1 May 2007

Mr Steve Edwell
Chairman
Australian Energy Regulator
GPO Box 520
MELBOURNE VIC 3001

Ms Michelle Groves
Chief Executive Officer
Australian Energy Regulator
GPO Box 520
MELBOURNE VIC 3001

Dear Steve & Michelle,

FIRST PROPOSED GUIDELINES

The AER has issued the first proposed guidelines and accompanying explanatory statements for the following guidelines associated with revenue regulation for electricity transmission businesses.

1. Post-tax revenue model
2. Roll-forward model
3. Efficiency benefit sharing scheme
4. Service Target Performance incentive scheme
5. Submission guidelines
6. Cost allocation guidelines

All of these first proposed guidelines were required by the NER to be issued by the AER by 1 January 2007 and are required to be finalised by 30 September 2007. These guidelines are important documents for all electricity transmission businesses, most particularly because the NER requires transmission businesses to comply with the guidelines.

While ETNOF appreciates the short amount of time the AER had to prepare these first proposed guidelines, ETNOF considers that substantial revisions are required to many of the guidelines in order for them to perform the role ETNOF understands was intended by the Rules – namely to enhance the certainty and efficiency of the process for a revenue determination.

A submission on each of the guidelines has been prepared highlighting ETNOF's concerns with the first proposed guidelines. ETNOF businesses would be happy to provide additional information and discuss our material concerns with the guidelines with AER staff to facilitate an effective outcome.

However, prior to finalising the guidelines, the ETNOF businesses request the AER to conduct a further round of consultation, at a minimum with the businesses subject to revenue determinations, if not more broadly should procedural fairness require it. As our view is that substantial revisions are required to the guidelines ETNOF considers further consultation on the guidelines is essential to producing documents that genuinely enhance the process of revenue determinations.

I would be happy to discuss this matter further with you in person and look forward to your agreement to additional consultation with transmission businesses on this important aspect of revenue determinations.

Yours sincerely,

Gordon Jardine
CHAIRMAN

ELECTRICITY TRANSMISSION NETWORK owners

Post-Tax Revenue Model

Response to AER's First Proposed Guidelines

1 May 2007

TransGrid ElectraNet electricity transmission Powerlink Queensland TRANSEND SP AusNet A member of Singapore Power Group

Post-Tax Revenue Model

Response to AER's First Proposed Guidelines

1. Introduction and overview

This submission is made by the Electricity Transmission Network Owners Forum, which comprises ElectraNet Pty Limited, Powerlink Queensland, SP AusNet, Transend Networks Pty Ltd and TransGrid ("ETNOF"). Collectively, this group own and operate over 40,000 km of high voltage transmission lines and have assets in service with a current regulatory value in excess of $9.1 billion. ETNOF welcomes the opportunity to respond to the Australian Energy Regulator ("AER") on the First Proposed Post-Tax Revenue Model ("PTRM"),[1] the associated Handbook[2] and the Explanatory Statement and Issues Paper[3].

The AER's PTRM guidelines have brought a number of technical issues to the fore, which have the potential to affect a TNSP's cash flows and the calculation of its maximum allowable revenue. For the purposes of this submission, ETNOF has focused on the more significant issues below:

- the timing assumptions made within the PTRM;
- the treatment of depreciation; and
- the capitalisation formulation used to account for the assumption that capital expenditure is undertaken, on average, in the middle of the year.

ETNOF's position on each of these issues is set out in the remainder of this submission.

2. Timing assumptions within the PTRM

Two significant questions raised by the AER in the Explanatory Statement and Issues Paper are:

- whether the simplifying assumptions made regarding the timing of revenue, operating expenditure and capital expenditure streams compromises the integrity of regulatory determinations?
- whether attempting to achieve a higher level of consistency in the timing of revenue, operating expenditure and capital expenditure streams would be unduly complex and costly for individual TNSPs?

Historically the PTRM has assumed that revenue is received on the last day of the year, operating expenditure is incurred on the last day of the year and capital expenditure is incurred on average in the middle of the year.

1 AER, Post-Tax Revenue Model, January 2007.

2 AER, First Proposed Electricity Transmission Network Service Providers, Post-Tax Revenue Model Handbook, January 2007.

3 AER, First Proposed Electricity Transmission Network Service Providers, Post-Tax Revenue Model, Explanatory Statement and Issues Paper, January 2007.

ETNOF considers that the current timing assumptions should be maintained in the PTRM. Any change to these existing assumptions would:

- lead to additional complexity in the regulatory model as the AER would need to:
  - develop a method for calculating a TNSP's working capital requirements;
  - consider the timing of all cash flows within the model; and
  - modify the PTRM to correctly account for the timing of all cash flows;
- have implications to the calculation of the cost of capital. Notwithstanding this, the methodology applied in the PTRM must reflect the relevant provisions of the National Electricity Rules (the "Rules"); and
- require a full and transparent consultation process to be undertaken, particularly given the absence of regulatory precedent in this area. ETNOF also recognises that such a task is unlikely to be completed before the current deadline to publish the first PTRM.

In order to more accurately model the timing of all cash flows in the PTRM, the AER would need to:

- develop a benchmark allowance for working capital;
- assess the timing of all cash flows; and
- develop modifications to the PTRM that correctly account for the timing of revenues and costs.

A working capital allowance would need to be developed as the benefit of intra-year cash flows has been the reason cited by the AER for excluding any allowance for working capital in the PTRM to date.

The AER (and formerly the Australian Competition and Consumer Commission ("ACCC")) appears to have formed the view that these simplifying assumptions accord transmission network service providers ("TNSPs") a financial benefit over and above that received if the timing of the cash flows were to be more accurately modelled.

The AER's position in relation to this issue can be seen in the following collection of quotes taken from regulatory decisions which have explicitly considered the interrelationship between working capital and timing assumptions in the PTRM (see Box 2.1).

Box 2.1: Regulatory decisions – the relationship between working capital and timing assumptions made by the ACCC/AER

NSW and ACT Transmission Network Revenue Cap - TransGrid: Draft Decision, 28 April 2004, pg. 32.

The ACCC considers that a TNSP should be compensated for working capital given that it is an appropriate operating cost for a TNSP. However, the allowed revenue determined by the ACCC's Post Tax Revenue Model provides adequate compensation for any mismatch between the timing of income and expenditure.

Final Decision, Moomba to Sydney Pipeline Access Arrangement, 2 October 2004, pp. 29-30.

Rather than model the timing of EAPL's cash flows throughout the year, the Commission assumed in its model that all costs and revenue are incurred on the last day of each year. In reality, EAPL's cash flows would occur at regular intervals throughout the year, giving EAPL a benefit above the regulated revenue equal to the time value of money on the net cash flow received throughout the year. The Commission considered that this benefit more than compensated EAPL for any gap between payments and collections during the year.

Final Decision Moomba to Adelaide Access Arrangement, 31 July 2002, pp. 12-13

The Commission's cash flow modelling errs on the side of the service provider by providing for total revenue that exceeds that which is calculated in a more precise and explicit model. Explicit compensation for working capital in conjunction with the adoption of the PTRM cash flow modelling approach would double count the working capital cost in addition to erring on the side of the service provider.

Final Decision Access Arrangement Proposed by NT Pty Ltd Amadeus to Darwin Pipeline, 4 December 2004, pg.70.

The cash-flow model used by the Commission assumes that the service provider receives the share of revenue in respect of capital costs on the last day of the year. As revenue is received over the course of each year, it would be expected that target revenue would overstate the opportunity cost associated with investors' funds and would more than offset any shortfall in the cost of financing operating expenditure (ie the required return on working capital). The Commission's modelling confirms that NT Gas already receives an advantage as a result of the time value of money under the Commission's cash flow modelling that is significantly greater than the working capital cost.

If NT Gas's cash flow were modelled more precisely (such as on a monthly or a daily basis rather than annually) it would be appropriate to explicitly include the working capital component. As a result, however, the total required revenue for NT Gas would be less than that determined under the Commission's modelling approach. Modelling cash flows on an annual basis results in reduced administration and compliance costs while adding to the transparency of regulation.

It is clear from the citations that any change to the timing of cash flows within the PTRM would require the AER to consider the magnitude of a TNSP's required working capital allowance as well as its treatment in the PTRM. Notwithstanding that clause 6A.5.3(b)(3) of the Rules requires that the PTRM specify "the manner (if any) in which working capital is to be treated", ETNOF notes that the proposed PTRM and Handbook is silent on this issue.

Estimation of a TNSP's working capital allowance is a complex task and requires consideration of, among other things, payment terms contained in a TNSPs contractual arrangements with users, payment terms a TNSP has with its own suppliers and the size of the individual TNSP. These terms may also vary widely across TNSPs. Given the complexity associated with development of a benchmark allowance for working capital, the AER will need to consult TNSPs and other interested parties before developing a guideline which sets out how it proposes to calculate a TNSP's working capital requirements.

Further, allowing for the recovery of working capital is not the only aspect of the PTRM that the AER would have to consider if the timing of cash flows were to change. The AER would also need to consider the timing of all other cash flows within the model, including:

- tax payments and imputation credits;
- cost passthroughs;
- the return of capital;
- interest payments; and
- dividend payments.

Given the complexity of issues surrounding the timing of each of these cash flows and the lack of uniformity across TNSPs, any proposal to change the PTRM to account for the timing of these cash flows should be subject to public consultation.

A further factor that would have to be considered if intra-year timing effects were to be incorporated in the PTRM is the consequential modification to the PTRM. ETNOF understands that there are currently two jurisdictional regulators that recognise the effects of intra-year cash flows - the Independent Pricing and Regulatory Tribunal ("IPART") and the Queensland Competition Authority ("QCA"). However, as far as ETNOF is aware, neither IPART nor the QCA have undertaken a public consultation process that outlines their assumptions and approaches to modelling the timing of cash flows. ETNOF also understands that both regulators have adopted a different approach to this issue.

Other regulators, namely, the Essential Services Commission of Victoria and the Essential Services Commission of South Australia have recognised that regulated businesses receive an intra-year cash flow benefit. However, they avoided the task of modelling intra-year cash flows and, instead, rely on the perceived intra-year cash flow benefit to deny all (or some) of a business' working capital requirements.

In the absence of any regulatory precedent in this area, ETNOF considers that any proposal to modify the PTRM to reflect intra-year timing effects should be subject to a transparent consultation process.

The foregoing discussion demonstrates that any movement toward accounting for intra-year timing effects would not only be a complex task, but would impose additional administration and compliance costs on TNSPs. Therefore, any claimed benefits from achieving a greater level of precision within the PTRM must be weighed against the complexity, costs and uncertainty associated with adopting such an approach.

Overall, ETNOF is of the view that the current timing assumptions should be maintained in the PTRM. If the AER were to change its position on this issue ahead of the release of the final PTRM, there would need to be an open and transparent consultation process to:

- incorporate a mechanism in the PTRM to allow for the recovery of working capital;
- determine how the working capital allowance will be calculated;
- form a view on the timing of each cash flow item within the PTRM; and
- establish the necessary adjustments to the PTRM to reflect these alternative timing effects.

Another factor that would need to be considered in this context is whether a change to the timing of cash flows would conflict with locking the WACC parameters into the Rules. The

reasoning which underpinned the Australian Energy Market Commission's ("AEMC's") decision to lock the WACC parameters in the Rules is provided below:[4]

> *"Providing short term stability regarding the WACC determination reduces an important source of potential variability in regulatory decision making thereby providing a more certain and predictable environment for investment and financing decision making."*

However, the current WACC parameters were established under the belief that the historic timing of cash flow assumptions made in the PTRM would be retained. Any proposal to now change the assumed timing of cash flows would be inconsistent with the WACC parameters included in the NER. In this regard, it should be noted that the WACC parameters cannot be changed until 2009.

Given the requirement for the first PTRM to be published by 30 September 2007, and the level of consultation required for each of the aforementioned issues, ETNOF strongly considers that the current approach should be maintained.

3. Treatment of depreciation

Clause 6A.6.3(a)(2) of the Rules allows TNSPs to nominate the depreciation schedule that will apply across each asset or category of assets (excluding those referred to in clause 6A.6.3(c)) subject to that nomination meeting the requirements contained in clause 6A.6.3(b). While the Rules explicitly afford TNSPs the flexibility to determine the method of depreciation (i.e. straight line, annuity depreciation or declining value), the proposed PTRM mandates the use of the straight line depreciation. ETNOF considers that this is a major shortcoming of the proposed model and is clearly contrary to clause 6A.6.3(a)(2) of the Rules.

The AEMC's reason for providing this flexibility was:[5]

> *"… that the discretion to propose depreciation schedules appropriately lies with TNSPs rather than with the regulator, as it is the TNSPs that have the best knowledge of the condition and likely future utilisation of their assets."*

This flexibility could be incorporated into the PTRM by simply having the real depreciation allowance for each year of the regulatory period as an input into the model. To ensure that the requirements of clause 6A.6.3(b) are satisfied, the AER could require that each TNSP prepare its own spreadsheet which sets out the proposed depreciation path across each asset or category of assets (excluding those referred to in clause 6A.6.3(c)) and the calculation of the real depreciation allowance over each year of the assets' economic life. If the nominated depreciation method meets the requirements of clause 6A.6.3(b), then this spreadsheet could be incorporated within the PTRM by linking the dollar value of real depreciation entries to the *Assets* worksheet and allowing these changes to flow through the remainder of the model.

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4 AEMC, *National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No.18*, November 2006, page 82.

5 AEMC, *National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No.18*, November 2006, page 79.

4. Capitalisation formulation

The proposed PTRM alters the manner in which capital expenditure is capitalised before being rolled into the regulatory asset base ("RAB"). Specifically, the capitalisation formulation utilises the real vanilla WACC rather than the nominal vanilla WACC.[6] ETNOF notes that neither the proposed model, the PTRM handbook nor Explanatory Statement provide any reason as to why this change has been made. It is also unclear whether this change is simply an error within the model or whether the AER has intentionally made this change.

The use of the real vanilla WACC rather than the nominal vanilla WACC implies that TNSPs will not be compensated for the inflation exposure over the six month capitalisation period. Given the potentially adverse effect this could have on a TNSP's maximum allowable revenue, ETNOF engaged NERA to consider this issue further. A copy of NERA's report on the *AER's First Proposed Post-Tax Revenue Model, Roll Forward Model and Efficiency Benefit Sharing Scheme* addresses this issue and is provided with ETNOF's submissions to the First Proposed Guidelines.

NERA found that the change in the capitalisation formulation represents a significant departure from that previously applied by the AER and, that TNSPs would be adversely affected by such an approach if retained in the PTRM. NERA concluded that this was a fundamental error within the proposed PTRM that should be remedied before the model is finalised. NERA suggested that this error could be corrected by simply replacing the real vanilla WACC which appears in the capitalisation formulation of the proposed PTRM (*Assets* worksheet) with the nominal vanilla WACC.

5. Summary of ETNOF's Position

ETNOF considers that the AER should:

- maintain the timing assumptions that have historically been utilised in the PTRM within the first PTRM;
- allow for the use of alternative depreciation schedules where nominated by a TNSP (for assets other than those specified in clause 6A.6.3(c) of the Rules) and where that nomination complies with clause 6A.6.3(b) of the Rules; and
- correct the capitalisation formulation within the proposed PTRM by replacing references to the real vanilla WACC with the nominal vanilla WACC.

6. Other Issues

ETNOF has also identified the following issues with the proposed PTRM:

- formula errors as set out below:
  - the use of the term "ranilla" in row 226 of the Assets worksheet instead of "rvanilla"; and
  - the use of the term "A8taxstdlife" rather than "A9taxstdlife" in rows 402-405 of the Assets worksheet;
- greater transparency could be achieved in the PTRM by:

[6] See AER, *Compendium of Electricity Transmission Regulatory Guidelines – PTRM*, August 2005.

- creating a separate efficiency carry forward rewards/penalties building block to clearly delineate such amounts from a TNSP's expected efficient future operating expenditure; and
- removing the term "economic depreciation" where the AER's use of the term is different from its meaning in accounting, finance and economics:
- decomposing depreciation into two building blocks – namely, indexation and nominal depreciation.

1 May 2007

AER's First Proposed Post-Tax Revenue Model, Roll Forward Model and Efficiency Benefit Sharing Scheme

ETNOF

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Contents

1. Introduction

This report has been prepared by NERA Economic Consulting ('NERA') at the request of the Electricity Transmission Network Owners Forum ('ETNOF'). It considers the appropriateness of certain aspects of the first proposed post-tax revenue model (PTRM), roll forward model and efficiency benefit sharing scheme being developed by the Australian Energy Regulator (AER) for application to electricity transmission network service providers (TNSPs).

Clauses 6A.5.2(c) and 6A.6.1(d) of the National Electricity Rules (the Rules) require the AER to develop and publish both the first PTRM and roll forward models by 28 September 2007. In accordance with the consultation process required by clause 11.6.17 of the Rules, the AER has released its first proposed PTRM[1], roll forward model[2] and efficiency benefit sharing scheme[3] and has invited comments from interested parties.

ETNOF has asked NERA to examine the proposed PTRM, the proposed roll forward model and the efficiency benefit sharing scheme and to consider whether:

- the formula applied to capital expenditure to be incorporated into the regulated asset base in both the PTRM and the proposed roll forward model - which has changed from versions of the PTRM that pre-dated the Rules - is appropriate;
- the first proposed roll forward model complies with clause 6A.6.1(e)(3) of the Rules and treats outturn inflation in a manner that is consistent with the indexation method used in the PTRM; and
- the efficiency benefit sharing scheme provides a 50:50 sharing ratio between the TNSP and users. If not how can scheme be adjusted to provide a constant 50:50 sharing ratio.

The remainder of this report is structured so as to discuss our findings in relation to these three questions in the order they appear above.

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1 The model and documentation published by the AER in relation to the first proposed post-tax revenue model include:

- AER, Post-Tax Revenue Model, January 2007;
- AER, First Proposed Electricity Transmission Network Service Providers, Post-Tax Revenue Model, Explanatory Statement and Issues Paper, January 2007; and
- AER, First Proposed Electricity Transmission Network Service Providers, Post-Tax Revenue Model Handbook, January 2007.

2 The model and documentation published by the AER in relation to the first proposed roll-forward model include:

- AER, Roll-Forward Model, January 2007;
- AER, First Proposed Electricity Transmission Network Service Providers, Roll-Forward Model, Explanatory Statement and Issues Paper, January 2007; and
- AER, First Proposed Electricity Transmission Network Service Providers, Roll-Forward Model Handbook, January 2007.

3 The model and documentation published by the AER in relation to the first proposed efficiency benefit sharing scheme include:

- AER, First Proposed Electricity Transmission Network Service Providers, Efficiency Benefit Sharing Scheme, January 2007; and
- AER, First Proposed Electricity Transmission Network Service Providers, Efficiency Benefit Sharing Scheme, Explanatory Statement and Issues Paper, January 2007.

2. Capitalisation of new capital expenditure

The PTRM framework assumes that capital expenditure is timed so as to be undertaken, on average, in the middle of the year. To account for this timing assumption capital expenditure is multiplied by a capitalisation factor before being rolled into the regulatory asset base (RAB).

In earlier versions of the PTRM that pre-dated the current Rules, the capitalisation factor was based on a simple interest formulation that utilised the nominal vanilla weighted average cost of capital (WACC), ie, (1+½nominal vanilla WACC). In the first proposed PTRM and roll forward models the simple interest nominal vanilla WACC capitalisation factor has been replaced by a compound interest formulation which utilises the real vanilla WACC, ie, $(1+\text{real vanilla WACC})^{½}$. This revision to the capitalisation formulation effectively involves two discrete changes consisting of:

- a change in the cost of capital measure from one a nominal to a real form; and
- a change in the manner by which the annual cost of capital measure is converted to a semi-annual measure.

The remainder of this section considers the implications of these two discrete changes.

2.1. Use of the real vanilla WACC

The earlier formulation of the capitalisation factor applied by the AER in regulatory determinations was based on a nominal vanilla WACC which provided TNSPs with an implicit allowance for expected inflation over the six month capitalisation period. The revised formulation applies a real vanilla WACC and so provides no compensation for expected inflation over the capitalisation period. It follows that TNSPs are exposed to the cost of expected inflation over the six month capitalisation period, which has flow on effects for the calculation of both the return on and return of this capital expenditure.

The magnitude of this exposure is significant, as illustrated in the following example. This example sets out the alternative estimates of the real and nominal capitalised value of capital expenditure calculated using the methodology contained in the first proposed PTRM and roll forward models. In this example it is assumed that the nominal value of capital expenditure in year 1 of the regulatory period is \$100,[4] the real value of year 1 capital expenditure is \$98,[5]

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[4] In the PTRM the real values of estimated capital expenditure appear to be in mid-year values, ie, the PTRM example uses the term - As Incurred (\$m Real 2007-08). As result, \$98 of expected real capital expenditure is equal to \$100 of expected nominal expenditure:

$$\$98 \times (1 + 2.04\%) = \$100$$

We note that if the PTRM were to use real capital expenditure estimates that were end of year values (ie, in values at the beginning of the regulatory period) then the problem of there being no compensation for six months of expected inflation discussed in this section would no longer be relevant for the PTRM. However, this problem would remain for the roll forward model.

[5] That is, $\frac{\$100}{(1+2.04\%)} = \$98.00$

the nominal vanilla WACC is 8.06%, expected inflation is 2.04% and the real vanilla WACC is 5.90%.[6] Table 2.1 sets out the relevant calculations.

Table 2.1
Comparison of estimated capital expenditure to be rolled into the RAB

Alternative models	Nominal capital expenditure rolled into the RFM	Real capital expenditure rolled into the PTRM
Proposed PTRM and roll forward model using a Nominal WACC (*Assets* worksheet)	\$103.95 $\$100\times(1+8.06\%)^{0.5}=\$103.95$	\$101.87 $\$98\times(1+8.06\%)^{0.5}=\$101.87$
Proposed PTRM and roll forward model (*Assets* and *Actual RAB roll forward*)	\$102.91 $\$100.85\times(1+2.04\%)=\$102.91$	\$100.85 $\$98\times(1+5.90\%)^{0.5}=\$100.85$
Difference in the value of capital expenditure rolled into the RAB	**\$1.04**	**\$1.02**

The results contained in this table demonstrate that the application of the real vanilla WACC rather than the nominal vanilla WACC causes the real value of the \$98 capital expenditure rolled into the TNSP's RAB in the PTRM to be \$1.02 lower than what it should actually be.

This \$1.02 difference stems from the alternative equations that underpin the two methodologies set out in Box 2.1, below. Method 1 represents the methodology that was previously used in the PTRM which applied the nominal vanilla WACC to nominal capital expenditure and divided this by the inflation index[7] to calculate the real capitalised value of capital expenditure. Method 2 represents the methodology that has been adopted in the first proposed PTRM and roll forward model which calculates the real capitalised value of capital expenditure by applying the real vanilla WACC to the real capital expenditure. These two alternative methodologies are not equivalent as can be seen in Box 2.1 which sets out the equations underlying methods 1 and 2.

In comparing the equations underlying methods 1 and 2 it is clear that method 2 will yield a lower capitalised value because it extracts an additional six months of inflation expectations from the capitalised value relative to method 1.[8] This difference simply reflects the fact that method 2 provides no compensation for expected inflation over the six month capitalisation period. The AER first proposed approach would only be appropriate if the PTRM's real capital expenditure inputs were end of year values (ie, in values at the beginning of the regulatory period). In this scenario the TNSP would receive the additional six months of expected inflation by the fact that the PTRM indexes expected capital expenditure by a full year of inflation rather than the required six months.

However, the first proposed PTRM does not appear to require that the real values of estimated capital expenditure to be in end of year values. The first proposed PTRM example

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6 The real vanilla WACC is calculated using the Fisher equation, ie, $(\frac{(1+8.06\%)}{(1+2.04\%)}-1=5.9\%$

7 This method is equivalent to applying the nominal vanilla WACC to real capital expenditure since real capital expenditure is nominal capital expenditure divided by the inflation index.

8 That is, $\left[(\frac{1}{1+i})\right]^{\frac{1}{2}}$

uses the term *As Incurred ($m Real 2007-08)* which implies that the AER expects real forecast capital expenditure to be in mid year values. Furthermore, the AER proposed approach is never the correct approach in the roll forward model, where assumption is that nominal capital expenditure occurs in the middle of the year.

The absence of compensation for expected inflation over the six month period under method 2 appear to be an error within the proposed PTRM and roll forward models. In our opinion, this error should be remedied before the models are finalised. To make this correction the AER should replace the real vanilla WACC appearing in the capitalisation formulation used in both the proposed PTRM (*Assets* worksheet) and the roll forward model (*Actual RAB roll forward* worksheet) with the nominal vanilla WACC.

Box 2.1: Calculating the real capitalised value of capital expenditure using alternative conversion methods

Method 1: Capitalised value of real capital expenditure calculated by applying the nominal vanilla WACC ($r_{nominal}$) to real capital expenditure which is equivalent to applying the nominal vanilla WACC to nominal capital expenditure and dividing through by the inflation index (1+i) to calculate the real capitalised value.:

Real capitalised value = $\frac{Capex_{nominal} \times (1 + r_{nominal})^{\frac{1}{2}}}{(1+i)} = Capex_{real} \times (1 + r_{nominal})^{\frac{1}{2}}$

Method 2: Capitalised value of real capital expenditure calculated by applying the real vanilla WACC (r_{real}) to real capital expenditure to calculate the real capitalised value of capital expenditure.

Real capitalised value = $Capex_{real} \times (1 + r_{real})^{\frac{1}{2}})$

$= Capex_{real} \times \left[1 + (\frac{1 + r_{nominal}}{1+i}) - 1\right]^{\frac{1}{2}}$

$= Capex_{real} \times \left[(\frac{1 + r_{nominal}}{1+i})\right]^{\frac{1}{2}}$

Method 1 and Method 2 –

$Capex_{real} \times \left[(\frac{1 + r_{nominal}}{1+i})\right]^{\frac{1}{2}} \neq Capex_{real} \times (1 + r_{nominal})^{\frac{1}{2}}$

The difference between these two methods is $\left[(\frac{1}{1+i})\right]^{\frac{1}{2}}$.

2.2. Converting an annual to a semi-annual cost of capital

Both the AER's proposed PTRM and roll forward models have adopted a semi-annual compounding formulation to account for the mid year timing effects, ie, $(1+\text{cost of capital})^{½}$. The use of the semi-annual compounding formulation produces a slightly lower rate than the simple interest formulation[9], and is in keeping with financial theory and practice.

[9] For example an annual cost of capital of 10% would translate to a semi-annual rate of 5% if the simple interest formulation were to be used while the semi-annual compound rate would be 4.88%.

3. Consistency in the treatment of outturn inflation

Clause 6A.6.1(e) of the Rules sets out the basic elements that the roll forward model must contain and the principles that should apply. Of particular relevance to the question of consistency in the treatment of outturn inflation across the calculation of maximum allowable revenues ("MAR") and the roll forward model is clause 6A.6.1(e)(3), which states:

> …the roll forward of the regulatory asset base from the immediately preceding regulatory control period to the beginning of the first regulatory year of a subsequent regulatory control period entails the value of the first mentioned regulatory asset base being **adjusted for outturn inflation, consistent with the methodology that was used in the transmission determination** (if any) for the first mentioned regulatory control period for **the indexation of the maximum allowed revenue** during that regulatory control period. [Emphasis added]

This inflation indexation consistency principle has been incorporated in the Rules to ensure compliance with the broader objective of ensuring that the roll forward model gives effect to the immediately preceding transmission determination. The importance of this provision arises because failure to adhere to this principle will distort the value of the RAB in future periods and so distort the future regulated revenues of the TNSP.

Given the importance of this issue we have undertaken a detailed examination of the manner by which inflation is treated in the calculation of the MAR during the regulatory period and the proposed roll forward model. This examination has revealed an inconsistency between the treatment of inflation in the transformation of real depreciation to nominal depreciation in the proposed roll forward model and the indexation method used to derive the MAR.

This inconsistency stems from the fact that the roll forward model uses actual inflation in every period to transform real depreciation to nominal depreciation while the MAR that is derived from the PTRM uses a combination of expected and actual inflation to determine allowed revenue. The difference between these two alternative indexation methodologies can be seen in Table 2.1, below. Table 2.1 sets out the inflation indexation used when calculating maximum allowable revenue from the PTRM and the proposed approach to converting real depreciation to nominal depreciation in the proposed roll forward model. For the purposes of this table the following terminology is used:

- ρ represents the change in CPI;
- ${}_0 r_e^1 - {}_0 r_e^5$ represents the inflation expectations for periods 1 to 5 formed in year zero. These inflation expectations are the same in each year of the regulatory period ie, ${}_0 r_e^1 = {}_0 r_e^2 = {}_0 r_e^3 = {}_0 r_e^4 = {}_0 r_e^5$,
- $\rho^1 - \rho^5$ represents the actual change in CPI calculated in years 1 to 5.

Table 3.1
Comparison of indexation methodologies used across models

	PTRM Indexation used in the calculation of MAR	Roll Forward Model Indexation used in the conversion of real to nominal depreciation
Year 1	$(1+_0 r_e^1)$	$(1+r^1)$
Year 2	$(1+r^1)(1+_0 r_e^2)$	$(1+r^1)(1+r^2)$
Year 3	$(1+r^1)(1+r^2)(1+_0 r_e^3)$	$(1+r^1)(1+r^2)(1+r^3)$
Year 4	$(1+r^1)(1+r^2)(1+r^3)(1+_0 r_e^4)$	$(1+r^1)(1+r^2)(1+r^3)(1+r^4)$
Year 5	$(1+r^1)(1+r^2)(1+r^3)(1+r^4)(1+_0 r_e^5)$	$(1+r^1)(1+r^2)(1+r^3)(1+r^4)(1+r^5)$

A comparison of the indexation parameters in each year shows that the methodologies adopted in the PTRM/MAR and the proposed roll forward model are not consistent. The proposed roll forward model utilises outturn inflation in every year of the regulatory period to calculate nominal depreciation while the PTRM/MAR utilises a combination of both expected inflation and outturn inflation when calculating each component of the nominal MAR (including the return of capital allowance). The consequence of this difference is that the nominal depreciation assumed in the proposed roll forward model will only correspond to the nominal return of capital actually received by the TNSP through the MAR stream when actual inflation is equal to expected inflation.

The effect of adopting alternative indexation methodologies across the two models can be demonstrated in the following simplified example, which makes the following assumptions:

- an initial capital investment of $1,000;
- an asset life of 10 years with straight line depreciation;
- zero operating expenditure;
- a real vanilla WACC of zero;
- an efficiency factor of zero;
- inflation expectations of zero per cent;
- actual inflation in year three of 100 per cent and in all other years in line with expectations, ie, zero per cent.

The table below sets out the calculation of depreciation under the two alternative models.

Table 3.2
Comparison of Alternative Indexation Methodologies

	PTRM Nominal return of Capital (MAR)	Roll Forward Model Nominal depreciation
Year 1	$100 ($1000÷10)÷(1+0%)	$100 ($1000÷10)÷(1+0%)
Year 2	$100 ($1000÷10)÷ (1+0%)*(1+0%)	$100 ($1000÷10)÷ (1+0%)*(1+0%)
Year 3	$100 ($1000÷10)÷ (1+0%)*(1+0%)*(1+0%)	$200 ($1000÷10)÷ (1+0%)*(1+0%)*(1+100%)
Year 4	$200 ($1000÷10)÷ (1+0%)*(1+0%)*(1+0%)*(1+100%)	$200 ($1000÷10)÷ (1+0%)*(1+0%)*(1+100%)*(1+0%)
Year 5	$200 ($1000÷10)÷ (1+0%)*(1+0%)*(1+0%)*(1+100%)*(1+0%)	$200 ($1000÷10)÷ (1+0%)*(1+0%)*(1+100%)*(1+0%)*(1+0%)
Total	**$700**	**$800**

This table shows that when actual and expected inflation are the same the two alternative indexation methodologies will yield the same answer. However, when actual inflation deviates from expected inflation the nominal depreciation estimated under the two models will also deviate.

If this inconsistency were to be maintained in the proposed roll forward model then TNSPs would be exposed to the risk of errors in inflation forecasting. In other words, to the extent that actual inflation exceeds (is lower than) expected inflation, the nominal depreciation calculated in the proposed roll forward model will be higher (lower) than that calculated in the PTRM/MAR and thus the RAB will be reduced by an amount which exceeds (is lower than) the actual depreciation recovered by the TNSP through its maximum allowable revenue.

The governing principle arising from the Rules is that the nominal depreciation profile calculated in the roll forward model should reflect the nominal revenue profile received by the TSNP. To ensure adherence to this principle, real depreciation in the roll forward model should be indexed in the following manner:

- year 1 – index real depreciation using expected inflation, ie, $(1+_0\ r_e^1)$;
- year 2 – index real depreciation using actual inflation in year 1 and expected inflation, ie, $(1+r^1)(1+_0\ r_e^2)$;
- year 3 – index real depreciation using actual inflation in years 1 and 2 and expected inflation, ie, $(1+r^1)(1+r^2)(1+_0\ r_e^3)$;
- year 4 – index real depreciation using actual inflation in years 1, 2 and 3 and expected inflation, ie, $(1+r^1)(1+r^2)(1+r^3)(1+_0\ r_e^4)$; and
- year 5 – index real depreciation using actual inflation in years 1, 2, 3 and 4 and expected inflation, ie, $(1+r^1)(1+r^2)(1+r^3)(1+r^4)(1+_0\ r_e^5)$.

4. Efficiency Benefit Sharing Ratio

4.1. The AER's 50:50 Sharing Ratio

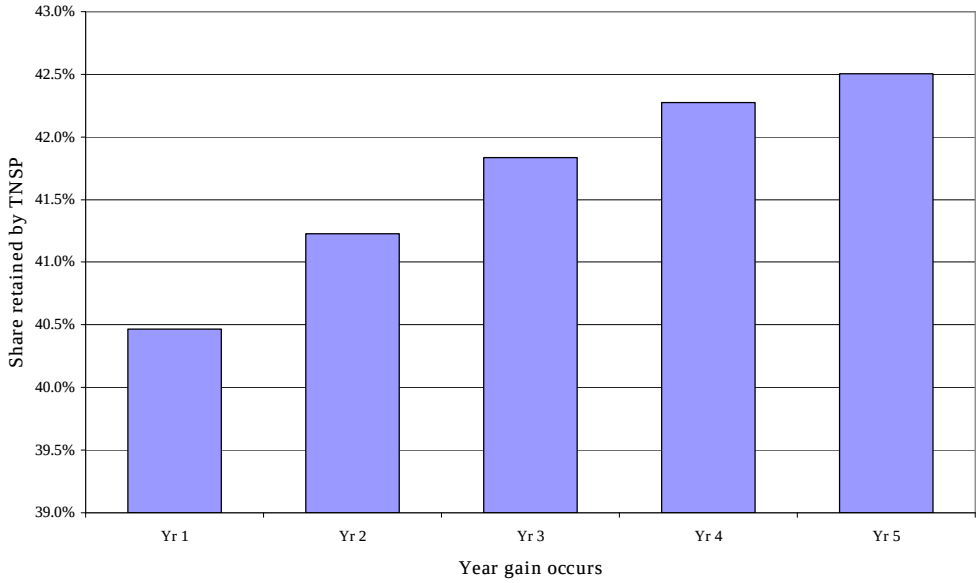
The AER's first proposed efficiency benefit sharing scheme guidelines indicate that its efficiency benefit sharing scheme results in a benefit sharing ratio of approximately 50:50 between the TNSP and users.

In order to assess the validity of this proposition we have considered a hypothetical example which is based on the following assumptions:

- a nominal vanilla of 8.76 per cent, consistent with the Powerlink Draft Determination;[10]
- forecast inflation of 3.15 per cent, again as consistent with the Powerlink Draft Determination;[11] and
- a $100 permanent efficiency gain achieved in years one to five of the regulatory period.[12]

Drawing on these assumptions we have calculated the share of the permanent efficiency gain retained by the TNSP by comparing the present value of an efficiency gain carried over for five years with the present value of an efficiency gain held into perpetuity. Figure 4.1 sets out the results of these calculations, which have been undertaken for years one through five of the regulatory period.

Figure 4.1
Sharing Ratio



[10] AER, *Powerlink Queensland transmission network revenue cap 2007-08 to 2011-12: Draft Decision*, 8 December 2006, page 113.

[11] Ibid.

[12] It is worth noting that changing this assumption has no influence on the results.

The results depicted in Figure 4.1 demonstrate that the AER's proposed five year carry-over period does not achieve its stated objective of providing a 50:50 sharing ratio. In this example the TNSP captures 40.5 to 42.5 per cent of the permanent efficiency gains while users capture 59.5 to 57.5 per cent of the gains. If a sharing ratio of 50:50 were to be achieved on average over the five year period then the carry-over period would either need to be extended to six years. We note that these calculations are sensitive to the level of the nominal vanilla WACC, for example, a WACC of 11 per cent, in conjunction with a five year carry-over period, would deliver a sharing ration of around 50 per cent. Appendix A sets out in greater detail the calculation of the sharing ratio.

The results presented in Figure 4.1 also demonstrate that under the efficiency carry-over arrangements proposed by the AER, the sharing ratio is not constant over time. Rather, the TNSP captures a greater share of efficiency gains achieved in the latter years of the regulatory period relative to the earlier years. This divergence over time arises because the proposed scheme allows TNSPs to retain nominal incremental gains during the current regulatory period while gains carried over to the following regulatory period are indexed for inflation, to ensure that their real value is maintained. This feature of the framework means that efficiency gains occurring later in the regulatory period are subject to a greater proportion of the benefits being indexed, as compared with those that occur at the beginning of the regulatory period.

On the basis of the foregoing analysis, we have calculated that the AER's proposition that a five year carry-over period achieves a 50:50 sharing ratio is not correct.

4.2. Scaling factors that result in a 50:50 sharing ratio

ETNOF has asked that we calculate a series of scaling factors that could be applied to the carry-over amounts that would result in an efficiency benefit sharing scheme that achieves a sharing ratio of 50:50 between the TNSP and users, in each year of the regulatory period.

These scaling factors are a substitute for the inflation indexing employed by the AER. Applying the Powerlink draft determination WACC of 8.76 per cent the following scaling factors would lead to a 50:50 sharing ratio between the TNSP and users:

- 24.3 per cent for year 1 carry-over amounts;
- 15.9 per cent for year 2 carry-over amounts;
- 12.6 per cent for year 3 carry-over amounts;
- 10.9 per cent for year 4 carry-over amounts; and
- 10.2 per cent for year 5 carry-over amounts.

These sharing factors have been derived using the goal seek function in Excel to solve for the target sharing ratio of 50:50 between the TSNP and users.

Appendix A. AER's sharing ratio

A.1. AER sharing ratio

In order to assess whether the AER's proposed efficiency benefit sharing scheme provides a 50:50 sharing ratio between the TNSP and users we have considered a hypothetical example which is based on the following assumptions:

- a nominal vanilla of 8.76 per cent, consistent with the Powerlink Draft Determination;
- forecast inflation of 3.15 per cent, again as consistent with the Powerlink Draft Determination; and
- a $100 permanent efficiency gain achieved in years one to five of the regulatory period.

We note that in order to simplify the calculation it has been assumed that the benefits to consumers and the TSNP occur at the end of the regulatory year. This simplifying assumption does not affect the calculation of the sharing ratio since the benefits that accrue to the TNSP and the users occur at the same time. If one were to make a different assumption as to the timing of the benefits it would change the absolute value of the benefits accrued but would not change the relative sharing ratio.

The total benefit is calculated by means of the following annuity formula:

$$TotalBenefit = \frac{Annualbenefit}{DiscountRate}$$

That is:

$$\$1{,}141.55 = \frac{\$100}{8.76\%}$$

The benefits accrued by the TNSP and the sharing ratios are set out in table A.1 below.

Table A.1
AER Efficiency Scheme
Sharing Ratios

Year that Benefit Occurred	Benefit to the TNSP						NPV	Sharing Ratio
	Year of Efficiency Gain	Carry-over years						
		First	Second	Third	Fourth	Fifth		
Year 1	$100.00	$100.00	$100.00	$100.00	$100.00	$116.77	$461.95	40.47%
Year 2	$100.00	$100.00	$100.00	$100.00	$113.21	$116.77	$470.63	41.23%
Year 3	$100.00	$100.00	$100.00	$109.75	$113.21	$116.77	$477.60	41.84%
Year 4	$100.00	$100.00	$106.40	$109.75	$113.21	$116.77	$482.58	42.27%
Year 5	$100.00	$103.15	$106.40	$109.75	$113.21	$116.77	$485.24	42.51%

Note that the sharing ratio has been calculated by dividing the NPV of the benefits to the TNSP by the present value of the total benefit (ie, $1,141.55) as calculated above. Shaded cells are amounts carried over to the subsequent regulatory period.

A.2. NERA scaling factors

On the basis of the Powerlink draft determination WACC of 8.76 per cent, we have employed the goal seek function in Excel to calculate the scaling factors that achieve a 50:50 sharing ratio between the TNSP and users, as follows:

- 24.3 per cent for year 1 carry-over amounts;
- 15.9 per cent for year 2 carry-over amounts;
- 12.6 per cent for year 3 carry-over amounts;
- 10.9 per cent for year 4 carry-over amounts; and
- 10.2 per cent for year 5 carry-over amounts.

The benefit accrued by the TNSP and the sharing ratio using these scaling factors is set out in table A.2 below.

Table A.2
Proposed NERA Efficiency Scheme
Sharing Ratios

Year that Benefit Occurred	Benefit to the TNSP						NPV	Sharing Ratio
	Year of Efficiency Gain	Carry-over years						
		First	Second	Third	Fourth	Fifth		
Year 1	$100.00	$100.00	$100.00	$100.00	$100.00	$296.88	$570.78	50.00%
Year 2	$100.00	$100.00	$100.00	$100.00	$180.54	$209.28	$570.78	50.00%
Year 3	$100.00	$100.00	$100.00	$142.60	$160.51	$180.67	$570.78	50.00%
Year 4	$100.00	$100.00	$123.07	$136.53	$151.46	$168.02	$570.78	50.00%
Year 5	$100.00	$110.24	$121.53	$133.97	$147.69	$162.81	$570.78	50.00%

Note that the sharing ratio has been calculated by dividing the NPV of the benefits to the TNSP by the present value of the total benefit (ie, $1,141.55) as calculated above. Shaded cells are amounts carried over to the subsequent regulatory period.

We note that the scaling factors are a function of the nominal post tax WACC which is used as the discount factor. Essentially a nominal WACC higher than 8.76 per cent will result in slightly lower scaling factors, while a lower WACC would lead to higher scaling factors.

These scaling factors can be calculated at the time transmission determination when the nominal WACC is determined. Alternatively the AER could adopt the above scaling figures for the first efficiency benefit sharing scheme and then update them at the time the WACC parameters are reviewed.

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