, members of the public and all licensed electricity entities that may be affected, directly or indirectly, by the resultant prices."

1.13 The Commission is therefore required to determine the methodology to be used in regulating network access prices in the second regulatory control period by facilitating public consultation and promoting wide-ranging discussion of the issues by all stakeholders.

1.14 Only in making their views known, and by articulating arguments in support of these views, can interested parties assist the Commission reach decisions which achieve an acceptable balancing of the interests of the network provider, network users and the public interest.

1.15 The timetable that will be guiding the Commission's consultation process is as follows:

Target	Event
22 August 2003	Submissions on the Issues Paper due
mid September 2003	Publication of the Commission's Draft Methodology Report on the price regulation methodology to apply in the second regulatory control period
mid October 2003	Submissions on the Draft Methodology Report due
mid November 2003	Publication of the Commission's Final Methodology Report on the price regulation methodology to apply in the second regulatory control period, including the data requirements for applying the revised methodology
early December 2003	Publication of the Commission's Draft Determination of the numerical value of the parameters required by the price regulation methodology applying in the second regulatory control period
end December 2003	Submissions on the Draft Determination due
end January 2004	Publication of the Commission's Final Determination of the numerical value of the parameters required by the price regulation methodology applying in the second regulatory control period
end March 2004	Publication of the Commission's approval of the tariff schedules for 2004-05

Submissions

Call for submissions

1.16 Submissions are invited from interested parties concerning the issues raised in this Paper and related matters.

1.17 Submissions, comments or inquiries regarding issues raised in this Paper should be directed to:

Executive Officer	Telephone:	(08) 8999 5480
Utilities Commission	Fax:	(08) 8999 6262
GPO Box 915		
DARWIN NT 0801	Email:	utilities.commission@nt.gov.au

1.18 The closing date for submissions is Friday, 22 August 2003.

Confidentiality

1.19 In the interests of transparency and to promote informed discussion, the Commission intends to make submissions publicly available. 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.

Public access to submissions

1.20 Subject to the above, submissions will be made available for public inspection at the office of the Commission and on its website (www.utilicom.nt.gov.au).

1.21 To facilitate publication on the Commission's website, submissions should be made electronically by disk or email. However, if this is not possible, submissions can be made in writing.

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

CHAPTER

2

SCOPE OF THE RESET

Introduction

2.1 As a basis for establishing the regulated network prices to apply from 1 July 2004, the 2004 Regulatory Reset essentially involves two broad stages:

- review and revision of the methodology used to regulate prices (“stage 1”); and
- the application of the revised methodology (“stage 2”).

2.2 This Paper initiates stage 1 of the reset, which will culminate in the Commission publishing its findings on the pricing regulation methodology to apply in the second regulatory control period. This Paper explores the key issues to be addressed in stage 1.

2.3 In turn, the Commission can distinguish two broad sets of issues relevant to stage 1 of the reset:

- identifying and addressing deficiencies in either the design or the implementation of the price regulation methodology, as revealed by experience in the first regulatory control period; and
- updating the methodology used in the first regulatory control period, where appropriate, to reflect what may be termed current ‘regulatory best practice’.

2.4 Before identifying the scope of each of these broad sets of issues, this chapter clarifies the nature and scope of the ‘price regulation *methodology*’ that is under scrutiny in this reset. This is intended to ensure agreement about the matters that are within the scope of the reset (and particularly stage 1 of the reset) and those that are not (and why).

Price regulation ‘framework’

2.5 Part 3 of the Code specifies the price regulation framework to be observed by the Commission and by network providers when setting the prices to be paid by network users for the conveyance of electricity through the electricity network.

2.6 Essentially, the price regulation ‘framework’ can be viewed as comprising:

- the price regulation ‘principles’ and ‘structures’ which must be observed by the Commission as regulator, essentially involving the policy framework set by the Government within which the Commission and Code participants (network providers and network users) operate and over which neither the Commission nor Code participants have any discretion; and
- the price regulation ‘methodology’ which involves the practical and technical detail concerning the administration of price regulation over which the

Commission as regulator – in consultation with Code participants – has a degree of discretion.

Price regulation ‘principles’ and ‘structures’

2.7 Chapter 5 of the Code sets out matters over which the Commission has no discretion. These include both the basic regulatory framework as well as the broad pricing principles to be followed by the Commission and by network providers when setting access prices.

2.8 Principally, clause 63 specifies the outcomes to be achieved (“objectives”) by the administration of price regulation under the Code.

2.9 Clause 61 of the Code also sets out aspects of the price regulation framework that are outside the scope of this reset, namely:

- the requirement on the provider of regulated services to give minimum advance notice of revised or new prices prior to such changes taking effect (subclause (1)); and
- except as otherwise provided in the Code, the tariffs contained in the network provider’s pricing schedule with respect to standard network access services are to be the maximum tariffs (hence ‘reference tariffs’⁴) applying to those services (subclause (3)).

2.10 Other notable aspects of the price regulation framework over which the Commission does not have discretion – and which are therefore outside the scope of this reset – include the following:

- where the network access services required differ in some regard to the relevant standard network access services, or where the circumstances associated with the provision of standard network access services may give rise to cost savings on the part of the network provider, the tariffs to apply in those circumstances are to be matters for commercial negotiation between the network user and the network provider (clause 73(4));
- prior to commencement of each regulatory control period or to the network provider’s coverage by the Code, the network provider must provide the regulator with a draft statement setting out details of principles and methods to be used for defining the individual standard network access services to be supplied by the network provider and for establishing the reference tariffs to apply to those services (clause 75(5));
- at least 60 days prior to the start of each financial year, the network provider must provide to the regulator a statement setting out its proposed reference tariffs for the standard network access services it will be supplying that will apply in the relevant period with respect to a network (clause 78(1));
- prior to commencement of each regulatory control period, the network provider must provide to the regulator a draft statement providing details of principles and methods for establishing capital contributions under chapter 8 (clause 81(2)); and

⁴ Clause 73(2) defines reference tariffs as:

- (a) the tariff that the network provider cannot exceed when charging for a standard network access service;
- (b) the reference point for use in establishing the tariffs that cannot be exceeded when charging for new or non-standard network access services; and
- (c) the tariffs that an arbitrator must apply in making an award in the case of an access dispute relating (wholly or partly) to the tariff that should apply to a standard network access service.

- The length of the second regulatory control period is taken to be five years (clause 3).⁵

2.11 All these matters are taken as given in this reset, and appropriately are not subject to any consideration.

Issue:

(1) Is there any disagreement with the Commission's views regarding the scope of the price regulation framework that is outside its discretion (and so not addressed in this reset)?

Price regulation 'methodology'

2.12 The price regulation 'methodology' involves the practical and technical detail for the administration of price regulation over which the Commission as regulator has a degree of discretion.

2.13 The scope of this methodology is largely determined by the role assigned to the Commission as regulator by the Code.

Chapter 6 – Network revenue caps

2.14 Clause 66 of the Code states that the Commission as regulator:

- is responsible for determining the 'revenue cap' to apply to the network provider with regard to a network covered by the Code at the time (subclause (1)); and
- is to determine 'revenue caps' for each financial year during the regulatory control period in accordance with the principles set out in chapter 6 of the Code (subclause (2)).

2.15 More specifically, clause 69(1) of the Code states that the revenue cap to apply to the network provider during the first year of a regulatory control period is to be calculated using the methodology set out in schedule 6. This schedule refers to the methodology to be used to determine the revenue cap in the first year of the first regulatory control period as the 'accrual building block approach'.

2.16 Most notable from the point of view of this reset, however, is the fact that paragraph 1(1A) of schedule 6 states that:

"The methodology for determining revenue caps in subsequent regulatory control periods is to be determined by the regulator, taking into account measurement and definitional conventions generally accepted at the time." (emphasis added)

2.17 Clause 69(2) of the Code states that the revenue cap set by the Commission is to provide a fair and reasonable risk-adjusted rate of return to the network provider on efficient investment, given efficient operating and maintenance practices on the part of the network provider, where:

- the assets making up the investment are to be identified and valued in accordance with schedule 7; and
- the fair and reasonable rate of return is to be established by the regulator in accordance with schedule 8, and is to be consistent with the method of

⁵ This is the term typical in other jurisdictions. The Commission has recommended amendment of the definition of 'regulatory control period' in clause 3 of the Code, to remove any doubt that such periods in future are to be five years in length (recommendation 50). As explained in chapter 1, this Paper assumes the Government adopts this recommendation.

valuation of new assets and revaluation, if any, of existing assets and consistent with achievement of a commercial return on efficient investment.

2.18 Schedule 7 of the Code specifies how, among other things, network assets are to be valued for the first regulatory control period.

2.19 Most notable from the point of view of this reset, however, is the fact that paragraph 6(1) of schedule 7 states that, among other things:

“... subsequent valuation of existing assets generally in service on 1 July 1999 (for use during the second or subsequent regulatory control periods, where the revaluations are to be used for regulatory purposes) are to be undertaken on a basis to be approved by the regulator.” (emphasis added)

2.20 Schedule 8 of the Code specifies how the weighted-average cost of capital (“WACC”) to be used during the first regulatory control period is to be measured. Once again, notable from the point of view of this reset is the fact that paragraph 1(2) of schedule 8 states that:

“The methodology for determining the WACC for use in subsequent regulatory control periods is to be determined by the regulator, taking into account measurement and definitional conventions generally accepted at the time” (emphasis added)

2.21 Clause 70(1) of the Code states that, for the second full financial year and for each following year in a regulatory control period, the revenue cap to apply to the network provider is to be derived by the methodology in schedule 9.

2.22 Schedule 9 in turn, specifies how the revenue caps for the second and subsequent full financial years of the first regulatory control period are to be determined prior to the start of each of these financial years. The methodology to be used by the regulator to determine the revenue cap is to involve increasing the previous year’s revenue cap in line with both –

- the factors which the regulator considers to be the main real-terms drivers affecting the network provider’s costs (such as the growth in the quantity of electricity transported annually over the electricity network); and
- inflation (as measured by the rate of change in the consumer price index),

and decreasing it by an efficiency gains factor (“X factor”). The use of an efficiency gains factor is to ensure that the benefits of efficiency gains are shared between end-use customers (those gains achieved up to the X factor level) and the network provider (any gains achieved in excess of the X factor).

2.23 Most notably from the point of view of this reset, however, is the fact that paragraph 1(1A) of schedule 9 states that:

“The methodology for determining revenue caps for the second and subsequent full financial years in subsequent regulatory control periods is to be determined by the regulator, taking into account measurement and definitional conventions generally accepted at the time.” (emphasis added)

2.24 Clause 70(5) of the Code states that the efficiency gains factor is to be established and applied by the Commission in accordance with the principles in schedule 10. This schedule specifies how the X factor is to be determined at the commencement of each regulatory control period by the Commission.⁶

2.25 Clause 72 of the Code makes reference to ‘excluded services’, being those services for which the associated costs and revenue are to be excluded from the revenue cap. In particular, clause 72(2) states that:

⁶ Unlike schedules 6, 7 and 9, no mention is made in schedule 10 of the regulator determining the methodology for establishing the X factor in subsequent regulatory control periods, taking into account measurement and definitional conventions generally accepted at the time. This is viewed by the Commission as an unintended omission, to be corrected in line with its recommendation 51 to the Minister in the context of the earlier review of the Code.

“Excluded network access services relate to services –

(a) the supply of which, in the assessment of the regulator, is subject to effective competition; and

(b) the cost of which, in the assessment of the regulator, can be satisfactorily excluded from the cost base (including all asset-related costs) used for the purpose of calculating the revenue cap applying to regulated network access services.” (emphasis added)⁷

2.26 Essentially, Power and Water’s network business provides services that can be grouped into three broad categories:

- services which are subject to the revenue cap;
- services which may be subject to regulation, but are not included in the revenue cap; and
- non-regulated services.

2.27 Hence, as far as chapter 6 of the Code is concerned, the price regulation methodology issues that must be addressed by the Commission for implementation in the second regulatory control period are the methodologies for determining:

- the revenue caps in the first year of a regulatory control period;
- the WACC;
- the revenue caps for the second and subsequent years of a regulatory control period; and
- the efficiency gains factor (X factor).

2.28 The Commission is also to:

- approve the methodology to be used for valuing network assets for regulatory purposes; and
- assess which network access services are to subject to effective competition and the cost of which can be satisfactorily excluded from the cost base (including all asset-related costs) used for the purpose of calculating the revenue cap applying to regulated network access services.

Chapter 7 – Network tariffs

2.29 Chapter 7 regulates the reference tariffs to be published annually by the network provider with respect to standard network access services.

2.30 Clause 73 states that the principles set out in chapter 7 provide the basis upon which:

- the network provider is to establish reference tariffs through a process overseen by the Commission (subclause (3)); and
- the Commission as regulator is to approve the maximum tariffs to apply to new or non-standard network access services in the case of an access dispute

⁷ The Commission has recommended amendment of Clause 72(2)(b) of the Code:

- to include within the class of ‘included services’ those services provided by the network provider which in the regulator’s opinion do not lend themselves to being regulated via the general price control mechanisms set out in chapters 6 and 7 of the Code; and
- to provide that (i) a network provider should be required to provide these types of ‘included services’ to network users on fair and reasonable terms and (ii) the regulator may determine the fair and reasonable terms which should apply to the provision of such an ‘included service’ if the network user and the network provider are unable to reach agreement (recommendation 49).

As explained in chapter 1, this Issues Paper assumes the Government adopts this recommendation.

where the dispute relates (wholly or partly) to the tariff to apply to those services (subclause (5)).

2.31 The Commission's role with regard to network tariffs under the Code is limited to the Commission approving:

- the network provider's pricing principles statement unless, *in the opinion of the regulator*, the statement is not consistent with the requirements/principles to be met by the reference tariffs (network pricing objectives) in clause 74 of the Code (clause 75(6)); and
- the tariffs and charges, or individual tariffs and charges, proposed by the network provider unless, *in the opinion of the Commission*, the tariffs and charges would result in the network provider not complying with the principles laid down in chapter 7 or is inconsistent with requirements elsewhere in the Code (clause 78(3)).

2.32 Hence, as far as chapter 7 of the Code is concerned, the price regulation methodology issues that must be addressed by the Commission for implementation in the second regulatory control period are the approaches the Commission uses for assessing whether, *in its opinion*:

- the network provider's pricing principles statement is consistent with the clause 74 network pricing objectives; and
- the network provider's proposed individual tariffs and charges complies with the principles laid down in chapter 7 or is consistent with requirements elsewhere in the Code.

Chapter 8 – Capital contributions

2.33 Chapter 8 of the Code regulates the calculation of any capital contributions and charges expected of network users in respect of the capital investment associated with the designing, constructing, installing and commissioning of the connection or system equipment where the granting of an access application involves the provision of connection or system extension.

2.34 Under clause 80 of the Code, such contributions and charges are only permitted if such a network extension was not otherwise 'commercially viable'. Subclause (3) defines a network extension to be commercially viable if:

- the network provider can be reasonably expected to recover within a reasonable time the costs, the capital investment and a reasonable rate of return on the capital investment of that extension and not increase the tariffs and charges payable by existing network users; and
- the network provider can be reasonably expected to obtain the necessary financial capital to fund that extension, from internal reserves or via new borrowings, on reasonable terms and conditions.

2.35 The matters to be taken into account by the network provider when establishing the reasonable rate of return, the reasonable time and the reasonable terms and conditions are set out in clauses 80(6), (7) and (8) of the Code, respectively.

2.36 The Commission's role with regard to capital contributions/charges is limited to the Commission:

- providing 'oversight' of the network provider's broad application of the principles set out in chapter 8 of the Code (clause 80(1)); and
- approving the network provider's capital contributions principles and methods statement unless, *in the opinion of the regulator*, the statement does not comply with the requirements in chapter 8 or is inconsistent with requirements elsewhere in the Code (clause 81(3)).

2.37 Hence, as far as chapter 8 of the Code is concerned, the price regulation methodology issues that must be addressed by the Commission for implementation in the second regulatory control period are the approaches the Commission uses for assessing:

- what form its 'oversight' of the network provider's broad application of the principles set out in chapter 8 of the Code should take; and
- whether, *in its opinion*, the network provider's capital contributions principles and methods statement is consistent the requirements in chapter 8 or elsewhere in the Code.

Scope of stage 1 of the reset

2.38 In summary, the price regulation methodology issues that must be addressed by the Commission for implementation in the second regulatory control period are:

- the methodologies for determining:
 - the revenue caps in the first year of a regulatory control period,
 - the WACC,
 - the revenue caps for the second and subsequent years of a regulatory control period, and
 - the efficiency gains factor (X factor),
- the methodology to be used for valuing network assets for regulatory purposes;
- the methodology to be used to assess which network access services are subject to effective competition and can be excluded from the revenue cap applying to regulated network access services;
- the approaches to be used for assessing whether, in the Commission's opinion:
 - the network provider's pricing principles statement is consistent with the clause 74 network pricing objectives, and
 - the network provider's proposed individual tariffs and charges complies with the principles laid down in chapter 7 or is consistent with requirements elsewhere in the Code; and
- the approaches to be used for assessing:
 - what form its 'oversight' of the network provider's broad application of the principles set out in chapter 8 of the Code should take; and
 - whether, in the Commission's opinion, the network provider's capital contributions principles and methods statement is consistent the requirements in chapter 8 or elsewhere in the Code.

2.39 Only when these methodology issues are settled (in stage 1) is it appropriate for the Commission to turn to the issues that arise from implementation of the preferred methodologies (stage 2 of the reset).

Issue:

(2) Is there any disagreement with the Commission's interpretation of its role and discretions as they relate to the second regulatory control period (and so the matters that fall within the scope of this reset)?

Scope of this Issues Paper

2.40 Of the methodology issues identified in this chapter, the issues dealt with in this Paper are:

- in chapter 4, the main lessons arising from the price regulation experience in the first regulatory control period;
- in chapter 5, the implications of best practice regarding methodologies for determining:
 - the revenue caps in the first year of a regulatory control period,
 - the revenue caps for the second and subsequent years of a regulatory control period, and
- in chapter 6, the implications of best practice for the approach to be taken by the Commission in assessing whether:
 - the network provider's pricing principles statement is consistent with the clause 74 network pricing objectives, and
 - the network provider's proposed individual tariffs and charges complies with the principles laid down in chapter 7 or is consistent with requirements elsewhere in the Code.

2.41 Before identifying the issues and options, chapter 3 of this Paper explores the criteria that are to be applied by the Commission in assessing the options and alternatives considered in this reset.

Scope of the Draft Methodology Report

2.42 The Draft Methodology Report will indicate the Commission's proposed position on the methodology issues raised in this Paper, in view of both submissions received and its own further analysis.

2.43 In addition, the Draft Methodology Report will for the first time put forward the Commission's proposals on certain methodology matters that it considers to be consequential to consideration of the high-level issues addressed in this Paper.

2.44 Of the methodology issues identified in this chapter, the consequential issues to be deferred until the Draft Methodology Report include:

- the methodologies for determining:
 - the WACC, and
 - the efficiency gains factor (X factor);
- the methodology to be used for valuing network assets for regulatory purposes;
- the methodology to be used to assess which network access services are subject to effective competition and can be excluded from the revenue cap applying to regulated network access services; and
- the approaches to be used for assessing:
 - what form its 'oversight' of the network provider's broad application of the principles set out in chapter 8 of the Code should take, and
 - whether, in the Commission's opinion, the network provider's capital contributions principles and methods statement is consistent with the requirements in chapter 8 or elsewhere in the Code.

2.45 Other detailed methodology matters likely to be covered in the Draft Methodology Report include:

- the cost drivers used in association with the efficiency gains factor to determine revenue caps in second and subsequent years of a regulatory control period;
- the possible role for side-constraints where the network provider's proposed individual tariffs and charges may result in substantial price increases to individual customers;
- the circumstances, if any, in which reconsideration of the revenue cap determination or the structure of network tariffs should be triggered during the regulatory control period ("off-ramps"); and
- detailed codification of the Under's and Over's Account arrangements, if any, to manage differences in the actual revenue collected versus the nominated maximum amount (or cap).

2.46 In preparing its Final Methodology Report, the Commission will take into account submissions made in response to all sets of issues.

CHAPTER

3

OBJECTIVES OF THE RESET

Introduction

3.1 The first step in evaluating the approach to price regulation, and the strengths and weaknesses of alternative forms of regulation, is to establish appropriate criteria by which regulatory approaches – both past and prospective – can be assessed.

3.2 The objectives of the Commission are variously laid out in the *Utilities Commission Act* (section 6(2)) and in the Code itself (clauses 2, 63, 68 and 74). The Commission's task in this reset is to determine which form of regulation will best achieve these objectives and accords with these various legislative requirements in practice.

Legislative requirements***Requirements of the Utilities Commission Act***

3.3 Section 6(2) of the *Utilities Commission Act* states that, in performing any of its functions, the Commission must have regard to the need:

- (a) to promote competitive and fair market conduct;*
- (b) to prevent misuse of monopoly or market power;*
- (c) to facilitate entry into relevant markets;*
- (d) to promote economic efficiency;*
- (e) to ensure consumers benefit from competition and efficiency;*
- (f) to protect the interests of consumers with respect to reliability and quality of services and supply in regulated industries;*
- (g) to facilitate maintenance of the financial viability of regulated industries; and*
- (h) to ensure an appropriate rate of return on regulated infrastructure assets."*

Requirements of the Code

3.4 Clause 2(2) of the Code ("Underlying principles") requires the Commission, in deciding on the terms and conditions for access, to undertake any of its functions under the Code by taking into account:

- (a) the network provider's legitimate business interests and investment in the electricity network;*
- (b) the costs to the network provider of providing access, including any costs of extending the electricity network but not costs associated with losses arising from increased competition in upstream or downstream markets;*
- (c) the economic value to the network provider of any additional investment that an access applicant or the network provider has agreed to undertake;*
- (d) the interests of all persons holding access agreements for use of the electricity network;*

- (e) *firm and binding contractual obligations of the network provider or other persons (or both) already using the electricity network;*
- (f) *the operational and technical requirements necessary for the safe and reliable operation of the electricity network;*
- (g) *the economically efficient operation of the electricity network; and*
- (h) *the benefit to the public from having competitive markets.”*

3.5 Clause 63 of the Code requires the Commission to administer access price regulation under the Code in a way that achieves the following outcomes:⁸

- “(a) efficient costs of supply;*
- (b) prevention of monopoly rent extraction by the network provider;*
- (c) promotion of competition in upstream and downstream markets and promotion of competition in the provision of network services where economically feasible;*
- (d) an efficient and cost-effective regulatory environment;*
- (e) regulatory accountability through transparency and public disclosure of regulatory processes and the basis of regulatory decisions;*
- (f) reasonable certainty and consistency over time of the outcomes of regulatory processes; and*
- (g) an acceptable balancing of the interests of the network provider, network users and the public interest.”*

3.6 Clause 68 of the Code (“Revenue cap principles”) requires the Commission, in setting a revenue cap, to take into account the revenue requirements of the network provider during the relevant financial year or years having regard to the following factors:

- “(a) the demand growth that the network provider is expected to service using any appropriate measure including but not limited to –*
- (i) energy consumption by category of network users or other relevant groups of persons who consume energy;*
- (ii) demand by category of network users or other relevant groups of persons who consume energy;*
- (iii) numbers of network users or other relevant groups of persons who consume energy by category of network users; and*
- (iv) length of the electricity network;*
- (b) the service standards applicable to the network provider under this Code and any other standards imposed on the network provider by any regulatory regime administered by the regulator and by agreement with the relevant network users;*
- (c) the potential for efficiency gains to be realised by the network provider in expected operating, maintenance and capital costs, taking into account the expected demand growth and service standards referred to in paragraphs (a) and (b);*
- (d) the network provider’s cost of capital applicable to the relevant network access service, having regard to the risk-adjusted rate of return required by investors in commercial enterprises facing similar business risks to those faced by the network provider in the provision of that service;*
- (e) the provision of a fair and reasonable return on efficient capital investment undertaken by the network provider in order to maintain or extend network capacity;*
- (f) the right of the network provider to recover reasonable costs incurred by the network provider in connection with the operation and maintenance of the network, including those arising from but not limited to –*

⁸ The Commission has recommended amendment of Clause 63 of the Code, both:

- to explicitly include in the pricing principles that regulated access prices are to be set so as to generate expected revenue for a regulated service or services that is at least sufficient to meet the efficient long-run costs of providing that regulated service or services, and includes a return on investment commensurate with the regulatory and commercial risks involved (recommendation 47); and
- to include an additional paragraph referring to such other outcomes as the regulator determines are consistent with the objects of the Code (recommendation 46).

As explained in chapter 1, this Paper assumes these changes are adopted by the Government.

- (i) any Territory and Commonwealth taxes or equivalent taxes paid in connection with the operation of its business as a provider of network access services; and
- (ii) the tariffs and charges paid to other network providers irrespective of whether these tariffs and charges are regulated under this Code;
- (g) any increase in the rate of a tax or any new tax, whether it is a tax or tax equivalent imposed by the Territory, a State or the Commonwealth that directly increases the cost of providing the access services that are directly attributable to the increase in the rate or to the new tax;
- (h) any reduction or increase in network energy losses; and
- (j) the on-going commercial viability of the network provider.”

3.7 Clause 74 of the Code sets out the objectives of network tariffs to be observed under the Code as follows:

“The reference tariffs are –

- (a) to reflect efficient costs of supply;
- (b) to involve a common approach for all network users, with the actual tariff with respect to a particular network access service only differing between users because of –
 - (i) the user’s geographical and electrical location;
 - (ii) the quantities in which the relevant network access service is to be supplied or is supplied;
 - (iii) the pattern of network usage;
 - (iv) the technical characteristics or requirements of the user’s load or generation;
 - (v) the nature of the plant or equipment required to provide the network access service; and
 - (vi) the periods for which the network access service is expected to be supplied;
- (c) to be transparent and published in order to provide pricing signals to network users;
- (d) to promote price stability; and
- (e) to reflect a balancing of the quest for detail against the administrative costs of doing so which would be passed through to end-use customers.”

Objectives in assessing reset options

3.8 The objectives set out in the *Utilities Commission Act 2000*, the *Electricity Networks (Third Party Access) Act* and the Code are quite lengthy and varied in nature and, as a consequence, are at times open to differing interpretations. In some respects, these objectives do not directly translate into a tangible set of criteria for the Commission to assess which form of regulation is most appropriate.

3.9 The Commission’s view is that these objectives involve a balancing of interests, namely:

- the interests of network users for tariffs that reflect efficient costs and are simple, stable and equitable;
- the interests of the network provider for incentives to maintain and invest in the network and to improve operational efficiency;
- the broader public interest in ensuring that resources are priced and allocated according to their economic value; and
- the interests of all stakeholders to ensure that regulatory costs are minimised and benefits maximised.

3.10 Nevertheless, there are a number of central themes contained in the legislative requirements that provide guidance for selecting among alternative price regulation framework methodologies. In summary, the regulatory arrangements should:

- be efficient and cost effective;

- ensure that network owners do not exploit their position as monopoly service providers;
- equitably distribute efficiency gains between stakeholders while providing sustainable commercial returns to network owners;
- foster competition in the provision of network services as a means of addressing concerns over monopoly pricing wherever economically efficient and practical to do so;
- foster competition in upstream and downstream markets; and
- foster efficient use of, operation of and investment in the network.

3.11 These objectives consistently emphasise the importance of promoting efficiency, competition, protecting the interests of customers and maintaining the financial viability of network providers. They provide a useful basis for evaluating the overall effectiveness of the regulation of network revenues and prices.

3.12 However, more specific criteria are required for the evaluation of alternative forms of price and revenue control (for example, a pure revenue cap, average revenue cap or weighted average price cap). The approach of other regulators illustrates the range of factors that could be taken into account.

NSW (and Queensland) regulator's criteria

3.13 In preparing for its 2004 reset, the NSW regulator (IPART)⁹ evaluated options for the form of price control in terms of the extent to which each option:

- minimises the overall cost of volume risk;
- provides network operators with incentives to set efficient prices;
- provides flexibility in pricing design;
- is not highly sensitive to inaccurate volume forecasts (and minimises problems associated with reconciling forecast and actual volumes of electricity distributed);
- provides incentives to reduce costs;
- is transparent; and
- requires minimal mid-period adjustments of the revenue or price caps.

3.14 The Queensland regulator (QCA)¹⁰ has adopted the same criteria.

Volume risk

3.15 The majority of price regulation methodologies require forecasts of the volume of electricity that the network provider is expected to distribute during the regulatory control period. These forecasts underpin assessments of allowed revenue and the X factor. There is a financial risk associated with these forecasts which either the network provider or customers must bear, depending on the regulatory approach adopted. Most of the network provider'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 volume.

⁹ Independent Pricing and Regulatory Tribunal of NSW, *Discussion Paper DP48 – Form of Regulation for NSW Electricity Network Charges*, August 2001.

¹⁰ Queensland Competition Authority, *Regulation of Electricity Distribution – Final Determination*, May 2001.

Incentives to set efficient prices

3.16 Because the different price regulation methodologies control different aspects of business decision-making, and allocate risks differently between the network provider 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.

Flexibility in pricing design

3.17 If the price regulation methodology allows flexibility in pricing, the network provider can restructure existing charges and introduce new ones. This improves its ability to provide services that customers find attractive, and to match prices to marginal costs.

Sensitivity to inaccurate volume forecasts

3.18 The price regulation methodologies differ in the extent to which they link the revenue that the network provider is allowed to earn and the volume of electricity distributed. As a result, the different methodologies 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 control period.

Incentives to reduce costs

3.19 Because price regulation methodologies control different aspects of business decision-making, and allocate risks differently between the network provider and their customers, they will in turn provide differing incentives when it comes to minimising costs.

Transparency

3.20 The complexity of price regulation methodologies 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.

Minimising mid-period adjustments of the revenue or price caps

3.21 The more frequently a price regulation methodology gives rise to the need to undertake mid-period adjustments of the revenues or prices, the higher the associated costs in terms of the impact on incentives to the network provider.

Victorian regulator's criteria

3.22 The Victorian regulator (ESC)¹¹, in its 2001 reset, assessed price control options in terms of the extent to which each option provided an incentive to maintain and expand network services to new and existing customers, without encouraging perverse behaviour or adding to business risk. As a result, the factors which the ESC had regard to in assessing alternative forms of price control were:

- the impact of the form of control on the network provider's incentives for efficient behaviour;
- the extent to which the controls ensure that total revenues track total costs; and
- the implications of the form of control for risk allocation.

¹¹ Office of the Regulator-General, Victoria, *2001 Electricity Distribution Price Review – Framework and Approach*, June 1998

Incentives on network provider's behaviour

3.23 A key determinant of efficient behaviour is the pricing strategies adopted by the network provider in response to the form of price control. In a competitive market, price signals encourage the efficient use of resources and efficient investment decisions over time. Generally, they do this by aligning the additional revenue attributable to increased production with the additional cost of an extra unit of output. Efficient network pricing signals guide investment decisions in electricity generation and infrastructure, as well as having an important influence on the investment decisions (including location), costs and efficiency of downstream industries.

3.24 The form of price regulation methodology can also have an impact on the incentives for the network provider to invest in the network. Where regulated income is linked to units distributed, the control may give the network provider an artificial incentive to encourage increased demand, which in turn may require higher network investment, relative to other options (such as demand management). Conversely, where regulated income is not linked to units distributed or the number of connections, the network provider may have a disincentive to invest, resulting in customers' demands for distribution services not being fully met.

Relationship between revenues and costs

3.25 It is important for economic efficiency that the form of price regulation methodology allows total revenue to track total costs, particularly where these are affected by factors largely outside of the network provider's direct control. Consider, for example, a situation where the price control ties revenue closely to the volume of energy consumed, but underlying costs are not greatly affected by changes in volumes. Here, the variable cost of distribution is low compared to the fixed cost. If there is an unexpected increase (decrease) in demand, profitability will also increase (decrease) under the operation of the price regulation methodology, compared with the level initially anticipated.

3.26 Persistent excess profits are not consistent with the objectives of monopoly regulation in promoting efficiency and protecting consumers. Persistent losses are inconsistent with safeguarding the investment of regulated businesses, will discourage new investment and result in a potential unwillingness by the firm to continue providing the regulated services.

Risk allocation

3.27 The form of price control can have a direct impact on the income volatility of a regulated network business, and consequently has implications for the financial risk borne by that business. An increase in financial risk generally increases the cost of capital for the regulated business. Where this volatility arises from factors largely outside the control of the regulated business, such an allocation of financial risk may not be optimal, and other businesses (for example, the retail business) or customers may be better placed to bear the income risk.

Impact of the NT context

3.28 In applying regulatory objectives and criteria to the Northern Territory, the Commission intends to be particularly mindful of the changing character of the Territory's electricity market, and the consequences of the withdrawal of NT Power from the generation and retail markets. In these circumstances, the Commission's view is that the reset needs to give particular focus to:

- the implications of the possible absence for the foreseeable future of third-parties requiring network access, in the context of the close integration between Power and Water's networks, retail and generation operations;
- when compared with larger markets with ongoing third-party access, the opportunities available in the Territory context for making regulatory oversight 'simple' and low-cost; and

- the scope for reducing regulatory uncertainty (and giving increased emphasis to regulatory stability and predictability).

Issue:

- (3) *What criteria should be used to assess options and alternatives for the form of regulation? What should be the relative importance attached to the various criteria?*
- (4) *How should the assessment criteria be amended or qualified to reflect the circumstances expected in the NT electricity market during the second regulatory control period?*

CHAPTER

4

LESSONS FROM THE FIRST REGULATORY CONTROL PERIOD

4.1 As explained at the beginning of chapter 2, the Commission can distinguish two broad sets of issues relevant to stage 1 of the reset:

- identifying and addressing deficiencies in either the design or the implementation of the price regulation methodology, as revealed by experience in the first regulatory control period; and
- updating the methodology used in the first regulatory control period, where appropriate to reflect what may be termed current 'regulatory best practice'.

4.2 This chapter identifies issues arising directly from experience during the first regulatory control period. The following chapters identify issues arising from developments in best practice evident elsewhere (and largely independent of experience in the NT).

4.3 In this chapter, experience during the first regulatory control period is separated into that associated with:

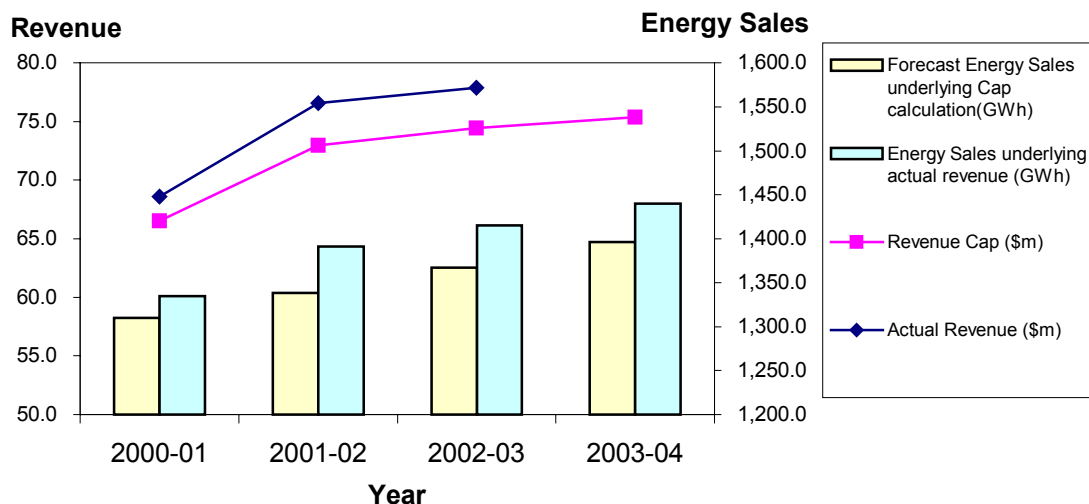
- revenue caps (and chapter 6 of the Code); and
- network pricing (and chapters 7 and 8 of the Code).

Revenue caps: Possible deficiencies revealed by experience

4.4 The main difficulty experienced during the first regulatory control period with regard to the revenue cap arrangements has been the network provider's consistent overshooting of the annual cap.

4.5 Chart 4.1 below illustrates the actual revenue collected versus the determined revenue cap during the first regulatory control period. It also shows the forecast versus actual volumes of energy sales, as this has been a key determinant of revenue over-recovery.

Chart 4.1



Note: Actual energy sales and revenue data for 2002-03 and 2003-04 are Power and Water's revised estimates as at March 2003.

4.6 This experience raises important questions about:

- the validity of the annual revenue cap formula applied by the Commission;
- the adequacy of Power and Water's forecasting techniques; and
- the adequacy of the Commission's processes in annually approving the network tariff schedules that have given rise to consistent over-recovery of revenues.

4.7 The over-recoveries have been returned to the retailers. This has raised the issue of the extent to which the retailers have been able – or should be required – to return the over-recoveries to end-use customers.

4.8 Other issues arising from the revenue cap arrangements during the first regulatory control period noted by the Commission are:

- the relatively high costs of implementing the building block approach in the small system context; and
- the significant variation of asset values and operating costs between the estimates used in the building blocks approach prior to the commencement of the first regulatory control period and as subsequently reported in the regulatory accounts annually provided by Power and Water to the Commission.

Issue:

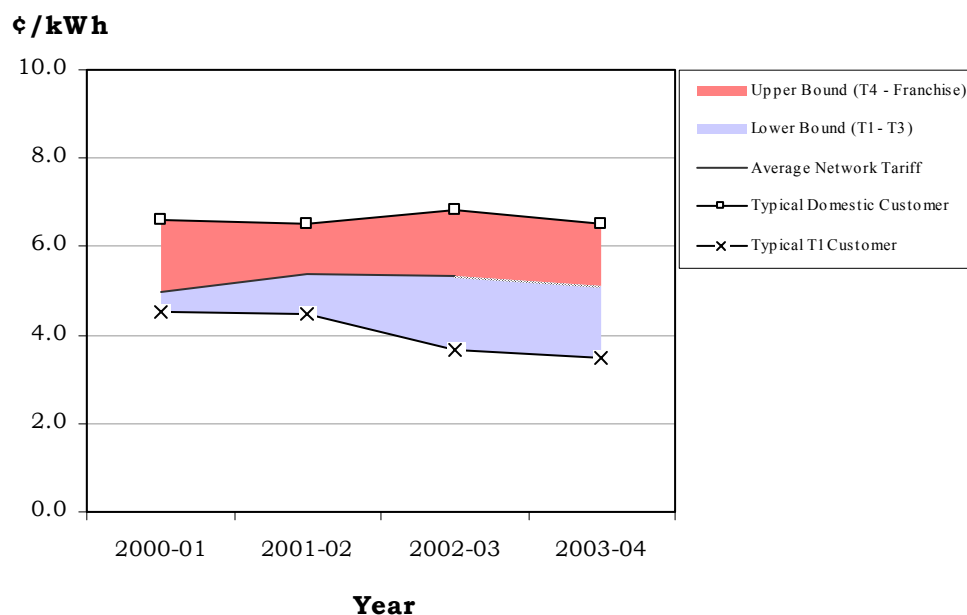
- (5) *What are the main deficiencies revealed by experience with the application of annual revenue caps in the first regulatory control period, particularly the pattern of over-recoveries of network revenue relative to those caps?*
- (6) *Are there matters additional to those listed by the Commission arising from experience with the revenue cap arrangements during the first regulatory control period that should be considered during this reset?*

Network pricing: Possible deficiencies revealed by experience

4.9 Regulated network operations in the Northern Territory have some distinguishing features:

- supply is provided through a single, relatively small, integrated generator, distributor and retailer.
- the system contains one distinct high voltage transmission link (DKTL).
- Otherwise, the regulated system is an integrated transmission/distribution network organised around three regions: Darwin/Katherine, Tennant Creek and Alice Springs.
- loads are small but relatively dispersed resulting in relatively high network costs per unit.

4.10 Chart 4.2 below illustrates the range of network prices paid by customers in the Darwin-Katherine region over the first regulatory control period.

Chart 4.2

4.11 The chart indicates that larger contestable customers (Tranches 1 to 3) typically saw a decline in their network prices, whereas smaller contestable customers (Tranche 4) and non-contestable customers typically experienced increases in some years.

4.12 Other features of the network pricing arrangements during the first regulatory control period noted by the Commission are:

- network tariffs are not 'unbundled' from energy charges and retail margins for any customers, contestable or non-contestable. Customers cannot gain information on the network component of their bundled electricity price;
- common pricing principles apply to each network region, but tariff levels vary with costs (separate revenue caps);
- multi-part (fixed, demand, energy) declining block network tariffs are applied to contestable load, while two-part network tariffs (fixed plus energy) are applied to non-contestable load;
- no connection or network usage charges have been applied to supply customers (generators). Network costs are recovered entirely from end-use customers (load customers);
- within each region and each customer category, uniform charges are applied. No customers, either supply or load, face locational or congestion-related network price signals;
- for the DKTL, uniform energy-based charges are levied on all demand customers in the Darwin/Katherine region; and
- there is an absence of documented service levels within the terms of supply for standard network access.

4.13 There are clearly shortcomings in the current pricing arrangements. But there are also clearly limitations imposed by complexity and information requirements, and tension with stability and transparency objectives.

4.14 From the Commission's perspective, the issues that arise from the experience with network pricing over the first regulatory control period are:

- the refusal of Power and Water to provide unbundled network charge data to large contestable customers on request;
- the absence of tariff categories for network services provided to and by embedded generators;
- the unequal treatment of supply customers (generators) and load customers (end users) in the application of network charges, and the potential for unequal treatment of new supply customers relative to existing supply customers;
- the relevance of tariff component weights to economic cost drivers in each of the three price regions;
- the absence of a pricing policy governing capital contributions by customers to connection costs;
- the basis for maintaining a separate energy-based usage charge for the DKTL; and
- the absence of documented standards of service as a basis for determining whether customers are receiving the service they have paid for, whether in relation to reference tariffs or negotiated tariffs.

Issue:

- (7) What are the main deficiencies revealed by experience with the type and structure of network tariffs in the first regulatory control period?***
- (8) Are there matters additional to those listed by the Commission arising from experience with the type and structure of network prices during the first regulatory control period that should be considered during this reset?***

CHAPTER

5

**NETWORK PRICE LEVELS:
IMPLICATIONS OF BEST PRACTICE****Introduction**

5.1 Network price *levels* mainly reflect outcomes from the *form of regulation* adopted.

5.2 In chapter 3, cost effectiveness was nominated as a primary criterion in the evaluation of options for the form of regulation. The particular context for this is provided by the relatively small size of the NT system and the absence at the present time of third parties requiring access to the network. In chapter 4, the cost and complexity of regulation were identified as possible deficiencies in the form of regulation applied in the first regulatory period.

5.3 Clearly, for a small system the cost effectiveness of regulation is a key consideration in assessing 'best practice'. In this context cost effectiveness does not mean minimum cost, but a balancing of costs and benefits. In considering the form of regulation for the next regulatory control period, the Commission considers that the primary choice is between:

- continuing with the building block approach used in the first regulatory control period, in which allowed revenues are built up from a detailed assessment of projected costs and efficiency levels; or
- alternatively, moving to an approach in which price increases on average are capped at the CPI less an efficiency (or productivity) factor determined by reference to industry-wide benchmarks.

5.4 This issue involves several component parts:

- should prices in year 1 of the second regulatory control period be based on a re-application of the cost building block approach, or on price levels established during the first regulatory control period (that is, should year 1 prices be de-linked from a re-assessment of costs);
- what should be the form of the price control eg., a continuation of the current revenue cap, an average revenue cap (revenue yield) or weighted average price cap (tariff basket);
- on what basis should the value of X in the CPI-X price or revenue cap be determined – external productivity-based benchmarks or a multi-year cost building block approach; and
- whichever approach is taken, how should 'efficiency' carryovers and 'revenue under/over recovery' carryovers arising during the second regulatory control period be treated at the following reset.

5.5 These are not the only issues to be addressed in this reset, but the choices made with regard to these four issues will be critical in deciding the direction to be taken in developing the detailed arrangements to apply in the second regulatory control period.

Cost-based revenue controls vs. price caps based on external benchmarks

5.6 At the broadest level, the most basic option facing the Commission is whether to adopt a price cap form of regulation that employs external efficiency benchmarks or retain a revenue cap that is based on an analysis of Power and Water's projected network operating and capital costs.

5.7 If a switch to price caps and external benchmarks is favoured, then the efficiency of the level and structure of the base year prices will obviously have a large bearing on outcomes over the following years. Therefore, for this option a key secondary question is whether prices in year 1 should be determined by a cost-based building block analysis to ensure that efficiency criteria are met and a sound foundation for the subsequent CPI-X indexation of prices provided.

5.8 Similarly, if a cost-based revenue control is employed in year 1, the option to index revenues in later years by reference to an external benchmark rather than via the building block approach also remains open.

Cost-based revenue controls

5.9 The revenue cap methodology used in the first regulatory control period involves the Commission setting some type of allowable maximum (or cap) for a network provider's total or average revenues, primarily with a view to preventing monopoly rent extraction. Revenue controls typically link allowed revenue to the network provider's own costs, on the premise that a reasonable prospect of cost recovery is essential to the long run performance of electricity networks.

5.10 The revenue cap is based on the building block approach, where the revenue that a firm may earn is directly related to the costs it can be expected to incur in providing its services in an efficient manner.

5.11 The capped amount for each year is set by building up the network provider's cost base from its individual components. The cost base generally includes return on capital, depreciation and operating expenses. To obtain these values, the Commission has required information from the network provider on the asset base of the facility, expected capital expenditure, the weighted average cost of capital for the business and efficient operating and maintenance costs. Since caps are set for future years, forecasts of each of these elements are required as well as forecasts of likely inflation.

5.12 The main attractions of a cost-based revenue control approach are that:

- it targets the prevention of monopoly rent extraction, but in a way that should also foster the pursuit of efficiency on the part of the network provider;
- its cost-linked approach ensures the continuing financial viability of the network provider by allowing differences in operating environments between networks to be taken into account;
- it requires network providers to adjust their pricing policies within the limits set on revenue, and so does not presuppose that existing prices on average are broadly appropriate; and
- there is a good deal of experience with revenue controls in the regulation of electricity networks in Australia.

5.13 Cost-based revenue controls also have their critics, who argue that such revenue controls:

- contain incentives to restrict output and move away from efficient prices – particularly for the more elastic segments of the market – when adjusting revenue to allowed levels;
- suffer from the requirement for detailed company information on past, actual and projected operating and capital expenditure; and
- rely heavily on regulatory judgments about the appropriateness of planned expenditure levels, and involve a potentially intrusive approach, with resultant disincentive effects.

Cost de-linked price cap approaches

5.14 The main alternative approach is to allow prices (“tariff basket”¹²) on average to rise in line with the CPI less an efficiency gains (or productivity) factor determined by reference to the industry-wide measure of productivity growth. The preferred measure is total factor productivity (“TFP”), which seeks to measure the relationship between the level of all inputs used in the production process and the level of output.

5.15 Under this approach, if the network provider performs better than the ‘average’ for the industry, it retains some or all of the gains, whereas if its costs are higher than average it will be penalised. This can provide powerful incentives for firms to improve their performance.

5.16 The price cap approach involves the regulator focusing not on revenue as such, but on prices. Provided the prices concerned conform to the regulator’s requirements, the network provider is free to raise whatever revenues arise from application of the approved tariffs.

5.17 Pure price caps aim to provide a light-handed regulatory approach with low compliance and regulatory costs. Starting prices are assumed to be efficient and taken as given. Allowed price movements are then determined with reference to independent measures of efficiency (such as total factor productivity), not directly related to the network provider’s own costs.

5.18 The in-principle light-handed approach of pure price caps is often contrasted with the detailed regulatory involvement under cost-linked approaches, which require the assessment of operating costs and capital expenditures and cost of capital parameters. It is argued that the focus on external efficiency benchmarks is more likely to encourage dynamic efficiency and provide incentives to deliver improved services than cost-based revenue regulation.

5.19 The main advantages of pure price caps are that they:

- involve reduced regulatory costs by removing most, if not all, of the direct scrutiny of individual company costs, so avoiding questions of cost allocation, differential treatment of operating and capital expenditure, the treatment of windfall gains and losses, and the identification of management controlled savings;
- reduce compliance costs and complexity by avoiding the need for revenue unders and overs correction mechanisms that are associated with revenue caps;
- do not contain incentives to restrict output, as the network provider would be permitted to earn additional revenue on additional output;

¹² Under a tariff basket, the limit on allowed price increases is expressed in terms of a weighted average of the prices of a basket of services, rather than on an average revenue.

- establish incentives to move towards efficient prices, as the direct link between the revenue earned by the network provider and its tariff structure would provide an incentive to align tariffs with underlying costs in order to minimise the extent to which the network provider is exposed to profit risk; and
- have been used extensively in the US, and are generally favoured over revenue caps in academic literature.

5.20 The main disadvantages of a pure price cap approach are that it:

- is de-linked from the network provider's costs and presupposes that existing prices on average are largely efficient and hence that the scope for monopoly rent extraction is unlikely to be a problem;
- creates an incentive to increase throughput at the expense of other efficiencies;
- is surrounded by considerable controversy about the practicalities of deriving measures of TFP; and
- may not adequately cover investment funding needs where investment is subject to a high degree of lumpiness, as occurs in electricity networks.

5.21 International experience has been that cost de-linked approaches have been adopted within mature regulatory regimes where the existing price levels and initial cost base are 'about right'. In addition, the regulatory regimes included established and effective regulatory data collection, accounting and decision-making procedures. In keeping with the intent of the Code, the Commission anticipates that network price regulation will evolve to become more light-handed over time and move in the direction of the cost de-linked approach.

5.22 However, at issue now is whether there is enough information available to enable the Commission to satisfy itself that current prices are 'about right', such that it could confidently move away from a building block approach to a more light-handed approach. It may be that one or more additional regulatory control periods are required in order to be fully satisfied that the original objectives of the cost-based approach, such as eliminating monopoly rents, have been met.

5.23 In exploring these alternatives to the building block approach, the Productivity Commission has noted the following:

"Yet, while productivity-based approaches are clearly feasible, like all forms of price control, they are far from perfect:

- *developing robust productivity benchmarks is not costless;*
- *there will always be scope for dispute as to whether the results of a TFP or benchmarking exercise are applicable in a given situation; and*
- *they appear to be less precise than cost-based approaches and, in the short-term, may not align prices as closely with costs.*"¹³

5.24 Notwithstanding its support in the National Access Regime report for greater use of productivity-based approaches to setting access prices, the Productivity Commission remained unconvinced that prices could be fully decoupled from costs and felt that eliminating cost considerations entirely would increase risk for both regulators and regulated firms.

5.25 Under a cost de-linked approach, any variation between price structure and the network's cost function will lead to deviations (either under or over) between efficient costs and revenues – and hence variations in the network provider's rate of return on capital employed. If price structure underestimates the sensitivity of costs to output (through incorrect drivers or coefficients), as output increases over the review

¹³ Productivity Commission, *Review of the National Access Regime*, Report No.17, Ausinfo Canberra, 28 September 2001, p.344.

period, the rate of return will decline. If price structure overestimates the sensitivity of costs to output, the rate of return will rise in response to increases in output.

5.26 For the target rate of return to be maintained (that is, to avoid excess profits or revenue shortfalls), prices must accurately reflect the sensitivity of efficient costs to changes in output over the regulatory control period. This requires:

- identifying the proportion of costs that, over the five year period, are likely to remain relatively unchanged under a range of output scenarios; and
- for the remainder, identifying, for the period in question, the primary output cost drivers (for example, customer numbers, maximum demand) and cost function output coefficients.

Issues:

(9) Should the Commission's reliance on the building block approach be relaxed, and if so in what way? In the NT context, where cost and complexity are important considerations, do the benefits of placing greater emphasis on the use of price caps and external productivity-based benchmarks during the second regulatory control period outweigh the costs and risks?

(10) Should year 1 prices or revenues be based on a building block cost analysis, irrespective of the approach taken in years 2 to 5?

Alternative forms of revenue control

5.27 If it is decided that a cost-based revenue cap should be re-established in year 1 of the second regulatory control period, should a total revenue cap approach continue to be applied, or is some alternative form of revenue control preferable?

Use of fixed (or pure) total revenue cap

5.28 Under a fixed revenue cap, the network provider's gross revenues from network access services are limited to a fixed amount.

5.29 The revenue cap is based on the building block approach, where the revenue that the network provider may earn is directly related to the costs it can be expected to incur in providing its services in an efficient manner. The capped amount for each year is set by building up the network provider's cost base from its individual components. The cost base generally includes: return on capital, depreciation and operating expenses.

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

Average revenue cap (or revenue yield approach)

5.31 A revenue yield approach involves a cap specifically on the *average* revenue (total revenue divided by total output) per unit. Under this approach, revenue varies directly with output, as allowed revenues for a network provider increase in line with the volume of energy transported over its 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 network provider.

Variable (or hybrid) revenue cap

5.32 Hybrid revenue controls combine 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.

5.33 Variable revenue drivers are introduced into the control mechanism 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 network provider, as occurs under a fixed revenue cap; and
- to strengthen the incentives for particular outcomes (for example, reduced system losses).

The allocation of volume risk

5.34 Depending on the form of revenue cap, if the network provider's actual volume differs from that forecast, either the network provider or its customers will receive a windfall gain or loss. For example:

- under an average revenue cap, the network provider bears the volume risk. Under this approach, if the volume of electricity actually distributed is greater than that forecast, the network provider will receive higher than expected profit. Conversely, if the actual volume distributed is below that forecast, the network provider will receive lower profit; and
- under a fixed revenue cap, the network provider'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.

5.35 The advantage of the hybrid form of control is that total revenue is able to track total costs more closely than under either a fixed revenue cap or an average revenue cap. Additional volumes earn additional revenue at a level determined by the control. Where this variable revenue approximates a network provider's variable distribution costs, profitability will remain broadly constant as volumes change. To the extent that the variable revenue under the control does not approximate variable costs, the network provider may retain some profit risk.

Incentive to set efficient prices

5.36 Under a fixed revenue cap, the network provider's income is fixed, regardless of how much electricity it distributes. As a result, the network provider does 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 network provider to produce a lower level of output at a higher price than under an unregulated (monopoly) situation.

5.37 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 network provider can earn on additional electricity distributed. As a result, the network provider may have an incentive to price below cost to segments of the market to which they can provide more electricity for a low incremental cost.

5.38 Hybrid controls aim at minimising the potential economic distortions created by the adoption of pure forms of revenue control. In particular, a hybrid

approach weakens the link between allowed revenue and volume, without eliminating it entirely.

Flexibility of pricing

5.39 Under fixed revenue caps, it is relatively easy to incorporate new pricing structures within a given regulatory control period. This is because the network provider is (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.

5.40 In contrast, under hybrid 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 control period, and are not re-calculated each year, or are based on historical data, it becomes more difficult for the network provider to introduce new prices and services.

Sensitivity to inaccurate forecasts

5.41 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 – the network provider is 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 the network provider 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.

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

Incentive to reduce costs

5.43 Under a fixed revenue cap, the network provider's income is fixed, regardless of how much electricity it distributes. As a result, the network provider 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 the network provider to minimise costs. A disadvantage is that it could provide an incentive to the network provider to restrict sales, as this could lower costs and increase profits. Also, there is a risk that assigning cost risks entirely to the network provider could threaten its financial viability because electricity distribution exhibits incremental costs, albeit at a relatively low level, for additional throughput.

5.44 Under 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 network provider is able to recoup from customers any increase in costs associated with increased volume of electricity distributed. Nevertheless, the network provider still has an incentive to reduce costs because allowed revenue varies according to average revenue in the case of an average revenue cap. As a result, cost reductions will increase the network provider's profit.

Transparency

5.45 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 in this Paper. This is because average revenue caps use algebraic formulae which can be complex and difficult to understand.

5.46 Hybrid arrangements require considerable information with respect to the appropriate coefficients and forecasts for the control equation. 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 formula.

5.47 The Commission 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.

Issue:

(11) If a cost-based revenue cap is to be used, what is the most appropriate form of that cap in the NT context?

Measuring and applying the X factor

5.48 If a cost-based approach is taken to establishing the revenue (and average prices) in year 1 of the second regulatory control period, the X factor in the CPI-X adjustment of the cap beyond year 1 could be based on a productivity assessment rather than the smoothing of a multi-year building block approach used in the first regulatory control period.

5.49 Under a fixed revenue cap, 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. 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 Commission implemented for the first regulatory control period.

5.50 The X factor applying to a base year's allowed revenues is the minimum expected annual real-terms reduction in total revenue allowed to be earned by the network provider.

5.51 In principle, there are two alternative methods for setting the value of X:

- relating X directly to available annual real-terms reductions in aggregate costs (the direct approach); or
- using X as a smoothing device, with available efficiencies being separately factored-in to each building block cost category to give annual revenues and the X factor being the value which achieves the present value of revenues summed over the period.

Direct approach to setting X

5.52 The direct approach involves setting the X factor to capture available efficiencies. It is not strictly a productivity measure, but a proxy for available efficiencies.

5.53 The X factor is a pre-determined annual scaler applied to the network provider's forecast revenue without reference to its actual earned rate of return. It

represents the percentage reduction in revenue the network provider is deemed capable of achieving, taking account of efficiency improvements, without jeopardising its financial integrity. If the network provider can realise efficiency gains at a faster rate, then it can keep all or some percentage of such gains. If not, the network provider's rate of return suffers.

5.54 The issues that might be considered in quantifying an X factor under this approach include:

- the capacity of the network provider to reduce costs without compromising customer service quality requirements;
- the opportunities available to the network provider 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 to allow a period of adjustment to new rates.

5.55 Some proponents of the direct approach stress the use of industry-wide (that is, independent) benchmarks, while others embrace the use of organisation-specific benchmarks. In translating anticipated cost savings to the determination of the X factor, the former only involves account being taken of the future scope for productivity improvements in the regulated industry as a whole, whereas the latter also takes account of the scope for productivity improvements in the network provider relative to productivity growth in the industry as a whole.

Indirect approach to setting X

5.56 The indirect approach to measuring the X factor involves building expected efficiencies into each of the building block components of the annual allowed revenue calculation, and using the X factor to smooth the resultant revenue streams. This approach is based upon financial modelling being used to develop a profile for the annual allowed revenue for each year of the regulatory control period based on:

- initial costs and financial position;
- assessed efficient cost paths; and
- the rate at which cost reductions can be expected to be achieved.

5.57 The X factor can then be used to set a revenue path over the regulatory control period that minimises price shocks. Under this approach, the initial year's revenue cap and the X factor are usually calculated so that the net present value "(NPV)" of the annual allowed revenue stream over the regulatory control period is exactly the same for the smoothed revenue caps established using the X factor along with CPI forecasts as it was for the original building blocks.

Issues:

(12) Should the X factor used by the Commission in the CPI-X adjustment of the opening year's revenues or prices continue to be based on smoothing of the building block-based annual allowed revenues, or should greater emphasis be given to an external productivity-based approach?

Beyond the second regulatory control period

5.58 A key feature of incentive regulation involves offering the network provider an incentive to out-perform the X factor, as doing so will enable it to increase profitability. However, the incentive to out-perform is likely to be reduced if the network provider believes its improved rate of return will be reset to its target level at the end of the regulatory control period.

5.59 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 or efficiency benchmark should be shared with customers;
- the period over which it should be shared with customers; and
- the profile of the sharing arrangements.

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

Po adjustment

5.61 As previously defined, the re-setting of prices at the start of each regulatory control period is known as year 0 price adjustment or Po adjustment.¹⁴

5.62 Under a Po adjustment mechanism, the prices would be set lower for the ensuing regulatory control period in order to move the network provider's rate of return on capital employed back to the target rate of return. (That is, the regulatory incentives have worked – the business has improved its performance allowing the owners to earn additional profit and allowing for lower prices to customers.)

5.63 On the other hand, the network provider has an incentive to 'game' the process by juggling returns from year to year. This could see the network provider dramatically reducing costs in initial years and delaying both operating and capital spending until late in the regulatory control period.

Glide path

5.64 Under a 'glide path' approach, prices are not immediately reset at the start of each regulatory control period. Instead, a higher X factor is set so that, based on forecasts, the regulated business's returns will be normalised over the next regulatory control period.

5.65 Proponents of glide path argue that:

- regulated businesses have an incentive to demonstrate high returns to their regulators (rather than hiding profits);
- longer effective payback periods allow more efficient projects to go ahead;
- as a result of the above two points (more innovation encouraged and higher X factors set), long-run prices to customers are lower; and
- any price shocks are phased in over time rather than being passed on to customers immediately in the form of higher or lower prices.

5.66 Critics of glide path argue that glide path is effectively regulatory and government approval to earn monopoly rents. They argue that superior methods to overcome gaming exist (more regulatory powers, higher penalties, etc.). However, these other methods require more intrusive regulation and, inevitably, commitment of more

¹⁴ Pronounced P-nought.

resources, resulting in higher regulatory costs. These extra costs would be of particular concern in Territory's small market.

Gains maintenance

5.67 Under a gains maintenance approach, the full gains for each year are retained by the network provider for a pre-specified time (for example, five to ten years) unconnected to any regulatory review whereupon gains are passed onto customers in a one-off or phased reduction.

Issues:

(13) Should there be an efficiency carry-over mechanism at the end of the second regulatory control period, and if so what form should it take?

CHAPTER

6

**NETWORK PRICE STRUCTURES:
IMPLICATIONS OF BEST PRACTICE****Introduction**

6.1 On the *structure* of network tariffs, at issue is whether the tariff structures (and pricing principles) adopted during the first regulatory control period need to change to reflect best practice standards.

6.2 Network prices have two main functions:

- they signal to customers the costs imposed by their use of the network; and
- they allow the costs of providing and operating the network to be recovered as revenue.

6.3 Prices that accurately signal costs allow consumption and investment decisions to reflect the value placed on the services provided and the cost of the resources consumed. This is a requirement for *economic efficiency*.

6.4 Revenue that covers total cost is a necessary condition for *financial viability*.

Price structure methodology

6.5 Clause 75(2) of the Code sets out the categories by which the network provider may distinguish tariffs and charges for standard network access services:

- (a) entry services that include the asset-related costs and services provided to serve a generator user at its connection point;*
- (b) exit services that include the asset-related costs and services provided to serve a load user at its connection point;*
- (c) common services that include the asset-related costs and services that ensure the integrity of the network and benefit all network users and cannot be allocated on the basis of voltage levels or location; and*
- (d) use of network services that include the network shared by generator users and load users, but exclude entry services, exit services and common services."*

6.6 Furthermore, clause 75(3) provides that tariffs and charges may relate to specific connection points, and may involve a combination of fixed and variable amounts and may be related to one or more of the following elements:

- demand levels (maximum kW or kVA per period);
- energy quantities involved (kWh or kVAh per period); and
- time of use.

6.7 In the network tariff schedules approved for use in the first regulatory control period, Power and Water effectively only has one bundled tariff for regulated

network services which is calculated by summing a daily standing charge, an energy based charge (which has peak and off-peak rates) and a demand base charge (which also has peak and off-peak rates), levied based on the requirements of the end-use customer.

6.8 Charges associated with standard connection and disconnection, metering and other services related to the transportation of electricity (for example, normal meter reading, billing services) are implicitly bundled into these tariffs. There were no network reference tariffs applicable to generators submitted or approved for the first regulatory control period.

6.9 Clause 75(5) of the Code provides that, prior to the commencement of each regulatory control period, the network provider is to submit for the Commission's approval a draft statement setting out details of principles and methods to be used for defining the individual standard network access services to be supplied by the network provider and for establishing the reference tariffs to apply to those services.

6.10 The Commission may only withhold its approval of the pricing principles statement if the statement is not consistent with the principles in clause 74 of the Code.

6.11 Clause 81(2) requires the network provider to submit for the Commission's approval details of principles and methods for establishing capital contributions.

6.12 The Commission may only withhold its approval of the capital contributions principles and methods statement if the statement is not consistent with chapter 8 of the Code.

Transmission and distribution prices

6.13 Electricity networks are divided into a high voltage transmission component, used for transporting bulk power from large generators to regional delivery points, and a lower voltage distribution network, which takes power from the regional delivery points and distributes it to final customers. Transmission assets combine with sources of generation to create an integrated and interdependent system for delivering bulk electricity.

6.14 The boundary between the networks depends mainly on engineering considerations, including the size of load flows. Over time, the boundary may move up the system as it expands in reach and capacity. A key difference in larger systems is that transmission networks are designed as meshed high voltage systems linking sources of generation and capable of complex power flows. Distribution networks in contrast operate more as radial systems stepping down to progressively smaller voltages.

6.15 Where networks are functionally separated in this way, as in the national electricity market ("NEM") and most large systems, separate prices are applied to the transmission and distribution sectors. Typically, different pricing methodologies are used between the sectors. The main difference is that transmission service is treated as an extension of the wholesale energy market. The extent to which the pricing of transmission service is integrated with the energy market has become a key issue in market design.

Issue:

(14) Should regulated networks in the NT be functionally separated into a transmission and distribution component, with separate network prices reflecting the different services provided?

Improving network cost signals

Cost signalling

6.16 Electricity networks are a transport system; they link sources of generation to points of consumption (or load). Generation may be provided by large dedicated power stations, smaller distributed generators that are linked to other activities (such as cogeneration plants using recycled boiler steam) or locally available energy (such as methane gas from landfills). Traditionally, most electricity has been generated in a few large power stations. In the future, factors such as improved technology may see the share of generation from distributed sources increase.

6.17 Load is more widely dispersed, determined by the spread of population and industry. Customers make decisions about where to locate based on a range of factors, one of which is the availability and cost of electricity at that location. Once located, the level of electricity consumption and its pattern (the hourly, weekly and seasonal profile) will depend on the customer's requirements, the value placed on consumption and the cost.

6.18 The resulting demand for electricity is met through the generation of electricity and its transport over the electricity network to the location at which it will be used. There are choices to be made as to the type of generation to use, whether it should be sited close to customers thus saving on transport costs and so on. Some large customers or other interested parties may consider generating their own electricity locally, to avoid high transport costs for example or to take advantage of by-products from their industrial operations that can be used to generate electricity at lower cost.

6.19 A key input to choices on both the demand and supply sides is cost – if costs are not known or are under- or over-stated then the choices made may be wasteful, using resources that could be better used elsewhere. Electricity usage and transport (network) prices that reflect all relevant costs allow unbiased comparisons to be made between alternative ways of meeting customers' energy service requirements.

6.20 When information on costs is made available, the lowest cost options that provide the required services can be selected. These may be on the demand side – for example, reducing electricity use by investing in energy efficiency or shifting demand from high cost to low cost periods – or on the supply side, such as the use of distributed (local) generation or cogeneration. It also creates business opportunities for the development of products and services directed at managing electricity consumption or taking advantage of lower cost supply options.

6.21 The critical cost signalling role of prices is the influence they have on the future behaviour of network owners and users. Therefore, efficient prices are those which, in a forward-looking sense, encourage efficient use of, operation of and investment in the network.

Network price signals and investment in the network

6.22 Networks provide the physical link that allows the transport of electricity between points of generation and points of consumption. The price of electricity delivered to the consumer is made up of the energy cost determined by the contract prices of generators in the electricity market, the transport cost and the retail margin. For electricity to be delivered to consumers at the lowest economic cost, costs must be minimised for both the energy and transport components.

6.23 In the short run, when capacity is fixed, network costs are made up of energy losses and the cost of capacity constraints. Where constraints occur, costs may be incurred through the use of out-of-merit generation, leading to a higher energy price, or through reduced supply quality or interruptions to supply. In the long run,

capacity can be expanded and network costs will be determined by the costs of maintaining and adding to the network.

6.24 Where there is a constraint, it will be economic to add network capacity if the cost of construction is less than the cost of the alternatives – additions to generation or the reduction of peak demand. Additional capacity will continue to be economic up to the point at which the cost of an extra unit (long run marginal cost or LRMC) will be equal to the cost of constrained out-of-merit generation, network losses, reduced quality of supply and interruptions (short run marginal cost or SRMC).

6.25 For optimal network use and investment, consumers and investors must face prices that reflect these costs (prices that are economically efficient).

6.26 Efficient pricing implies two conditions are met:

- in the short run prices are set equal to marginal cost; and
- there is a mechanism for ensuring that productive capacity expands or contracts efficiently.

6.27 Electricity consumption varies considerably during the day. Peak demand usually occurs in the mornings and evenings. Network capacity must be capable of meeting these peaks, even though this means that a large proportion remains unused for the rest of the time. Peak demand is therefore a major cost driver.

6.28 If parts of the network become congested through heavy use, reliability falls and the chances of prolonged interruptions to supply increase. There are three main remedies – the capacity of the lines can be increased (network investment), demand during periods of congestion can be reduced (demand side response) or a new source of generation can be added that takes load away from the congested lines (distributed or local generation).

6.29 Network prices that signal the cost of congestion (the cost of the investment in additional capacity required to relieve the congestion) can play a key role in bringing forward the least cost supply or demand response.

6.30 In the NEM and in electricity markets elsewhere, the efficiency aspects of transmission pricing have received considerable attention. The cost signalling role of economically efficient pricing does not stop at the arbitrary boundary between transmission and distribution. To the contrary, there is a strong economic case for lifting the profile of efficient pricing and investment across distribution networks:

- the distribution network accounts for around 30% of the final cost of delivered electricity; the cost of network investment – and therefore the importance of price signalling – is significant;
- the large majority of electricity end users receive supply through the distribution network, and hence receive their network usage price signals, including transmission costs, through distribution charges;
- all of the major electricity market competitors to large scale generation (and hence also transmission networks) – distributed generation, cogeneration, demand-side bids and other demand management options – have their economics influenced by the performance and the pricing of distribution network services; and
- in addition, a number of these alternatives to large scale generation also provide competition for distribution networks, by allowing end users to source their electricity from on-site (or local) generation or by substituting demand management products for delivered electricity.

Issue:

- (15) *To what extent should network prices in the NT be reflective of the economic costs of network use and access?*
- (16) *Is one declining block tariff for regulated network services (as applied in the first regulatory control period) sufficient to provide appropriate price signals to the market? Should separate charges be mandated?*
- (17) *What approach should be taken to the pricing of network services provided to, and by, embedded generation to ensure that economic projects are not disadvantaged?*

Network usage cost signals

6.31 Putting network losses to one side, the economic costs of network use will vary with the level of capacity utilisation and by location:

- marginal costs will be low when there is spare capacity, since demand on the system can be increased with no loss of performance;
- at higher levels of network use, additional demand will progressively reduce the quality and reliability of supply unless there is investment in new capacity; and
- investment costs will not be uniform across the network.

Capacity signals

6.32 As the level of demand on network elements approaches their rated capacity, the reliability and quality of supply deteriorates. If service standards are to be maintained as demand approaches the capacity of the network to perform satisfactorily, either investment in additional capacity will be required to meet further increases in demand or some form of demand management will be required.

6.33 An efficient pricing signal for network use will have a relatively low value when demand is low relative to available capacity and a value that approaches LRMC when demand is at or close to available capacity. This reflects the probability of demand exceeding the capacity threshold for that part of the network, triggering the need for investment in additional capacity. As congestion increases and the capacity threshold is approached, the price signal gives customers an incentive to reduce their demand on the network.

6.34 The required level of network capacity is determined by the coincident peak demand – the maximum demand that customers collectively place on the network at any one time. Constraints are therefore time-specific. Technically, network capacity is required to meet both real and reactive power. The demand cost driver is therefore most accurately measured in kilo-Volt-Amperes (kVA) by time of use.

Locational signals

6.35 Capacity constraints may occur at different levels of the network and at different locations. The constraint may be within the transmission network, at the sub-transmission level or at a particular distribution element. In addition, variations in terrain, customer density, distance from transmission nodes and other factors can lead to differences in LRMC across the distribution network.

6.36 Ideally, network usage charges will signal locational variations in marginal costs. In practice there is significant complexity in accurately representing locational and time-specific marginal costs.

Cross subsidies

6.37 Prices are subsidy free when:

- no group of consumers pays more than its stand alone cost; and
- each group of consumers pays at least its incremental cost.

6.38 Subsidy free network prices are particularly important where some network services can be supplied on a competitive basis. For example, a load centre can receive its electricity supply either from a remote generator supplying via the network or from an embedded generator via the network or a direct connection. In these circumstances, cross subsidies may encourage inefficient behaviour if they stimulate activity that would not take place in a subsidy free environment, for example, new investments, patterns of demand, entry to or exit from an industry.

Limitations on network pricing

6.39 The economic principles that underpin the concept of efficient pricing seem relatively clear. In the absence of an effective market for network services, they provide some general guidance for administering economically efficient usage charges. They emphasise the importance of signalling the marginal (or forward-looking) costs of network use, the relationship between capacity utilisation (or its corollary, the level of network congestion) and marginal cost and the time and location-specific nature of the cost signal.

6.40 However, the pricing of network services is a practical exercise that takes place in an environment of limited cost information, technical complexity and uncertainty. Prices have a broader function than signalling economic costs. They also recover the revenue necessary for financial viability and allocate sunk network costs between customers. Price changes may also impose adjustment costs on customers that are not taken into account when considering pricing efficiency.

6.41 The purpose of capacity-related pricing is to signal to customers the costs imposed by their use of the network. As the level of available capacity shrinks, the requirement for additional investment will increase. If customers see the investment cost reflected in their usage charge they will have an incentive to consider the value of their use of the network relative to other options for either meeting their energy service requirements or indeed reducing them.

6.42 However, the relationship between customer use and network investment is rarely clear cut:

- capacity constraints may occur at any level within the network, from low voltage reticulation to sub-transmission network elements;
- the timing of demand peaks may vary at different levels within the network and by location; and
- the relationship between system performance and power flows over the network is often complex, as in many cases capacity augmentations cannot be attributed to a single measure of demand for an individual customer or group of customers.

6.43 Where usage prices do not accurately represent the costs of network use, the efficiency of the price signal and the associated economic benefits will be reduced. Poorly structured prices may provide quite misleading signals and increase rather than reduce economic costs.

6.44 The selection of the most appropriate indicator of network marginal costs is therefore a key consideration. It will invariably involve a strategic assessment of the expected performance of the network over the medium term, the nature and cost of likely capacity constraints and the customer network usage patterns that contribute to the expected constraints.

6.45 In making this assessment some of the choices to be considered will include:

- the level of capacity signalling – whether this is system-wide or location-specific; and
- the form of capacity signalling, in particular the use of:
 - real power (kW) or real and reactive power (kVA) as a measure of demand placed on the network, and
 - anytime demand, preset for time of use (hour, day, season), coincident demand or congestion-dependent time of use measures.

Setting priorities and balancing objectives

6.46 No single set of prices can equally satisfy the commonly agreed objectives that have been discussed above. There are clearly tensions between the objectives. In settling on a particular pricing structure and cost allocation methodology, a balancing of objectives is arrived at, either explicitly or implicitly. In the lead up to a new five year regulatory control period, it is appropriate and important that the relative weights given to the objectives, as expressed in the basis and structure of current network charges, should be reviewed for their suitability to conditions across the network and the market more generally.

6.47 On one view, it is possible to argue that network charges applied in the current regulatory control period unduly favour the recovery of accounting costs on a fully distributed cost basis over the cost signalling role of efficient prices. Signals regarding the variation in the cost of network use by time, location and level of asset utilisation are generally weak. If this view is valid, there is a material risk that opportunities for more economic means of meeting customers' energy service requirements are being missed, with the net effect of higher costs and wasted resources.

6.48 In a large open energy market, the combined interests of competing energy service providers and alert customers act as a stimulant to the development of more economically efficient network charges. In the NT market, these factors are largely absent at present. The market is relatively small and competition has not yet taken hold. More efficient prices take effort to develop and add to costs in the short term. The risk is that, in these circumstances, Power and Water, as the integrated monopoly supplier, will continue practices that, implicitly or explicitly, create barriers to the entry of efficient alternative suppliers, be they large or small, supply or demand based.

6.49 This issue goes beyond price alone. It also concerns the basis on which network planning and investment takes place and the public disclosure of information as a means of bringing forward economic alternatives to network investment.

6.50 Over the next five years, as increased supplies of gas become available, there may be increased opportunities for distributed generation of varying sizes and configuration. Such projects may have the potential to defer the need for network augmentations as well as allowing customers that are supplied direct from local generation sources to avoid network charges. Similarly, demand management service providers are gaining a foothold in the NEM by providing benefits to customers and networks, and it is only a matter of time before they become more active in the NT market. The approach to network pricing will be an important influence on potential market developments such as these – should the door be opened, or left closed?

Issue:

- (18) What changes to network charges and structures are necessary to ensure that customers will benefit from economic opportunities in the provision of energy services that may occur during the second regulatory control period?**
- (19) In a small network, are there cost effective ways to provide the appropriate signals (price or otherwise) for efficient use and investment (having regard to capacity and location) and to ensure that customers and competing service providers are not unreasonably discriminated against?**