

Report
to:

LECG

**Accounting for the Cost of
Working Capital in the
Revenue Requirement for
TRANSCO**



23 August 2005

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1 Introduction

1.1 Context

Transco is required to provide a filing for its Maximum Annual Revenue cap (MAR) for the period from 2006 – 2010. The methodology setting the MAR is described in a document “*Guidelines on the Methodology for Setting Transmission Wheeling Rates for 2003 to around 2027*” (the “*Transmission Wheeling Rate Guidelines*” or “*TWRG*”) dated 29th May 2003. This document shows an allowance for Working Capital as an allowable component of the Annual Revenue Requirement, which in turn determines the MAR cap.

The Working Capital requirement, as defined in the TWRG, also includes a deduction that relates to bad debts.

In September 2004, the ERC published an Issues Paper “*Regulatory Reset for the National Transmission Corporation (TRANSCO) for 2006 – 2010*”. This paper notes that the ERC has not specified a methodology for the working capital allowance, and sets out the methodology options that the ERC expected to consider (see section 1.3).

1.2 Scope of Brief

Energy Market Consulting associates has been asked by LECG to assist with certain aspects of the Transco filing. This includes assisting with the definition of an appropriate method for calculating working capital and with deriving a working capital allowance in accordance with that method.

This report describes the recommended methodology that TRANSCO uses in its filing, along with supporting argument. The supporting argument is based on conceptual analysis of the issue and on consideration of the treatment of working capital in other regulatory jurisdictions. The workings in support of the working capital allowance are appended to this report.

2 Interpreting the Regulatory Requirements for TRANSCO

2.1 The Regulatory Formula for ARR

In the Transmission Wheeling Rate Guidelines (TWRG), working capital is added to the RAB and both are multiplied by the WACC. The full specification of the ARR is as follows¹:

$$\text{ARR}_t = \text{Opex}_t + \text{Tax}_{m,t} + \text{RegDepn}_t + [(\text{RAB}_t + \text{WC}_t) \times \text{WACC}] + \text{Tax}_{p,t} + \text{ITA}_t$$

As we discuss in the next section, the purpose of a working capital allowance is essentially to correct for timing differences “within the year” in the ARR formula, given that this formula applies to annual amounts. It can be relevant to note the intra-year timing assumptions that are inherent in the ARR formula generally, since the theoretical purpose of the formula is to determine a revenue level which, in present value terms, recovers each of the required ARR components. However these other adjustments are not usually referred to as “working capital” and they do not seem to be included in the TWRG’s definition of working capital in clause 4.5.7 – as we discuss in the next section. We take the view, therefore, that apart from what the TWRG refers to as working capital, it would be beyond our brief to consider any other intra-year timing adjustments since the ARR formula is quite clearly prescribed in this regard.

For clarity, we note that the working capital allowance is not intended to adjust for matters such as:

- The specific timing of tax payments within the year,
- The assumed imposition of regulatory depreciation, or
- The timing of the recovery of revenue to cover the WACC return that is earned.

We note that the timing of capital expenditure (within the year) is also not included in the working capital definition. However capital expenditure itself is picked up in the ARR formula, since the definition of the RAB is an average of the opening and closing valuations².

¹ TWRG clause 4.5.7

² TWRG clause 4.7.1

2.2 The Regulatory Definition of Working Capital

In the ARR formula, the term “WC_t” is defined in the TWRG as follows:

“The working capital allowance for Regulatory Year t, which is set at a proportion of the difference between:

- (a) The nominal operating and maintenance expenditure which is forecast for that Regulatory Year and approved by the ERC in accordance with Section 4.11; and
- (b) The nominal amount of the bad debts which are forecast for that Regulatory Year and approved by the ERC in accordance with Section 4.11,

such proportion being determined by the ERC, as part of the Regulatory Reset Process for the Second Regulatory Period under Article VII, after a lead/lag study of relevant payables and receivables³”

The first of the two components of working capital effectively involves a factor that is directly related to the amount of operating and maintenance expenditure. The purpose of this paper is to define the methodology for calculating this factor and the calculation of the factor itself is included in Appendix 1 to this paper.

Since typically there is a lag between incurring expenditure and recovering revenue, we expect this component to be positive – i.e. an increase to working capital.

2.3 The Regulatory Allowance for Bad Debts

The second component in the “working capital” formula is bad debts.

Elsewhere in the TWRG, an allowance for bad debts is recoverable as an allowed component of operating and maintenance expenditure based on their estimated level ex ante⁴. For reasons that we do not consider correct, the TWRG appears to require that the annual level of bad debts is also to be deducted from the working capital allowance. And it is implicitly defined there as a factor relating to operating and maintenance expenditure, whereas in practice there is not necessarily any relationship.

In TRANSCO’s modelling, we suggest that bad debts should be included in its operating expenditure, in accordance with the TWRG,

³ TWRG clause 4.5.7

⁴ TWRG clause 4.11.1(i)

but should be ignored in the working capital calculation. We would be happy to consider evidence to the contrary.

2.4 Regulatory Reset Issues Paper

In September 2004 the ERC issued the paper “Regulatory Reset for the National Transmission Company for 2006 – 2010. In that paper, the Commission noted that it had not yet specified the working capital allowance, beyond what is covered by the TWRG. The ERC suggests that it could be set by benchmarking against other electricity companies (in other jurisdictions), by benchmarking against other Philippine utilities, undertaking a lead-lag study, setting the level at that of an efficient company or using “other” methodologies.

In this report we use a combination of most of these suggested methods for determining the appropriate working capital allowance. We use a “first-principles” conceptual overview of the matter (section 3) together with a review of methods used in other jurisdictions (section 4) to arrive at a recommended methodology (section 5). That method relies on an assessment of leads and lags, as was suggested by ERC in its Issues Paper; TRANSCO has made assessments of efficient lead and lag factors – which we describe in Appendix 1.

3 The Concept of Working Capital for Regulatory Purposes

In this section we describe the regulatory concept that underlies the need for an allowance for working capital, in regulatory revenue determination. We compare this with the more familiar accounting concept of working capital.

3.1 Working Capital for Accounting Purposes

Working capital as defined for accounting purposes, comprises all short term assets and liabilities. Some of these may be financing related (such as short term loans and cash in bank). Others will include trade debtors and creditors. Under accounting standards, typically debtors and creditors are recognised only when an invoice is raised (in the case of debtors) or received or otherwise accrued (in the case of creditors).

3.2 Working Capital for Regulatory Purposes

For regulatory purposes, the financing components of “accounting” working capital are ignored as they are all implicit in the WACC and RAB. And rather than recognising trade debtors and creditors based on invoice timings, a cashflow-based finance/economic approach is taken to the timing difference. This can be summarised as follows.

The regulatory purpose of the ARR is to determine the revenue of the business that is required to recover its costs. The concept of “recovering costs” includes the concept of the time value of money. Therefore to the extent that the time at which a particular cost is incurred is not matched with its recovery (via tariff revenues), then capital is required to cover the lag and there is a cost associated with that capital requirement.

In a regulatory revenue formula, expenses are typically presented as annual amounts and the ARR is also, by definition, an annual amount. This makes the calculation tractable and also more transparent than the “pure” equivalent – which would involve specifying daily costs and revenues and summing them, using a daily compounding equivalent to the annual WACC. An annualised definition of ARR is also standard regulatory practice.

In order to correct for the implicit assumption in the ARR formula that expenses and revenues occur at the same point in time, an allowance for the time difference is typically included (as it is in the TWRG). The

time difference relates to the time lag between an expense being incurred and the revenue to cover that expense, being received. In principle, an allowance for the timing lag or lead could be made to any or all components of the ARR. However in practice, the working capital allowance is often made only to the operating and maintenance expense recovery component and, as we showed in section 2, this is what the TWRG allows for. Any other intra-year timing considerations are either covered through more subtle adjustments to the ARR formula, or ignored.

3.3 Conceptual Requirement

The conceptual requirement is therefore to determine the extent to which timing of revenue being received lags the payment of operating expenditure which, in part, that revenue is required to recover.

4 Australian Regulatory Practice

4.1 Overview

We have reviewed the regulatory treatment of working capital by several regulators in Australia. All recognise the conceptual validity of allowing for working capital. In some cases the regulators have taken the view that there are other discrepancies in their respective revenue determination formulae, which act to overstate the conceptually “correct” revenue requirement and, for pragmatic reasons, the revenue determinations from these regulators therefore ignore the working capital allowance. Some regulators do provide an allowance for working capital and some other regulators discuss how they would make such an allowance, were it not for the offsetting discrepancies in their revenue formulae. Each of these provides some insight on the matter.

4.2 Australian Competition and Consumer Commission (ACCC)

In 2002 the ACCC commissioned a report on working capital from an independent consultant⁵. That report provides a relatively in-depth discussion on the issues of intra-year timing generally, in relation to different specifications of the ARR formula. It endorses the concept of a timing adjustment being required for the lag in the recovery of operating expenses. However the report went further than covering working capital, and considered the wider issue of all intra-year timing assumptions inherent in the ACCC’s ARR formula.

The report found that the ACCC’s ARR formula over-compensates for intra-year timing in relation to capital costs, by an amount that is likely to exceed the under-compensation for working capital based on operating costs. Therefore the report proposes that ACCC should not make an allowance for working capital, in order to balance out the other larger discrepancy in its ARR formula. This reasoning has been applied (for example) in the ACCC’s Draft Decision on NSW and ACT transmission network revenue caps for Energy Australia and for TransGrid⁶.

⁵ Working Capital – Relevance for the Assessment of Reference Tariffs; Report to the ACCC, by The Allen Consulting Group (March 2002)

⁶ NSW and ACT Transmission Network revenue Caps – EnergyAustralia 2004/05 – 2008/09; ACCC Draft decision (28 April 2004); also Draft Decision of same date relating to TransGrid

4.3 Essential Services Commission of South Australia (ESCOSA)

In its Statement of Reasons for its 2005 – 2010 Electricity Distribution Price Determination⁷, ESCOSA allowed ETSA Utilities a return on a working capital allowance of \$30m. This was explained as being based on a revenue lag of 73 days together with an expense lead of 34 days; in other words, a net lag of 39 days, which corresponds to a stock of working capital of approximately 10.7% of operating expenditure.

Using the WACC in ESCOSA's decision, we estimate that the working capital allowance contributed approximately 0.8% to the revenue requirements for ETSA Utilities.

4.4 Victorian Essential Services Commission (ESC)

The Victorian ESC (previously known as the Office of the Regulator General) addressed the issue of an allowance for working capital in its electricity distribution price determination for 2001 – 2005⁸. ESC notes in this determination that it did not consider the accounting concept of working capital to be relevant for revenue benchmarks. It then goes on to outline a cashflow-based economic/finance concept of working capital similar to that described in section 3 of the present report.

ESC acknowledges that there is a net cost associated with working capital for operating activities. For each of the five electricity distribution businesses ESC assesses the working capital allowance, which ranges from 0.2% to 0.5% of the ARR.

Like ACCC, ESC also estimates that inherent in its ARR formula there is a bias towards over-compensating for capital expenditure and that this exceeds the requirement for a working capital allowance. For simplicity, the ESC decided to ignore both effects. ESC came to the same conclusion in its 2003 Decision on Gas Access Arrangements⁹.

⁷ Draft 2005 – 2010 Electricity Distribution Price determination; Part A: Statement of reasons, Essential Services Commission of South Australia

⁸ Electricity Distribution Price Determination 2001 – 2005; Volume 1 Statement of Purpose and reasons; Office of the Regulator General, Victoria (now Essential Services Commission, Victoria) (September 2000)

⁹ Review of Gas Access Arrangements, Final Decision; Essential Services Commission, Victoria (October 2002)

4.5 New South Wales Independent Pricing and Regulatory Tribunal (IPART)

IPART has retained an allowance for working capital, as is shown in its decisions and other papers.

For example, in its 1 July 2004 Issues Paper covering regulatory arrangements for NSW electricity distribution businesses, IPART notes that its then-current determination includes an allowance for working capital based on a simplified payment and receipts cycle. This appears to be a lead/lag approach¹⁰. In its modelling guidelines for electricity distributors¹¹ IPART further clarifies that this involves consideration of payments based on operating and capital expenditure, and receipts based on “network revenue”¹².

In its decision on gas distribution pricing for AGL Gas Networks (AGLGN)¹³, IPART agreed that an allowance for net working capital was justified. This appears to have been a lead/lag approach and the following assumptions were made:

- Debtors lag of 29 days
- Operating cost creditors lead of 45 days
- Capital cost lead of 10.5 days.

Unbilled gas was also allowed for as was, in principle, the change in inventories although this was deemed to be zero.

In its Decision on network prices for the four NSW electricity distributors for 2004/05 to 2008/09¹⁴, IPART allowed a similar method. The resulting allowances for the three largest businesses lie between 0.5% and 0.9% of revenues. This is stated as being based on a 45 days receivables cycle, a 30 days payables cycle (covering operating

¹⁰ Regulatory Arrangements for the NSW Distribution Network Service Providers from 1 July 2004; Issues Paper; The Independent Pricing and Regulatory Tribunal of New South Wales (IPART), (November 2002)

¹¹ A Users Guide to the Financial Model for the 2004 Electricity Network Pricing Review; IPART, (November 2002)

¹² It is not clear whether this is calculated in terms of lead and lag days, or whether a working capital allowance has been made on all revenues, not just on that component of revenues which covers capital and operating costs.

¹³ Revised Access Arrangements for AGL Gas Networks, Draft Decisions, IPART, (December 2004)

¹⁴ NSW Electricity Distribution Pricing 2004/05 to 2008/09; Final Report, IPART, (June 2004)]

and capital expenditure) and an “inventory” allowance based on a set number of days (not stated) of operating and capital costs.

4.6 Conclusions from Practice in Other Jurisdictions

The use of a working capital estimate based on operating and maintenance expenses is supported by its use in other jurisdictions. It is applied in this way in South Australia, while in New South Wales the allowance takes the same factors into account but also takes account of the timing of capital expenditure.

Federally in Australia (ACCC) and also in Victoria, it is acknowledged that the working capital allowance should relate to timing of operating and maintenance expenditure (relative to the revenue that “recovers” this expenditure) and this is covered in their various discussion and issues papers. However in their final decisions these two regulators state that there are larger offsetting timing discrepancies inherent in their ARR formulae and, rather than correct for those, they take the pragmatic option of ignoring a working capital allowance in their final regulatory decisions.

It is noted that the effect of working capital adjustments is relatively subtle, but still material. Taken across nine electricity network businesses in three Australian jurisdictions, it ranged from 0.2% to 0.9% of revenues.

Finally we note that lead/lag studies are used to calculate working capital allowances in a number of US jurisdictions¹⁵.

¹⁵ L Goodman, *The Process of Ratemaking*, Public Utilities Reports (1998) as quoted in Essential Services Commission of South Australia, Draft 2005 – 2010 Electricity Distribution Price Determination, Part A – Statement of reasons, P155

5 Allowance for Working Capital for TRANSCO

5.1 Methodology

The TWRG requires that working capital be assessed as a proportion of operating and maintenance expenses. As we have shown this is a common approach in other jurisdictions. The allowance is typically based on a “lead/lag” assessment which involves assessing:

- The time from when electricity distribution service is provided to consumers, until it is paid for, and
- The time from when operating and maintenance services (and materials) are provided to the network business, until they are paid for.

The difference between these two time periods represents the net lag in the recovery of operating and maintenance expenditure. When this lag (in days) is multiplied by the average daily operating and maintenance expenditure level, then the result is the average working capital requirement.

The cost of this working capital requirement is then represented by the requirement multiplied by the cost of capital. We note that the cost of capital in this instance should be pre-tax and expressed in nominal terms¹⁶.

Mathematically this is represented as follows:

$$WC_{\text{allowance}} = WC_{\text{requirement}} \times WACC$$

where

$$WC_{\text{requirement}} = (\text{revenue lag} - \text{expense lead}) \times \text{Annual Opex} / 365$$

and where

Revenue lag and expense lead are measured in days, and

Opex = annual operating and maintenance expenditure

¹⁶ In the TWRG the WACC prescribed to be used is post-tax, as for the RAB. However the result will be the same provided tax, which is a separate term in the TWRG ARR formula, is based on an assumed taxable income which includes the working capital cost allowance.

5.2 Implementation Issues

The lead and lag days need to represent acceptably efficient business practices. In an electricity network business, the cycle for revenue collection - including the billing cycle and the collections cycle is typically prescribed, as is the case for TRANSCO. The payments cycles simply need to be assessed as being realistic and representing good commercial practice. In the appendix to this paper, the assumptions made by TRANSCO are transparent so that they can be assessed.

It should also be noted that different revenue and expense streams may be on different cycles. Where this occurs, and the differences are material, then the leads and lags of the components can be calculated and weighted together.

The overall lead or lag can be thought of as comprising up to three components:

- The average time from provision of service to close-of for billing purposes – which typically will be 50% of the billing cycle;
- The time from service close-off to invoices being issued;
- The time from invoice issue to invoice payment.

Not all of these time periods will apply in all circumstances – for example, salaries and wages may be paid by direct credit into employees' bank accounts and no "invoice" is issued.

The following calculations for TRANSCO's working capital requirements are provided based on information provided to Energy Market Consulting associates by LECG. Energy Market Consulting associates has not reviewed this data and, other than noting that it appears to fall within the bounds of estimates in other jurisdictions, we do not express an opinion on the data, which is provided here for clarity in illustrating the methodology.

5.3 Revenue Lag for TRANSCO

We understand that:

- TRANSCO is required to invoice monthly, within 10 working days of the end of the month, for services provided over that month;
- Customers are required to pay invoices by the end of the following billing period – i.e., by the end of the month that they are invoiced.

The resulting lag is:

- 50% of the service period (i.e. 50% of 30 days = 15 days)
- + the time allowed to pay (which is the sum of the time allowed to issue the bill and the time allowed to pay it – say a further 30 days)
- = 45 days.

A further 5 days is allowed for preparation of the invoice for MEC and the same credit terms are provided to MEC as to others. Weighted together this equates to an average 48 days' lag.

This is shown in Appendix 1.

5.4 Expense Lead for TRANSCO

For operating and maintenance expenditure, different lead times will apply to different components of expenditure. Typically, the lead times differ for example between labour costs, purchases of materials and purchases of contracted services. Given the relatively low materiality of working capital, it is usually adequate to use no more than four or five “typical” categories of expenditure.

For the sake of example, it may be that a large proportion of operating and maintenance expenditure is labour, which is paid for fortnightly in arrears by direct credit to workers' accounts. Then the average “lead” for such expenses is $0.5 \times 14 = 7$ days.

Another proportion of maintenance expenditure may be on similar payment terms to those for network services as described above and so the lead for them would be 45 days. If these were the only two groups of expenditure, and they are evenly weighted, then the average lead is $(45 + 7) / 2 = 26$ days.

TRANSCO has calculated its expense “lead” as shown in the calculations in Appendix 1. This combines three factors:

- A “service period”. This applies to continuously provided services, such as salary and wage labour and, for periods of time, may also include contractors and consultants. TRANSCO informs us that salary and wages are typically paid fortnightly, for the service period just ended. In other words, we understand that these are paid in arrears. Therefore there is, on average, a 7 days lag from the time when the services were provided to the end of the period to which they relate.

On the other hand, contractors typically invoice for monthly services, again, in arrears – that is, after the services have been

provided. Therefore there is an average 15-days' lag from the provision of the services to the end of the service period that they relate to.

- A “bill issue lag”. This is the time from the end of the service period until an invoice is issued.
- A “bill payment lag”. This is the credit term provided - in other words the time from invoice being issued until it is paid.

The total “expense lead” is the average time from provision of services or materials to the payment for them. This is the sum of the average payment lags above¹⁷. TRANSCO has calculated that this is on average 20.3 days.

5.5 Calculation of Working Capital

The net lag from the assumptions above is

$$48 \text{ days (revenue lag)} - 20.3 \text{ days (expense lead)} = 27.7 \text{ days.}$$

The proportion to be applied to operating and maintenance expenses therefore, in accordance with the TWRG, is

$$27.7 \text{ days} / 365 \text{ days} = 7.6\%.$$

This is the factor that needs to be inserted into the TWRG ARR formula.

Based on TRANSCO's total annual operating and maintenance expenditure for 2003, as shown in Appendix 1, of 3,653 Mn pesos, the working capital requirement would be 277 Mn peso. As an illustration, if the pre-tax nominal WACC was, for argument's sake, 20%, then the resulting working capital allowance in the ARR would be:

$$20\% \times 277 \text{ Mn} = 56 \text{ Mn peso pa.}$$

¹⁷ The convention is to refer to a lag between a service being provided by the company and receipt of payment, and a “lead” between a service being provided to the company and the company's payment for that service.

Appendix 1: TRANSCO's Calculation of Working Capital Requirement

Payables

Operating Expenditure	Approximate Value (Phil. Mn peso)	Weighting (%)	Service Period (Days)	Average Service Lag (Days)	Bill Issue Lag (Days)	Bill Payment Lag (Days)	Average Payables Lag (Days)	Weighted average Payables Lag (Days)
Personal Services	1,759	48%	15	7.5	0	0	7.5	3.6
Materials acquired directly (1)	509	14%	0	0	0	35	35	4.9
Materials acquired directly (2)	293	8%	0	0	0	35	35	2.8
Contracts for services (1)	287	8%	30	15	8	7	30	2.4
Contracts for services (2)	15	0%	30	15	8	7	30	0.1
Other (1)	791	22%	30	15	8	7	30	6.5
	3,653	100%						20.3

OPEX, excluding bad debts expense

- Personal services - includes expenses for contractals
- Materials (1) - requirements for operation & maintenance of TL/SS
- Materials (2) - Operation & maintenance of equipments & Office supplies
- Contracts (1) - Security, janitorial, rental
- Contracts (2) - Professional fees
- Others (1) - includes claims for representation, HR, utilities, freight, taxes, etc.

Approximate value = CY 2003 full year values

Notes:

- 1 Contracts for services may include materials purchased by contractors as part of their service - eg for "turn-key" projects or all-inclusive "labour and materials" maintenance contracts
- 2 **Service Period** is the period over which services are provided, for a given billing or payments cycle. For example - the payroll cycle is a service period - eg fortnightly or monthly. While the service period for consultants or contractors may be (typically) one month.
- 3 **Bill Issue Lag** is the number of days from the end of the period to which it relates to the time the bill is issued. **Bill Payment Lag** is the number of days from bill issue to bill payment.
- 4 For materials acquired directly, the **lag is measured from time of receipt of the materials to time of payment**. For example, materials may typically be invoiced on delivery, with 20-day payment terms. In this case the lag is 20 days. Alternatively, they may be invoiced monthly (based on deliveries over the previous month) within 10 days of month end and again (say) with 20 day payment terms. This implies a $30/2 = 15 \text{ days} + 10 \text{ days} + 20 \text{ days} = 45 \text{ days}$ average payables lag



Calculation of Working Capital Requirement (continued)

	MEC		other
	60%	40%	
Billing Period	30	30	30 days (billed in arrears)
Payment period	30	35	35 days following end of billing period
Average lag to billing period	15	15	15 days
Lag to bill issued	10	5	5 days
Lag to bill paid (from issue date)	25	25	25 days
Average receivables lag	<u>50</u>	<u>45</u>	45 days
Weighted average days	48 days		

Working Capital Requirement	
Average Revenue Lag (Days)	48.0
Average Operating and Maintenance Expense Lead (Days)	<u>20.3</u>
Net Lag (Days)	<u>27.7</u>
Average Working Capital Requirement (as a proportion of O&M)	<u><u>7.6%</u></u>
(as a proportion of annual O&M)	