

3 December 2020

Ms Merryn York
Acting Chair
Australian Energy Market Commission
GPO Box 2603
Sydney NSW 2000

Submitted via website

Dear Ms York

Re: Financeability of ISP Projects Consultation Paper

Thank you for the opportunity to respond to the Financeability of ISP Projects Consultation Paper published in November 2020 (Reference: ERC0320 & ERC0322).

Overarching comments

The changes we are seeing in the energy sector and in consumer behaviour are unprecedented and require a new way of thinking about how network service providers are incentivised to invest. The rule change proposal from Transgrid and Electranet highlights the challenges that the sector is facing. We have provided a detailed submission on the benefit of nominal modelling in Attachment 1. This is supported by detailed advice from Dr Jeff Makholm on the economic efficiency of nominal modelling in Attachment 2.

ATCO supports the rule change proposal and the adoption of nominal modelling for ISP projects. In addition, we support the rule changes proposed by Transgrid and Electranet being broadened beyond ISP projects to require nominal modelling to be adopted by service providers in all circumstances. Nominal modelling is a critical policy change needed to support Australia's future and its response to the uptake of renewables and other changes in the operating environment. Nominal modelling creates the efficiencies and investment environment that encourages investment needed to support consumers changing needs. Consumer's benefit from the investments that flow from network service providers being incentivised to invest under a nominal framework.

The rule change proposal is wholly consistent with the National Electricity Objective and the National Gas Objective¹ and in particular, the long term interest of consumers. Not only do consumers pay less in total with nominal modelling, but there is a tangible benefit to consumers when you consider the alternatives for the consumer such as their home mortgage. For future consumers, nominal modelling avoids deferring of payments into the future and so avoids placing an increased burden on these consumers.

From a global perspective, nominal modelling will attract and retain capital in Australia that is currently challenged in the low returns environment. For example, nominal modelling is commonly adopted in regulatory settings in North America that is delivering returns on equity, on a cash basis, of 8.5%. Our experience from our Canadian network businesses regulated by the Alberta Utilities

¹ S.23 National Gas (South Australia) Law 2008 (as applied in Western Australia pursuant to the National Gas Access (Western Australia) Act 2008)

Commission is that nominal modelling better reflects the operation of competitive markets and is therefore to the benefit of consumers. Nominal modelling reflects how our suppliers and customers normally transact with each other and therefore is a more economically efficient reflection of the cost base of running the network. As investors, our strong preference is for nominal cash returns, as we consider that it provides adequate compensation for the opportunity cost of our capital, expected inflation and allows us to effectively manage any associated risks.

In our detailed submission we have highlighted changes that would be necessary to the National Gas Rules to require the adoption of nominal modelling. We recognise that this process may not be able to be expanded to incorporate these changes but have included these changes to spur further discussion with stakeholders on this important matter.

Now is the time for the Commission to act on this important policy change. A nominal approach will provide longevity for the regulatory regime that will enable it to respond to the changes in the operating environment. The operating environment, along with the current low inflation and low interest rate environment, provide the ideal opportunity for this critical policy change to be implemented to support Australia's future.

If you have any questions or would like to discuss any of these matters further please contact me or John Ivulich, Chief Financial Officer.

About ATCO

ATCO has been proudly operating in Australia and providing employment opportunities for almost 60 years. ATCO is a customer-focussed global company that develops, builds, owns and operates a range of energy infrastructure assets, supporting residential, business and commercial consumers. ATCO is committed to investing in its people, innovation and technology to drive leading-edge application-based research.

In Australia, ATCO:

- owns and maintains the largest (Mid-West and South-West) gas distribution network in Western Australia, together with two non-regulated gas distribution networks in Albany (LPG) and Kalgoorlie (natural gas), servicing over 760,000 connections through more than 14,000 km of natural gas pipelines and associated infrastructure;
- owns an alternative electricity retailer (Source Energy Co.) in Western Australia that provides cleaner, affordable and innovative energy solutions to around 500 embedded network customers in strata developments through a combination of solar photovoltaic systems, grid purchases and battery storage;
- owns and operates two power generation facilities (a joint-owned facility in Adelaide and a wholly-owned facility in Karratha) with a combined capacity of 266 MW;
- is drawing on its established expertise in natural gas to explore the future role of hydrogen through a number of projects, including the Clean Energy Innovation Hub (an embedded hybrid microgrid system that incorporates renewable solar generation, battery storage, natural gas backup generation and blends green hydrogen produced with natural gas used onsite), are working in collaboration with Fortescue Metals Group to establish a hydrogen refuelling facility at the Hub, and are currently conducting a feasibility study into the development of a commercial scale renewably hydrogen production facility, the Clean Energy Innovation Park; and
- manufactures and delivers modular building solutions to a diverse group of customers.

ATCO's Australian businesses are part of the worldwide ATCO Group with approximately 6,500 employees and assets of \$22 billion. ATCO is a diversified holding corporation with investments in Structures & Logistics (workforce housing, innovative modular facilities, construction, site support services, and logistics and operations management), Energy infrastructure (electricity generation, transmission and distribution; natural gas transmission, distribution and infrastructure development; energy storage and industrial water solutions; and electricity and natural gas retail sales), Transportation (ports and transportation logistics) and Commercial Real Estate.

Yours sincerely

A handwritten signature in black ink, appearing to be 'J.D. Patrick Creaghan', written over a circular scribble.

J.D. Patrick Creaghan
Managing Director & Chief Operating Officer

Attachment 1: ATCO submission on benefits of nominal modelling

Attachment 2: Makhholm, J. D. (NERA), Report On the Subject of Cost Accounting for Gas Pipelines, 13 March 2014



ATTACHMENT 1: BENEFITS OF A NOMINAL MODEL

**RESPONSE TO CONSULTATION PAPER ON FINANCEABILITY OF ISP
PROJECTS**

AUSTRALIA

03/12/2020

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1. INTRODUCTION

ATCO welcomes the opportunity to provide a submission on the Australian Energy Market Commission's (Commission) consultation paper on the financeability of Integrated System Plan (ISP) investments, published on 5 November 2020.

ATCO's interest in this process comes about from our previous submissions to the Economic Regulation Authority (ERA) and the Australian Energy Regulator (AER) where we have also sought the adoption of a pure nominal rate of return on an unindexed Regulatory Asset Base (nominal modelling). Our Canadian operations adopt full nominal modelling, which is common practice in North America. In our AA4 submission in 2014 to the ERA¹, we proposed a staged adoption of nominal modelling but it was not approved by the ERA. We have recently highlighted the benefits of nominal modelling through submissions to the AER's 2020 Inflation Review.²

The rule change proposal from Transgrid and Electranet has identified that there are features of the regulatory framework that have significant implications for the financeability of large scale projects with long asset lives. The financeability issue results from the interaction of the regulatory concepts and revenue modelling that defers revenue recovery primarily through the deduction of expected inflation on the Regulatory Asset Base from revenue in the Post Tax Revenue Model (PTRM), and the indexation of the Regulatory Asset Base in the Roll Forward Model. At the heart of this is the ability to universally apply the rate of return and the revenue model – together they should support the necessary investments by service providers. The rule change proposal demonstrates that the current framework does not provide sufficient cash flows to ensure the financeability of investments.

We support the rule change proposal from Transgrid and Electranet. Now is the time for the Commission to act on this important policy change. The changes that are occurring in the energy sector, along with the current low inflation and low interest rate environment, provide the ideal opportunity for this policy change. We would like to see the rule changes proposed by Transgrid and Electranet broadened beyond ISP projects and instead require nominal modelling to be adopted by service providers in all circumstances. We believe that adopting full nominal modelling is wholly consistent with the National Electricity Objective and the National Gas Objective³ and in particular, the long-term interests of consumers, as it will provide longevity for the regulatory regime by ensuring the required investment to move to a low emissions energy future and the continued safe and reliable provision of services.

¹ Available from the ERA website: <https://www.erawa.com.au/gas/gas-access/mid-west-and-south-west-gas-distribution-systems/access-arrangements/access-arrangement-for-period-2014-2019>

² Available from the AER website: https://www.aer.gov.au/system/files/ATCO%20-%20Submission%20to%20discussion%20paper%20-%202020%20inflation%20review%20-%20July%202020_0.pdf and <https://www.aer.gov.au/system/files/ATCO%20Australia%20-%20Submission%20to%20draft%20position%20-%202020%20inflation%20review%20-%20November%202020.pdf>

³ S.23 *National Gas (South Australia) Law 2008* (as applied in Western Australia pursuant to the *National Gas Access (Western Australia) Act 2009*)

2. BENEFITS OF NOMINAL MODELLING

The full nominal approach to setting revenue has the following features:

- the regulatory asset base is not indexed for inflation; and
- the return on and of revenue building blocks are determined in nominal terms.

The interaction of the real return, the low rate of returns provided for by the rate of return instrument⁴ and the large investment requirements are together creating the financeability issues underpinning this rule change. The rate of return and the PTRM revenue model cannot be universally adopted to ensure the financeability of investment. A nominal modelling approach would enable the rate of return to be universally applied no matter the scale of the investment. Evidence of the PTRM RFM framework not supporting financeability at all investment levels, not only for large projects but also for smaller projects, is provided in Energy Networks Australia's (ENA) recent submission to the AER's inflation review:

“ENA, member firms, and the AER's advisers have raised concerns about the fact that recent regulatory decisions produce negative net profit after tax in every year of the regulatory period.

This is a new development in the Australian regulatory setting, with the problem first arising in the NSW distribution network decisions in 2019. The problem has persisted in all subsequent decisions and continues to apply to the Victorian distribution draft decisions, even after the AER's proposed modification to its approach for estimating expected inflation.

The negative net profit allowance is a real and important issue for network businesses. Negative net profits affect credit rating metrics, ratios used in debt covenants, and have real effects on the ability to attract capital. These issues have the potential for materially harmful flow on impacts for current and future customers if left unaddressed.”⁵

Nominal modelling has the following advantages for consumers over the current approach:

- **Better value for consumers:** Over time, the nominal approach results in consumers paying less, in total, to network service providers than the current approach. This is because of the compounding that occurs in the regulatory asset base under the current method resulting in higher total bills paid by consumers than under the nominal approach. Over time, the nominal approach results in a NPV benefit to consumers when compared against the opportunity cost of the average consumer's mortgage;
- **Responding to a changing operating environment** – Under our changing operating environment, the nominal approach better provides service providers with a reasonable opportunity to recover efficient costs. ATCO operates its distribution pipelines in an increasingly diverse, contestable, and competitive energy market that places a natural constraint on pricing and access decisions. The nature of energy services is driven by changes in technology and the increased adoption of distributed energy resources, such as battery and solar photovoltaic systems. ATCO recognises that in light of increasingly competitive technologies, such as solar and batteries, future consumers of distribution networks may no longer be captive;

⁴ AER – “Rate of Return Instrument – December 2018” – available from AER website: https://www.aer.gov.au/system/files/2018%20Rate%20of%20Return%20Instrument%20%28Version%201.02%29_1.pdf (In Western Australia, ERA – “Final Rate of Return Guidelines (2018)” – 18 December, 2018 – available from ERA website: <https://www.erawa.com.au/cproot/19968/2/2018%20Final%20Gas%20Rate%20of%20Return%20Guidelines.PDF>

⁵ Energy Networks Australia, Review of the Regulatory Treatment of Inflation, Response to AER draft position, 6 November 2020, page 7

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- **Long term interest of consumers:** The nominal approach avoids both deferring of payments into the future and placing an increased burden on future customers (as a result of the flat level of total demand) that may result in the future inefficient use of the network by consumers. The emphasis of the National Gas Objective being on the long term, dynamic dimension of efficiency and on future consumers, shows that continuing the current approach of deferring revenue is not in the interests of future consumers, as technology changes and the flattening of total demand will place an increased burden on future customers; and
 - **Reduced complexity:** Inflation and real returns do not have to be estimated nor indexation of the regulatory asset base calculated resulting in reduced costs during regulatory processes.

The nominal modelling approach is also known as historic cost accounting (HCA) as it results, under the straight-line depreciation method, in a constant nominal amount of depreciation each year.

2.1 Background on the nominal approach to setting NSP revenues

In this section, ATCO describes the full nominal approach, other jurisdictions where it is adopted, and discusses how Australian regulators have adopted and applied the real approach to setting network service providers' revenues.

Nominal modelling (HCA)

With the historic cost accounting (HCA) method, revenue building blocks are determined by applying a nominal rate of return to an unindexed regulatory asset base. Inflation compensation is paid through reference tariffs now rather than in the future.

The HCA method is consistent with how investors target returns at the time funds are invested. Investors target a real rate of return plus an additional amount to compensate for expected inflation. Required rates of return are set in the market based on the real required rate of return and an additional amount to compensate for *expected* inflation. The important point is that the cost of funds for which a service provider should be compensated is based on expected inflation.

The HCA method is consistent with the depreciation method adopted by the majority of businesses participating in competitive markets. These businesses can choose an alternative method, but don't.

ATCO has previously sought advice from Dr Jeff Makhholm on the economic efficiency of the HCA method (nominal modelling), which concluded that the HCA method is a *more economically efficient reflection of inflation*. Dr Makhholm's detailed advice can be found in Attachment 2. Dr Makhholm specialises in the economics of regulated infrastructure industries in the energy (electricity, gas, and petroleum products), transportation (pipelines, railroads, and airports), water, and telecommunications sectors in the US and more than 20 other countries. In his report, Dr Makhholm concluded:

I conclude that HCA is a more economically efficient reflection of inflation for regulated pipeline services. HCA accounting for inflation emulates the way in which pipeline suppliers and customers transact in competitive pipeline markets to promote long-term efficiency—particularly when competitive pipelines bring another fuel or source fuel from another location in established energy markets. In fuel markets served by independent pipelines, long-term contracts confront gas pipeline customers ex-ante with the long-term consequences of their own decisions to install equipment

for the consumption of gas, making the yearly payments simply a way of allocating the payment for the choices already made. In other words, HCA coupled with the standard accounting methods for depreciation (which accountants recognize is also merely a method of book entry allocation) deals with pipeline costs the way competitive markets do—which was the ultimate goal of the original 1990s push for the privatisation of Australian public service enterprises.⁶

In summary, we consider that nominal modelling (HCA) is aligned with how investors target returns because it:

- Removes any issues related to the variance between forecast and actual inflation;
- Ensures appropriate cash flows to meet nominal dollar commitments; and
- Ensures asset depreciation is appropriately allocated to consumers during the period the service potential of the asset is used.

Other jurisdictions adopt nominal modelling

Many firms subject to economic regulation in North America are subject to the nominal modelling method, including ATCO's Canadian network businesses that are regulated primarily by the Alberta Utilities Commission.

In North American jurisdictions, concerns around the current cost accounting (CCA) method have been flagged as far back as the late 1940's. Accounting standards setting bodies in the US did not support the application of CCA on the basis that it was inherently subjective, too complex, with rarely an active market to derive current values.⁷

Deferring the recovery of revenue simply creates intangible capital accounts that must be paid by captive consumers later⁸ – a loose promise to pay but not a guarantee to pay. This intergenerational impact will become more challenging in the future because of the changing operating environment flattening total demand for services.

As investors, our strong preference is for nominal cash returns, as we consider that it provides adequate compensation for the opportunity cost of our capital, expected inflation and allows us to effectively manage any associated risks. Jeff Makhholm supports this in his comments on attracting capital and embracing practices of competitive markets:

Regulators cannot conscript capital from those competitive markets as public authorities once did for publicly-owned infrastructure services—they must attract capital. Indeed, such was one of the key incentive-destroying aspects of pre-privatisation Australian economic activity, with its many publicly-owned pipelines and other utilities, that Hilmer sought to change. As such, investment efficiency reasonably deals with how those capital markets, with alternatives in which to place their funds, decide to devote capital to regulated companies, for what purpose, and at what cost.

Inviting competitive capital markets to participate in providing gas pipeline services efficiently necessarily includes embracing the institutions and practices upon which those competitive markets rely. Those capital markets rely on longstanding definitions for accounting and related concepts (such as depreciation). Reflecting the contemporaneous nominal opportunity cost of capital, including the generally-

⁶ Makhholm, J. D. (NERA), Report on the Subject of Cost Accounting for Gas Pipelines, 13 March 2014, pg. 4 – 5, See Attachment 2

⁷ Ibid. p. 17.

⁸ Ibid. p. 19.

*accepted methods of depreciation accounting, is consistent with the expectations of those capital markets in the way they account for investments in the market. CCA accounting, with its deferral of the cost of inflation, is not.*⁹

In summary, based on long-term experience, other jurisdictions have recognised that capital markets rely on longstanding definitions from accounting (such as depreciation), which is a nominal concept. Nominal modelling does a better job of reflecting the revenues that track the computations of the opportunity cost of capital providers and of reflecting in revenues the inflation related opportunity cost in the year it occurs.

Australian regulators adopt a real approach to setting NSP revenues

The AER's PTRM adopts a real approach to modelling revenues, where the regulatory asset base is indexed for inflation, and an adjustment is made to the revenue building blocks to remove the double count of inflation that occurs through the application of a nominal rate of return. This approach is also known as current cost accounting (CCA) and results in a "real" return (i.e. the nominal return adjusted to exclude inflation). We understand that CCA has its origins from the privatisation of British Gas in 1986.

ATCO believes the use of CCA in the PTRM model in Australia simply reflects this history and that the initial valuations have been "rolled over" according to capital additions and depreciation in subsequent reviews.

We observe that CCA has become the default approach applied to regulated NSPs in Australia. We have been unable to determine definitive reasons why the capital base has been previously indexed. We have previously sought advice regarding the use of indexation at the commencement of economic regulation, with the view being that CCA was initially used for valuing state owned enterprises. In his report, Dr Makhholm comments:

*Those state enterprises ultimately drew from public funds—not the capital markets—and it was reasonable to compute a "current" value of such assets to set a RAB for privatisation. The use of CCA allowed governments to strike a balance between, on one hand, maximising the sale price, and, on the other, avoiding short-term tariff shocks that would have adversely impacted consumers and, in political terms, undetermined support for privatisation. The difficulty, however, was that in the medium and long term, tariffs would rise higher under CCA as the deferred revenue was recovered.*¹⁰

We speculate that perhaps the regulator's interpretation and application of the NGR and PTRM framework in providing an ex ante real rate of return is to protect the capital value of funds invested. It is unclear why this has become part of the framework, as when the National Electricity Objective was introduced, the Minister observed that:

*"This should be guided by an objective of efficiency that is in the long-term interest of consumers. Environmental and social objectives are better dealt with in other legislative instruments and policies which sit outside the National Electricity Law."*¹¹

Importantly, the National Gas Rules do not require the capital base to be indexed, unlike the National Electricity Rules¹². Therefore, whilst there is no regulatory barrier to the regulator adopting nominal modelling for gas networks, the discretion afforded the regulator has inhibited

⁹ Ibid. p. 6.

¹⁰ Ibid, p. 6.

¹¹ Legislative Council, South Australia, 16 October 2007, Hansard, p. 885

¹² Clause 6.5.1(e)(3) of the National Electricity Rules.

its adoption. We discuss further regulatory considerations, including the revenue and pricing principles, in Section 2.3 below.

2.2 Energy sector is exposed to technology change

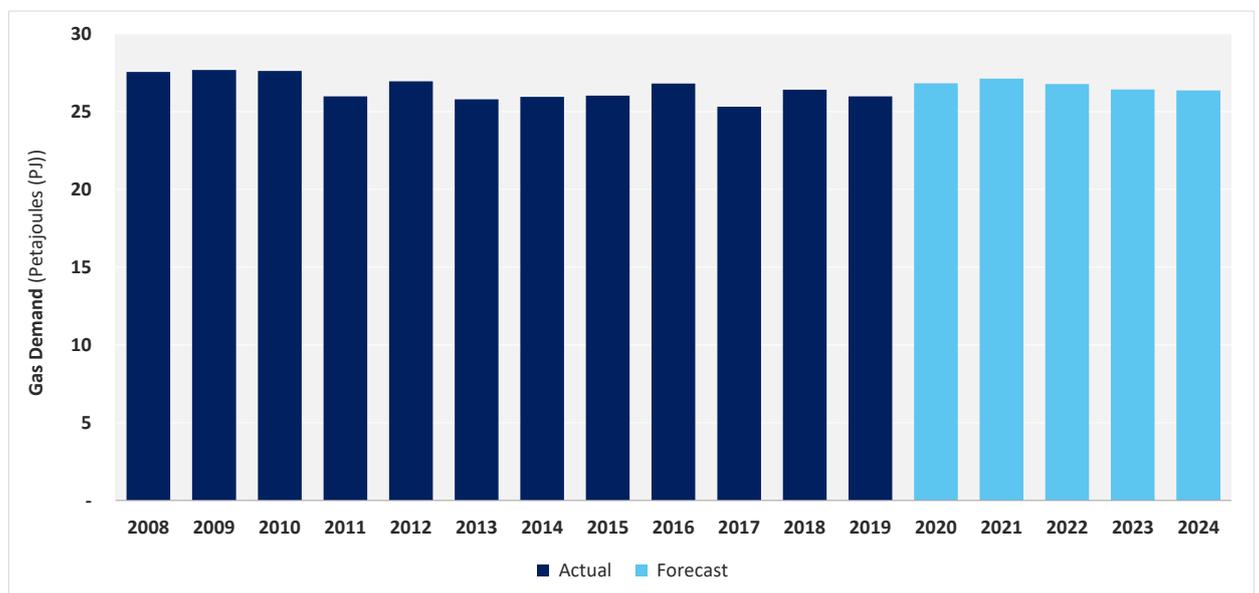
The traditional energy sector is exposed over the medium to longer term to technology changes that are reducing consumers' average demand. It is no longer the case that anticipated growth in demand over time, when combined with a CCA approach that defers revenue into the future, generates a more level path for real tariffs over time.

ATCO operates its distribution pipelines in an increasingly diverse, contestable, and competitive energy market that places a natural constraint on pricing and access decisions. The nature of energy services is driven by changes in technology and the increased adoption of distributed energy resources, such as battery and solar photovoltaic systems.

ATCO recognises that in light of increasingly competitive off-grid technologies such as solar and batteries, future consumers of distribution networks may no longer be captive. By deferring payments into the future, as is the case with the PTRM method, an increasing burden is placed on future customers, especially now as a result of the flattening level of total demand.

This effect is not new. Over the past decade, ATCO has seen a flattening of the total demand through its network and this is expected to continue into the foreseeable future, as shown in the chart below. This flattening of total demand is driven by improvements in appliance efficiency and housing standards that have reduced the average demand of residential consumers.

Figure 2.1: Gas Demand in ATCO's Mid-West and South-West Gas Distribution System



In this environment, the approved reference tariffs need to ensure that the service provider can compete with new technologies when the demand for distribution networks services may become more elastic. Deferring revenue into the future, as the PTRM method does, does not provide service providers with a reasonable opportunity to recover efficient costs.

2.3 Impact on efficient investment

The Commission highlights that the regulatory framework should provide service providers with a reasonable opportunity to recover their efficient costs. In this section, we detail the reasons for our support for nominal modelling against the National Gas Rules and consider whether network service providers are able to recover their efficient costs, taking into account the revenue and pricing principles.

National Gas Rules

ATCO considers that the full nominal modelling approach (HCA) is preferable because the case for deferring the recovery of revenue in our Australian operating environment is inconsistent with the National Gas Objective and the Revenue and Pricing principles under the National Gas Law.

ATCO notes that the National Gas Objective (NGO) incorporates an emphasis on the long term, dynamic dimension of efficiency and on future consumers.¹³

This emphasis shows that continuing the current approach of deferring revenue through the current PTRM method is not in the interests of future consumers, as technology changes and the flattening of total demand place an increased burden on future customers. To continue to meet the NGO, an appropriate response to the changes in the operating environment will be to transition network service providers to a full nominal approach to setting their revenues.

ATCO has assessed that the revenue and pricing principles better support the adoption of the nominal modelling approach than the CCA approach currently adopted in the PTRM. The following table outlines ATCO's assessment:

Table 2.1: Assessment of HCA against the revenue and pricing principles

NGL	Revenue and pricing principles	Commentary
24(2)	A service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in: (a) providing reference services; and (b) complying with a regulatory obligation or requirement or making a regulatory payment.	The AER's Rate of Return Instrument implements a 10-year trailing average approach which implicitly assumes that the service provider issues nominal debt. For the service provider to be provided a reasonable opportunity to recover these efficient costs, the regulator must adopt a nominal approach. The current PTRM approach does not provide this opportunity as it results in a real cashflow profile that does not recognise the impact on the service provider's ability to service its nominal debt commitments. Furthermore, over the longer term, with an increasingly diverse, contestable, and competitive energy services market, the demand profile for gas and the effect on the elasticity of gas network prices, there may no longer be a reasonable opportunity to recover at least the efficient costs. The revenue profile of real cash flows – a nominal profile of cash flows - provides a fairer opportunity for gas distribution networks to recover efficient costs.
24(3)	A service provider should be provided with effective	The nominal method avoids the following detrimental impacts of the current PTRM method:

¹³ HoustonKemp, Economic Review of the ERA's Draft Decision, 27 November 2014, pg 6 Available from: <https://www.erawa.com.au/cproot/13018/2/20141129%20GDS%20-%20ATCO%20-%20AA4%20-%20Appendix%201.1%20Evaluation%20of%20Economic%20Regulation%20Authority%20-%20Draft%20Decision%20against%20the%20National%20Gas%20Objective.PDF>

NGL	Revenue and pricing principles	Commentary
	<p>incentives to promote economic efficiency with respect to the reference services of the service provider. The economic efficiency that should be promoted includes:</p> <p>(a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services; and</p> <p>(b) the efficient provision of pipeline services; and</p> <p>(c) the efficient use of the pipeline.</p>	<ul style="list-style-type: none"> • on the incentive to invest and on the efficient provision of pipeline services if debt costs are not fully recovered as they fall due; • on the incentive to invest and on the efficient provision of pipeline services if equity returns become the balancing item, as is currently the case with the PTRM¹⁴, due to service providers nominal debt commitments; and • on the efficient use of the pipeline if too much revenue is being deferred at cost to future customers.
24(5)	<p>A reference tariff should allow for a return commensurate with the regulatory and commercial risks involved in providing the reference service to which that tariff relates.</p>	<p>The AER's Rate of Return Instrument implements a 10-year trailing average approach that implicitly assumes that the service provider issues nominal debt.</p> <p>For the service provider's reference tariffs to provide for a return commensurate with the commercial risks associated with debt financing, a better approach would be for the regulator to adopt a nominal approach. This change will ensure that there is not a mismatch between the cash flow requirements to service the nominal debt and the cash flow received through revenues over time.</p>
24(6)	<p>Regard should be had to the economic costs and risks of the potential for under and over investment by a service provider in a pipeline with which the service provider provides pipeline services.</p>	<p>The nominal method will ensure that the reference tariffs for a gas distribution network enables the service provider to compete with new technologies by ensuring costs are recovered as incurred, not deferred to future consumers. In doing so, it avoids the potential for under and over investment by a service provider in a gas distribution network by ensuring the costs reflected in tariffs in any period reflect the costs incurred in that period and thus provide correct investment signals.</p>
24(7)	<p>Regard should be had to the economic costs and risks of the potential for under and over utilisation of a pipeline with which a service provider provides pipeline services.</p>	<p>The nominal method avoids deferring payments into the future. In doing so, it avoids placing an increased burden on future customers, as a result of the flat level of total demand seen on gas distribution networks. Under the nominal method, the prices consumers pay for services reflect the costs of providing those services in the period in which they are consumed.</p> <p>Furthermore, over the long term it will result in lower aggregate network costs for consumers. Over time, the nominal approach results in consumers paying less, in total, to network service providers than the current approach. This is because of the compounding that occurs in the regulatory asset base resulting in the total bills paid by consumers being higher than under the nominal approach. Furthermore, the nominal approach results in an NPV benefit to consumers when compared against the opportunity cost of the average consumer's mortgage.</p>

¹⁴ AER: Inflation review 2020, Stakeholder forum, ENA presentation, slide 20

Importantly, the National Gas Rules do not require the capital base to be indexed, unlike the National Electricity Rules¹⁵. Therefore, whilst we conclude that there are no regulatory barriers to the AER adopting the nominal revenue model for gas distribution networks, the discretion afforded the regulator has prevented the adoption of nominal modelling to date.

Economic efficiency benefits of nominal modelling

With the increasingly contestable, and in many cases substitutable, nature of energy services, ATCO considers that the nominal modelling approach has the following additional benefits:

- **Emulates competitive markets:** It emulates how our suppliers and customers normally transact with each other. Nominal modelling is a more economically efficient reflection of the cost base to operate regulated pipelines.
- **Efficient prices:** Regulatory economics literature does not support the notion that a “levelised” or “annuitised” collection or recoupment of investment costs is efficient. For consumers, Dr Makhholm found that there is no benefit in shielding consumers from the inflation component of the building block costs:
“...it is of no economic benefit to shield customers from the costs that could otherwise inform their own decisions on whether and how to use gas in their long-term interests.”¹⁶
- **Efficient investment:** Nominal modelling provides better signals for reflecting opportunity costs for capital employed i.e. there is no real benefit in shielding customers from the costs that could otherwise inform their own decisions on whether and how to use gas in a way that supports their long-term interests.
- **Financeability:** The adoption of nominal modelling provides a better match between revenue and financing cash flows, avoiding the issues highlighted by Transgrid and Electranet in the rule change proposal, therefore avoiding the need for the regulator to consider the financeability of its access arrangement decision.
- **Precedent in other jurisdictions:** Nominal modelling is embedded in accounting recognition – nominal based accounting and well established in longstanding regulatory sectors in Canada and the US.

2.4 Risk allocation

The Commission’s position set out in the consultation paper is that risks should be borne by, or allocated to, parties who are in the best position to manage them and have the incentives to do so, as this ultimately leads to lower costs for consumers. ATCO broadly supports the concept that risk should generally rest with the party that is best placed to manage it.

For clarity, it is important to distinguish between revenue risk and the risk to the real dollar value of the asset base caused by movements in inflation. Both consumers and service providers face revenue risk, in that they can pay too much or not enough, or that they may receive too much or too little, depending on the variance between actual and forecast inflation.

Under the PTRM framework, the main element of this variance comes about due to the mismatch between the expected inflation included in the rate of return paid by service providers and the actual inflation added to the RAB, resulting in consumers paying too much or too little. This does not occur with nominal modelling as the investor is compensated for expectations of inflation at

¹⁵ Clause 6.5.1(e)(3) of the NER.

¹⁶ Makhholm, J. D. (NERA), Report on the Subject of Cost Accounting for Gas Pipelines, 13 March 2014, p. 5, See Attachment 2

the regulatory decision. Investors know of this risk and how to manage it. Service providers bearing inflation risk under a nominal model is not a new risk.

Adopting a nominal model effectively removes the risk that debt and equity holders will receive a return that is not the required return that is consistent with the National Gas Objective, including compensation for expected inflation, and therefore removes the risk of under or over compensation by consumers. Removing the need to estimate expected inflation also ensures that any variation between actual and expected inflation will be truly random.

ATCO recognises that unexpected movements in the inflation rate can be managed by:

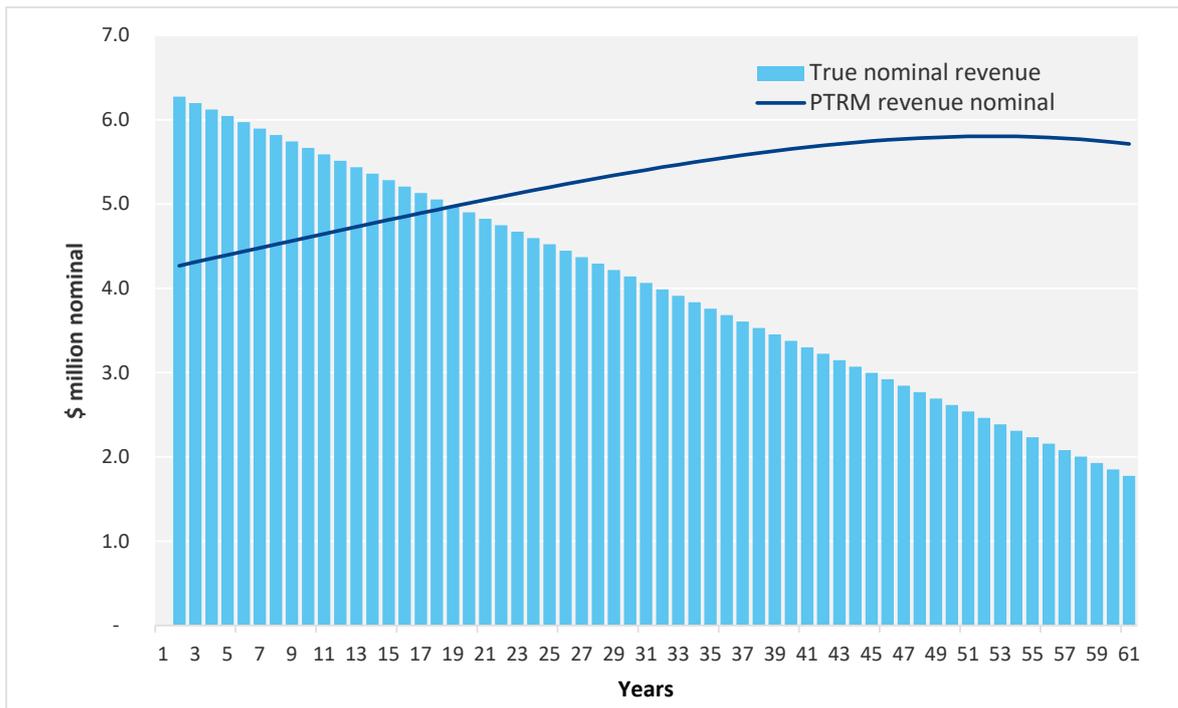
- **CPI factor in the annual tariff mechanism** - similar to the North American approach outlined above, within the 5-year access arrangement period including a CPI component through the tariff variation mechanism formula, as is currently the case under the variation mechanism;
- **Roll forward method** - adding actual capital expenditure to the regulatory asset base in the roll forward model, which reflects actual inflation; and
- **Inflation swaps** - network service providers can better manage this risk through financial instruments, such as inflation swaps, than the average consumer.

2.5 Impact on consumers

The Commission has highlighted in the Consultation Paper that they will consider if there are benefits to consumers from the proposed changes to the regulatory framework. In this section, we summarise the benefits of nominal modelling to consumers by first considering a simple example and then expanding the example to ATCO's gas distribution network in Western Australia.

Firstly, to show the impact of nominal modelling on consumers we start with a simple example of a single investment. The following figure illustrates the effect of the PTRM method on the regulated revenue of the network service provider arising from deferring the recovery of depreciation compared to a nominal model for a single \$100 million investment with a 60-year economic life and a 4.49% nominal vanilla WACC.

Figure 2.2: Cash flow profile of nominal and PTRM modelling



The example and chart above illustrates the following:

- Consumers pay less with nominal modelling** - Under the PTRM method, the effect of the deferral of revenue is that consumers will pay more for network services than if the nominal method were adopted. In the above example, for a single \$100 million investment, consumers will pay \$75.2 million less in total over the economic life under the nominal method compared to the PTRM method, as shown in the table below.

Table 2.2: Comparison of the cost to consumers of nominal and PTRM modelling

	PTRM (CCA) Method	NOMINAL (HCA) Method
Total revenue paid by consumers over economic life for a single \$100 million investment	\$316.8m	\$241.6m

- Consumers benefit from the cash flow timing differences under the nominal model** - The profile of cash flows under the nominal and PTRM methods is equivalent from an NPV perspective from the network service provider’s perspective, however it is not from the average consumer’s perspective. We have assessed the benefits of nominal modelling to consumers considering that the next best alternative for the average consumer is their home mortgage. Using a home loan mortgage rate as the discount factor for the average consumer, it can be demonstrated that the nominal method is in the long-term interest of consumers. In the above example, for a single \$100 million investment consumers are \$7.5 million better off under the nominal method assuming a mortgage rate of 3.27%¹⁷.

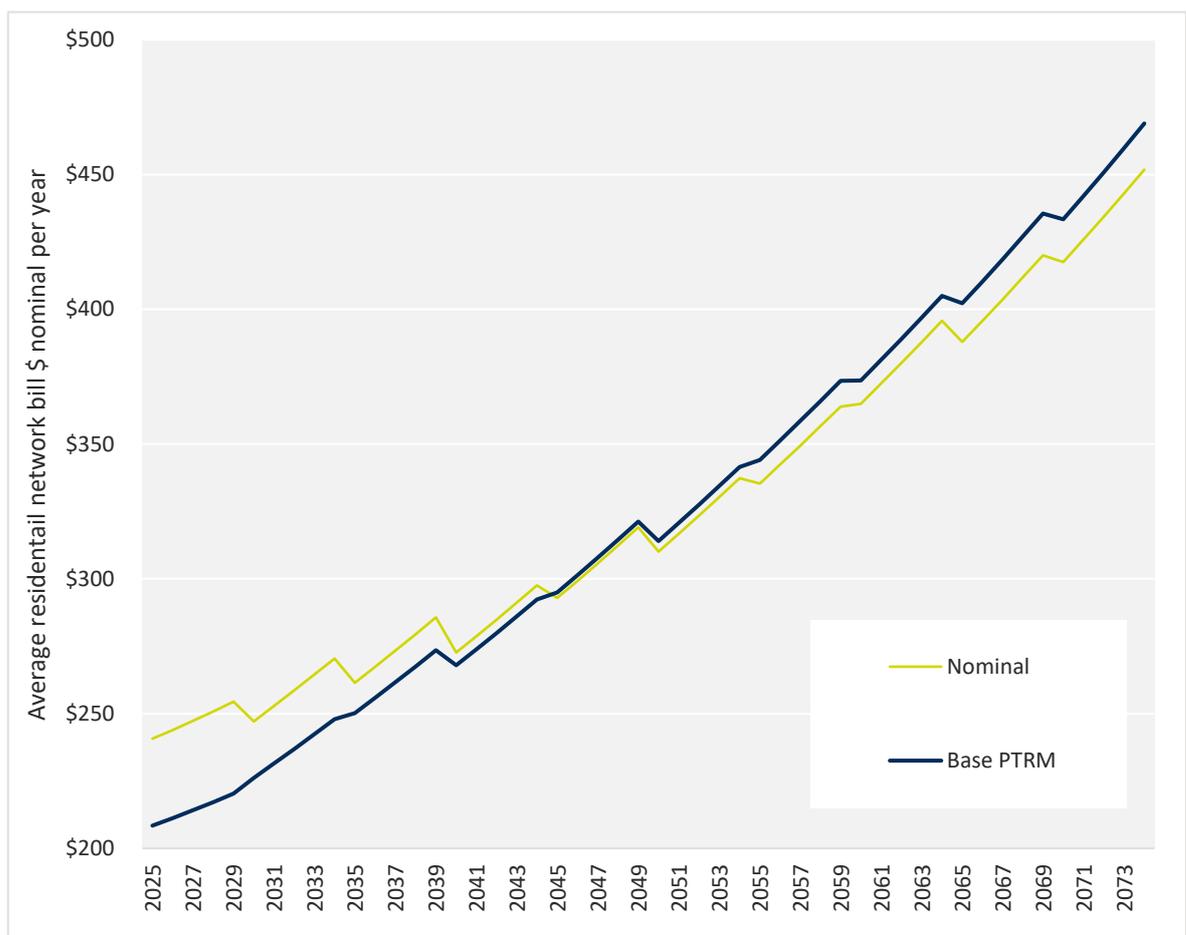
¹⁷ RBA 30 April 2020:Lending rates; Housing credit; Outstanding; Owner-occupied; Variable-rate; All institutions

- Intergeneration equity** - there is an implicit assumption in the PTRM method that customer demand will increase over time to enable future consumers to fund the deferred revenue without upward pressure on future tariffs and that the regime will operate into perpetuity. The nominal approach avoids deferring payments into the future, avoiding placing an increased burden on future customers (as a result of the flat level of total demand) that may result in inefficient use of the network in the future by consumers.

Secondly, we have expanded the simple example to ATCO’s gas distribution network in Western Australia. We have considered the impact on residential consumers’ average gas network bill through the adoption of full nominal modelling. We have considered how a change to nominal modelling would be consistent with the National Gas Objective and in particular, the long-term interests of consumers, including modelling that shows the potential impact on prices for our consumers as a result of the change.

We have modelled the impact based on the cost and demand forecast recently approved by the ERA for the 2020 to 2024 access arrangement period¹⁸ being adopted into the future, adjusted for a 2% inflation rate. The results of our modelling are shown below.

Figure 2.3: Comparison of the average residential network bill under nominal and PTRM modelling



Source: ATCO analysis

Figure 2.3 shows that after a period of transition, consumers will benefit from permanently lower network bills under nominal modelling, compared to retaining the current approach. The results

¹⁸ ERA’s Final Decision is available here: <https://www.erawa.com.au/ATCO-AA5>

of our analysis show that consumers will permanently pay less network charges from 2045 if nominal modelling was adopted in full in the next access arrangement period (commencing in early 2025). This is consistent with the National Gas Objective and in particular, the long-term interests of consumers. The following is a summary of the outcomes of each of the two scenarios:

- **Base PTRM model** – If the current treatment of inflation continues, then the average residential consumer will see their gas network service bills increase from \$208 in 2025 to \$295 in 2045 and continue to rise thereafter.
- **Full nominal** – If full nominal modelling was adopted in the next access arrangement period, the average residential consumer will see their gas network service bills increase from \$241 in 2025 to \$293 in 2045, lower than the PTRM and continuing to fall relative to the PTRM.

Over time, the nominal approach results in consumers paying less, in total, and in NPV terms to the extent the consumers cost of funds is less than the approved WACC to network service providers, than they would pay if the current approach were to be retained.

The time to act on this important policy change is now. The current low rate environment provides the ideal opportunity to adopt nominal modelling to minimise any short-term impact on consumers.

3. AMENDMENTS TO THE NATIONAL GAS RULES

ATCO have proposed a series of principle based changes to the National Gas Rules that would broaden the application of nominal modelling beyond Transgrid and Electranet's ISP projects. ATCO's proposal is that the relevant National Gas Rules should be amended to reflect a requirement that nominal modelling be adopted by service providers in all circumstances to provide a transparent and balanced rules based framework.

We have draft these changes to illustrate how the adoption of full nominal modelling can be incorporated relatively simply into the National Gas Rules to be consistent with the National Gas Objective and the long-term interest of consumers. ATCO recognises that further minor consequential amendments (which have not been set out below) to the National Gas Rules may also be necessary to ensure consistency.

We suggest that the adoption of the principle based amendments outlined below will ensure the required investment needed to move to a low emissions energy future and that safe and reliable services continue to be provided in a way that achieves the National Gas Objective.

Table 3.1: Proposed amendments to the National Gas Rules

Rule Reference	Principle	Details
Basis on which financial information is to be provided (NGR 73)	Financial information is to be on a nominal basis.	Amend the sub-rules to provide that financial information may only be provided, and all calculations made, on a nominal basis
Contents of the financial models (NGR 75B)	The revenue model implements a nominal modelling approach by not indexing the capital base or the projected capital base.	Amend sub-rules and/or add new sub-rules to specify that the revenue model shall be on a nominal modelling basis and not index the capital base or the projected capital base.
Total revenue (NGR 76)	Total revenue is to be calculated on a nominal basis	Amend the sub-rules to provide that total revenue, returns and depreciation shall be determined on a nominal basis
Opening capital base (NGR 77)	The opening capital base for the later access arrangement period under the nominal modelling approach will not need to be increased by an amount necessary to maintain the real value of the capital base	Add new sub-rule to provide that all calculations in relation to this Rule 77 are to be on a nominal basis not adjusted for inflation.
Projected capital base (NGR 78)	The projected capital base will not be indexed under the modelling approach as it is not necessary to maintain the real value of the projected capital base	Amend the rule to specify that the projected capital base shall have an opening capital base on a nominal basis not adjusted for inflation
Rate of return (NGR 87)	Require the adoption of a 'nominal vanilla' WACC to develop the rate of return for the benchmark efficient entity	Amend the rule to specify that the allowed rate of return will be determined on a nominal basis
Depreciation schedule (NGR 88)	Depreciation is to be calculated on a nominal basis	Add a new sub-rule specifying that the depreciation schedule shall be on a nominal basis not adjusted for inflation.

Rule Reference	Principle	Details
Mechanics of reference tariff variation (NGR 97)	Provide for tariffs to be adjusted for unexpected movements in inflation to ensure that consumers do not pay too much or too little, depending on the variance between actual and forecast inflation.	Amend the tariff variation mechanism criteria in the rule to provide that adjustments to nominal dollar tariffs included in the final decision for any year in an access arrangement period shall be the difference between forecast inflation and actual inflation

ATTACHMENT 2: REPORT ON THE SUBJECT OF COST ACCOUNTING FOR GAS PIPELINES

FINANCEABILITY OF ISP PROJECTS CONSULTATION PAPER

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Report
On the Subject of
Cost Accounting for Gas Pipelines

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March 13, 2014

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I. Executive Summary

In this report, I investigate the question of the accounting basis for cost-based revenue determination for regulated gas pipeline companies in Western Australia. The issue is timely because of the Australian Energy Market Commission's (AEMC's) determination in late 2012 that sought to standardise the rules for computing the regulated rate of return to provide the Economic Regulatory Authority (ERA) of WA with "additional strength and flexibility in setting revenues and prices."¹ The AEMC's change to the National Gas Rules (NGR) requires the computation of a "nominal" rate of return (inclusive of the effect of inflation) on the regulatory asset base (RAB).²

The root issue is how inflation is dealt with in terms of the time pattern of permissible regulated revenues and the payout to investors—whether inflation is paid in cash, year by year, to reflect inflation in the allowed nominal return or, instead, entered as an upward book entry adjustment to the RAB to collect the current opportunity cost of inflation in the future. The former would reflect what is known as historic cost accounting (HCA) that treats the RAB and the return component of permissible revenues in nominal terms. The latter reflects what is known as current cost accounting (CCA) that indexes the RAB for inflation and includes in permissible revenues only a "real" return (i.e., the nominal return adjusted to exclude inflation). Since

¹ See: Australian Energy Market Commission, Rule Determination, 29 November 2012, p. i.

² The AEMC did not, however, specify whether that nominal return would include treating depreciation also in nominal terms—which the ERA has called the "full nominal" revenue model See: Economic Regulatory Authority, Letter to Mr. John Pierce, AEMC, 4/10/12, p. 3.

inflation compensation should happen only once, the choice is whether to pay inflation now (under HCA) or as a “promise to pay” later (under CCA).

The standard by which to choose HCA or CCA rests in the National Gas Objective (NGO) in the National Gas Access (WA) Act consistent with revenue and pricing principles contained therein.³ With respect to the NGO’s requirement “to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas...,”⁴ I conclude that HCA is a more economically efficient reflection of inflation for regulated pipeline services. HCA accounting for inflation emulates the way in which pipeline suppliers and customers transact in competitive pipeline markets to promote long-term efficiency—particularly when competitive pipelines bring another fuel or source fuel from another location in established energy markets. In fuel markets served by independent pipelines, long-term contracts confront gas pipeline customers *ex ante* with the long-term consequences of their own decisions to install equipment for the consumption of gas, making the yearly payments simply a way of *allocating* the payment for the choices already made. In other words, HCA coupled with the standard accounting methods for depreciation (which accountants recognize is also merely a method of book entry *allocation*) deals with pipeline costs the way competitive

³ See National Gas Access (WA) Act 2009, Part 3, Section 23: “The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.”

⁴ *Ibid.*

markets do—which was the ultimate goal of the original 1990s push for the privatisation of Australian public service enterprises.⁵

The regulatory economics literature does not support the notion that a “levelised” or “annuitised” collection of investment costs, rather than the traditional collection (through annual depreciation charges coupled with a nominal return on undepreciated balances) is efficient from the perspective of consumers of pipeline services. Smooth revenue collection for an investment does not equate to economic efficiency. Unregulated pipeline markets use contracts to signal to shippers, right at the start, the consequences of their demand for pipeline capacity—thereby allowing shippers to make efficient choices on the gas-using equipment they will install and their long-term costs. Regulated gas network suppliers serve the bulk of their customers without such contracts. In such an environment, HCA does a better job of reflecting the opportunity costs for the capital employed (the way those capital markets account for it) than CCA. Anyhow, it is of no economic benefit to shield customers from the costs that could otherwise inform their own decisions on whether and how to use gas in their long-term interests.

The choice of HCA is also important from the perspective of business enterprises generally—whether regulated or not. Evidence from North America, Europe and Australia shows that, when given a choice between HCA and CCA for booking non-financial assets, competitive industries unambiguously prefer HCA for a variety of reasons. While it is true that regulated

⁵ “As the Prime Minister has observed, ‘the engine which drives efficiency is free and open competition.’ [note omitted] Competition is also a positive force that assets economic growth and job creation.” See: Commonwealth of Australia, National Competition Policy [*Hilmer*], 1993, p. xv.

markets employ prescriptive pricing-structure and price-control tools to promote the kinds of economic efficiency referred to in the Act, those tools do not prescribe CCA for the regulation of ongoing investor-owned enterprises. There is nothing in the foundation of the economics of regulation to justify departing from the unambiguous preferences of competitive markets for HCA as a means for dealing with the capital that regulated companies provide for the public's use. As such, HCA is firmly embedded as the default accounting standard in competitive markets around the world (including competitive pipeline markets) and in longstanding regulated sectors like those in Canada and the United States.

In contrast, CCA—with its deferral of payment for the inflation component of capital charges vis-à-vis HCA—is in prevalent use for regulated companies today in Australia. Why? CCA was used initially to address the problem of valuing the assets of state-owned enterprises for privatization—first in the UK, and then in New Zealand and Australia. Those state enterprises ultimately drew from public funds—not the capital markets—and it was reasonable to compute a “current” value of such assets to set a RAB for privatisation. The use of CCA allowed governments to strike a balance between, on one hand, maximising the sale price, and, on the other, avoiding short-term tariff shocks that would have adversely impacted consumers and, in political terms, undetermined support for privatisation. The difficulty, however, was that in the medium and long term tariffs would rise higher under CCA as the deferred revenue was recovered.

Thus, when Australia adopted CCA for its newly-regulated companies, computing “current” asset values for privatisation served a valid purpose in reflecting reasonable asset values for state-owned enterprises whose books were never constructed or kept to satisfy the investment community. But continuing to compute “current” assets values for ongoing investor-

owned regulated enterprises does not serve such a purpose, and the prescriptive tools for eliciting efficiency in investor-owned regulated businesses do not support CCA. Rather, they support HCA as a reasonable reflection of how the capital markets treat their funds.

The problems inherent in CCA are apparent in recent regulatory decisions, such as the GasNet decision in 2013 and the Goldfields decision in 2005.⁶ In those decisions, the deferral of the payment of inflation into the future, via a “smoothed” revenue profile, appears to have become a regulatory goal in and of itself without an objective foundation in the principles of regulatory economics or any evidence that efficient operation or growth—or public welfare—is served by such revenue deferrals. As such, regulated companies have become understandably frustrated with the continued application of CCA.

The ultimate question in dealing with inflation is whether HCA or CCA better promotes efficient growth in markets and long-term consumer welfare. The question involves different collection patterns for the cost of particularly long-lived assets, planned and installed to serve long-term service requirements, within a portfolio of numberless such assets in unique combinations, serving an unbundled pipeline component that is generally the smaller share of a larger gas supply service cost (the larger share being the gas itself). Such complexity should not detract from the evidence that HCA is the preference in competitive pipeline markets and the

⁶ Access arrangement final decision, APA GasNet Australia (Operations) Pty Ltd, 2013-17, issued 2013; Final Decision on the Proposed Access Arrangement for the Goldfields Gas Pipeline, issued by the Western Australia Economic Regulation Authority, 2005

way those markets account for their funds. And it is ultimately the competitive market paradigm that drove Australia's push for privatisation in the first place.

Further, without any evidence suggesting otherwise, the *efficient growth* in the market for such services should reflect the kind of accounting that unregulated markets prefer—not a type of accounting created to solve an initial privatisation problem that is no longer relevant. In such a case, it is reasonable to conclude that promoting efficient growth means using the prescriptive economic tools to promote efficiency where they are applicable, and otherwise employing the accounting and financial architecture of competitive markets; that is, not to promote *any growth* by deflecting inflation costs to future captive service consumers, but *efficient growth* by using the best economic and accounting tools that the economic literature and competitive markets support.

II. Efficient Pipeline Regulation

Pipelines share much in common with other industries subject to regulation. The same economic principles that apply to regulated pipelines would also apply to other regulated companies (such as those providing electricity and water). But pipelines are also unique in the way they transport fuel long distances with immobile and relatively low-technology capital facilities that serve no purpose other than to transport that fuel between particular locations. The efficient regulation of pipelines should reflect both the principles that apply to regulatory enterprises generally and those that apply particularly to the unique features of pipelines. This section looks at both.

A. Productive and Allocative Efficiency for Existing Regulated Enterprises

The regulatory economics literature gives two particular definitions to the term “economic efficiency.” Regulated firms exhibit *productive efficiency* when they produce their services at least cost over time. The provision of regulated services reflects *allocative efficiency* when the societal resources consumed in the provision of those services go to their highest valued use. The vast economic literature on the subject of productive efficiency in regulation, a representative sample of which I present in Appendix A, stems from investigations into “incentive-based regulation,” generally credited to UK Treasury economist Stephen Littlechild, and subsequently applied to privatised companies in the UK and elsewhere.⁷ An equally vast literature, also listed in Appendix A, involves the pursuit of allocative efficiency in the form of

⁷ Littlechild, S.C. (1983) “Regulation of British Telecommunications’ Profitability.” Report to the U.K. Secretary of State.

what is commonly-referred to as “marginal-cost pricing,” synthesized and popularized in the modern regulatory economics literature by Professor Alfred E. Kahn.⁸

1. Productive Efficiency and “Incentive-Based” Regulation

Incentive-based regulation arose with both the wave of pipeline and other utility privatizations that began in the United Kingdom in the 1980s and the search around the same time for more effective ways of regulating prices for the rapidly-changing telecommunication industry. A principal focus of such regulation is to provide an alternative to traditional cost-based regulation. Incentive regulation, also known as “price cap” or “RPI minus X” regulation, permits regulated prices to change without a full tariff case, lengthening what is known as “regulatory lag.” That lengthened regulatory lag subjects pipelines and other regulated utilities to the type of incentives experienced by company managements in competitive industries where benchmark prices move according to the productivity of the industry in question rather than the particular costs of one company.

The economic literature, comprising roughly 50 articles and papers listed in Appendix A, reflects the desire to insert competitive incentives into the business of controlling the revenues of regulated firms. The root of this literature is a report to the UK Secretary of State by Littlechild in 1983 describing this new method of price control. His goal, as reflected both in his writings and generally in the economic literature, is the best reasonable emulation of competitive incentives within the constraints of generally non-competitive sectors (telecommunication,

⁸ Kahn, A.E., *The Economics of Regulation, Principles and Institutions*, Wiley, New York (1971).

electricity, gas, water, etc.). The literature thus generally takes the level of permissible revenues as given, rolling it forward according to a pre-set formula (of the RPI minus X variety, where RPI is the movement in the general price level and X is a measure of overall productivity growth). If the regulated firm beats the formula-based revenue trajectory by containing costs or expanding sales, it swells its permitted return. If not, its return suffers.

Such incentive regulation exists to elicit *productive efficiency* as a way of avoiding inefficient cost-plus incentives that traditional cost-of-service regulation can embody. The literature on incentive regulation is reflected in the type of five-year formula-based regulation adopted for privatised firms in Australia. The goal of such prescriptive regulatory tools as embodied in the incentive regulation literature is to achieve *productive efficiency* in regulated firms, as addressed in Section 24(3) of the Act.

None of the publications that discuss incentive regulation and productive efficiency in Appendix A prescribe the use of CCA to encourage efficiency.

2. Allocative Efficiency and Marginal Cost Pricing

Marginal-cost pricing (popularized in the modern economic literature by Kahn and others starting in the 1970s) emphasized that marginal-cost principles appearing in unregulated markets, and as defined by economic theory, were both practical and necessary to promote economic efficiency in increasingly high-cost regulated service environments. The point of such economic literature was to investigate how to systematically apply such pricing to regulated industries that had historically relied on either non-economic, or haphazardly economic methods of pricing such services in order both to use infrastructure most efficiently and to present consumers with economically efficient price signals.

Kahn was certainly not the first to describe a seemingly obvious application of economic pricing to the question of regulation. But his 1971 book⁹ appeared at the right time: when electric utility prices stopped their seemingly relentless fall throughout the twentieth century to reflect newly-rising fuel costs and the limits of economies of scale in electricity generation. As in the case of incentive regulation and productive efficiency, the discussions of marginal cost pricing and allocative efficiency in the publications listed in the applicable section of Appendix A take the permissible revenue level as given—to be recouped in the fashion most consistent with the behaviour of markets without regulatory constraints.

B. Efficient Pipeline Entry into Fuel Markets

The economic literature on the methods for achieving productive and allocative efficiency (as listed in Appendix A) takes the existing regulated facilities as given. That literature does not address what motivates such facilities as pipelines to be built in the first place. Because pipeline enterprises are highly capital intensive, last for decades and, once installed, cannot be re-deployed to other uses or locations, they require particular forms of long-term assurance of stable relations with both suppliers and users. These stable assurances (whether contractual or regulatory) change the context of the periodic charges levied by independent pipeline enterprises—signalling a long-term relationship unlike the prices for other businesses.

⁹ See Appendix A.

1. The Economics of Pipeline Entry

The industrial relationships that motivate the building of pipelines are the subject of a substantial field of economic inquiry called “transactions cost economics” that has produced a body of peer-reviewed literature covering pipelines and other similar types of industries.¹⁰ In this economic literature, pipelines are called “transactions-specific” in that they realize their value only in relation to a particular transaction and become less valuable (or lose their value entirely) if relegated to another use. Pipelines have no use other than that for which they were originally installed. Uncertainty or commercial opportunism can readily wreck the investment value. The resulting commercial challenges are so great that governments often themselves step in to build pipelines with public funds. Where investors build pipelines, they make interlocking relations with suppliers and users—which often-enough take the form of formal vertical integration to deal with the risk that pipelines will not be used as planned. Non-integrated, independent pipelines require particularly robust contracts or other assurances against such risks before investors will commit capital to such an enterprise.¹¹

In the century-long history of pipelines, whether upstream supply pipelines or local distribution pipelines, vertical integration into gas production or government ownership were originally the near-universal modes of industrial governance. Australia is no exception.¹²

¹⁰ See: Klein, B.J., Crawford, R., and Alchian, A., “Vertical Integration, Appropriable Rents, and the Competitive Contracting Process,” *Journal of Law and Economics*, 21, No. 2 (1971), pp. 297-326; Makhholm, J.D., *The Political Economy of Pipelines*, University of Chicago Press, Chicago and London (2012).

¹¹ See *The Political Economy of Pipelines*, Chapters 5-7 (pp. 78-152).

¹² See: *The Political Economy of Pipelines*, pp. 41-42, 63-68.

Independent pipeline suppliers arrived later; requiring either meticulous contracts or credible regulatory coverage to motivate the long-term dedication of investor capital.

2. Revenue Collection as an Allocation of Costs, not a Valuation of the Pipeline

Unlike most other business enterprises, the periodic charges for the use of independent pipelines reflect not the current value of the pipe but rather an *allocation* of the costs for supply decisions already made. Economists have long recognized that such charges “refer to an expenditure which has taken place, and are merely a special method of writing history. Depreciation accounting enables the business firm to make several ledger entries, instead of one, when a capital expenditure occurs.”¹³ That is to say, given the transaction-specific nature of independent pipelines, the revenues received recoup the costs of the pipelines in place according to the methods that accountants have of spreading out the ledger entries over the life of the pipeline. If there are new pipelines (or additional pipelines) new revenues (or revenue increments) will cover those.

3. CCA Accounting for Regulated Companies

If revenues are simply a way of recouping the cost of past decisions on the entry of investor-owned pipeline investments, then the question remains whether to recover inflation from pipeline customers the year it is incurred or from future consumers—that is, HCA or CCA?

¹³ Bell, C.S., “Elementary Economics and Depreciation Accounting,” *The American Economic Review*, Vol. 50, no. 1. (March 1960), p. 154.

Discussions about the propriety of using HCA or CCA as the basis for regulating the value of gas pipeline property have their roots in the rapid privatization of British Gas in 1986, where owing to the press of time the government used accounting rules designed for valuing investments in public enterprises. Those public-entity accounting rules are in a 1984 HM Treasury report entitled “Accounting for Economic Costs and Changing Prices.” Led by I C R Byatt—then Deputy Chief Economic Advisor, HM Treasury (later to become the Chairman of OFWAT, the water industry regulator)—the “Byatt Report” is well known in the UK. The report focused on nationalised industries, where the capital markets were not directly involved in financing.¹⁴

The Byatt Report remains a prescription for how to reflect the value to the state-owner of state-supplied services, given the state’s ability to draw upon public funds instead of needing to go to the competitive market for funds. As such, it was an important reference document in the later privatizations in New Zealand and Australia. New Zealand derived values for its newly-privatised enterprises through the “Optimised Deprival Value” valuation metric by the New Zealand Ministry of Commerce in 1993 and 1994. A similar concept lay behind the Depreciated Optimised Replacement Cost (DORC) in Australia for the initial tariff review valuation of the

¹⁴ See: *Accounting for Economic Costs and Changing Prices, A Report to HM Treasury by an Advisory Group*, Her Majesty’s Stationery Office, London (1986) (the “Byatt Report”), Vol. 1, p. 5. “... **accounting for changing prices is especially important in nationalised industries**. ... Nationalised industries ... differ from most of the private sector ... [in that among other things] there is no competitive market in the capital of the industries.” (emphasis in original)

capital of privatised enterprises.¹⁵ The initial valuations, thus fixed, have been “rolled over” according to capital additions and depreciation in subsequent tariff reviews.

4. Competitive Market Reaction to CCA Accounting

For a five-year interval beginning in 1979, accounting standards in the United States required CCA (current cost) disclosures. Along with many other countries in the developed world, the United States experienced unexpected inflation in the 1970s. Accordingly, with the *Statement of Financial Accounting Standards (FAS) No. 33, Financial Reporting and Changing Price*, the FASB began an experiment to require large companies to disclose supplemental price-adjusted information (in addition to historical cost data) about Inventories and Property, Plant, and Equipment. In 1983 FASB requested comments on the utility of FAS 33.¹⁶ Responders included institutional investors, market analysts, rating agencies, retailers, suppliers, manufacturers, and others. The approximately 400 comments received, which were highly critical of the cost and usefulness of inflation-adjusted financial statements, prompted the subsequent elimination of the requirement to report price change indexes in financial reports. A large number of responses to the Invitation to Comment suggested that the costs of preparing the disclosures had outweighed the benefits. Some respondents stated that although inflation is considered in assessing the results of operations, mandatory disclosure requirements were

¹⁵ See: Makhholm, J.D., *The Political Economy of Pipelines*, University of Chicago Press, Chicago (2013), pp. 240 (n.19); “Rationale for Financial Performance Measures in the Electricity Information Disclosure Regime,” A Report to Energy Policy Group, by Ernst & Young, August 1994; and the Final Decision by the Office of the Regulator-General, Victoria for the Multinet, Westar, and Stratus Access Arrangements, October 1998

¹⁶ Invitation to Comment: Supplementary Disclosures about the Effects of Changing Prices, December 1983

unnecessary because users have developed their own methods for making those assessments. A large majority of respondents commented that the data provided in the experiment: (1) were too simplistic to represent actual ongoing cost or entry cost; (2) were not reflective of price changes of specific assets; (3) could not incorporate changes in technology and preferences; (4) were not a useful indicator of future spending or cash requirements; and (5) were ignored by managers, market analysts, industry experts and shareholders.¹⁷

This preference for HCA over CCA was reflected previously. In a 1947 decision, the Committee on Accounting Procedure concluded that price-change adjustments should not be recognized because such adjustments were inherently subjective, unless determined through the “serious step” of a complex and formalised appraisal method, without which “...there would be no objective standard by which to judge the propriety of the amounts of depreciation charges against current income, and the significance of recorded amounts of profit might be seriously impaired.”¹⁸ Over fifty years later, these views were maintained in a decision regarding the valuation of leased assets. FASB determined that assets should be valued at historical cost, as any subsequent reassessment of fair value would be too complex. Justification included the fact that there is “rarely an active market” and “it requires the use of both current expected cash flows and current interest rates.”¹⁹

¹⁷ Comment summaries from survey respondents are contained in Appendix B.

¹⁸ See Accounting Research Bulletin 43, Chapter 9, Depreciation, Section A – Depreciation and High Costs, paragraph 7.

¹⁹ See Proposed Accounting Standards Update (Revised): Leases (Topic 842) (September 2013), paragraph BC186.

Other countries have also rejected CCA for normal accounting purposes. Professors Christensen and Nikolaev from the University of Chicago surveyed the accounting choices of firms in Germany and the UK when International Financial Reporting Standards (IFRS) mandating fair value accounting were proposed in Europe starting in 2005. Under IFRS, firms have the option to choose either HCA or a fair-value approach to book plant and equipment. The survey found that over 95 percent of firms revealed their preference for HCA for non-financial assets when mandated to move to a new accounting regime.²⁰ An earlier study of Australian firms, predating IFRS, found that CFOs had many reasons for deciding not to revalue plant and equipment, including “valuations not easily/reliably obtained, depreciation adjustments preferred, too many items of plant and equipment, [and] effect on earnings detrimental.”²¹ These experiences are consistent with that of the United States, where competitive firms have shunned the revaluation of plant and equipment.²²

C. Conclusions on the Efficient Regulation of Pipelines

Nothing about the basic accounting questions affects the ability of regulators to apply the standard tools to elicit productive or allocative efficiency for pipelines in place. Thus, the choice between HCA and CCA involves whether one or the other better informs efficient pipeline entry and the choice by consumers of whether and how to consume gas (i.e., which kind of gas

²⁰ “Does Fair Value Accounting for Non-Financial Assets Pass the Market Test?”, Hans B. Christensen and Valeri V. Nikolaev, Review of Accounting Studies (RAST) Conference, November 2012.

²¹ Easton, Peter D. Eddey, Peter H. and Harris, Trevor S. “An Investigation of Revaluations of Tangible Long-Lived Assets,” *Journal of Accounting Research*, Vol. 31, Supplement 1993

²² See Appendix B.

equipment to install). For pipelines that serve without specific contractual commitments, HCA does a better job of reflecting the revenues that track the computations of the opportunity cost of capital providers—reflecting in revenues the inflation-related opportunity cost in the year it occurs. Deferring such opportunity costs simply creates intangible capital accounts that must be paid by captive consumers later.

Regulators cannot *conscript* capital from those competitive markets as public authorities once did for publicly-owned infrastructure services—they must *attract* capital. Indeed, such was one of the key incentive-destroying aspects of pre-privatisation Australian economic activity, with its many publicly-owned pipelines and other utilities, that *Hilmer* sought to change. As such, *investment efficiency* reasonably deals with how those capital markets, with alternatives in which to place their funds, decide to devote capital to regulated companies, for what purpose, and at what cost.

Inviting competitive capital markets to participate in providing gas pipeline services efficiently necessarily includes embracing the institutions and practices upon which those competitive markets rely. Those capital markets rely on longstanding definitions for accounting and related concepts (such as depreciation). Reflecting the contemporaneous nominal opportunity cost of capital, including the generally-accepted methods of depreciation accounting, is consistent with the expectations of those capital markets in the way they account for investments in the market. CCA accounting, with its deferral of the cost of inflation, is not.

III. Reflections of Economic Efficiency in Pipeline Regulation in Australia

The NGR and National Gas Law (NGL) use the terms “efficiency” and “economic efficiency” in ways consistent with these widely-held definitions in the regulatory literature discussed above. Australian regulators generally comport with the prescriptions of such research, including the method of “*RPI minus X*” regulation (to promote productive efficiency) and in the principles of marginal-cost-based regulated prices (to promote allocative efficiency). The choice between HCA or CCA, or how to deal with the contemporaneous cost of inflation, is more a question of how pipeline markets deal generally with eliciting efficiency behaviour.

A. “Efficiency” as Defined in the NGL

The 2009 National Gas Access (WA) Act (under which Western Australia administers the NGL) breaks economic efficiency as it relates to national gas regulation into three components:²³

24(3): A service provider should be provided with effective incentives in order to promote economic efficiency with respect to reference services that service provider provides. The economic efficiency that should be promoted includes:

- (a) efficient investment in, or in connection with, a pipeline with which the service provider provides reference services; and
- (b) the efficient provision of pipeline services; and
- (c) the efficient use of the pipeline.

These definitions as a group capture the familiar definitions of economic efficiency in terms of *productive* and *allocative* efficiency. The former involves incentives of the pipeline to

²³ 2009 Act, pp. 75-76.

build and operate facilities at least cost to provide service to customers (points (a) and (b) above) through *RPI minus X* regulation to avoid wasteful “cost-plus” management attitudes. The latter involves presenting customers with the price signals to promote efficient use (point (c) above) through the application of “marginal-cost-based pricing” to avoid wasteful congestion or idling of such facilities.²⁴ Such are the regulatory tools in wide acceptance, as described in the regulatory economics and practical literature, in Australia and elsewhere, to achieve “efficient production” and “efficient use.” It is proper to construe that the NGL/NGR drew from these universally familiar and time-tested regulatory tools for economically efficient revenue control and consumer pricing.

These definitions of economic efficiency mirror *Hilmer*, which defines economic efficiency, with references to competitive markets for each, as follows:²⁵

1(a): Economic Efficiency

Efficiency is a fundamental objective of competition policy because of the role it plays in enhancing community welfare. There are three components of economic efficiency:²⁶

- **Technical or productive efficiency**, where firms produce goods and services at *least cost*. ...
- **Allocative efficiency** is achieved where resources used to produce goods and services are allocated to their highest valued uses. ...
- **Dynamic efficiency**, where industries make timely changes to technology or products in response to consumer tastes or productive opportunities. Competition in markets for goods and services provides incentives to undertake research and development, effect innovation in product design,

²⁴ The Act also specifies that “regard should be had” for the “costs and risks” of “under and over investment” and “under and over utilisation” of a pipeline (sections 24.(6)-(7)).

²⁵ *Hilmer*, pp. 3-4.

²⁶ See Treasury (Sub 76), published separately as *Treasury Submission to the National Competition Policy Review*, (1993), ad 3-5, as cited in *Hilmer*, p. 4.

reform management structures and strategies and create new products and production processes.
(emphasis in original)

The first two are familiar in regulation, and as such are reasonably paraphrased in the Act. The third, if it has anything to do with regulation at all, might be construed as having something to do with the long-term efficient provisions of regulated services—or the efficiency of pipeline entry.

B. Recent Regulatory Decisions Discussing CCA

As pipeline and public utility regulation has developed in Australia, legislatures have addressed and resolved various issues that should form the basis for regulation for the long term. For example, regulators and the courts have litigated the rules relating to coverage and the initial property values used as the basis for regulation. But the basic accounting value for determining revenue levels, or for making depreciation calculations, remains uncertain. Regulators in Australia have used HCA and CCA valuations without clear-cut rules on which approach they prefer that would guide future actions by themselves or other Australian regulatory bodies. For example, in the Goldfields Final Access Arrangement of 2005, the regulator approved a switch to HCA;²⁷ but in the APA GasNet Final Decision of 2013, the AER directed the company to retain CCA.²⁸ What appears evident in these decisions is that a mixture of economic efficiency criteria is being applied inappropriately to the choice between HCA and CCA. That is, the choice of accounting method is not supported by accepted concepts of economic efficiency or the tools

²⁷ Final Decision on the Proposed Access Arrangement for the Goldfields Gas Pipeline, Economic Regulatory Authority, 17 May 2005, paragraph 315 (p. 70).

²⁸ APA GasNet Final Decision, Appendix D (Depreciation), March 2013.

regulators use to promote it. In this context, and in the AEMC’s recent rule changes, it would appear that a fundamental examination of these accounting issues is needed.²⁹

1. Goldfields Gas Transmission

The Goldfields case involves a pipeline company, Goldfields Gas Transmission (GGT or “the company”), that had initially agreed to an accounting method reflecting a levelised revenue profile over time (by producing constant revenues in inflation adjusted terms—a form of CCA combined with deferred depreciation). Later, the company switched to request HCA (which it called the “Cost of Service methodology”) because it concluded that the complexity of the accounting, and the associated problems with transparent revenue determination, made an objective analysis of revenue determination unnecessarily difficult. The ERA ultimately permitted the company to make the switch to HCA, but only after requiring other amendments to the company’s application that had the effect of lowering permissible revenues despite the switch to HCA (see below). Thus, while the ERA permitted the switch to HCA, the rationale for it would seem to call for more consistent analysis *vis-à-vis* the NGL and NGO.

GGT’s description of the original method for computing revenues is as follows:

GGT’s original tariff design delivered levelised (i.e. constant in inflation adjusted terms) tariffs. These were established using an NPV methodology spanning the entire 42 year life of the pipeline under the State Agreement. The levelised tariff methodology was specifically utilised to explicitly deliver tariffs in early years which were lower than those calculated under a Cost of Service methodology. By definition, therefore, tariffs applicable to the GGP under the State Agreement were designed to under-recover pipeline

²⁹ See: AEMC 2012, Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper, 15 November 2012, Sydney.

costs in the early years of project life and over-recover costs in the later years in order to achieve the same NPV as it would have achieved using a Cost of Service tariff setting methodology.³⁰

The company's change of attitude regarding the objectivity and predictability of its revenue determination is reflected in its statement on the difficulty of deriving transparent reasons for the ERA's changes to its submission:

The tariff determination methodology employed by the Regulator is esoteric and arcane, and appears to contain flaws which can be unravelled only by delving deep into the often implicit assumptions underpinning his calculations. ...

GGT believes that developing real (constant value dollar) returns and forecasts adds an unnecessary level of complexity to the tariff setting process, since results are reported (to shareholders and wider stakeholders) in nominal terms. Inflation in Australia is low, and, thus, any distortion due to inflation is small. Thus, it is much simpler to establish the capital base, set rates of return, and establish tariffs in nominal terms.³¹

In the end, the ERA stated:

The Authority was mindful that the historical cost accounting methodology used by GGT for the calculation of Total Revenue has the effect of accelerating depreciation and considers that there is no substantive justification in terms of expectations of a decline in the market for pipeline Services.³²

Nevertheless, the ERA permitted GGT to make the switch, saying the following:

However, taking into account that the effect of this is to affect the time path of tariffs but not the present value of returns to GGT over the life of the pipeline, and that the required amendments to the Access Arrangement under this Amended Draft Decision result in a reduction in tariffs for the pipeline despite the accelerated depreciation, the Authority considered that the historical-cost, straight-line depreciation methodology used by GGT for the purposes of the tariff calculation described in its submission of 17 December 2002 complies with the requirements of the Code.³³

³⁰ GGT's Public Submission No. 1 on Draft Decision for Goldfields Gas Pipeline Proposed Access Arrangement, 13 July 2001, p. 39.

³¹ Ibid, pp. 39-40.

³² Final Decision on the Proposed Access Arrangement for the Goldfields Gas Pipeline, paragraph 315. It must not be overlooked that the regulators characterisation of "accelerating depreciation" is misleading in that it assumes that CCA is the 'right' method. The CCA method actually results in a deferral of depreciation compared to the HCA method which is the only method supported by the accounting rules and practice for many firms and the commonly adopted practice of competitive firms.

³³ Ibid.

From the perspective of economic efficiency, by tying the suitability of HCA, and the lower revenues in later years to “expectations of a decline in the market for reference services,” the ERA blurred the line between economic valuation (which draws from values in the market) and regulatory valuation (which draws from how regulators set property values for the purpose of setting regulated prices). As discussed in the preceding section, there is no support in the relevant economic literature for deciding on a revenue accounting regime based on assumptions regarding the nature of the market for pipeline services decades in the future.

There are, of course, times when changes in the nature of energy markets mean that the demand for pipeline services do not turn out as planned. For example, shifting patterns of unconventional gas production in North America have greatly changed the demand patterns for the TransCanada Mainline—North America’s largest gas pipeline—which has led Canadian regulators to alter depreciable lives for idled capacity.³⁴ But the TransCanada case is a highly-unusual exception where unpredictable market forces compel a regulatory remedy for stranded costs for an upstream supply pipeline. Nothing in the course of the normal operation of gas distributors would warrant such actions. Absent the unseen dislocations in cases like TransCanada’s, there is no justification in regulatory economics for altering the regulatory allocation of the costs of past investment decisions in an essentially objective fashion.

³⁴ Canadian National Energy Board *Reasons for Decision* in RH-003-2011, pp. 52-54.

2. The 2013 APA GasNet Decision

In the GasNet case, basic revenue accounting (HCA/CCA) and depreciation were both repeatedly used by the AER as tools for pursuing economic efficiency. The AER made various references to “efficient growth” in its evaluation of APA GasNet’s proposal to utilize HCA when determining its revenue profile. However, the discussion did not engage directly with the accounting method or the appropriate treatment of inflation but rather confused the issue by reviewing only the consequential impact on the depreciation amount. As a result, those references generally cloud the responsibility to assure revenue adequacy with the responsibility to encourage efficient prices. For example, the AER states in the APA GasNet Draft Decision:

There are several reasons to expect APA GasNet’s [HCA] proposal will inhibit efficient growth of the market. These include: ... Inefficient asset utilisation—Depreciation schedules which provide for price paths that encourage inefficient utilisation of assets, that is, under or over utilisation of the asset at different times in its life cycle.³⁵

This discussion by the AER encapsulates the difficulty of discussing proper accounting methods—turning the job of how to align consumer interests with fair investor returns into a subjective discussion based on an unprovable assumption that abandoning HCA to allow a more smoothed revenue collection for a single asset somehow promotes efficiency or efficient growth. First, efficient asset utilisation is the proper job of efficient pricing structures, including all of the methods that have long been employed by regulated companies to encourage the best use of limited infrastructure assets. Second, the discussion of the “life cycle” implies that depreciation is somehow related to “peak load” pricing over time, rather than the recovery of the cost of past

³⁵ AER, *Access arrangement draft decision, APA GasNet Australia (Operations) Pty Ltd, 2013-17, Part 1*, September 2012, p. 115.

investment decisions. Depreciation charges, as part of the permissible revenue level, simply do not constitute a recognised tool for efficient pricing of existing facilities. And to the extent that the question involves whether to build the infrastructure at all, competitive markets, including the competitive capital markets from which regulated pipelines draw their investment funds, prefer HCA.

There are other problems associated with the AER's reasoning in rejecting APA GasNet's claim that capital costs are lower with HCA. The AER states:

Even if the additional revenues from the change of approach are offset by falls in other building block components, such as the rate of return and consequently the return on capital, the price impact cannot be ignored. Customers would expect prices to fall if the rate of return and other cost components are reduced.³⁶

Although it may be unintentional, this passage would seem to confirm an attachment to CCA simply because it delivers lower prices in the short term. The statement implies that (1) the change would have to produce a net decrease in current revenues to be efficient; and (2) even then, the impact on customers of bearing the partially countervailing increase in depreciation charges in the future is irrelevant to the consideration of benefits customers would expect to get from lower capital costs now. This latter conclusion would appear to be contradictory to the NPV=0 principle relied upon by regulators in delivering a decision (as referred to by the ERA in the earlier decision). Neither is a reasonable implication and both are inconsistent with expectations of usual practices of regulators. Regulators, in performing their functions acknowledge that both increases and decreases in costs and prices could be efficient and consider

³⁶ Ibid, p. 117.

outcomes to customers over the long term. Regulators are required under law to consider the long-term impacts and consumers rely on this so that short-term decisions do not put long-term efficient service provision at risk.

In its draft GasNet decision, the AER also referred to the regulatory rule that to promote efficient growth, a substantial amount of depreciation may be deferred.³⁷ But the thrust of the AER's comments are that the rule applies generally to the HCA/CCA choice regardless of the circumstances. A more practical reading is that for particular start-up service providers, the specific deferral of initial capital costs may be required in order to attract initial consumers. Such deferrals are reasonably common, even in HCA environments, for start-up pipelines.³⁸

The GasNet final decision displays, in a succinct fashion, the AER's mixing of the concepts of accounting/revenue adequacy on the one hand and economic efficiency on the other:

The AER considers that [CCA] depreciation will generally lead to tariffs varying, over time, in a way that promotes efficient growth in the market for reference services. . . . In most circumstances, this would imply that sunk costs are recovered as evenly as possible over an asset's life and that revenues (and tariffs) be relatively flat.³⁹

Again here, there is no support for the assertion that flatter revenue profiles for particular assets are the most efficient.

Prices, capacities, contracts, and other commitments tie consumers and pipeline owners together in reasonable and efficient ways (particularly for upstream pipelines like those owned

³⁷ NGR, r. 89(2). See Part 2 (attachments) for the Draft Decision, p. 171.

³⁸ Greenfield LDCs such as Enbridge Gas New Brunswick in Atlantic Canada and Phoenix Natural Gas in Northern Ireland have relied upon deferral accounts or similar regulatory mechanisms during the initial stages of operation.

³⁹ APA GasNet Final Decision, Appendixes, p. 87.

by GasNet) that have little to do with the basic accounting that mimics practices in unregulated markets. There is no foundation for the AER's evident belief that the CCA depreciation profile for a single asset, being "flatter" than the HCA profile, better achieves the Act's economic efficiency criteria.

IV. Concluding Remarks

The choice between HCA and CCA is more complicated than the regulatory decisions discussed above convey. Economic efficiency has multiple definitions: both in the relevant legislation covering regulated pipelines in Australia (the NGL and NGR) and in important precursors, such as the *Hilmer*. The economic literature is prescriptive in its identification of tools for achieving those efficient outcomes. Furthermore, the ultimate rationale for employing any of those economic efficiency tools is emulation of the incentives and outcomes of competitive markets. Such concepts are critical to assessing the straightforward choice between HCA and CCA.

Separate from the traditional productive/allocative efficiency goals (and the tools used to achieve them) the NGL and NGR define economic efficiency a third way, called “efficient investment” in the NGL/NGR, and “dynamic efficiency” in *Hilmer*. Both imply a focus on the long-term, which is reasonable given the long life—and long-term planning aspect—of pipeline investments. In this context, the choice between HCA and CCA does matter, and to the extent that competitive markets are the standard, HCA would appear to be the better choice for the following reasons:

- Competitive markets do not use CCA. Evidence from competitive markets, including the market for funds upon which regulated pipelines depend, is that those markets unambiguously prefer that accounting records not be coloured by the inflationary indexation inherent in CCA.
- Principles of economic efficiency do not support CCA. Although CCA defers capital charges into the future, there is no support for the proposition that such deferrals promote more efficient consumption or consumer investment decisions (in gas using equipment)

apart from what the tools of marginal-cost pricing can evoke. Indeed, to the extent that CCA could contribute to the shaping of behaviour at all, it would encourage an inefficient shifting of consumption from future periods to the present due to the inherent deferral of financing costs to those future periods compared to how investors assess those costs. It thus promotes investment that consumers may not have supported if prices had included the full costs according to the accounting principles unregulated markets use. Against the standard for competitive markets, such deferrals of cost responsibility promote inefficient investment and use—contrary to the NGR and NGL objectives.

Using basic accounting to try to shape consumer behaviour, rather than the prescribed and accepted regulatory and accounting tools, removes the objective anchor for regulated revenues. It turns the job of how to align consumer interests with fair investor returns—a basic role of regulation—into a subjective problem based on the unprovable assumption that flattened revenue recovery for past investment decisions promotes efficient growth in regulated markets. Competitive markets do not set their prices according to inflation-indexed capital values, and the regulatory literature does not support that economic efficiency is at all enhanced by compelling regulated companies to defer revenue collections to future captive customers.

A choice of HCA (coupled with straight-line depreciation) for non-financial assets has in practice delivered efficient outcomes in competitive markets and (to the extent that firms rely on the accounting method to make decisions about entering and exiting competitive markets) promotes economic efficiency. Further, HCA does not impair the application of the long-recognized tools for achieving economic efficiency, supports efficient growth, and emulates competitive market preferences for book accounting and depreciation to the benefit of consumers.

There is no evidence that CCA's pushing of capital charges into the future achieves any net benefit to the group of today's and tomorrow's consumers.

Appendix A: Literature on Economic Tools for Promoting Economic Efficiency for Regulated Pipelines and Other Utilities

I collected works on incentive regulation and marginal-cost pricing (those being the “economic tools for promoting economic efficiency of regulated pipelines and other utilities”) using the following two-step process.

First, I gathered all relevant works with which I was already familiar—e.g., ones I had cited in previous papers or refer to regularly.

Second, I searched for works in the Econlit and Google Scholar databases, using relevant keywords—e.g., “incentive regulation,” “marginal-cost pricing,” “utilities,” and “efficiency.” From the search results, I gathered all works that were both relevant and accessible to me in electronic or non-electronic format. “Relevant” works were those that discussed the concept in question (incentive regulation or marginal-cost pricing) in a manner applicable to the promotion of efficiency via the regulation of pipelines.⁴⁰

I present the list of the works relied upon below.

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3. Alexander, I. and T. Irwin. (1996) “Price Caps, Rate-of-Return Regulation, and the Cost of Capital.” World Bank Group *Public Policy for the Private Sector* Note No. 87.

⁴⁰ Note that my search was not limited to works discussing the application of these pathways in any one geographic region.

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16. Green, R. (1997) "Has Price Cap Regulation of U.K. Utilities Been a Success?" World Bank Group *Public Policy for the Private Sector* Note No. 132.

17. Hemphill, R.C., M.E. Meitzen, and P.E. Schoech (2003) "Incentive Regulation in Network Industries: Experience and Prospects in the U.S. Telecommunications, Electricity, and Natural Gas Industries." *Review of Network Economics* 2(4): 316-337.
18. Hill, L. (1995) "A Primer on Incentive Regulation for Electric Utilities." Oak Ridge National Laboratory publication, downloaded from <http://web.ornl.gov/~webworks/cpr/rpt/82230.pdf>.
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Appendix B: Comments from Industry on the Efficacy of Inflation-Cost Accounting

As indicated in the body of the report, the three main conclusions resulting from the United States' five-year experiment with requiring CCA disclosures were as follows:

- 1) **CCA is too simplistic to represent actual ongoing cost or entry cost:**
 - General inflation indexes do not reflect price change of specific assets;
 - Current cost data does not incorporated changes in approach due to technology and preferences.
- 2) **CCA is not a useful indicator of future spending or cash requirements.**
- 3) **CCA disclosures were judged as immaterial, and were ignored by:**
 - Managers, market analysts, industry experts; and
 - Shareholders.

Below, I provide the basis for these summary conclusions by quoting from the comments themselves. Note that I only include a small (yet indicative) sample of comments, as including all of the comments supporting these conclusions would be redundant and overly lengthy. The comments provided below are indicative of the general consensus among industry and financial/accounting firms.

1. CCA is too simplistic to represent actual ongoing cost or entry cost

a. Comments from Industry

United States Steel and Carnegie Pension Fund, Inc.: “[The FAS 33 disclosures] have rarely been useful in our analysis work and generally are a misuse of analyst time as well as company preparation cost ... data are not at all reliable, neither for analyzing a particular company, nor for comparison with others in an industry ... [current cost data] would not produce meaningful results, simply because the approach is too simplistic.”⁴¹

Shell Oil Company: “[T]he current cost concept inherently assumes a continuation of identical product lines utilizing similar productive facilities. The disclosures also imply that only depreciation would change if the productive facilities were replaced. In our industry at least, such presumptions are inappropriate and misleading. For example, a modern oil refinery will consume significantly less energy, require fewer operators and produce a different and more valuable slate of products than one which is even a few years old. Therefore, adjusting depreciation to reflect the cost of a modern facility, without recognizing all the other larger changes that would occur if indeed the assets were replaced, produces a result that does not seem useful to anyone.”⁴²

Lockheed Corporation: “Investment analysts with whom we have spoken indicate that the FAS 33 data is of little use to them, although they are very aware of the importance of assessing the impact of inflation on a company's operations. One reason cited for their lack of interest is the limited disclosure of the assumptions used in preparing the data, with the resultant inability of the analysts to make a meaningful assessment of the data.”⁴³

b. Comments from Accounting and Financial Firms

The First National Bank of Chicago: “FASB 33 does not give an indication of the liquidation value of assets, e.g., a specialized piece of machinery. Instead, it requires the asset be shown at its current replacement cost while, in reality, the machinery may be totally worthless to anyone except the firm which is now operating it.”⁴⁴

American Express Company: “Technological change has a far greater impact on our investment in this equipment than does inflation. The cost of replacing this productive capacity has declined when compared with historical cost. In this respect, constant dollar and current cost

⁴¹ Comment Letter No. 85: Graham O. Harrison, United States Steel and Carnegie Pension Fund, Inc.

⁴² Comment Letter No. 100: N. E. Gautier, Shell Oil Company

⁴³ Comment Letter No. 114: R. H. Northcutt, Lockheed Corporation

⁴⁴ Comment Letter No. 284 & 284A: William G. Dearhammer, Charles H. Montgomery, The First National Bank of Chicago

are misleading and financial statement users do tend to rely on the more conservative historical cost.”⁴⁵

Michigan Association of CPAs Review of FASB and AICPA Drafts Subcommittee: “I don't think that any one method of determining current cost can be applied in all instances and I don't feel that the use of indexes will provide useful information. The current cost of acquiring the same service potential will probably have to be determined on a case-by-case basis. This, of course, would not provide a consistent measurement format and the cost would most likely exceed the benefits.”⁴⁶

2. CCA is not reflective of current or future expenditures

a. Comments from Industry

United States Steel and Carnegie Pension Fund: “Because of ongoing change, current cost estimates based on present plant and technology will often not be of relevance in assessing future spending and cash requirements ... Such estimates, even if calculated with the best of intentions, simply would be ‘soft’ or too unanalyzable by outsiders to be given any credibility.”⁴⁷

General Motors Corporation: “[CCA] purports to present the future cost of capital expenditures (i.e., future cash flows) when in fact it often bears little relationship to future cash flows but instead, represents the current cost of past cash flows (capital expenditures).”⁴⁸

Merck & Co., Inc.: “[W]e do not believe the Statement No. 33 disclosures provide a meaningful measure of the impact of changing prices on our operations. Further, we do not believe they are useful to our shareholders in assessing future cash flows or enterprise performance. And finally, we believe the disclosures have the potential to undermine the primary financial statements. All of this leads inexorably to the conclusion that the five year experiment should be terminated.”⁴⁹

b. Comments from Accounting and Financial Firms

Dow Jones & Company, Inc.: “[T]he current value of productive capacity may not be the best available predictor of future cash flows ... [as it] might not show the imminence of new capital expenditures as clearly as a simple aging schedule ... a focus on maintaining productive capacity

⁴⁵ Comment Letter No. 291: Howard L. Clark, Jr., American Express Company

⁴⁶ Comment Letter No. 332: John W. Hebert, Michigan Association of CPAs Review of FASB and AICPA Drafts Subcommittee

⁴⁷ Comment Letter No. 85: Graham O. Harrison, United States Steel and Carnegie Pension Fund, Inc.

⁴⁸ Comment Letter No. 215: J. E. Rhame, General Motors Corporation

⁴⁹ Comment Letter No. 93: Thomas L. Osterbrink, Merck & Co., Inc.

could lead to poor capital investment decisions ... the current cost data Statement 33 provides cannot be effectively used by management in this area.”⁵⁰

Petroleum Accountants Society of Dallas FASB & SEC Reporting Committee: “[T]he disclosure requirements in SFAS 33, as a whole, are not generally useful for assessing the effects of changing prices on oil and gas producing companies.

“The current cost of finding and developing oil and gas reserves bears little relationship to the cost of finding reserves in the future.”⁵¹

Financial Executives Institute Committee on Corporate Reporting: “Indications of possible erosion of operating capability, current cost income from continuing operations, fluctuations in current cost of assets and similar information pertaining to an enterprise cannot be translated into a meaningful assessment of future cash flows without recognizing the effects of other important factors which cannot be quantified.”⁵²

Morgan Guaranty Trust Company of New York: “We believe that the supplementary disclosures required by Statement 33 do not accurately reflect the effects of changing prices on a banking institution.”⁵³

3. CCA disclosures are seen as immaterial and are ignored

a. Comments from Industry

Ford Motor Company: “... from an internal standpoint, the results of this reporting requirement are not viewed as useful by Ford management, and we seriously doubt that the data is of any utility to the external users of financial statements.”⁵⁴

Mobil Corporation: “Changing price data are never used by our management in their decision-making processes. Furthermore, we are not aware of any interest whatsoever in such data by either the financial community or our shareholders.”⁵⁵

⁵⁰ Comment Letter No. 218. Kevin J. Roche, Dow Jones & Company, Inc.

⁵¹ Comment Letter No. 50: Paula S. Armstrong, Petroleum Accountants Society of Dallas FASB & SEC Reporting Committee

⁵² Comment Letter No. 105: Joseph A. Sciarrino, Financial Executives Institute Committee on Corporate Reporting

⁵³ Comment Letter No. 222: John F. Ruffle, Morgan Guaranty Trust Company of New York

⁵⁴ Comment Letter No. 20A, R. G. Bentley, Ford Motor Company

⁵⁵ Comment Letter No. 70: Gerald F. Lewis, Mobil Corporation

Motorola Inc.: “I can tell you, as a fact, that the number of inquiries, comments, even indications of awareness of the material which we have received from readers of our annual report in the aftermath of the 5 annual reports which have contained the Statement 33 required data and discussion has been – ZERO”⁵⁶

Procter & Gamble: “the dearth of interest shown by the financial press indicates that this data has not been useful, and has been generally ignored ... by investors and analysts alike.”⁵⁷

Exxon Corporation: “Our conclusion, upon nearing the end of the 5-year experiment, is that we have (in the language of the oil industry) ‘drilled a dry hole’ with FAS 33. FAS 33 information has clearly failed the key test of decision usefulness. As such, it should be dropped. ... As to shareholders, Exxon has not received any questions or comments relating to inflation-adjusted financial results from its more than 850,000 shareholders. Furthermore, there is very little evidence that Statement 33 data are used in internal decision-making.”⁵⁸

Peabody Holding Company, Inc.: “Thus, it is the opinion of the management of this Company that the majority of information now being provided to represent the effects of inflation and changing prices on operations and selected assets and liabilities is not useful and should no longer be required, either as supplemental information or as part of the basic financial statements.

“Our conclusion is based upon the apparent lack of acceptance of this information as a meaningful tool for measuring either past management performance or projected future cash flows. Discussions with investment advisors employed by us indicates that they tend to dismiss this data (except for disclosures of resource reserves) when analyzing financial statements of natural resource companies. Lack of comparability of this information from industry to industry and, even more significantly, between any two companies within the same industry is cited as the main reason for their disinterest.”⁵⁹

b. Comments from Accounting and Financial Firms

First National Bank of Chicago: “Conversion of the standard accounting presentation of financial statements to reflect FASB 33 is extremely complex and hard to follow.”⁶⁰

⁵⁶ Comment Letter No. 38: John T. Hickey, Senior Vice President and Chief Financial Officer, Motorola Inc.

⁵⁷ Comment Letter No. 81: G. M. Gibson, Vice President and Comptroller, The Procter & Gamble Company

⁵⁸ Comment Letter No. 188: A.L. Monroe, Vice President and Controller, Exxon Corporation

⁵⁹ Comment Letter No. 265: W. Howard Carson, Peabody Holding Company, Inc.

⁶⁰ Comment Letter No. 284 & 284A: William G. Dearhammer, Charles H. Montgomery, The First National Bank of Chicago

American Express Company: “In assessing future cash flows, historical statements are considered more relevant and reliable by analysts. Surveys, such as the one by T. E. McCaslin and K. G. Stanga published in ‘The Journal of commercial Lending,’ July 1983, have shown that users prefer historical statements to inflation adjusted data ...

“We strongly feel that the costs involved would not justify the benefits obtained. Even with the abbreviated disclosures that are required of a financial services company, we spent approximately 200 hours in preparing 1983 data during a period in which our personnel were also required to prepare more critical data for shareholder reports. In addition to the preparatory time, our external auditors are required to provide audit time to review the data.”⁶¹

Bear, Stearns & Co.: “We have not found the FASB No. 33 disclosures to be of significant use to us nor does it appear that our clients, principally institutional investors, accord any attention to the disclosures.”⁶²

Republic National Bank of New York: “I consider FASB 33 to be an academic exercise of little practical value. Analysts in this department are knowledgeable of basic industry price trends and are able to determine if our borrowers are generating real gains in sales and profits, albeit, various methods of recognizing sales and values of inventory may raise questions regarding the quality of recognized cash receipts. To my knowledge, footnotes for FASB 33 disclosure are rarely relied on in our analyses. As a result, I favor that such disclosure be discontinued in the future.”⁶³

Wells Fargo & Company: “Subsequent to the issuance of Statement 33, empirical evidence indicates that neither investors, creditors, nor managers have used the required supplementary disclosures to any great extent.”⁶⁴

Financial Executives Institute’s Members of the Committee on Corporate Reporting: “Evidence to date suggests that virtually no one uses these overly complex data. Furthermore, it is burdensome and time-consuming to prepare the data which must be assembled during the final stages of the year-end closing process. As a result, the Statement 33 experiment per se should be discontinued.”⁶⁵

⁶¹ Comment Letter No. 291: Howard L. Clark, Jr., American Express Company

⁶² Comment Letter No. 12: Lee J. Seidler, Patricia McConnell; Bear, Stearns & Co.

⁶³ Comment Letter No. 16: Joseph W. Harpster, Republic National Bank of New York

⁶⁴ Comment Letter No. 62: Frank N. Newman, Wells Fargo & Company

⁶⁵ Comment Letter No. 105: Joseph A. Sciarrino, Vice President and Technical Director, Financial Executives Institute

Prudential-Bach Securities Inc.: “Statement 33 disclosures are of no value. The data is not useful in part because they are only guesses ... I do not know anyone who actively uses this information.”⁶⁶

City Investing Company: “It has been our general experience that the Statement 33 disclosures are of little use to investors and analysts in assessing the effects of changing prices on the Company and are not considered or used by management in internal decision making.”⁶⁷

National Association of Accountants Management Accounting Practices Committee: “SFAS 33 disclosures are not considered to be particularly useful by investors, creditors, financial analysts, management accountants, and other internal users of financial information.”⁶⁸

NBD Bancorp, Inc.: “As requested, we have evaluated the usefulness of the constant dollar and current cost data and have generally determined that it has no significant value for external or internal management decisions.”⁶⁹

⁶⁶ Comment Letter No. 1: B. V. Wright, Jr., Prudential-Bache Securities Inc.

⁶⁷ Comment Letter No. 97: Richard L. Braun, City Investing Company

⁶⁸ Comment Letter No. 137: John F. Chironna, National Association of Accountants Management Accounting Practices Committee

⁶⁹ Comment Letter No. 293: Gerald K. Hanson, NBD Bancorp, Inc.

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Dr. Makholm concentrates on the issues surrounding the privatization, regulation and deregulation of energy and transportation industries—those that operate networks (such as oil and gas pipelines, electricity transmission and gas distribution systems, telecommunications and water utility systems) and those operating infrastructure business at specific sites, such as oil refineries, electricity generation plants, gas treatment plants, sewage treatment plants and airports. These issues include the broad categories of efficient pricing, market definition and the components of reasonable regulatory practices. Specific pricing issues include tariff design, incentive ratemaking, and the unbundling of prices and services, and analysis of energy commodities markets. Issues of market definition include assessments of mergers, including the identification and measurement of market power. Issues of reasonable regulatory practices include the creation of credible and sustainable accounting rules for ratemaking as well as the establishment of administrative procedures for regulatory rulemaking and adjudication. On such issues among others, Dr. Makholm has prepared expert testimony, reports and statements, and has appeared as an expert witness in many states, federal and U.S. district court proceedings as well as before regulatory bodies and Parliamentary panels abroad.

Dr. Makholm's clients in the United States include privately held oil, gas and utility corporations, public corporations and government agencies. He has represented dozens of gas and electric distribution utilities, as well as both intrastate and interstate oil and gas pipeline companies and oil, gas and electricity producers. Dr. Makholm has also worked with many leading law firms engaged in issues pertaining to the local and interstate regulation of energy utilities.

Internationally, Dr. Makholm has directed an extensive number of projects in the utility and transportation businesses in 20 countries on six continents. These projects have involved work for investor-owned and regulated business as well as for governments and the World Bank. These projects have included advance pricing and regulatory work prior to major gas, railroad and toll highway privatizations (Poland, Argentina, Bolivia, Mexico, Chile and Australia), gas industry restructuring and/or pricing studies (Canada, China, Spain, Morocco, Mexico and the United Kingdom), utility mergers and market power analyses (New Zealand), gas development and and/or contract and financing studies (Tanzania, Egypt, Israel and Peru), regulatory studies (Chile, Argentina), and oil pipeline transport financing and regulation (Russia). As part of this work, Dr. Makholm has prepared reports, drafted regulations and conducted training sessions for many government, industry and regulatory personnel.

Dr. Makholm has published a number of articles in various peer-reviewed and editor-reviewed publications (*Public Utilities Fortnightly*, *Natural Gas*, *The Electricity Journal*, *The Energy Law Journal*, *Competition and Regulation in Network Industries*, and *Economics of Energy & Environmental Policy*)—many involving emerging issues of wholesale and retail competition in gas and electricity, including the issues of unbundled and competitive transport, secondary markets and stranded costs. He is a frequent speaker in the U.S., Europe and elsewhere at conferences and seminars addressing market, pricing and regulatory issues for the energy and transportation sectors. His book, *The Political Economy of Pipelines: A Century of Comparative Institutional Development*, published by the University of Chicago Press, was published in 2012.

EDUCATION

UNIVERSITY OF WISCONSIN-MADISON,
MADISON, WISCONSIN
Ph.D., Economics, 1986
Dissertation: Sources of Total Factor Productivity in the Electric Utility Industry
M.A., Economics, 1985

BROWN UNIVERSITY
PROVIDENCE, RHODE ISLAND
Graduate Study, 1980-1981

UNIVERSITY OF WISCONSIN-MILWAUKEE
MILWAUKEE, WISCONSIN
M.A., Economics, 1980
B.A., Economics, 1978

EMPLOYMENT

1996-present	<u>Senior Vice President.</u> National Economic Research Associates, Inc., (NERA) Boston, Massachusetts.
1986-1996	<u>Vice President/Senior Consultant.</u> National Economic Research Associates, Inc., (NERA) Boston, Massachusetts.
1987-1989	<u>Adjunct Professor.</u> College of Business Administration, Northeastern University, Boston, Massachusetts
1984-1986	<u>Consulting Economist.</u> National Economic Research Associates, Inc., (NERA) Madison, Wisconsin.
1983-1984	<u>Consulting Economist.</u> Madison Consulting Group, Madison, Wisconsin.
1981-1983	<u>Staff Economist.</u> Associated Utility Services, Inc., Moorestown, New Jersey.

RECENT TESTIMONY (SINCE 2000)

Before the 298th Judicial District Court of Dallas County, Texas, Expert Testimony on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, February 2014. Subject: Assessment of causation and valuation of damages from lost pipeline opportunity.

Before the National Energy Board, Expert Testimony on behalf of Enbridge Gas Distribution Inc. and Union Gas limited, Hearing Order MH-001-2013, November 1, 2013. Subject: Tolling issues involving pipeline abandonment.

Before the National Energy Board, Expert Report and Direct Evidence on behalf of MAS (Market Area Shippers Group), Hearing Order RH-001-2013, July 26, 2013. Subject: Contract renewal provisions.

Before the 298th Judicial District Court of Dallas County, Texas, Supplemental Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, July 24, 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the 298th Judicial District Court of Dallas County, Texas, Rebuttal Expert Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, March 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the 298th Judicial District Court of Dallas County, Texas, Direct Expert Report on behalf of plaintiff in Energy Transfer Partners, L.P., and Energy Transfer Fuel, L.P. v. Enterprise Products Partners, L.P., Enbridge (US) Inc., and Enterprise Products Operating LLC, Cause No. 11-12667, January 2013. Subject: Causation and damages in abandoned joint oil-pipeline venture

Before the Alberta Public Utility Commission, Direct Testimony on behalf of ATCO Electric and ATCO Gas, Proceeding ID #2131, December 2012. Subject: Analysis of ATCO Electric's and ATCO Gas' capital tracker proposals

Before the American Arbitration Association, Expert Report with Dr. Victor P. Goldberg, Case No. AAA No. 16 132 Y 00502 11. December 17, 2012. Subject: Confidential Arbitration.

Before the National Energy Board, Written Evidence on behalf of FortisBC Energy Inc., Hearing Order GH-001-2012, May 29, 2012. Subject: Tariff treatment for pipeline extensions to new Canadian gas production regions.

Before the National Energy Board, Expert Report and Direct Testimony on behalf of Market Area Shippers Group, Hearing Order RH-003-2011, March 2012. Subject: Assessment of TransCanada's omnibus restructuring proposal and commentary on Market Area Shippers Group's alternative solution.

Before the Alberta Public Utility Commission (with Agustin J. Ros). Reply Expert Report. Application No. 1606029, AUC Proceeding 566. February 22, 2012. Subject: Update to TFP analysis and review of PBR plans for the Commission's performance-based regulation initiative.

Before the State Corporation Commission of the State of Kansas, Testimony on Behalf of Coffeyville Resources Refining & Marketing, LLC, Docket No. 12-MDAP-068-RTS. October 25, 2011. Subject: Reasonable ratemaking methodology.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the United States Federal Energy Regulatory Commission, Prepared Direct Testimony in Public Utilities Commission of Nevada and Sierra Pacific Power Company v Tuscarora Gas Transmission Company, Docket No. RP11-1823-000. October 17, 2011. Subject: Reasonable interstate gas pipeline tariff levels.

Before the Public Utilities Commission of Nevada, Pre-filed Rebuttal Testimony on behalf of Nevada Power Company and Sierra Pacific Power Company d/b/a NV Energy. Docket Nos. 11-03003, 11-03004 & 11-03005. August 3, 2011. Subject: Prudence of hedging practices.

Before the United States Federal Energy Regulatory Commission, Affidavit in Public Utilities Commission of Nevada and Sierra Pacific Power Company v Tuscarora Gas Transmission Company, Docket No. RP11-1823-000. February 28, 2011. Subject: Reasonable interstate gas pipeline tariff levels.

Before the Public Utilities Commission of Nevada, Prepared Direct on behalf of Nevada Power Company d/b/a NV Energy, 2011 Gas and Electric Deferred Energy Proceeding, Docket No. 11-03____. February 24, 2011. Subject: Prudence of hedging practices.

Before the Public Utilities Commission of Nevada, Prepared Direct on behalf of Sierra Pacific Power Company d/b/a NV Energy, 2011 Gas Deferred Energy Proceeding, Docket No. 11-03____. February 24, 2011. Subject: Prudence of gas hedging practices.

Before the Federal Energy Regulatory Commission and the State of Alaska Regulatory Commission, Prepared Direct Testimony on behalf of Trans Alaska Pipeline System. Docket No. IS09-348-004, *et al.* January 21, 2011. Subject: Prudence of capital rehabilitation costs.

Expert report filed before the Alberta Public Utility Commission (with Agustin J. Ros). Application No. 1606029, AUC Proceeding 566. December 30, 2010. Subject: Total factor productivity study for use in the Commission's performance-based regulation initiative.

Before the Commonwealth of Kentucky, Edmonson Circuit Court. Opinion on behalf of plaintiff in Honeycutt vs. Atmos Energy Corporation. Docket No. 09-CI-00198 and 10-CI-00040. September 10, 2010. Subject: Valuation of Natural Gas Commodity.

Before the Régie de l'Énergie, Direct Testimony on behalf of Hydro-Québec TransÉnergie. Demande R-3738-2010. August 2, 2010. Subject: Economic analysis of issues related to the regulatory policies for network upgrades.

Before the Public Utilities Commission of Nevada, Pre-Filed Supplemental Direct Testimony on behalf of Nevada Power Company, Sierra Pacific Power Company d/b/a NV Energy (electric and gas departments), Docket No: 10-03003, 10-03004, 10-03005. May 5, 2010. Subject: Gas hedging.

Before the Arkansas Public Service Commission, Rebuttal Testimony on behalf of Entergy Arkansas, Inc., Docket No. 09-084-U. March 24, 2010. Subject: Justification of the operation of a multi-year formula rate plan.

Before the Public Utilities Commission of Nevada, Pre-Filed Direct on behalf of Nevada Power Company, Docket No. 10-03003. February 26, 2010. Subject: Prudence of gas purchase costs.

Before the New York State Public Service Commission, Rebuttal Testimony on behalf of Rochester Gas and Electric Corporation, Case 09-E--07717 Case 09-G-0718 and New York State Electric & Gas Corporation, Case 09-E-0715, Case 09-E-0716. February 12, 2010. Subject: Cost of equity capital.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the Public Utilities Commission of Nevada, Pre-Filed Direct Testimony on behalf of Sierra Pacific Power Company , Docket No. 09-09001. December 15, 2009. Subject: Gas hedging plan.

Before the Public Utilities Commission of Nevada, Pre-Filed Direct Testimony on behalf of Nevada Power Company , Docket No. 09-07003. December 15, 2009. Subject: Gas hedging plan.

Before the New York State Public Service Commission, Direct Testimony on behalf of Rochester Gas and Electric Corporation, Case 09-E--07717 Case 09-G-0718. September 17, 2009. Subject: Cost of capital and capital structure.

Before the New York State Public Service Commission, Direct Testimony on behalf of New York State Electric & Gas Corporation, Case 09-E-0715, Case 09-E-0716. September 17, 2009. Subject: Cost of capital and capital structure.

Before the Arkansas Public Service Commission, Direct Testimony on behalf of Entergy Arkansas, Inc., Docket No. 09-084-U. September 4, 2009. Subject: Justification of the operation of a multi-year formula rate plan.

Submission before the New Zealand Commerce Commission, on behalf of Orion New Zealand Limited, July 31, 2009. Subject: Theory and practice of price cap regulation.

Before the Hawaii Public Utilities Commission, Testimony on behalf of Hawaiian Electric Company Inc., Docket No. 2008-0083. July 2009. Subject: Energy cost adjustment clause.

Before the Public Utilities Commission of Nevada, Pre-Filed Direct Testimony on behalf of Nevada Power Company , Docket No. 09-02____. February 27, 2009. Subject: Prudence of gas purchase costs.

Before the Public Utilities Commission of Nevada, Pre-Filed Direct Testimony on behalf of Sierra Pacific Power Company, Docket No. 09-02____. February 27, 2009. Subject: Prudence of gas purchase costs.

Before the Department of Public Utility Control of Connecticut, Direct Testimony on behalf of Connecticut Natural Gas Corporation. Docket No. 08-12-06. January 11, 2009. Subject: Cost of capital.

Before the Department of Public Utility Control of Connecticut, Direct Testimony on behalf of Southern Connecticut Gas Corporation. Docket No. 08-12-06. January 11, 2009. Subject: Cost of capital.

Before the Public Utility Commission of Texas, Rebuttal Testimony on behalf of Lone Star Transmission, LLC. Docket No. 35665. November 14, 2008. Subject: Licensing of new electricity transmission projects.

Before the Public Utilities Commission of Ohio, Direct Testimony on behalf of The Dayton Power and Light Company. Case No. 08-1094-EL-SSO. October 10, 2008. Subject: Cost of capital.

Before the Illinois Commerce Commission, Rebuttal Testimony on behalf of Northern Illinois Gas Company, Case No. 08-0363. September 25, 2008. Subject: Cost of capital.

Before the Illinois Commerce Commission, Testimony on behalf of Northern Illinois Gas Company, Case No. 08-0363. April 29, 2008. Subject: Cost of equity.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the Illinois Commerce Commission, Rebuttal Testimony on behalf of Shelby Coal Holdings, LLC, Christian Coal Holdings, LLC and Marion Coal Holdings, LLC. Docket No. 07-0446. April 7, 2008. Subject: Pipeline certification and competition in pipeline transport market.

Before the New York State Public Service Commission, Rebuttal Testimony on behalf of Iberdrola, S.A., Energy East Corporation, RGS Energy Group, Inc., Green Acquisition Capital, Inc., New York State Electric & Gas Corporation and Rochester Gas and Electric Corporation, Case No. 07-M-0906. January 31, 2008. Subject: Regulatory philosophy/ merger issues.

Before the Public Utilities Commission of Nevada, Rebuttal Testimony on behalf of Sierra Pacific Power Company, Docket No. 07-09016. January 14, 2008. Subject: Stand-alone costs and cost allocation issues.

Before the Public Utilities Commission of Nevada, Rebuttal Testimony on behalf of Sierra Pacific Power Company. Docket No. 07-09016. January 11, 2008. Subject: Allocation of pipeline transport costs.

Before the Illinois Commerce Commission, Testimony on behalf of Shelby Coal Holdings, LLC, Christian Coal Holdings, LLC and Marion Coal Holdings, LLC. Docket No. 07-0446. January 7, 2008. Subject: Pipeline certification and competition in pipeline transport market.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of Consolidated Edison Company of New York, Docket No. OA08-13-000. January 7, 2008. Subject: Planning and allocation of electric transmission costs.

Before the Public Utilities Commission of Nevada, Direct Testimony on behalf of Sierra Pacific Power Company, Docket No. 07-09016. December 14, 2007. Subject: Stand-alone costs and cost allocation issues.

Before the New Hampshire Public Service Commission, Docket No. DE 07-064, invited appearance on an expert panel to present perspectives and answer questions on policies and practices regarding retail gas and electric distribution rate "decoupling," November 7, 2007.

Before the Public Utilities Commission of Nevada, Prefiled Direct Testimony on behalf of Sierra Pacific Power Company, Docket No. 07-05019. May 15, 2007. Subject: Prudence of gas purchase costs.

Before the United States Bankruptcy Court, Southern District of New York, Supplemental Report on behalf of Solutia, Inc., *et al.*, Debtors, Case No. 03-17949 (PCB) (Jointly Administered), April 20, 2007. Subject: Discount rate for contract rejection damages.

Before the Public Utilities Commission of Nevada, Rebuttal Testimony on behalf of Sierra Pacific Power Company, Docket No. 06-12001. April 19, 2007. Subject: Stand-alone costs and cost allocation issues.

Before the United States Bankruptcy Court, Southern District of New York, Supplemental Report on behalf of Solutia, Inc., *et al.*, Debtors, Case No. 03-17949 (PCB) (Jointly Administered), March 23, 2007. Subject: Discount rate for contract rejection damages.

Before the United States District Court, District of Kansas, Expert Report on behalf of J.P. Morgan Trust Company, *et al.* in the matter of J.P. Morgan Trust Company, *et al.* V. Mid-America Pipeline Company, *et al.*, Docket No. 05-CV-2231-CM/JPO. March 21, 2007. Title: "Harm to Farmland's Coffeyville Refinery Expert Report", by Jeff. D. Makhholm.

RECENT TESTIMONY (SINCE 2000 CONTINUED)

Before the Public Utilities Commission of Nevada, Prefiled Direct Testimony on behalf of Nevada Power Company, Docket No. 07-01022. January 16, 2007. Subject: Prudence of gas purchase costs.

Before the Public Utilities Commission of the State of Hawaii, Supplemental Testimony on behalf of Hawaii Electric Light Company, Inc., Docket No. 05-0135. December 29, 2006. Subject: Energy cost adjustment clause.

Before the Public Utilities Commission of the State of Hawaii, Testimony on behalf of Hawaiian Electric Company, Inc., Docket No. 2006-0386. December 22, 2006. Subject: Energy cost adjustment clause.

Before the Public Utilities Commission of Nevada, Pre-filed Direct Testimony on behalf of Sierra Pacific Power Company, Docket No. 06-12001. December 1, 2006. Subject: Stand-alone costs and cost allocation issues.

Before the State of New Jersey Board of Public Utilities, Prepared Reply Testimony on behalf of Public Service Electric & Gas, OAL Docket No. PUC1191-06 and BPU Docket No. EO05111005. November 3, 2006. Subject: Unregulated contract prices for telecommunication conduit rental contracts.

Before the State of New Jersey Board of Public Utilities, Rebuttal Testimony on behalf of the New Jersey American Water Company, Case No. WR06030257, October 10, 2006. Subject: Cost of Capital.

Before the Public Utilities Commission of Nevada, Rebuttal Testimony on behalf of Sierra Pacific Power Company, Docket No. 06-05016. October 2, 2006. Subject: Prudence of gas purchase costs.

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“Consultation Paper: Development of Approaches Towards Regulating Tariffs for Petroleum Pipelines, Storage and Loading Facilities in South Africa.” Report prepared for the National Energy Regulator of South on the determination of economically feasible approaches towards establishing revenue requirements, regulating the setting/approval of tariffs, and developing rules, guidelines and framework regarding regulatory accounts for the petroleum pipelines, storage, and loading facilities in South Africa. December 14, 2006.

“Regulatory Assessment of the Turkish Electricity Sector.” Report prepared for Prisma Energy on the examination of the economic and regulatory risks facing investors in the privatization of the energy infrastructure of Turkey. December 6, 2006.

“Calculation of the X-Factor in the 2nd Reference Report of the Bundesnetzagentur.” Report prepared for E. ON Ruhrgas, Germany: Design of a regulatory method based on comparison of average tariffs, consistent with new German legislation on the regulation of gas transmission networks. April 21, 2006. (with Graham Shuttleworth and Michael Kraus).

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Advised on Fare Regulation Issues related to the Impending Merger of the MTRC and KCRC Railroad Companies in Hong Kong, Mercer Consulting on behalf of MTRC, 2003-2004.

“Natural Gas Pipeline Access Regulation”. Report prepared for BHP Petroleum Pty Ltd., May 31, 2001.

“Manual de Procedimientos para el Sistema Uniforme de Cuentas Regulatorias Eléctricas (SUCRE) de México” (April 2000). The report includes an explanation of each of the accounts needed for regulation, recording procedures and the structure the information should take when reporting to the regulator.

“Investigation into Petronets’ Liquid Fuels Pipeline Tariffs: Final Report” (March 9th, 2000). This report presents NERA opinions in the quasi-arbitration of the tariffs disputes in the oil industry in South Africa for their liquids pipelines.

“Seeking Genuine Gas Competition in NSW”, prepared for BHP Petroleum Pty. Ltd., February 18, 2000.

“Análisis y Revisión del Recurso de Revocatoria Interpuesto por la Compañía Boliviana de Energía S.A. (COBEE) a la Resolución SSDE N° 92/99 de la Superintendencia de Electricidad” (September 6, 1999). This report represents NERA’s opinion on COBEE’s appeal in the electricity tariff review process in Bolivia (report in Spanish).

“Gas Sector Regulation Consultancy Services” report prepared for the Vietnam Oil and Gas Corporation, August 10, 1999.

“Natural Gas Demand Estimation for Guatemala, Honduras and El Salvador” (July 19th, 1999). This report done for an international consortium of companies presents calculations of prices and volumes of natural gas demand for three Central American countries if a pipeline is built from Mexico.

“Comments on East Australian Pipeline Limited Access Arrangements: (July 15, 1999). Report prepared on behalf of Incitec Ltd.

“Supplementary Submission to IPART on AGLGN’s Proposed Access Arrangements” on behalf of Incitec Limited (April 27th, 1999). This submission discusses reload practices, customer

RECENT INTERNATIONAL REPORTS (CONTINUED)

contributions, operating expenses and recalculates charges for a user of the distribution network in New South Wales, Australia.

“Supplementary Submission to IPART on AGLGN’s Proposed Costs and Tariffs” on behalf of BHP (April 15th, 1999). This submission explains how NERA recalculated charges for AGLGN in New South Wales, Australia.

“Initial Comments on AGLGN’s Revised Access Arrangement Information” on behalf of BHP (March 20th, 1999). This submission presents NERA’s comment to AGLGN submission to IPART in New South Wales, Australia.

“International Restructuring Experience” (February 12th, 1999). This paper surveys a number of countries whose experience of restructuring and competition in the electricity sector is directly relevant to the proposed changes in Mexico – Argentina, Australia, Chile, Guatemala, New Zealand, Norway, Spain, the US and the UK

“Report I: Review of the Regulatory Framework” (January 18th, 1999). This report presents the options for a natural gas framework in Peru.

“Conceptual Framework for the Reform of the Electricity Sector in Mexico: White Paper” (November 24th, 1998). This report represents the White Paper for restructuring of the electricity sector in Mexico which is being used in Congress for debate.

“Precios del Gas Natural para la Generación de Electricidad en el Perú” (November 16th, 1998). This report analyzes different alternatives for the treatment of natural gas prices in the electricity tariff model (report in Spanish).

“Tariffs and Subsidies: Report for the Tariffs Group” (November 10th, 1998). This report presents recommendation on the path for tariffs and subsidies for 1999 to the Electricity Tariffs Group of the Government of Mexico.

“Gasoducto México-Guatemala: Informe Final” (October 22nd, 1998). This report analyzes the legal and regulatory framework in both Mexico and Guatemala and costs and volumes for the building of a natural gas pipeline connecting both countries. A copy of the report was given by President Zedillo (Mexico) to President Arzú (Guatemala) (report in Spanish).

“Checks and Balances in Regulating Power Pools: Seven case Studies. A Report for the Electricity Pool of England and Wales” (September 10th, 1998). This report surveys the regulation of power pools in electricity industries around the world.

“Fuels Policy Group: Recommendations” (September 11th, 1998). This report presents recommendations to the Government of Mexico on their fuels policies for the electricity sector.

“Análisis de Costos e Inversiones. Revisión Tarifaria de Transener” (August 25, 1998). Report given to ENRE (the Argentinean electricity regulator) on behalf of a Consortium of Generators on the analysis of costs and investments to be considered for the revenue requirement of the electricity transmission company (report in Spanish).

“Central America Pipeline: Regulatory Analysis and Proposal” (July 28, 1998). This report presents the regulatory analysis and development of a fiscal, legal and commercial framework proposal for gas import, transportation, distribution and marketing in El Salvador, Honduras and Guatemala regarding the proposed Central American Pipeline.

“Energy Regulation in El Salvador” (July 28, 1998). This report presents a deep analysis of the electricity and natural gas regulatory, legal and tax frameworks in El Salvador.

RECENT INTERNATIONAL REPORTS (CONTINUED)

“Energy Regulation in Guatemala” (July 28, 1998). This report presents a deep analysis of the electricity and natural gas regulatory, legal and tax frameworks in Guatemala.

“The Cost of Capital for Gas Transmission and Distribution Companies in Victoria” (June 22, 1998). Report prepared for BHP Petroleum Pty Ltd.

“Principios Económicos Básicos de Tarificación de Transmisión Eléctrica. Revisión Tarifaria de Transener” (May 26, 1998). The main purpose for this report was to provide an economic and regulatory analysis of laws, decrees, license and documents of the tender to provide advice in the tariff review of Transener (the electricity transmission company in Argentina), to present an economic analysis of transmission tariffs and to provide an opinion on specific topics to be discussed in the public hearing. This report was written for a consortium of generators in Argentina (reports in English and Spanish)

“Asesoría en la Fijación de Tarifas de Transener y Normativa del Transporte, Benchmarking Study” (May 26, 1998). This report compares the costs of Transener (the electricity transmission company in Argentina) with those of other companies elsewhere for a consortium of generators (the electricity transmission company in Argentina).

“International Regulation Tool Kit: Argentina” (March 20, 1998). This document describes the natural gas regulatory framework in Argentina for BG.

“Tarificación de los Servicios Que Prestan las Terminales de Gas LP” (January 9, 1998). The final report given to PEMEX Gas y Petroquímica Básica (México) for the determination of rates for LPG terminals.

“NERA-Pérez Companc Distribution Tariff Model” (January 5, 1998). This report explains the methodology behind NERA’s calculations of distribution tariffs for Pérez Companc in Monterrey.

“Monterrey Natural Gas Market Assessment,” (January 5, 1998). A series of reports were written to present the results of the market study of the demand for natural gas in the geographic zone of Monterrey to a company interested in bidding for the natural gas distributorship.

“Resolving the Question of Escalation of Phases (bb) and (cc) Under the Maui Gas Sale and Purchase Contract”, prepared for the New Zealand Treasury, December 16, 1997.

“Timetable and Regulatory Review for the Monterrey International Public Tender,” (December 5, 1997). A description of the necessary steps to bid for a distribution company as well as an explanation and analysis of natural regulations in Mexico for Pérez Companc.

“Economic Issues in the PFR for 18.3.1(I)(bb) & (cc)”, prepared for the New Zealand Treasury, November 17, 1997.

“NERA’s Distribution Tariff Model” (October 29, 1997). This report explains the methodology behind NERA’s calculations of distribution tariffs for MetroGas.

“Evaluation Design Standards for MetroGas,” (October 24, 1997). This report dealt with the analytical support resulting from work with MetroGas to create a meticulously-documented security criterion analysis that supported its efforts to obtain due recognition—and appropriate tariff treatment—for its costs.

“Ghana Natural Gas Market Assessment,” prepared for the Ministry of Mines and Energy, Ghana (March-July, 1997). A series of four reports assessing prospective gas demand usage and netback prices for a number of proposed pipeline project alternatives.

RECENT INTERNATIONAL REPORTS (CONTINUED)

“Final Report for Russian Oil Transportation & Export Study: Commercial, Contractual & Regulatory Component,” prepared for The World Bank, June 25, 1997.

Response to FIEL’s criticisms regarding NERA’s report “Cálculo del Factor de Eficiencia (X)” (June 2, 1997).

“Impacts on Pemex of Natural Gas Regulations” prepared for Pemex Gas y Petroquímica Básica México, May 21, 1997.

“Market Models for Victoria’s Gas Industry: A Review of Options,” April 1997, prepared for Broken Hill Proprietary (BHP) Petroleum, to propose an alternative model for gas industry restructuring in Victoria, Australia.

“New Market Arrangements for the Victorian Gas Industry,” prepared for Broken Hill Proprietary Petroleum; March 13, 1997.

“CEG Privatization: Comments to the Regulatory Framework,” prepared for Capitaltec Consultoria Economica SA describing our comments with respect to the regulatory framework and the license proposed in the privatization of Riogas and CEG in Rio de Janeiro, Brazil; March 7, 1997.

“Determination of the Efficiency Factor (X),” prepared for ENARGAS, Argentina, January 24, 1997.

“Determination of Costs and Prices for Natural Gas Transmission,” prepared for Pemex Gas y Petroquímica Básica, México, December 19, 1996.

“Regulating Argentina’s Gas Industry,” a report prepared for The Ministry of Economy and The World Bank, November 26, 1996.

“Open Access and Regulation,” prepared for Gascor, in the State of Victoria, Australia; (October 2, 1996).

“A Review and Critique of Russian Oil Transportation Tariffs (Russian Oil Transportation & Export Study; Commercial, Contractual & Regulatory Component),” prepared for The World Bank, June 13, 1996.

“Tariff Options for Transneft (Russian Oil Transportation & Export Study; Commercial, Contractual & Regulatory Component),” prepared for The World Bank, June 6, 1996.

“Comments on the Proposed Amendments to the Regulation of Airports in New Zealand,” prepared for the New Zealand Parliament Select Committee hearings on the regulation of monopolies, March 13, 1996.

“Evaluating the Shell Camisea Project,” prepared for Perupetro S.A., Government of Peru, December 8, 1995.

“Towards a Permanent Pricing and Services Regime,” prepared for British Gas, London, England, November, 1995.

“Final Report: Gas Competition in Victoria,” prepared for Gas Industry Reform Unit, Office of State Owned Enterprises, June 1995.

“Natural Gas Tariff Study,” prepared for the World Bank, May 1995, consisting of:

Principles and Tariffs of Open-Access Gas Transportation and Distribution Tariffs
Handbook for Calculating Open-Access Gas Transportation and Distribution Tariffs

RECENT INTERNATIONAL REPORTS (CONTINUED)

“Economic Implications of the Proposed Enerco/Capital Merger,” prepared for Natural Gas Corporation of New Zealand, December 1994.

“Contract Terms and Prices for Transportation and Distribution of Gas in the United States,” prepared for British Gas TransCo, November 1994.

“Economic Issues in Transport Facing British Gas,” prepared for British Gas plc, December 1993.

“Overview of Natural Gas Corporation's Open-Access Gas Tariffs and Contract Proposals,” prepared for Natural Gas Corporation of New Zealand, October 1993.

PARTIAL LIST OF CLIENTS SERVED WORLDWIDE**ELECTRIC UTILITY**

AEP Energy Services, Inc
 Alberta Power Limited
 American Electric Power Company
 Atlantic Electric Company
 Boston Edison Company
 Central Hudson Gas and Electric
 Central Maine Power Company
 Central Power & Light Company
 Commonwealth Edison Company (Unicom/Exelon)
 Commonwealth Energy System
 Consolidated Edison Company of New York, Inc
 Conowingo Power Company
 Duquesne Light Company
 Edison Electric Institute
 Entergy Gulf States, Inc
 Florida Power and Light Company
 Green Mountain Power Company
 Long Island Lighting Company
 Massachusetts Municipal Wholesale Electric Company
 Massachusetts Electric Company
 Nantahala Power Company
 New York State Electric & Gas Corporation
 Niagara Mohawk Power
 Ohio Power Company
 Orange & Rockland Utilities
 Pennsylvania Power and Light Company
 Pennsylvania Power Company
 Philadelphia Electric Company
 PJM electricity transmission owners
 Public Service Company of New Hampshire
 Public Service Company of New Mexico
 Public Service Electric and Gas Company
 Portland General Electric Company
 Reliant Energy HL&P
 Rochester Gas and Electric Corp.
 Sierra Pacific Power Corporation
 Southwest Electric Power Company
 Southwestern Public Service Company
 Tampa Electric Company
 Texas-New Mexico Power Company
 TXU Electric Company
 United Illuminating Company
 UtiliCorp Networks Canada
 Virginia Electric and Power Company
 West Penn Power Company
 West Texas Utilities Company
 Western Massachusetts Electric Co.

GAS UTILITY

ARKLA, Inc.
 Atlanta Gas Light Company
 Bay State Gas Company
 Berkshire Gas Company
 Blackstone Gas Company
 Boston Gas Company
 Bristol & Warren Gas Company
 British Gas plc
 Brooklyn Union Gas Company
 Canadian Western Natural Gas
 Chattanooga Gas Company
 Colonial Gas Company
 Commonwealth Gas Company
 Connecticut Natural Gas Corp.
 Consolidated Gas Supply Corp.
 Elizabethtown Gas Company
 Empire State Pipeline Company
 ENAGAS (Spain)
 EnergyNorth, Inc.
 Essex County Gas Company
 Fall River Gas Company
 Fitchburg Gas & Electric Light Company
 Gas and Fuel Corporation of Victoria
 Gateway Pipeline Company
 Granite State Gas Transmission, Inc.
 Great Falls Gas Company
 Holyoke, Mass. Gas & Electric Dept.
 ICG Utilities (Ontario) Ltd.
 KN Energy, Inc.
 Middleborough Municipal Gas & Electric
 National Fuel Gas Distribution Corp.
 Natural Gas Corporation of New Zealand
 Natural Gas Pipeline of America
 Norwich Department of Public Utilities
 Pacific Gas Transmission
 Pemex Gas y Petroquímica Básica
 Pennsylvania Gas and Water Company
 Peoples Gas Light and Coke Company
 Providence Gas Company
 Southern Connecticut Gas Company
 Southwest Gas Corporation
 Transwestern Pipeline Company
 Valley Gas Company
 Washington Gas Light Company
 Westfield Gas & Electric Light Dept.
 Wisconsin Gas Company
 Yankee Gas Services Company

PARTIAL LIST OF CLIENTS SERVED WORLDWIDE (CONT.)

TELEPHONE UTILITY

Centel Corporation
Chichester Telephone Company
Community Service Telephone Company
Continental Telephone Company of Illinois
General Telephone of Pennsylvania
General Telephone Company of Ohio
Kearsarge Telephone Company
Meriden Telephone Company
Pacific Bell Telephone Company
Tipton Telephone Company

PARTIAL LIST OF CLIENTS SERVED WORLDWIDE (CONT.)**REGULATORY AND GOVERNMENT**

Delaware Public Service Commission

re: Delmarva Power & Light Company

District of Columbia Public Service Commission

re: Potomac Electric Power Company
Washington Gas Light Company

Massachusetts Municipal Wholesale Electric Company

The Government of Chile

Gas industry regulations

The Government of Argentina

Plan for privatized rail freight industry regulation

The Government of Tanzania

Natural gas development and regulation plan for Songo Songo Island gas reserves.

Financing the development of gas reserves on Songo Songo Island with emphasis on payment guarantee mechanisms for foreign exchange.

The World Bank

re: Natural gas tariffs for Polskie Gornictwo Naftowe i Gazownictwo
(The Polish Oil and Gas Company)

re: Natural gas transport and distribution tariffs for Gas del Estado
(The Argentine State-owned gas utility)

re: Natural gas development for the Moroccan Gas System.

re: Natural gas transport and distribution tariffs for the Bolivian Gas Industry.

re: Natural gas development plan for Sichuan province of China.

OTHER

Air New Zealand

BHP Petroleum Pty Ltd

Centel Corporation

General Electric Company

Intel Corporation

Jamaica Water Supply Company

Nucor Steel Corporation

Parsons Brinckerhoff Development Group

MEMBERSHIP IN**PROFESSIONAL ORGANIZATIONS**

The American Economic Association