

A Methodology for the

Valuation of the Regulatory Asset Base

Discussion Document & Valuation Methodology Rules

Published for Public Comment

The Ports Regulator of South Africa has published a Discussion Paper and Methodology Rules for the Valuation of the National Ports Authority's Regulatory Asset Base.

The details of the Methodology and proposed Rules are set out within this document.

Interested parties' / port users are hereby invited to submit written comments to the Ports Regulator of South Africa. Comments should reach the Ports Regulator by close of business on the 22nd March 2018.

Written Comments should be addressed to:

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1. Acronyms

DOC	Depreciated Original Cost
DORC	Depreciated Optimised Replacement Cost
НС	Historical Cost
MEA	Modern Equivalent Asset
MYM2	Multi Year Methodology 2
NPA	National Ports Authority
NPCC	National Ports consultative Committee
NPV	Net Present Value
ODV	Optimised Deprival Value
PCC	Ports Consultative Committee
PRSA	Ports Regulator of South Africa
RAB	Regulatory Asset Base
Regulator	Ports Regulator of South Africa
RoD	Record of Decision
RUL	Remaining Useful Life
SRAB	Starting Regulatory Asset Base
тос	Trended Original Cost
WACC	Weighted Avergae Cost of Capital
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2. Introduction

The valuation of the Regulatory Asset Base (RAB) plays an integral part in the setting of tariffs for the National Ports Authority (the Authority / the NPA). As such the specific valuation methodology approach and its associated incentives and impacts must be taken into consideration. This document sets out the options available and makes a recommendation on the appropriate asset valuation methodology approach as well as the implementation thereof, within the context of the current tariff methodological framework. The last section of the document sets out the draft rules that will be included in the multi-year Tariff Methodology as published by the Ports Regulator of South Africa (the Regulator).

3. Background

A key aspect of the Ports Regulator's mandate is to regulate the tariffs charged by the NPA. The Ports Regulator's Regulatory Manual has adopted an amended/adjusted rate-of-return (ROR) Tariff Methodology for the calculation of an annual regulatory approved total Revenue Requirement (and average tariff) for the NPA. The Revenue Requirement is calculated to recover the costs of providing the relevant services over the *life of the assets* used and includes the annual cost of capital (this is in essence the cost to build, operate and maintain, as well as allowance for a profit commensurate with the associated risk, to be re-invested). After determining the annual Revenue Requirement, the Ports Regulator is required to calculate the individual tariffs that are published in its tariff book so as to enable the NPA to recover the Revenue Requirement from the tariffs for the services it offers.

In accordance with the RoR method, the Revenue Requirement for a period includes a return (as determined in the Methodology) earned on the Regulatory Asset Base (RAB). It is thus important for the regulation of tariff levels that both the cost of capital and the RAB are appropriately determined – hence the Regulator's concern with developing this practical methodology for the valuation of the NPA's RAB – and in particular reviewing the starting RAB as at the commencement of regulation by the Ports Regulator.

All accounting (including asset valuation) systems are designed to ensure "capital maintenance" (repayment) of some kind and to measure profitability. This refers to the principle that income can only be recognised as accounting profit after the full recovery of costs, including the cost of capital maintenance ("repayment"). Capital maintenance therefore implies the need to clarify the basis on which the value of the capital base will be measured (i.e. the basis for asset valuation).

Three different capital measurement principles are considered and recommendations are made as to the appropriate implementation of these on the NPA asset register for regulatory purposes.

The capital maintenance approach requires a policy decision as to the regulatory approach to capital maintenance. Three options present themselves: *financial capital maintenance, physical capital maintenance and economic capital maintenance*. The three options are discussed below and the corresponding valuation techniques explained.

Financial capital maintenance: original cost based

In this approach the measurement of asset values, and the calculation of depreciation, is aimed at repaying the financial capital invested in the asset. This can be measured in fixed nominal monetary units (capital is returned on the basis of historic nominal values), or in fixed real terms (capital is returned on the basis of constant values). In this approach, the aim is thus to ensure that investors receive their investment back plus a return on capital.

Physical capital maintenance: replacement cost based

This approach to the measurement of asset values, and the calculation of depreciation, is aimed at repaying the value of replacing the physical assets. The regulatory aim is to ensure that the investor receives the replacement cost value (as adjusted from time to time) back, plus a return on this adjusted capital value. Under rate of return regulation, a method based on physical capital maintenance can thus be expected to generate a revenue stream that differs from that which would result from a method that implements financial capital maintenance. What this can imply for a RAB is that any replacement costs of new or updated technology may be lower than the original (financed) costs. A simple example would be where a new technology in productive infrastructure would result in a replacement cost of the facility being significantly lower than the original cost of the current asset. This would result, in the context of a return calculated on the value of the assets, in the regulated entity not able to repay the current asset. This type of problem will be more prevalent where assets are capital intensive and long term in nature.

Economic maintenance: economic opportunity cost based

In this approach the measurement of asset values, and the calculation of depreciation, is aimed at repaying the economic value of the physical assets. The regulatory aim is to ensure that the investor receives the economic value (as adjusted from time to time) back, plus a return on this adjusted capital value. This does however introduce a significant level of uncertainty in pricing accurately for intangible economic externalities and variables.

Capital Maintenance principles in summary

In short, regulatory approaches that utilise a financial capital maintenance valuation approach will ensure that investors receive their capital back (plus appropriate returns), but this runs the risk that future investment costs will result in tariff levels that depart significantly from the tariffs levels resulting from these RAB values. It is thus prudent to include in a regulatory design a mechanism that will serve to mitigate the risk of substantial replacement cost impacts on the tariff¹. On the other hand, regulatory approaches that utilise physical capital maintenance create the risk that investors will not recover (or will over recover) the original capital costs, but it will result in tariff levels that closer track replacement costs. This may however in most cases result in substantially higher tariff levels and may be unsustainable especially in instances where assets have (very) long remaining useful lives or where significant technological change may occur over time. Finally, approaches that utilise economic capital maintenance (if at all possible to calculate) similarly create the risk that investors will not recover (or will over recover) the original capital costs, but it will result in tariff levels that closer track the economic value of the assets and in general will result in introducing a number of uncertainties into the system. In particular, capital over-recoveries from high returns on both physical as well as economic capital maintenance (especially when applied to long term assets with a low likelihood of being replaced – e.g. an entrance channel) run the risk of being redistributed as dividends in the absence of effective legal, regulated or institutional mechanisms to retain the over recoveries within a regulated infrastructure owning company.

¹ An instrument like the Excessive Tariff Increase Margin Credit as defined in the Tariff Methodology may be seen as such a mitigating instrument.

4. Overview of available/prudent valuation methodologies

Financial Capital Maintenance

Depreciated Original Cost (DOC)/Historical cost (HC)

The DOC method is a cost based asset valuation approach that achieves financial capital maintenance.

In respect of the DOC method, the gross asset values are simply recorded at the original cost of creating or purchasing the assets. It is this gross value that is depreciated to determine the depreciated original cost values.

Some of the key challenges specifically anticipated with implementing this method in the South African ports environment include the following:

- Obtaining or determining reliable original cost information for assets that are very old, especially where construction occurred several decades ago with different technologies and project parameters.
- Accurately determining the remaining useful life of mid-life assets that potentially have very long lives and for which their condition cannot be easily determined by visual inspection and will often require significant engineering assessments.

Trended Original Cost (TOC)

The TOC method is also a cost based asset valuation approach that achieves financial capital maintenance

With the TOC method, the gross assets value is determined by revaluing assets from their original cost by applying a specified index to reflect inflation in asset prices. This gross value is then depreciated to determine the *net* TOC values.

This method:

- has the benefit that it is easy to implement (if original cost information is available), utilises
 objective information, and produces asset values that at least keep track of the price inflation
 reflected in the index.
- does not reflect the effect of changes in technology or, depending on index used, replacement costs, and asset utilisation.
- achieves financial capital maintenance.

Physical Capital Maintenance

Depreciated Optimised Replacement Cost (DORC)

The DORC method is often used by economic regulators who aim to achieve economic efficiency by emulating a contestable market by setting tariffs at a level required to leave a new entrant neutral with respect to the option of entering the market. This is achieved by establishing a current value of assets that represents the cost of replicating the assets in the most efficient way possible under the following assumptions: Its service capability, demand for service, and the age of the existing assets.

In principle the gross value is determined as the optimised modern equivalent asset value (Optimised Replacement Cost (ORC), which is then depreciated to determine the net ORC or DORC value. The DORC method is a replacement cost based asset valuation approach that achieves physical capital maintenance

- It is aimed at establishing a current value of assets that represents the cost of replicating the assets in the most efficient way possible, given: Its service capability, demand for service, and the age of the existing assets.
- The optimised replacement cost excludes any over-capacity in assets, overdesigned assets, redundant assets and abandoned but listed assets.
- It assumes modern equivalent asset values (MEA) for those assets that are included.

DORC therefore aims to value the asset at the cost of providing a modern equivalent configured to address the market requirement or opportunity. The compilation of a DORC asset value thus generally involves a number of steps:

- Calculation of replacement costs using a Modern Equivalent Assessment;
- Optimisation of the replacement cost (ORC);
- Assessment of the depreciation parameters; and
- Determination of the DORC

DORC achieves physical capital maintenance (appropriately optimised for its role) and is widely practiced by Australian regulators. Some of the key challenges specifically anticipated with implementing this method in the South African ports environment include the following:

 Accurately determining capacity of the asset where it forms part of a logistical chain and port operational system, and where throughput constraints might be imposed by adjoining infrastructure, operations, or systems

- Obtaining the demand for service information (volume and functionality demand) forecasts for the use of the asset to ensure an appropriate optimisation process (for over-capacity, over-designed, redundancy, etc.)
- Ensuring that the optimisation process is applied consistently over all the assets.

At this point it must however be noted that port infrastructure in South Africa is state-owned through an Authority and the National Ports Act prevents private sector ownership of ports and port assets. There is thus no real need to "leave a new entrant neutral to entry into the market" such as the objective in using DORC in some network industries in Australia and elsewhere.

It is important to consider that the risk of over optimising an asset that has a longer term impact (i.e. by proposing a reduced capacity based on current throughput), especially prudent as capacity is provided ahead of demand as well as appropriately accounting for the importance of safety requirements in the port environment versus perceptions of redundancy in the system.

By definition the cost based methods that achieve financial capital maintenance do not entail asset revaluations (DOC and TOC) and changes in the regulatory asset base that result from the implementation of a DORC will not necessarily achieve financial capital maintenance. The practical implication of this is that such methods entails the risk that a regulated firm might either under or over recover the financial capital used to finance its assets resulting in port users either paying too much or too little, resulting in an adverse impact on the sustainability of the NPA or excessive dividend outflows.

Economic Capital Maintenance

Calculating asset values on a deprival basis

The use of deprival values (an optimised deprival value (ODV)) depends on a two legged economic assessment. The first approach would be to base the value of the asset on the expected future cash flows (i.e. tariffs). The second would be to consider the maximum of the DORC value. Practical implementation of this approach does presents a number of difficulties and application of the ODV approach in the NPA's circumstances runs into fatal limitations. Both legs of the economic assessment encounter difficulties. Given that tariffs for infrastructure assets are regulated, determining both the NPV of their revenues and the disposal value of assets (which, for infrastructure assets will depend on the former) suffers from circularity. Even in the case where a realistic disposal value can be determined (say for a movable asset, such as a tug), the ODV method still has difficulties. The ODV method relies on the maximum of the two economic values, if the one value – the NPV of future cash flows – is undefined (as is explained below) it is not possible to determine the correct maximum of the two (i.e. in this case it cannot be assumed that the NPV is zero and that the economic value is the disposal value – the NPV is thus undefined).

Furthermore, given that port tariffs are set on the basis of system wide aggregate costs for the entire ports system, and that tariffs charges do not relate directly to specific infrastructure assets, determining the cash flows suffers from a revenue attribution problem. It follows thus that it is not practical to determine objective ODV values for port infrastructure assets and to adopt the economic capital maintenance approach in determining the value of the RAB.

Valuation of the Regulatory Asset Base Draft Methodology for Public Comment

5. Implications of the application of different approaches to the NPA asset register

Implications: Historic Cost Approach+

Using original / historic cost values as a basis for tariff setting would imply a change in the NPA tariff methodology away from the current TOC basis. Using historic cost assets (and a nominal WACC) in the rate of return asset methodology is now generally considered bad regulatory practice because it results in large fluctuations in tariff levels along with the investment cycles of the regulated entity.

Implications: Trended Original Cost

TOC has a number of important benefits in the context of setting NPA tariffs in that:

- It achieves financial capital maintenance for existing and new assets, thereby minimising the risk and cost of financing new investments.
- This principle is also likely to be more acceptable as "customers will not be asked to pay twice for the same infrastructure."
- It produces a more stable price path compared to the DOC-based approach. This will also make it easier to support future investments, compared to the alternative of implementing larger tariff increases when new investments are required.
- Like DOC, TOC also reduces discretion and uncertainty by basing the asset values on the recorded historic cost asset values and inflation rates in the intervening periods.

Implications: DORC

Many of the assets in the NPA asset base are much older than the 1990 take-on date and have been almost fully depreciated. DORC valuations keep track of market based infrastructure costs and these can change substantially over time (especially when dealing with long lived assets). DORC valuations could well result in the very high asset values that will require commensurate tariffs, or conversely in exceedingly low tariffs making the regulated entity financially unsustainable.

The question therefore arises as to whether the DORC approach is appropriate for the NPA context where many of the assets are very old (older than the 27 years implied by the 1990 take-on date), have almost indefinite useful lives, and are likely to have been mostly amortised (depreciated) by now. This question is especially pertinent given the fact that the NPA (Transnet SOC Limited) is a state owned entity (SOE) which is being operated for the benefit of its users and the keeping of the cost of doing business low for port users and South Africa as a whole.

Put in the terms of the different types of capital maintenance achieved by the different asset valuation methods the difficulty with applying DORC to the NPA assets is as follows: It achieves physical capital

maintenance (optimised) BUT does not reflect financial capital maintenance. The very long life of the assets involved, and the fact that assets in general do not have to be replaced in the foreseeable future, means that the difference between asset values (and thus tariffs) that are determined to achieve financial capital maintenance and physical capital maintenance respectively can become very large. Furthermore, replacement cost valuations will change over time as exchange rates and commodity prices vary. While such tariff fluctuations might well be reasonable for a privatised operator which has to operate on the basis of competition, there is arguably no need for this approach with a monopoly SOE that operates for the benefit of its customers.

The analysis found that the DORC method and the theoretical rationale explaining the difficulty with applying DORC in the NPA circumstances thus lead to the conclusion that this approach does not necessarily offer the best basis for re-setting the NPA's RAB - at least given the 1990 capitalisation dates specified for many assets.

6. The Regulatory Approach to Determining the SRAB

The appropriate (minimum) criteria elements, as determined by the Regulator for the purpose of setting an appropriate Starting RAB and asset valuation system must:

- 1. Be based on a principled and sound rationale;
- 2. Produce a reasonable asset value for existing assets;
- 3. Result in an acceptable price-path;
- 4. Ensure financial capital maintenance;
- 5. Encourage efficiency and caution with respect to new investment decisions on the part of the NPA;
- 6. Be reconcilable back to the NPA asset register;
- 7. Minimise regulatory information asymmetry problems.

7. Conclusion

The Regulator concluded that the TOC approach based on the capitalisation dates and values in the NPA asset register best meets these criteria, however, some concerns related to the older assets capitalised before 1990 remain.

- Using historic cost valuation on new (post 1990) assets for tariff setting will result in an inappropriate tariff path;
- ODV asset values are undefined for the NPA context and can therefore not be objectively determined or determined with ease.;
- DORC asset valuations will, by definition, produce replacement cost based asset values that could be higher than most other methods and is likely to lead to a substantial increase in NPA tariffs. Such an increase is not required for the purposes of financial capital maintenance and is not required for the purposes of financial viability and funding new investments.
- DORC will also result in unnecessary tariff fluctuations as asset replacement costs values fluctuate in accordance with economic cycles.

8. Recommendations

- a) TOC values provide a viable approach to setting the starting RAB and shoud be applied to new (post 1990 assets) (See Annexure A).
- b) The approach proposed: A hybrid approach which differentiates between assets in existence in 1990 and those with capitalisation dates after 1990 is thus considered with a HC / DOC approach used for the older assets.
- c) A ROD shall direct the NPA on a the method and phased/scheduled implementation of the methodology and will form an addendum to the current Tariff Methodology (MYM2), published in March 2017.

9. RAB Valuation Methodology Rules (Addendum to be added to Tariff Methodology (MYM2)

Proposed Approach: Assets with capitalisation dates before 1990 are treated at historical costs. Here the assumption is that assets in existence by 1990 have been in existence for a long period of time and, for most of that time, have been depreciated on a trajectory following the historic cost method. We therefore retain these assets on the historic cost method, while treating any assets created after 1990 onwards on the basis of the TOC approach.

RAB Rules for inclusion in the Multi-Year Tariff methodology (MYM2)

The RAB covers all assets employed/owned by the NPA in the provision and supply of port capacity and services. The following are the conditions that must be met in order to include an asset in the RAB. The following rules set out the criteria for inclusion and valuation of assets and treatment of maintenance on the RAB:

Prudency test applicable to new and used assets for inclusion in the RAB

The amount by which the capital base may be increased in any specific year is the amount of the actual project capital expenditure incurred in that specific year provided that:

- The amount does not exceed the amount that would be invested by a prudent landlord port owner acting efficiently in accordance with good industry practice to achieve the lowest sustainable cost of delivering the required services; and
- A least one of the following conditions is satisfied:
 - The anticipated incremental revenue (subjected to the claw back mechanism in outer years if found to not true) generated by the capital expenditure exceeds the investment cost;

The NPA can satisfy the regulator that the new capital expenditure has system wide
 benefits that in the regulator's opinion justify its inclusion in the capital base; or
 The new capital expenditure is necessary to maintain safety and integrity in the system.

In addition, all capital expenditure must be approved by formal PCC and NPCC resolutions.²

- Fixed assets must be long-term in nature and must be operationally used and useable;
- Fixed and other assets that are not in an operationally used and useable (useful) form will not be included in the RAB;

² This is in part to dis-incentivise the over-investment or replacement of fully functional and usable assets early.

- Used and useable means that assets should be in a condition that makes it possible to supply demand for port services in the short to medium-term (within12-36 months).
- Assets will be included in the RAB and subjected to the TOC methodology as set out if the expected life of the asset exceeds 5 years.
- All assets with 5 or less years (i.e. depreciation periods of 5 years or less at the acquisition of said assets will attract straight line depreciation to be included in the tariff calculation). Maintenance on these "short term assets" may have maintenance costs included if used beyond full depreciation.
- The NPA shall with each tariff application provide a list of temporary and long term unused assets (i.e. all assets not used operationally). This list will be published.

Calculation of the RAB

- Working capital will be included in the RAB for the purposes of calculating the return as per the Tariff Methodology.
- The return on capital will be based on the trended original cost (TOC) value of the assets (for assets with capitalisation dates post 1990) and historical cost value for assets predating 1990 to ensure financial capital maintenance.
- A real return will be applied in the case of assets that is valued on a TOC basis and a nominal return will be applied to the HC asset values in the RAB.
- The *net* TOC value is determined by calculating the accumulated and annual depreciation on a *straight line basis* over the elapsed life for those assets that are depreciated (with appropriate adjustments for refurbishments etc.).
- The historic asset base as at 31 March 1990 will be used as an opening asset base (This asset base will be used as a basis to determine the current trended net value of NPA's assets).
- Concession funded assets and prepayments (e.g. concessions that resulted in assets transferring back to the NPA) will be recorded on the regulatory asset base at the NPV of the actual market related rental, i.e. rental will be assumed on par with the WACC return at a minimum.

i.e. NPV =(Rental revenue less costs less tax)/WACC.

RAB Depreciation

- Accumulated depreciation is the cumulative straight line depreciation of regulated property, plant and equipment.
- The depreciation should be calculated on historical cost of an asset (this is independent of the amortization of the revaluation amount) and based on the remaining useful life of each asset; See Annexure A.
- The total accumulated depreciation and accumulated amortisation is deducted from the TOC cost of the RAB to obtain the regulatory asset base on which to calculate the return. See Annexure A.
- Mothballed and/or impaired assets will not earn a return although the maintenance of mothballed assets with a definite plan for future use, will be allowed in the operating expenses.³
- Similarly, the maintenance on assets still in use, but fully depreciated, will be allowed in the operating expenses.
- A complete list of assets in this category must be compiled and updated on an annual basis by the NPA.

Treatment of Maintenance

Maintenance to be treated as *operational expenditure* (i.e. not capitalised and included in the RAB) for purposes of tariff calculation will be defined as: "work undertaken within the port system with the intention of:

- re instating the physical condition of an asset to a specified standard (e.g. dredging to the specified depth)
- preventing further deterioration or failure
- restoring correct operation within specified parameters
- replacing *components* of assets at the end of their useful/economic life with modern engineering equivalents
- making temporary repairs for immediate health, safety and security reasons
- assessing assets for maintenance requirements (e.g. to obtain accurate and objective knowledge of physical and operating condition, including risk and financial impact, for the purpose of maintenance)".

³ See annexure A for complete list of asset differentiation

Maintenance or projects that **may be included** in the RAB as capital expenditure when it results in the following:

- an increase in the asset's useful function or service capacity (e.g. dredging to a greater than specified depth).
- an extension of its useful life.
- an improvement to the quality of the service(s) delivered through utilisation of the asset (e.g. the installation of a mooring system in Ngqura).
- a reduction in future operating costs.
- the upgrade or enhancement becoming an integral part of the asset.

Maintenance dredging must be subjected to the criteria above.

Annexure B summarises the treatment of different assets descriptions in the RAB.

10. Annexure A

The example below illustrating the calculation of depreciations and the TOC value (for new assets and those that postdates 1990 capitalisation dates) of the RAB is based on the following basic assumptions:

- Historical cost of R100 m.
- Inflation 5% per Annum.
- Depreciation on a straight line basis over 30 years life of asset.
- Service life of the asset is 30 years.
- No adjustment in the Remaining Useful Life.

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RAB Calculation			Yr O	Yr1	Yr2
		-	R'm		
Original Cost		1	100.00	100.00	100.00
Capex		2	100.00		-
Depreciated original cost brought forward		3	-	100.00	96.67
Current period depreciation	2/RUL	4	-	3.33	3.33
Depreciated original cost carried forward	3-4	5	100.00	96.67	93.33
		6			
TOC opening balance	13	7		→ 100.00	→ 101.89
Accumulated write-up		8	-	-	5.22
Current period write-up	7*cpi	9	-	5.40	5.50
Write-up bal on which Return earned	8+9	10	-	5.40	10.72
Amortisation	10/RUL	11	-	0.18	0.37
Accumulated write-up carried forward	10-11	12	-	5.22	10.35
TOC closing balance	5+12	13	100.00	101.89	103.69
		14			
Total depreciation and amortisation	4+11	15	-	3.51	3.70
		16			
Regulatory Asset Base	3+10	17	-	105.40	107.39

11. Annexure B

Asset description	Remaining Useful Life	RAB depreciation and Valuation treatment	Maintenance allowed as part of operational expenditure	Return allowed (included in RAB calculation for return purposes)	Notes
Short term assets	5 years or less	Straight line Historical Cost	Yes	Yes	
Existing assets in use not fully depreciated	More than 5 years	тос	Yes	Yes	
Existing asset in use-fully depreciated	Any	If leased – lease revenue will be assumed value If not leased (e.g. breakwater – maintenance on the asset may be capitalised	Yes/optional	Allowed to capitalise maintenance. Value on RAB for return calculation will be 0.	Risk of gold plating requires prudency assessment and NPCC approval for capex inclusion in RAB
Assets no longer in use	Any	Removed from RAB	Yes	No	
Assets acquired for strategic purposes (E.g. land)	Any	Included in RAB	Allowed on a case by case basis	Return will be deemed equal to lease revenue. Value on RAB will be 0 until in use.	

Notes:

Capitalisation dates will be 1990 if no capitalisation date post 1990 is available