



ANP's Determination of an RCM value for NTS Gas Pipeline Assets

July 2026

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Glossary

Term / Acronym	Definition
ANP	Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (National Agency for Petroleum, Natural Gas and Biofuels of Brazil)
AER	Australian Energy Regulator
DAC	Depreciated Actual Cost
DORC	Depreciated Optimised Replacement Cost
DRV	Depreciated Replacement Value
GRMG	Gas Market Reform Group, an Australia Government gas policy advisory body established in 2015 until 2023
NGL	National Gas Law
NGR	National Gas Rules
NTS	Nova Transportadora do Sudeste S.A.
RAB	Regulatory Asset Base
RCM	Recovered Capital Method
Technical Note	Nota Técnica 14 – Assunto: Aplicação do Método de Capital Recuperado (Recovered Capital Methodology - RCM) para valoração dos ativos referentes ao Contrato Legado Malhas Sudeste da empresa Nova Transportadora do Sudeste S.A. (NTS) (Subject: Application of the Recovered Capital Methodology (RCM) for the valuation of assets related to the Southeast Network Legacy Contracts of Nova Transportadora do Sudeste S.A.

1. Introduction

Nota Técnica 14 (**Technical Note**) prepared by Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP¹), (National Agency for Petroleum, Natural Gas and Biofuels) proposes application of the Recovered Capital Method (**RCM**) to determine an initial Regulatory Asset Base (**RAB**) value to the **Malha Sudeste** legacy contract for Nova Transportadora do Sudeste S.A (NTS). The RAB value will be used as part of the determination of NTS' regulated gas transportation service tariffs from 2026.

Synergies has relied on an English translation of the **Technical Note** to develop our understanding of how ANP has applied the RCM. We have also reviewed ANP's financial model (named 'RCM_Malha_Sudeste.xlsx') which shows RCM's inputs and calculations that underpin the zero RAB value that it proposes should be used in applying price regulation to NTS' gas transportation services.

Our report should be read in conjunction with the Expert Statement of Flavio Menezes², also prepared for NTS, which provides his opinion on the issues raised by use of the RCM asset valuation methodology in an economic regulatory context, including the Australian precedent for its use.

This report is set out as follows:

- Section 2 discusses the application of the RCM in Australia.
- Section 3 discusses ANP's estimation of the initial construction cost of NTS's gas pipeline assets.
- Section 4 discusses ANP's inputs used in estimating the return of capital component of the RCM formula, which directly affects the asset base value over time and ultimately establishes the initial asset base value in 2026 for the purpose of applying price regulation to NTS' pipelines.
- Section 5 provides our concluding comments.

¹ Assunto: Aplicação do Método de Capital Recuperado (Recovered Capital Methodology - RCM) para valoração dos ativos referentes ao Contrato Legado Malhas Sudeste da empresa Nova Transportadora do Sudeste S.A. (NTS) (Subject: Application of the Recovered Capital Methodology (RCM) for the valuation of assets related to the Southeast Network Legacy Contract (Contrato Legado Malhas Sudeste) of Nova Transportadora do Sudeste S.A. (NTS))

² Expert Statement on ANP's use of RCM to determine NTS's RAB, Flavio Menezes, July 2026

2. ANP's description of RCM application in Australia

This section provides a short summary of the use of the RCM asset valuation methodology in Australia.

Given its backward-looking nature, application of the RCM requires many historical cost and revenue input assumptions to be made. The resulting rolled forward asset base value from initial construction date is highly sensitive to these inputs and assumptions.

2.1 A brief explanation of the RCM calculation

The RCM asset valuation methodology is set out in Rule 113Z(5)(b) of the National Gas Rules (NGR) created under the National Gas Law (NGL) applicable in all Australian States and Territories as follows:

the cost of construction of the pipeline and pipeline assets incurred before commissioning of the pipeline (including the cost of acquiring easements and other interests in land necessary for the establishment and operation of the pipeline);

plus:

(ii) the amount of capital expenditure since the commissioning of the pipeline;

less:

(iii) the return of capital recovered since the commissioning of the pipeline; and

(iv) the value of pipeline assets disposed of since the commissioning of the pipeline.

Presented as a mathematical formula, the RCM³ is expressed as follows:

³ NGR rule 113Z(5)(b) and AER Pipeline information disclosure guidelines and Price reporting guidelines for Part 18A facilities - October 2023

Value of Capital Base_t

$$= \text{Construction Cost}_0 + \sum_{i=1}^t \text{Capex}_i - \sum_{i=1}^t \text{Return of Capital}_i - \sum_{i=1}^t \text{Asset Disposals}_i$$

where

$$\sum_{i=1}^t \text{Return of Capital}_i = \sum_{i=1}^t \text{Revenue}_i - \left[\sum_{i=1}^t \text{Opex}_i + \sum_{i=1}^t \text{Return on Capital}_i + \sum_{i=1}^t \text{Net Tax Liabilities}_i \right]$$

The remainder of this report will address ANP's application of the above formula including how it has derived its inputs and the implications that this has for the resulting RCM-based asset base value.

- ANP's approach to setting the initial construction cost of the pipeline assets is discussed in Section 3 of our report, including ANP's estimation of a hypothetical asset base value in 2006, many years after several of the pipelines in the Southeast Network were commissioned.
 - Capex additions made to the estimated hypothetical asset base value after 2006 are discussed in Section 3.2.
- ANP's approach to estimating the return of capital component of the RCM formula are discussed in Section 4, with our concerns identified in relation to:
 - revenue where there has been no information provided to ensure the reliability of the data for a stand-alone gas transportation entity and omitted revenue in the 2006 to 2010 period (refer to Section 4.1)
 - omissions in ANP's opex estimate, including the use data from the period when Petrobras was a vertically integrated entity and no market transactions were made (refer to Section 4.2)
 - ANP's approach to estimating an annual post-tax nominal WACC is inconsistent with the economic and contractual foundations of the legacy agreements. Rather than reflecting the financing conditions, risk profile, and market expectations prevailing at the time of contract execution, the methodology reconstructs the rate of return using ex post parameters, introducing a material degree of regulatory discretion into the analysis. This approach is not only inconsistent with the methodology historically adopted in legacy contracts but also undermines the preservation of the economic and financial balance of those contracts, as protected under the applicable gas sector legislation. (refer to Section 4.3.2)

- the reliability of net tax liabilities used from the pre-2005 period when Petrobras was vertically integrated, including ignoring potential tax losses arising from gas pipeline investments in this period (refer to Section 4.4).

2.2 Narrow application of RCM in practice

2.2.1 ANP's misrepresentation of Australian regulatory practice

ANP's discussion about use of the RCM in Australia and its relationship to the setting of initial RAB values appears to be based on the following three views that are factually incorrect:

1. that the Australian Energy Regulator (AER) developed the RCM
2. that initial RAB values for price-regulated gas pipelines have been set by the AER based on the RCM
3. the RCM was developed by the AER to deal with a transition from no price regulation of specific pipelines to price regulation of these pipelines

The following quotes make clear the misleading nature of the Technical Note:

"O método foi originalmente desenvolvido no contexto da regulação australiana de gasodutos pelo *Australian Energy Regulator* (AER)."⁴

The AER did not develop the RCM – the concept was developed by the Gas Market Reform Group (**GMRG**), which was appointed by the Australian Council of Governments. The central assumption underpinning the RCM, made explicit in the GMRG's work, was that the RCM could better reflect the outcomes of a workably competitive market and only in those instances should be used as a basis for resolving arbitration disputes.⁵

ANP mischaracterises the genesis of the RCM as follows:

"Nesse contexto, o AER institucionalizou o *Recovered Capital Method* como instrumento regulatório destinado a avaliar quanto do investimento originalmente realizado em determinado gasoduto já havia sido recuperado economicamente por meio das receitas históricas auferidas pelo operador da infraestrutura."⁶

and

"A principal referência internacional para aplicação regulatória do Método do Capital Recuperado encontra-se na experiência australiana de regulação de gasodutos de transporte de gás natural, conduzida pelo *Australian Energy Regulator*

⁴ Technical Note, section 1

⁵ Gas Pipeline Information Disclosure and Arbitration Framework, Implementation Options Paper, March 2017, GRMG section 5..1.2.1, page 131

⁶ Technical Note, section 2.4

(AER) no âmbito das *National Gas Rules* (NGR).⁷

and

“Por essa razão, o regulador australiano passou a adotar abordagem baseada na reconstrução econômica dos fluxos históricos de caixa do ativo, em substituição à simples utilização de metodologias contábeis convencionais.”⁸

The AER does not apply the RCM in administering price regulation of scheme gas transmission pipelines. It is only applied to non-Scheme pipelines that are not subject to price regulation. This issue is discussed further in section 2.2.2 below.

The Technical Note further implies that the RCM is used in transitional environments:

“A experiência australiana tornou-se particularmente relevante na literatura regulatória internacional porque demonstra a viabilidade prática de utilização do RCM em ambientes de transição institucional envolvendo ativos legados de infraestrutura energética. .”⁹

Since its implementation in Australia in 2017, the RCM has been considered only in the context of two access disputes involving individual non-scheme pipelines (not interconnected pipeline systems) and indeed only applied on one occasion. On that occasion, the arbitrator found that the application of RCM was consistent with the outcome that would be expected in a workably competitive market. This is not a transition environment. Rather it forms part of a regulatory framework that clearly distinguishes between scheme gas transmission pipelines subject to price regulation with no role for the RCM and non-scheme pipelines subject to an negotiate-arbitrate form of regulation where the RCM is potentially applicable in the context of an access dispute and subject to satisfying a workable competition test; that is the application of RCM has to be consistent with the outcomes of a workably competitive market.

Moreover, the AER has identified its concerns about using the RCM as an asset valuation methodology because of the large number of input assumptions that are required in applying it, primarily the WACC.¹⁰ The AER’s specific concerns about the RCM is as follows:¹¹

As the recovered capital method is highly sensitive to the inputs chosen, incorrectly chosen inputs (and the assumptions underpinning them) can also produce recovered capital values that are inconsistent with the asset valuation objective. This is essentially likely to be the case for inputs concerning the return

⁷ Technical Note, section 2.4

⁸ Technical Note, section 2.4

⁹ Technical Note, section 2.4

¹⁰ Explanatory note - Pipeline information disclosure guidelines and Price reporting guidelines - October 2023, AER, section 1.6

¹¹ AER (2019), Pipeline information disclosure guidelines and Price reporting guidelines for Part 18A facilities, Explanatory Note, October, pp19-20

of capital component of the recovered capital methodology.

Clause 13Z(5)(a) of the National Gas Rules prescribe the asset valuation objective in the context of an access dispute, such that the arbitrator must choose an asset valuation methodology that facilitates the provision of access to pipeline services on price and non-price terms and conditions that are consistent with the outcomes of a workably competitive market.

2.2.2 Determining initial RAB values under Australia's national gas regulatory framework

Under the National Gas Rules, the RCM is potentially applicable in relation to non-scheme pipelines. Australia dealt with the transition from a non-regulated to a regulated gas pipeline regulatory framework in 1997 with the enactment of the National Third Party Access Code for Natural Gas Pipelines (**Gas Code**).

In setting the initial Capital Bases of pipelines, the jurisdictional economic regulators at the time were required to consider a range of matters but could only set the initial RAB value between Depreciated Actual Cost and Depreciated Optimised Replacement Cost. The latter valuation methodology was most often used.

ANP notes the following in terms of the Brazilian and Australian contexts relating to the establishment of initial regulatory asset base values:

“Embora o contexto institucional brasileiro possua diferenças relevantes em relação ao modelo australiano, ambas as experiências compartilham elemento central comum: a necessidade de definir bases regulatórias iniciais para ativos que operaram durante longos períodos fora de regime tarifário regulado ex-ante.”¹²

and the following:

“No caso brasileiro, o encerramento dos contratos legados de transporte de gás natural e a transição para ambiente regulado de acesso aberto tornam especialmente pertinente a utilização de metodologia capaz de incorporar explicitamente a trajetória histórica de recuperação econômica dos ativos. Nesse sentido, a experiência australiana fornece importante referencial conceitual e metodológico para a aplicação do RCM à valoração da Malha Sudeste da NTS.”¹³

These statements misrepresent the Australian context, the history of setting initial RAB values and the use of the RCM.

In practice, initial RAB values (Capital Bases) are set in accordance with Chapter 9 of the National Gas Rules determined under Rule 77 as follows:

¹² Note Técnica 14, Section 2.4

¹³ Nota Técnica 14, section 2.4

1. If a pipeline was constructed before 1997 using the criteria set out in Section 8.10, and 8.11. Section 8.10 specifies 11 factors to be considered in setting an initial RAB value. Section 8.11 requires that the initial RAB value be set between DAC and DORC.
2. If the pipeline was constructed after July 2008, the initial RAB value is to be set as initial construction cost, plus capex minus depreciation and assets disposed. That is, it is a DAC valuation.
3. If an access arrangement follows immediately after the conclusion of a preceding access arrangement, the asset base of the pipeline is to be determined in accordance with Section 8.12 and 8.13, which together set the initial RAB value as the actual construction cost, less depreciation, plus capital expenditure and less any assets no longer used. In effect, this is a DAC valuation.

2.2.3 How RCM is used in Australia

The RCM valuation approach was developed in response to a review of the Australia wholesale gas market with one of its findings being that unregulated gas pipelines were using their market power¹⁴.

The ultimate response was not to change the test for when pipelines should be regulated, but to subject unregulated pipelines to a commercial negotiate-arbitrate regime which was underpinned by a prescriptive information disclosure framework.¹⁵

In providing guidance to an arbitrator, Rule 113Z(2)(a)) sets an overarching objective that the arbitrator should deliver prices that reflect the outcomes of a workably competitive market. Arbitrators are given wide discretion about asset valuations methods/techniques they can apply in resolving a dispute, with the only constraint being that in considering alternative asset valuation methods the RCM must be applied and only if its application will reflect the outcome of a workably competitive market.

The requirement that the application of RCM be consistent with the outcomes of a workably competitive market is particularly significant because market participants in workably competitive markets are forward looking in their focus and decision making. In contrast, RCM is an inherently backward-looking methodology. This means that there is no certainty that RCM would be applied by an arbitrator in the event of an arbitration. Indeed, this reflects the limited precedent where it has been applied only once in the two arbitrations that have occurred under the National Gas Rules.

2.2.4 Conclusions

In summary, in respect of application of the RCM in Australia, it:

¹⁴ Inquiry into the East Coast Gas Market April 2016, ACCC

¹⁵ Gas pipeline information disclosure and arbitration framework final design recommendation, June 2017

- can only be applied to non-scheme pipelines not subject to price regulation; that it is not applied to price regulated pipelines, in particular in setting of an initial RAB value;
- can only be applied by a commercial arbitrator, not by the AER;
- is not the only asset valuation methodology that can be considered by an arbitrator and must be rejected where its use would not reflect the outcomes of a workably competitive market, which is generally a forward-looking test rather than a backward-looking test which is the orientation of the RCM approach.

3. ANP's calculation of NTS' RAB value

This section assesses how ANP has estimated the initial construction cost of NTS gas pipeline assets, which under the RCM formula, sets the initial RAB value that is subsequently rolled forward to reflect capex additions and asset disposals.

The return of capital component in the RCM formula that is also used to adjust the rolled forward RAB value is discussed in Section 4 of this report.

ANP has assumed an initial valuation date for NTS' gas pipeline RAB of 31 December 2005 and rolls forward this initial RAB value to 31 December 2025.

3.1 Initial construction cost

3.1.1 ANP's approach

ANP addressed this issue in Technical Note: Sections 4 & 5, Table 34. ANP developed a hypothetical estimate of the initial RAB value at 31 December 2005 (ie it was not reflective of the initial construction cost of these assets, some of which were commissioned in the late 1980s).

3.1.2 RCM conceptual issues

The fundamental principle of the RCM framework, at least as it has been applied in Australia, is that it is to be based on actual costs and revenues, including initial construction cost, historical capex and opex, representative historical WACC and actual revenue earned.

This principle was at the heart of the design of the RCM in Australia over the course of 2016 and 2017. Specifically, the Australian GMRG identified the use of the "actual cost standard" as a key principle in developing and applying the RCM.¹⁶ It determined that a "new entrant standard" was not to be applied.

In contrast, ANP notes in developing a hypothetical initial construction cost for NTS gas pipeline assets that the actual costs were likely to have been 'inefficient' due to the previous owner's, Petrobras', vertical integration. There was no substantiation of this assertion.

In our view, quite apart from the departure from the Australian precedent, which represents a fundamental principle of the RCM approach, the assumption that costs (capex and opex) for a vertically integrated business will be inefficient is debateable for at least three reasons:

1. Just because a business is vertically integrated does not logically lead to an expectation of inefficiency. A profit maximising entity will seek to minimise costs and efficient construction would have maximised Petrobras' profit. Managers and directors have

¹⁶ Gas Pipeline Information disclosure and arbitration Framework, GRMG March 2017, GRMG

fiduciary responsibilities to minimise costs.

2. ANP provides no supporting evidence of inefficiency. It simply assumes it occurred without basis.
3. Even if there was historical inefficiency, from an economic perspective, there is no reason to penalise the current owner of the asset with the long past decisions of the previous owner. This is because the current owner of the NTS pipeline assets had no control over those previous decisions and acquired the assets in 2017 based on the asset's condition at that time, its cost structure and future price expectations given forecast demand for gas pipeline services. In other words, the current owner applied a forward-looking approach to the value of the assets upon their acquisition.

However, the more important point is that the RCM is not intended to be a prudence and efficiency assessment mechanism. Rather, it is intended to assess revenue recovery since initial construction of an asset having regard to actual costs incurred in delivering its services, not a reconstruction of what might have been if assumed inefficient costs needed to be replaced with hypothetical efficient costs.

In our view, the combination of ANP estimating a hypothetical initial construction cost for the NTS pipeline assets at a date around 10 to 20 years after their actual commissioning dates starting in the late 1980s, completely undermines its application of the RCM having regard to the original design intent of this asset valuation methodology based on the "actual cost standard".

3.1.3 ANP's estimation of Depreciated Replacement Value

ANP estimated the Depreciated Replacement Value of NTS's pipelines in Technical Note: Section 5.

Initial investments in the Southeast Network commenced in the second half of the 1980s and the pipeline system was extended and expanded in the years that followed. However, rather than applying the actual construction costs of each segment of the NTS, ANP has developed its own proxy for the initial pipeline construction cost by calculating a Depreciated Replacement Cost Value (DRV) at 1 January 2006.

The proxy is a DRV based on a hypothetical cost estimate derived by ANP using 2005 US/EIA unit rate data of a pipeline equivalent to the assets in place in 2005 assuming the same pipeline length and diameter as then. The DRC is then depreciated using an age-based depreciation formula applied to assets constructed before 2006 rather than using actual reported depreciation.

Moreover, in deriving its hypothetical proxy for the initial pipeline construction cost, ANP has used US construction costs in 2005 rather than Brazilian constructions costs for pipelines at the time they were built between the 1986 and 2005.

This is problematic from several points of view:

1. The costs used are for pipelines built in the US under US economic conditions (labour force, geography, regulation, material supplies, exchange rates, etc.), conditions that are very likely to be different to those that applied in Brazil at the time and more than likely lower than those applicable in Brazil.
2. The time at which the hypothetical costs are estimated is for pipelines built in 2005 not over the years following the commissioning dates of the pipeline assets in the 1980s. That is, they do not reflect the different cost structures for materials, pipeline construction technology, and equipment availability, etc. applicable at the time of construction.
3. There is the issue of whether a Purchasing Power Parity (PPP) exchange rate should be used when converting nominal asset costs in \$US to \$R. This is typically done when benchmarking costs are in another currency.

These factors mean that the use of 2005 US construction costs will likely be unrepresentative of the actual construction costs incurred by Petrobras (the then owner of the pipelines) in the years leading up to 2005. Hence, using these US costs in the RCM calculations is likely to significantly understate the construction costs of the gas pipelines in the period up to 2005. This will directly affect the return of capital calculations in the 2006-2026 period.

The estimation difficulties and risk of error that are evident in ANP's re-calculation of the pipeline costs that were actually incurred in this earlier period demonstrates a major weakness of the RCM valuation methodology, which is its backward-looking nature.

Moreover, the approach risks introducing bias in the application of the RCM approach. This is because pipelines are normally the least profitable in the early years of operation, when the asset value is relatively high and as demand increases from a low base over time. To the extent that this is the case, the RCM approach will capitalise these losses, with the deficit increasing in line with the applicable WACC until it is reduced over time with increasing pipeline profitability.

This means that the ANP's approach risks systematically understating the asset value of NTS' pipelines because:

1. A forward-looking approach to asset valuation is inconsistent with the RCM approach.
2. Depreciating the asset base when it is not supported by underlying profitability is internally inconsistent with the RCM approach and risks systematically understating the opening asset value for the period in which RCM is applied.
3. To the extent that the pipelines incurred economic losses early in their life, which is likely because at that time the asset value is highest and the demand typically is building, the RCM approach should capitalize these losses into the asset base, with the deficit increasing in line with the applicable WACC until it is reduced over time with increasing pipeline profitability. This issue is not recognized in ANP's application of the RCM.

3.1.4 Practical/implementation issues

The comments in this section relate to ANP's spreadsheet RCM_Malha_Sudeste.xlsx, which it uses to calculate the asset base value for NTS' pipeline assets.

ANP's DRV estimation approach

ANP's estimate of the starting RAB value includes seven pipeline assets in operation prior to 2006 including GASVOL (1986), GASPAL (1988), and GASAN (1993), which had already accumulated 13 to 20 years of operation by the base asset value date of 31/12/2005. This represents a substantial portion of time which occurred before the regulated transportation regime came into effect. ANP estimates the values for these older assets using the DRV method described in Sections 4 and 5 of the Technical Note. Our concerns about ANP's DRV estimates, including the likelihood that the DRV underestimates the value of these assets, were discussed in section 3.1.2 above.

Asset write-offs (Table 34)

GASDUC II was replaced by GASDUC III in 2010 and the depreciated value of GASDUC II at that time appears to have been simply written off and so not fully recovered. This is inconsistent with applying the RCM as there is no case to write off any asset value other than through application of the RCM formula (ie actual recovery of revenue) not in determining the initial construction cost.

A substantial sum was added in relation to GASCAR, which makes sense as an addition (and described as an acquisition by NTS) but the write-off of undepreciated assets in 2010 was some 6% of the closing RAB in that year. This appears to be a material error and possibly related to preference by ANP for an "efficient" cost base.

Excluded assets

ANP's RCM model and Table 5 of the Technical Note indicate that prior to 2005, only individual pipeline assets were included in the hypothetical DRV, not supporting pipeline infrastructure, which we consider to be an important omission.

We note that the definition of initial construction cost under the RCM in the National Gas Rules, includes the cost of construction of the pipeline and pipeline assets incurred before commissioning of the pipeline, including the cost of acquiring easements and other interests in land necessary for the establishment and operation of the pipeline. Table 22 of the Technical Note regarding tax depreciation of assets between 2006 and 2016 recognises the type of supporting assets that are likely to have been in use between the late 1980s and 2005.

Further, ANP has also excluded some assets it considers do not relate to the stand-alone gas pipeline and it is not clear that all relevant infrastructure has been included as some filters were applied. For example, it is not clear if any assets with negative or zero value based on the Ross-Heidecke depreciation method were removed from the estimated initial asset base

value at 31 December 2005.

The overall impact of the excluded assets in the pre-2005 period is to reduce the size of the initial asset base value for NTS pipeline assets and in so doing more quickly reduce that initial asset value through the return of capital component of the RCM formula than would otherwise have been the case.

This provides further evidence of the unreliability of the initial asset base value that ANP has estimated.

Application of RCM to pipeline system

Applying the RCM to an interconnected pipeline system (the Southeast Network) as ANP has done in its valuation of pipeline assets in the pre-2005 period potentially creates problems regarding revenue attribution to individual pipelines within the system, including the treatment of revenue losses in the early years of a pipeline's life.

This important issue is discussed further in section 4.1.2 of this report and in Flavio Menezes' Expert Statement.¹⁷

3.2 Asset life and depreciation approach

ANP's treatment of asset life and depreciation approach was addressed in Technical Note: Section 5.1.

Having estimated a DRV value at 31 December 2005, ANP estimates a hypothetical depreciation profile for the gas pipeline assets in the period from their initial construction dates, some starting in the late 1980s, to that later valuation date.

The depreciation formula applies the Ross-Heidecke methodology to determine the physical deterioration of the pipeline assets. A simplified form of the method is used incorporating a quadratic relationship which reflects an estimate of the effective age relative to ANP's assumed useful pipeline life of 30 years.

The essence of the RCM approach is that the depreciation (return of capital) component is assessed by reference to the revenue generated by the affected asset over its whole life up to the point at which the RCM is estimated, including the early years of pipeline operation when it is likely to be least profitable. Hence, it is inherently incompatible with RCM to apply depreciation based on anything other than this approach. However, this is what ANP has chosen to do by starting the RCM calculation in 2006 not the initial construction dates of the individual pipelines comprising the Southeast Network.

¹⁷ Flavio Menezes (July 2026), Expert Statement on ANP's use of Recovered Capital Method to determine NTS's RAB value, paragraphs 5.3.7 and 5.3.8.

3.3 Capex additions to RAB

ANP's assessment of Capex additions to RAB was considered in Technical Note: Sections 11.2 & 11.3.

Given ANP applies the 2005 DRV as its proxy for the initial construction cost, no capex additions are recognised before 2006. As noted in section 3.1.4 of this report, ANP has only recognised the value of pipeline assets in this earlier period and no other supporting assets necessary to facilitate pipeline operations, which we consider to be an important omission in establishing the asset base value at December 2005.

All capex additions from 2006 to 2026 appear to be recognised in the roll-forward of the asset base used in the return of capital component of the RCM calculation.

However, ANP separates the capex additions into two classes: first, reported acquisitions by NTS between 2006 and 2017; and second, capex additions between 2017 and 2025.

3.3.1 Capex acquisitions – 2006-2017

ANP's approach to Capex acquisitions – 2006-2017 was contained in Technical Note: Section 11.2.

In terms of acquisitions, ANP identifies the 16" Spur, the 20" Spur and GASCAR asset values as being taken directly from the "BRA CHCI (Asset by Asset)" worksheet of the model spreadsheet, which consolidates the asset-by-asset accounting detail reported by NTS for the fixed assets associated with the Southeast Network.

These are therefore acquisition values or capitalised amounts recorded in the transporter's accounting base, rather than values ANP reconstructed from US cost benchmarks. Table 34 of the Technical Note shows the RAB value at 2006 for the assets in the second group are only 4% of the total RAB. In other words, the assets valued at actual cost rather than the ANP-estimated DRV between up to 2017 make up only a small component of the estimated hypothetical construction cost of the pipeline assets.

However, we understand that ANP has previously stated in Technical Note 07/2026 that the accounting data related to these assets had been poorly managed and therefore were inappropriate to use in valuing a RAB using the DAC method. Considering this observation, it is reasonable to conclude that if this data is too unreliable for a DAC valuation it should also not be used in an RCM valuation.

The use of historical cost, which is based on capitalisation dates rather than dates at which disbursements incurred during the construction phase, creates an inconsistency, given they were not remunerated throughout the construction phase, but should have been. That is, capitalised interest should have been applied as a minimum in the valuation of additions in this period.

3.3.2 Capex additions – 2017-2025

ANP's assessment of capex additions between 2017-2025 was addressed in Technical Note: Section 11.3, Table 36.

ANP notes that the fixed-asset additions reported from 2017 onward should be interpreted predominantly as capitalisable maintenance expenditures (sustaining capex), incurred after NTS assumed operational control of the Southeast Network. ANP further notes that this capex is required to preserve the integrity, reliability, safety, and operational capability of the existing system rather than to expand it.

We agree with ANP's characterisation of the nature of these capex additions but note that the way that it has applied the RCM results in all capex additions that have been made by NTS after 2016 and that extend the life of the pipeline have been written down to a zero value by the end of 2025. ANP notes that between 2017 and 2025, NTS added around R\$738 million in new fixed-asset investments, all now valued at zero.

The practical effect of ANP's application of the RCM is that NTS' investments in sustaining capex that will extend the life of the pipeline to meet expected user demand for pipeline services beyond 2026 will not receive any return on capital or depreciation. This includes around R\$635 million invested between 2023 and 2025.

4. ANP's calculation of return of capital component of RCM formula

As shown in section 2.1 of this report, the return of capital component of the RCM formula requires historical estimates of the following variables:

- Revenue
- Opex
- Return on capital
- Tax.

The return of capital reflects the net effect of revenue minus the sum of the opex, return on capital and tax variables. Depending on whether it has a positive or negative value, the return of capital variable is used to reduce or increase the rolled forward RAB value each year from the initial construction date to the current valuation date.

ANP's treatment of each of the return of capital variables is discussed in the sections below.

4.1 Revenue

4.1.1 ANP's approach

ANP's approach to revenue attribution for the purposes of the RCM was addressed in Technical Note: Section 6.

For the years 2006 and 2007, ANP states that it uses revenues earned from the tariffs in force under the First Transportation Contract.

From 2008, ANP states that it has used revenue earned under the "Second Transportation Contract for the Southeast Network, as Amended and Restated (**Contract**), entered with Petróleo Brasileiro S.A. — Petrobras on 1 August 2007. This revenue is calculated annually based on the Contracted Transportation Capacity, the applicable Transportation Tariff, and the taxes levied on gross revenue.

4.1.2 Synergies' assessment

The revenue data that ANP has used in applying the RCM formula has not been independently audited. There has also been no information provided to ensure the reliability of the revenue data for a stand-alone gas transportation business given the revenue was accrued over a period when Petrobras was a vertically integrated entity and NTS its related party.

As discussed in section 2.2.1, applying the RCM to a pipeline system and in so doing aggregating revenues of the systems in calculating the return of capital component will likely

distort the RCM calculations by not capturing differing rates of return earned across the individual pipelines, including in the period before the pipelines become an integrated system. This issue is discussed further in Section 5 of Flavio Menezes' Expert Statement.¹⁸

Further, we understand that ANP's assumption regarding revenues earned under the transportation contracts disregards reference of capacity & tariffs from 2006-2010 ANP had published on its website to fulfill with Decree 7.382 provisions. Should it had been considered, total revenue earned would have been reduced by around R\$350 million. ANP's higher estimated revenue contributes to a quicker write-down of the asset base value under the return of capital component of the RCM formula than would otherwise be the case.

4.2 Opex

4.2.1 ANP's approach

ANP's approach to opex was contained in Technical Note: Section 9 and Table 28.

ANP's explanation of its opex sources and adjustments that it has applied are detailed but complicated to understand and to establish their reliability.

Furthermore, different approaches were used to estimate opex for the 2006 to 2016 period when Petrobras was a vertically integrated entity and for the 2017 to 2025 period when NTS was solely responsible for operating and maintaining the pipeline assets.

ANP explains that the consolidated opex series it has constructed covers the entire 2006–2025 period (Table 28) and was based on three methodological blocks:

1. a parametric cost per kilometre estimate for 2006 and 2007, based on ANP's adjusted 2008 opex estimate;
2. Petrobras' historical data for 2008–2016, adjusted by a 1.3811 multiplier for scope alignment; and
3. NTS-declared data for 2017–2025, allocated to the SE Network Contract using a cost allocator of 62% of the total network length (advised by NTS having regard to its total gas system assets).

4.2.2 Synergies' assessment

Parametric estimate – 2006-2007

ANP notes that it derives a parametric cost per kilometre estimate to estimate opex because Petrobras does not have consolidated data for this period.

¹⁸ Flavio Menezes (July 2026), Expert Statement on ANP's use of Recovered Capital Method to determine NTS's RAB value, paragraphs 5.3.7 and 5.3.8.

In our view, a simple cost per kilometre estimate is a proxy for total pipeline opex and is likely to under-estimate costs given it will not capture any opex not driven by the kilometre metric, including indirect costs likely to be associated with operating the pipeline assets.

Petrobras' opex – 2008-2016

In relation to Petrobras, accounting allocations of cost are not necessarily appropriate to be applied in an RCM assessment. It reflects the inherent difficulty of applying RCM to individual assets or a class of assets for a vertically integrated entity. Cost allocation approaches are inherently problematic, especially when applied ex-post to a vertically integrated entity over a lengthy historical period.

It is also important to note that ANP is relying on this internal allocated cost data from Petrobras, which is the largest user currently connected to the NTS Southeast Network and so has a strong commercial interest in ANP understating opex over the 2006 to 2026 period.

Further, for the period from 2006 to 2016, NTS acted as a financial lessor, recognizing in its books only the lease receivables and the financing charges on the construction debt, without recording service revenue or O&M costs.

It is apparent from the Technical Note that an entity named Transpetro was engaged as operator of the Southeast Network on behalf of Petrobras and its related entities such that the operating and maintenance costs were borne entirely by Transpetro under a Consortium Operation Agreement. ANP notes that Petrobras expressly notes that it cannot identify the amounts paid to Transpetro correspond to the full amount of the operating and maintenance costs from 2018 to 2016. ANP notes the implications of this information gap as follows:

“(…) o que confere aos valores do período 2008-2016 um caráter de valor de referência, e não necessariamente de mensuração exaustiva dos custos operacionais reais da malha.”¹⁹

As we understand it from the Technical Note, there was a change in scope of functions in 2016 arising from NTS taking control of the Southeast Network and the former vertically integrated corporate structure ceasing to exist. To recognise this scope change, ANP adjusts upwards the base opex relating to the Petrobras values for 2008 to 2016 by a multiplier of 1.38.

However, NTS has advised that ANP disregarded the several Outsourced Compression services costs, which were disclosed by Petrobras and that were required to operate the Malhas in the early years of the contract.

Further, ANP did not factor in any portion of TAG OPEX from 2006-2016, when TAG was the leader of the Consortium and when most of NTS assets, including these related to Malhas Sudeste, were legally attached to TAG.

¹⁹ Technical Note, section 9.1.3

The combination of the above factors suggests that the opex data that ANP has used in the 2006 to 2016 period is likely to be unreliable because it captures the Petrobras vertical integration period with associated significant information gaps and problematic incentive incompatibilities. Consequently, the opex incurred in relation to the Southeast Network in this period is likely to be understated.

NTS' opex – 2017-2025

ANP notes that the first NTS financial statement to record operating and maintenance costs in a profit or loss statement was that for the financial year ended 31 December 2016. Further, ANP notes that there was a change in the composition of the data from 2022, although the nature and impact of this change are not explained.

We consider the 2017-2021 period is likely to provide a more reliable operating cost data set than the 2006-16 period because operating and maintenance tasks were being performed by Transpetro and so the costs are more representative of the earlier period's costs.

However, over the 20-year period of ANP's RCM calculations, the most likely result is lower operating costs than were actually incurred, especially in the 2006 to 2016 period when Petrobras was a vertically integrated entity. This in turn will increase the return of capital component by more than would otherwise be the case (by causing a larger gap between revenue and costs incurred) and so more quickly reduce the rolled forward asset base value under the RCM formula.

4.3 Return on capital

4.3.1 ANP's WACC estimate

ANP's assessment of the return on capital was set out in Section 7, in which it estimated a WACC for the return on capital component of its RCM calculations.

It has applied three different WACC approaches applied over three defined periods:

1. 2006-2013: WACC estimates updated annually, real WACC was determined by applying the inflation adjustment to the overall WACC.
2. 2014-2018: WACC set for a 5-year period, inflation was applied to cost of equity and debt rather than the overall WACC to compute the real WACC.
3. 2019-2025: WACC set for the period with revised gearing and beta estimates. The inflation adjustment was also applied to the WACC rather than its components.

The same approach to estimating WACC is applied across the three periods as follows:

- Estimate cost of equity and cost of debt using US Treasury bonds, US corporate bonds and US Market Risk Premium estimates, plus a 'Brazil risk' premium.
- The post-tax nominal WACC (in US terms with added Brazil risk) is converted to post-

tax real terms using an inflation estimate based on breakeven analysis of US Treasury bonds. This eliminates the US inflation characteristics embedded in the WACC estimate.

- Applying the assumption of no arbitrage between countries through interest rates, ANP has assumed that real interest rates in the US and Brazil are equal.
- The post-tax real WACC is then converted back to a post-tax nominal WACC in Brazilian currency terms, using a measure of Brazilian inflation. ANP has used the IGP-M annual index for this conversion.
- This results in a post-tax nominal Brazilian WACC, which is used to calculate the return in capital component of the return of capital term in the RCM formula.

4.3.2 Synergies' assessment

The rate of return applicable to legacy contracts should be assessed based on the macroeconomic, financial, and commercial conditions prevailing at the time the contracts were executed, rather than on parameters observed retrospectively. This premise stems from the very nature of gas transportation infrastructure investments, which are capital-intensive, long-term in nature, and undertaken on the basis of the risk and return expectations prevailing at the time the investment decision is made. This understanding is supported by sector-specific legislation, which preserved the economic conditions of legacy contracts both under the former Gas Law (Article 33 of Law No. 11,909/2009) and under the current framework (Article 44 of Law No. 14,134/2021), thereby reinforcing the protection of contractually agreed revenues and the economic-financial balance of those contracts.

In this context, the use of an ex post WACC, derived from macroeconomic conditions observed after contract execution, artificially reduces the remuneration associated with the investment and is inconsistent with the legal protection afforded to long-term contracts. Given that legacy contracts were designed to support investments with an approximately twenty-year horizon, it is expected that the assessment of risk and the remuneration of capital would be performed only once, at the time of contract execution, through the establishment of a fixed WACC reflecting the market conditions prevailing at that time.

ANP Technical Note No. 27/2006 reinforces this conclusion. Used as the reference methodology for calculating the WACC of legacy contracts, it does not provide for annual updates, periodic recalculation, or revisions linked to tariff review cycles. Instead, the WACC is defined based on the economic conditions prevailing at the time of contract execution and incorporated into the initial tariff, reflecting the expected return over the entire investment horizon.

The practice adopted in the legacy contracts MALHAS II, GASPAJ, GASTAU, and GASDUC III confirms this interpretation. In each case, the WACC was calculated in accordance with the methodology set out in Technical Note No. 27/2006 and incorporated

into the tariff structure as a fixed rate applicable throughout the contractual term. None of these contracts provides for periodic updates or redefinition of the rate of return during the life of the contract.

Although the Malha Sudeste contract does not contain publicly available documentation with the detailed calculation of the WACC adopted, there is no evidence supporting the presumption that it was treated differently from the other legacy contracts. On the contrary, the methodological consistency observed across the available contracts indicates that the Malha Sudeste WACC was likewise determined based on the economic conditions prevailing at the time of contract execution and intended to remain unchanged throughout the contractual term.

Accordingly, the use within the RCM framework of an annually varying WACC calculated retrospectively not only departs from the methodology adopted in legacy contracts and from the guidance established in Technical Note No. 27/2006 but also disregards the economic conditions that underpinned the original investment and contracting decisions. By replacing the rate of return originally embedded in the contractual tariffs with ex post parameters, the proposed methodology undermines the preservation of the economic-financial balance guaranteed under sector legislation. Consequently, any assessment of capital recovery intended to faithfully reproduce the economic logic of legacy contracts should employ a rate of return consistent with the conditions prevailing at the time of contract execution and maintained as a fixed parameter throughout the contractual term.

4.4 Tax

4.4.1 ANP's approach

ANP calculation of the tax component of the RCM formula was set out in Section 9 of the Technical Note.

The ANP's assessment was based on its estimation of Corporate Income Tax (IRPJ) and Social Contribution on Net Profit (CSLL) levied on NTS' estimated taxable income, which is calculated based on transportation revenues (gross revenue) less operating costs and the tax depreciation applied to fixed assets. A tax rate of 34% is applied.

ANP notes that tax depreciation is estimated based on two asset groups:

1. pipelines valued using New Replacement Cost (NRC), with commencement of operation before 2006, whose tax bases are derived from converting the New Replacement Cost into Brazilian reais at the 31/12/2005 asset base date; and
2. pipelines and other fixed assets incorporated through incremental capex from 2006 onward, whose tax bases correspond to the historical acquisition or construction cost in Brazilian reais, depreciated from the year of entry into fixed assets.

It appears that ANP has derived taxable income based on what it refers to as "Contractual Revenue" using the Contracted Capacity and the tariff in force under the transportation

contract.

It notes the alternative tax approach in the pre-2016 period would be to use Historical Petrobras Payment, which corresponds to the amounts invoiced and paid by Petrobras in each financial year, according to billing documents issued under Chapter XII of the Contract.

In the post-2016 period, actual tax paid by NTS is used in ANP's tax calculation.

4.4.2 Synergies' assessment

ANP's estimation of the commencement of tax depreciation in 2005 is based on the hypothetical depreciated asset base value it estimates at 31 December 2005. Our concerns about ANP's approach to estimating depreciation as part of establishing the initial asset base value were discussed in section 3.2 of this report. This means that the tax depreciation amount is hypothetical for the pipeline assets commissioned in the late 1980s to 2005, not the actual tax depreciation reported by Petrobras in this period.

Further, it is not clear why the actual invoiced tax amounts paid by Petrobras (Historical Petrobras Payment) were rejected in favour of the hypothetical Contractual Revenue approach unless some of the tax related to non-transportation services.

Consistent with other aspects of ANP's RCM calculations, the tax data relating to the post-2016 period are likely to be more reliable than the tax data in the 2006 to 2016 period. Tax data in relation to the pre-2005 period, including potential tax losses, is ignored in ANP's tax calculation.

5. Conclusions

There are considerable concerns about ANP's attempt to derive an initial asset base value for NTS soon-to-be price regulated pipelines using the RCM. Numerous assumptions and inputs seem to be in favour of a smaller RCM-based asset base value than a more objective approach to assumptions and inputs would suggest. The need for very many assumptions to be made dating back over a long period is one of the main weaknesses of the RCM as has been noted by the AER in Australia.

5.1 ANP's hypothetical DRV valuation

The most egregious assumption is that the actual construction cost can be replaced with a hypothetical DRV value as a reasonable proxy. Moreover, the proxy is not based on the costs likely to have been incurred in Brazil under Brazilian construction conditions at the time they were incurred, but on those applicable in the US in 2005. In addition, the conversion of the US benchmark costs to Brazilian Reais is deeply problematic. The initial DRV valuation used by NTS has no validity at all and likely significantly understates the value that would have been calculated if the actual constructions costs, opex, capex and cost of capital had been applied.

5.2 ANP's WACC estimate

It can therefore be concluded that the rate of return applicable to legacy contracts should be determined based on the market, financing, and risk conditions prevailing at the time the contracts were executed and should remain unchanged throughout their contractual term. This interpretation is consistent with the long-term nature of gas transportation infrastructure investments, the guidelines established in ANP Technical Note No. 27/2006, and the practice observed in the legacy contracts reviewed.

Furthermore, the preservation of the original economic conditions agreed upon by the parties is expressly supported by sector-specific legislation, which safeguards both the economic and financial balance of the contracts and the revenues associated with the investments made. In this context, the use within the RCM framework of a historical series of ex post WACC values does not reflect the economic rationale that underpinned the structuring of legacy contracts and introduces a distortion capable of undermining the contractual equilibrium originally established.

5.3 ANP's other revenue and cost assumptions

The other costs adopted by ANP are in many cases likely to be understated and in others so uncertain that risk of incorrectly calculating the RCM is very high. Concerns about the cost categories are:

- The only assets captured in the pre-2005 asset valuation are individual pipelines not

any associated land acquisitions or supporting infrastructure essential to operation of the pipelines.

- Capex between the late 1980s and 2005 considered only the costs of the pipelines and did not include the other supporting transportation infrastructure assets. Further, it does not account for the time value of money associated with the timing of capex. The best modelling would attribute cashflows in the years in which they occur. In the alternative capitalised interest should be added to the capex.
- Opex is exposed to significant underestimate due to the vertically integrated nature of Petrobras and lack of adequate accounting data for actual opex associated with NTS's Southeast network
- Inappropriate asset write-offs in relation to GASDUC II
- Revenue and tax calculations are also fraught because of the vertical integration of Petrobras in the 2006 to 2016 period (as well as in the pre-2006 period, which ANP has completed ignored in its RCM calculations).

The effects of the above problems in ANP's input assumptions are amplified in applying the RCM formula, because the estimated revenues and costs interact with one another through the return of capital component, which directly affects the asset base value.

Given the incorrect approach applied by ANP in providing a proxy for the first 20 years of NTS's Southeast Network, ANP's calculations do not qualify as an RCM. In addition to this, even if ANP's proxy was acceptable, given uncertainties about other input parameters, any value for the RCM calculated would be unreliable. Moreover, the input values chosen by ANP appear to favour a lower RCM than we would think reflected an objective valuation.

In our view, the concerns raised in this report indicate the significant practical problems applying the RCM approach and indicate why the RCM is not an appropriate valuation approach to set asset base values for price regulated gas pipelines. This reflects the reality in Australia where under the National Gas Rules, the RCM cannot be used for this purpose.