

REPORT TO
QUEENSLAND COMPETITION AUTHORITY

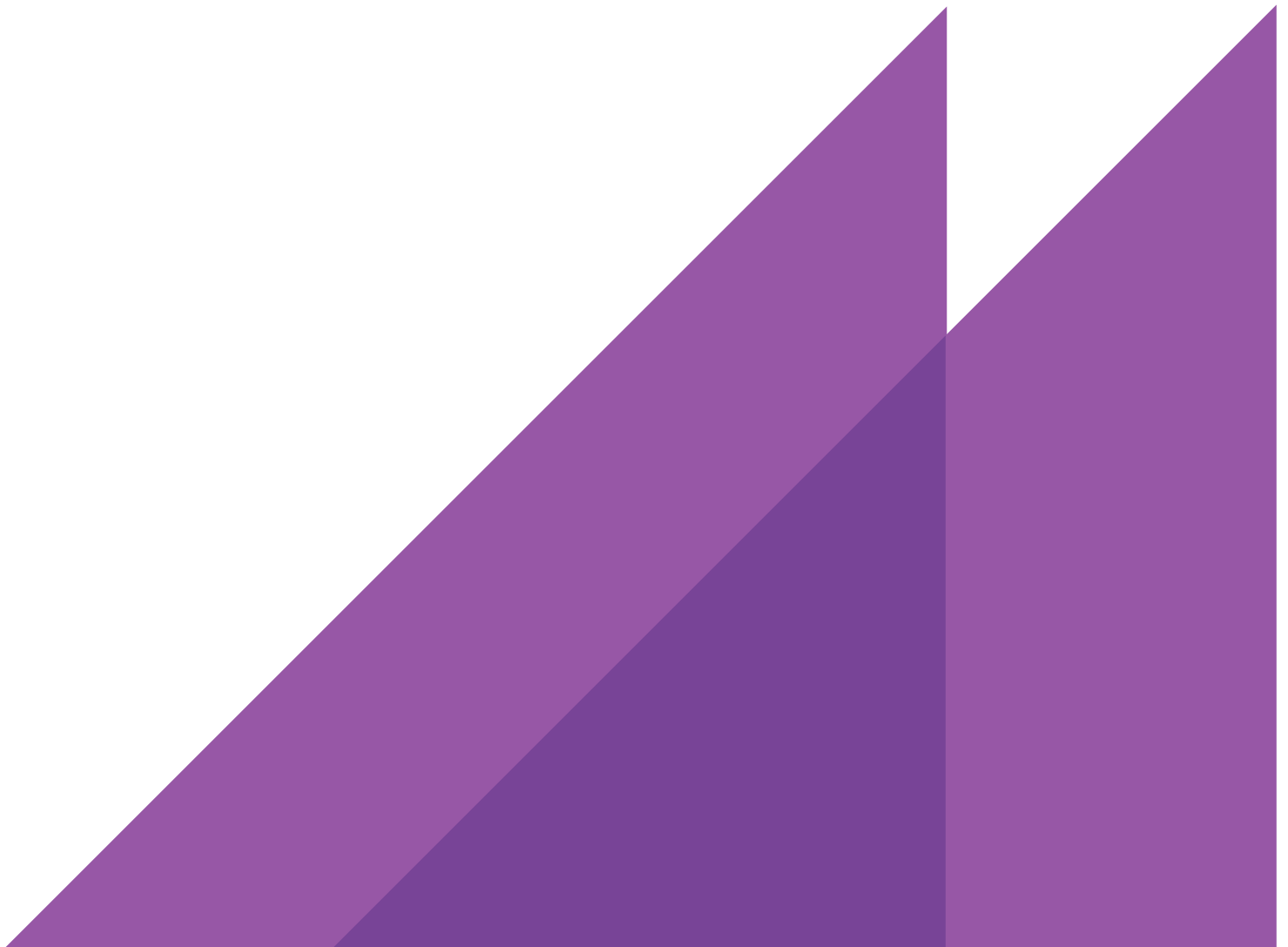
28 SEPTEMBER 2020

ESTIMATED ENERGY COSTS



2020-21 NEW LOAD
CONTROL RETAIL
TARIFFS

**FOR USE BY THE QUEENSLAND COMPETITION
AUTHORITY IN ITS FINAL SUPPLEMENTARY
DETERMINATION**





ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

LEVEL NINE
60 COLLINS STREET
MELBOURNE VIC 3000
AUSTRALIA
T+61 3 8650 6000
F+61 3 9654 6363

LEVEL ONE
50 PITT STREET
SYDNEY NSW 2000
AUSTRALIA
T+61 2 8272 5100
F+61 2 9247 2455

LEVEL FIFTEEN
127 CREEK STREET
BRISBANE QLD 4000
AUSTRALIA
T+61 7 3009 8700
F+61 7 3009 8799

LEVEL ONE
15 LONDON CIRCUIT
CANBERRA ACT 2600
AUSTRALIA
T+61 2 6103 8200
F+61 2 6103 8233

LEVEL TWELVE, BGC CENTRE
28 THE ESPLANADE
PERTH WA 6000
AUSTRALIA
T+61 8 9449 9600
F+61 8 9322 3955

161 WAKEFIELD STREET
ADELAIDE SA 5000
AUSTRALIA
T +61 8 8122 4965
ACILALLEN.COM.AU

SUGGESTED CITATION FOR THIS REPORT

ESTIMATED ENERGY COSTS FOR 2020-21 NEW LOAD CONTROL RETAIL TARIFFS: FINAL SUPPLEMENTARY DETERMINATION, ACIL ALLEN, SEPTEMBER 2020

RELIANCE AND DISCLAIMER THE PROFESSIONAL ANALYSIS AND ADVICE IN THIS REPORT HAS BEEN PREPARED BY ACIL ALLEN CONSULTING 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 THE REPORT MUST NOT BE PUBLISHED, QUOTED OR DISSEMINATED TO ANY OTHER PARTY WITHOUT ACIL ALLEN CONSULTING'S PRIOR WRITTEN CONSENT. ACIL ALLEN CONSULTING 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 ALLEN CONSULTING HAS ENDEAVOURED TO USE WHAT IT CONSIDERS IS THE BEST INFORMATION AVAILABLE AT THE DATE OF PUBLICATION, INCLUDING INFORMATION SUPPLIED BY THE ADDRESSEE. ACIL ALLEN CONSULTING HAS RELIED UPON THE INFORMATION PROVIDED BY THE ADDRESSEE AND HAS NOT SOUGHT TO VERIFY THE ACCURACY OF THE INFORMATION SUPPLIED. UNLESS STATED OTHERWISE, ACIL ALLEN CONSULTING DOES NOT WARRANT THE ACCURACY OF ANY FORECAST OR PROJECTION IN THE REPORT. ALTHOUGH ACIL ALLEN CONSULTING EXERCISES REASONABLE CARE WHEN MAKING FORECASTS OR PROJECTIONS, FACTORS IN THE PROCESS, SUCH AS FUTURE MARKET BEHAVIOUR, ARE INHERENTLY UNCERTAIN AND CANNOT BE FORECAST OR PROJECTED RELIABLY.

ACIL ALLEN CONSULTING 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 ALLEN CONSULTING.

© ACIL ALLEN CONSULTING 2020

C O N T E N T S

1

INTRODUCTION	1
--------------	---

2

METHODOLOGY	2
2.1 Introduction	2
2.2 Components of the energy cost estimates	2
2.3 Overview of methodology	2
2.4 Demand profiles for the new load control tariffs	3
2.5 What is the purpose of the new load control tariffs?	3
2.6 What might be the characteristics of the new load control tariff load profiles?	4
2.7 The 2019-20 Ergon Energy Agricultural Tariff Trial	4
2.8 Summary: Is the trial data more, or less, representative of the new Energex small business primary load control tariff than one of the existing load profiles?	8
2.9 Are there other data that could be used for the Ergon large business control load tariffs?	8
2.10 Estimation of the WEC of the trial load to be adopted for the Energex small business primary control load tariff	8
2.11 Estimation of the WEC for the Ergon large business control load tariffs	9

3

RESPONSES TO SUBMISSIONS TO DRAFT SUPPLEMENTARY DETERMINATION	1
3.1 Introduction	1
3.2 Period of application of the new tariffs	1
3.3 Load data used to estimate the WECs of the new tariffs	2

4

ESTIMATION OF ENERGY COSTS	4
4.1 Introduction	4
4.2 Estimate of WEC for the Energex small business primary load control tariff	4
4.3 Estimate of WEC for the Ergon large business primary load control tariffs	6
4.4 Summary of estimated wholesale energy cost	6
4.5 Estimation of energy losses	7
4.6 Summary of estimated energy costs	7

FIGURES

FIGURE 2.1	HALF-HOURLY AGGREGATE DEMANDS FROM ERGON ENERGY AGRICULTURAL TARIFF TRIAL – FOR 80 NMIS IN 2019-20	5
FIGURE 2.2	AVERAGE TIME OF DAY DEMAND IN AGGREGATE FROM ERGON ENERGY AGRICULTURAL TARIFF TRIAL– FOR 80 NMIS IN 2019-20	6

C O N T E N T S

FIGURE 2.3	ACTUAL AVERAGE TIME OF DAY TARIFF 33 LOAD PROFILE (MW, RELATIVE) – 2011-12 TO 2018-19	6
FIGURE 2.4	ACTUAL AVERAGE TIME OF DAY LOAD PROFILE (MW, RELATIVE) – 2011-12 TO 2018-19	7
FIGURE 4.1	CONTRACT VOLUMES USED IN HEDGE MODELLING OF 539 SIMULATIONS FOR 2020-21 FOR TRIAL LOAD	5
FIGURE 4.2	ESTIMATED WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE	5
FIGURE 4.3	ESTIMATED ENERGEX SMALL BUSINESS PRIMARY CONTROL LOAD WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE	6

TABLES

TABLE 4.1	ESTIMATED WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE	6
TABLE 4.2	ESTIMATED TRANSMISSION AND DISTRIBUTION LOSS FACTORS FOR ENERGEX AND ERGON ENERGY'S EAST ZONE	7
TABLE 4.3	ESTIMATED TEC FOR 2020-21 FINAL SUPPLEMENTARY DETERMINATION	8



ACIL Allen has been engaged by the Queensland Competition Authority (the QCA) to provide advice on the energy related costs likely to be incurred by a retailer to supply customers on three new notified retail tariffs (the new tariffs) for the 2020-21 regulatory period.

Retail prices generally consist of three components:

- network costs
- energy costs
- costs associated with retailing to end users.

ACIL Allen's engagement relates to the energy costs component only. In accordance with the Ministerial Delegation (the Delegation), and the Consultancy Terms of Reference (TOR) provided by the QCA, the methodology developed and implemented by ACIL Allen provides an estimate of energy costs to be incurred by a retailer to supply customers on notified prices for 2020-21 for the following three new load control tariffs:

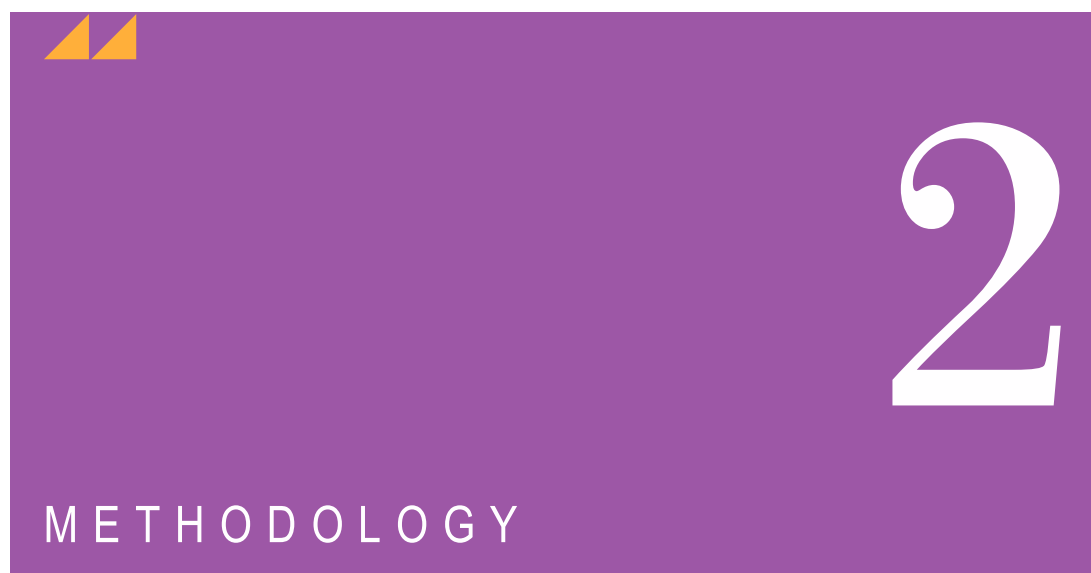
1. Energex's Small Business Primary Load Control Tariff
2. Ergon Energy's Large Business Primary Load Control Tariff
3. Ergon Energy's Large Business Secondary Load Control Tariff.

The scope of work for this assignment can be thought of as supplementing the analysis (the Supplementary Determination) already undertaken by ACIL Allen for the QCA's 2020-21 Final Determination for the existing tariffs¹ (the Final Main Determination).

This report provides estimates of the energy costs for use by the QCA in its Final Supplementary Determination for the new tariffs, and is presented as follows:

- Chapter 2 summarises our methodology.
- Chapter 3 provides responses to submissions made by various parties following the release of the QCA's *Draft determination Supplementary review Regulated retail electricity prices 2020–21 Regional Queensland* (August 2020), where those submissions refer to the methodology used to estimate the cost of energy in regulated retail electricity prices.
- Chapter 4 summarises our derivation of the energy cost estimates.

¹ <https://www.qca.org.au/project/customers/electricity-prices/regulated-electricity-prices-for-regional-ql-2020-21/#accordion-5f28c37376175-panel-1>



2.1 Introduction

In preparing advice on the estimated energy costs, ACIL Allen is required to have regard to the actual costs of making, producing or supplying the goods or services which in this case are the customer retail services to be supplied to customers on notified prices for the tariff year 1 July 2020 to 30 June 2021.

2.2 Components of the energy cost estimates

Energy costs comprise:

- wholesale energy costs (WEC) for various demand profiles
- costs of complying with state and federal government policies, including the Renewable Energy Target (RET)
- National Electricity Market (NEM) fees, ancillary services charges, Reliability and Emergency Reserve Trader costs, and costs of meeting prudential requirements
- energy losses incurred during the transmission and distribution of electricity to customers.

2.3 Overview of methodology

The methodology used in this Final Supplementary Determination for the new tariffs is the same methodology used to provide advice to the QCA for the 2020-21 Final Main Determination of the existing retail tariffs (refer to ACIL Allen's report for the 2020-21 Final Main Determination² for more details), with the exception of the derivation of the load profiles of the new tariffs (which is discussed in more detail throughout this chapter).

The ACIL Allen methodology estimates costs from a retailing perspective. This includes wholesale energy market simulations to estimate expected pool costs and volatility and the hedging of the pool price risk by entering into electricity contracts with prices represented by the observable futures market data. Other energy costs are added to the wholesale energy costs and the total is then adjusted for network losses.

For this particular assignment, to retain internal consistency with the 2020-21 Final Main Determination for the existing tariffs, we have retained the same methodology, same input assumptions and same contract data cut-off dates.

² <https://www.qca.org.au/wp-content/uploads/2020/01/acil-allen-cost-of-energy-report-2020-21.pdf>

2.3.1 Estimates for 2020-21 in its entirety

We note that the new tariffs will be offered from 1 November 2020 to 30 June 2021. This of course is not the same date range as the 2020-21 Final Main Determination for the existing tariffs.

This raises the question: *should the energy costs for the new tariffs be estimated on the basis that they are offered for part of 2020-21 or as if they would be on offer for the entirety of 2020-21?*

ACIL Allen understands that the delegation the QCA received from the Minister for Natural Resources, Mines and Energy requires the energy costs for the existing tariffs already determined for 2020-21 not to change. Therefore, this delegation can be viewed as a supplementary delegation.

On this basis, ACIL Allen is of the view that the cost estimates for the new tariffs should be for the whole of 2020-21 determination year. Certainly, this allows for a direct comparison with the costs of the existing tariffs.

2.4 Demand profiles for the new load control tariffs

The key task in this assignment is the derivation of the load profiles for the three new load control tariffs, in a format suitable for the WEC estimation process. Unlike the existing tariff classes, there is no directly observable load profile data for these new tariff classes (since they are yet to be offered by retailers). Therefore, a representative load profile needs to be estimated for each of the new tariffs.

This means either:

- adopting one of the existing load profiles that is currently used as part of the broader determination process (that is, one of the Energex or Ergon NSLPs, or one of the Tariff 31 or 33 control load profiles)
- or estimating a load profile from another source.

Each approach has its strengths and weaknesses, which are considered throughout this chapter.

2.5 What is the purpose of the new load control tariffs?

2.5.1 Energex small business primary load control tariff

According to the Explanatory Notes accompanying the 2020-2025 Energex Tariff Structure Statement (TSS), although many of the residential customers in the Energex zone have access to secondary load control tariffs (tariffs 31 and 33), these current tariffs are designed for load associated with heating of hot water outside of peak times, and interruptible residential pool pump loads as controlled by Energex, and hence represents a small portion of residential load (compared with the load served by the primary Tariff 11). The TSS suggests these tariffs are not suitable for small businesses with relatively large loads like irrigation pumps and motors which have their own National Meter Identifier (NMI), and in any case, for small businesses these load control tariffs are only offered as a secondary tariff in conjunction with a primary tariff.

The TSS states that the new load control tariff for small businesses will be a primary tariff suitable for large loads to deliver *more load control per customer* compared with residential customers.

2.5.2 Ergon large business primary and secondary load control tariffs

According to the Explanatory Notes accompanying the 2020-2025 Ergon Tariff Structure Statement (TSS), Ergon has received significant interest from customers regarding the new load control tariffs from a range of sectors at the Large Standard Asset Customer (SAC) level. Similar to Energex, the Ergon TSS states that application of the current load control retail tariffs is predominantly to SAC Small customers – typically residential customers with controlled hot water systems, pool pumps, and air conditioners.

Based on Ergon's Agricultural Tariff Trial (discussed in more detail below in section 2.7), large customers who are able to adjust to occasional load control may well be attracted to the load control tariffs.

The Ergon TSS notes that offering a load control tariff to SAC Large customers provides a cost-effective way to respond to network constraints that driven by non-residential loads.

2.6 What might be the characteristics of the new load control tariff load profiles?

2.6.1 Energex small business primary load control tariff

ACIL Allen and QCA had a number of very helpful information sessions with Energy Queensland (EQ) to discuss what sorts of customers and loads are likely to adopt this new tariff. ACIL Allen's summary take-away points from these sessions are:

- The tariff is designed for small businesses with relatively large loads which have their own NMI.
- The new load control tariff will likely appeal to customers with high-energy volume loads that can be interrupted.
- Current load control tariffs for residential tariffs are largely characterised by time of day load control (i.e. during peak periods).
- The new load control tariff will be characterised by targeted and localised load control for which Energex may well undertake manual load switching of specific loads.
- Unlike the current load control tariffs, load switching will not necessarily occur each day – this will be a function of the load itself as well as localised network conditions. For example, some customers joining this tariff may well have loads that are seasonal and hence are already not operating during periods when load control is required for some parts of the year.
- Hence there is unlikely to be a regular pattern of load control for each individual customer. Indeed, customers may not be switched for much of the time throughout the year – in some cases customers may experience switching for 10 times per year.
- The new network control load tariff is not designed on the basis of a forecast number of customers and volumes.
- The load profile may evolve over time as more customers switch to the new tariff - particularly as the number of installed digital meters grows.
- The load data associated with the 2019-20 Ergon Energy Agricultural Tariff Trial (the trial) may provide an indication of the sorts of customers and loads that find the new control load tariff appealing (this is discussed in more detail in section 2.7).

2.6.2 Ergon large business primary and secondary load control tariffs

ACIL Allen and QCA had a number of very helpful information sessions with EQ to discuss what sorts of customers and loads are likely to adopt this new tariff. ACIL Allen's summary take-away points from these sessions are:

- The trial was open to SAC small customers only, and as such the trial load data is unlikely to be representative of Ergon's large SAC customers who might be interested in the new load control tariffs.
- Customers with a low load factor are likely to find the control load tariffs appealing as they have the potential to lower costs by avoiding demand charges.
- It is difficult to identify with certainty which customer type may adopt a new load control tariff. However, there are some customer types, such as large hotels with hot water load and/or large pool pumps/heating, which could reasonably be expected to adopt one of the new load control tariffs.
- Unlike small customers, large customers will be more likely to be the first customers to be switched since they represent the largest opportunity for reduction in load for network management purposes. Therefore, customers on the Ergon large business load control tariffs will experience more frequent load switching events than customers on the Energex small business load control tariff – possibly at similar levels of frequency as Tariff 33.
- The load profile may evolve over time as more customers switch to the new tariffs.

2.7 The 2019-20 Ergon Energy Agricultural Tariff Trial

According to the Ergon Energy TSS Explanatory Notes, the trial commenced in 2017 to explore both primary and secondary load control network tariff options for non-residential customers and non-traditional equipment types. In our discussions with EQ, we learnt that a second, more targeted trial

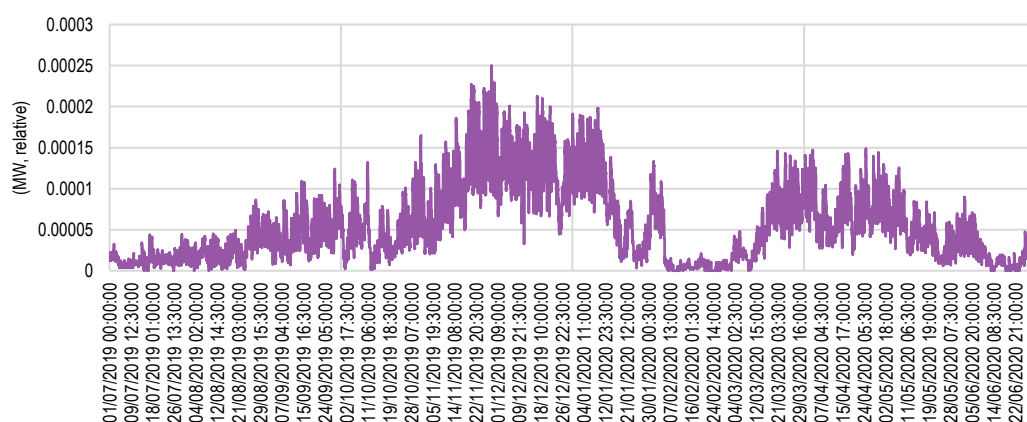
focusing on the agricultural sector was run for 2019-20 across 80 customer sites. The trial was open to Standard Asset Class (SAC) small customers only – thus irrigators with a large load were excluded from the trial. Around two thirds of trial participants were cane farmers, and the next two largest groups were from the horticulture and cotton industries.

EQ noted that the extent to which the new load control tariffs will attract customers from other sectors (beyond those participating in the trial) will be a function of the technical capability of the customer's equipment, operational flexibility and appetite to accommodate such interruptions.

EQ provided the half-hourly data associated with the 2019-20 trial to QCA which was then passed on to ACIL Allen. Based on our discussions with EQ, the trial was limited to small customer sites.

Figure 2.1 shows the half-hourly aggregate load of the 80 participating sites for 2019-20. The data shows loads tend to peak during early summer (November to early January), as well as extended periods of very low load.

FIGURE 2.1 HALF-HOURLY AGGREGATE DEMANDS FROM ERGON ENERGY AGRICULTURAL TARIFF TRIAL – FOR 80 NMIS IN 2019-20



Note: The term relative MW means the loads been scaled so they sum to one. This removes the potential to be able identify individual participants in the trial. This is an appropriate representation of the loads since it is the relative shape of the load profile, not its absolute size, which determines its wholesale energy cost.

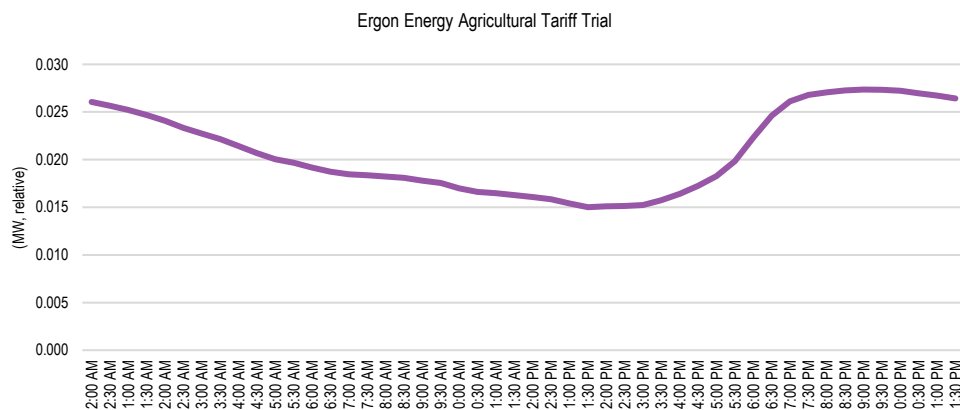
SOURCE: ACIL ALLEN ANALYSIS OF EQ DATA

The average time of day load shows no apparent interruptions in aggregate form (as shown in **Figure 2.2**). However, as noted above, EQ suggests there will not be routine switching like Tariff 33 (as demonstrated in **Figure 2.3** with switching typically occurring between 6 pm and 7 pm, and 8:30 pm to 10:30 pm), hence it is not surprising that there is no apparent switching pattern in the aggregate load.

Other key points are:

- The load from the trial is peakier than the current Tariff 33 load profile – with a load factor of 0.23 compared with about 0.29 for Tariff 33.
- The trial load is much lower (in relative terms) during daylight hours, compared with night time hours.
- Although the annual load factor is lower for the trial load when compared with the Tariff 33 load, its time of day profile is slightly 'smoother' – this is primarily due to there be no routine switching.

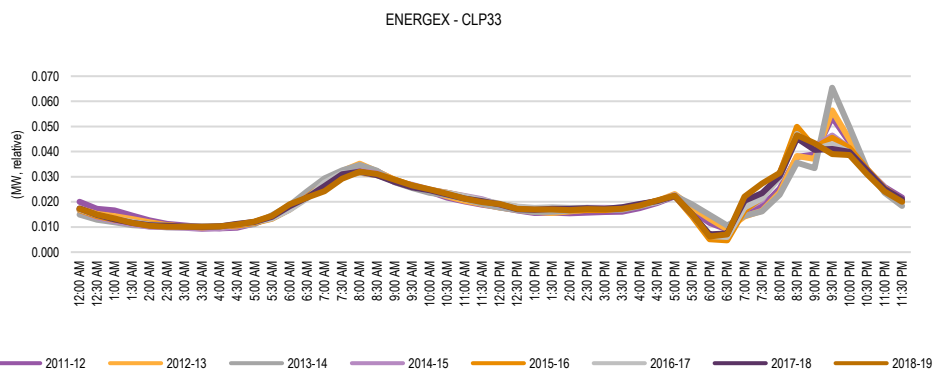
FIGURE 2.2 AVERAGE TIME OF DAY DEMAND IN AGGREGATE FROM ERGON ENERGY AGRICULTURAL TARIFF TRIAL– FOR 80 NMIS IN 2019-20



Note: The term relative MW means the loads been scaled so they sum to one. This removes the potential to be able identify individual participants in the trial. This is an appropriate representation of the loads since it is the relative shape of the load profile, not its absolute size, which determines its wholesale energy cost.

SOURCE: ACIL ALLEN ANALYSIS OF EQL DATA

FIGURE 2.3 ACTUAL AVERAGE TIME OF DAY TARIFF 33 LOAD PROFILE (MW, RELATIVE) – 2011-12 TO 2018-19



Note: The term relative MW means the loads been scaled so they sum to one.

SOURCE: ACIL ALLEN ANALYSIS OF AEMO DATA

2.7.1 Qualitative assessment of the trial data

Given that the trial data relates to agricultural customers, and despite being located in the Ergon distribution zone, EQ suggested that the load profile may be an indication of the load profile of the new Energex small business primary load control profile since the tariff is designed to attract customers with irrigation pumps and motors. However, EQ have quite rightly cautioned the QCA and ACIL Allen on using this data for the purpose of estimating the WEC given it is derived from a limited trial and is likely to evolve over time. These, and other matters are considered below.

Sample data set

The trial data consists of 80 customers, and can be thought of as a sample of those customers who may choose to move onto a new load control tariff. However, it is possible since it is a sample that it does not reasonably reflect the shape of the aggregate load likely to be associated with new tariff. Although this might be the case, we note that the load profile for Tariff 33, as published by AEMO, is

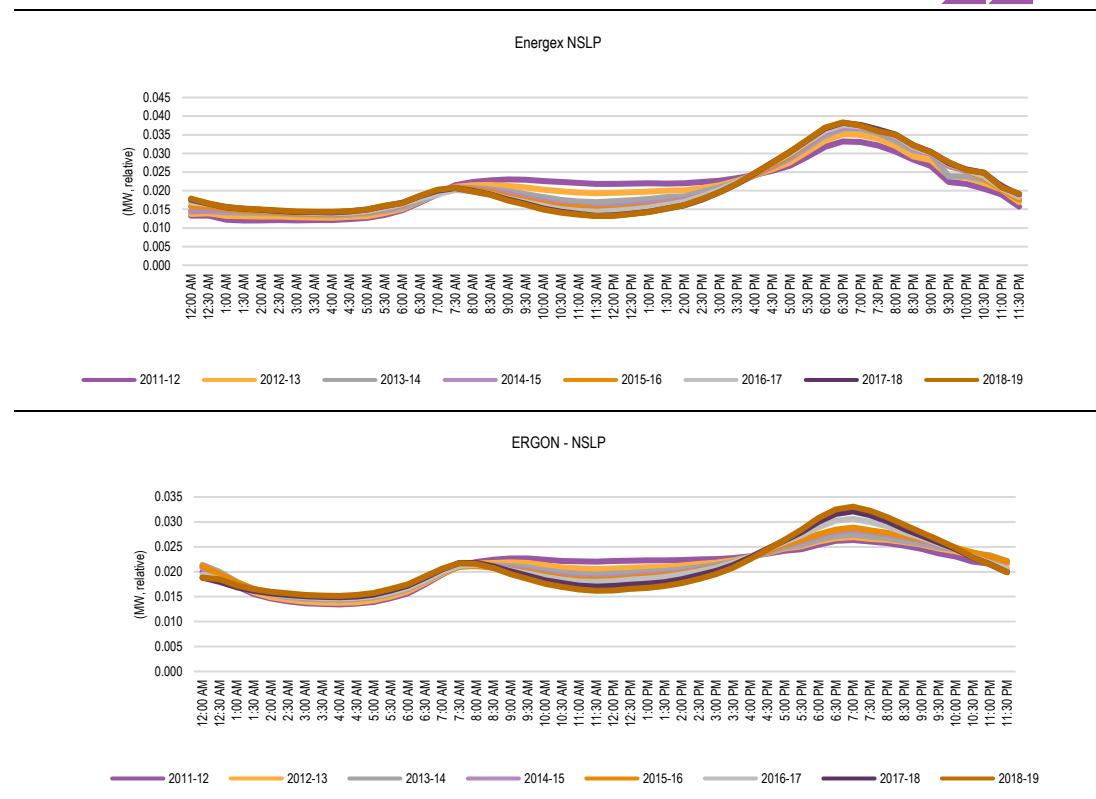
derived from a sample of 200 customers³. So, in that sense, that the trial data is a sample only does not, on its own, distinguish it as being inferior to the Tariff 33 load data.

Evolution of the load profile over time

It is very likely that the load profile associated with the new control load tariff will evolve over time as customers gradually assess and move onto the new tariff. This in itself is not a reason to dismiss the trial data. Aggregate load profiles commonly evolve over time – the Energex and Ergon NSLPS have changed noticeably over the past seven or so years with the uptake of rooftop solar PV (as shown in **Figure 2.4**).

ACIL Allen understands from discussions with EQ, that the expected uptake of the new tariff will likely be gradual as customers assess the new tariff from a commercial standpoint. Nonetheless, it is possible that the shape of the load profile will display some degree of year on year change in the initial years of its inception.

FIGURE 2.4 ACTUAL AVERAGE TIME OF DAY LOAD PROFILE (MW, RELATIVE) – 2011-12 TO 2018-19



Note: The term relative MW means the loads for each tariff and year have been scaled so they sum to one. This removes differences in absolute scale between the different tariffs and changes in absolute size over time. This is an appropriate representation of the loads since it is the relative shape of the load profile, not its absolute size, which determines its wholesale energy cost.

SOURCE: ACIL ALLEN ANALYSIS OF AEMO DATA

Reliance on load data not in the public domain

If the data from the trial were to be used to estimate the WEC for one or more of the new control load tariffs, then this would represent a departure from the usual approach adopted by the QCA and ACIL Allen of using load data readily accessible in the public domain. The current approach makes use of load data published by AEMO for the two NSLPS (Energex and Ergon) and two control loads (tariffs 31 and 33) (the four existing load profiles).

³ According to page 6 of AEMO's report *Understanding Load Profiles Published from MSATS* - <https://aemo.com.au/-/media/files/electricity/nem/data/metering/load-profiles/mtma1772v0055understandingloadprofilespublishedfrom-msats.pdf>

If the trial data were to be used for the 2020-21 Supplementary Final Determination for the new control load tariffs, then presumably future determinations would also require information on the load associated with these tariffs. Although future determinations of the WEC may not rely on the trial data, they would necessarily rely on EQ and/or AEMO collecting and compiling the relevant customer load data of those customers who have migrated onto the new tariffs. An important question then arises: *which entity will take on this responsibility to ensure this data is readily available over the longer term? And is it to be published in the public domain?*

2.8 Summary: Is the trial data more, or less, representative of the new Energex small business primary load control tariff than one of the existing load profiles?

It is not possible to know with certainty whether the trial data will be more representative of the load profile of the new tariff than the current Tariff 33 load profile.

However, we know the following:

- The new tariff is designed for small business customers with interruptible equipment, and not residential customers.
- The load of the new tariff will not display the pattern of daily routine switching as Tariff 33.
- The load profiles of the trial and Tariff 33 are both based on a sample of 80 and 200 customers respectively.
- The trial targeted customers who expressed interest in a new load control tariff.

On this basis, it is ACIL Allen's view that the trial data is likely (but not certain) to be more representative of the load profile of the new Energex small business primary load control tariff than the current Tariff 33 load profile published by AEMO. Hence, ACIL Allen recommends using the trial data to estimate the WEC for the Energex small business load control tariff.

However, the trial data is not appropriate for estimating the WEC for the Ergon large business primary and secondary load control tariffs.

2.9 Are there other data that could be used for the Ergon large business control load tariffs?

The QCA and ACIL Allen explored whether other load data could be used to approximate the load profile of the Ergon large business customer control load tariffs.

One option would be to examine the load profiles of large customers who have access Tariff 33. EQ provided a sample of this data in September 2020. However, upon examination of the data it became apparent that only eight customers in the data set had complete load data for the entirety of 2019-20. Further, there is no indication that these customers are clearly interested in migrating to the new load control tariffs. Hence there is a real risk that the data is not representative of the load profiles of customers who may migrate to the Ergon large business control load tariffs.

On this basis, ACIL Allen recommends adopting the Tariff 33 WEC for the Final Supplementary Determination.

2.10 Estimation of the WEC of the trial load to be adopted for the Energex small business primary control load tariff

ACIL Allen has estimated the WEC for the trial load as if it were part of the 2020-21 Final Main Determination for the current existing tariffs. This estimated WEC is then adopted as the estimate of the WEC for the Energex small business primary load control tariff.

The approach used to estimate the WEC is as follows:

- The trial data was simply aggregated across all 80 participants.

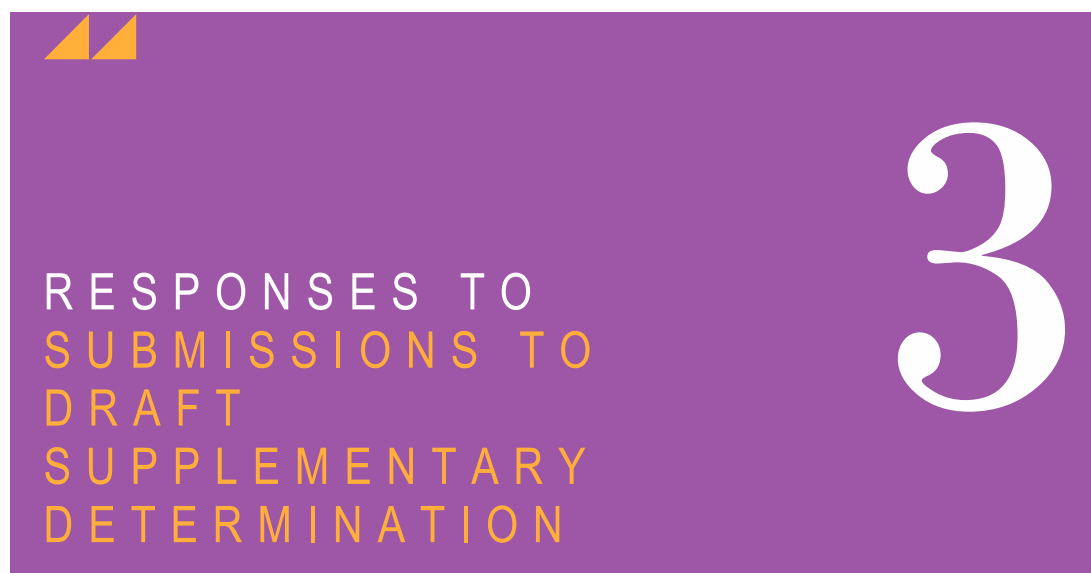
- 49 random simulations of the trial data were generated by using a stratified sampling approach within each month and day type.
- As per the 2020-21 Final Main Determination for the existing tariffs, we have utilised our:
 - stochastic demand model to develop 49 weather influenced simulations of hourly demand traces for each region of the NEM – using temperature data from 1970-71 to 2018-19 and demand data for 2016-17 to 2018-19
 - stochastic outage model to develop 11 hourly power station availability simulations
 - energy market models to run 539 simulations of hourly pool prices of the NEM using the stochastic demand traces and power station availabilities as inputs
 - analysis of contract data to estimate contract prices
 - trials of different hedging strategies to determine the hedging strategy that gives the lowest 95th percentile WEC
 - hedge model taking the above analyses as inputs to estimate a distribution of hedged prices for the new tariff.

The approach is identical to that used to estimate the WEC for the four current existing load profiles with the exception that we have not attempted to develop 49 simulated demand sets using our stochastic weather model for the new tariff load since there is only one year of usable trial data (which is insufficient for the weather matching process).

All the inputs used in the analysis are identical to those used in the 2020-21 Final Main Determination for the current tariffs. In other words, although the new load control tariffs will be available part way through the 2020-21 determination year, we have estimated the WEC for the entirety of 2020-21.

2.11 Estimation of the WEC for the Ergon large business control load tariffs

As mentioned above, the estimate of the WEC for the two Ergon large business load control tariffs is taken to be the estimated WEC for Tariff 33.



3.1 Introduction

The QCA forwarded to ACIL Allen a total of four submissions in response to its Draft Supplementary Determination. ACIL Allen reviewed the submissions to identify issues that related to our methodology and required our consideration for the 2020-21 Final Supplementary Determination.

The submissions were received from:

- Cotton Australia
- Ergon Energy Retail
- Queensland Farmers' Federation (QFF)
- CANEGROWERS.

They key the issues raised in the submissions that are considered in relation to the WECs of the new tariffs are:

- Period of application of the new tariffs
- Load data used to estimate the WECs of the new tariffs.

3.2 Period of application of the new tariffs

QFF notes on page two of its submission that the new tariffs are available from 1 November 2020 to 30 June 2021, and on page three states

the inconsistency in the methodology used for pricing in this supplementary determination needs to be acknowledged in the implementation process via extending the dates past June 30, 2021. ... however for the agricultural sector a longer period is required to evaluate the new tariffs to ensure they are also making the same comparisons when assessing tariffs that best suit their needs.

QFF suggest an extension of the tariffs to 1 January 2022.

ACIL Allen has been engaged to estimate the WEC for the 2020-21 determination period only and notes this is to be a supplement to the 2020-21 Final Main Determination.

Extending the new tariffs to 1 January 2022 would require extending the WEC estimation methodology into the first half of the next determination period (2021-22). This in turn would require obtaining, now, contract trade volume and price data for July to December 2021 which is currently thinly traded (noting that it is typical for the majority of trades for a given quarter to occur within 12 months of the quarter). This means that estimating the WEC for July to December 2021, now, runs the risk of producing an unstable estimate.

In addition, it would be expected that the WECs for the new tariffs be updated as part of the 2021-22 determination process, which will most likely result in a change in WEC given the additional contract trade volume and price data that would be available at that time.

Hence, extending the tariffs at this point in time will not provide greater certainty.

3.3 Load data used to estimate the WECs of the new tariffs

Ergon Energy Retail notes on page one of its submission that using the trial load data (which is based on digital meter data) to estimate the WEC for the Energex small business primary load control tariff represents an inconsistency in methodology, since the WECs for all other control load tariffs are based on the AEMO published control load profile data.

Ergon Energy Retail suggests that:

given the CL tariffs have the same intent and structure, they should be developed using one of the existing AEMO load settlement profiles. That is, they should not be developed using different data inputs.

CANEGROWERS note on page two of its submission that the WEC for the Energex small business primary load control tariff should be based on Tariff 33:

The availability of electricity supply for those using the new load control tariffs is determined through targeted and localised load control in regional Queensland, not by pattern switching. This enables Energy Queensland (EQ) greater control in managing loads across its network. Individual EQ switching decisions are based on the need to manage total load on specific segments of the network loads, not on the representative profile of irrigators. EQ also note the trial sample was small and not representative of a load profile that is likely to evolve overtime.

... rather than using the T33 data for customers in SEQ will result in business customers using this tariff facing T34 usage charges of 17.295c/kWh, 5.9 per cent higher than would otherwise be the case. As well as defying standard practice for statistical analysis, QCA's chosen methodology does not take account of EQ's ability to manage load in accordance with its network needs ...

ACIL Allen does not, and nor should we, take into account the value of the WEC outcome (in relative or absolute terms) as a factor for deciding which methodology and load profile to use when estimating the WEC for a given tariff.

ACIL Allen agrees that using the trial data is a departure from the standard methodology. In particular, we acknowledge that the data is not in the public domain. But we also acknowledge that price regulation is not perfect – currently, the WECs estimated for the four existing load profiles published by AEMO are used by the QCA when determining the wholesale cost components for the various retail tariffs. In effect the QCA is choosing one of the existing four load profiles to represent the load of customers on any given tariff. This approach is adopted because AEMO bills retailers for energy consumed by customers on basic (accumulation or consumption) meters based on these profiles. In one sense it is the technology of the meters that has influenced the approach.

However, we know that the new tariff is designed as a primary control tariff for small business customers with interruptible equipment, and not as a secondary load control tariff for residential customers. And we agree with CANEGROWERS that the new tariff load profiles will be influenced by localised and targeted load control and therefore will not display the pattern of daily routine switching of Tariff 33.

Further, technically, customers taking up the new tariff are likely to have a digital meter, and hence their load will not form part of the four existing load profiles published by AEMO.

If customers who migrate to the Energex small business load control tariff are unlikely to have digital meters, then our view would be to consider using either the Tariff 33 or the NSLP load profile since these customers on basic meters would continue to be contributing to the existing load profiles published by AEMO. However, it is our understanding that this is unlikely to be the case.

Finally, that the load profile is likely to evolve over time, as noted by CANEGROWERS, is not a sufficient reason alone to not use the load data. As noted in Chapter 2, aggregate load profiles

commonly evolve over time – the Energex and Ergon NSLPS have changed noticeably over the past seven or so years with the uptake of rooftop solar PV (as shown in **Figure 2.4**).

It is for these reasons that we are of the view that a separate WEC ought to be calculated, and that the trial data could be reasonably used to estimate the WEC for the Energex small business load control tariff. However, we also note that the use of the trial data means that the QCA will need to give consideration to the source of load data for the new tariff when estimating its WEC in subsequent determination years.



4.1 Introduction

In this section we apply the methodology described in Section 2 of our report for the 2020-21 Final Main Determination for the existing tariffs, coupled with:

- the load data from the trial to represent the load profile of customers adopting the Energex small business load control tariff,
- the load data from Tariff 33 to represent the load profile of customers adopting the Ergon large business load control tariffs,

and summarise the estimates of each component of the Total Energy Cost (TEC) for each of the three new tariffs for 2020-21.

With the exception of the WEC and energy losses, all other cost components are identical to the Final Main Determination of the current tariffs and hence are not repeated in this report.

4.2 Estimate of WEC for the Energex small business primary load control tariff

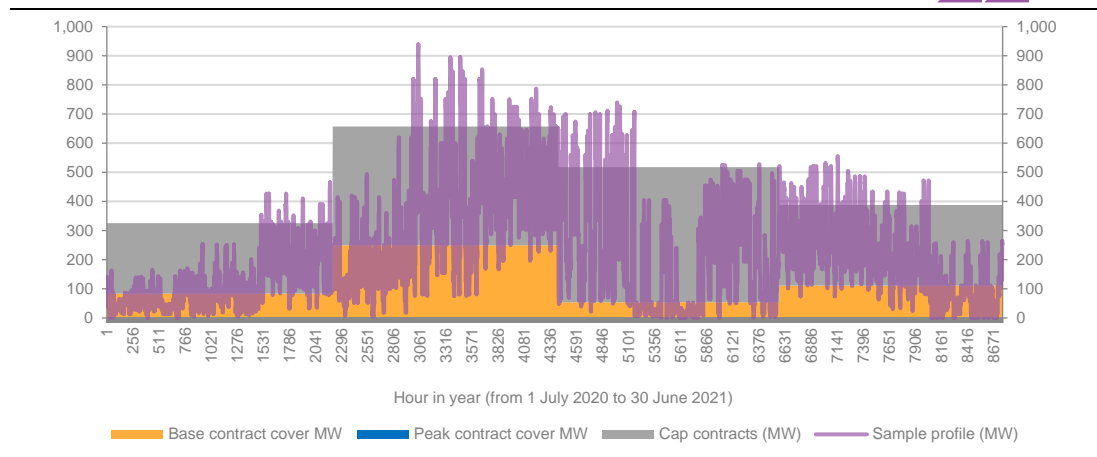
Unlike the control loads of tariffs 31 and 33, which are offered as secondary tariffs for customers on Tariff 11, the new load control tariff for Energex small business customers is a primary tariff. Therefore, we have derived a separate hedging strategy.

Contract volumes for the optimal hedging strategy for each quarter are as follows:

- The base contract volume is set to equal the 30th percentile of the off-peak period hourly demands across all 49 demand sets for the quarter.
- The optimal hedging strategy does not require peak contracts. This is likely due to the shape of the load profile which has relatively lower demand during daylight hours, and peaks later in the evening compared with the NSLPs.
- The cap contract volume is set at 70 per cent of the median of the annual peak demands across the 49 demand sets minus the base and peak contract volumes.

Figure 4.1 shows the strategy places more reliance in cap contracts than base contracts when compared with the other load profiles, which is not surprising given the shape of the load and extended periods of very low load.

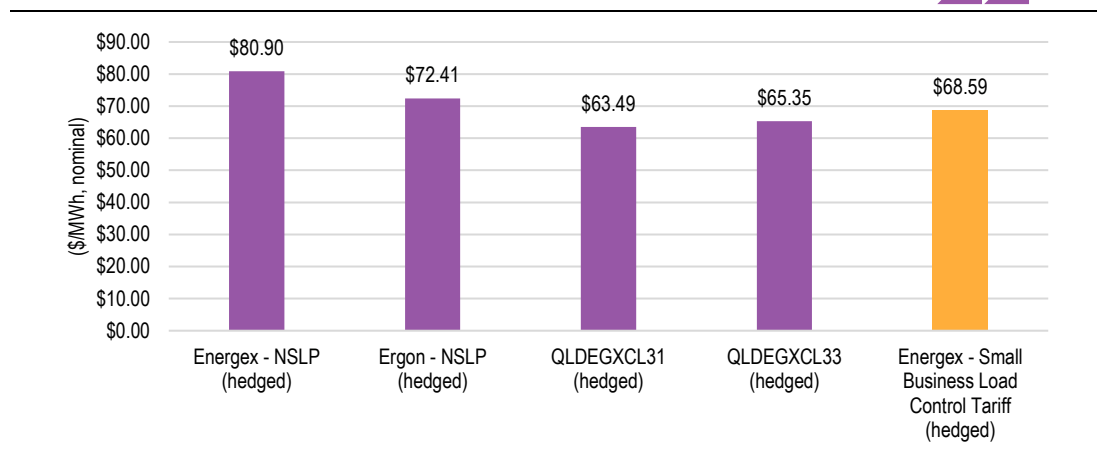
FIGURE 4.1 CONTRACT VOLUMES USED IN HEDGE MODELLING OF 539 SIMULATIONS FOR 2020-21 FOR TRIAL LOAD



SOURCE: ACIL ALLEN ANALYSIS

The estimated WEC for the Energex small business primary load control tariff for 2020-21 is \$68.59/MWh – and remains unchanged from the Draft Supplementary Determination. **Figure 4.2** compares the estimated WEC with those of the other load profiles from the 2020-21 Final Main Determination for the current existing tariffs. The WEC is about five per cent higher than the WEC of Tariff 33. There is a good reason for this - the trial load is peakier and more volatile hour by hour than the Tariff 33 load. However, this is offset to some extent by a contracting strategy more reliant on cap contracts.

FIGURE 4.2 ESTIMATED WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE



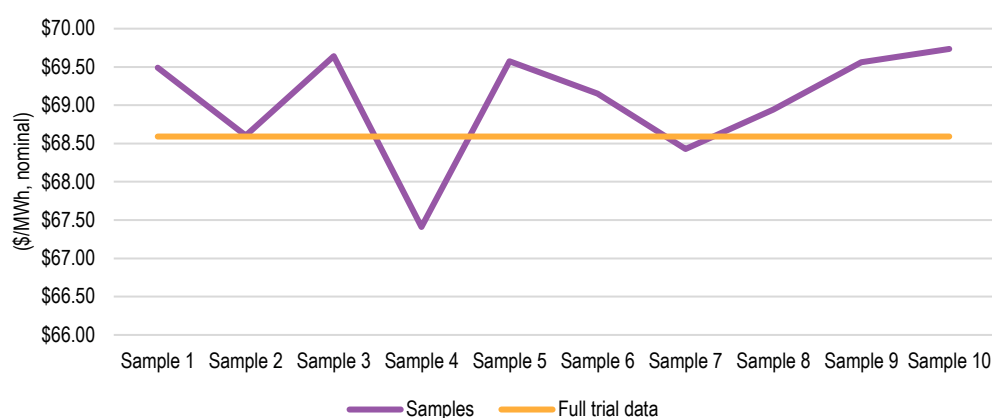
SOURCE: ACIL ALLEN ANALYSIS

A reasonable question to ask is: *given the tariff is new and there is no certainty around the uptake of the tariff, what would the WEC be if only a portion of those loads in the trial signed up to the new tariff?*

ACIL Allen generated 10 sets of aggregated loads by randomly selecting 50 per cent of the 80 NMIs and their associated loads from the trial data set. These 10 sets of aggregated loads were then subjected to the hedge model to estimate the WEC. The WECs of the 10 samples varied by about \$1/MWh (less than two per cent) around the WEC of the full trial data (as shown in **Figure 4.3**). This suggests a reasonable degree of stability in the WEC estimate if only a portion of customers from the

trial sign up to the new tariff (although this does not test the robustness of the estimate if other customers which have load profiles very different to the trial data sign up to the tariff).

FIGURE 4.3 ESTIMATED ENERGEX SMALL BUSINESS PRIMARY CONTROL LOAD WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE



Note: The scale of the y-axis is magnified.

SOURCE: ACIL ALLEN ANALYSIS

4.3 Estimate of WEC for the Ergon large business primary load control tariffs

As discussed in section 2.11, for the Final Supplementary Determination for the Ergon large business primary and secondary load control tariffs, we have adopted the Tariff 33 WEC of \$65.35/MWh, as published in the 2020-21 Final Main Determination for the current tariffs.

4.4 Summary of estimated wholesale energy cost

After applying the hedge model, the WEC is taken as the 95th percentile of the distribution containing 539 annual hedged prices. ACIL Allen's estimate of the WEC for each tariff class for the 2020-21 Final Supplementary Determination for the new tariffs are shown in Table 4.1. WECs for the current tariffs from the 2020-21 Final Main Determination are provided for comparison.

TABLE 4.1 ESTIMATED WEC (\$/MWH, NOMINAL) FOR 2020-21 AT THE QUEENSLAND REFERENCE NODE

Settlement classes	2020-21 – Final Supplementary Determination	2020-21 – Final Determination
Energex – Small business primary load control tariff	\$68.59	
Ergon – Large business primary load control tariff	\$65.35	
Ergon – Large business secondary load control tariff	\$65.35	
Energex – NSLP - residential and small business		\$80.90
Energex – Controlled load tariff 9000 (31)		\$63.49
Energex – Controlled load tariff 9100 (33)		\$65.35
Energex – NSLP - unmetered supply		\$80.90
Ergon Energy – NSLP - CAC and ICC		\$72.41
Ergon Energy – NSLP - SAC demand and street lighting		\$72.41

SOURCE: ACIL ALLEN ANALYSIS

4.5 Estimation of energy losses

The methodology up to this point produces price estimates at the Queensland regional reference node (RRN). Prices at the Queensland RRN must be adjusted for losses to the end-users. Distribution loss factors (DLF) for Energex and Ergon Energy east zone and average Marginal Loss Factors (MLF) for transmission losses from the reference node to major supply points in the distribution networks are applied.

The estimation of transmission and distribution loss factors for the settlement classes to be used in calculating energy costs for 2020-21 is shown in Table 4.2. We have adopted the Energex loss factors for the Energex small business primary load control tariff. Given the Ergon large business primary and secondary load control tariffs apply to large loads of SAC customers, we have adopted the Ergon SAC tariff losses.

TABLE 4.2 ESTIMATED TRANSMISSION AND DISTRIBUTION LOSS FACTORS FOR ENERGEX AND ERGON ENERGY'S EAST ZONE

Settlement classes	Distribution loss factor (DLF)	Transmission marginal loss factor (MLF)	Total loss factors (MLFxDLF)
Energex – Small business primary load control tariff	1.052	1.007	1.060
Ergon – Large business primary load control tariff	1.093	0.964	1.053
Ergon – Large business secondary load control tariff	1.093	0.964	1.053
Energex – NSLP - residential and small business	1.052	1.007	1.060
Energex – Controlled load tariff 9000 (31)	1.052	1.007	1.060
Energex – Controlled load tariff 9100 (33)	1.052	1.007	1.060
Energex – NSLP - unmetered supply	1.052	1.007	1.060
Ergon Energy – NSLP - CAC and ICC	1.031	0.964	0.993
Ergon Energy – NSLP - SAC demand and street lighting	1.093	0.964	1.053

SOURCE: ACIL ALLEN ANALYSIS BASED ON QUEENSLAND TNI ENERGY FOR 2018-19; AEMO'S FINAL MLFS FOR 2020-21 AND AEMO'S ENERGEX AND ERGON EAST ZONE FINAL DLFS FOR 2020-21.

As described by AEMO⁴, to arrive at prices at the customer terminal (price at load connection point) the MLF and DLF are applied to the prices at the regional reference node (RRN) as follows:

$$\text{Price at load connection point} = \text{RRN Spot Price} * (\text{MLF} * \text{DLF})$$

4.6 Summary of estimated energy costs

Drawing together the analyses and estimates from the previous sections of this report, as well as the estimates of the other cost items from the 2020-21 Final Main Determination for the existing tariffs, ACIL Allen's estimates of the 2020-21 total energy costs (TEC) for the Final Supplementary Determination for each of the new tariffs are presented in Table 4.3.

⁴ See Page 23 of the AEMO publication *Treatment of loss factors in the national electricity market- July 2012*

TABLE 4.3 ESTIMATED TEC FOR 2020-21 FINAL SUPPLEMENTARY DETERMINATION

Settlement class	WEC at Qld reference node (\$/MWh)	Renewable energy costs at Qld reference node (\$/MWh)	Other costs Qld reference node (\$/MWh)	Total transmission and distribution loss factor (MLF x DLF)	Network losses (\$/MWh)	TEC at the customer terminal (\$/MWh)
Energex – Small business primary load control tariff	\$68.59	\$14.30	\$3.99	1.060	\$5.21	\$92.09
Ergon – Large business primary load control tariff	\$65.35	\$14.30	\$3.67	1.053	\$4.42	\$87.74
Ergon – Large business secondary load control tariff	\$65.35	\$14.30	\$3.67	1.053	\$4.42	\$87.74
Energex – NSLP - residential and small business	\$80.90	\$14.30	\$3.99	1.060	\$5.95	\$105.14
Energex – Controlled load tariff 9000 (31)	\$63.49	\$14.30	\$3.99	1.060	\$4.91	\$86.69
Energex – Controlled load tariff 9100 (33)	\$65.35	\$14.30	\$3.99	1.060	\$5.02	\$88.66
Energex – NSLP - unmetered supply	\$80.90	\$14.30	\$3.99	1.060	\$5.95	\$105.14
Ergon Energy – NSLP - CAC and ICC	\$72.41	\$14.30	\$3.99	0.993	(\$0.63)	\$89.75
Ergon Energy – NSLP - SAC demand and street lighting	\$72.41	\$14.30	\$3.99	1.053	\$4.79	\$95.17

Note: Values for current tariffs are from the 2020-21 Final Main Determination.

SOURCE: ACIL ALLEN ANALYSIS

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148
ACILALLEN.COM.AU

ABOUT ACIL ALLEN CONSULTING

ACIL ALLEN CONSULTING IS THE
LARGEST INDEPENDENT,
AUSTRALIAN OWNED ECONOMIC
AND PUBLIC POLICY CONSULTANCY.

WE SPECIALISE IN THE USE OF
APPLIED ECONOMICS AND
ECONOMETRICS WITH EMPHASIS ON
THE ANALYSIS, DEVELOPMENT AND
EVALUATION OF POLICY, STRATEGY
AND PROGRAMS.

OUR REPUTATION FOR QUALITY
RESEARCH, CREDIBLE ANALYSIS
AND INNOVATIVE ADVICE HAS BEEN
DEVELOPED OVER A PERIOD OF
MORE THAN THIRTY YEARS.

