

**Guidelines for Monitoring and Approving
Piped-Gas Transmission and Storage Tariffs
in South Africa**

1 May 2009

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Glossary

CAPM	Capital Asset Pricing Model
Claw Back	Factor to correct for differences between actual values and assumptions used in the calculation of the tariff
CPI	Consumer Price Index
AR	Allowable Revenue
DSCR	Debt Service Cover Ratio
EBIT	Earnings Before Interest and Tax
FERC	Federal Energy Regulatory Commission
IRR	Internal Rate of Return
MRP	Market Risk Premium
O&M	Operating and maintenance costs
Opex	Operational expenditure
PPI	Producer Price Index
RAB	Regulatory Asset Base
SRAB	Starting Regulatory Asset Base
TOC	Trended Original Cost
WACC	effective Weighted Average Cost of Capital

1 Introduction

The Energy Regulator (“NERSA”) derives its mandate regarding piped-gas tariffs and maximum prices from the Gas Act, 2001. According to the Gas Act, the Energy Regulator is required to “monitor and approve, and if necessary regulate” transmission and storage tariffs for piped gas and “take appropriate action when necessary to ensure that tariffs are applied in a non-discriminatory manner.” In line with these requirements NERSA has developed guidelines for monitoring and approving piped-gas transmission and storage tariffs.

This document is limited to transmission and storage tariffs for piped gas and covers the following:

- the role of the Energy Regulator in piped-gas transmission and storage tariffs in South Africa;
- manner and content of tariff applications;
- suggested methodologies for the calculation of gas transmission and storage tariffs;
- preferred sources of data to be used as inputs in the tariff calculations;
- assessment of tariff applications by the Energy Regulator; and
- common approaches to tariff structuring.

2 The Policy and Legislative Framework

2.1 Introduction

After an overview of the general objectives for the economic regulation of gas tariffs, this section provides a review of the legal aspects of gas sector regulation, including:

- the regulatory mandate of the Energy Regulator with regard to the piped-gas sector;
- the role of the Energy Regulator in monitoring, approving and regulating gas transmission and storage tariffs;
- the obligations of participants in the piped-gas sector.

These aspects are key to defining the scope and nature of the gas transmission and storage tariff guidelines developed by NERSA.

2.2 Objectives for tariff regulation

The following objectives generally apply to the monitoring and approving of tariffs for the transmission and storage of piped-gas:

- *Cost reflectiveness.* The tariffs for services provided by a transmission or storage facility should reflect the direct and assignable costs associated with providing those services to a particular customer. To be fully cost reflective, fixed capacity related costs should be recovered via a capacity charge and volume related costs should be recovered by a demand charge. It is an established economic principle that cost-reflective tariffs provide appropriate incentives in a network industry.
- *Economically appropriate pricing signals.* It is important that the tariffs provide users and potential users of gas transmission or storage services with the correct economic signals regarding the economic cost of the service.
- *Incentives for efficient operation of a system.* The tariffs should reflect the costs required by an efficient operator to run the system.
- *Allow for full cost recovery and ensure a reasonable return.* The selected methodology should enable the transmission and storage companies to recover the costs of delivering those services,¹ plus a reasonable return to ensure the long term provision of transmission and storage services.

¹ Typically regulators allow recovery of efficiently incurred costs rather than the actual costs incurred by the company as part of incentive regulation.

- *Non-discrimination.* The tariff structure should not discriminate between customers, except for objectively justifiable and identifiable differences, as approved by the Energy Regulator.
- *Transparency.* Transparency is required to ensure a balance between buyer and seller power in the market and to facilitate regulation. If tariffs are not transparent it is difficult for pipeline or storage users to respond to incentives or disincentives contained in these prices or for competition between facilities to occur.
- *Predictability.* In addition to transparency, consumers will value the ability to forecast their gas transportation and storage costs and to be able to make informed business decisions.
- *Practicality.* In addition to the above, the selected method must be suitable for efficient implementation and administration.
- *Public interest and social objectives.* Consistent with Government policy, tariffs may be designed to take account of social objectives. For instance, certain surcharges or cross subsidies may be introduced with the aim of funding the provision of affordable services to low income sectors of the population.

2.3 Legislative framework and requirements of the Energy Regulator

The National Energy Regulator Act, 2004

The Energy Regulator is mandated in terms of the National Energy Regulator Act, 2004 (Act No. 40 of 2004, herein under referred to as “the NERSA Act”) to regulate the electricity, piped-gas and petroleum pipeline industries in terms of the Electricity Regulation Act, 2006; the Gas Act, 2001; and the Petroleum Pipelines Act, 2003.

The Energy Regulator embarked on an extensive consultation process regarding its proposed guidelines for monitoring and approving tariffs for gas transmission and storage tariffs, in compliance with the requirements of the NERSA Act.

Gas Act, 2001

The Gas Act aims to *inter alia* promote the orderly development of the piped-gas industry and to establish a national regulatory framework with the National Gas Regulator (now Energy Regulator) as the custodian and enforcer of this national regulatory framework.

The Gas Act further contains a list of objectives for the development of the piped-gas industry in South Africa, ranging from investment and competitive markets to skills and employment equity promotion. Notably the Gas Act aims to promote “the efficient, effective, sustainable and orderly development and operation of gas

transmission, storage, distribution, liquefaction and re-gasification facilities” and “the provision of efficient, effective and sustainable gas transmission, storage, liquefaction, re-gasification and trading services.”

The functions of the Energy Regulator are *inter alia* to:

- issue licences for construction, conversion and operation of gas facilities and trading in gas;
- undertake investigations and inquiries into the activities of licensees; and
- regulate prices in terms of section 21(1)(p) in the prescribed manner.

Furthermore, the Energy Regulator has a duty as laid out in section 4(h) of the Gas Act to “*monitor and approve, and if necessary regulate, transmission and storage tariffs and take appropriate actions when necessary to ensure that they are applied in a non-discriminatory manner as contemplated in section 22.*”

The above objectives and the functions of the Energy Regulator were taken into consideration in the development of these guidelines.

Existing agreements concerning gas transmission

In principle, all agreements, including agreements that were in force prior to the enactment of the Gas Act are subject to monitoring and approval and if necessary regulation by the Energy Regulator. It should be noted that in order to attract investment and promote the development of the piped-gas sector, the Energy Regulator is acutely aware of the need to provide regulatory certainty and predictability and would approach existing contracts with prudence.

- **Agreement Concerning the Mozambican Gas Pipeline between the Government of the Republic of South Africa and Sasol Limited (“the Agreement”)**

This Agreement sets the tariff for the gas transportation between the owner of the Mozambique to South Africa pipeline, Republic of Mozambique Pipeline Investments Company (Pty) Ltd (ROMPCO), and Sasol Gas at R4,64 per Gigajoule as at January 2000, adjusted quarterly with South African PPI, excluding any expansion related charges, based on a ship or pay for 80% of the contracted 120 million Gigajoules per annum. This agreement, as any other existing agreement, is subject to section 4(h) of the Gas Act. However, as the Agreement is incorporated into the Gas Act it is envisaged that the emphasis for the current tariff will be on monitoring and approval in the short term, but that the tariff for additional Gigajoules, i.e. in excess of 120 million Gigajoules, is subject to approval prior to implementation.

- **The Regulatory Agreement between the Minister of Minerals and Energy, the Minister of Trade and Industry and Sasol Limited (Schedule One to the Agreement)**

Schedule One to the Agreement sets out the regulatory dispensation, which is applicable to Sasol's current piped-gas business and provides for Market Value Pricing. Currently, Sasol does not charge separately for the supply of gas, the gas transportation and distribution tariffs and other charges.

- **The Gas Transportation Agreement between Transnet and Sasol Limited**

Sasol Gas currently uses a pipeline owned by Transnet to transport its methane-rich gas, manufactured at Secunda, to the Kwazulu-Natal province. The Gas Transportation Agreement contains a transportation tariff, with an indexation mechanism, agreed to by the parties.

This agreement, as any other existing agreement, is subject to section 4(h) of the Gas Act. It is envisaged that the emphasis for the current tariff will be on monitoring and approval in the short term.

2.4 The role of the Energy Regulator in piped-gas tariffs

In terms of section 2 of the Gas Act, the Energy Regulator is required to '*promote the efficient, effective, sustainable and orderly development and operation of gas transmission, storage, distribution*' and related activities in South Africa.

In order to enable the Energy Regulator to achieve the objects of the Gas Act listed in section 2 of the Gas Act, the Energy Regulator is, *inter alia*, required to issue licences for purposes of the construction, conversion and operating of gas transmission, storage, and distribution facilities and for trading of gas. In addition, the Energy Regulator is required to ensure compliance to licence conditions and is also given the authority to undertake investigations and enquiries into the activities of licensees.

Section 4(h) of the Gas Act further provides that the Energy Regulator must '*monitor and approve and, if necessary, regulate*' transmission and storage tariffs. This is operationalised as follows:

- the monitoring process requires the Energy Regulator to ensure that the tariff is being applied and adhered to;
- in giving effect to its duties to monitor and approve the tariff the Energy Regulator may direct enquiries to the licensees to establish that the tariff is appropriate before approval;
- the Energy Regulator is required to determine, at regular intervals, whether the tariff requires any adjustment.
- the Energy Regulator is required to regulate the tariffs, if necessary, to ensure that NERSA is fulfilling its regulatory duties, *inter alia* by ensuring tariffs are cost reflective and applied in a non-discriminatory manner.

3 Tariff Application

3.1 Introduction

As indicated earlier, NERSA has a duty as laid out in section 4(h) of the Gas Act to 'monitor and approve and, if necessary, regulate' transmission and storage tariffs. In practice this is interpreted as follows:

In monitoring and approving,

- NERSA will not set tariffs but will review tariffs prepared by licensees or applicants for transmission and storage facilities;
- NERSA can request licensees or applicants to amend the levels of tariffs or the tariff structure or both; and
- NERSA can approve or decide not to approve a tariff.

In regulating,

- NERSA will regulate the tariffs, if necessary, to ensure that NERSA is fulfilling its regulatory duties, *inter alia* by ensuring tariffs are cost reflective and applied in a non-discriminatory manner.

The process of tariff applications is envisaged as follows:

- All licensees (or applicants as appropriate) will be required to submit an application for tariff approval (a 'tariff application') to NERSA for the respective gas transmission and storage facilities concerned.
- For monitoring purposes, this application must be provided on an annual basis, although applicants are allowed to apply for approval of tariffs for a period of several years.

The Energy Regulator will request licensees to submit a tariff application based on their respective preferred methodology that may be chosen from the approved menu of tariff methodologies. In addition, NERSA will specify and publish the preferred sources of information that must be used for tariff calculation input variables. The Energy Regulator will review each tariff application using the same methodology chosen and used by the tariff applicant and any other appropriate information or method for assessing the reasonableness of each application. Alternative tariff methodologies or variations on the methods listed in the menu may be used by the applicant, provided that such method is proven, tested and verifiable.

Applicants must provide information regarding the parameters chosen and assumptions made in the tariff calculation, as well as the detailed calculations, for ease of assessment by the Energy Regulator before approval.

It should be noted that this method of 'monitoring and approving and if necessary regulating' provides ample room for project finance approaches to tariff determinations, as the main criterion for comparison and assessment is the resultant tariff outcome, not the method used in arriving at such a tariff. Moreover, a

discounted cash flow approach is included as an approved methodology in the menu of tariff methodology options.

3.2 Tariff methodology approaches

Licensees or applicants for transmission and storage tariffs will be able to choose the type of tariff methodology they wish to adopt. Below is a list of methodologies which the transmission and storage applicants or licensees can use to submit tariff applications:

3.2.1 Rate of return regulation

Rate of return regulation adjusts overall tariff levels according to the company's efficient level of accounting costs and cost of capital. Rate of return regulation is based on the calculation of the revenue the company will be allowed to earn to cover its efficient operational expenses and to provide a return on its efficient level of investment in capital assets. This can be done for a single year or for a number of years (typically 3 to 5 years where a licensee opts for a multi-year application, although a longer term tariff formula may be considered, logically constrained by the useful economic life of the facility).

The components of the allowed revenue formula under the rate of return methodology are as follows:-

$$AR = (RAB \times WACC) + E + T + D - C$$

Where

AR =	Allowable Revenue
RAB =	Regulatory Asset Base inflation indexed original cost net of cumulative depreciation and cumulative amortization write-up
WACC =	effective Weighted Average Cost of Capital (in real terms)
E =	efficient operating and maintenance Expenses
T =	Tax expense
D =	Depreciation for the tariff period under review, including amortization of the inflation write-up
C =	"Claw back" factor to correct for differences between actual values and assumptions using the calculation of the tariff for the preceding tariff period (including volume or other cost differences). This factor is included with a 1 or 2- year lag in order to obtain full year actual values for assumed values

It should be noted that all the components of allowable revenue are discussed in a generic manner in Section 4 of this document to allow licensees to use any of

the elements in the methodology of their choice as they deem appropriate. Table 1 is provided as a suggestive, but not prescriptive, overview of how these components may be adopted for the various methodologies in the menu.

3.2.2 Incentive regulation

Price Caps

An alternative approach for regulation is incentive-based regulation. Incentive based regulation is aimed at providing incentives for efficiency increases and often involves setting of prices or revenues for a number of years (typically 3 to 5 years) into the future and including in those prices an “efficiency factor” (a projected decrease in prices or revenues to incentivise the licensee to reduce costs).

Price Cap regulation is usually associated with CPI-X regulatory regimes, where CPI is an appropriate inflation index and where the X factor is an efficiency target.

The components of the price cap formula are as follows

$$P_1 = P_0 * (1 + (I - X)) + K +/- Z$$

Where:

P₁ = new price

P₀ = current price (and the initial price is set using cost of service approach)

I = a measure of inflation or consumer price index

X = productivity/efficiency adjustment

K = correction factor to adjust for variations between estimated and actual values of variables such as the demand forecast

Z = an exogenous factor considered outside of the licensee’s control.

Revenue Caps

An alternative version of incentive regulation is to apply a **revenue cap**, which is designed to provide a certain amount of revenue for the licensee. This is achieved by estimating the allowed revenue required by the regulated business (using the allowed revenue formula). The revenue cap differs from the price cap inasmuch as it provides the licensee with protection against variations in demand that apply in the price cap. The licensee is generally allowed to earn its allowed revenue regardless of the level of demand.

The components of the revenue cap formula are as follows

$$R_1 = R_0 * (1 + (I - X)) + K +/- Z$$

Where:

R_1 = Revenue Year 1

R_0 = Revenue Year 0 (initial revenue is set using cost for of service approach)

I = is a measure of inflation,

X = is a productivity/efficiency adjustment,

K = correction factor to adjust for variations between estimated and actual values of variables such as the demand forecast

Z = an exogenous factor considered outside of the licensee's control.

3.2.3 Profit sharing and sliding scales

Under profit sharing approaches the licensee is allowed an appropriate level of profitability (based on the cost of capital approach described in Section 4.4.5 of this document). Any excess profits or losses relative to the allowed Weighted Average Cost of Capital (WACC) are then shared in pre-determined proportions between customers and the licensees.

The formula for a profit sharing performance based methodology will contain the following components:

- 1) a starting point allowable revenue or tariff (established using the rate of return method);
- 2) a performance-based revenue formula to establish allowable revenues in subsequent years which are indexed to some measure of inflation and productivity/efficiency (similar to revenue cap above);
- 3) a mechanism by which allowable revenues or tariffs are adjusted to account for changes in the cost of capital, usually called a "cost of capital trigger" mechanism;
- 4) some type of revenue or earnings sharing component, whereby customers and the licensee share the excess of actual revenues over allowable revenues; and
- 5) "Z-factors" and similar exclusions to account for highly unusual events and costs which are not within the control of the licensee.

3.2.4 Hybrids of the abovementioned approaches

Under a hybrid scheme the regulator combines a price cap or rate of return mechanism with a revenue sharing or other mechanism that uses realized earnings to determine prices. The most common type of hybrid price cap is one where the regulator approves a price cap formula and an explicit earnings-sharing requirement via which any additional earnings are divided between the licensee and customers using a pre-determined formula.

3.2.5 Discounted Cash-Flow

The discounted cash-flow approach to tariff calculation is based on the use of project finance-based financial modelling to determine the appropriate tariffs for transmission and storage facilities. Allowable revenue for transmission or storage facilities is calculated based on projected expenditure, capital investment and discount rates using the allowed revenue formula. These allowable revenues are then used in a financial model of the transmission or storage facility's cash flows to assess whether the business is financially sustainable.

This assessment is based on a range of financial performance indicators, for instance whether the transportation or storage business is able to meet a target hurdle rate, i.e. a target range of Internal Rate of Return (IRR), or some target Interest Cover Ratio or Debt Service Cover Ratio (DSCR) in order to attract investment.

3.3 General application

The methodologies outlined briefly above would also require a reward or penalty system as an incentive to maintain or improve licensee service, safety, and customer satisfaction performance compared to established benchmarks.

Licensees or applicants may apply for a tariff for more than one year, logically constrained by the useful economic life of the pipeline or storage facility, depending on the specific circumstances. The period of application notwithstanding, such long term tariffs will remain subject to monitoring and the other requirements of the Gas Act.

In addition, so-called "Z-factors" are often included to account for highly unusual or exogenous events and costs which are not within the control of the licensee and hence are inappropriate for performance based regulation.

Lastly, any tariff methodology will be subject to monitoring and evaluation by the Energy Regulator.

4 Components of Allowable Revenue (AR)

4.2 Introduction

Each of the regulatory methodologies considered in Section 3 require the calculation of an allowed revenue formula. In this section we discuss the calculation of some of the elements of the allowable revenue as summarized in the following table:-

Table 1 Tariff methodology elements

Methodology/ Component of Allowable Revenue	Rate of Return Regulation	Incentive Regulation	Profit sharing/ Sliding scale	Hybrid	Discounted Cash flows
Efficient O&M expense (Bottom-up)	✓	✓	✓	✓	✓
Flow through tax¹	✓	✓	✓	✓	✓
Straight-line depreciation	✓	✓	✓	✓	✓
TOC for RAB Valuation²	✓	✓	✓	✓	✓
CAPM & Real cost of equity	✓	✓	✓	✓	✓
Real cost of debt³	✓	✓	✓	✓	✓
Real WACC³	✓	✓	✓	✓	✓
Inflation CPI/PPI	✓	✓	✓	✓	✓
Financial Indicators e.g. hurdle rate, DSCR, Interest Cover					✓
Correction Factor	✓ = C	✓ = K	✓ = cost of capital trigger	✓ = pre- determine d formula	✓ = financial indicators trigger
Cost of Service for initial P_0/R_0		✓			

Allowable Revenue	✓ = AR	✓ = P ₁ * Volume = R ₁	✓	✓	✓
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Note 1: See section 4.3 for exceptions to use Normalized tax approach

Note 2: See section 4.4 for exceptions regarding 100% TOC versus trending of equity financed portion of asset

Note 3 see section 4.4 for exceptions regarding applying real Ke on equity funded portion of assets versus use of real WACC on 100% on full asset base.

4.3 The efficient level of operating and maintenance costs (Expenses)

Data for monitoring Expenses

Operating and maintenance (O&M) cost efficiency analysis will be based on:

- NERSA receiving operating cost projections from the regulated transmission or storage licensee;
- NERSA forming a view as to the efficient level of maintenance and operational expenditure; and
- The revised operating and maintenance costs based on NERSA's view being included in the Allowable Revenue calculation.

Operating and maintenance cost data for tariff determinations should be provided in a form consistent with that laid out in the Regulatory Reporting Manual prescribed by NERSA² to facilitate comparisons between actuals and projections over the tariff period. The provided costs should be such that there is a clear separation of storage from transmission activities and between individual pipelines as prescribed.

An approach to determining efficient operating and maintenance costs

To effectively monitor pipeline tariffs on a pipeline-by-pipeline basis or for individual storage facilities, at any point during the lifetime of the facility, NERSA may undertake an assessment of the efficient level of operating and maintenance expenditure by licensees.

The Energy Regulator will use the 'bottom up' approach to assess the efficient level of O&M expense in transmission and storage activities.

² NERSA[2008]: "Regulatory Reporting Manual Volume 3: Piped Gas (effective 1 September 2008)

The bottom up assessment is typically based on the regulator appointing a suitably qualified expert to review the data provided by the licensee and to conduct interviews with the licensee to identify opportunities for cost reduction.³

At this stage, a bottom up approach is favoured mainly due to the relatively early stage of development of the gas industry in South Africa, and to the relatively low degree of comparability between individual pipelines. However, as the gas industry evolves, a top down benchmarking approach to efficiency assessments may be useful to complement bottom up assessment.

Other considerations in efficient O&M expenses

The Energy Regulator will assess the O&M expenses using principles such as whether the expense was “prudently incurred”, its controllability and efficiency.

There are two other areas of regulatory precedent that NERSA will consider in the determination of efficient O&M expenses:

- **Consideration of controllable and uncontrollable costs:** In determining tariffs efficiency targets should only be set for costs that are considered to be within a licensee’s control.
- **Opex efficiency targets and X factors:** In incentive regulation, such as CPI-X regulation, the X factor is referred to as the efficiency factor. This efficiency factor is likely to be different from a simple target set for opex reduction, for a number of reasons including:
 - The X factor represents the change in tariff therefore taking into account total efficiency (e.g. capital efficiency as well as opex efficiency); and
 - Often the X factor is calculated to smooth the tariff over a number of years which does not specifically reflect operating cost efficiency in any particular year.

4.4 Determining TAX (T)

Tax refers to a licensee’s estimated tax payable to the tax authority with respect to taxable allowable revenue from the regulated activity for the tariff period under review.

The flow-through tax approach is the Energy Regulator’s preferred tax methodology.

³ This approach has been used in the regulation of the gas sector in the UK. Examples of reports for bottom-up cost efficiency analysis can be found at www.ofgem.gov.uk/Networks/Trans/PriceControls/TPCR4/consultantsReports/Documents1/15836-TPCR-tpareport.pdf

The flow-through (of taxes payable) approach is an approach whereby only current income taxes payable are factored into the allowable revenue and recovered in the tariff during the period under review. In this flow-through of taxes payable method, it is not necessary to provide for future income taxes (deferred taxes), since there is a reasonable expectation that future taxes payable will be included in future costs of service and provided for in allowable revenues at that time.⁴ Thus, in applying the flow-through of taxes payable approach, income taxes payable are estimated for the tariff period under review based on taxable income as opposed to accounting income.

To derive the taxable income (as opposed to accounting income), the licensee is obligated to maximize all eligible deductions for income tax. Differences between the estimated flow-through tax at time of tariff application and actual flow-through taxes paid will be adjusted through the appropriate +/- correction factor contained in the tariff methodology chosen by the licensee.

Although the flow-through tax methodology is preferred, the Energy Regulator may upon request allow a licensee to use the normalized⁵ tax approach under one of the following conditions:-

- Where a licensee has been using the normalized tax approach in the past and has obtained approval from the Energy Regulator to continue using this approach. In this case, the deferred taxes are deducted from the RAB because the licensee would have collected the funds necessary to meet its deferred tax liability obligations in its tariff in advance. In addition the licensee must maintain adequate records for the assets creating the deferred tax liability and the tariff application must include a schedule disclosing the year-on-year deferred tax liability and expected year-on-year reversal of the deferred tax liability until the time that such a deferred tax liability “zeros out.”
- Any other licensee wishing to use the normalized tax approach must motivate to the Energy Regulator before using the normalized approach and provide sufficient undertakings that detailed records must be kept as indicated as well as proof that sufficient funds will be set aside to be available in the later years to pay the taxes when the deferred taxes start reversing.

It must be emphasised that the flow-through approach does not take away the tax benefits envisaged from an accelerated wear and tear allowance envisaged by the tax authorities. The difference is in the form of compensation when it is applied to

⁴ The taxes payable method of accounting for income taxes is used for tariff setting purposes for Canadian natural gas transmission operations.

⁵ The normalized tax approach - is a method in which a licensee collects more revenue from tariff payers to cover its tax obligation early in the life of a depreciable asset than the licensee is obliged to pay in taxes in the early tariff period(s). This arises from the fact that the licensee would ordinarily use a straight-line depreciation method to determine depreciation expenses charged against operating income for tariff making purposes while in contrast, *accelerated* depreciation deductions are permitted by the tax authority for determining corporate income taxes. Deferred taxes for this asset are built up in a deferred tax account, and then drawn down to zero over the asset's life as lower tax charges during the asset's early years are followed by higher taxes during its later years. The fundamental aspect of "normalization" accounting is that the deferred tax account must "zero out."

tariffs. In the flow through approach the corresponding assets financed by the deferred tax liability are included in the regulatory asset base and earn a return based on real WACC, whereas in the normalized tax approach the actual cash is collected via the tariff, which is in turn deducted from the regulatory asset to avoid double compensation.

4.5 Calculating RETURN - the regulatory asset base (RAB)

The key principle for setting a regulatory asset base value is to ensure that the investment in assets receives an appropriate level of reward to recoup the investment and earn a return commensurate with risk. At the same time this requires the WACC to be set at an appropriate level for an adequate “return on capital”. In addition, setting the asset value correctly for the calculation of depreciation is fundamental to ensuring that an appropriate level of funds is available for a “return of capital” towards the eventual replacement of those assets.

4.4.1 Determining the value of the Regulatory Asset Base (RAB)

The value of the regulatory asset base is the inflation-adjusted historical cost or trended original cost (TOC) of plant, property and equipment less the accumulated depreciation for the period under consideration plus the net working capital. The following formula may be used to determine the value of the regulatory asset base:

$$\text{RAB} = \text{V} - \text{d} + \text{w}$$

Where

- V** = Value of used and usable regulated property, plant, vehicles and equipment at the commencement of the tariff period under review, indexed by TOC
- d** = accumulated depreciation at the commencement of the tariff period under review and amortization of the inflation indexation adjustment value for the same period
- w** = net working capital

The trending can be done either for the entire asset base if the so-called ‘patient equity capital’ approach is used or otherwise only the equity financed proportion of the asset must be trended by an inflation index (see the explanation below for details).

4.4.2 Value of Property, Plant, Vehicles and Equipment (V) using TOC

The value of used and usable property, plant, vehicles and equipment comprises only non-current assets used in the regulated activity.

The RAB must be adjusted for capital additions upon commissioning of the assets concerned. This is the approach used by regulators when capital additions occur infrequently. Should additions occur frequently and in small increments, the RAB on which return for any given year is calculated can be calculated by averaging opening and closing balances: $[(RAB_{t-1} + RAB_t)/2]$.

Inflation adjustments must be based on appropriate inflation indices as approved by the Energy Regulator. The same inflation index (CPI or PPI) used in trending will be applied in adjusting the nominal return on equity / nominal WACC to real rate of return on equity/real WACC and vice versa.

The full asset base will be trended for inflation if the “patient capital” approach is used as explained below. If however the debt is treated as a pass-through then only the equity-financed portion of the assets is trended as explained below. Of these two approaches, the ‘patient capital’ approach is preferred to avoid asset abandonment.

Non-current assets must be calculated for each asset category and added to arrive at the value for V using the TOC valuation method as follows:-.

1. The starting regulatory asset base (SRAB) will be determined using depreciated original cost. Where original cost does not exist, then the SRAB should be determined as prescribed in the Regulatory Reporting Manuals;
2. The SRAB for existing assets determined as explained above becomes the proxy for original cost to be trended for the future;
3. In the so called ‘patient capital’ approach, the equity investor takes the risk by getting less of its return upfront but more return later (e.g. from year 8 as per the attached example 1).

In the patient capital approach:

- the equity holder is entitled to full trending of the asset base for both the debt and the equity-financed asset portion.
- the real WACC that combines both debt and equity as per the capital structure financing the asset will be applied to the Trended RAB.
- the real WACC times the total regulatory asset base yields the yearly allowed total return on assets in Rands.
- the inflation factor multiplied by the total regulatory asset base yields the regulatory asset base write-up for inflation (adjustment) to be added to the RAB balance carried forward to the next tariff period.

In the cost of debt pass-through approach, the equity holder has not taken as much risk since the full debt costs are a pass through. As a result:

- it is required to trend the equity portion only in order to ensure that the equity holder will not benefit from an inflation adjustment or inflation “write-up” of the rate base with respect to assets financed by debt.

- the equity holder will only be compensated for the inflation to the extent that assets are financed by equity. The real cost of equity (not WACC) will be applied to the trended equity-financed portion of RAB.
- the real rate of return on equity (not WACC) times the equity share of the regulatory asset base yields the yearly allowed return in Rands.
- the inflation factor multiplied by the equity share of the regulatory asset yields the regulatory asset base adjustment (write-up) added to the RAB balance carried forward to the next tariff period.
- in determining the proportion of equity-funded assets to be trended, the capital structure should be representative of the regulated business' risk, and therefore the actual capital structure may be used.
- However, the Energy Regulator may use an 'optimal' or 'deemed' capital structure in order to provide incentives for efficient financing.
- Where debt cost is a pass through, both the interest as well as the difference between depreciation of debt-financed asset and the actual debt principal are allowable as a pass-through in the tariff through a calculation to achieve the desired debt service cover ratio (DSCR).
- The write-up or adjustment is, similar to depreciation, written off or amortized over the useful life of the asset. Prior periods' write-ups will be excluded from the tariff calculation because previously a nominal rate of return, which included inflation, has already been earned by the licensee;

An example of trending the original cost of an asset using the patient capital approach is provided in under the discussion on depreciation in Section 4.4.3 below.

The Energy Regulator intends to implement this approach based on depreciated original cost or, in the absence of original cost, as prescribed in the Regulatory Reporting Manuals. The annual change in the asset value with this approach is equal to the value of net (expected) new investment during the year.

General provisions

The provisions below provide guidance regarding the treatment of assets in the tariff methodology:

- plant, property and equipment under construction are excluded from the Regulatory Asset Base;
- non-current assets must be used and usable, of a long term economic lifespan and in a condition that makes it possible to be used in the short term;
- capital expenditure is admitted to the Regulatory Asset Base when the asset concerned becomes used and usable, i.e. is 'commissioned';
- other costs of an extraordinary nature, for example major storm damage repairs not covered by insurance, may be included in the Regulatory Asset Base if the licensee decides to capitalise these costs;
- funds deposited by customers with the licensee are excluded from the Regulatory Asset Base;
- contributions received in lieu of connection charges representing non-refundable funds contributed by customers are excluded from the Regulatory Asset Base;

- where a normalized tax approach is applied the deferred tax collected from tariff payable earlier than the licensee currently must pay in taxes is deducted from the Regulatory Asset Base;
- leasehold improvement constitutes an investment in a right to use property and is admitted to the Regulatory Asset Base;
- non-current assets expected to become used and usable during the forthcoming tariff period are admitted to the Regulatory Asset Base in proportion to the share of the forthcoming tariff period during which they will be used and usable. If a difference occurs between the expected share of the tariff period (date) and the actual share of the tariff period (date) then a claw back adjustment is made in the following tariff period; and
- plant equipment (spares) held for emergency stores for security of supplies (if not already included in working capital) are allowed for inclusion in the Regulatory Asset Base and depreciated at a rate specific to its respective asset class.

4.4.3 Depreciation (d) and amortization

Accumulated depreciation is the cumulative depreciation against plant property, vehicles and equipment in service. It is calculated on a straight line over the economic life of the asset. Depreciation can be calculated on the historical (original) cost of the asset. The inflation write-up from the trending of the asset value is treated in a similar manner to the depreciation of the historical cost and amortized over the remaining economic useful life of the asset.

The method to determine depreciation using trended original costs (TOC) is illustrated by the two examples below, based on the following assumptions:

Example 1 patient equity approach:

- Historic cost of asset is R100
- Inflation is 5% per annum
- Depreciation is on a straight line basis over ten years
- The service life of the asset is 10 years
- Patient equity capital approach whereby 100% of RAB is trended

Example of TOC vs Depreciated Original Cost (DOC) - All Equity Financed											
Asset Original Cost	100	100%									
Equity Financed	100	100%									
Debt Financed	0	0%									
Asset Useful Life	10 years										
Tariff Period	1	2	3	4	5	6	7	8	9	10	
Asset's Remaining Useful Life	10	9	8	7	6	5	4	3	2	1	0
Depreciated Original Cost b/f	100	90	80	70	60	50	40	30	20	10	0
Depreciation-Current Tariff Period	10	10	10	10	10	10	10	10	10	10	0
DOC Rate Base Balance c/f	90	80	70	60	50	40	30	20	10	0	0
Inflation rate	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Trended Original Cost b/f	100	96.3	91.6	85.8	78.6	70.1	60.0	48.2	34.4	18.4	0.0
Current year inflation write-up	7.0	6.7	6.4	6.0	5.5	4.9	4.2	3.4	2.4	1.3	0.0
Inflation write-up b/f	0.0	6.3	11.6	15.8	18.6	20.1	20.0	18.2	14.4	8.4	0.0
Amortization of write-up	0.7	1.4	2.3	3.1	4.0	5.0	6.1	7.2	8.4	9.7	
Write-up balance c/f	6.3	11.6	15.8	18.6	20.1	20.0	18.2	14.4	8.4	0.0	
TOC Rate Base Balance c/f	96.3	86.3	81.6	75.8	68.6	60.1	50.0	38.2	24.4	8.4	0.0
Total Depreciation & Amortization to include in the Cost of Service	10.7	11.4	12.3	13.1	14.0	15.0	16.1	17.2	18.4	19.7	0.0

c/f: carried forward b/f: brought forward

The value of the RAB using the TOC valuation is calculated using the following formula:

$$\text{original cost} - \text{depreciation} + \text{net inflation adjustment}$$

in the example:

$$100 - 10 + (7 - 0.7) = \underline{\underline{96.3}}$$

Example 2 debt cost as pass-through approach:

- Historic cost of asset is R100
- Inflation is 5% per annum
- Depreciation is on a straight line basis over ten years
- The service life of the asset is 10 years
- Equity comprises 70%
- Debt comprises 30% and debt cost is a pass-through

Example of TOC vs Depreciated Original Cost (DOC) - Debt and Equity Financed											
Asset Original Cost	100	100%									
Equity Financed	70	70%									
Debt Financed	30	30%									
Asset Useful Life	10 years										
Tariff Period	1	2	3	4	5	6	7	8	9	10	
Asset's Remaining Useful Life	10	9	8	7	6	5	4	3	2	1	0
Depreciated Original Cost b/f	100	90	80	70	60	50	40	30	20	10	0
Depreciation-Current Tariff Period	10	10	10	10	10	10	10	10	10	10	0
DOC Rate Base Balance c/f	90	80	70	60	50	40	30	20	10	0	0
Inflation rate	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Trended Original Cost b/f	100	94.4	88.0	80.8	72.7	63.5	53.3	41.9	29.3	15.4	0.0
Current year inflation write-up	4.9	4.6	4.3	4.0	3.6	3.1	2.6	2.1	1.4	0.8	0.0
Inflation write-up b/f	0.0	4.4	8.0	10.8	12.7	13.5	13.3	11.9	9.3	5.4	0.0
Amortization of write-up	0.5	1.0	1.5	2.1	2.7	3.3	4.0	4.7	5.4	6.1	
Write-up balance c/f	4.4	8.0	10.8	12.7	13.5	13.3	11.9	9.3	5.4	0.0	
TOC Rate Base Balance c/f	94.4	84.4	78.0	70.8	62.7	53.5	43.3	31.9	19.3	5.4	0.0
Total Depreciation & Amortization to include in the Cost of Service	10.5	11.0	11.5	12.1	12.7	13.3	14.0	14.7	15.4	16.1	0.0

The value of the RAB using the TOC valuation is calculated using the following formula:

original cost – depreciation + net inflation adjustment of equity portion of asset base

in the example:

$$100 - 10 + (4.9 - 0.5) = \underline{\mathbf{94.4}}$$

4.4.4 Net Working Capital (w)

Net working capital refers to various regulatory asset-base funding requirements other than utility plant in service. These funding requirements include inventories, prepayments, cash working capital and other non-plant operating requirements. Working capital funded by investors may be included in the regulatory asset base.

The following formula may be used to determine net working capital:

Net working capital = inventory + receivables + operating cash – trade payables

Operating cash refers to the amount of investor-supplied funds needed to finance operations. This is finance to bridge the gap between the time expenditures are made to provide service and the time collections are received for that service. It is the cash supplied by investors to finance operating costs during the time lag before revenues are collected.

Common approaches to working capital determination include the balance sheet method; lead-lag studies; and an average 45-day period (the licensee should disclose the method chosen and used).

Measurement of required operating cash must be based on the licensee's standard practice subject to a maximum 45 days' operating expenses, excluding depreciation and deferred taxes.

If an applicant has carried out an adequate lead-lag study to determine the net difference, in terms of days, between the point at which service is rendered and revenues are collected from customers, and the point at which costs are incurred until they are paid, then the Energy Regulator may use this determination rather than the approach set out in the above paragraph.

Trade payables refers to current liabilities for which the amount to be settled is usually known.

The Energy Regulator will expect licensees to observe optimal working capital management practices such as timely collections and minimizing uncollectibles (bad debts) and abnormal inventory losses/unaccounted for gas in accordance with international standards.

4.4.5 Weighted Average Cost of Capital (WACC)

The weighted average cost of capital is the average of the cost of equity and debt, weighted by the proportions of equity and debt which an efficiently financed company can be expected to use to fund its activities. Hence, to determine the WACC, it is necessary to determine the cost of debt and equity and the proportions of debt and equity that would be employed in an efficiently financed company.

As providers of equity and debt are interested in the post-tax returns available to them, when determining the allowed revenues and tariffs, NERSA must allow not only for the post-tax WACC return but must also allow for corporate taxation that will be incurred by the regulated company. Since the tax treatment of debt (deductible as a cost) is different from the tax treatment of equity (not deductible as a cost), the allowed revenues to fund taxation will be a function of the proportions of debt and equity that would be employed by an efficiently financed business.

Pipeline and storage companies will be expected to submit their WACC expectations based on evidence regarding the cost of debt and the cost of equity. Internationally recognised approaches to the calculation of cost of debt and the return on equity should be used. For example, the Capital Asset Pricing Model (CAPM) can be used for the cost of equity.

Besides CAPM, a licensee is allowed to opt for the use of any other internationally accepted methodology to estimate the cost of equity, provided that such methodology must be supported by expert testimony from credible financial sources. Quotations or estimates from different lenders could provide further justification.

The following formula is used to determine the WACC using CAPM –

$$WACC = \left[\left(\frac{E}{Dt + E} \right) * Ke \right] + \left[\left(\frac{Dt}{Dt + E} \right) * Kd \right]$$

Where:

Eq= Equity

Dt= Debt

Ke= the Cost of Equity in terms of the Capital Asset Pricing Model (CAPM)

Kd= is the after-tax rate of return on Debt capital

CAPM is the preferred approach as it is the most common methodology in the determination of cost of capital.

However, if CAPM is considered to be inappropriate, applicants have the option to submit an application based on any other internationally recognized and used cost of capital approaches. Companies are expected to provide a rationale for the approach used, and this will be assessed by NERSA on a case-by-case basis.

When tariffs are considered by NERSA the tariff level will be set to ensure that appropriate levels of financial indicators will be met, based on prevailing financial market conditions and best practice.

If the Capital Asset Pricing Model is adopted for the calculation of WACC, one of the key components that will need to be estimated is Beta, which will be discussed below.

As much regulatory certainty can be provided by narrowing down the range of acceptable input variables, NERSA will publish preferred sources of information for the key input variables discussed in the remainder of this section. These sources of data will be subject to stakeholder comment and will be determined and revised by the Energy Regulator from time to time.

Cost of equity

The cost of equity is the rate of return available on alternative equity investments of comparable risk. In the WACC formula, it is calculated as:

$$\mathbf{K_e} = r(f) + \beta(e) * MRP$$

where

r(f) = the risk-free rate

It represents the return an investor can achieve on the least risky asset in the market. Generally the spot prices of selected 5 to 10 year government of South Africa bonds are used for the expected risk free return when estimating the cost of equity capital.

$\beta(e)$ = the equity beta

This measures the covariance between the return on the firm's equity and the returns from the stock market as a whole. Beta is an important parameter calculated by the regulator, and more details on its calculation are provided below.

MRP = the market risk premium

This represents the additional expected return investors require to invest funds into equities rather than risk-free instruments. It can be calculated using historical averages and/or market based forward looking approaches. At present the use of historical averages is the preferred method.

The NERSA preferred sources of information for input variables, to be determined from time to time, will provide clarity on the appropriate sources to be used for $r(f)$, $\beta(e)$ and MRP.

Beta

β = 'beta', is the systematic risk parameter for regulated entities providing transmission and storage. The methodology to be used to determine the beta is set out below:

For licensees that are not publicly listed and where there are insufficient publicly listed competitors, the equity beta must be determined by proxy. As a proxy the average equity Beta of six (6) pipeline (international) companies (approved by the Energy Regulator) listed on stock exchanges must be used. To make adjustments for differences in gearing between the proxy and the licensee the process involves 'unlevering' and 'relevering' as follows:

- Obtaining the equity beta for the proxy company.
- Unlevering the beta of the proxy company by the gearing level of the proxy company. This unlevered beta is known as the 'asset beta'.
- Calculating the weighted average of the asset betas for the chosen proxy companies.
- Relevering the average asset beta by the (optimal) gearing expected of an efficiently financed licensee to fund its licensed activities.

The following steps and formulae must be used:

Step 1 – Calculate asset beta (or unlevered beta) for proxy firm

The following formula must be used to determine the asset beta –

$$\beta_{a1} = \frac{\beta 1}{1 + [1 - Tr] * \left[\frac{D}{E} \right]}$$

Where:

β_{a1} = asset beta for proxy company 1
 $\beta 1$ = beta of proxy company 1

Tr = tax rate of relevant country
Dt = debt
Eq = equity

Repeat step 1 for each of the 6 chosen proxy companies.

Step 2 – Calculate weighted average asset beta of proxy companies

Weight each of the 6 proxy firm asset betas by their proportion of the total debt plus equity of the 6 proxy firms and sum the 6 results using the following formula –

$$\beta_{aE} = \sum_{n=1}^6 \left[\left(\frac{(D+E)_n}{\sum_{n=1}^6 (D+E)_n} \right) * (\beta a)_n \right]$$

Where:

β_{aE} = weighted average asset beta of the regulated entity
 $(D+E)_n$ = sum of the debt and equity for a specific proxy company
 $(\beta a)_n$ = asset beta of the corresponding specific proxy company
 $\sum_{n=1}^6 (D+E)_n$ = sum of debt and equity for all proxy companies

Step 3 – Calculation of beta (β) for licensee

The following formula must be used to determine the beta for the licensee –

$$\beta_L = [WA \beta][1+(1-t)(D/E)]$$

Where:

β_L = beta for the licensee

WA β = the weighted average β of the proxy firms asset betas from Step 2. The Energy Regulator may adjust this factor to take account of a difference in country risk ratings between the host country of the proxy firms and South Africa.

t = tax rate of the licensee
Dt = the debt of the licensee subject to a minimum gearing level of 30%
Eq = the equity of the licensee

Where a portion of the Regulatory Asset Base is located in another country and where that country has a country risk rating that is different from South Africa's country risk rating, then the beta may be adjusted to take into account the difference between these two country risk ratings if the costs associated with that risk are not

catered for elsewhere in the Allowable Revenue formula. This adjustment will only apply to that portion of the Regulatory Asset based located outside of South Africa.

See published preferred sources of information for benchmarking beta in South Africa including adjustments thereof.

Cost of debt

The actual cost of debt (interest charges) incurred by the licensee must be used for K_d and for calculation WACC (both real or nominal as appropriate) subject to the Energy Regulator finding it reasonable through the application of reasonableness tests.

The actual cost of debt (K_d) must be determined by estimating the actual weighted average interest charged on debt achieved by the licensee for the tariff period under review.

Where actual interest rates are not known (for example where the interest rate fluctuates) then the lender's estimate of interest rates for the forthcoming tariff period must be used.⁶ At the end of the tariff period the actual interest rates achieved must be compared with the estimated interest rates used in the tariff application and any adjustment necessary must be made in the Allowable Revenue in the subsequent tariff period.

Where the licensee has business activities that are not regulated by the Energy Regulator and the licensee raises corporate debt then the actual cost of debt charged to the regulated activities must fairly reflect the risks of those regulated activities as prescribed in the RRM and approved by the Energy Regulator in a Cost Allocation Manual.

The cost of debt is calculated as:

$$K_d = r(f) + D_p$$

where:

K_d is the after-tax rate of return on debt capital

$r(f)$ is the risk free rate

D_p is the borrowing / debt margin or yield.

The debt margin represents the difference in the redemption yield on a corporate bond and the yield on a government bond (the risk-free rate). Lenders require a higher return for lending to a company rather than a government due to higher default risk.

⁶ Tariff applicants must provide the estimates made by their lenders in writing.

Gearing

When calculating the cost of capital, regulators make assumptions on the gearing level of the regulated companies. Typically, an assumption is made based on an *optimal* level of gearing that an efficient company would be expected or deemed to have, rather than on the actual level of gearing of the licensee.

The Energy Regulator will use actual gearing ratios as submitted by the applicant, subject to motivation of its reasonableness. As the appropriateness of the gearing will be assessed on a case-by-case basis, no optimal gearing ratio is prescribed at present. Infrastructure finance experience suggests however that at least 30% debt is a reasonable minimum gearing.

4.4.6 Financial Indicators

Financial indicators used in a tariff methodology may include *inter alia* the interest cover ratio and the internal rate of return (discount/hurdle rate).

Interest cover ratio

The interest cover ratio is estimated by dividing the earnings before interest and taxes by the interest expense. i.e;

$$\text{Interest Cover Ratio} = \text{EBIT} / \text{Interest Expense}$$

Where EBIT stands for Earnings Before Interest and Tax and the Interest Expense is the total cost of borrowing in a given tariff period as determined by applying the annual percentage rate on the qualifying debt.

Internal rate of return

Internal rate of return (IRR) is a rate of return (discount rate) on an investment (project) that will give a net present value of zero. The selected IRR for a project will be selected at a value that meets a set target cost of capital (known as the hurdle rate). The hurdle rate is therefore an investor's set minimum acceptable required rate of return for making an investment.

4.4.7 Correction Factor/Claw-back

Under Rate of Return Regulation the following applies:

$$\mathbf{C} = \text{Claw back}$$

This is a factor to correct for differences between actual values and assumptions using the calculation of the tariff for the prior year (including volume or other cost differences). This factor is included with a 1-year lag in order to obtain full year actual values for assumed values.

Under Incentive regulation the following applies:

K= correction factor

This is a factor to adjust for variations between estimated and actual values of variables such as the demand forecast.

Under Hybrid regulation the following applies:

Pre-determined **earnings-sharing formula**. The licensee can propose an appropriate earnings-sharing formula to the Energy Regulator. For example, using a rate of return formula with an explicit earnings sharing requirement via which any additional earnings are divided between the licensee and customers.

Under Profit sharing/Sliding Scale the following applies:

Cost of capital trigger mechanism. This is a mechanism by which allowable revenues or tariffs are adjusted to account for changes in the cost of capital. There will be some type of revenue or earnings sharing component, whereby customers and the licensee share the excess of actual revenues over allowable revenues.

Under Discounted Cash Flow the following applies:

Financial indicators triggers. This involves a mechanism by which allowable revenues or tariffs are adjusted to account for the variance from a target range of the hurdle rate or specific financial indicator.

4.4.8 Cost of Service for initial P_0/R_0

The components of Cost of Service for the initial price and revenue (P_0/R_0) are the same as those listed under the rate of return methodology as defined in Section 3.2 above.

5 Assessment of tariffs

5.2 Introduction

In this section we describe the process that will be followed by NERSA to monitor and approve proposed tariffs.

5.3 Approach of testing tariff proposals

NERSA may choose to use any reasonable comparator to the tariff applied for by the applicant. In principle the methodology used by the licensee will be used to ensure comparison of like with like and to achieve consistent and objective decision making. In addition, NERSA may use additional information; alternative methodologies; or rely on expert views.

Further, the Energy Regulator intends to specify the preferred sources of information that may be used for tariff calculation input variables. The published sources of information will include the following:-

- Historical equity / stock returns for determining Market Risk Premium;
- Historical RSA government bonds returns;
- Risk-free rate (R_f) expectations;
- Tax rate;
- Beta benchmarks of proxy companies including adjustments thereof;
- Historical Consumer Price Index and Producer Price Index data; and
- Consumer Price Index and Producer Price Index expectations.

The intended publishing of sources of data is aimed at addressing the need for clearly defined input factors and stakeholders' requests that each input element be reviewed and approved on a regular basis.

In addition, an applicant retains the option to use data from a source different from such list of preferred sources for input variables, in other words, the preferred sources are not an exclusive and exhaustive list. However, before using of such data, it must be approved by the Energy Regulator after due process is followed.

Moreover, an applicant or licensee may submit an application for an amendment of these guidelines should a strong preference for an alternative methodology occur. In the event of such application, the Energy Regulator will consider the request to include an additional methodology after due process is followed.

The above implies that the Energy Regulator will request licensees to submit tariff applications based on their preferred methodologies using the Energy Regulator's published preferred sources of information. The Energy Regulator will perform the comparison test on each tariff application and may request a licensee to provide evidence of the calculation of specific elements in the tariff application.

Any deviation from the tariff calculated by the Energy Regulator will be dealt with on a case-by-case basis. The Energy Regulator is not able to set a 'maximum deviation allowed' as requested by stakeholders as this would constitute prejudging of individual cases and would encourage speculative applications.

The following objectives will be followed in testing tariff proposals:

- Promote the efficient, effective, sustainable and orderly development and operation of gas transmission and storage facilities;
- Promote the provision of efficient, effective and sustainable transmission and storage services;
- Facilitate investment in gas transmission and storage;
- Ensure the safe, efficient, economic and environmentally responsible transmission and storage of gas;
- Ensure that gas transmission and storage services are provided on an equitable basis and that the interests and needs of all parties concerned are taken into consideration;
- Promote the development of competitive markets for gas and gas services;
- Facilitate gas trade between the Republic and other countries; and
- Promote access to gas in an affordable and safe manner.

In practice this requires a delicate balance to be struck between facilitating investment and the requirement that "the interests and needs of all parties concerned are taken into consideration." The desired outcome should be one that results in tariffs that are sufficiently high to promote investment whilst not preventing the development of gas markets or promote access to gas in an affordable manner.

5.4 Regulatory financial reporting and data requirements for regulation

To effectively monitor and approve tariffs on individual pipelines and storage activities or facilities will require licensees to develop financial and operating data for both the business plan (prospective) and regulatory returns (retrospective submissions) for each gas transmission and storage facility. This approach is described as accounting separation for regulatory reporting purposes and will be a key requirement for implementing a monitoring methodology for gas transmission and storage.

For this purpose NERSA has developed the Regulatory Reporting Manuals. The Manuals prescribe the format in which financial data, facilitated by a cost allocation manual, must be submitted to the Energy Regulator. Key aspects of appropriate accounting separations are:

- that only the costs related to the specific activity are attributed to that activity; and

- that vertically integrated businesses must be managed separately with separate accounts and data with no cross-subsidisation between activities / facilities.

The regulatory reporting data and projections are required by NERSA for tariff monitoring purposes regardless of which tariff methodology or which tariff structure is adopted by licensees.

6 Common approaches to tariff structuring

6.2 Introduction

This section of the tariff methodology is not intended to be prescriptive, but aims to provide an overview of typical approaches to tariff structuring. Licensees are able to choose the tariff structure most appropriate to their particular circumstances, within the confines of the tariff principles outlined in section 2.

Below are the common approaches to tariff structuring. In particular, these concentrate on the geographic dimension of the tariff structure, namely:

- Full distance pricing;
- Entry / exit pricing; and
- Postal pricing.

6.3 Geographic dimension of tariff structure

Full distance pricing

Full distance-related pricing is the calculation of tariffs (for both capacity and volume) for individual pairs of entry and off-take points. The tariffs will reflect the distance between the off-take point and the point where gas was delivered into the pipeline system (the entry point). It will be necessary to calculate a tariff for each entry and off-take point, based on the distance between the off-take point and each entry point.

Where the configuration of the pipeline system is complex (i.e. there are many interconnections) and there is a large number of off-take points, full distance pricing may be complicated to develop and impracticable to administer and maintain.

Entry / exit pricing

Entry/exit pricing is a simplified approximation of full distance pricing. Off-take points are grouped according to their location - the Exit Zone. Tariffs (both capacity and volume) are set for each Exit Zone. The tariff for the off-take point is then determined according to the Exit Zone in which it is located.

In addition, tariffs will be set for the transmission of gas from the point at which it is delivered into the system, the Entry Point, to the Exit Point. The Entry Point may be an import terminal, processing or storage facility or regasification plant.

The high-pressure system may be divided into regions, with staging posts along its length. The customer will be charged the tariff applicable for each leg of the pipeline system through which gas is transported. A variant of this tariff structure is the use

of a nodal system, where congestion at certain points in the system can be priced accordingly.

Postal pricing

Postal pricing is a system in which each off-take point in a particular region is charged a flat rate, irrespective of its capacity, the distance gas is transported or any other characteristics, similar to a postage stamp system.

Postal pricing has the advantage of simplicity, although it may be less suitable for a regulated environment, as it does not fully reflect costs associated with gas transportation over specific distances.

6.4 Approach to calculating the level of cost based tariffs

Gas pipelines can, within certain geographical limits, be considered as natural monopolies. In the absence of competition, the objective of regulation is to ensure that tariffs will be closely related to the costs of providing gas storage or transmission services. The first step, therefore, in approving tariffs, is to define the costs that are to be recovered through tariffs.

The approach preferred by the Energy Regulator for calculating the level of cost-based tariffs is the average accounting cost (also known as fully allocated cost) approach. The Fully Allocated Cost Approach is prescribed in the Regulatory Reporting Manuals.

Average accounting cost (or Fully Distributed Cost)

Definition

The average accounting cost (AAC) method is based on the allocation of total costs of operating the system to different storage or transmission services and then expressing these as an average unit cost. This approach is also known as fully distributed cost.

For each service, the allocated costs may be further segregated according to the cost drivers. The cost drivers will include fixed and distance-related elements:

- distance (or geographic zone);
- seasonality;
- load factor (i.e. the ratio of average daily demand to peak day demand); and
- volume.

Average tariffs may then be calculated for each service and cost segment.

Issues for developing AAC tariffs

The development of tariffs on this basis requires a detailed understanding of the costs associated with each service.

Unbundling of accounting information is required to support this approach. The number of services identified depends on the degree of unbundling that is adopted.

It is generally accepted that the higher the number of services to which costs are allocated (and hence the higher the degree of unbundling) the more correct the economic signals given by the tariffs.

Section 21(1) (c) of the Gas Act provides that the gas transmission, storage, distribution, trading, liquefaction and re-gasification, activities of vertically integrated companies must be managed separately with separate accounts and data and with no cross-subsidisation. Hence the required unbundling is in line with AAC use.

Figure 1 Spreadsheet example - Allowable Revenue using the patient equity approach

Guidelines for monitoring and approving
piped-gas transmission and storage tariffs

Asset Original Cost	100.00		100%												
Equity Financed	51		51%												
Debt Financed	49		49%												
Debt Tenor (years)	7														
Asset economic life (years)	25														
Trending 100% of Asset Value															
Tariff Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Remaining Asset Useful Life	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	
Depreciated Original Cost b/f	100.00	96.00	92.00	88.00	84.00	80.00	76.00	72.00	68.00	64.00	60.00	56.00	52.00	48.00	
Depreciation	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
DOC RAB Bal c/f	96.00	92.00	88.00	84.00	80.00	76.00	72.00	68.00	64.00	60.00	56.00	52.00	48.00	44.00	
Inflation	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
TOC Opening Balance (b/f)	100.0	100.8	101.4	101.9	102.1	102.1	101.8	101.3	100.5	99.3	97.7	95.8	93.4	90.5	
Inflation write-up bal b/f		4.80	9.43	13.87	18.10	22.10	25.85	29.31	32.47	35.29	37.73	39.78	41.38	42.51	
Amortization of write-up		0.2	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8	3.2	3.5	
Write-up bal net of ammortization	-	4.60	9.02	13.24	17.24	21.00	24.49	27.68	30.56	33.08	35.22	36.94	38.20	38.97	
TOC balance to inflate	96.00	96.60	97.02	97.24	97.24	97.00	96.49	95.68	94.56	93.08	91.22	88.94	86.20	82.97	
Current period inflation write-up	4.8	4.8	4.9	4.9	4.9	4.8	4.8	4.8	4.7	4.7	4.6	4.4	4.3	4.1	
Inflation write-up bal c/f	4.8	9.4	13.9	18.1	22.1	25.8	29.3	32.5	35.3	37.7	39.8	41.4	42.5	43.1	
TOC Closing Balance (c/f)	100.8	101.4	101.9	102.1	102.1	101.8	101.3	100.5	99.3	97.7	95.8	93.4	90.5	87.1	
Total Depreciation & Amortization to incl	4.00	4.2	4.4	4.6	4.9	5.1	5.4	5.6	5.9	6.2	6.5	6.8	7.2	7.5	
Assume Return on Equity	15%														
Cost of Debt	12%														
tax rate	28%														
WACC	11.88%														
Real WACC	6.88%														
Debt Principal balance	49	R 44.14	R 38.70	R 32.61	R 25.79	R 18.15	R 9.59	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
Allowable Revenue - Equity as Patient Capital															
Return on Rate base(Real WACCxTOC	6.88	6.94	6.98	7.01	7.03	7.03	7.01	6.97	6.92	6.83	6.73	6.59	6.43	6.23	
Depreciation	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
Amortization of write-up	-	0.20	0.41	0.63	0.86	1.11	1.36	1.63	1.91	2.21	2.52	2.84	3.18	3.54	
Total allowable revenue	R -100	10.88	11.14	11.39	11.64	11.89	12.13	12.37	12.60	12.83	13.04	13.24	13.43	13.61	13.77
Debt repayment	49	R -10.74	R -10.74	R -10.74	R -10.74	R -10.74	R -10.74	R -10.74	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
interest		R -5.88	R -5.30	R -4.64	R -3.91	R -3.09	R -2.18	R -1.15	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	
Principal		R -4.86	R -5.44	R -6.09	R -6.82	R -7.64	R -8.56	R -9.59	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
Revenue to equity holder	R -51.00	0.15	0.40	0.66	0.91	1.15	1.40	1.63	12.60	12.83	13.04	13.24	13.43	13.61	13.77

Guidelines for monitoring and approving
 piped-gas transmission and storage tariffs

Tariff Period	13	14	15	16	17	18	19	20	21	22	23	24	25	0.0
Asset Original Cost														
Equity Financed														
Debt Financed														
Debt Tenor (years)														
Asset economic life (years)														
Trending 100% of Asset Value														
Remaining Asset Useful Life	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0
Depreciated Original Cost b/f	52.00	48.00	44.00	40.00	36.00	32.00	28.00	24.00	20.00	16.00	12.00	8.00	4.00	
Depreciation	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
DOC RAB Bal c/f	48.00	44.00	40.00	36.00	32.00	28.00	24.00	20.00	16.00	12.00	8.00	4.00	-	
Inflation	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
TOC Opening Balance (b/f)	93.4	90.5	87.1	83.2	78.6	73.3	67.4	60.6	53.1	44.6	35.1	24.6	12.9	
Inflation write-up bal b/f	41.38	42.51	43.12	43.16	42.58	41.34	39.39	36.65	33.07	28.58	23.10	16.57	8.90	
Amortization of write-up	3.2	3.5	3.9	4.3	4.7	5.2	5.6	6.1	6.6	7.1	7.7	8.3	8.9	
Write-up bal net of ammortization	38.20	38.97	39.20	38.84	37.85	36.18	33.76	30.54	26.45	21.43	15.40	8.29	-	
TOC balance to inflate	86.20	82.97	79.20	74.84	69.85	64.18	57.76	50.54	42.45	33.43	23.40	12.29	-	
Current period inflation write-up	4.3	4.1	4.0	3.7	3.5	3.2	2.9	2.5	2.1	1.7	1.2	0.6	-	
Inflation write-up bal c/f	42.5	43.1	43.2	42.6	41.3	39.4	36.6	33.1	28.6	23.1	16.6	8.9	-	
TOC Closing Balance (c/f)	90.5	87.1	83.2	78.6	73.3	67.4	60.6	53.1	44.6	35.1	24.6	12.9	-	
Total Depreciation & Amortization to inc	7.2	7.5	7.9	8.3	8.7	9.2	9.6	10.1	10.6	11.1	11.7	12.3	12.9	
Assume Return on Equity														
Cost of Debt														
tax rate														
WACC														
Real WACC														
Debt Principal balance	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	
Allowable Revenue - Equity as Patient Capital														
Return on Rate base(Real WACCxTOC	6.43	6.23	6.00	5.72	5.41	5.05	4.64	4.17	3.65	3.07	2.42	1.69	0.89	
Depreciation	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
Amortization of write-up	3.18	3.54	3.92	4.32	4.73	5.17	5.63	6.11	6.61	7.14	7.70	8.29	8.90	
Total allowable revenue	R -100	13.61	13.77	13.92	14.04	14.14	14.22	14.27	14.28	14.27	14.21	14.12	13.98	13.79
Debt repayment	49	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00
interest	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00	R -0.00
Principal	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00	R 0.00
Revenue to equity holder	R -51.00	13.61	13.77	13.92	14.04	14.14	14.22	14.27	14.28	14.27	14.21	14.12	13.98	13.79