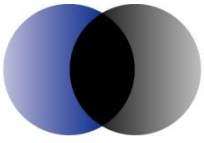
Forecast load traces

Forecast load traces for input to determination of BRCI for 2009/10

Prepared for Queensland Competition Authority

Revised 15 May 2009



ACIL Tasman

Economics Policy Strategy

Reliance and Disclaimer

The professional analysis and advice in this report has been prepared by ACIL Tasman for the exclusive use of the party or parties to whom it is addressed (the addressee) and for the purposes specified in it. This report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. The report must not be published, quoted or disseminated to any other party without ACIL Tasman's prior written consent. ACIL Tasman accepts no responsibility whatsoever for any loss occasioned by any person acting or refraining from action as a result of reliance on the report, other than the addressee.

In conducting the analysis in this report ACIL Tasman has endeavoured to use what it considers is the best information available at the date of publication, including information supplied by the addressee. Unless stated otherwise, ACIL Tasman does not warrant the accuracy of any forecast or prediction in the report. Although ACIL Tasman exercises reasonable care when making forecasts or predictions, factors in the process, such as future market behaviour, are inherently uncertain and cannot be forecast or predicted reliably.

ACIL Tasman shall not be liable in respect of any claim arising out of the failure of a client investment to perform to the advantage of the client or to the advantage of the client to the degree suggested or assumed in any advice or forecast given by ACIL Tasman.

ACIL Tasman Pty Ltd

ABN 68 102 652 148
Internet www.aciltasman.com.au

Melbourne (Head Office)
Level 6, 224-236 Queen Street
Melbourne VIC 3000

Telephone (+61 3) 9604 4400
Facsimile (+61 3) 9600 3155
Email melbourne@aciltasman.com.au

Brisbane
Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3009 8700
Facsimile (+61 7) 3009 8799
Email brisbane@aciltasman.com.au

Canberra
Level 1, 33 Ainslie Place
Canberra City ACT 2600
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6103 8200
Facsimile (+61 2) 6103 8233
Email canberra@aciltasman.com.au

Darwin
Suite G1, Paspalis Centrepoint
48-50 Smith Street
Darwin NT 0800
GPO Box 908
Darwin NT 0801

Telephone (+61 8) 8943 0643
Facsimile (+61 8) 8941 0848
Email darwin@aciltasman.com.au

Perth
Centa Building C2, 118 Railway Street
West Perth WA 6005

Telephone (+61 8) 9449 9600
Facsimile (+61 8) 9322 3955
Email perth@aciltasman.com.au

Sydney
PO Box 1554
Double Bay NSW 1360

Telephone (+61 2) 9389 7842
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au

For information on this report

Please contact:

Marc Randell

Telephone (07) 3009 8709
Mobile 0404 822 319
Email m.randell@aciltasman.com.au

Contents

1 Background

The Queensland Competition Authority (QCA) has engaged ACIL Tasman to provide a critique on the methodology used by CRA to calculate the energy purchase costs (EPC) for use in the determination of the 2009/10 BRCI.

In addition, QCA engaged ACIL Tasman to provide advice on improving the methodology forecasting half hour load traces used in the calculation of EPC used in determining the BRCI for 2009/10. The following forecast load traces are required:

- 2008/09 for the NEM load for Queensland at 10%, 50% and 90% POE based on the actual load trace for the year to 31 March 2008 and the medium growth forecast summer and winter maximum demands and annual energy for 2008/09 as published in the 2007 Powerlink Annual Planning Statement (APR)
- 2009/10 for the NEM load for Queensland at 10%, 50% and 90% POE based on the actual load trace for the year to 31 March 2009 and the medium growth forecast summer and winter maximum demands and annual energy for 2009/10 as published in the 2008 APR

The project involves forecasting load traces using an ACIL Tasman model which produces forecast load traces based on an actual load trace and forecasts of summer and winter maximum demands, minimum demand and annual energy.

2 Comments on the CRA methodology

ACIL Tasman has compared two methods for estimating the energy purchase cost (EPC) component used by CRA and offers recommendations for a preferred methodology to be used in the 2009/10 BRCI determination.

The comments are largely confined to the alternative methodologies proposed as well as the treatment of data rather than the results.

2.1 The 2008-09 addendum report methodology

CRA based the energy growth rate for the small load on growth rates between corresponding 6 month periods to provide a growth in energy consumption for the small load bringing together actual (July to December 08) and projected (January to June 09) and using the energy growth rate between 2007/08 and 2008/09 (as calculated) to provide a forecast of energy consumed in the 2009/10 year.

Peak demand for 2009/10 for the small load was forecast by assuming that the forecast growth in peak demand was caused entirely by the small load.

The load trace for the small load in 2009/10 was developed on the basis of the actual load trace for 2007/08.

Energy purchase costs were estimated using a market model to provide an estimate of half hourly prices over the period and applying these prices to the half hourly load trace of the small load. When combined with assumed levels of hedge cover and hedge prices a half hourly energy purchase cost can be derived and aggregated into an annual cost.

2.1.1 Comment on 2008/09 methodology

ACIL Tasman agrees with these steps except for the derivation of peak demand for the small load by assuming the growth in peak demand for the large load is all attributable to growth in the small load. We believe that the increase in large load demand should not be assumed to be the increase in the maximum demand for the small load.

Assuming the spot price modelling approach is well founded, the methodology used to estimate the EPC would appear sound.

2.2 The 2009-10 final second report methodology

The approach adopted by CRA in this instance avoided the problems of applying different growth rates to energy and maximum demand and then

attempting to derive the small load from these by, firstly deriving the half hourly load trace for the large load by taking the previous year's half hourly load trace and applying the 50% POE from the SOO and combining the maximum demand and energy growth to produce a new set of half hourly demands. The 10% POE and 90% POE were then applied to the top 200 hours of the load trace for 09-10 to provide two new load traces. The small load was derived from this by using the ratios derived from historical data between the large and small load for corresponding half hours. The ratios were then applied to the large load in the 3 cases (50%, 90% and 10% POE) to derive the small load.

The 3 cases are used and then combined to produce a weighted average because the use of the 50% POE case alone may bias the results towards the low side. Average annual wholesale electricity prices are not distributed in a normal pattern - the distribution is skewed towards the higher end – resulting in the median being less than the mean. As a result a POE50 (the median forecast) demand projection alone is likely to underestimate the energy purchase price. The weightings are not published but we believe they were 30% for 90POE, 40% for 50POE and 30% for 10POE. These seem reasonable enough, if somewhat arbitrary.

2.2.1 Comments on 2009/10 methodology

ACIL Tasman believes the 2009/10 methodology seems a better way to proceed than the previous method used for 2008/09 even though it involves a change in methodology. It provides a consistent method for developing the large and small load based on historical and accessible data. It will require that the small load and large load data is checked each year for consistency (no large directly connected customers either commencing or terminating their consumption) and may need to be adjusted for any material year on year changes that would alter the small load/large load ratio.

That said, the load trace methodology is still not ideal with the small load derived by using the ratios between the large and small load for corresponding half hours derived from historical data. ACIL Tasman has developed an alternative methodology to overcome these problems as discussed in the Section 3 of the report.

3 ACIL Tasman load trace methodology

This section deals with a methodology developed by ACIL Tasman to produce the forecast load traces which is designed to overcome the shortcomings of the previous methods.

3.1 Forecast load traces for the NEM load in Queensland

The forecast load trace for the NEM load for Queensland is at the point of delivery from the transmission network. The NEM load for Queensland is defined as the load delivered from the transmission network to customers on distribution networks and does not include customers which are directly connected to the transmission network.

3.1.1 Half hour load trace data for Queensland

The first step is to aggregate the half-hourly load data for each Queensland TNI for the year to 31 March 2008 (for use in the 2008/09 load trace forecast) and for the year to 31 march 2009 (for use in the 2009/10 load trace forecast) as supplied by NEMMCO, into:

- total NEM load for Queensland
- directly connected customer load

Financial year load trace configurations for both total NEM load for Queensland and the directly connected customers are then produced by:

- moving the June Quarter from the beginning to the end of the year to 31 March load traces
- adjusting the date and day type structure to match the financial year being forecast.

The load traces for both total NEM load for Queensland and the directly connected customers are adjusted in precisely the same manner so that they remain exactly comparable with each other.

3.1.2 Load forecasts for Queensland

The forecasts of the following items for 2008/09 and 2009/10 are then extracted from the 2007 and 2008 APRs respectively:

- **Annual scheduled energy delivered** from the transmission system based on the medium economic forecast. (i.e. Native Energy minus the

Delivered Energy Adjustment to account for embedded non-scheduled generation)

- **Scheduled summer maximum demand** delivered from the transmission system under the medium economic forecast at 10%, 50% and 90% POE. (i.e. Summer Native Demand minus the Delivered Demand Adjustment)
- **Scheduled winter maximum demand** delivered from the transmission system under the medium economic forecast at 10%, 50% and 90% POE. (This is the Winter Native Demand minus the Delivered Demand Adjustment)
- **Coincident demand of directly connected customers in summer and winter** taken from the table showing Connection Point Native Demands Coincident with State.

3.1.3 Forecast of minimum demand for Queensland

A forecast minimum demand is produced by ACIL Tasman by projecting the observed minimum half hourly load from the actual load traces at the forecast growth in annual energy.

3.1.4 Forecast load trace for total NEM load for Queensland

The ACIL Tasman spreadsheet model is then applied to manipulate the half-hourly load trace for the total NEM load for Queensland to match the forecasts of summer and winter peak demands, minimum demand and annual energy.

It is a spreadsheet model that uses a non linear transformation to adjust the recorded load trace to fit the forecast elements using a goal seek method akin to a linear programming solution.

Forecast half hourly load traces are produced for:

- 2008/09 based on the year to 31 March 2008 load trace with the June Quarter moved and the date and day structure adjusted to match 2008/09 and the medium growth 10%, 50% and 90% POE forecasts from the Powerlink 2007 APR.
- 2009/10 based the year to 31 March 2009 load trace with the June Quarter moved and the date and day structure adjusted to match 2009/10 and the medium growth 10%, 50% and 90% POE forecasts from the Powerlink 2008 APR.

3.1.5 10% and 90% POE load traces for Queensland

10% and 90% POE load traces are then constructed by replacing the top 400 half hours from the 50% POE load trace with the values from the load traces based on the 10% and 90% POE load forecasts.

This means that the 10% and 90% POE load traces are the same as the 50% POE load trace except for the top 400 half hour demands. This, in turn,

means that the annual energy under the 10% POE load trace will be slightly higher than the annual energy under the 50% POE load trace and the annual energy under the 90% POE load trace will be slightly lower than the 50% POE load trace.

3.1.6 Forecast load traces for directly connected customers for Queensland

The half-hourly load trace for directly connected customers, calculated as described in 3.1.1, is then increased or decreased by the percentage change in the contribution to summer and winter system demand of the directly connected customers as reported by Powerlink in the relevant APR.

3.1.7 Forecast load traces for small load for Queensland

The forecast half-hourly demand trace for retail customers in Queensland, (i.e. the NEM load or small load), is then calculated by subtracting the forecast half-hourly demand trace for directly connected customers from the forecast half-hourly demand trace for the total NEM load for Queensland. The resultant forecast load trace would be the one used in the calculation of the BRCI.

Load traces are produced for the small load for 10% 50% and 90% POE for:

- 2008/09 based on the year to 31 March 2008 load trace and APR
- 2009/10 based on the year to 31 March 2009 load trace and APR.

3.1.8 Use of the Queensland load traces

These load traces of the Queensland small load are to be used by CRA to calculate the EPC for 2008/09 and 2009/10.