Report to

Essential Services Commission of South Australia

Assessment of Envestra's Response to the Commission's Draft Decision on Envestra's Access Arrangement

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EXECUTIVE SUMMARY

The Commission's Draft Decision in relation to the revised Access Arrangement for the South Australian gas distribution network requires Envestra to substitute the MMA forecasts in the Access Arrangement. Envestra has rejected these proposals on the grounds that:

- In regard to the Domestic and Commercial markets, MMA's weather normalisation does not meet Code requirements and the demand forecasts should be based on NIEIR forecasts prepared in November 2005
- In regard to the demand market, the MMA forecast should be modified to remove a 2.5 TJ increase in the Northern zone.

MMA has assessed the merits of Envestra's claims and finds that:

- In regard to the Domestic market this claim should be rejected by the Commission as it is based on:

  1. Misrepresentation of MMA's approach to weather normalisation and the supposed errors in it.

     MMA has used two methods to assess weather sensitivity and normalisation. In addition to the method represented by Envestra as MMA's sole methodology, MMA has used the method used by Envestra and NIEIR for corroboration.

  2. Misleading claims regarding the statistical accuracy of Envestra's and NIEIR's weather normalisation method.

     Envestra's and NIEIR's method produces reliable estimates of weather sensitivity of net system load. In regard to normalisation of Domestic load, the method suffers from use of unvalidated assumptions and the trend is based on only eight data points.

     The NIEIR derivation of EDDs is statistically unsound. It does not meet the criteria used by NIEIR to judge one of MMA's approach's to weather normalisation. In addition there are three NIEIR reports, each of which appears to present a different EDD formula. Until EDDs are placed on a sound footing, HDDs are the preferred option.

  3. The false assertion that the NIEIR forecast overcomes issues regarding Envestra's forecast assumptions

     NIEIR has not used best estimates of the impact of MEPS or of base year new homes average usage and has not provided detailed estimates of the impact of building standards, solar water heater penetration or AAA shower heads.

- In regard to the Commercial market this claim should be rejected by the Commission as the NIEIR methodology contains several of the flaws MMA identified in the Envestra methodology:

  1. The artificial division of this market into Commercial V and Industrial V on a size basis (below and above 1 TJ). This allows the potential anomalies to be incorporated in forecasting.

  2. The assumption that Commercial V is sensitive to commercial drivers and Industrial V to industrial drivers, with no justification.

  3. The assertion that the Commercial V market is weather sensitive while the Industrial V market is weather insensitive.

  4. The arbitrary pro-rating of weather normalisation between the Domestic and Commercial V markets.

- In regard to the Demand market MMA has reaffirmed with the customer concerned that the 2.5 TJ expansion is still anticipated. The customer now expects the expansion to be some time in 2008 and MMA has prepared a revised forecast assuming start-up from 1 January 2009. MMA recommends that this updated forecast be used by the Commission.

1 INTRODUCTION

The Essential Services Commission of South Australia (the Commission) regulates third party access to the South Australian gas distribution networks through approval of Access Arrangements. Envestra, the natural gas distributor for Adelaide and other regions of South Australia, has submitted proposed Access Arrangement revisions covering the period 1 July 2006 to 30 June 2011. The revisions include forecasts of gas demand for three Reference Tariffs: Domestic Haulage for domestic customers; Commercial Haulage for small business customers consuming less than 10 TJ pa; and Demand Haulage for customers consuming more than 10 TJ pa.

The Commission engaged McLennan Magasanik Associates (MMA) to evaluate whether the forecasts proposed by Envestra meet the required criterion of the Gas Code, to be considered "best estimates arrived at on a reasonable basis[1]".

In its Stage 1 Report[2] MMA reviewed the approach, methodology and assumptions used by Envestra in preparing its forecasts and concluded that the Envestra forecasts did not meet the above criterion. Envestra made a detailed response to the Stage 1 report but after taking into account the response made by Envestra, MMA was still of the opinion that the forecasts prepared by Envestra did not meet the Code requirements. MMA was then asked by the Commission to prepare forecasts for the Envestra network which MMA considered did meet the Code requirements.

The MMA Stage 2 Report[3] set out MMA forecasts for the Domestic, Commercial and Demand Haulage reference tariffs. The final version of this report was prepared after meeting with Envestra and its advisor, the National Institute of Economic and Industry Research (NIEIR), and receiving and responding to their questions and comments.

The Commission's Draft Decision[4] in relation to the revised Envestra Access Arrangement requires Envestra to substitute the MMA forecasts in the Access Arrangement. In response to this aspect of the Draft Decision Envestra[5] has submitted that:

- In regard to the Domestic and Commercial markets, MMA's weather normalisation does not meet Code requirements and the demand forecasts should be based on NIEIR forecasts prepared in November 2005
- In regard to the demand market, the MMA forecast should be modified to remove a 2.5 TJ increase in the Northern zone.

1This is referred to as the Code requirement.
2 Review of demand forecasts for the Envestra gas distribution network in South Australia, MMA 14 November 2005
3 Demand forecasts for the Envestra gas distribution network in South Australia, MMA, 21 March 2006
4 Proposed revisions to the Access Arrangement for the South Australian Gas Distribution System. Draft Decision. ESCOSA, March 2006
5 060505-Sub-GAAR_DD-Envestra Part B

This report to the Commission assesses the merits of Envestra's response to the Draft Decision, including the NIEIR forecasts.

2 DOMESTIC HAULAGE MARKET

2.1 Envestra's response to the Draft Decision

In Part B of its submission Envestra claims that:

*"(However) the alternative forecasts presented by MMA are affected by statistical errors and are not a suitable basis for addressing weather normalisation. These errors are outlined in the report prepared for Envestra by National Institute of Economic and Industry Research ("**NIEIR**") which is attached as Annexure 2 to these submissions.*

Envestra had previously commissioned NIEIR to produce revised forecasts. These were provided to the Commission in December 2005 (and are attached as Annexure 1 to these submissions). These are the forecasts which Envestra relies upon as being the best estimates derived on a reasonable basis. The forecasts incorporate the weather normalisation methodology proposed by NIEIR, which remedies the errors in MMA's forecasts.

Any other issues regarding the assumptions underpinning the September 2005 forecasts provided by Envestra to the Commission, are now overcome and have been addressed by NIEIR in its report dated November 2005 basing its forecasts on those used by the Commission in June 2005 to forecast demand as part of determining the standing contract prices able to be charged by Origin Energy Retail Limited. The NIEIR forecasts have previously been found by the Commission to be consistent with those proposed by Origin Energy to determine standing contract prices, and which were approved by the Commission in its Price Determination as reasonable. The NIEIR forecasts therefore constitute a suitable basis, compliant with the Code, for deriving Envestra's forecasts."

This claim should be rejected by the Commission as it is based on:

1. Misrepresentation of MMA's approach to weather normalisation and the supposed errors in it
2. Misleading claims regarding the statistical accuracy of Envestra's and NIEIR's weather normalisation method.
3. The false assertion that the NIEIR forecast overcomes issues regarding Envestra's forecast assumptions

It is noted that Envestra has made the claims notwithstanding the meetings and correspondence between Envestra/NIEIR and MMA, facilitated by the Commission, through which MMA explained the differences between the parties' methods and outcomes.

2.2 Weather normalisation

2.2.1 The two approaches

In considering weather normalisation of gas demand it is important to differentiate between the estimation of the weather sensitivities and the estimation of the normalised usage and trends, based on the sensitivities. It appears to MMA that Envestra and NIEIR may have overlooked this distinction and their critique of MMA's approach to weather normalisation is in fact a critique only of the estimation of weather sensitivities.

In its Stage 2 Report MMA used two methodologies for estimating the historical weather sensitivity and normalised usage of South Australian gas load. Both methods rely upon the statistical technique of regression analysis to establish the sensitivity of gas loads to weather variables such as heating degree days or effective degree days (HDDs and EDDs, defined in section 2.2.6):

> **Method 1**: regression analysis of annual domestic and small C&I loads (separately). This method simultaneously produces both sensitivity coefficients and normalised trend usage for the domestic and small C&I sectors.
>
> **Method 2**: regression analysis of daily net system load (Adelaide gate station load less daily metered customers). This method produces only the sensitivity coefficients of the net system load. Normalised trend usage for the domestic and small C&I sectors is derived separately by disaggregating the sensitivity coefficient into domestic and small C&I components, weather normalising the respective annual loads and estimating trends.

The two methodologies are compared in Table 2-1. Neither is perfect, which is why MMA used both and compared the results, unlike Envestra and NIEIR who relied solely upon Method 2. Using Method 1 we found that the HDD sensitivity of domestic and small C&I loads in 2004/05 were 4.1 TJ/HDD and 1.3 TJ/HDD respectively. Using Method 2 we found that the HDD sensitivity of combined, Adelaide only, domestic and small C&I loads in 2005 was 5.2 TJ/HDD. Adding a further 0.2 TJ/HDD for the approximately 4% of load that is outside the Adelaide area takes this to 5.4 TJ/HDD, in almost exact agreement with the total of 5.4 TJ/HDD for Method 1. Had this agreement not been obtained, MMA would have placed more emphasis on Method 2, using Method 1 solely as a means of splitting the total into the two consumer categories.

The fact that neither method is perfect and that MMA used both is the reason why at a meeting between Envestra, NIEIR, MMA and the Commission on 22 February 2006, Dr Richard Lewis of MMA did not assert that Method 1 could be considered to yield best linear unbiased estimates of weather sensitivity (by itself) but nevertheless did state that MMA's approach to weather sensitivity and normalisation is acceptable[6].

6 This was reported by Envestra in Part B of its submission regarding the Draft Decision

Table 2-1 Comparison of weather sensitivity/normalisation methods

	Method 1	Method 2
Based on variables being forecast?	Yes, uses separate domestic and small C&I data	No, gate data is combined, Adelaide only and includes non-daily metered large users and UAFG
Based on time intervals being forecast?	Yes, uses annual data	No, uses daily data. Daily weather sensitivity not guaranteed to be the same as annual[7].
Directly establishes average usage trend?	Yes	No, two stage process: weather normalisation; then simple trend based on 8 observations.
Allows for trends in temperature sensitivity?	Yes	Yes
Can be based on HDDs or EDDs?	Yes	Yes
Statistically robust sensitivities guaranteed?	No, only eight data points	Yes, large number of data points
Statistically robust normalised trends guaranteed?	No, only eight data points	No, only eight data points
Widely used?	No	Yes

MMA would accept that Method 2 would yield best linear unbiased estimates of weather sensitivity of net system load but not that it is sufficient by itself for weather normalisation, because of its reliance on untested assumptions regarding the disaggregation of net system load weather sensitivity. In this regard it is noted that the annual net system load provided to MMA lies in the range 14.9 PJ to 16.6 PJ over the period 1997/98 to 2004/05, whereas the combined domestic and small C&I load lies in the range 9.7 PJ to 10.5 PJ. Approximately 35% of the net system load is therefore non-daily metered large users and UAFG and this component could significantly bias estimates of weather sensitivity.

7 It is quite easy for the weather coefficients in daily demand models to be biased by non-weather seasonal factors that are not built into the model.

2.2.2 Envestra/NIEIR misrepresentation of MMA's approach

Envestra and NIEIR have persistently represented MMA's approach as relying entirely upon Method 1 and, based upon NIEIR's statistical analysis of Method 1 (refer to section 2.2.3), have asserted that MMA's forecasts are affected by statistical errors. The Envestra and NIEIR approaches rely solely upon Method 2 which according to NIEIR does not suffer from the same statistical errors.

Since MMA's approach in fact incorporates both Method 1 and Method 2, Envestra and NIEIR have significantly misrepresented the approach and the validity of our forecast outcomes. MMA's approach is broader than Envestra's and NIEIR's approaches, bringing to bear additional information, particularly on the relative weather sensitivity of the domestic and small C&I sectors, a factor for which Envestra and NIEIR rely upon unsubstantiated assumptions.

Clearly, since it introduces additional information, MMA's approach to weather normalisation is an improvement upon Envestra's and NIEIR's. However in the case of Envestra's domestic load, it results in very similar outcomes (section 2.2.5) when based on the same weather variable.

2.2.3 NIEIR's assessment of Method 1

NIEIR has prepared a report[8] on weather normalisation for Envestra. This report focuses on the regression analysis used in Method 1, which as discussed above is misleadingly presented as MMA's sole approach to weather normalisation.

MMA naturally accepts NIEIR's general statements about the problems of using regression to estimate reliable coefficients from eight data points. The problems are well known to practitioners of statistical analysis and these potential problems are precisely the reason that MMA used Method 2 to verify the estimates from Method 1. However, since NIEIR has failed to properly replicate MMA's analysis, MMA does not accept NIEIR's detailed conclusions regarding the MMA model coefficients.

2.2.4 The truth about the weather normalised trend produced by Method 2

NIEIR states in the introduction to its report:

"*In the Econometrics literature the minimal sample size cited is 30 observations. Some Econometricians have demonstrated that samples should be at least 120 observations.*

The MMA regressions have only 8 observations. Any inferences drawn from these regressions are unsatisfactory and unreliable since they do not satisfy the requirements of the general linear model and the central limit theorem;

NIEIR's approach to whether (sic) normalization does not suffer from this problem as the weather effects are estimated on a daily basis, hence hundreds of observations are used in the regressions."

8 Weather normalisation of Envestra's South Australian gas sales. The NIEIR and MMA approaches. NIEIR April 2006.

NIEIR's claim about its approach is true only in regard to their weather sensitivity coefficients that go into the weather normalisation calculation, which are indeed based on hundreds of daily observations. However, the weather normalisation calculation itself produces just 8 weather normalised annual consumption observations, which NIEIR uses to calculate a trend (by the same methods as regression), which is used for forecasting. The NIEIR weather normalised trend is therefore subject to exactly the same statistical reliability issues as trends estimated using Method 1.

While the Econometricians are no doubt correct in theory, practitioners frequently make do with far fewer than 30 observations. If 30 or 120 observations were required to make a forecast then no forecast of Envestra network annual demand would be possible.

2.2.5 No difference in outcome between methods

Given that MMA has used both weather normalisation methods and found them to be in excellent agreement, it comes as no surprise that, when applied to the same data using the same weather variable, they yield almost identical estimates of the domestic consumption trend.

MMA has replicated Envestra's domestic weather normalisation methodology[9] using Billing HDDs and compared the results to MMA estimates – the differences between this outcome and MMA's are then due entirely to methodology and not to data. The results are presented in Table 2-2 together with the trend of NIEIR's domestic weather normalised average usage.

Table 2-2 Domestic normalised average usage trends (GJ)

FY	1998	1999	2000	2001	2002	2003	2004	2005	Ann growth 98-05
"Envestra" Billing HDD normalised	24.33	24.28	23.71	23.96	23.57	23.77	23.32	22.80	-0.93%
Trend of "Envestra" Billing HDD normalised	24.37	24.18	24.00	23.81	23.62	23.44	23.25	23.06	-0.79%
MMA Normalised Trend	24.39	24.19	24.00	23.80	23.60	23.41	23.21	23.02	-0.83%
NIEIR EDD normalised	25.00	24.20	23.70	23.90	23.90	23.40	22.80	22.70	-1.37%
Trend of NIEIR EDD Normalised	24.70	24.41	24.13	23.84	23.56	23.27	22.99	22.70	-1.20%

9 To confirm that we have replicated Envestra's methodology, we have replicated Envestra's outcomes using annual HDDs

The Envestra trend based on Billing HDDs is virtually indistinguishable from MMA's normalised trend, which demonstrates that the methodologies produce similar outcomes. Since the Envestra and NIEIR approaches are the same, the significant difference between the NIEIR trend of -1.2% and the Envestra/MMA trend of approximately -0.8% must be due to the choice of weather parameters. NIEIR has used annual EDDs (simple sum of EDDs over the year) and MMA has used billing HDDs (a profiled sum of HDDs that matches the billing profile for the billings that define annual consumption) and based on the above it is concluded that the difference in the NIEIR and MMA trends is largely due to the difference between EDDs and HDDs

It is noted that the first three rows of the above table were provided to Envestra after a meeting between Envestra, NIEIR, MMA and the Commission on 22 February 2006, to demonstrate the similar outcomes from the two approaches.

2.2.6 Weather parameters

Envestra and MMA based their weather nomalisations on the Heating Degree Day (HDD) weather parameter defined as:

HDD = max [0, 18 – T]

In this formula T is the average temperature for a gas day. Use of this parameter assumes that average temperature has a linear effect on gas use when it is below 18C and no effect when it is above 18C. HDDs are widely used for this purpose in the gas industry.

NIEIR based its weather normalisation on the Effective Degree Day (EDD) parameter defined as:

EDD = max [0, DD + A*DD*Wind – B*Sunshine hours + 2*cos((day-200) π /182)]

In this formula DD is the same as HDD, "Wind" is the average wind speed, "Sunshine hours" is the number of sunshine hours above a threshold and the cosine term adds a seasonal factor that suggests more gas is used in winter, per HDD, than in shoulder seasons. A and B are parameters determined to maximise the explanatory power of EDDs in relation to variations in daily net system load.

The additional weather factors enable EDDs to explain more of the variation in net system gas load from day to day and EDD formulas are selected on this basis (see next section). However, owing to differences between net system load and domestic load it is not a foregone conclusion that EDD formulas will automatically provide for more accurate annual domestic weather normalisation. This is an unstated assumption in the NEIR methodology that can only be tested by using Method 1 with EDDs! The same applies with HDDs but since the only parameter is the 18C, which is typically not varied, there are not likely to be any biases.

EDDs have been used by VENCorp to weather normalise Victorian gas usage for many years. The NIEIR derivation of an EDD formula for South Australia is flawed however

and the resulting EDDs cannot be regarded as a reliable basis for weather normalisation. Until such time as a reliable EDD formula has been derived, use of HDDs is preferable.

2.2.6.1 Flaws in NIEIR's EDD derivation

NIEIR's EDD derivation has two principle flaws:

1. Three apparently different formulas have been presented in three different reports and it is not clear which is best or why
2. The methodology used is statistically unsound and does not meet the criteria used by NIEIR to judge weather normalisation Method 1

2.2.6.1.1 Which formula?

Three NIEIR derivations of EDDs for South Australia are available to the Commission. Two derivations have been submitted as part of Envestra's response to the Draft Decision.

NIEIR April 2005 report to ESCOSA[10]

In this report the EDD formula is stated as:

EDD = max [0, DD + 0.143*DD*Wind – 0.29*Sunshine hours + 2*cos((day-200) π /182)]

It is based on data from 1997/98 to 2003/04 and the EDD value in 2003/04 is 1390. It is noted that the HDD*Wind term is reported with a power 0.5 in the text but not in the appendix.

NIEIR November 2005 report to Envestra[11]

In this report the EDD formula is stated as:

EDD = max [0, DD + 0.021*(DD*Wind)$^{0.5}$ – 0.035*Sunshine hours + 2*cos((day-200) π /182)]

It is based on data from 1997/98 to 2004/05 and the EDD value in 2003/04 is 1396. MMA believes that the 0.5 power on the DD*Wind term is misreported – removing it yields annual EDD values consistent with those reported by NIEIR. The coefficients of DD*wind and Sunshine hours are 7 to 8 times smaller than in the April 2005 formula, which raises questions about their statistical significance.

NIEIR April 2006 report to Envestra[12]

In this report, which was submitted in support of Envestra's response to the Draft Decision, the EDD parameters A and B are not stated. The EDD formula is based on

10 Forecasts of natural gas sales and customer numbers for standing contract customers in South Australia. NIEIR report to Escosa, April 2005
11 Natural gas forecasts for the Envestra distribution region to 2015. NIEIR November 2005.
12 Attachment 3 to Weather normalisation of Envestra's South Australian gas sales. The NIEIR and MMA approaches. NIEIR April 2006.

data from 1996/97 to 2003/04 and EDD $_{2003/04}$ appears to be about 1390 (from a chart, no table is provided). It is not clear why a formula reported in 2006 would not be based on the latest data including 2004/05.

In relation to this formula NIEIR states "*The EDD model calibrated to South Australian conditions has been demonstrated to be empirically superior to other weather normalisation indices (e.g. HDD). This was the weather correction index adopted by NIEIR in its work for Envestra in November 2005".* This statement is difficult to reconcile with the use of different data compared to the November 2005 report for Envestra. Even though the formula parameters are not defined, it appears to be a third formula and NIEIR's statement that the index is the same as used in the work for Envestra does not appear to be true.

The multiplicity of formulas produced by NIEIR and the absence of cross referencing in NIEIR reports that would enable third parties to keep track of changes makes it impossible to know which is best and why. If EDDs are to become an accepted weather normalisation tool in South Australia, the process of establishing and updating the EDD formula requires more professional management and greater transparency, as displayed by VENCorp in relation to Victoria[13]. MMA would recommend that in South Australia the process be managed by an independent body such as the Commission or REMCO.

2.2.6.1.2 Methodology

NIEIR's EDD derivation methodology is outlined in its April 2006 report to Envestra:

"*An index's appropriateness for weather normalisation can be measured by how well it explains movements in gas consumption. The most straightforward way to measure this is by regressing (daily) gas consumption against the index and examining the regression's goodness of fit, as a measured by an R-squared statistics. A high R-squared would indicate a high explanatory power. Hence, the index with the highest R-squared would be the most appropriate index for the weather normalisation for Envestra's gas network*."

The regression model includes a constant, dummy variables representing weekends and public holidays, an economic activity variable and the EDD variable. MMA understands that the parameters A and B in the EDD formula are derived by manually varying them and repeating the regression analysis until the highest R-squared is obtained, which is the same method as used by VENCorp.

This approach has the following defects:

1. Only two parameters in the EDD formula are varied. VENCorp has also tested varying the temperature threshold (18C in the HDD term) and there is also no reason not to vary the coefficient of the cosine term (2) and the value 200 in the cosine term, both of

13 Review of Effective Degree Day Weather Standards Used For Forecasting Annual and Peak Day Gas Demand. VENCorp, 10 July 2003.

which are arbitrary. Varying these parameters may yield even higher R-squared values.

2. The statistical significance of the parameters A and B is not addressed, presumably because they are not directly part of the regression. This is a very significant omission, particularly as VENCorp has reported that:

   "All the components in the EDD formula are highly correlated with each other and this causes "Multicollinearity of the regressors" resulting in highly unstable regression coefficients. Inconsistent results can be generated depending on the order in which the variables are included in the analysis."

   NIEIR should assess and report on the correlations among the EDD components for South Australia and determine the statistical significance of the parameters A and B (and the other parameters that should be estimated rather than assumed). This can only be done by including the parameters in the regression analysis. The resulting regression is non-linear, because the parameters in the EDD formula are multiplied by the EDD coefficient, and non-smooth, because of the max [0,formula] function in the EDD and HDD formulas. This causes the regression to be considerably more difficult to solve and many, if not the majority, of statistical packages are unable to solve it. This does not mean that the issue of statistical significance can be avoided however.

The lack of statistical rigour in NIEIR's derivation of EDDs stands in stark contrast to its insistence on statistical validation of weather normalisation Method 1.

2.3 Critique of the NIEIR Forecast

MMA's Stage 1 Report identified a number of amendments that would need to be made to Envestra's forecasts before they could be considered to meet the requirements of the Code. Many of these amendments relate to substantiation of assumptions and proper linkage of forecasts to historical data.

Contrary to Envestra's claim, NIEIR's forecasts[14] do not overcome these issues. The following sections document the weak substantiation offered by NIEIR. MMA has not previously reviewed NIEIR's forecasts but has considered the data and information provided and concluded in our Stage 2 Report that:

"It is clear from the residential market outcomes that NIEIR has made different average usage assumptions than MMA, however, there is no information or arguments presented that dissuade us from the assumptions used in the MMA forecasts."

14 Natural gas forecasts for the Envestra distribution region to 2015. NIEIR November 2005.

2.3.1 Appliance Minimum Efficiency Performance Standards

The future trend in gas appliance efficiencies will be influenced by proposed changes in Minimum Efficiency Performance Standards (MEPS). NIEIR does not appear to have analysed the impact of the new MEPS, to be introduced in 2007 or 2008, in any detail and has simply made an assumption (p42):

"*As noted above, NIEIR has adopted the relatively conservative assumption that more stringent MEP's (sic) introduced by GAEEP will result in an improvement in average efficiencies of only 10 per cent, spread evenly over 2007-08 and 2008-09.*"

In our Stage 2 Report we presented a detailed analysis of the impact of MEPS on the efficiency of gas water heating, which accounts for a majority of gas usage, and concluded that the best estimate of the improvement in efficiency would be 4.5%. NIEIR's 10% estimate appears to be halfway between 0% and 20%, which is the expected increase in the MEPS itself, which we have previously noted is not the same as the increase in actual appliance efficiency because the majority of current appliances considerably exceed the current MEPS.

It is concluded that NIEIR has not used a best estimate of the impact of MEPS. Use of the NIEIR assumption would result in significantly lower gas demand forecasts compared to use of the best estimate.

2.3.2 Base year new homes average usage

NIEIR has not presented a plausible derivation of base year (2005-06) new homes average usage. It is stated that (p35):

"*The analysis in this section reports average gas usage by new dwellings in Adelaide in 2001 at around 19 GJ per annum. Given the introduction of 4-star standard in January 2003, the average usage by new customers in 2005-06 is assumed to be 17 GJ per connection.*"

That section of the NIEIR forecast report actually reports average usage of new homes constructed in 2001 as 19.8 GJ in 2002-03 and 21.2 GJ in 2003-04, which averages 20.5 GJ, 7.5% more than NIEIR claims. MMA, using this data together with that for new homes constructed in subsequent years and detailed calculations of the impact of 4-star homes and other factors, has estimated a 2005-06 new homes usage of 17.8 GJ per annum.

It is concluded that NIEIR has not used a best estimate of the base year new homes usage. Use of the NIEIR assumption would result in significantly lower gas demand forecasts compared to use of the best estimate.

2.3.3 Other new homes assumptions and new homes forecast

Apart from MEPS and base year new homes consumption, NIEIR has not provided detailed estimates of any other factors that impact on the new homes forecast. These include: impact of building standards; solar water heater penetration; and AAA shower impact.

In order for the NIEIR new homes forecast to comply with the Code it would be necessary for NIEIR to demonstrate that best estimates of the impacts of these factors have been used. A comparison of MMA, Envestra and NIEIR new homes average usage forecasts (Table 2-3) suggests that NIEIR has used different assumptions from both MMA and Envestra.

Table 2-3 New homes average usage forecast comparison (GJ per customer)

	MMA Stage 2 Report	Envestra	NIEIR
2005-06	17.8	17.4	16.9
2006-07	17.3	17.1	13.5
2007-08	15.9	14.5	12.7
2008-09	14.6	14.2	12.0
2009-10	14.4	14.0	11.8
2010-11	14.1	13.7	11.7

2.3.4 Existing homes forecast

A comparison of MMA, Envestra and NIEIR existing homes forecasts (Table 2-4) shows the impact of the key differences in MMA's and NIEIR's assumptions. The NIEIR forecast starts at a lower value (due to weather normalisation differences) and has a stronger declining trend (due to differences in historic trends and MEPS impacts). In all respects we consider the MMA estimates to be best estimates.

Table 2-4 Existing homes average usage forecast comparison (GJ per customer)

	MMA Stage 2 Report	Envestra	NIEIR
2005-06	22.9	22.8	22.5
2006-07	22.8	22.5	22.3
2007-08	22.6	22.1	22.1
2008-09	22.4	21.6	21.7
2009-10	22.2	21.2	21.4
2010-11	22.1	20.8	21.1

3 SMALL COMMERCIAL AND INDUSTRIAL HAULAGE MARKET

3.1 Envestra's response to the Draft Decision

Envestra proposes to use the NIEIR forecasts for the small business (I&C < 10 TJ) market together with additional growth from new township reticulations.

3.2 Weather normalisation

The NIEIR report on weather normalisation[15] criticises the MMA small commercial and industrial model on the same grounds as it criticises domestic normalisation Method 1, namely that eight data points are too few. NIEIR does not state how many data points its forecast model relies upon since the answer is obvious once the fallacy of the NIEIR weather normalisation methodology is exposed– there are only eight annual consumption data points (refer to section 2.2.4).

The basis on which Envestra has rejected the MMA forecast therefore has no merit.

3.3 Critique of the NIEIR forecast

3.3.1 NIEIR approach

According to the November 2005 NIEIR report, the NIEIR forecasts for small business have been prepared on the following basis:

- Division of small business customers of size < 1 TJ and of size 1 – 10 TJ. NIEIR has referred to these classes of customers as Commercial V and Industrial V.
- Weather normalisation of the Commercial V class but not the Industrial V class.
- Using the NIEIR state forecast of GSP by industry disaggregated into local government areas to produce a gross regional product by industry.
- Linking forecasts by class to a general equation for gas sales, where sales are related to gas prices and total commercial and industrial output for the district network areas.

The new town reticulations are not included within the NIEIR forecasts, however, Envestra proposes to add these separately.

3.3.2 Comparison of NIEIR and Envestra methodologies

The NIEIR forecasting methodology shares some features with that used by Envestra in its initial forecasts but appears to differ on others.

15 Weather normalisation of Envestra's South Australian gas sales. The NIEIR and MMA approaches. NIEIR April 2006.

- NIEIR separates the small business class into two classes on the basis of gas consumption – as did Envestra.
- NIEIR has assumed that the < 1 TJ customers are commercial and the 1 – 10 TJ customers are industrial - as did Envestra.
- NIEIR has assumed that the < 1 TJ customers are weather sensitive but that the 1 – 10 TJ customers are weather insensitive – as did Envestra.
- NIEIR has carried out the weather normalisation for its Commercial V class by pro-rating its weather sensitivity for the Tariff V market as a whole (i.e. all customers < 10 TJ including domestic) between the domestic and Commercial V classes according to consumption for these two classes – as did Envestra.
- NIEIR has used its own output and price forecasts together with its own elasticities by industry to generate consumption forecasts. Envestra used NIEIR's commercial and industrial output forecasts with its own elasticities.

3.3.3 MMA comments

In its review of the Envestra forecasts, MMA found that those forecasts could not be considered "best estimates arrived at on a reasonable basis" because they included flaws in several areas. These flaws were identified in the Stage 1 and Stage 2 reports and a summary also provided to the Commission which in turn provided it to Envestra. The summary is repeated below.

MMA considers that the methodology used by Envestra for this market cannot be considered reasonable.

> *As stated in the Stage 1 and Stage 2 reports, MMA considers the Envestra model for the Commercial tariff to not be reasonable because:*
>
> - *The division between small commercial and small industrial is artificial (being based on size alone). There is, for example, no evidence that the 1 to 10 TJ customers are predominantly industrial. There is no evidence of different drivers for each sector.*
> - *Dividing the market may result in apparent increases in one sector and reductions in the other due to movements based on size alone. Such movements are anomalous and need not be considered as the reference tariff caters for the market as a whole.*
> - *Envestra has asserted that the 1 – 10 TJ sector is not weather-sensitive but has provided no evidence to support this assumption. By comparison, AGL assumed that the whole of the small business sector was weather-sensitive and the Gas and Fuel Corporation of Victoria assessed that the weather sensitive proportion of the load was 35% for small commercial and 25% for small industrial*[16]
>
> *Envestra uses a complicated formula to develop the outcomes:*

16 Marsden Jacobs Associates and McLennan Magasanik Associates, report to the Victorian Office of the Regulator General, "Review of gas demand forecasts", October 1998, Chart 4.1 page 18. available at http://archive.esc.vic.gov.au/1998/Gas_public_register_marjac29.pdf.

- *Previous years volume x trend average usage forecast for this year/trend average usage in previous year x (change in output x elasticity).*
- *However, its assumptions about elasticities are not consistent with the evidence. This results in a significant underestimation of the small industrial load.*
- *It uses actual rather than weather normalised consumption for its base value.*
- *It treats the small industrial sector differently to the commercial sector. For example, while a negative trend in average usage is factored in for the commercial sector a (small) positive trend in the small industrial sector is not.*

The NIEIR methodology contains several of the flaws MMA identified for the Envestra methodology:

- The division between Commercial V and Industrial V on the same artificial size basis. This allows the potential anomalies identified above to be incorporated in forecasting.
- The assumption that Commercial V is sensitive to commercial drivers and Industrial V to industrial drivers with no justification.
- The assertion that the Commercial V market is weather sensitive while the Industrial V market is weather insensitive.
- The arbitrary pro-rating of weather normalisation between the domestic and Commercial V markets.

MMA cannot comment on the models and elasticities used by NIEIR as these have not been provided.

3.3.4 The MMA methodology

The MMA methodology does not have the flaws discussed above:

- It considers the small business market as a whole;
- It weather normalises the small business market as a whole using the methodology described in the report.
- It uses the same drivers GSP and weather for the small business market as a whole using the methodology derived in the report.

3.3.5 Conclusion and recommendation

MMA concludes that its small business forecast does not have the flaws found in the NIEIR forecasts and recommends that the MMA forecast be used by the Commission.

4 DEMAND HAULAGE MARKET

4.1 Envestra's response to the Draft Decision

Envestra proposes to use the MMA demand forecasts after subtracting 2.5 TJ for an expansion by a customer in the Northern Zone from 1 July 2007.

Envestra has stated that it has no knowledge of any expansion by a customer in the Northern Zone and that it expects that it would have been advised of such an expansion. Envestra suggests that the forecast by MMA may have been for a glass plant served from the Moomba to Adelaide Pipeline (MAP).

4.2 MMA analysis

Information provided by Envestra confirmed that the customer had been taking gas from the distribution mains over the past few years. Subsequent to receipt of this information MMA has checked with the customer in question to confirm:

- That it did not plan to change the mode of delivery of gas (i.e. take from the MAP).
- That the planned expansion is as expected in the initial survey.

The customer has responded that:

- It has not changed its mode of delivery of gas and did not expect to.
- Its expansion plans had been delayed somewhat. Instead of being in mid 2007, the expansion was now planned from some time in 2008. The expected scale of the expansion is as conveyed in the previous survey.

The updated survey form has been provided to the Commission.

4.3 MMA conclusion and recommendation

MMA concludes that the customer in question is and will remain a distribution customer.

MMA also expects that the expansion will be delayed but will take place within the coming regulatory period. The customer now expects the expansion to be some time in 2008 and has said that it believes mid 2008 to be a reasonable time to assume start-up, MMA considers it reasonable to assume start-up only from 1 January 2009.

MMA proposes to reduce its MDQ forecasts for the Northern Zone by the amount due to the planned expansion in financial year 2008 and half this amount in 2009. MMA recommends that this updated forecast be used by the Commission for the Northern Zone.

The updated MDQ forecast for the Northern Zone is provided in Table 4-1 .

Table 4-1 Updated MDQ forecast for the Northern Zone and total network, GJ MDQ

	2007	2008	2009	2010	2011
Northern Zone	32,844	33,008	34,347	35,701	35,902
Total	70,629	70,897	72,598	74,243	74,639