Review of AER Draft Decision on Envestra Queensland's Base Year Opex

Report prepared for
Envestra Ltd

23 March 2011

Denis Lawrence

Economic Insights Pty Ltd
6 Kurundi Place, Hawker, ACT 2614, AUSTRALIA
Ph +61 2 6278 3628 Fax +61 2 6278 5358
WEB www.economicinsights.com.au
ABN 52 060 723 631

CONTENTS

EXECUTIVE SUMMARY

Envestra Ltd has commissioned Economic Insights to review the Australian Energy Regulator (AER 2011a) Draft Decision on Envestra Queensland's ('Envestra Qld') base year opex. The AER Draft Decision draws heavily on the advice of its consultant, Wilson Cook & Co Limited (WCC 2010a), which in turn is based, in large part, on interpretations of Economic Insights' (2010) productivity report and a benchmarking report prepared by Marksman Consulting Services Pty Ltd (Marksman 2010).

WCC (2010a) and AER (2011a) both claim that the Economic Insights (2010) report points to 'a concerning trend in Envestra's efficiency performance' and 'concludes' that Envestra Qld's productivity performance is 'inferior' to that of other gas distribution businesses (GDBs) (AER 2011a, p.125). Both these claims are incorrect.

WCC (2010a) and AER (2011a) recommend an effective reduction in Envestra Qld's base year opex of 16 per cent. In this report we show that much of the information quoted by WCC (2010a) has been incorrectly used as follows:

- Productivity growth rates quoted for Envestra Qld are those excluding network marketing and including capex on full retail contestability (FRC) which means they are not on a like–with–like basis compared to the other included GDBs' growth rates. Including network marketing and removing FRC capex puts the growth rates on a comparable basis to those of Envestra SA and the Victorian GDBs. Envestra Qld's annual total factor productivity (TFP) growth rate is then 0.7 per cent and its opex partial factor productivity (PFP) growth rate is 2.3 per cent – both of which are very reasonable given Envestra Qld's adverse operating environment conditions.
- Comparisons of TFP levels do not adjust for the important effects of scale, differing customer densities and differing energy densities, all of which need to be allowed for before any conclusions regarding relative efficiency levels can be drawn given Envestra Qld's outlier characteristics compared to the other include GDBs.
- High level benchmarking comparisons are based on public domain data (including regulatory allowances) which are not likely to be sufficiently consistent or robust to provide the primary basis for making regulatory decisions, although they may be broadly indicative in some circumstances and be part of a range of information drawn on.
- No allowance is made in high level benchmarking comparisons for the important impact of scale and operating environment differences.
- Comparisons are made with APT Allgas without recognising that APT Allgas has twice the energy density and is much more focused on serving large commercial and industrial customers than is Envestra Qld and this will have a significant effect on opex partial indicators.
- No recognition is given to the implausibility of the public domain APT Allgas opex series which falls by 40 per cent between 2005 and 2007 indicating the likely impact of reporting changes such as changes in overhead allocation and capitalisation policies

(particularly given that there are concurrent step increases in APT Allgas' capex indicators).

- No recognition is given to the effects of differing opex requirements resulting from Envestra Qld's common use of polyethylene and nylon mains which are more prone to leakage.
- Comparisons between Envestra Qld and APT Allgas only look at opex partial indicators whereas they should also include capex indicators to provide information on likely opex/capex trade–offs.
- Envestra Qld outperforms APT Allgas on key capex partial indicators indicating that, reporting changes aside, Envestra Qld has likely opted to continue using older assets which have lower capital costs but higher opex costs compared to APT Allgas but this is ignored by WCC (2010a) resulting in 'cherry picking' of results.
- Comparisons of connection unit rates between Envestra Qld and Envestra SA ignore important differences in scale, operating environment conditions such as mains placement and traffic management requirements, and labour market conditions.

We find the WCC (2010a) analysis and recommendation concerning Envestra Qld's base year opex is not an appropriate basis for assessing Envestra Qld's efficiency.

In its electricity and gas distribution decisions to date, the AER has generally accepted that EDBs and GDBs were operating at (or close to) efficient base year opex levels at the end of the preceding regulatory period if their opex was less than (or close to) the previous regulatory allowance for that year. In some instances the AER has made some adjustments for standardisation of treatment.

We note that Envestra Qld's 2010 opex reported in AER (2011a, p.119) is below the Queensland Competition Authority (2005) regulatory allowance for that year. In light of this and the incorrect use of information and analysis contained in WCC (2010a) which the AER uses in arriving at its draft decision, we recommend the AER reconsider its draft decision regarding Envestra Qld's proposed base year opex.

1 INTRODUCTION

Envestra Ltd ('Envestra') has commissioned Economic Insights Pty Ltd ('Economic Insights') to review the Australian Energy Regulator (AER 2011a) Draft Decision on Envestra Queensland's ('Envestra Qld') base year opex. Economic Insights (2010) reported on the total factor productivity (TFP) and partial factor productivity (PFP) growth performance of Envestra's South Australian and Queensland gas distribution systems. Our earlier report also included these networks in comparisons of productivity levels and growth rates with the three Victorian gas distribution businesses (GDBs) – Envestra Victoria, Multinet and SP AusNet – and the New South Wales GDB, Jemena Gas Networks (JGN). The AER Draft Decision draws heavily on the advice of its consultant, Wilson Cook & Co Limited (WCC 2010), which in turn is based, in large part, on interpretations of Economic Insights (2010) and a benchmarking report prepared by Marksman Consulting Services Pty Ltd (Marksman 2010).

WCC (2010a) and AER (2011a) both claim that the Economic Insights (2010) report points to 'a concerning trend in Envestra's efficiency performance' and productivity performance that is 'inferior' to that of other GDBs (AER 2011a, p.125). However, Envestra Qld's relatively flat and declining reported recent productivity performance is explained by the exclusion of network marketing costs for Envestra Qld while they are included for the South Australian and Victorian GDBs included in Economic Insights (2010). Including these costs for Envestra Qld – so that productivity growth comparisons are on a more like–with–like basis – leads to Envestra Qld's productivity growth being positive rather than negative and positive to a reasonable extent given its adverse operating environment conditions.

And the comparisons of productivity levels that are used by WCC (2010a) and AER (2011a) to justify a recommended 16 per cent cut in Envestra Qld's base year opex fail to allow for the effects of the very large differences in customer and energy densities and scale between Envestra Qld and other Australian GDBs. In particular, WCC (2010a, p.46) claims that 'Economic Insights *concludes* that Envestra's … productivity performance is *inferior* to that of other gas distribution businesses' (emphasis added). This is incorrect. Rather, Economic Insights (2010, p.23) noted that small scale, low overall energy density and by far the lowest domestic energy density and customer density 'will make it hard for Envestra Qld to achieve productivity levels that are even closely comparable with those of the other included GDBs'. Economic Insights (2010) also noted that robust adjustments for the widely differing operating environment conditions would have to be made before any conclusions could be drawn regarding Envestra Qld's relative efficiency. This has not been done by either WCC (2010a) or AER (2011a).

The following parts of this section of the report summarise the terms of reference for this report, list Economic Insights' and Denis Lawrence's productivity measurement, benchmarking and regulatory experience and qualifications, and list the information sources drawn on in preparing this report. In section 2 of the report we review the conclusions of AER (2011a) regarding Envestra Qld's productivity growth and levels. We then review the use and interpretation of opex benchmarking work in section 3 before reviewing the recommended adjustments to base year opex in section 4.

1.1 Terms of reference

The terms of reference for this report state that Envestra wished to engage Economic Insights to prepare a report which reviewed section 8.6.1 of AER (2011a) and the associated determination by the AER that Envestra Qld's base year costs were not efficient. Reference was also made to the report by WCC (2010a) discussed in section 8.6.1 of AER (2011a). Opinion was sought as to whether the analysis undertaken by AER (2011a) and WCC (2010a) is sufficient and appropriate to reliably form the view that the operating costs of Envestra Qld are inefficient.

A copy of the letter of retainer for the review is presented in Attachment A.

1.2 Economic Insights' experience and consultant's qualifications

Economic Insights has been operating in Australia for 17 years as an infrastructure consulting firm. Economic Insights provides strategic policy advice and rigorous quantitative research to industry and government. Economic Insights' experience and expertise covers a wide range of economic and industry analysis topics including:

- infrastructure regulation;
- benchmarking of firm and industry performance;
- productivity measurement;
- infrastructure pricing issues; and
- analysis of competitive neutrality issues.

This report has been prepared by Dr Denis Lawrence who is a Director of Economic Insights.

Denis Lawrence has undertaken several major energy supply industry productivity measurement and benchmarking studies including: advising the Australian Energy Market Commission on its review of productivity–based regulation; benchmarking the productivity of Australian and US gas distribution businesses; benchmarking the performance of New Zealand's 29 electricity lines businesses and advising the Commerce Commission on appropriate X factors for each of the distribution businesses; benchmarking the performance of Australian and New Zealand gas distribution businesses for the Commerce Commission; benchmarking the productivity performance of the Australian state electricity systems against best practice in the US and Canada at both the system–wide level and for individual power plants; benchmarking the productivity, service quality and financial performance of 13 Australian electricity distribution businesses; and reviewing benchmarking work undertaken for regulators in NSW and Victoria. Denis has worked on productivity and regulatory issues for electricity utilities, regulators, state Treasury departments, international agencies and prospective investors.

Denis holds a PhD in Economics from the University of British Columbia, Canada. Denis' summary CV is presented in Attachment B.

Denis Lawrence has read the Federal Court Guidelines for Expert Witnesses and this report has been prepared in accordance with the Guidelines. A declaration to this effect is presented in Attachment C to the report.

1.3 Information sources used

In preparing this report a range of information sources have been drawn on as follows:

- the Economic Insights GDB Database – this database has been assembled over the last five years and contains output and input data which were collected by detailed surveys from the included GDBs. All included data underwent extensive review and checking to ensure consistency through time and across GDBs. The GDBs included in the Economic Insights GDB Database are Envestra Qld, Envestra SA, Envestra Victoria, JGN, Multinet and SP AusNet. Detailed productivity reports have been prepared for all these GDBs using the data contained in the Economic Insights GDB Database.
- public domain information sources including regulatory Performance Reports, consultants' reports, GDB Access Arrangements Information and Gas Access Arrangement Review Final Decisions as presented in Marksman (2010) and used by WCC (2010a,b).
- discussions and correspondence with Envestra Qld, Envestra SA and APA Group staff between December 2009 and March 2011.

2 ENVESTRA QLD'S PRODUCTIVITY GROWTH AND LEVELS

WCC (2010a, p.42) quote the Economic Insights (2010, p.38) result that Envestra Qld's partial productivity of opex increased between 1999 and 2002 but has fluctuated since then producing an average annual growth rate of around 1 per cent for the 12 years up to 2010. They go on to quote the capital PFP growth rate of –1.1 per cent for the last 12 years which produces a small negative annual TFP growth rate when combined with the opex PFP growth rate.

WCC then note that Envestra Qld's TFP growth differs from that of Envestra SA, JGN and the three Victorian GDBs whose TFP growth all continued to be positive after 2002. WCC then quotes the Economic Insights (2010) result that in 2006 Envestra Qld's TFP level was 76 per cent that of Envestra SA, 70 per cent that of JGN and between 60 and 70 per cent those of the three Victorian GDBs. Although WCC quote the Economic Insights qualifier that the very large differences in customer and energy densities between Envestra Qld and the other included GDBs would need to be normalised for before any conclusions could be drawn regarding Envestra Qld's efficiency, this is not considered further by WCC.

WCC (2010a, p.43) concludes that Envestra Qld's productivity 'has been deteriorating and does not compare favourably with the other networks considered'. WCC (2010a, p.46) goes on to make the stronger conclusion that:

> 'The productivity report prepared by Economic Insights *concludes* that Envestra's productivity has declined over recent years and that its productivity performance is *inferior* to that of other gas distribution businesses, even if the comparative businesses are larger in most cases and have higher customer and energy densities.' (emphasis added)

This is incorrect. Economic Insights (2010) makes no conclusion that Envestra Qld's performance has been 'inferior' and clearly states that conclusions regarding relative efficiencies cannot be drawn unless customer and energy density differences were adjusted for. The incorrect assertion is further repeated by AER (2011a, p.125) which also claimed that the report 'demonstrated a concerning trend in Envestra's efficiency performance'.

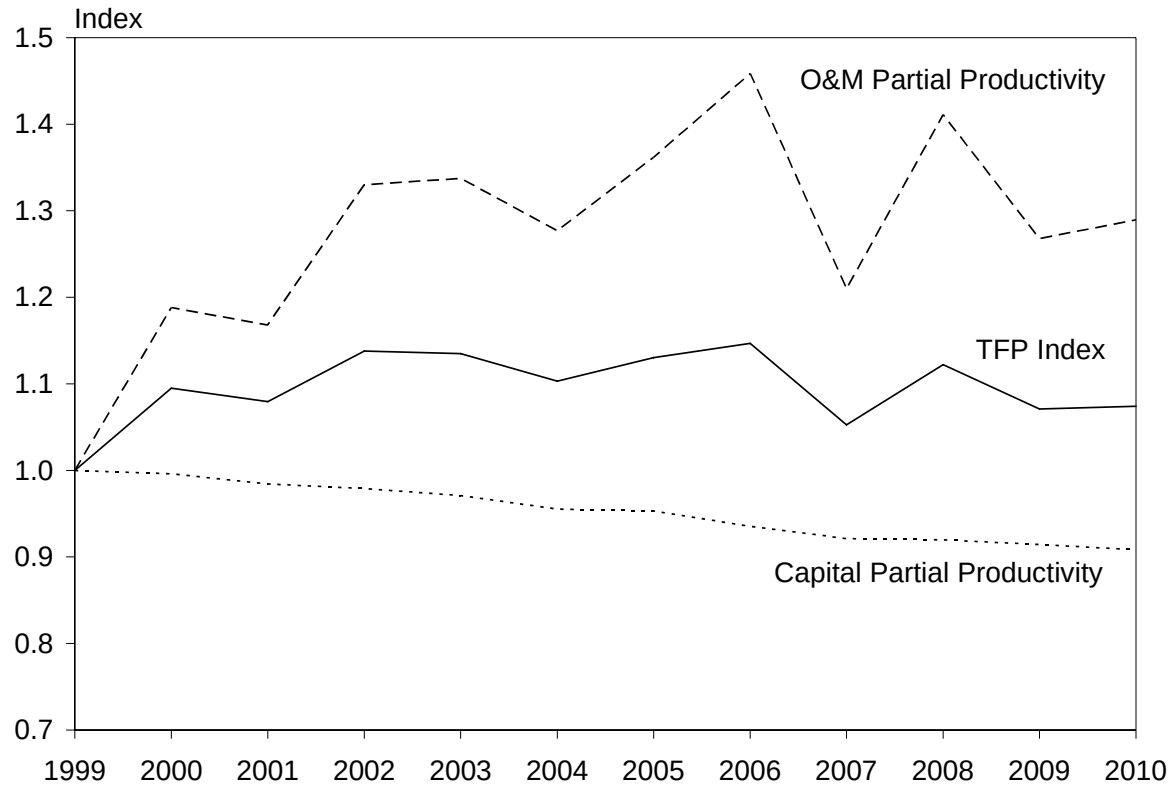
To demonstrate that both WCC (2010a) and AER (2011a) have incorrectly used the Economic Insights (2010) report, in the following sections we present further analysis of Envestra Qld's productivity growth and explain why its productivity levels cannot be compared with those of the other GDBs included in the report.

2.1 Envestra Qld's productivity growth performance

Economic Insights (2010, p.17) noted that 'network marketing expenses are also excluded for Envestra Qld given its low penetration'. This was done to provide some consistency with the treatment of JGN which also has lower penetration rates than the other included GDBs and to provide a potentially more appropriate basis for comparing productivity levels in the most recent year. Consequently, network marketing expenses were included for the three Victorian GDBs and Envestra South Australia but not for Envestra Qld and JGN. However, since some

of the networks where network marketing was included cut back significantly on network marketing during the global financial crisis, this gives them a higher opex PFP growth rate than would be the case if network marketing were excluded. Similarly, while Envestra Qld did not cut back in the same way during the recent crisis, its network marketing was considerably lower than it was at the start of the last decade and excluding network marketing gives it a considerably lower productivity growth rate than if network marketing expenses were included. To provide a like–with–like basis for comparing productivity growth rates, it is thus necessary to include network marketing for all GDBs given its secular decrease over the period. Given the focus of WCC and the AER on productivity growth rates, we have therefore recalculated the productivity measures for Envestra Qld including network marketing so that productivity growth rates can be compared on a more like–with–like basis.

Figure 1: **Envestra Qld TFP and PFP indexes including network marketing, 1999–2010**



Source: Economic Insights GDB database

A downturn in Envestra Qld's capital PFP can also be observed in 2007 in Economic Insights (2010, p.28). Investigation of the reasons for this downturn revealed that it was due to one–off capex to facilitate full retail contestability (FRC). Since this capex was allocated to the otherwise small 'other capital' input and the quantity of this component is measured by its constant price depreciated asset value, it produced a distorting effect on the overall capital input measure. Capex for FRC was excluded for the other included GDBs and so should have also been excluded in the data supplied by Envestra Qld. To allow more like–with–like

growth rate comparisons, we have therefore now excluded FRC–related capex for Envestra Qld.

The TFP and PFP indexes resulting from including network marketing and excluding FRC–related capex are presented in figure 1. This more like–with–like growth rate specification produces annual TFP growth over the last 12 years of 0.7 per cent instead of the –0.2 per cent reported in Economic Insights (2010). Opex partial productivity growth is now 2.3 per cent per annum instead of 1 per cent and capital partial productivity growth is now –0.9 per cent instead of –1.1 per cent.

Calculated on the like–with–like basis Envestra Qld's TFP, opex PFP and capital PFP annual growth rates of 0.7 per cent, 2.3 per cent and –0.9 per cent over the last 12 years compare with Envestra SA's corresponding figures of 1.5 per cent, 4.2 per cent and –0.1 per cent, respectively. Envestra Qld's productivity growth rates are thus not unreasonable given the relatively adverse operating environment conditions it faces and the AER's (2011, p.125) description of a 'concerning trend' in efficiency performance is misplaced.

It is also instructive to examine the drivers of the two PFP indexes. Envestra Qld's capital PFP does decline somewhat over the last 12 years while those of the other included GDBs, including Envestra SA, stay relatively flat over the same period. Despite both having annual output growth rates of around 1.5 per cent over this period, Envestra SA's capital input quantity grew by 1.6 per cent annually while Envestra Qld's capital input quantity grew by around 2.3 per cent annually. The main reason for Envestra Qld's higher increase in capital input quantity over this period was an increase of over 55 per cent in the length of medium pressure mains which account for over half of annual capital costs. While Envestra Qld's low pressure mains length was halved over the period, this was starting from a small base and low pressure mains always accounted for less than 10 per cent of annual capital costs and consequently receive little weight in forming the capital input quantity index. As a result there was little offset to the increase in medium pressure mains from the reduction in low pressure mains.

While Envestra SA also had large increases in medium pressure lengths, these were offset in forming the capital input quantity index by reductions in low pressure lengths of around 40 per cent. In the case of Envestra SA low pressure mains were a much larger proportion of the capital stock accounting for 23 per cent of annual capital costs in 1999 and still 16 per cent in 2010. The reduction in low pressure mains length thus receives much more weight in forming the capital input quantity index in the case of Envestra SA than it does in the case of Envestra Qld.

Envestra Qld's increase in medium pressure mains with little offset in low pressure lengths reflects the fact that most of its mains laying has been directed to adding customers in new areas rather than at mains replacement. This also reflects the low customer density of Envestra Qld where longer lengths have to be added to service each new customer on average. Furthermore, given that Envestra Qld is mainly a domestic residence supplier in a subtropical climate where nearly all domestic consumption is for hot water heating and cooking only, Envestra Qld's medium pressure mains are mainly smaller 40mm 100 kPa mains compared to Envestra SA's medium pressure mains of 63 mm and 300 kPa.

A significant part of Envestra SA's mains laying, on the other hand, has been directed at replacing old mains which, combined with its higher customer density, gives it an 'advantage' in comparisons of capital PFP and, hence, TFP growth. Without taking these important differences in the asset age profile and customer and energy density operating environment characteristics into account, Envestra Qld's lower capital PFP and TFP growth rates over the last decade may be incorrectly interpreted as 'inferior' or 'concerning' when they simply reflect the fact that Envestra Qld's low customer and domestic energy densities force it to add more mains for each new customer it adds relative to the other included GDBs.

Turning to opex partial productivity and comparing Envestra Qld to Envestra SA – the only other GDB for which actual data are available over a comparable period – Envestra Qld's opex PFP has grown at an average annual rate of 2.3 per cent over the period 1999 to 2010 compared to Envestra SA's rate of 4.2 per cent. While both GDBs had similar output growth rates, Envestra Qld's opex quantity fell by 0.9 per cent annually whereas Envestra SA's opex quantity fell by 2.6 per cent annually. There are a number of reasons for the lower rate of reduction in opex quantity in Envestra Qld compared to Envestra SA including:

- the global financial crisis had larger impacts on Envestra SA with network marketing being cut back by around 80 per cent between 2005 and 2010. By contrast, Envestra Qld's network marketing spend has increased somewhat over the same period. A similar impact is likely to be evident across all projects where discretionary spend was involved;
- in the latter years the implementation of FRC in Envestra Qld has had a larger proportional impact than Envestra SA due to the relative sizes of the networks and the relatively fixed cost nature of implementing FRC;
- the impact of the Leaks Management Plan has seen Envestra Qld leaks costs increase as a percentage of total opex from around 25 per cent in 2008 to 36 per cent in 2009 compared to Envestra SA where it increased from around 32 per cent in 2007 to 35 per cent in 2009. This is likely to be due in part to the larger fixed workforce in Envestra SA as opposed to the need to increase the use of contractors in Envestra Qld. The Leaks Management Plan represented a change in the way leaks in the field were processed and classified by Envestra Qld; and
- it is incrementally more expensive to add a customer in Queensland than in SA due to economies of scale, significantly lower customer density and higher labour costs given competition from alternative employers of field labour such as the resources sector.

Envestra Qld's annual opex PFP growth rate of 2.3 per cent is good given the adverse operating environment conditions it faces. If adjustments were to be made for the factors above to allow more like–with–like comparisons across the included GDBs and through time, the opex PFP (and consequently TFP) growth rates observed would be much more similar. Again, valid conclusions regarding relative productivity growth performance cannot be made without taking these factors into account. Neither WCC (2010a) not AER (2011a) allow for any of these factors.

2.2 Comparing productivity levels

Scale, customer density and energy density differences across GDBs are key drivers of differences in productivity levels and need to be explicitly adjusted for before any conclusions can be drawn regarding relative efficiency levels.

The key characteristics of the six GDBs included in Economic Insights (2010) – Envestra Qld, Envestra SA, JGN and the three Victorian GDBs – are presented in table 1 for 2006, the latest year for which actual Victorian data are available in the database used. In terms of throughput Envestra Qld is only 20 per cent the size of Envestra SA, less than 10 per cent the size of the three Victorian GDBs and around 5 per cent the size JGN. In terms of customer numbers Envestra Qld is also around 20 per cent the size of Envestra SA, around 15 per cent the size of the three Victorian GDBs and around 8 per cent the size of JGN. To the extent that economies of size are important in gas distribution, Envestra Qld will be at a significant disadvantage relative to all the other included GDBs.

Table 1: **Key characteristics GDBs included in Economic Insights (2010), 2006**

GDB	Throughput	Customers	System capacity	Distribution mains length	Energy density	Customer density
	TJ	*No*	*Sm^3*	*kms*	*GJ/customer*	*customers/km*
Envestra Qld	5,163	75,668	26,515	2,244	68	34
Envestra SA	26,703	367,482	83,573	6,665	73	55
JGN	94,788	975,033	358,799	23,149	97	42
Envestra Vic	57,430	498,807	114,375	8,647	115	58
Multinet	60,138	647,572	111,859	9,332	93	69
SP AusNet	71,294	520,289	112,667	8,941	137	58

Source: Economic Insights GDB database

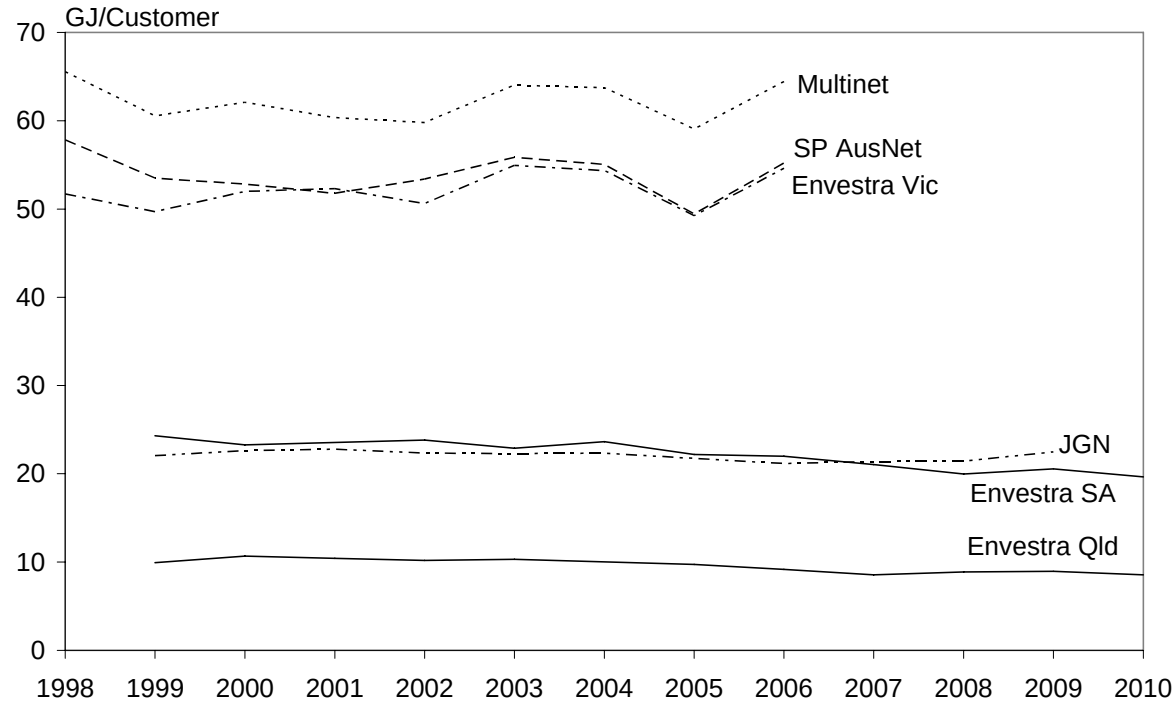
WCC (2010a, p.43) make the following observation:

> 'Whilst the network is small, we note that Envestra claims that its outsourcing arrangement with the APA Group provides economies of scale that offset the disadvantages of having a smaller network. It should also enjoy small, further, benefits from owning and operating three gas networks.'

While the outsourcing arrangement should help offset some of the disadvantages of having a very small network such as lower purchasing power in negotiating with input suppliers, some diseconomies of scale will inevitably remain. These include the impact of implementing changes such as FRC which have a high fixed cost element and indivisibilities such as the need for minimum field crew sizes for safety reasons. In addition, smaller work quantities are often more difficult to manage and, without continuity of work in some areas, there is a requirement for greater multi–skilling and the availability of a greater variety of equipment and fittings on each truck to be able to respond to different work requirements. The effects of these disadvantages from operating at such a small scale in comparison to the other included GDBs needs to be allowed for in comparisons of productivity levels and cannot simply be dismissed as done by WCC.

However, the two key operating environment characteristics which influence energy distribution business productivity levels – energy density (throughput per customer) and customer density (customers per kilometre of main) – are likely to have a larger impact. In terms of customer density, Envestra Qld has less than around 60 per cent the customer density of the Victorian GDBs and Envestra SA and around 80 per cent the customer density of JGN. In terms of energy density, Envestra Qld has less than half the energy density of SP AusNet, less than around 70 per cent the energy density of Envestra Victoria, JGN and Multinet and 93 per cent that of Envestra SA.

Figure 2: **Included GDBs' domestic energy densities, 1998–2010**



Source: Economic Insights GDB database

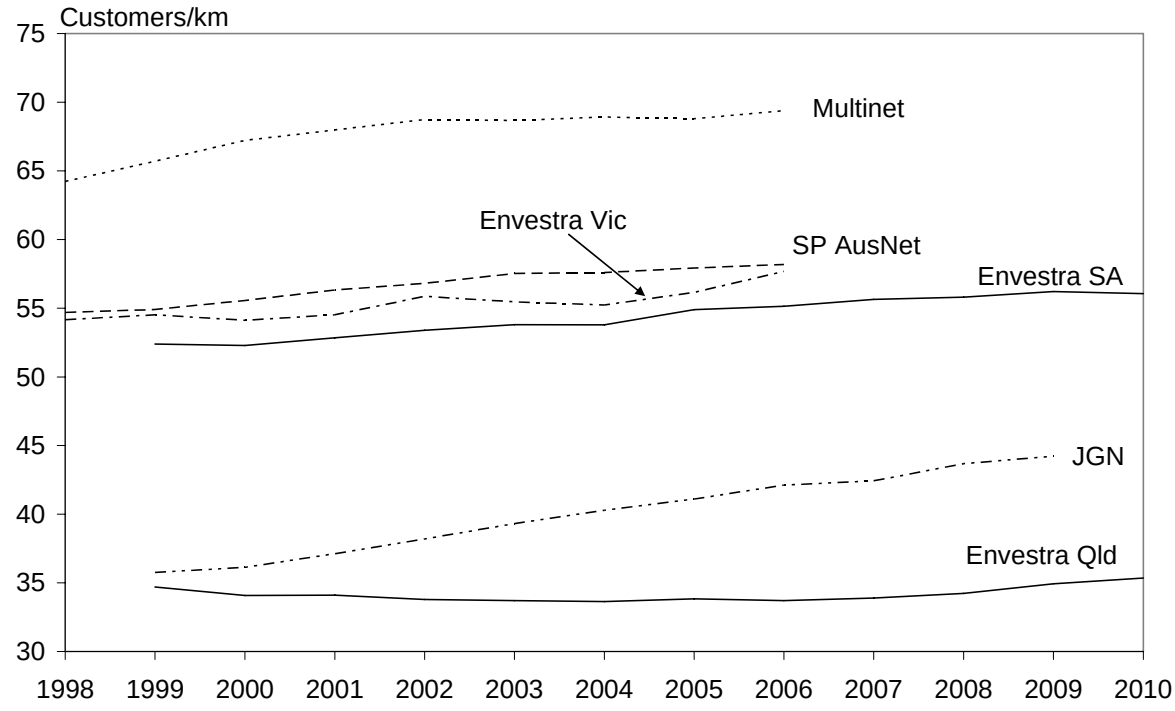
However, these energy densities are overall figures across domestic, commercial and industrial customers and a key cost driver for GDBs is domestic energy density. GDBs operating in a subtropical climate will be at an obvious disadvantage relative to GDBs operating in cold climates where there is a much higher demand for gas for space heating. The domestic demand for gas for GDBs operating in subtropical climates is likely to be largely limited to cooking and hot water heating. The domestic energy densities of the six included GDBs are plotted in figure 2. From this figure we can see that the three Victorian GDBs have considerably higher domestic energy densities than the three non–Victorian GDBs. Envestra Qld's domestic energy density is less than 17 per cent those of the Victorian GDBs and less than half those of Envestra SA and JGN reflecting its subtropical conditions.

The significant differences in domestic energy densities highlight the different operating conditions faced by Envestra Qld. This is further highlighted by the share of domestic energy throughput in total throughput across the GDBs. In 2006 domestic throughput accounted for 40 per cent of SP AusNet's throughput, 46 per cent of Envestra Victoria's throughput and 68

per cent of Multinet's throughput. By contrast it accounted for 21 per cent of JGN's throughput, 29 per cent of Envestra SA's throughput and only 13 per cent of Envestra Qld's throughput. This impacts adversely on Envestra Qld's TFP level because the domestic customer market has to be served with corresponding need for network assets deployed despite the relatively small consumption by each domestic customer compared to the other included GDBs, particularly those in Victoria. Even if Envestra Qld had the same customer density as the other included GDBs, its small consumption per kilometre of the domestic network given its very low domestic energy density will be reflected in low TFP levels for Envestra Qld relative to the other included GDBs. This would have to be adjusted for before any meaningful comparisons of relative efficiency levels could be made.

Climatic conditions can also be expected to have a significant impact on a GDB's customer density as will the geographic characteristics of the area served. Domestic customer penetration rates are likely to be much lower for GDBs operating in milder climates, meaning that those GDBs have to lay relatively more length of pipeline to reach each domestic customer. Customer densities will also be lower for those GDBs whose geography dictates a relatively 'dendritic' system rather than a more compact, meshed system. A dendritic system will arise where a number of spreadout pockets of consumption have to be served. Customer densities for the included GDBs are plotted in figure 3.

Figure 3: **Included GDBs' customer densities, 1998–2010**



Source: Economic Insights GDB database

Multinet has the highest customer density of the included GDBs reflecting its coverage of Melbourne's densely populated inner southeast. Envestra Victoria and SP AusNet have the next highest customer densities followed closely by Envestra SA, all of which have relatively compact, meshed distribution systems despite some differences in climatic conditions. JGN

has only three quarters the customer density of Envestra SA reflecting the relatively dendritic nature of its system while Envestra Qld has only 60 per cent the customer density of Envestra SA and less than half the density of Multinet. Even if Envestra Qld had the same energy density as the other included GDBs, its low customer density means that it has to lay considerably longer distances of mains to reach each of its customers. This means greater use of inputs per unit of output with correspondingly lower TFP levels compared to the other included GDBs. Again, this would have to be adjusted for before any meaningful comparisons of relative efficiency levels could be made.

It can be seen that Envestra Qld's low domestic and overall energy densities, all else equal, place it at a significant disadvantage in comparisons of TFP levels across the included GDBs. Similarly, it can be seen that Envestra Qld's low customer density, all else equal, also places it at a significant disadvantage in comparisons of TFP levels across the included GDBs. When these two effects – low energy density and low customer density – are combined, Envestra Qld is doubly disadvantaged in comparisons of TFP levels. It is for this reason that Economic Insights (2010, p.23) stated:

> 'Envestra Qld … is likely to be at a significant disadvantage relative to the other included GDBs in comparisons of productivity levels as it is by far the smallest, has low overall energy density, and by far the lowest domestic energy density and customer density. All else equal, this will make it hard for Envestra Qld to achieve productivity levels that are even closely comparable with those of the other included GDBs.'

Economic Insights (2010) went on to stress that Envestra Qld's operating environment conditions are so different to the other included GDBs that no meaningful conclusions can be drawn regarding Envestra Qld's relative efficiency without either undertaking robust econometric adjustments for these differences or including other small GDBs operating in a subtropical environment. The limited number of observations available in the productivity database preclude undertaking robust econometric adjustments and the only other small GDB operating in Australia – Allgas – is not included in the database. There is insufficient information in the public domain to include Allgas and, as will be shown in the following section, it has significantly different characteristics to Envestra Qld which do not make it a good comparator (without the need for adjusting for operating environment differences).

In conclusion, the discussions of the Economic Insights (2010) productivity results contained in WCC (2010a) and AER (2011a) fail to allow for the effects of the very large differences in customer and energy densities and scale between Envestra Qld and the other included Australian GDBs. In particular, the WCC (2010a, p.46) claim that 'Economic Insights *concludes* that Envestra's … productivity performance is *inferior* to that of other gas distribution businesses' (emphasis added) is incorrect. Rather, Economic Insights (2010) noted that robust adjustments for the widely differing operating environment conditions would have to be made before any valid conclusions could be drawn regarding Envestra Qld's relative efficiency. This has not been done by either WCC (2010a) or AER (2011a).

3 OPEX BENCHMARKING

In arriving at its recommendation for an effective 16 per cent cut in Envestra Qld's base year opex, as well as referring to the Economic Insights (2010) productivity report, WCC (2010a) also drew on the Marksman (2010) GDB benchmarking report.

The Marksman report examined a range of partial indicators covering opex and capex for nine Australian GDBs covering the years 2003 to 2010, although data were not available for all the GDBs for all years. The data were drawn from publicly available sources including regulatory performance reports, consultants' reports, Access Arrangement Information (AAI) and regulators' final decisions on Access Arrangement Reviews. Actual costs were used where possible and allowed regulatory costs were also drawn on.

WCC (2010a) used the data presented in the Marksman report to compare a number of opex indicators for the year 2009 and compared the value of each indicator for Envestra Qld to an average of the indicators for all of the included GDBs. Particular emphasis was placed on comparisons between Envestra Qld and APT Allgas.

In this section we firstly review the role of high level benchmarking and the data required before examining drivers of opex indicators, the influence of operating environment differences on those indicators, comparisons with APT Allgas and differences in connection unit rates between GDBs.

3.1 Purpose and data considerations

High level benchmarking using publicly available data of the type presented in the Marksman report can be useful in providing a general impression of performance relativities. However, the degree to which high level benchmarking is able to achieve this depends on the quality and consistency of the data available in the public domain, the degree to which included GDBs are comparable in terms of size and operating environments and the degree to which comprehensive rather than partial indicators can be used. If the quality and consistency of publicly available data is relatively poor and the GDB in question faces quite different operating environment conditions to the rest of the sample then it may not be possible for high level benchmarking to provide robust information of the standard required for basing specific productivity adjustments on. Furthermore, it does not of itself provide a basis for adjusting for customer density, energy density and scale differences which are of critical importance in the case of Envestra Qld given its outlier characteristics relative to the other included GDBs. Similarly, it does not of itself provide a means for allowing for different opex/capex trade–offs across GDBs.

The limitations of high level benchmarking are clearly recognised in Marksman (2010, p.2):

> 'Benchmarking is a tool used to help evaluate whether the performance of the subject business is reasonable, when compared on an informed basis against other like businesses. The difficulty is that each distributor is unique and will differ from other distributors in its network characteristics, such as the size of the network, customer numbers, operating environment, climate, geographic

> considerations, age and condition of the network and customer mix etc. Each of these network characteristics will have an impact in some way on the requirements for capital and operating expenditure, making it difficult to make definitive expenditure comparisons.'

Similarly, WCC (2010a, p.43) makes the following observation:

> 'Benchmarking is also more useful when the characteristics of networks and the conditions under which they operate are similar or can be normalised. Gas networks tend to have a much wider range of energy and customer densities than electricity networks with the result that the information presented from benchmarking needs to be carefully interpreted and, *at best, will present only a broad indication of cost performance*. It is important to identify network characteristics that may result in dissimilar cost structures that suggest that a further detailed 'bottom-up' analysis of costs should be undertaken.' (emphasis added).

However, despite this initial acknowledgement of the limitations of high level benchmarking and the need to normalise for differences in operating environment conditions, WCC go on to compare opex indicator results across the GDBs without normalising for the quite large differences in customer and energy densities and scale. The errors in this approach are further compounded by looking at opex indicators in isolation, thus ignoring the information available that provides an indication of the opex/capex trade–offs that have been made across the included GDBs.

These difficulties are heightened by reliance on publicly available data. Economic Insights (2009) has recently reviewed the quality and consistency of regulatory data of the type required for high level benchmarking analyses for the Australian Energy Market Commission as part of its review of productivity–based regulation and made the following observations:

> 'The extent, quality, uniformity and continuity of currently available historical regulatory data are very variable both between jurisdictions and over time. … Even for financial data, there are significant gaps and changes in coverage over time and across jurisdictions. … Regulatory data consistency is also very variable. Even the coverage of key cost variables such as opex has varied over time as regulators have progressively tightened definitions and collection requirements in response to identified gaps and actions by the regulated businesses. In some cases regulators have unilaterally revised and altered data … And the coverage and treatment of a key opex component – the allocation of corporate overheads – has contained little clarity in the past.
>
> 'Data requirements have in general evolved first and foremost to reflect jurisdictional characteristics and priorities with the objective of national uniformity being recognised but not receiving the highest priority.' (pp. v–vi)

Therefore, the use of historic publicly available 'actual' data needs to be treated with considerable caution given the lack of uniformity and consistency of regulatory reporting both over time and across jurisdictions. Economic Insights (2009, p. v) found that 'regulatory data currently available are not fit for the purpose of robust TFP analysis of the standard

required to base regulatory pricing and revenue determinations on'. The data required for high level benchmarking are a subset of those required for TFP analysis. Furthermore, data problems are compounded in the case of gas distribution by the need to use regulatory allowances in some instances rather than actual data.

There are some inconsistencies in the AER's views on the role and limitations of high level benchmarking. For example, despite AER (2011a) accepting the WCC (2010a) use of high level benchmarking with regard to assessing Envestra Qld's base year opex, AER (2011b, p.143) noted the following with regard to Envestra SA's network management fee:

> 'The AER has had regard to the analyses submitted by Envestra, however the AER has not placed significant weight on these reports ... the AER considers that such a process of case by case consideration necessarily needs to be followed, rather than the alternative of resorting to comparative analyses such as those submitted by Envestra to inform on the legitimacy of these costs.'

It is difficult to reconcile the AER's view that high level benchmarking analysis is adequate to determine whether base year opex is efficient but not adequate to assess network management fees which are part of base year opex.

In summary, while WCC (2010a) initially recognises some of the limitations of high level benchmarking, it goes on to make recommendations regarding Envestra Qld's base year opex which ignore these limitations. Limitations concerning different operating environments and circumstances of the included GDBs are further compounded by the relatively poor quality of regulatory data currently available in Australia, its inconsistency both across GDBs and through time and the need to rely on regulatory allowances in some instances due to the lack of actual data available.

3.2 The impact of operating environment conditions on opex

Just as operating environment conditions were shown in section 2 to have a major impact on comparisons of productivity levels, they have an analogous impact on partial indicator comparisons of the type presented in Marksman (2010) and need to be adjusted for before any definitive conclusions can be drawn regarding relative efficiencies.

As a very small GDB Envestra Qld faces a number of inherent disadvantages compared to its larger counterparts. These include but are not limited to:

- implementing changes such as FRC which have a high fixed cost element;
- indivisibilities such as the need for minimum field crew sizes for safety reasons;
- a requirement for greater multi–skilling given smaller work quantities with ensuing loss of economies of scale and benefits from specialisation; and
- the need for a greater variety of equipment and fittings on each truck to be able to respond to different work requirements.

While Envestra Qld's outsourcing arrangement should help offset some of the disadvantages of having a very small network such as lower purchasing power in negotiating with input suppliers, diseconomies of scale due to the factors listed above will inevitably remain. WCC

(2010a) does not allow for these factors in arriving at its recommendation regarding base year opex.

Customer and energy density differences will also have a major impact on partial indicator comparisons. The majority of operating and maintenance costs driven by length of mains are related to activities such as:

- patrolling;
- cathodic protection surveys;
- coating surveys;
- leak surveys;
- repair of leaks on mains;
- clearing water from mains;
- provision of Dial Before You Dig information; and
- provision of site watch services.

These costs are relatively unrelated to the number of customers per kilometre of mains. Consequently, GDBs that have a high customer density (ie many customers per kilometre) will be at a significant advantage relative to GDBs with a very low customer density (ie few customers per kilometre) as they will be able to spread these relatively fixed costs over a larger number of customers (and throughput volume). Having near the lowest customer density of the included GDBs, Envestra Qld will be at a significant disadvantage in opex partial indicator comparisons that are on a per kilometre or per unit of throughput basis, all else equal.

Similarly, there can, in general, be expected to be only a relatively minor impact from customer consumption on operating and maintenance costs. The difference for residential and small industrial and commercial customers is likely to be very small with only minor opex increases for large volume and demand industrial and commercial customers. These minor differences are related to:

- odourisation costs directly related to the quantity of transported gas; and
- step increases in metering station maintenance costs for industrial and commercial customers only.

As a result, GDBs that have a high energy density will be at a significant advantage relative to GDBs with a low energy density, such as Envestra Qld, in opex partial indicator comparisons that are on a per unit of throughput basis.

A fourth consideration that needs to be allowed for in comparisons of opex partial indicators is the trade–off between opex and capex a GDB has chosen to make. Some GDBs may opt to replace aging assets early to avoid the higher opex associated with maintaining and fixing leaks in older mains. Others may find it more economic to keep their older assets going longer with the higher opex offset by lower capex spends. Unless this trade–off is allowed for, a GDB that chooses to replace assets early will look better on opex partial indicator comparisons even though it may have higher overall costs.

Section 5.2 of Marksman (2010) presents an analysis which seeks to allow for operating environment differences. Marksman (2010, p.17) finds that Envestra Qld's relative position is 'consistent with other gas distributors'. However, WCC (2010a) in its analysis, despite recognising the need for careful interpretation in the presence of widely differing customer and energy density differences, does nothing to allow for the impact of different operating environment conditions. Instead, WCC (2010a) uses the Marksman (2010) data to compare the unadjusted indicators for 2009 and to form simple ratios of each Envestra Qld opex partial indicator relative to the average of that indictor across all the included GDBs. Simply comparing Envestra Qld opex partial indicators relative to group averages as WCC do takes no account at all of the all–important scale, customer density, energy density and opex/capex trade–off differences. As a result the WCC (2010a) analysis is not comparing like–with–like and does not provide a useful basis for assessing the relative efficiency of Envestra Qld's base year opex.

3.3 Comparisons with APT Allgas

Another component of the WCC (2010a) argument that Envestra Qld's base year opex is inefficient relates to comparisons between Envestra Qld and APT Allgas opex partial indicators. APT Allgas is advanced by WCC (2010a) as the only other small GDB operating in a subtropical climate in the Marksman database. Before 2007 Envestra Qld outperformed APT Allgas on the main opex partial indicators. However, a large reduction in the reported value of the APT Allgas partial indicators between 2005 and 2007 led to APT Allgas having lower values of opex per customer and opex per kilometre from 2007 to 2009, the last year data were presented for APT Allgas. APT Allgas' capex indicators had large step increases over the same period that saw a large step reduction in the APT Allgas opex indicators.

The size of the reported reduction in the APT Allgas opex indicators between 2005 and 2007 immediately raises questions of plausibility. APT Allgas' reported opex per kilometre falls by a massive 43 per cent over this two year period while its reported opex per customer falls by an equally massive 41 per cent. Since the length of APT Allgas mains and its number of customers will have only changed by small proportions over this two year period, this reported result implies a reduction in opex in the order of 40 per cent. Such a large reported reduction almost certainly reflects major changes in reporting procedures such as overhead allocation or capitalisation policies rather than an actual reduction in opex usage because a reduction in actual opex usage of 40 per cent over a two year period is highly implausible for a sustainable business. Rather than being a valid basis for comparison, the APT Allgas series is a classic example of the inconsistencies in current public domain regulatory data identified in the Economic Insights (2009) data report for the AEMC and the problematic nature of trying to base regulatory decisions on these data.

The concurrent step up in APT Allgas' capex partial indicators coinciding with the step down in APT Allgas' opex partial indicators points to these erratic movements being caused by reporting changes (eg the extent of capitalisation of overheads) rather than real performance changes. Before any comparisons between Envestra Qld and APT Allgas can be made, it is clearly necessary for a detailed investigation of reporting differences to be undertaken so that any resulting comparisons are made on a like–with–like basis.

Quite apart from the implausibility of the APT Allgas reported opex series used in the high level benchmarking, it is important to recognise that there are important differences between Envestra Qld's and APT Allgas' operating characteristics. Key characteristics are listed in table 2.

Table 2: Envestra Qld and APT Allgas key operating characteristics

Description	Envestra Qld	APT Allgas
Total length of mains at 1/7/2010 (km)	2,368	2,942
Total length of old cast iron and unprotected steel mains (km)	330	480
Total length of high and transmission pressure mains with cathodic protection (km)	138	531
Customer density (customers/km)	35.3	27.8
Energy density (TJ/customer)	0.068	0.128
Use of high density polyethylene and nylon mains	Common	Extremely rare
Common operating pressure for networks supplying domestic customers (kPa)	100	200
Customer metering stations in low pressure networks have pressure regulators	Yes	No
Total annual load for 2009/10 (TJ/Annum)	5,697	10,466
Total annual load for volume industrial and commercial customers for 2009/10 (TJ/Annum)	1,253	2,015
Total demand customers annual load for 2009/10 (TJ/Annum)	3,725	7,666
Total number of customers at 1/7/2010	83,573	81,824
Number of industrial and commercial volume customers at 01/07/10	2,831	4,739
Number of demand customers at 01/07/10	67	102

Source: Envestra Qld and APT Allgas Access Arrangement Information and information supplied by APA Group

While the two GDBs have a similar total number of customers, APT Allgas has almost twice the throughput of Envestra Qld and a 24 per cent longer length of mains. This leads to APT Allgas having a customer density that is 20 per cent less than Envestra Qld but an energy density that is around twice that of Envestra Qld. APT Allgas has almost 70 per cent more volume industrial and commercial customers and 50 per cent more demand customers than does Envestra Qld. Furthermore, each of APT Allgas' demand customers consumes more than twice Envestra Qld's demand customers do on average while APT Allgas' volume industrial and commercial customers each consume 60 per cent more than Envestra Qld's volume industrial and commercial customers do on average. This makes APT Allgas much more focused on large industrial and commercial customers than is the case for Envestra Qld. As discussed in the preceding section, this will put APT Allgas at a large advantage in comparisons of many of the partial opex indicators, particularly those on a per unit of throughput basis. Having much higher throughput per customer, APT will be able to spread its opex costs over a larger throughput and so have considerably lower values of those partial indicators than a GDB focusing more on residential customers, especially one where those residential customers have little or no demand for gas for space heating. However, the different configuration of the system required to serve large commercial and industrial customers compared to residential customers will also make it difficult to compare partial indicators using other normalisation bases.

WCC (2010a, p.45) state that they 'considered whether other characteristics (such as the amount of unprotected steel and cast iron mains in service) might account for the difference [in Envestra Qld and APT Allgas opex indicators] but .... were not able to identify any impact'. However, among other things, WCC (2010a) appear to have overlooked the impact of differences in the use of high density polyethylene and nylon mains between the two GDBs. The use of these mains is relatively common in Envestra Qld but quite rare in APT Allgas. High density polyethylene and nylon mains are more prone to leakage and thus require more opex per kilometre than other mains to monitor for and fix leaks.

Apart from significant data consistency issues and ignoring differences in operating environment characteristics, the WCC (2010a) analysis is subject to another important shortcoming – it only looks at opex partial indicators in isolation and ignores the capex partial indicators contained in Marksman (2010). Changes in reporting methods aside, an examination of the capex partial indicators is necessary to provide information on opex/capex trade–offs that the different GDBs may have made. In 2009 APT Allgas' capex per kilometre was 34 per cent higher than Envestra Qld's while APT Allgas' capex per customer was 75 per cent higher than Envestra Qld's. While this may in part reflect the differences in reporting policies referred to above, it also provides evidence that Envestra Qld and APT Allgas have made different choices regarding the opex/capex trade–off. As a result it is invalid to make recommendations for cutting base year opex on the basis of opex partial indicator comparisons alone as WCC (2010a) have done. Indeed, doing so represents a form of 'cherry picking' as it ignores the evidence that Envestra Qld has significantly lower capex partial indicators than APT Allgas which may more than offset its higher reported opex partial indicators. This type of cherry picking can easily force a GDB into an unsustainable situation as its opex is being cut without recognition that it is using older assets that require more maintenance but which have lower capital costs than newer assets.

3.4 Connection cost comparisons

Another factor WCC (2010a) draws on in reaching its conclusion that Envestra Qld's base year opex is inefficient is a comparison of reported connection unit rates between Envestra Qld and Envestra SA. The connection unit rate for Envestra Qld is twice that for Envestra SA. However, again this comparison by WCC (2010a) makes no allowance for operating environment differences between the Queensland and South Australian networks.

Envestra Qld faces a number of adverse operating environment characteristics that make it considerably more expensive for it to connect new customers compared to Envestra South Australia. Operating an older network Envestra Qld has many of its mains located in inner city areas where they run down the middle of roads rather than on the sides of roads under footpaths as is common practice in newer networks, including in South Australia. This means that Envestra Qld has to undertake considerably more extensive excavations and disrupt traffic significantly to connect customers on these older mains. These high costs have been further increased by increasingly strict traffic control and environmental protection requirements instituted by the Brisbane City Council. In many instances Envestra Qld is required to reinstate road access at the end of each day and re–excavate the following day where connection jobs take more than one day.

The smaller scale of Envestra Qld also means that new connections are undertaken on a considerably smaller scale than is the case for Envestra SA. This means that less favourable rates can be negotiated with contractors given the piecemeal nature of work required by Envestra Qld compared to Envestra SA. This is again made worse by the much stronger competition for field labour in Queensland from the resources sector – and now from flood reconstruction – compared to South Australia. As a result Envestra Qld has to pay higher rates to attract the required labour.

Without adjusting for the impact of these differences in scale, operating environment conditions and labour market conditions on connection unit rates, WCC (2010a) is not comparing like–with–like and is drawing an invalid conclusion.

4 ADJUSTMENT TO BASE YEAR OPEX

AER (2011a) accepts the recommendation of WCC (2010a) that Envestra Qld's base year opex be cut by the equivalent of 16 per cent. In this section we will review the information WCC (2010a) draws on in arriving at its recommendation. We will then review the WCC (2010a) base year opex analysis and recommendation against a range of criteria that studies used in robust regulatory decisions need to satisfy.

4.1 Information used in the WCC (2010a) analysis

The WCC (2010a) base year opex analysis draws principally on the GDB productivity report prepared by Economic Insights (2010) and the Marksman (2010) high level benchmarking study. In sections 2 and 3 of this report we have shown that much of the information quoted by WCC (2010a) has been incorrectly used as follows:

- Productivity growth rates quoted for Envestra Qld are those excluding network marketing and including capex on FRC which means they are not on a like–with–like basis compared to the growth rates of the other included GDBs. Including network marketing and removing FRC capex puts the growth rates on a comparable basis to Envestra SA and the Victorian GDBs. Envestra Qld's annual TFP growth rate is then 0.7 per cent and its opex PFP growth rate is 2.3 per cent both of which are very reasonable given Envestra Qld's adverse operating environment conditions.
- Comparisons of TFP levels do not adjust for the important effects of scale, differing customer densities and differing energy densities, all of which need to be allowed for given Envestra Qld's outlier characteristics compared to the other include GDBs.
- High level benchmarking comparisons are based on public domain data (including regulatory allowances) which are not likely to be sufficiently consistent or robust to provide the primary basis for making regulatory decisions, although they may be broadly indicative in some circumstances and be part of a range of information drawn on.
- No allowance is made in WCC (2010a) high level benchmarking comparisons for the important impact of scale and operating environment differences.
- Comparisons are made with APT Allgas without recognising that APT Allgas has twice the energy density and is much more focused on serving large commercial and industrial customers than is Envestra Qld and this will have a significant effect on key opex partial indicators.
- No recognition is given to the implausibility of the APT Allgas public domain opex series which falls by 40 per cent between 2005 and 2007 and the concurrent step increases in APT Allgas public domain capex partial indicators indicating the likely impact of overhead allocation and capitalisation policy changes.
- No recognition is given to the effects of differing opex requirements resulting from Envestra Qld's common use of polyethylene and nylon mains which are more prone to leakage.

- Comparisons between Envestra Qld and APT Allgas only look at opex partial indicators whereas they should also include capex indicators to provide information on likely opex/capex trade–offs.
- Envestra Qld outperforms APT Allgas on key capex partial indicators indicating that Envestra Qld has likely opted to continue using older assets which have lower capital costs but higher opex costs compared to APT Allgas but this is ignored by WCC (2010a) resulting in 'cherry picking' of results.
- Comparisons of connection unit rates between Envestra Qld and Envestra SA ignore important differences in scale, operating environment conditions such as mains placement and traffic management requirements, and labour market conditions.

These errors in the use of data and information sources and analytical shortcomings need to be addressed before the efficiency of Envestra Qld's base year opex can be adequately assessed.

4.2 Assessment of WCC (2010a) base year opex recommendation

There are several basic criteria that efficiency analyses that are satisfactory for use in regulatory decisions must satisfy. These criteria have been clearly set out and applied in earlier reports (eg Lawrence 2005, 2007) and include:

1. the data used must be accurate, consistent and comparable. Failure to understand the operations of all included utilities and to ensure that data are being captured for exactly similar functions will invalidate the results. This applies particularly to items such as 'overheads' within the one jurisdiction and applies more broadly to regulatory and accounting requirements and standards and the range of tasks performed by distributors when comparing across jurisdictions. All data must be individually tracked back and verified against primary sources.
2. efficiency comparisons and conclusions must be made using a model that is explicit, clearly specified, robust and, most importantly, replicable. Only by using an explicit model that can be scrutinised and reproduced by interested parties can objective assessments of efficiency differences be made and their veracity assessed.
3. the model needs to be holistic with all major outputs and inputs included. If some important outputs are excluded from the analysis then this will disadvantage those utilities which provide that output efficiently while providing an artificial advantage to those utilities who provide the output less efficiently or not at all. Similarly, excluding key inputs from the analysis will artificially advantage those utilities who are intensive users of those inputs. Reliance on partial indicator comparisons should be avoided if possible as they do not allow for trade–offs that inevitably arise between using different combinations of inputs. Failing to allow for these trade–offs can lead to unrealistic 'cherry–picking' recommendations.
4. all outputs and inputs must be adequately specified. Unless accurate and robust measures of key outputs and inputs are used the study is likely to produce misleading results. Capital inputs are difficult to measure and account must be taken of differences in the

resource intensiveness and quality of different capital inputs. This will, in turn, impact differences in opex requirements.

5. differences in the operating environment must be adequately and explicitly allowed for. It is essential that benchmarking studies compare like with like situations either by limiting comparisons to very similar utilities or explicitly modelling the impact of operating differences in a rigorous quantitative framework. Comparing a city centre distribution business with a rural distribution business will produce nonsensical results. When including utilities across several jurisdictions – or across countries – the scope to ensure that like is being compared with like rapidly diminishes making it essential to ensure data comparability, that like functions are being covered and that an explicit model is used, preferably allowing confidence intervals to be formed given the uncertainties inevitably involved.
6. the sample of utilities included needs to include a number of utilities similar to the one being reviewed. It is not possible to accurately assess the efficiency of two utilities whose characteristics are at the two end points of the sample used.
7. the modelling must be transparent and reproducible. If all participants in the process are to have confidence in the quality of the analysis then the model and the data used in the study for all the included utilities must be available to participants to permit complete checking, verification and the carrying out of sensitivity analyses.

We now assess WCC (2010a) against these 7 key criteria.

Were the data used accurate, consistent and comparable?

No. The high level benchmarking data drawn on by WCC (2010a) contain a mixture of public domain information from regulatory performance reports, consultants' reports, Access Arrangement Information and regulators' final decisions on Access Arrangement Reviews along with allowed regulatory costs where no actual data were available. Economic Insights (2009) showed that public domain regulatory data currently available in Australia is not of sufficient consistency through time for each business or across jurisdictions to base regulatory decisions on. The 40 per cent reduction in APT Allgas' opex over two years implied by the benchmarking data is not plausible. Furthermore, the data drawn on in productivity growth comparisons do not include common treatment of network marketing expenses which has a material impact on productivity growth rates.

Was the model used explicit, clearly specified, robust and replicable?

No. The recommendation regarding the 16 per cent reduction in base year opex is based on 'judgement' with no explicit quantitative model. Furthermore, the information presented does not take differences in operating environments into account – something that it is critical to do given Envestra Qld is an outlier in terms of scale, customer density and domestic energy density. Without an explicit and rigorous model, differences in operating environments cannot objectively be taken into account and the results will not be reproducible. Not using an explicit model means interested parties cannot assess the reasonableness of the recommendations and undertake relevant sensitivity analyses. Importantly, failure to use an explicit model may prevent adequate allowance for the trade–offs available to GDBs in their choice of input mix.

Were all the major outputs and inputs of the distribution industry included?

No. The WCC report does not explicitly include capital inputs in its analysis and excludes normalisations with respect to key outputs such as system delivery capacity and contracted reserved capacity. Not including all inputs runs the risk of obtaining unrealistic estimates of potential cost reductions if the interrelationships between operating expenditure and capital expenditure are not adequately taken into account. Again, this is likely to lead to misleading conclusions.

Were all the included outputs and inputs adequately specified?

No. Uncertainty surrounds the comparability of the opex series used both within Queensland and across jurisdictions. There appears to be inadequate allowance for the different characteristics of customers across GDBs. As noted above, other key outputs and inputs are not included which makes it problematic to provide an accurate assessment of efficiency.

Were differences in GDBs' operating environments adequately allowed for?

No. The information presented makes no allowance for differences in operating environments – something that it is critical to do given Envestra Qld is an outlier in terms of scale, customer density and domestic energy density. The failure to use an explicit quantitative model means that we cannot assess the extent to which operating environment differences have been adequately allowed for, if at all. Similarly, the analysis is not replicable and sensitivity analyses cannot be carried out unless an explicit quantitative model is used.

Did the sample include a number of similar utilities to the one being reviewed?

No, there are inadequate comparable GDBs to Envestra Qld which is something of an outlier. Comparisons concentrate on APT Allgas but APT Allgas has twice the throughput of Envestra Qld and around twice the energy density. No allowance is made for APT Allgas' greater focus on large industrial and commercial customers.

Was the modelling transparent and reproducible?

No. The failure to use an explicit quantitative model means the analysis is neither transparent nor reproducible.

In contrast to the WCC (2010a) report which fails all seven criteria, the Economic Insights (2010) productivity report satisfies five of the seven criteria. The data used in Economic Insights (2010) has undergone extensive checking and verification to ensure they are consistent, accurate and comparable. The analysis is based on an explicit model which covers all outputs and inputs. Furthermore, all outputs and inputs are robustly specified. And the modelling methodology used is clearly set out and therefore transparent and reproducible. However, the Economic Insights (2010) productivity report does not include GDBs comparable to Envestra Qld and there are too few observations available to make econometric adjustments for the very large operating environment differences (criteria 6 and 5 above, respectively). For these reasons the Economic Insights (2010) productivity report does not make efficiency assessments of Envestra Qld. Rather, Economic Insights (2010, p.39) notes:

> '[Envestra Qld's] operating environment conditions are so different to those of the other included GDBs that it is difficult to establish whether or not Envestra

> Qld is operating efficiently based on this comparison. To do this we would need to either include other small GDBs operating in a subtropical environment or undertake econometric adjustments for operating environment conditions. The number of observations available in the Economic Insights GDB database precludes the latter option.'

If it is not possible to come up with definitive conclusions regarding Envestra Qld's efficiency from a study that satisfies five of the seven criteria, it is clearly not possible to come up with definitive conclusions regarding Envestra Qld's efficiency from a study that satisfies none of the seven criteria as is the case with WCC (2010a).

It should be noted that efficiency studies for base year opex purposes relate to comparisons of productivity levels rather than productivity growth rates. Productivity growth performance provides only background or contextual information for this purpose. WCC (2010a) and AER (2010a) both claim that the Economic Insights (2010) report points to 'a concerning trend in Envestra's efficiency performance' and productivity (growth) performance that is 'inferior' to that of other GDBs (AER 2011a, p.125). However, in section 2 we showed that Envestra Qld's relatively flat and declining reported recent productivity performance is explained by the exclusion of network marketing costs for Envestra Qld while they are included for the South Australian and Victorian GDBs included in Economic Insights (2010). Including these costs for Envestra Qld – so that productivity growth comparisons are on a more like–with–like basis – leads to Envestra Qld's productivity growth being positive rather than negative and positive to a reasonable extent given its adverse operating environment conditions. This analysis and conclusion is not dependent on criteria 5 and 6 above which are of relevance only to comparisons of productivity levels.

As noted above, the comparisons of productivity levels that are used by WCC (2010a) and AER (2011a) to justify a recommended 16 per cent cut in Envestra Qld's base year opex fail to allow for the effects of the very large differences in customer and energy densities and scale between Envestra Qld and other Australian GDBs, as well as having other significant shortcomings. They hence fail criterion 5 above in particular. Economic Insights (2010, p.23), on the other hand, noted that small scale, low overall energy density and by far the lowest domestic energy density and customer density 'will make it hard for Envestra Qld to achieve productivity levels that are even closely comparable with those of the other included GDBs'. But Economic Insights (2010) also noted that robust adjustments for the widely differing operating environment conditions would have to be made before any conclusions could be drawn regarding Envestra Qld's relative efficiency. This has not been done by either WCC (2010a) or AER (2011a) and so it is incorrect for them to draw conclusions that Envestra Qld is inefficient and its base year opex should be reduced.

4.3 Conclusion on base year opex

This review has identified a number of fundamental data and modelling concerns with the WCC (2010a) recommendation regarding Envestra Qld's base year opex. Much of the information quoted from Economic Insights (2010) and Marksman (2010) has been used incorrectly and like–with–like comparisons have generally not been made. Importantly, no allowance has been made for operating environment differences. Given that Envestra Qld is a

relative outlier in terms of scale, customer density and domestic energy density, meaningful assessments of relative efficiency cannot be made without explicit adjustment for operating environment differences. In particular, the failure to consider opex/capex trade–offs appears to have led to cherry picking by not recognising that Envestra Qld has lower capex partial indicators than APT Allgas.

The finding of this assessment is that the WCC (2010a) analysis and recommendation concerning Envestra Qld's base year opex is not an appropriate basis for assessing Envestra Qld's efficiency.

In its electricity and gas distribution decisions to date, the AER has generally accepted that EDBs and GDBs were operating at (or close to) efficient base year opex levels at the end of the preceding regulatory period if their opex was less than (or close to) the previous regulatory allowance for that year[1]. For example, with regard to the South Australian EDB, ETSA Utilities, AER (2009, p.201) noted:

> 'Given ETSA Utilities' actual opex in the base year has been verified by an audit of the regulatory information provided to the AER, and the overspend in comparison to the regulatory allowance is insignificant, the AER considers it represents an efficient amount from which to forecast opex in the next regulatory control period.'

We note that Envestra Qld's 2010 opex reported in AER (2011a, p.119) is below the Queensland Competition Authority (2005) regulatory allowance for that year. In light of this and the incorrect use of information and analysis contained in WCC (2010a) which the AER uses in arriving at its draft decision, we recommend the AER reconsider its draft decision regarding Envestra Qld's proposed base year opex.

[1] In some instances there has been standardisation of treatment and exclusion of some items.

ATTACHMENT A: LETTER OF RETAINER

JOHNSON WINTER & SLATTERY
LAWYERS

Partner: Anthony Groom +61 8 8239 7124
Email: anthony.groom@jws.com.au
Our Ref: A3170
Doc ID: 61252150.1

21 March 2011

Denis Lawrence
Economic Insights Pty Ltd
6 Kurundi Place
Hawker ACT 2614

Dear Dr Lawrence

Envestra Limited – Queensland Access Arrangement Review

We act for Envestra Limited in relation to the AER's review of Envestra's Access Arrangement for Queensland.

As you have discussed with Envestra, Envestra Limited wishes to engage you to prepare an expert report in connection with the AER's review of Envestra's Access Arrangement for Queensland.

This letter sets out the matters which Envestra Limited wishes you to address in your report and the requirements the report must comply with to be capable of use in the AER review.

Terms of Reference

We refer to the AER Draft Decision entitled "Envestra Ltd Access arrangement proposal for the Qld gas network 1 July 2011 – 30 June 2016" and dated February 2011. In particular, reference is made to section 8.6.1 of that decision and the determination by the AER that Envestra's base year costs were not efficient. Reference is also made to the report of Wilson Cook discussed in that section 8.6.1.

Envestra seeks your opinion, as an expert, as to whether the analysis undertaken by the AER and Wilson Cook is a sufficient and appropriate analysis to reliably form the view that the operating costs of Envestra are inefficient.

Use of Report

It is intended that your report will be included by Envestra in its response to the AER's Draft Decision. The report may be provided by the AER to its own advisers.

The report must be expressed so that it may be relied upon both by Envestra and by the AER.

Level 10, 211 Victoria Square
ADELAIDE SA 5000
T +61 8 8239 7111 | F +61 8 8239 7100

www.jws.com.au
SYDNEY | PERTH | MELBOURNE | BRISBANE | ADELAIDE

The report will be reviewed by Envestra's legal advisers and will be used by them to provide legal advice to Envestra as to its rights and obligations under the National Gas Law and National Gas Rules. You will be required to work with these legal advisers and Envestra personnel to assist them prepare Envestra's submissions in response to the draft and final decisions made by the AER.

Compliance with the Code of Conduct for Expert Witnesses

Attached is a copy of the Federal Court's Practice Note CM 7, entitled "Expert Witnesses in the Federal Court of Australia", which comprises the code of conduct for expert witnesses in the Federal Court of Australia (**the Code of Conduct**).

Please read and familiarise yourself with the Code of Conduct and comply with it at all times in the course of your engagement by Envestra.

In particular, your report prepared for Envestra should contain a statement to the effect that the author of the report has read the Code of Conduct and agrees to comply with it.

Your report must also:

1 give details of the expert's qualifications and of the literature or other material used in making the report;

2 state all of the questions or issues that the expert has been asked to address;

3 state all of the factual premises upon which the report proceeds; and

4 otherwise comply with the Code of Conduct.

It is also a requirement that the report be signed by the expert and include a declaration that the expert has made all the inquiries which the expert believes are desirable and appropriate and that no matters of significance which the expert regards as relevant have, to the expert's knowledge, been withheld from the report.

Please also attach a copy of these terms of reference to the report.

Terms of Engagement

Your contract for the provision of the report will be directly with Envestra Limited. You should forward to Envestra Limited any terms you propose govern that contract as well as your fee proposal. Your invoices for the production of the report are to be addressed and sent to Envestra Limited.

Contact with us

We request that you contact us or Envestra Limited by telephone in the first instance to discuss any requests for the provision of data or your preliminary conclusions. All enquiries to Envestra Limited should be made to Craig de Laine.

Please sign a counterpart of this letter and forward it to Envestra Limited to confirm your acceptance of the engagement by Envestra.

Yours faithfully

Johnson Winter & Slattery

Doc ID: A3170 - 61252150.1

Enclosed: Federal Court of Australia Practice Note CM 7, "Expert Witnesses in Proceedings in the Federal Court of Australia"

D.A. Lawrence

Signed and acknowledged by Dr Denis Lawrence

Date 21/3/2011

Doc ID: A3170 - 61252158.1

ATTACHMENT B: CURRICULUM VITAE

Dr Denis Lawrence

Position	Director, Economic Insights Pty Ltd
Business address:	6 Kurundi Place, Hawker, ACT 2614
Business telephone number:	02 6278 3628
Email address	denis@economicinsights.com.au

Qualifications

Doctor of Philosophy (Economics), University of British Columbia, Canada, 1987.

Bachelor of Economics (Honours), Australian National University, 1977.

Key Skills and Experience

For the past 20 years Dr Denis Lawrence has played a leading role in the regulation, benchmarking and performance measurement of infrastructure enterprises. He has advised Australian and overseas regulators and utilities on a wide range of quantitative and strategic issues in the energy, telecommunications, post and transport sectors. Denis has been a consultant on energy regulation since 1996. Recent key projects include:

- Assisting the AEMC with its review of total factor productivity-based regulation including advice on data requirements and specification issues, constructing a detailed model comparing outcomes under productivity-based and building block regulation and drafting and review of sections of AEMC reports (2008-2010).
- Advice to the New Zealand Commerce Commission on asset valuation and total factor productivity measurement in the presence of sunk costs and incorporating the principle of financial capital maintenance (2008–09).
- Advice to the Commerce Commission on using the comparative or benchmarking option for resetting the price path threshold for electricity transmission and distribution businesses using total factor productivity and econometric techniques (2003–09).
- Advice to the Commerce Commission on key aspects of its inquiry into whether the distributor Unison Networks should be subject to price control for having breached price thresholds (2006–07).
- Advice to the Northern Territory Utilities Commission on the setting of key price control parameters for electricity distribution (2008–09).
- Benchmarked the productivity, operating and capital expenditure, reliability and price performance of 13 of Australia's 15 electricity distributors for a consortium of distribution businesses (2004).
- Reviewed total factor productivity modelling of electricity distribution in Victoria undertaken for the Essential Services Commission and assessed regulatory implications (2005).

- Econometric modelling of operating and maintenance expenditure efficiency based on a sample of electricity distributors and taking operating environment differences into account (2005).
- Presented commentaries on the principles behind incentive regulation and the implementation of total factor productivity measurement to support incentive regulation for a Utility Regulators' Forum workshop on future electricity networks regulation (2003).
- Examined the relative efficiency performance of Australian State electricity supply industries in response to energy reforms from 1975 to 2001 for the Parer Review of Energy Market Reform (2001).
- Advised ENMAX Corporation (Alberta, Canada) on developing the case for moving from cost–of–service to formula–based regulation (2006–09).
- Prepared case studies for the Ontario Energy Board of international best practice in distribution pricing structures, allowing for distributed generation, incorporating energy conservation and demand management incentives (2006).
- Advised the Australian Energy Networks Association on development of a nationally consistent suite of service quality performance indicators and assisted with developing the ENA's position on service quality incentive regulation (2006).
- Advised CitiPower and Powercor on developing a robust and defendable case for a revised Service Incentive Scheme for their 2006 Price Review submissions (2005).
- Assisting the Commerce Commission with reviewing the regulated gas distribution businesses' pricing principles and quantitative cost of service models (2007–09).
- Studies of the comparative efficiency performance of gas distribution for the Victorian gas distribution businesses (2006–07).
- Benchmarking of the efficiency of gas transmission and distribution pipelines in Australia and New Zealand for the Commerce Commission (2004).

Selected Publications

Coelli, T.J. and D. Lawrence (eds.) (2006), *Performance Measurement and Regulation of Network Utilities*, Edward Elgar Publishing, Cheltenham, UK.

Lawrence, D., W.E. Diewert and K.J. Fox (2006), "The Contribution of Productivity, Price Changes and Firm Size to Profitability", *Journal of Productivity Analysis* 26, 1–13.

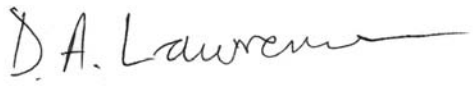
Zeitsch, J. and D. Lawrence (1996), "Decomposing Economic Inefficiency in Base Load Power Plants", *Journal of Productivity Analysis* 7(4), 359-378.

Zeitsch, J., D. Lawrence and J. Salerian (1994), "Comparing Like With Like in Productivity Studies - Apples, Oranges and Electricity", *Economic Record* 70(209), 162-70.

Lawrence, D., P. Swan and J. Zeitsch (1991), 'The Comparative Efficiency of State Electricity Authorities', in P. Kriesler (ed.), *Contemporary Issues in Australian Economics*, MacMillan.

ATTACHMENT C: DECLARATION

I, Denis Anthony Lawrence, Director of Economic Insights Pty Ltd, declare that I have read the Federal Court Guidelines for Expert Witnesses and that I have made all inquiries I believe are desirable and appropriate and that no matters of significance which I regard as relevant have, to the best of my knowledge, been withheld.



Denis Anthony Lawrence

23 March 2011

REFERENCES

Australian Energy Regulator (AER) (2009), *South Australia Draft Distribution Determination 2010–11 to 2014–15*, Draft Decision, November.

Australian Energy Regulator (AER) (2011a), *Envestra Ltd, Access Arrangement Proposal for the Qld Gas Network, 1 July 2011 – 30 June 2016*, Draft Decision, February.

Australian Energy Regulator (AER) (2011b), *Envestra Ltd, Access Arrangement Proposal for the SA Network, 1 July 2011 – 30 June 2016*, Draft Decision, February.

Economic Insights (2009), *Assessment of Data Currently Available to Support TFP–based Network Regulation*, Report by Denis Lawrence and John Kain to the Australian Energy Market Commission, Canberra, 9 June.

Economic Insights (2010), *The Productivity Performance of Envestra's South Australian and Queensland Gas Distribution Systems*, Report by Denis Lawrence to Envestra Ltd, Canberra, 30 September.

Lawrence, Denis (2005), *Review of Report by Wilson Cook & Co 'Estimate of Efficient Opex for CitiPower and Powercor'*, Report by Meyrick and Associates to CitiPower and Powercor, Canberra, 19 August.

Lawrence, Denis (2007), *Response to Pacific Economics Group on Meyrick Opex Rate of Change and Productivity Reports*, Report by Meyrick and Associates to Envestra, Multinet and SP AusNet, Canberra, 15 October.

Marksman Consulting Services Pty Ltd (Marksman) (2010), *Gas distributor Benchmarking Report, Envestra South Australia and Queensland*, 28 September.

Queensland Competition Authority (QCA) (2005), *Envestra Gas Distribution Network*, Draft Decision, December.

Wilson Cook & Co Ltd (WCC) (2010a), *Review of Expenditure of Queensland & South Australian gas distributors: Envestra Ltd (Queensland)*, Auckland, December.

Wilson Cook & Co Ltd (WCC) (2010b), *Review of Expenditure of Queensland & South Australian gas distributors: Envestra Ltd (South Australia)*, Auckland, December.