# Non-Capital Costs in the Access Arrangement for Envestra: Report to the Essential Services Commission of South Australia

Pacific Economics Group, LLC
Economic and Litigation Consulting

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# 1. Introduction and Summary

## *1.1 Introduction*

The Essential Services Commission of South Australia (ESCOSA) is currently undertaking a review of the access arrangement (AA) for Envestra's gas distribution services in South Australia. This review will set allowed changes in gas distribution prices based on ESCOSA's assessment of Envestra's required revenues over the term of the upcoming AA. One component of required revenues is non-capital costs. The Gas Code allows for the recovery of all Non Capital costs, except for any cost that would not be incurred by a prudent service provider, acting efficiently to achieve the lowest sustainable cost of delivering the reference service.

ESCOSA has issued a Draft Decision which requires Envestra "to remove the 3 percent network management fee from its forecast Non Capital Costs unless it can demonstrate to the satisfaction of the Commission that the inclusion of the management fee is consistent with the Code requirement that the forecast Non Capital Costs achieve the lowest sustainable cost of delivering Reference Services."[1] This management fee (set at three percent of Envestra's regulated gas distribution revenue) is paid to Origin Energy Asset Management (OEAM) in an outsourcing arrangement. ESCOSA's view is that including this fee in non-capital costs is not consistent with the "lowest sustainable cost" of providing service, particularly since Envestra and OEAM are related parties and the contract is not an "arms length" arrangement that has ever been market tested.[2]

Envestra has presented benchmarking evidence which purportedly shows that its non-capital costs are efficient. A September 2005 study from Worley Parsons (WP) concluded that the Company's non-capital costs were reasonable when evaluated relative to similar costs for other Australian gas distributors. In the Draft Decision, ESCOSA examined some of the same benchmarking metrics as those presented in the WP report (*i.e.* non-capital costs per customer and per km of distribution main) but found Envestra's non-capital costs during the first AA were at the upper end of those for comparable

[1] *Draft Decision: Proposed Revisions to the Access Arrangement for the South Australian Gas Distribution System*, March 2006, Amendment 64, p. 164.

[2] *Draft Decision*, op cit, p. 153. Origin has a controlling interest in OEAM and a 17.5% equity stake in Envestra.

Australian distributors. In response, Envestra submitted a new benchmarking study from Benchmark Economics (BE) which, using different techniques, also concluded that the Company's non-capital costs were efficient. The main difference between the work done for Envestra and by ESCOSA was that the former excluded network development costs from the analysis while the latter did not. Envestra argues that these costs should be excluded because they reflect network specific factors that are beyond management control, especially less favorable weather which reduces the demand for natural gas vis-à-vis many other Australian distributors.

ESCOSA asked Pacific Economics Group LLC (PEG) to provide an independent, objective analysis of the benchmarking evidence presented in Envestra's AA proceeding and the network management fee more generally. PEG has extensive experience with benchmarking energy utilities: we have to date undertaken 56 benchmarking projects for utility or regulatory commission clients in North America, Latin America, the Caribbean, Europe, Asia, Australia and New Zealand. In evaluating the benchmarking evidence and network management fee, we reviewed the following relevant documents:

- *Access Arrangement Information for Envestra's South Australian Network*, a September 2005 document from Envestra summarizing the past AA
- *Review of Gas Access Arrangement for South Australia*, a September 2005 benchmarking study done by Worley Parsons (WP) for Envestra
- *Envestra Limited Capital and Operating Expenditure Review*, a March 2006 benchmarking study done by the Energy Consulting Group (ECG) for ESCOSA
- The non-capital cost section of ESCOSA's March 28, 2006 Draft Decision
- *Benchmarking Non-Capital Costs*, a May 2006 benchmarking study by Benchmark Economics (BE) for Envestra
- *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part A, chapter 8 (non-capital costs)
- *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part B, chapter 5 (network management fee)
- *Issues Pertaining to Envestra's Contract with Origin Energy Asset Management*, a June 2006 Expert Witness Statement from Graham Holdaway of KPMG

This report presents our analysis of the network management fee and benchmarking issues. Chapter Two discusses the management fee and Chapter Three considers the benchmarking evidence presented in the proceeding. Chapter Four provides concluding remarks.

### *1.2 Summary*

Outsourcing arrangements between related corporate parties can be a source of production efficiencies but, under any type of cost-based regulation, also raise legitimate regulatory concerns. These concerns can be effectively mitigated if regulated utilities demonstrate that the terms of an outsourcing contract are consistent with the outcome of a competitive market bid. We are not aware of all the details of the Envestra-OEAM contract, but the relevant public documents imply that this agreement was not market tested in this manner either at the time of its inception or subsequently.

The fact that the network management fee is tied to Envestra's regulated revenues is also a source of concern, since both Envestra and OEAM will benefit financially from any regulatory decision that increases regulated cost and, by extension, regulated revenue. Linking management fees to regulated revenues can give OEAM financial incentives to allocate costs and resources in ways that increase Envestra's reported costs above the "lowest sustainable cost" of operations. In the absence of market testing, ESCOSA cannot be assured that this is not occurring unless it has complete information on OEAM's cost and resource allocations, which does not seem to be the case.

Benchmarking evidence could in principle demonstrate that the costs of outsourced services to related parties are efficient. Such evidence could in turn show that consumers are not being disadvantaged by such arrangements, even if they are not market tested. However, any demonstrations of the efficiency of these outsourcing contracts would have to be both rigorous and robust to assuage regulators' legitimate *a priori* concerns about outsourcing contracts between at least partly related corporate parties. At a minimum, rigorous and robust benchmarking would have to be based on high-quality and appropriate data; control for major "cost drivers" that can lead to differences in actual costs among companies; utilize benchmarking techniques that lead to unbiased estimates of the impact of these "drivers" on costs and, by extension, unbiased benchmarking assessments; and make appropriate allowance for the uncertainty that exists in any benchmarking evaluation.

The benchmarking studies presented by WP or BE do not satisfy these criteria. One threshold issue is that these studies exclude network development expenditures from the benchmarked non-capital costs. We agree that network development spending can vary across distributors because of factors beyond company control, but this does not mean these costs must necessarily be excluded from benchmarking studies. Indeed, doing so can distort efficiency assessments because network development spending is expressly designed to increase network utilization, reduce unit costs and thereby improve overall efficiency. Rather than simply excluding these costs, it is preferable to quantify the "exogenous" factors that may influence the optimal level of network development spending for a given distribution system and incorporate these variables into the benchmarking analysis. There was some attempt to do this in the BE study, but the "gas uptake" measure used in this report is clearly not independent of the costs which are the focus of the analysis and hence not appropriate to use in a benchmarking study.

We have other concerns with the benchmarking studies done on behalf of Envestra, including:

- The data used in the WP and BE reports are almost certainly biased in favor of positive benchmarking evaluations for Envestra.
- It is generally not appropriate to evaluate efficiency using a single year of data, as is done in both the WP and BE studies; ESCOSA's examination of multiple years of data is preferable.
- The BE report properly concludes that ESCOSA's benchmarking techniques are simple and can be misleading, but fails to note that the same basic approach was adopted by WP. The BE study represents a step in the direction of greater rigor, but the BE models are still too simple to be an adequate representation of the gas distribution technology. The estimated coefficients in these models are therefore likely to be characterized by "omitted variable" bias. Further efforts and more sophisticated benchmarking techniques are required for robust benchmarking.

- Neither the WP nor the BE study presents a clear criterion for defining or evaluating "efficiency"; the language surrounding this critical concept is so vague and subjective it can be used to justify a wide range of conclusions.
- BE's discussion of "sustainable cost" is one-sided, and the conclusions regarding cost sustainability cannot be supported given the limited amount of data and analysis.
- The capex econometric cost model presented in the BE report simply has no bearing on the issue of cost allocations and cannot support any conclusion about whether Envestra is or is not shifting costs between operating and capital expenditure budgets.

Given the available evidence, we believe ESCOSA's decision to require removal of the network management fee when determining allowed costs for Envestra is sound. This network management fee raises legitimate regulatory concerns which would conflict with ESCOSA's statutory requirements. In principle, performance benchmarking could assuage these concerns, but the benchmarking studies presented in the proceeding are not sufficient for this purpose and do not provide persuasive evidence that Envestra's non-capital costs, inclusive of the network management fees, deliver the lowest sustainable cost of providing service. If such a benchmarking study was to be done, it would have to use high quality and appropriate data, control simultaneously for the impact of major cost driver variables on gas distributors' non-capital costs, employ more sophisticated benchmarking techniques, and present rigorous quantitative evidence on the imprecision associated with benchmarking predictions.

Although PEG has not had time to investigate the issue in depth, we believe that such benchmarking evidence could have been provided in this proceeding. Researchers can use bootstrapping and similar methods to develop more robust benchmarking evaluations when there is a relative paucity of data, as in Australia. There is also no reason to restrict the benchmarking analysis to only Australian companies, especially for non-capital cost benchmarking, since high quality data on overseas gas distributors' non-capital costs and cost driver variables are readily available. These more ample datasets would have allowed more rigorous benchmarking methods to be employed and facilitated more robust benchmarking evaluations. Chapter Three of this report also describes a "competitive market paradigm" which we believe, in combination with rigorous benchmarking evidence, could have been used to demonstrate consistency with the Code's requirement that non-capital costs reflect the lowest non-sustainable cost of providing service.

## 2. The Management Fee to OEAM

Outsourcing contracts between at least partly related corporate parties are becoming more common. There are several such contracts in Australia's energy utility industries. Similar arrangements have also developed in North America and Europe. In principle, such contracts can lead to economies of scale and scope that reduce the unit cost of utility services. Appropriate outsourcing can therefore be a means of promoting efficiencies that ultimately reduce prices for utility services and thereby benefit customers.

At the same time, outsourcing agreements among partly related corporate parties raise contentious regulatory issues. In Australia, this was perhaps most evident in the 2005 electricity distribution price review in Victoria. The most controversial issue in this review was whether the costs reported in the outsourcing agreement between Alinta Network Services (ANS) and United Energy Distribution (UED) were appropriate for setting the terms of UED's upcoming price controls. The Essential Services Commission of Victoria (ESCV) concluded that the reported costs of this contract were not appropriate and developed a proxy cost measure. UED appealed this issue to an Appeal Panel, which ruled in the ESCV's favor.

The main concern with related party contracts is they create incentives for transfer pricing and cost allocations that raise regulated service prices. For example, when companies operate in both regulated and unregulated sectors, they have clear incentives to shift reported costs from unregulated to regulated operations. The reason is that, under the "building block" approach to CPI-X regulation used in Australia, regulated revenues depend directly on the approved costs of regulated services. Higher allowed costs for regulated services lead to greater regulated revenues. Companies can therefore increase their revenues and profits by allocating more of their "common" costs (*i.e.* costs used to provide multiple services) to regulated operations. This typically cannot be done in more competitive markets. Companies cannot easily "pass on" costs to competitive market customers since they must compete against the price and quality terms of alternative providers.

This may be a salient point for the OEAM-Envestra transaction. Any agreement among affiliated corporate companies will be designed to maximize the profits of the corporation as a whole. These profits can be increased by structuring contracts between different parties (such as OEAM and Envestra) so that costs are shifted towards affiliates where those costs can be recovered more easily. This would necessarily include shifting reported costs from competitive to regulated operations. Similarly, there are incentives to shift costs between regulatory jurisdictions depending on the perceived strength of regulatory monitoring, the timing of regulatory reviews, differences in taxation, and other factors. Recovering a greater share of costs from regulated operations would enable OEAM to offer lower prices and still remain profitable in competitive markets. The terms of the transaction could therefore tend to give OEAM an advantage over rival service providers in the unregulated markets in which it operates or may choose to operate. By the same token, cost-shifting from unregulated to the regulated sectors raises prices for regulated services. This is effectively an exercise of monopoly power, which ESCOSA has a statutory duty to prevent.

The concept that firms have incentives to misallocate costs when they operate in regulated and unregulated markets is well-established in the regulatory economics literature. One representative article on this topic is "Cross Subsidization and Cost Misallocation by Regulated Monopolists," written by Timothy Brennan for the June 1990 issue of the *Journal of Regulatory Economics.* As explained in this article, "(t)he central concept is that costs of supplying the unregulated market are shifted to the regulated sector. The regulator, hypothetically unable to determine that the shifted costs should be attributed to supplying the unregulated product, increases the revenue requirement that ratepayers of the regulated product must cover…Essentially, costs are misallocated in order to capture monopoly profits otherwise eliminated by regulation. Prices in the regulated market rise, with the attendant profits taken in the unregulated market."[3]

This article also discusses the importance of regulators having cost information on both unregulated and regulated operations when attempting to determine whether costs

[3] Brennan, *op cit*, p. 37.

have been misallocated. Referring to the monopoly producer as ‘M’, regulated sales as ‘r’ and unregulated sales as ‘u’, Brennan writes

> If cost information is not known to the regulator, producing *u* may give *M* the ability to mislead its regulators about the costs of producing *r*. For example, if sales agents are used to market both *r* and *u*, the agents (or the agents’ time) devoted to selling *u* could be attributed by *M* to the sale of *r*. To allocate costs correctly, the regulator has to determine not only that sales agents themselves were necessary to provide *r*, but that *M’s* sales agents allegedly spent marketing *r* was not actually devoted to selling *u*. Similar stories could be told about common equipment or financial capital. It is this kind of practice that is referred to when regulators worry about cross subsidization. If *M* can misallocate without limit, *it becomes for all intents and purposes unregulated*. In practice, however, *M’s* ability to cross-subsidize will be limited by what the regulator cannot detect.[4] (emphasis added)

These points are relevant for ESCOSA’s AA determination. There are incentives to set the terms of the contract between OEAM and Envestra so that costs are shifted towards Envestra’s regulated gas distribution services. Under the “building block” CPI-X regulation approach used in Australia, there are only two ways ESCOSA can be assured that such monopoly power is not exercised. The first is the method suggested by Professor Brennan - to obtain cost information from Envestra *and* OEAM that is sufficient to evaluate OEAM’s allocation of costs between Envestra and all other sectors it serves. The alternative is evidence that the contract has been “market tested.” The terms of a market-tested contract would reflect the outcome of a workably competitive market and thus would not be characterized by monopoly power. Based on our reading of the relevant publicly available documents, it is PEG’s understanding that neither of these conditions has been satisfied in the current proceeding.[5]

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[4] Brennan, p. 40.

[5] For example, regarding market testing, in *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part B, Envestra says the O&M Agreement was not originally market tested in 1997 because “there were no other suitable parties that could have provided the required services” (p. 46). The contract has also apparently not been subject to a competitive tendering process since 1997, even though it has been in place for more than eight years and a number of outsourced utility service providers have become active. Envestra has also apparently not provided details on how OEAM costs have been allocated between Envestra and other entities, in part because “it would be difficult to accurately encompass the number and magnitude of all such services that are recovered through the Network Management Fee. This is partly because such services are derived from OEAM being part of a large vertically integrated company” (*Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part B, pp. 52-53).

The issue most directly relevant to the AA is the network management fee component of Envestra's non-capital costs. ESCOSA has written that it is not clear that this fee is a cost rather than a profit transfer. If it was a profit transfer, ESCOSA believes non-capital costs would be greater than lowest sustainable cost, which conflicts with the requirements of the Gas Code. Envestra provides a detailed response which, among other things, discusses a number of safeguards built into the contract to encourage low costs, such as incentive arrangements for OEAM to pursue efficiency gains, Envestra's contract management rights, and audit assurance.

The provisions of specific outsourcing contracts are complex and idiosyncratic, so such arrangements should be evaluated on a case by case basis. PEG is clearly not privy to all details of the Envestra-OEAM agreement, but several aspects of Envestra's submissions do raise concerns. One basic issue is that the network management fee is linked to Envestra's regulated revenue. This implies that Envestra and OEAM would benefit from arrangements that raise this revenue and, indeed, have a joint interest in increasing regulated revenue. Revenue gains that result from increased natural gas usage, especially via increased penetration of contestable end use markets such as space heating, are appropriately encouraged by designing the contract in this manner. However, revenues could also be increased through cost allocations, transfer pricing and similar accounting changes that shift OEAM costs to Envestra. This behavior would obviously disadvantage consumers of Envestra's gas distribution services and again highlights the importance for ESCOSA to know what direct and indirect costs are being allocated to Envestra.

Envestra has argued that it would not benefit from contract arrangements that increase its regulated costs. For example, it writes that "Envestra has no financial interest in OEAM and therefore no incentive to inflate the Network Management Fee (or any other cost for that matter) to a level that is greater than that expected to recover efficient and prudent economic costs."[6] It is not clear that this is in fact the case. It is known that under cost-based regulation (such as the building block approach to CPI-X regulation), firms have incentives to misallocate costs and even engage in pure "waste" or excessive

[6] *Response to ESCOSA Draft Decision Envestra Access Arrangement,* Part B, p. 46.

expenditures that raise future revenues and thereby boost future profitability.[7] For instance, the costs of certain services provided by OEAM could be increased in the last year of an expiring AA, increasing reported cost in that year. If allowed cost changes are escalated from this base, then allowed revenues over the following AA will be greater than would otherwise be the case. Reported costs could subsequently be reallocated away from Envestra, which would be recorded as an efficiency gain that benefits both Envestra and OEAM according to the efficiency sharing provisions in the agreement. It should be emphasized that PEG has no evidence that either company has in fact behaved in this way, but it remains a theoretical concern.

It is also worth noting that submissions done on behalf of Envestra lend support to the view that ESCOSA would need to examine the costs of OEAM for it to be assured that the costs recovered through the management fee are appropriate and not, in fact, a transfer of profit. For example, the KPMG Expert Witness Statement writes

> "(a) contractor's rationale for charging prices that are sufficient to cover their direct costs plus a margin to cover their indirect costs and cost of capital is, in principle, no different to the cost model employed by ESCOSA to establish the required revenue for Envestra. This model is often referred to as the "building block" model. In both cases, the contractor and ESCOSA are attempting to ensure that the contractor and Envestra respectively recover the total cost of providing their respective services."[8]

We agree that the "required revenue" for services provided by OEAM to Envestra and Envestra's other costs can both be determined through the building block model. It is also instructive to recall that revenue requirements determined through building block methods are designed to compensate companies for both their operating costs and their capital costs (sometimes referred to as the "return on" and the "return of" capital). If a building block approach was used to determine the cost of the Envestra-OEAM contract, detailed cost information would be needed to *separate* the payments that are made for operating expenses and capital services that are provided under the contract.[9] However,

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[7] For example, see D. Sappington (1980), "Strategic Firm Behavior Under a Dynamic Regulatory Adjustment Process," *Bell Journal of Economics*, 360-372.

[8] Graham Holdaway Expert Witness Statement, p. 16.

[9] For example, if the building block approach was applied to the OEAM contract, ESCOSA would, *inter alia*, need information on OEAM's total overhead cost that was allocated to Envestra SA, the allocation of OEAM management time to Envestra SA, and the allocation of common capital (*e.g.* IT infrastructure) to Envestra SA, along with estimates of the appropriate return on (weighted average cost of

the current arrangement establishes an overall management fee linked to Envestra's regulated revenue without any support for the underlying operating or capital costs involved. Without this cost information, ESCOSA cannot evaluate whether the contract's "margin" above direct costs is in fact approximately equal to the contractor's "indirect costs and cost of capital," nor could ESCOSA examine the relative payments for indirect costs and capital.

This point is directly relevant to the concern expressed in the Draft Decision. Without information on OEAM's underlying costs, particularly the breakdown between the capital and operating costs inherent in the services provided to Envestra, ESCOSA has no basis for determining how much of the management fee compensates OEAM for its operating costs (including operational overhead) and how much is implicit compensation for the capital services provided. Accordingly, ESCOSA cannot be assured that the management fee does not effectively include some profit transfer or, equivalently, returns for Envestra's use of OEAM capital that are in excess of WACC. If profit transfers were in fact implicit in the contract, the non-capital costs of the contract must necessarily exceed the lowest sustainable cost of providing service.

We also disagree with Envestra's description of the consequences of eliminating the management fee from allowed non-capital costs. Envestra writes "(t)the application off the Commission's decision leads to perverse results. For example, is (sic) the effect of that decision that Envestra should cease to engage a contractor but rather operate its network in-house so as to ensure that all Envestra's costs meet the criteria in section 8.37…The consequence of such a step would be that Envestra would incur substantially higher costs, due to the loss of the economies of scale and specialization with contracting out."[10] This passage assumes, incorrectly, that the only two options available to Envestra are contracting out to OEAM and in-house provision.

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capital) and return of (depreciation) that capital. This information could be used to develop a "revenue requirement" for the contract which compensates OEAM for the operating and capital costs associated with its provision of network management services to Envestra. ESCOSA could then examine these data to ensure that the costs of the contract are appropriate.

[10] *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part B, p. 42.

PEG also believes that, in principle, benchmarking evidence could be used to reduce regulatory concerns about the terms of outsourcing contracts between at least partly related corporate parties. Some regulators have downplayed the value of benchmarking for this purpose because they believe it is less objective than competitive market tendering for determining whether outsourced services are priced appropriately.[11] PEG agrees that benchmarking evidence is not as direct or unambiguous as competitive market tenders in assuaging regulators' concerns about the terms of outsourced contracts to related parties. Accordingly, we believe that benchmarking studies must satisfy a very high standard to be persuasive and justify the costs of such contracts. At a minimum, satisfying this standard requires high quality data; rigorous benchmarking techniques that take account of relevant operating conditions and lead to robust benchmark evaluations; and demonstration of superior cost performance relative to a well defined and verifiable standard. As discussed, Envestra has presented benchmarking evidence by BE and WP in this proceeding. The next chapter considers this benchmarking evidence with an eye towards assessing whether it is sufficient to overcome the *a priori* concerns regarding the network management fee component of the Envestra-OEAM contract and whether it effectively demonstrates that Envestra's non-capital costs are the lowest sustainable costs needed to provide service.

[11] For example, see Essential Services Commission, *Electricity Distribution Price Review 2006-2010, Final Decision Volume 1*, pp. 174-175. The ESCV also cites Ofwat in the UK as another regulator which has examined these issues and come to a similar decision.

# 3. Benchmarking Envestra's Non-Capital Costs

Because of time constraints, this section will not provide a comprehensive and point by point analysis of the WP and BE benchmarking studies. Instead, this chapter will address the main points of these studies and whether they generally constitute robust benchmarking that supports the view that the Company's non-capital costs are efficient.

## 3.1 Definition of Benchmarked Costs

One threshold issue is whether the benchmarked cost measure should include Envestra's network development costs. Compared with other Australian gas distributors, these costs are relatively high for Envestra in South Australia. Thus if these costs are included in the analysis (as in ESCOSA's Draft Decision) Envestra's comparative performance is worse than if these costs are excluded (as in the WP and BE studies). Envestra argues that these costs reflect network specific conditions, particularly a difference in climate in South Australia that requires greater marketing effort to encourage customers to connect to the network. Hence "(t)o conclude that this factor is largely within the control of Envestra is essentially concluding that Envestra is largely in control of the climate, clearly a false premise."[12] BE agrees that gas penetration is more difficult in South Australia and requires greater marketing effort but attributes this to differences in "gas uptake." In the BE analysis, gas uptake is measured by the share of gas in a State's total energy use since "the first and most significant measure of gas penetration is the proportion of gas in the total energy demand for the state."[13]

Our assessment of this issue begins from what we believe are two indisputable facts. First, the network marketing costs themselves are subject to management discretion and, thus, controllable, although parties differ on whether and to what extent exogenous factors affect the level of these expenditures.[14] Second, network development spending is expressly designed to increase gas penetration, which in turn should improve the utilization of the existing gas distribution network and reduce unit cost.

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[12] *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part A, p. 27.

[13] Benchmark Economics, *Benchmarking Non-Capital Costs*, May 2006, p. 11.

[14] Envestra appears to accept this premise in its statement "(w)hile Envestra acknowledges that it is responsible for determining its marketing program, the impetus for the program are the exogenous costs specific to its network"; *Response to ESCOSA Draft Decision Envestra Access Arrangement*, Part A, p. 27.

These hopefully non-controversial statements lead directly to the conclusion that Envestra's network marketing is purposely motivated to achieve a type of efficiency gain. Effective gas marketing will increase gas penetration. This will in turn improve the efficiency with which the existing gas delivery network is utilized. If marketing is effective, this will reduce unit cost and the overall price of gas distribution services.

From this conclusion, it also follows that there is a logical inconsistency in the argument that network costs should be excluded when evaluating efficiency. That is, Envestra and its consultants are arguing that, when evaluating the Company's efficiency, analysts must exclude expenditures that are expressly designed to improve efficiency. This paradoxical implication of Envestra's (and WP's and BE's) position seems inconsistent with the objective of benchmarking and insupportable on its face.

On closer inspection, it becomes evident that the approach favored by WP and BE can lead to distorted benchmarking assessments. It is easy to recognize that network development spending is an example of an O&M expenditure designed to achieve *capital* efficiencies (*e.g.* improved capital utilization via increased customer density on the network). In other words, network marketing can lead to a tradeoff between measured capital and non-capital efficiency. The approach of researchers attempting to assess a company's efficiency should not be to ignore expenditures that may lead to capital-O&M efficiency tradeoffs. Rather, analysts should take a more holistic approach towards assessing efficiency and be careful to consider these tradeoffs. Admittedly, this is not an easy task, but the alternative of simply eliminating expenditures associated with potential tradeoffs is not an acceptable solution since it can lead to biased efficiency evaluations. For example, suppose company A spends money on program X, which reduces its capital expenditures, but company B does not. All else equal, if a benchmarking study eliminates the expenditures of program X from its assessment of non-capital costs, company A will be measured as being more efficient than Company B in both capital and non-capital spending. However, if the effect of program X was to raise Company A's overall unit cost of service (*i.e.* even though capex declined, the operational costs of the program exceeded the effective capex savings), then eliminating these costs leads to the incorrect benchmarking conclusion: program X actually made Company A less efficient than Company B, not more.

Our analysis therefore leads us to conclude that network development costs should be included in the analysis of Envestra's non-capital costs. A failure to do so can lead to distorted efficiency assessments. It is not true, as the BE report claims, says that if network development costs are included then the "activity sets" between Envestra and other companies will not defined on a "like for like" basis. The "activity sets" for all Australian distributors include activities devoted to marketing and network development. The issue is not whether these activities are undertaken but the relative magnitude of the associated costs and the extent to which any differences in magnitudes are due to exogenous factors beyond a distributor's control. The appropriate response to this issue is for the benchmarking study to specify and examine exogenous operating conditions that may be associated with differences in the costs of the network development "activity." We turn next to the issue of appropriate operating condition variables.

### 3.2 Operating Conditions and Benchmark Normalizations

All benchmarking studies presented in the review of the AA accept that non-capital cost comparisons must control for differences in operating conditions across distributors. ESCOSA's analysis did this by normalizing a company's non-capital costs by the number of customers it served and km of distribution main. The WP report also reported operating cost measures normalized by customer numbers, km of distribution main, and the value of the regulatory asset base (*i.e.* opex as a percent of the regulatory asset base (RAB)).

The BE report claims that the simple metrics presented in the Draft Decision do not control adequately for operating conditions. BE presents cost models where average non-capital costs (non-capital costs per connection) are regressed against total number of connections, network size in km, gas uptake (measured as the share of gas in total state energy use), customer density (measured as connections per km), and customer class (measured as gas use per connection). All of the models use non-capital costs per customer as the dependent variable because BE claims cost drivers "can only be determined by measuring the change in average costs associated with a change in operating conditions."[15] BE says that its approach is more useful for quantifying the impact of economies of scale or economies of density on cost. The regression of unit non-capital costs versus customer density is the most important of BE's models since this is the one that is ultimately used to generate a prediction for Envestra's non-capital costs.

We agree with BE's basic concern that normalizing costs by only customers or km does not adequately control for differences in economies of scale or economies of density (although we disagree that the "only" solution to this problem is measuring changes in average cost for a given change in operating conditions; this will be discussed further in Section 3.4).[16] We also agree that customer density is an important cost driver that should be examined in a benchmarking analysis of distributors' non-capital costs. We also agree that what BE calls customer class is a relatively less important operating condition variable than customer density or controls for economies of scale.

However, we do not believe that BE's "gas uptake" variable is appropriate. Any operating condition that is used as an "independent" (or right hand side) variable in a regression model should, in fact, be independent of the model's dependent (left hand side) variable. This means that values for the independent variable should not depend on values that the dependent variable takes.

The gas uptake measure does not satisfy this criterion. Gas uptake is measured as the percent of natural gas in a State's energy use. This will be correlated with gas penetration, which depends on network marketing expenditures. As previously discussed, these expenditures should be included in the benchmarked non-capital cost measure (the left hand side variable). It follows that BE's gas uptake measure is not in fact exogenous or independent of the costs to be benchmarked. Thus while we agree that exogenous factors may affect a company's optimal marketing expenditures, the gas uptake measure presented in the BE study is not an exogenous "driver" and therefore not an appropriate operating condition to use in a benchmarking analysis.

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[15] Benchmark Economics, *op cit*, p. 8.

[16] BE does not comment on WP's benchmarking metrics, but the same criticisms would apply to the cost per customer and per km measures developed there. We also believe that WP's metric of operating cost as a percent of the RAB is not appropriate because the denominator of this expression: 1) can be distorted across distributors by differences in the valuations of the RAB and/or by the relative age of capital; and 2) the value of capital is not exogenous, and will depend on a company's capex decisions among other things.

PEG recommends an alternative measure for this operating condition known as "heating degree days." This is a well-established metric that measures the severity of winter weather and, hence, is correlated with the end-use demand for space heating. Natural gas penetration increases markedly as end-use demand for space heating increases. Heating degrees for a given day is defined as the difference between 65 degrees Fahrenheit and average temperature for that day (unless this difference is negative, in which case heating degree days is set to zero). The heating degree measure is summed for all days to arrive at annual heating degree days.

PEG estimated annual heating degree days for Australia's eight capital cities using Bureau of Meteorology data.[17] We also took a simple average of these heating degree day measures, as well as a population-weighted average of heating degree days for the eight capitals. The results are presented in Table One.

It can be seen that heating degree days for Adelaide are about 30% below those for Melbourne and about 50% lower than Canberra. However, Adelaide's heating degree days are significantly above Sydney's and far greater than those for Brisbane. Overall, Adelaide's heating degree days are about equal to the average for Australia's eight capitals and somewhat below the population-weighted average. These data show that, by Australian standards, the severity of Adelaide's winter weather is roughly the same as the eight capital average. Based on this criterion, one would expect Envestra would need to undertake greater marketing effort to connect customers than distributors serving Melbourne or Canberra but less than distributors serving the Sydney or Brisbane metropolitan areas.

PEG accepts that heating degree days is not a perfect measure of all exogenous factors that may drive differences in marketing effort.[18] Nevertheless, it represents a truly exogenous factor that can be applied in benchmarking models. Further efforts could be undertaken to refine or develop alternative measures, but it is preferable for

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[17] We had only monthly data, so we calculated HDD for a month as 65 degrees Fahrenheit minus the mean of the maximum and minimum temperature for that month, multiplied by the number of days in the month.

[18] Another factor that could influence optimal marketing effort is the delivered price of gas to a distributor's "city gate." This will depend on the distance of end use markets from gas sources, among other factors. PEG was not able to locate any publicly available data on delivered gas prices to Australian city gates, but we did find some suggestions that this data is potentially available from the Australian Gas Association.

Table One

## Heating Degree Days for Australia

| | Population | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Adelaide** | 1,087,600 | 0 | 0 | 0 | 80 | 242 | 353 | 415 | 373 | 266 | 147 | 13 | 0 | 1,888 |
| **Sydney** | 4,250,100 | 0 | 0 | 0 | 0 | 166 | 291 | 359 | 295 | 167 | 35 | 0 | 0 | 1,313 |
| **Melbourne** | 3,610,800 | 0 | 0 | 5 | 175 | 328 | 455 | 512 | 462 | 358 | 261 | 134 | 13 | 2,704 |
| **Brisbane** | 1,547,700 | 0 | 0 | 0 | 0 | 2 | 137 | 200 | 155 | 0 | 0 | 0 | 0 | 494 |
| **Perth** | 1,375,200 | 0 | 0 | 0 | 0 | 130 | 237 | 300 | 286 | 207 | 113 | 0 | 0 | 1,274 |
| **Hobart** | 189,400 | 66 | 62 | 150 | 266 | 420 | 518 | 565 | 521 | 420 | 337 | 237 | 155 | 3,717 |
| **Canberra** | 327,700 | 0 | 0 | 44 | 272 | 507 | 636 | 713 | 638 | 472 | 320 | 150 | 0 | 3,752 |
| **Darwin** | 96,200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | |
| **Simple Average** | 2,763,689 | 8 | 8 | 25 | 99 | 224 | 328 | 383 | 341 | 236 | 152 | 67 | 21 | 1,893 |
| **Population-Weighted Average** | | 1 | 1 | 5 | 69 | 209 | 332 | 395 | 345 | 227 | 127 | 48 | 6 | 1,764 |

researchers to quantify exogenous factors in this manner and include these variables in benchmarking studies instead of simply eliminating nettlesome costs from the analysis.

### 3.3 Data

Another relevant issue in the WP and BE studies is the data used. WP and BE both rely primarily on the costs that were allowed by regulators in other access arrangements rather than the companies' actual data. Using allowed cost rather than actual cost data is very problematic in benchmarking studies.

Fundamentally, benchmarking is designed to obtain an inference on the efficiency of the management of an enterprise. Such an inference can only be obtained by examining metrics that reflect the impact of management decisions. This will not be possible using data on the costs that are *allowed* by regulators, because these metrics depend directly on decisions that are made *by regulators*. Only data that reflect the actual operations, and hence management decisions, of the companies themselves will necessarily reflect the managerial efficiency of those companies.

This issue is material, because there is an expected bias associated with the use of allowed rather than actual cost data. It is typical for utilities' actual operating costs during the term of a CPI-X plan to be less than what was allowed in the Determination. Indeed, there is a strong presumption that companies' cost performance will be below the cost "benchmarks" embodied in a CPI-X determination. Australia's incentive regulation frameworks are designed to encourage ongoing efficiencies in utility operations. If regulation is operating as intended, companies will be outperforming their cost benchmarks and their actual costs will be below allowed costs.

This implies that the WP and BE studies are likely to be biased in Envestra's favor. If actual cost data were available for other Australian companies and used for the analysis, the costs for these companies would be expected to be lower than their allowed costs. Although the amount of this bias is not known, more accurate data would be expected to reduce costs for the comparator distributors while not affecting Envestra's own reported costs (*i.e.* the company's actual costs). This would tend to increase Envestra's costs relative to the rest of the sample.

In light of these points, comparing the actual costs of one enterprise with the allowed costs of another is an example of not comparing like with like. This process is more akin to comparing, say, oranges to tangerines than the more common analogy of comparing apples to oranges. There are some obvious similarities between oranges and tangerines, but tangerines can be expected to be smaller on average. If a tangerine is compared to a group of oranges, it would be a mistake to infer that the difference in size was due to the relative efficiency or inefficiency of the tangerine grower. However, a mistake of this nature is likely when actual utility costs are compared to allowed costs.

Another data issue is the number of years used in the analysis. Both the WP and BE studies base their conclusions on sample observations for a single year while ESCOSA examines multiple years. ESCOSA's approach is preferable for a number of reasons. First, all else equal, a single year's observation is more likely to be affected by temporary or one-time factors (due to either exogenous or endogenous, management decisions) that affected either reported costs or reported business condition variables. Examples could be accounting changes or the timing of maintenance or investment cycles. In general, there will be more assurance that costs and business conditions are representative and sustainable if they use multiple years of data.

In addition, efficiency itself is a multi-year concept. One would generally expect measured efficiency to remain relatively stable from year to year and change only slowly.[19] Researchers can have more assurance that this is, in fact, the case if they examine data over a multiple year period. Efficiency measures that fluctuate wildly from year to year are likely to indicate problems with either the data used or the benchmarking model itself. For these reasons, relying on multiple years of data is useful for developing and verifying that benchmarking assessments are robust.

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[19] See Bauer, P., A. Berger, G. Ferrier, and D. Humphrey (1998), "Consistency Conditions for Regulatory Analysis of Financial Institutions: A Comparison of Frontier Efficiency Methods," *Journal of Economics and Business*, 50:85-114. The authors say relative stability in efficiency measures over time is an important criterion for assessing the degree to which a given benchmarking approach is consistent with reality or believable. One would not generally expect a company's efficiency to change substantially from year to year for reasons including the fact that managers and management practices turn over slowly and capital equipment is often adjusted gradually. These factors should produce relative stability in efficiency measures in closely related time periods.

## 3.4 Benchmarking Techniques and Results

The benchmarking approach of WP and ESCOSA is to construct simple, partial cost measures by normalizing non-capital costs by a limited range of operating condition variables (principally customer numbers and km of main). BE uses an econometric approach that regresses cost against a series of operating conditions. As discussed, all of BE's regression models use non-capital costs per customer as the dependent variable because of the assumption that cost drivers and controls for scale and density economies "can only be determined by measuring the change in average costs associated with a change in operating conditions."

In principle, BE's benchmarking technique is more powerful than that used by WP and ESCOSA and can yield more reliable and robust benchmarking inferences. Econometric methods can be used to consider the impact of a wide range of cost drivers on non-capital costs. Econometrics can also lead to more holistic assessments that consider how different cost driver variables interact with one another, as well as measuring both "first order" and "second order" changes associated with a given variable (*e.g.* how costs change with both the value and squared value of a given cost driver). Compared with simpler methods, the ability to consider a wide range of cost drivers simultaneously promotes more robust benchmarking assessments.

However, PEG has concerns with the actual econometric methods and results presented in the BE report. As a conceptual matter, it should first be noted that it is not true that economies of scale and density can "only" be quantified and controlled by regressing the change in a dependent variable against an operating condition (or by regressing a unit cost measure against a variable). This is, in fact, not the normal or best means of controlling for economies of scale. Economists have developed a class of "flexible form" cost functions that quantify and control for economies of scale and, depending on the choices for independent variables, economies of density. These flexible form functions also have the appealing property that they do not impose any arbitrary assumptions on the underlying technology that transforms selected operating conditions into costs. The approach taken by BE is more blunt and less flexible than the conventional econometric approach although, in practice, it does control for economies of scale in a fashion, since the concept of scale economies depends on the relationship between changes in the unit cost of service and changes in output. Some of BE's regressions embody this concept, but readers should not conclude that this is the only acceptable method for specifying cost functions.

Another concern is that BE regresses its unit cost measure against only a single variable at a time. This is unduly restrictive and cannot consider how various cost driver variables may interact. The failure to consider relevant cost driver variables in a regression can also lead to "omitted variable bias," or a biased estimate of the parameter for the variable that is in fact used in a given regression. Biased parameter estimates naturally lead to biased benchmarking predictions and are not consistent with the objective of robust benchmarking.

PEG suspects that the BE parameter estimates are characterized by omitted variable bias. Cost functions that regress a cost measure against a single variable are almost certainly too simple to capture the complexities of gas distribution technologies. We therefore believe they are unlikely to yield robust benchmarking inferences.

Another bias is likely to result from the fact that BE regresses *allowed* non-capital costs against individual business conditions. Such a regression will literally only estimate the impact of different drivers on the costs that regulators *allow*, not necessarily the costs that firms achieve. Knowing the relative impact of different variables on regulatory decisions may be interesting, but it has no necessary implications for how efficiently a firm operates after those regulatory decisions have been made. Moreover, as discussed, allowed costs are likely to be greater than actual costs, so the coefficients that result by regressing individual cost driver variables on allowed costs can be expected to be greater than those that result from regressing those same variables on actual costs. Models estimated using allowed cost data therefore have parameter estimates that can be expected to be biased in favor of positive benchmarking evaluations, when those model predictions are compared to companies' actual costs.

## 3.5 Standard for Evaluating Efficiency

Both the WP and BE reports conclude that Envestra's non-capital costs are efficient, but neither study provides well-defined criteria for evaluating, let alone quantifying, what would qualify as "efficient" performance. The WP report simply provides an "expected range" of values for the selected benchmarking indicators without saying what this range is based on or how it is derived. PEG assumes that the range stems from WP's judgment and collective experience, but without context or explanation (at a minimum) the reader has no basis for evaluating whether this judgment is sound.

The BE report discusses efficiency concepts in more detail. It says the concept of efficient costs is "elusive." Furthermore, BE says "(t)hough economic efficiency (productive, allocative and dynamic) is a concept widely used in regulatory economics, it is insufficiently precise to provide guidance to regulators on appropriate *levels* of efficient expenditure for regulatory purposes. It is a process not a target."[20] BE concludes that "..efficient cost is not an exact level of expenditure or target. Rather, it is one that fits within a range of the overall experience of the industry and is that appropriate to the operating scale and conditions of the business."[21]

PEG acknowledges that it is difficult to quantify or evaluate the concept of "efficiency" rigorously. We also agree that regulators should not focus on identifying a single, efficient level of expenditure and conclude that any expenditure in excess of this level is necessarily "inefficient." However, we do not believe that BE's proposed criteria provide meaningful guidance to regulators for making specific, concrete determinations on whether a utility's expenditures are efficient. Naturally, benchmarking assessments should take into account the industry's experience and the scale and operating conditions of the business but, on its own, this principle is not helpful for identifying a precise "range" of company expenditures that is consistent with efficient performance. If they are taken at face value, without further elaboration, the standards proposed by WP and BE are subjective and elastic enough to support nearly any conclusion.

PEG believes more precise standards for evaluating efficiency can be employed. Without attempting to provide a definitive resolution of this issue, we present two different "efficiency" criteria that we believe are worth considering in the current proceeding. The first is the idea of a *superior cost performer,* as established through rigorous statistical measures. The second is a *competitive market standard*.

[20] Benchmark Economics, *op cit*, p. 3.
[21] Benchmark Economics, *op cit*, p. 4.

Econometric methods can be used to determine whether a utility is a superior cost performer in a statistical sense. For example, superior cost performance can be evaluated by specifying an econometric cost model and using this model to develop both a point prediction for a company's cost and a confidence level around this point prediction. The confidence interval provides a well-defined quantification of the uncertainty associated with any given cost prediction, and the value of this confidence interval will be specific to the circumstances of any individual company and the performance of the model itself (*e.g.* all else equal, confidence intervals become smaller as the model is more successful in explaining the change in the dependent variable). If a company's actual costs are below the lower end of the (say) 95% confidence interval, then a researcher has a well-founded basis for concluding that the company's actual costs are less than what would be expected. A reasonable inference from this result is that the company is a superior cost performer. Conversely, if a company's actual costs are above the upper end of the 95% confidence interval, it is reasonable to conclude that the company is an inferior cost performer. If the company's actual costs are within the confidence interval around the point prediction, the analyst cannot reject the hypothesis that the company is an average cost performer.

This approach is attractive for a number of related reasons. First, it acknowledges that there is uncertainty associated with any benchmarking analysis. It can also quantify this uncertainty in a manner that directly reflects the conditions of the company in question. In addition, it provides the researcher with a rigorous basis for concluding with a well-defined degree of confidence whether the enterprise in question is or is not efficient.

The BE report did provide a confidence interval around its value for predicted cost. However, as discussed, PEG has serious concerns with this model and the predictions it generates. Accordingly, we do not believe that it can be used to make robust inferences on efficiency.

The second option is the competitive market standard. It is known that competitive markets create strong incentives to perform efficiently. Accordingly, if a utility can show that its efficiency is compatible with what would be expected in a competitive market, regulators would have more assurance that the company's costs were efficient.

PEG believes it is possible to operationalize this standard by considering the relationship between the average and the frontier levels of efficiency in the utility industry, and comparing this to the relationship between average and frontier efficiency levels in competitive markets. One would expect that, over time, competitive markets drive the industry's average level of efficiency to be "close" to but not actually at the frontier performance. Not all firms in competitive markets will be operating at frontier standards; indeed, in competitive markets, firms that are on the frontier tend to earn above average returns, whereas average firms in the industry earn only average returns (*i.e.* returns approximating their cost of capital). The competitive market experience implies that it is not reasonable for regulators to assume that all firms in a *utility* industry should be operating on the frontier, because if competitive markets actually behaved in this way then only firms on the frontier could earn returns commensurate with their cost of capital and all other firms would have returns below their cost of capital.

It follows that, in competitive markets, firms that are earning returns commensurate with their cost of capital have efficiency levels that are "close" to but below frontier levels. The critical issue for operationalizing this standard for utility regulation is how "close" this relationship is. PEG provides some information on this point by reviewing a number of benchmarking studies in competitive industries. We surveyed published frontier benchmarking studies in two competitive sectors: banking and farming. Tables Two and Three summarize our findings from the two surveys.

The surveys show that, on average, efficiency levels of firms in these two competitive sectors are about 80-90% of frontier efficiency levels. Our survey on banking efficiency using frontier methods covers Greek, Turkish, European and U.S. banks. The studies for European banks report average efficiency levels from 70% to 85% using parametric methods. The average efficiency level among U.S. banks is from 80% to 90% using this same approach. Non-parametric approaches like data envelope analysis (DEA) show average efficiency levels to be even lower in this competitive industry. The efficiency studies in the farming sector find average efficiency levels in a similar range. It is clear from this survey that the average efficiency level of firms is not

Table Two
Survey of Efficiency Studies of Banking Firms

| Study | Data Coverage | Method | Result |
|---|---|---|---|
| Bauer, Berger, Ferrier and Humphrey (1997) | US Banks 1977-1988 | Parametric | Average cost efficiency = 83% |
| | | Nonparametric | Average cost efficiency = 30% |
| Berger and Humphrey (1997) | Survey of 130 efficiency studies of financial institutions | Parametric | Average efficiency = 84% |
| | | Nonparametric | Average efficiency = 72% |
| Berger and Mester (1997) | US Banks 1990-1995 | Parametric | Average cost efficiency = 86.8% |
| Casu and Girardone (2002) | European Banks 1993-1997 | Parametric | Average economic efficiency = 86% |
| | | Nonparametric | Average technical efficiency = 65% |
| Christopoulous and Tsionas (2001) | Greek Banks 1993-1997 | Parametric | Average economic efficiency = 65% |
| Christopoulous, Lolos and Tsionas (2002) | Greek Banks 1993-1998 | Parametric | Range of economic efficiency = 60% -100% |
| Clark and Siems (2002) | US Banks 1993-1997 | Parametric Method 1 | Average cost efficiency = 86% |
| | | Parametric Method 2 | Average cost efficiency = 74% |
| Eisenbeis, Ferrier and Kwan (1999) | US Banks 1986-1991 | Parametric | Range of average efficiency level by size = |
| | | Nonparametric | Range of average efficiency level by size = |
| Fethi, Jackson and Weyman-Jones (2002) | Turkish Banks 1992-1999 | Nonparametric (one variant) | Average technical efficiency = 57% |
| Vennet (2000) | Turkish Banks 1995-1996 | Parametric | Average cost efficiency = 80% |

Table Three
Survey of Efficiency Studies of Farming Firms

| Study | Data Coverage | Method | Result |
|---|---|---|---|
| Brummer, Glauben and Thijssen (2002) | German, Dutch and Polish Diary Farms 1991-1994 | Parametric | Range of average technical efficiency by country = 76% - 95% |
| Hadri, Guermat and Whittaker (2003) | English Cereal Farms 1982-1987 | Parametric | Average technical efficiency = 86% |
| Kumbhakar (2001) | Norwegian Salmon Farms 1988-1992 | Parametric | Range of average technical efficiency by specification = 79% - 83% |
| Kumbhakar, Ghosh and McGuckin (1991) | US Diary Farms 1985 | Parametric | Range of technical efficiency by size = 66.8% - 77.4% |
| | | | Range of average allocative efficiency by size = 84.6% - 87.6% |

at frontier performance in either of these two competitive sectors. Average efficiency levels in competitive industries are about 10% to 20% below the performance frontier.

It should be emphasized that neither the WP nor the BE studies have employed this approach. Both reports appear to compare Envestra to the mean level of performance in Australia's gas distribution industry. They also appear to conclude that if actual cost is equal to average (*i.e.* expected) cost, then the company in question is efficient. PEG does not believe that such a showing is sufficient for demonstrating efficiency, nor is it compatible with the competitive market standard proposed here. The latter standard examines a relationship between frontier and average performance levels, not average efficiency in isolation.

## 3.6 Cost Sustainability

The BE report also considers the issue of cost "sustainability" and concludes that "as actual costs amounted to only 87 per cent of estimated costs, we are of the view that this efficient cost performance may not be sustainable over the long run."[22] PEG believes that no conclusion can be derived on cost sustainability from the BE study and, in general, it will be very difficult to derive any conclusion on this issue from a study that examines a single year of data. Cost "sustainability" necessarily involves a consideration of whether expenditures can be maintained on a multi-year period while still providing service at what regulators (and the public) believe are appropriate quality levels. This inherently multi-year concept cannot be evaluated from a single cross examination. At best, one cross section can provide information on what factors drive cost differences across firms at a given point in time, not whether costs are compatible with exogenous drivers over a multi-year period.

It should also be recognized that, in any given year, costs may not be "sustainable" because they are either too low *or* too high. Discussion of this concept appears to contemplate only the first possibility. But any given cost observation could in principle reflect the effect of actions taken in that year which increase costs but which are not undertaken (at least to the same degree) year in and year out. For example, utilities

[22] Benchmark Economics, *op cit*, p. ii.

typically have investment or maintenance "cycles" that take place over a multi-year period, and the amount of investment or maintenance activity undertaken in a given year may depend on where they happen to be in the cycle. Costs could therefore be unsustainably high if they reflect, *inter alia*, an unusually large amount of investment or maintenance activities. Since the issue of cost sustainability is part of the Gas Code, it is important not to lose sight of this basic point.

PEG believes the competitive market paradigm presented in the previous section could be useful for determining whether non-capital costs reflect the lowest sustainable cost, as required by the Gas Code. It is reasonable to believe that the costs that set the price in a competitive market will correspond with the lowest sustainable cost. The competitive market paradigm and experience from competitive markets suggests that these costs would be consistent with efficiency levels that are 10%-20% below the frontier levels of efficiency in the industry. This information could in principle be used to define a well-defined range for "lowest sustainable costs" that is tailored to the business conditions of an individual company.

## 3.7 Operating-Capital Cost Allocations

BE presents a regression of capital expenditures (capex) per customer against customer density. The report finds a similar trend line to the analogous regression for non-capital costs. It therefore concludes that "there is no reason to believe that allocation policies have resulted in lower Non Capital costs at the expense of higher capex."[23]

The capex econometric model presented in the BE report simply has no bearing on the issue of operating versus capital cost allocations. Fundamentally, this is an issue of accounting and not econometric cost drivers. An econometric model cannot distinguish whether the selected dependent variable does or does not contain the correct cost components. In fact, if the opex and capex models had identical cost drivers, an analyst could reallocate costs from one cost category to another without influencing the regression results that are obtained. However, these cost reallocations would necessarily influence the conclusion about whether the company in question was "efficient" since

[23] Benchmark Economics, *op cit*, p. 19.

they by definition impact the value of cost measure that is subject to benchmarking.  PEG believes there is no evidence one way or the other on whether Envestra's opex costs are in fact defined appropriately because an econometric cost model is not the appropriate tool for addressing this issue.

# 4. Conclusions

Given the available evidence, we believe ESCOSA's decision to require removal of the network management fee when determining allowed costs for Envestra is sound. This network management fee raises legitimate regulatory concerns which could conflict with ESCOSA's statutory requirements. In principle, performance benchmarking could assuage these concerns. Any such benchmarking study would have to use high quality and appropriate data; control simultaneously for the impact of major cost driver variables on gas distributors' non-capital costs; employ benchmarking techniques that lead to unbiased estimates of the impact of cost drivers on distributors' costs and, by extension, unbiased benchmarking evaluations; and present rigorous quantitative evidence on the imprecision associated with benchmarking predictions.

The benchmarking studies presented by WP or BE do not satisfy these criteria. These studies are problematic with respect to the data chosen, the definition of non-capital costs that excludes network marketing expenditures, the benchmarking techniques employed, the selected operating condition variables, and the standards used to evaluate efficiency. Overall, the benchmarking studies presented on behalf of Envestra in this proceeding do not provide persuasive evidence that Envestra's non-capital costs inclusive of the network management fee deliver the lowest sustainable cost of providing service.

Although PEG has not had time to investigate the issue in depth, we believe that such benchmarking evidence could have provided in this proceeding. We recognize that one issue that has likely shaped the benchmarking approaches adopted by BE and WP is the paucity of data in Australia (*e.g.* on actual cost). However, even restricting the analysis to Australian data, researchers can use bootstrapping and similar methods to develop more robust benchmarking evaluations.

More fundamentally, there is no reason to restrict the benchmarking analysis to Australian companies. This is especially true for non-capital cost benchmarking, since high quality data on overseas gas distributors' non-capital costs and cost driver variables are readily available. The more ample datasets that are available overseas would have allowed more rigorous benchmarking methods to be employed and promoted more robust benchmarking evaluations. It is true that international benchmarking does introduce its own challenges, but this is not a sufficient reason for not exploring this option, especially if, by restricting their attention to Australian data, analysts find themselves undertaking inherently flawed comparisons of the actual costs of one company to the allowed costs of others.

PEG also believes the competitive market paradigm presented in this report could be useful for future AA proceedings. In the absence of market testing, an application of this paradigm could be used by companies to demonstrate that their non-capital costs reflect the lowest sustainable cost, as required by the Gas Code. It is reasonable to believe that the costs that set the price in a competitive market will be consistent with the lowest sustainable cost. Experience from competitive markets suggests that these costs would be consistent with efficiency levels that are 10%-20% below the frontier levels of efficiency in the industry. This information, combined with rigorous benchmarking studies, could be used to define a well-defined range for “lowest sustainable costs” that is tailored to the business conditions of an individual company.

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