BUNDABERG REGIONAL IRRIGATORS GROUP
REPRESENTING MEMBER IRRIGATORS IN THE BUNDABERG IRRIGATION AREA

ABN: 86 137 318 631
Postal Address: PO Box 953,
Bundaberg Qld 4670
07 4151 2555 P
07 4153 1986 F
BRIG@bdbcanegrowers.com.au E

Mr Kim Wood
Principal Commissioner
Queensland Productivity Commission
PO Box 12112
George Street
BRISBANE QLD 4003

By email: enquiry@qpc.qld.gov.au

Dear Mr Wood

RE: Public Inquiry into Electricity Prices

Rapidly rising electricity prices are having a severe impact on the costs faced by our members and irrigated agriculture in general. Many irrigators have turned off their pumps and seen production plummet, while households and small business have cut their budgets to the bone or simply run up debt.

Right now, rural and regional Queensland is in crisis as a direct result of electricity prices.

The electricity pricing system is clearly broken. The balance between fair electricity prices and profits is well and truly non-existent.

We have reviewed the extensive findings that you and your group have produced.

There is no doubt that there has been significant effort and expense in collating this work and whilst we appreciate the time that you and your team have dedicated to this we feel underwhelmed and disappointed.

We have identified that there are three main areas that if addressed will result in a viable irrigated agricultural sector in Queensland, a network that is not under constant threat from the death spiral, and a vibrant Queensland economy:

1) A write down to the Regulatory Asset Base. (RAB)
2) Review of what cost reflectivity actually is
3) Recognition of the benefits of a suite of food and fibre tariffs for irrigated agriculture.

We are underwhelmed in that you have identified that the Network component, the Revenue Cap and the RAB are the predominant cause of the excessive cost to irrigators. This finding has been identified time and time again yet it appears that nothing can be done and we are all powerless in rectifying this situation.

We are disappointed because your group has not offered any real solution to the economic negligence that continues to allow excessively high prices (gouging) which in turn is making off grid alternatives (diesel and solar) a viable alternative for irrigation.

This is a blatant waste of our scarce capital.

Page 83 of the report "*there may be a strong case for a write down of the RAB if it can be demonstrated that ...*"

There <u>IS</u> a strong case for RAB write down and at a minimum we suggest that you include a recommendation to urgently investigate the mechanics as well as the pros and cons of a write down to the RAB. We further suggest that your recommendation include a statutory requirement for the shareholder and the DNSP providers Boards to prepare an impairment schedule on an annual basis.

It is BRIG's view that the manner in which the RAB is managed is a classic case of the sunk cost fallacy.

That is, the continued inefficient use of resources so that previous resources allocated to an inefficient decision are not wasted.

The cost reflective arguments outlined throughout the report are, in our opinion, nonsense. We accept that the habitual over forecasting of demand by the energy companies has resulted in a Network that is only utilised to around 30% of its capacity.

We do not accept that we should be forced to pay for an expensive gold plated system that has arisen because of a perverse application of the rules to get outrageous returns for the state government and created the evident "gaming culture" within the providers of energy and distribution services.

As users we have had no say in the provision, construction nor operation of the electricity network. Many irrigators have actually paid for the transformers and infrastructure provided. Why should we pay for it again?

The argument that cheaper electricity prices could potentially result in over consumption and could result in the need for further investment is at best spurious and illogical.

In 2009 we used substantially more electricity to irrigate crops through the existing 2009 network.

We are now paying 93 per cent more than we were in 2009 (CPI increase over this period was 15.0 per cent) **for exactly the same service and level of reliability and network, and as a result we cannot afford to irrigate our crops to their agronomic potential.**

On Page Xii you point to the fact that you have not seen evidence that would suggest proposals for industry specific tariffs are viable. I have attached a report from CME (Annex 1) commissioned by the National Irrigators Council that highlights that a specific food & fibre tariff for irrigation would be viable and should be structured on the following basis:

Specific Food and Fibre Tariff Structure

- **Supply charges:** These charges are connection-specific and do not vary with consumption. They should be set at a level high enough to recover individual customer specific costs – such as for reading and supplying meters – (i.e. costs that are not shared with other consumers and which do not vary with the customers' level of consumption or demand.

- **Consumption charges:** These charges are levied per kWh consumed. They should be set to cover costs that are variable in the short term and also to make a contribution to the recovery of sunk costs. The design of consumption charges should also reflect the following considerations:
  a) It may be sensible to have consumption charges that vary by time of day: such as peak and off-peak or peak, standard and off-peak and where applicable should reflect seasonal variations.
  b) The difference between peak, off-peak and if applicable standard rates should reflect the existence of temporally defined capacity constraints and customers' temporally varying elasticity of demand.
  c) If there are to be significant differences between the peak and off-peak rates (peak rates greater than, say, twice off-peak rates) then it is important that the peak rates apply for limited intervals so that irrigators can respond to those prices by reducing their consumption.

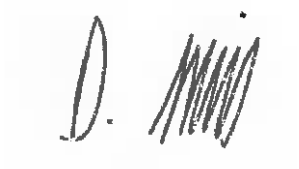
- **Demand charges:** Charges for peak demand in addition to, or as an alternative to consumption charges, introduce additional complexity in metering and billing: specifically the requirement for half-hourly remotely read meters. Demand charges are plausible for higher consumption customers (those that are likely to consistently consume more than 100 MWh per year). An economically sound specification of demand changes should reflect the following:
  a) Demand charges should not be subject to minimum chargeable demand levels. Such minimum thresholds simply turn demand charges into fixed charges, which defeats the rationale for their inclusion.
  b) It is plausible to differentiate demand charges by voltage of supply (in recognition of the greater amount of infrastructure required to supply lower voltage customers relative to higher voltage customers).
  c) It is not plausible to differentiate demand charges on the basis of subscribed or minimum maximum demands.
  d) Demand charges should signal expected future network capacity shortfalls that may arise (depending on the network) during periods of simultaneous peak demands. The applicable period should be short (no more than three hours). This is adequate to capture the time periods when peak demands are most likely to arise. Sufficiently short peak demand charge periods are also necessary to provide irrigators with an opportunity to reduce their bills by reducing demand in those periods.

We concur with a number of your recommendations and in numerical order agree with Recommendations 16, 20, 21 29, 30, 31, 32, 35, 37, 38 and 42.

With respect to Recommendation 20 and 21 we suggest that you recommend that there be a single shareholder and also recommend that a statutory annual requirement to investigate impairment be mandatory.

With respect to Recommendation 32 we would like to draw your attention to the fact that QCA first suggested this to Minister Stephen Robertson around 2010 and Minister McArdle noted that he was targeting a 2016/17 implementation date and you are now recommending no later than 1 July 2019.

Please call me should you have any questions or require further explanation.



Dale Holliss
Company Secretary

Irrigator Tariff Analysis in the National Electricity Market

A report for the National Irrigators' Council

December 2015

Table of Contents

Table of Tables

Table of Figures

Executive summary

This document is a report prepared for the National Irrigators Council and funded by the Council, and Energy Consumers Australia. The focus of this report is electricity network tariffs and, where applicable, regulated retail tariffs that apply to irrigators in the National Electricity Market (NEM). The purpose of this report is to provide information and analysis that is useful to irrigators and those who advocate on their behalf, in assisting them to better understand electricity pricing particularly in respect of charges for the use of the networks.

The main content of this report is reporting on the analysis of network tariffs and the resulting "heat maps" showing how network prices and bills vary as a function of the elements of the tariffs. It is intended that these heat maps will be useful to analysts, advocates and individual irrigators in understanding their bills and prices.

The report also analyses regulated retail tariffs in Queensland, using heat maps and and analysis of the tariffs from 2007 to 2015 on the basis of the half-hourly metered data of individual customers to show how bills (and the components of the bills) and prices have changed over time.

All analysis has been done in bespoke software developed in R.

The main observations in this report are as follows:

- The various network service providers apply a wide variety of very different tariffs structures to irrigators.
- Network charges have increased everywhere, but the increases have been by far the highest in New South Wales and Queensland. Victorian irrigators pay much lower prices that than those elsewhere.
- Several network service providers are seeking to change their tariff structures to make the fixed elements of the tariffs higher. This trend is particularly evident in Queensland, where some newly proposed tariffs are bizarrely high fixed charges, exactly contrary to the prescriptions of "cost reflective" tariffs. The tariff "debate" in Queensland has become very confusing with numerous "obsolete" tariffs replaced by new tariffs which themselves have since become

"obsolete". The new tariffs display price structures that are exactly contrary to the "cost reflective" badges that some have sought to attach to them.

We were asked to advise on the design of a tariff applicable to irrigators in Australia. Our recommendation on this is as follows:

- **Supply charges:** These charges are connection-specific and do not vary with consumption. They should be set at a level high enough to recover individual customer specific costs – such as for reading and supplying meters – (i.e. costs that are not shared with other consumers and which do not vary with the customers' level of consumption or demand. We would expect that such charges would not exceed $130 per connection per year.

- **Consumption charges:** These charges are levied per kWh consumed. They should be set to cover costs that are variable in the short term and also to make a contribution to the recovery of reasonably incurred sunk costs. The design of consumption charges should also reflect the following considerations:

    a) It may be sensible to have consumption charges that vary by time of day: such as peak and off-peak or peak, standard and off-peak and where applicable should reflect seasonal variations.
    b) The difference between peak, off-peak and if applicable standard rates should reflect the existence of temporally defined capacity constraints and customers' temporally varying elasticity of demand.
    c) If there are to be significant differences between the peak and off-peak rates (peak rates greater than, say, twice off-peak rates) then it is important that the peak rates apply for limited intervals – not longer than say three hours - so that irrigators can respond to those prices by reducing their consumption.

- **Demand charges:** Charges for peak demand in addition to, or as an alternative to consumption charges, introduce additional complexity in metering and billing: specifically the requirement for half-hourly remotely read meters. Demand charges are plausible for higher consumption customers (those that are likely to consistently consume more than 100 MWh per year). An economically sound specification of demand changes should reflect the following:

a) Demand charges should not be subject to minimum chargeable demand levels. Such minimum thresholds simply turn demand charges into fixed charges, which defeats the rationale for their inclusion.

b) It is plausible to differentiate demand charges by voltage of supply (in recognition of the greater amount of infrastructure required to supply lower voltage customers relative to higher voltage customers).

c) It is not plausible to differentiate demand charges on the basis of subscribed or minimum maximum demands.

d) Demand charges should signal expected future network capacity shortfalls that may arise (depending on the network) during periods of simultaneous peak demands. The applicable period should be short (no more than three hours). This is adequate to capture the time periods when peak demands are most likely to arise. Sufficiently short peak demand charge periods are also necessary to provide irrigators with an opportunity to reduce their bills by reducing demand in those periods.

1 Introduction

This document is a report prepared for the National Irrigators Council and funded by the Council, and Energy Consumers Australia. The focus of this report is electricity network tariffs and, where applicable, regulated retail tariffs that apply to irrigators in the National Electricity Market (NEM). The purpose of this report is to provide information and analysis that is useful to irrigators and those who advocate on their behalf, in assisting them to better understand electricity pricing particularly in respect of charges for the use of the networks.

1.1 How to use this document

Electricity tariffs are very complex and detailed. This is unavoidable and any report on tariffs has to grapple with this. This report has the additional challenge of grappling not just with tariffs that affect irrigators served by one distributor, but that affect all irrigators served by all distributors that operate in the National Electricity Market. The challenge is complicated further by the shortage of actual metered data that can be used to draw statistically valid conclusions applicable to irrigators as a customer class.

These challenges have been dealt with in various ways in this report. For those individual irrigators looking to draw insights from this report without trying to master the whole topic we suggest the following:

1. Turn to the Table of Contents and look for the sub-section headings (in Section 3) to find the network Tariff that is likely to be relevant to you.
2. Having identified the relevant Tariff, turn to the relevant pages to find the "heat maps" applicable to your network tariffs. As long as you know your monthly demand and consumption (and if applicable, the proportion of your consumption that is in peak periods) you will be able to use the "heat maps" to work out your average price, and how this average price will vary if you change your demand and/or your monthly consumption.

Heat maps use colour to indicate values. A legend above each heat map provides the average prices corresponding to the colour. The heat maps allow readers to see the prices that results from combinations of the relevant Tariff variables (typically consumption in MWh and peak demand in kW, or the combination of consumption

and proportion of consumption in peak and off-peak time periods.) The areas in some heat maps that are white are areas where prices are higher than top of the price legend.

If you irrigate in Queensland, South Australia or the west of Victoria you will be able to see detailed case studies of network tariffs based on consumption data provided to us by irrigators in these areas. Again, line up your own circumstances as closely as possible with one of those case studies and you will be able to gain additional insights, particularly on how prices have changed over the last eight years.

If you irrigate in Queensland and what to know more about your regulated *retail* tariffs turn to Sections 4 and 5 where you will find detailed case studies of how prices vary on the various existing and possible future retail tariffs in Ergon's area of distribution.

If you irrigate in Queensland and wish to know even more about the break-down of the non-network and network element of the Ergon tariffs, the material in Appendix 1 will be helpful.

If you advocate on behalf of irrigators and/or are interested in the bigger picture, you will find relevant comments in the main section of this report, and the main advocacy messages are brought out in the Discussion in Section 6.

1.2 Layout

The document proceeds as follows:

- Section 2 describes the methodology;
- Section 3 is a generic analysis of tariffs;
- Sections 4 and 5 examines network tariffs; regulated retail tariffs in Queensland; and an analysis of network and non-network elements of tariffs in Queensland; and
- Section 6 draws out key issues for energy user advocates and makes various recommendations on Tariff structures applicable to irrigators.

Appendix A presents a case study analysis of the network versus non-network components of retail tariffs in Queensland. Appendix B is a detailed comparative analysis of all half-hourly irrigator demand profiles we received.

2 Methodology

Tariff analysis is unavoidably detailed and very complex. We have been supplied with a limited amount of actual metered demand from irrigators. This data scarcity presents additional challenges. We address these challenges in two ways:

1. A generic analysis of electricity tariffs using heat maps to show how prices are affected by the various elements of tariffs.
2. Detailed case studies using the half-hourly demand data provided to us.

All calculation is done in a proprietary program developed in R Studio using our networks' and retail tariffs databases and half-hourly data where available.

2.1 Generic analysis of network and retail tariffs

Network tariffs applicable to irrigators across Australia are identified by distribution network service provider (DNSP). Small and large irrigators are distinguished: a 'small' irrigator is assumed to consume less than 100 MWh p.a. and a 'large' irrigator consumes more than 100 MWh p.a. The DNSPs covered include Ergon Energy (QLD), Energex (QLD), Essential Energy (NSW), Ausnet Services (VIC), SA Power Networks (SA) and TasNetworks (TAS).

An analysis of these tariffs is performed by calculating monthly average prices. The result of this analysis is presented in heat maps which graphically depict the average price as a function of combinations of monthly demand and consumption (for tariffs with demand charges) or as a function of monthly consumption with varying proportions of peak and off-peak usage.

2.2 Case studies

Various half-hourly demand data were provided to us[1]. These half-hourly data were used to calculate charges and prices with the tariffs that have applied from 2008 to the present (2015/2016). For Queensland – where regulated retail prices apply - network and retail tariffs are also analysed. For South Australia, the analysis focusses on network tariffs but retail charges are also analysed for July 2015 for which retail price data is available[2].

[1] 13 irrigators from SA - half-hour demand data for financial year 2013/14 and July 2015 retail bills provided by Central Irrigation Trust (CIT) (Gavin McMahon). Two single year profiles for an irrigator in Victoria. 29 separate meters from Relmay Pty Ltd in QLD - quarterly energy demand (peak, shoulder, off-peak and peak demand) for Irrigators within the Ergon Distribution network. Nine (9) of the irrigators had data which was more than 12 months in duration which covers Sep 2014 to Sep 2015. tariffs with demand charges require monthly calculation. Therefore data which is summarised quarterly or annually, as is the case for the Relmay site data, cannot be used for analysis. We have therefore used the 13 x SA irrigator half-hourly demand profiles and 9 x QLD irrigator demand profiles for analysis.

[2] Without the knowledge of actual retail bills for years prior to 2015, we are unable to calculate the non-network component of the irrigator bills in South Australia.

3 Generic analysis of network and retail tariffs

This section identifies and analyses the network tariffs applicable to irrigators in New South Wales, Queensland, Victoria, South Australia and Tasmania and the regulated retail tariffs applicable to irrigators in Queensland. After the describing the various network tariffs, each Tariff is then analysed and the price results portrayed in heat maps.

3.1 Network Tariff description

The network tariffs applicable to small (annual energy consumption of less than 100 MWh p.a.) and large irrigators in the NEM is shown in Figure 1 below.

Figure 1. Applicable network tariffs

Ergon Energy	EBIBT1 - IBT Business	EDST1 - Demand Small EDMT1 - Demand Medium EDLT1 - Demand Large	Demand threshold > 30kW Demand threshold >
Essential Energy	BLNT2AU - LV TOU < 100 MWh	BLND3AO - LV TOU Demand 3 Rate BLND3TO - LV TOU Demand Alternative tariff	
Ausnet Services	NEE21 - Small Business two rate		
Powercor	ND1 - Non-Residential Single Rate	DL - Large Low Voltage Demand	
SA Power Networks	QBSR - LV Business - Single Rate	VLVA - Low Voltage Agreed Demand (kVA)	
TasNetworks	TAS75 - Irrigation LV TOU	TAS75 - Irrigation LV TOU	

A summary of these tariffs is presented in Table 1.

Table 1. Network Tariff charges

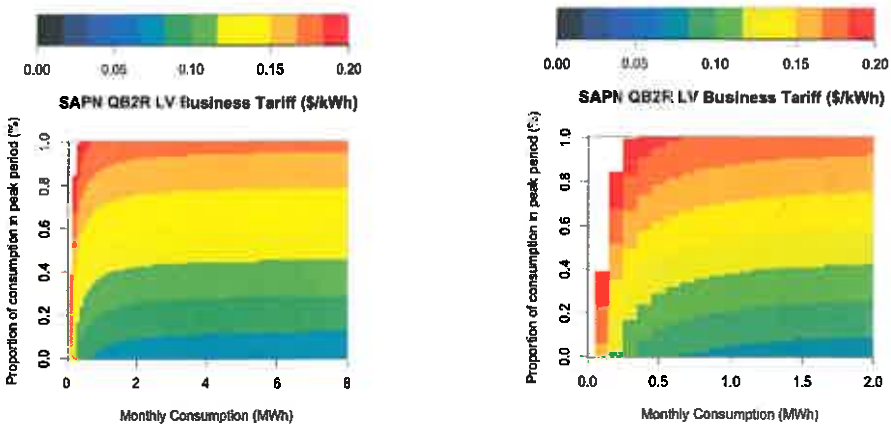
Tariff Name	DNSP	Irrigator type	Supply charge	Demand (Time and Seasonal Variant)	Demand (DBT)	Demand (Flat)	Demand for Additional	Capacity charge (transmission)	Volume (IBT)	Volume (Peak and Off Peak)	Volume (Peak, Shoulder, Off Peak)	Volume (Flat)
Low Voltage Agreed Demand (KVA)	SAPN	Large	X		X		X					X
High Voltage Agreed Demand (KVA)	SAPN	Large	X			X	X					X
QB2R LV Business – 2 Rate	SAPN	Small	X								X	
EBIBT1 IBT Business	Ergon	Small	X						X			
Demand Small / Medium / Large	Ergon	Large	X			X		X				X
BLNT2AU LV TOU < 100 MWh	Essential Energy	Small	X							X		
BLND3AO - LV TOU Demand 3 Rate	Essential Energy	Large	X	X							X	
BLND3TO - LV TOU Demand Alternative Tariff	Essential Energy	Large	X	X							X	
BLNS1AO – LV TOU Avg daily Demand	Essential Energy	Large	X	X							X	
NEE21 Small Business two rate	Ausnet	Small	X							X		
ND1 Non-Residential Single Rate	Powercor	Small	X						X			
DL Large Demand	Powercor	Large				X				X		
TAS75 Irrigation LV TOU	TasNetworks	All	X								X	

3.2 Network Tariff analysis

3.2.1 South Australian Power Networks - small irrigators

Small irrigators are most likely to be on the QB2R "LV Business – 2 Rate". The Tariff includes a supply charge and a peak / off-peak volume charge. The heat maps are shown in Figure 2.

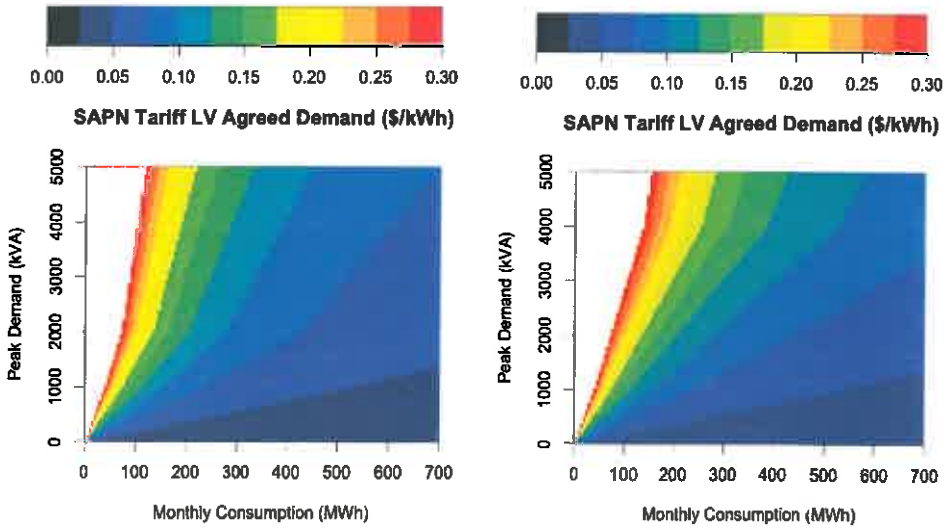
Figure 2. SAPN QB2R LV Business Tariff ($/kWh): 0 – 8 MWh per month (b) 0 – 2 MWh per month



3.2.2 SAPN - large irrigators

Large irrigators may be supplied on either low voltage (LV) or high voltage (HV). For these users, SAPN and the irrigator agree monthly peak demand. We show heat maps for different Agreed Demands of 2000kVA and 4000kVA in Figure 3. The LV Agreed Demand has a block 1 demand of 1000kVA, block 2 is the difference between the Agreed Demand and 1000kVA. The 'Additional Agreed Demand' charge occurs when the peak demand exceeds the 'Agreed Demand'.

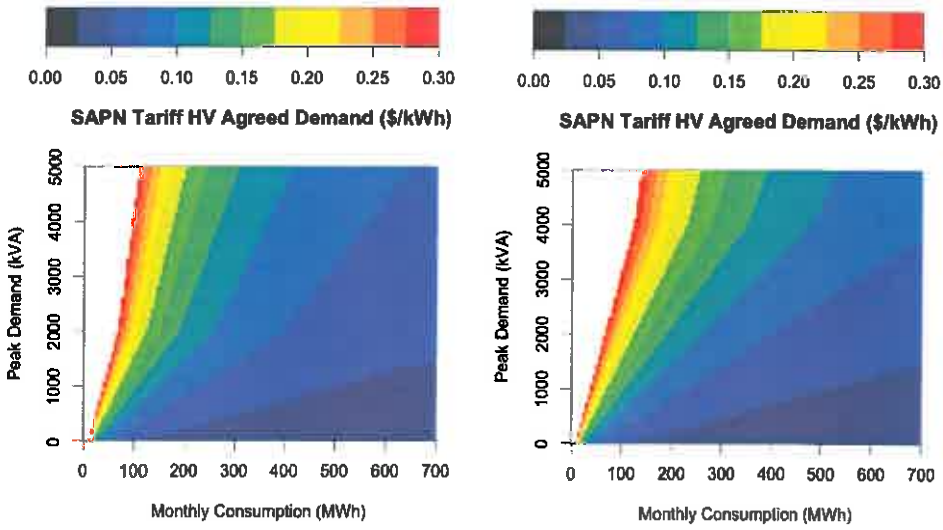
Figure 3. SAPN Tariff LV Agreed Demand - (a) 2000kVA Agreed Demand, (b) 4000kVA Agreed Demand



For the SAPN HV Agreed Demand Tariff, there is a peak demand charge up to the Agreed Demand. Beyond this Agreed Demand, the customer pays the "Additional Agreed Demand" charge, similar to the LV customer.

For HV users, the heat maps in Figure 4 are for irrigators who have an Agreed Demand of 2000kVA and 4000kVA.

Figure 4. SAPN Tariff HV Agreed Demand - (a) 2000kVA Agreed Demand (b) 4000kVA Agreed Demand

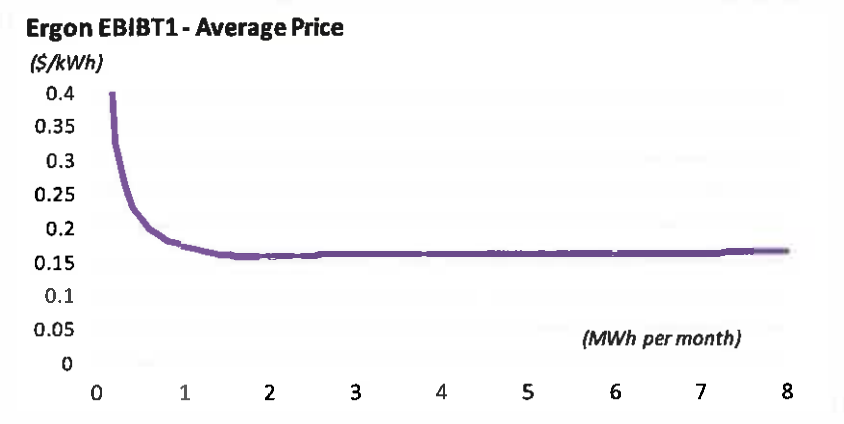


Beyond the Agreed Demand, the network Tariff comes less expensive as the Agreed Demand charge is approximately 50% lower than the Agreed Demand.

3.2.3 Ergon - small irrigators

The network Tariff that applies to small irrigators (<100 MWh per annum) is the Inclining Block Tariff (IBT) Business Tariff (EBIBT1). This Tariff has a supply charge and an inclining volume charge. The average price dependent on monthly consumption is shown in Figure 5.

Figure 5. Ergon Energy EBIBT1 Average Price ($/kWh)



3.2.4 Ergon - large irrigators

Irrigators who consume more than 100 MWh p.a. can choose between three tariffs based on their size and supply voltage[3] as shown in Table 2.

Table 2. Ergon large energy user Tariff categories

Tariff Charge	Tariff Code	Threshold Demand
Demand Small	EDST1	30 kW
Demand Medium	EDMT1	120 kW
Demand Large	EDLT1	400 kW

[3] Pg. 74/96 of Ergon Energy Pricing Proposal (AER approved) June 2015

These tariffs have supply, volume and demand charges. The actual demand charge is calculated if peak demand recorded in the month is greater than the threshold demand. If the peak demand does not exceed the threshold demand, the demand charge for the month is zero. If the peak demand exceeds the threshold demand, the demand charge is calculated as the difference between the actual demand and the threshold demand at the actual demand charge ($/kW/month).

The heat maps for the EDST1 Tariff are in Figure 6, the EDMT1 Tariff in Figure 7 and the EDLT1 Tariff in Figure 8.

Figure 6. Ergon Tariff EDST1 Average Price (Threshold Demand 30kW)

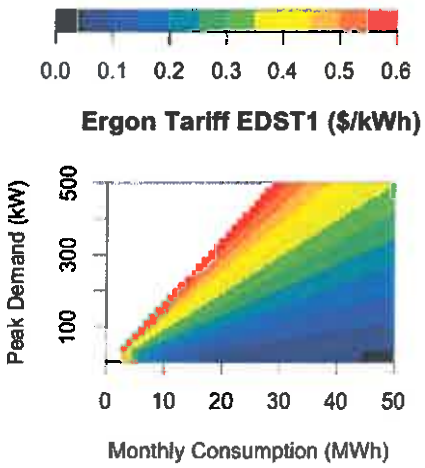


Figure 7. Ergon Tariff EDMT1 Average Price (Threshold Demand 120kW)

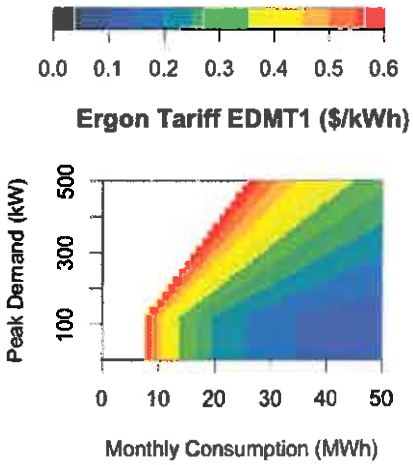
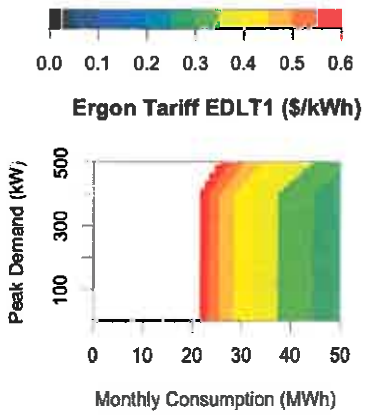


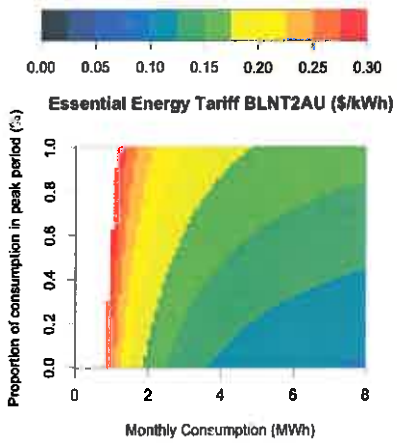
Figure 8. Ergon Tariff EDLT1 Average Price (Threshold Demand 400kW) MWh per month

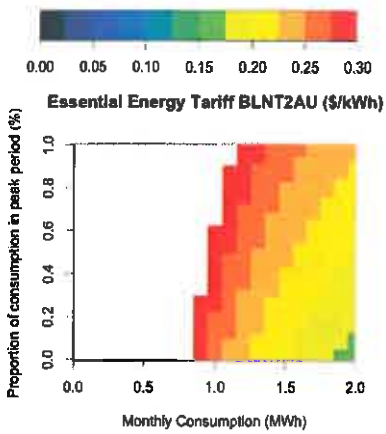


3.2.5 Essential Energy

For irrigators supplied by Essential Energy that consume less than 100 MWh p.a., we assume that the BLNT2AU LV TOU Tariff applies. This has a peak, shoulder and off-peak charge. Figure 9 is a heat map assuming 20% of consumption is in the shoulder period and the split between peak and off-peak as shown on the Y-axis.

Figure 9. Essential Energy network Tariff BLNT2AU – assuming 20% shoulder (a) 0 – 8 MWh p.a. (b) 0 -2 MWh p.a.





Large Irrigators who consume more than 100 MWh p.a. within the Essential Energy distribution zone are on one of three different business tariffs – BLND3AO, BLND3TO and BLNS1AO. Each of these have a supply charge, volume charge (time of day

variant) and demand charge (time of day and seasonal variance). We examine these and produce their respective heat maps below.

We understand that historically rebates associated with BLND3TOU have been paid in the past. They are not reflected in these calculations.

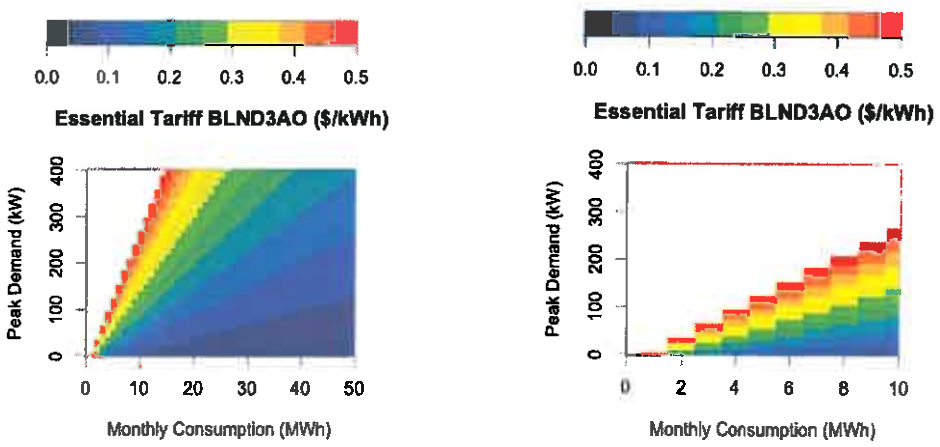
BLND3AO - LV TOU Demand 3 Rate

The BLND3AO "LV TOU Demand 3 Rate" business Tariff is applicable to business premises whose consumption exceeds 160 MWh per year and that is connected to the LV Distribution System.

This Tariff consists of a supply charge, time variant energy charge and seasonal and time of day variant demand charge. The energy charge consists of peak, shoulder and off-peak with the peak and shoulder charges being the same. The demand charge has a time/seasonal variance characterised as a peak, shoulder and off-peak demand charge per month ($/kVA/month). The peak and shoulder prices are the same.

For the heat map analysis, we have made assumptions about the proportion of consumption in the different time periods. These are 30% Peak, 30% Shoulder and 40% off-peak. For the demand charge assumptions, we assume the Shoulder demand is 80% of the Peak demand and Off-peak demand is 60% of the Peak demand. The heat maps with these assumptions are shown in Figure 10.

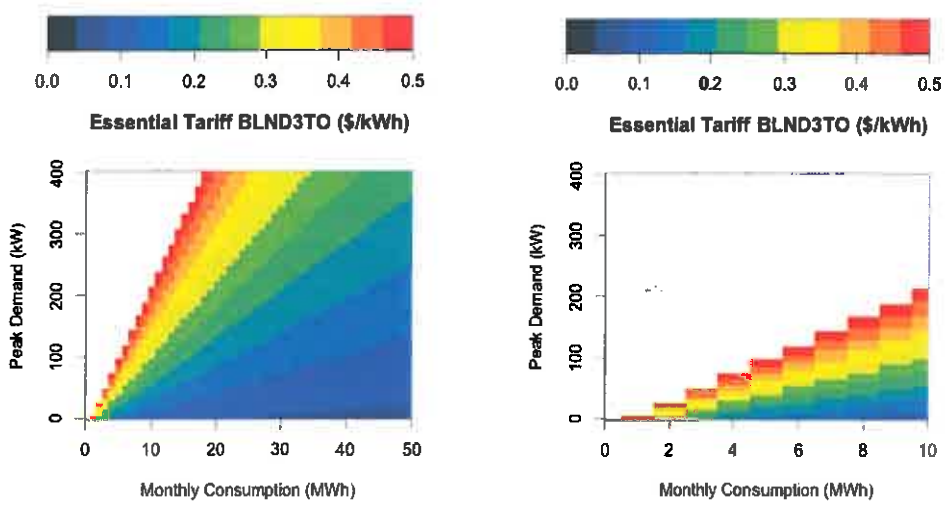
Figure 10. BLND3AO heat map (a) 0 – 50 MWh per month (b) 0 – 10 MWh per month



BLND3TO - LV TOU Demand Alternative Tariff

This Tariff is similar to the BLND3AO Tariff except that the demand charge only applies in the shoulder and peak periods. The energy charge has peak, shoulder and off-peak rates with equal peak and shoulder since 2008. The peak and shoulder demand rates have been the same since 2008. The heat maps for these Tariff, using the same assumptions as those described above are shown below.

Figure 11. Heat maps for BLND3TO (a) 0 – 50 MWh per month (b) 0 – 10 MWh per month



BLNS1AO – LV TOU Average daily Demand

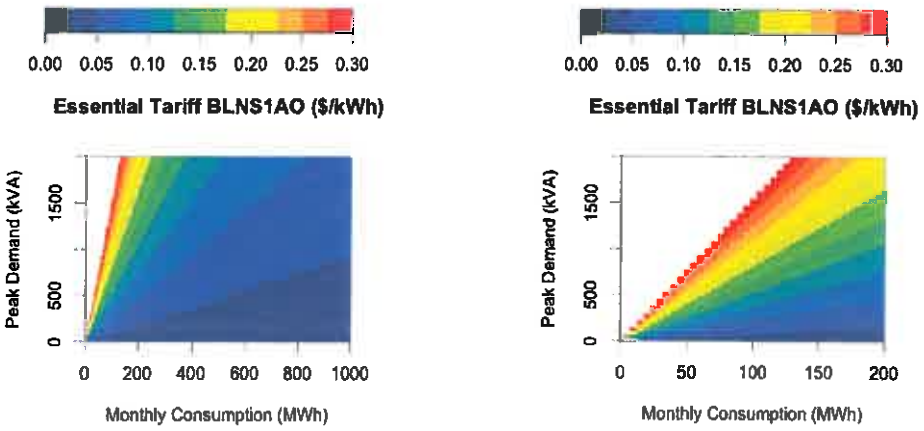
This Tariff is available to customers who have a monthly load factor greater than 60% for at least 4 of the most recent 12 months and a minimum monthly demand of 1500 kVA. The Tariff schedules say that this Tariff applies to customers with a seasonal demand, though it is not clear what this means since it only applies to those with a monthly load factor greater than 60% - which is not necessarily consistent with seasonal demands. Charges under this Tariff (based on a verbatim quote of their Tariff schedule) are calculated as follows:

1. The daily kVA maximum demand in each of the Peak, Shoulder and Off Peak periods will be metered for each day of the month.

2. The metered kVA Demand for each day of the Peak, Shoulder and Off-Peak periods will be summed for the month and divided by the number of days in the month when the load occurs. This means that Peak and Shoulder Demand will be divided by the number of week days, and Off Peak Demand by the total number of days.
3. The average TOU Demand calculated above will be multiplied by the TOU Demand rates.
4. No adjustments to billable demand shall be made for pre-season "test runs".

The heat maps below are based on the assumptions described above.

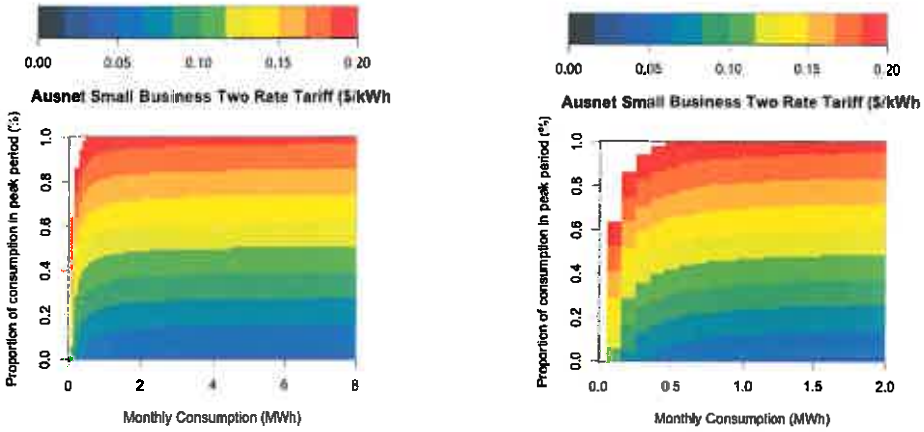
Figure 12. Heat maps BLNS1AO (a) 0 - 1000 MWh per month and (b) 0 - 200 MWh per month



3.2.6 Ausnet Services

Small irrigators on the Small Business Two Rate (NEE21) Tariff pay a supply charge and a peak/off-peak volume charge, with prices as shown in Figure 13.

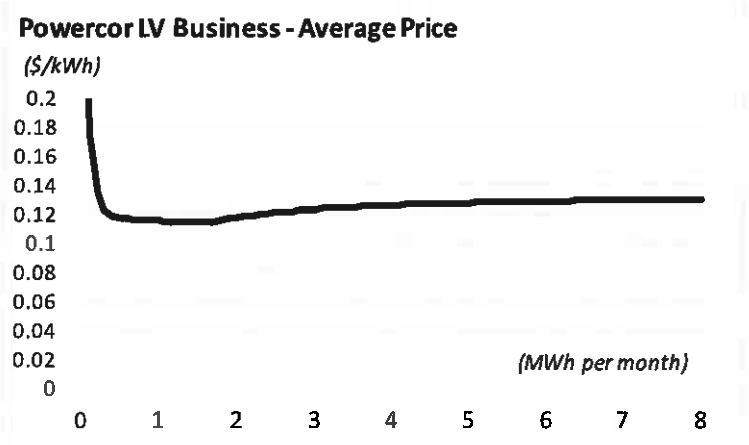
Figure 13. Ausnet Services Small Business Two Rate ($/kWh) (a) 0 - 8 MWh per month and (b) 0 – 2 MWh per month



3.2.7 Powercor

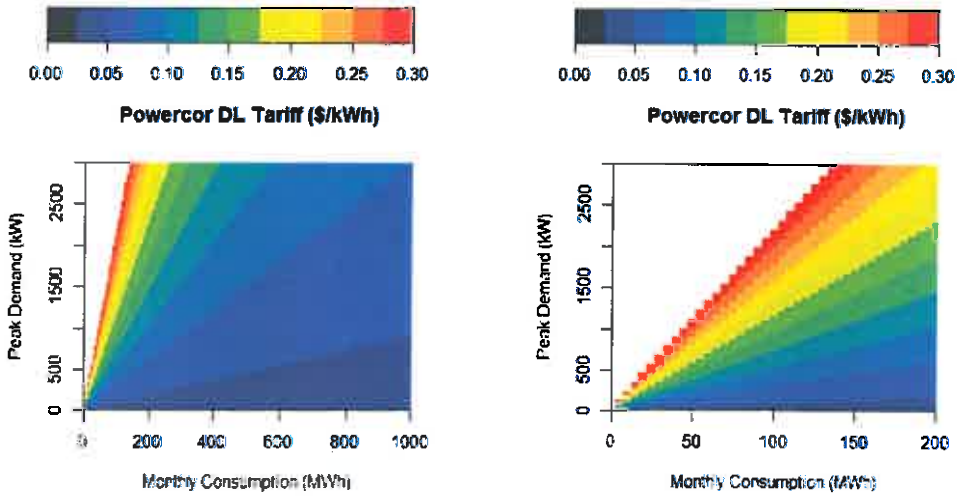
Small volume irrigators in Powercor would be placed on the LV Business Tariff (ND1), incorporating a supply charge and an inclining block Tariff (IBT) volume charge. Average prices on this Tariff are shown in Figure 14 (the inclining block nature of this Tariff means that it is not amenable to display as a heat map).

Figure 14. Powercor LV Business Tariff - average price ($/kWh)



Large irrigators consuming greater than 100 MWh p.a. are placed on the DL "Large Low Voltage Demand" Tariff. This Tariff incorporates a time-variant energy charge (peak and off-peak)[4] and a peak demand charge. The peak demand charge is based on the annual peak demand ($/kW/pa). A minimum connection capacity of 250kW is required to be assigned to this Tariff. The determining factor in Tariff selection is the connection capacity, not the actual capacity[5]. We show the heat map in Figure 15.

Figure 15. Powercor DL Tariff (a) 0 - 1000 MWh per month (b) 0 – 200 MWh per month



3.2.8 TasNetworks

Irrigators within the TasNetworks (Tasmania) distribution network region, are assumed to be supplied on the TAS75 network Tariff. This Tariff has a peak, shoulder and off-peak charges as shown in Table 3.

Table 3. TasNetworks TAS75 network time periods

Time Period	Summer (1 Oct – 31 Mar)	Winter (1 Apr – 30 Sep)
Week Day (7am to 10pm) (Mon - Fri)	Shoulder	Peak
Weekend Day (7am to 10pm) (Sat and Sun)	Off-peak	Shoulder

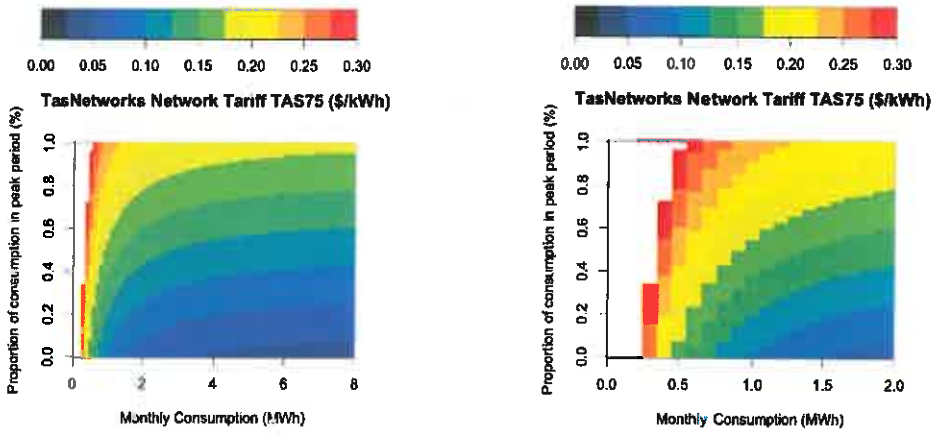
[4] Peak is 7am to 11pm Mon – Friday, Off Peak is all other times

[5] p. 84 of Powercor Annual Pricing Proposal 2015

Any Day (10pm to 12midnight) (Mon - Sun)	Off-peak	Off-peak
Any Day (12midnight to 7am) (Mon - Sun)	Off-peak	Off-peak

The heat map shown in Figure 16 assumes 20% of consumption occurs in the shoulder period with the split between peak and off-peak as shown on the Y-axis.

Figure 16. TasNetworks TAS75 Irrigation Tariff - for 20% consumption in the shoulder period. (a) 0 - 8 MWh p.a. and (b) 0 - 2 MWh p.a.



Some irrigators will be on the LV Day/Night (Irrigation) Tariff (TAS73). This network Tariff is to be discontinued over a two year period and was not made available to any new customer after 31 July 2014.

3.3 Regulated retail tariffs in Queensland

This sub-section examines the regulated retail Tariff offers in Queensland. Table 4 summarises the regulated retail offers which are applicable across small (< 100 MWh p.a.) irrigators and large (> 100 MWh p.a.) irrigators.

Table 4. Regulated retail offers in Queensland

Tariff Code	Tariff Name	Comments
Tariff 62	Farm - Time-of-Use	Tariff no longer available to new customers
Tariff 65	Irrigation - Time-of-Use	
Tariff 22	Business General Supply	For < 100 MWh p.a.
Tariff 44	Business Over 100 MWh (Demand Small)	> 100 MWh p.a. threshold demand > 30kW
Tariff 45	Business Over 100 MWh (Demand Medium)	> 100 MWh p.a. threshold demand > 120kW
Tariff 46	Business Over 100 MWh (Demand Medium)	> 100 MWh p.a. threshold demand > 400kW

The regulated retail offers are described in Table 5.

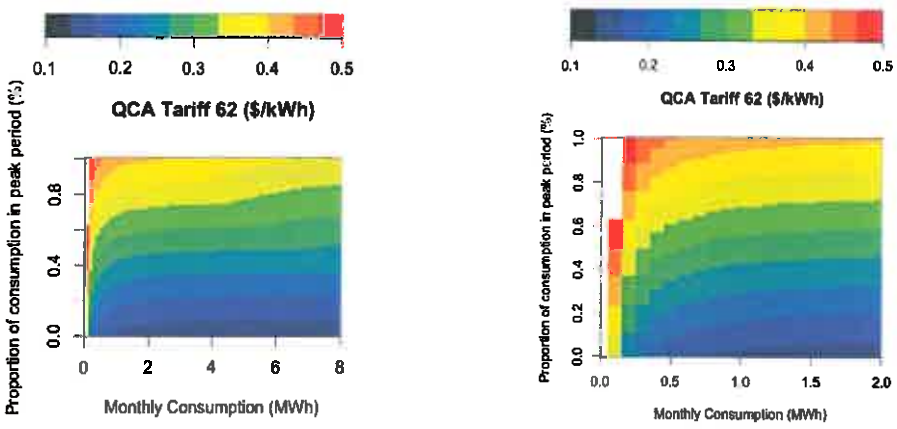
Table 5. Regulated retail tariffs by bill elements

Tariff	Supply charge	Volume Flat	Volume Peak	Volume Off Peak	Demand	Annual Fixed charge[6]
62	X		X (DBT)	X		
65	X		X	X		
66	X	X				X
22	X		X	X		
44	X	X			X	
45	X	X			X	
46	X	X			X	

3.3.1 Small Users (<100 MWh p.a.)

According to the most recent QCA 2015/16 regulated retail electricity determination, the majority of small irrigators (around 9000) are on Tariff 62, "Farm – Time-of-Use". This Tariff has a supply charge with a time variant volume based charge (peak and off peak). The peak charge itself has a Declining Block Tariff (DBT) component with the first block up to 10MWh p.a. The heat maps with different scales are in Figure 17.

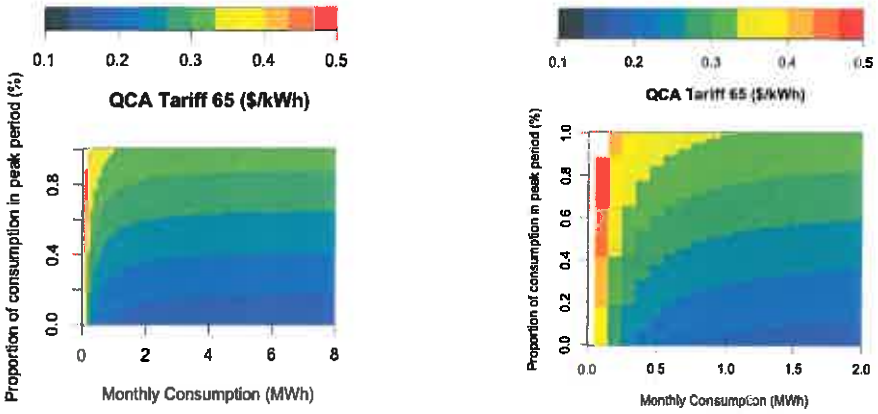
Figure 17. QCA Tariff 62 heat map, (a) 0 – 8 MWh per month (b) 0 – 2 MWh per month



[6] In respect of each point of supply per kilowatt of connected motor capacity used for irrigation pumping. An inclining block annual fixed charge, a higher charge applies for capacity greater than 7.5kW.

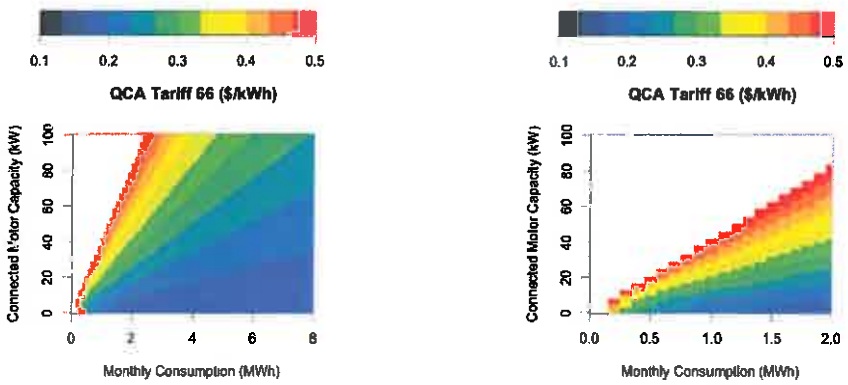
The next highest number of regional irrigator customers (~5,500) are on Tariff 65, "Irrigation - Time-of-Use". This has a similar structure to Tariff 62 except there is no block component within the peak charge. The heat map is shown in Figure 18.

Figure 18. QCA Tariff 65 heat map: (a) 0 - 8 MWh per month (b) 0 - 2 MWh per month



The third Tariff used by small user irrigators is Tariff 66, "Irrigation (Transitional)" with the smallest number of connected customers, around 2500. This Tariff has a supply charge, a flat volume charge and a demand charge described as an "annual fixed charge" is calculated as the capacity of motors connected to irrigator equipment and is charged per kW. The heat map for this Tariff is shown in Figure 19.

Figure 19. Tariff 66 (a) 0 - 8 MWh per month and (b) 0 - 2 MWh per month



The Queensland Competition Authority (QCA) 2013-14 determination ruled tariffs 62 and 65 'transitional'. These tariffs are still available to new customers, however they will not be available beyond 30 June 2020. [7]

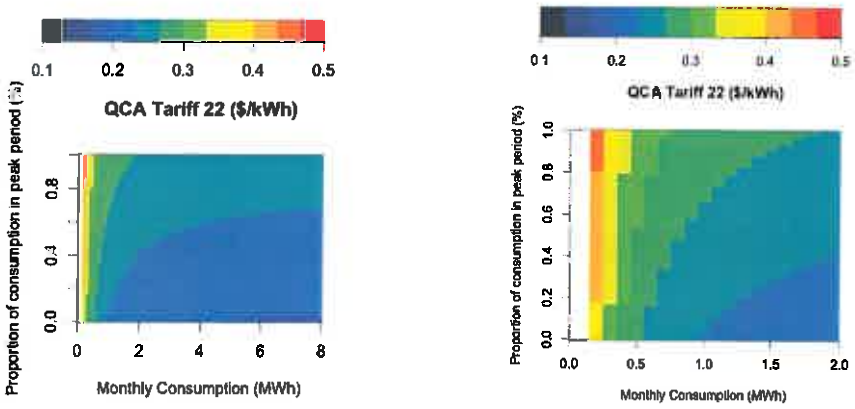
In the 2014-15 determination, the QCA noted, "the majority of small customers on tariffs 62 and 65 will move to the cost reflective Tariff 22."[8]

In the 2015-16 determination, the QCA noted in relation to Tariff 22, "Regional customers will move to the new Tariff 22A (which is based on Ergon Distribution Tariff structures), rather than the old Tariff 22 (which will become an obsolete Tariff in the Ergon Distribution area that is not available to new customers)."[9]

If the small irrigator should choose to leave Tariff 62 / 65 before 30 June 2020, they will most likely be on Tariff 22A – "Business (time-of-use)" since Tariff 22 is now an obsolete Tariff in regional Queensland and is only available until 30 June 2017 for existing customers.

For those irrigators on Tariff 22, we show the heat map in Figure 20.

Figure 20. QCA Tariff 22 heat map: (a) 0 – 8 MWh per month (b) 0 – 2 MWh per month



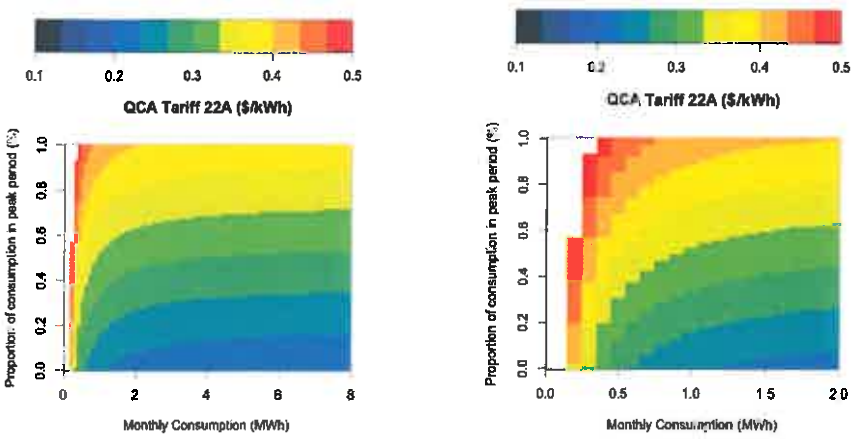
[7] p. 53/114 of QCA Determination 2015/16

[8] p. 89/121 of QCA Determination 2014/15

[9] p. 54/114 of QCA Determination 2015/16

After 1 July, 2015, those customers who wish to move off Tariff 62 or 65, they will now use Tariff 22A "Business (time-of-use)". We show the heat maps for 22A below:

Figure 21. QCA Tariff 22A (a) 0 - 8 MWh per month (b) 0 - 2 MWh per month



3.3.2 Large users (>100 MWh p.a.)

Similar to the small irrigators, most large irrigators consuming more than 100 MWh p.a. are on Tariff 62 and Tariff 65. We show the heat map for Tariff 62 for large users in Figure 22 and the heat map for Tariff 65 for large users in Figure 23. According to the 2015/16 QCA Final Determination, there are around 100 large irrigators on Tariff 66. We show the heat maps for Tariff 66 applicable for large irrigators in Figure 24.

Figure 22. QCA Tariff 62 (a) 0 - 50 MWh per month (b) 0 - 10 MWh per month

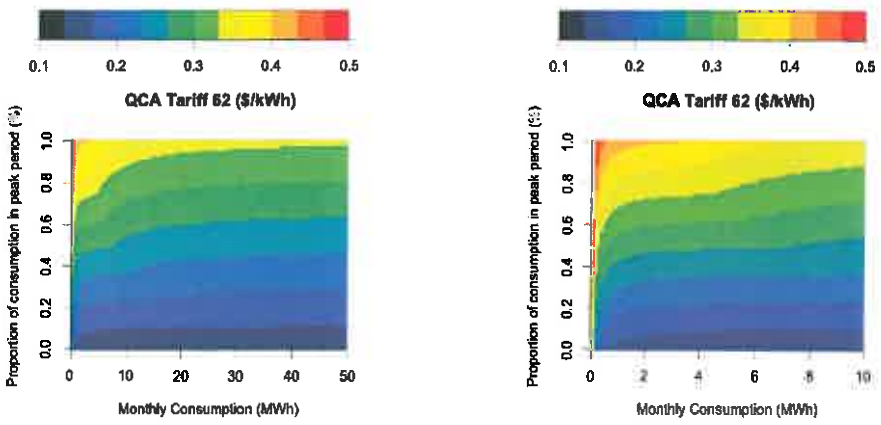


Figure 23. QCA Tariff 65 (a) 0 - 50 MWh per month (b) 0 - 10 MWh per month

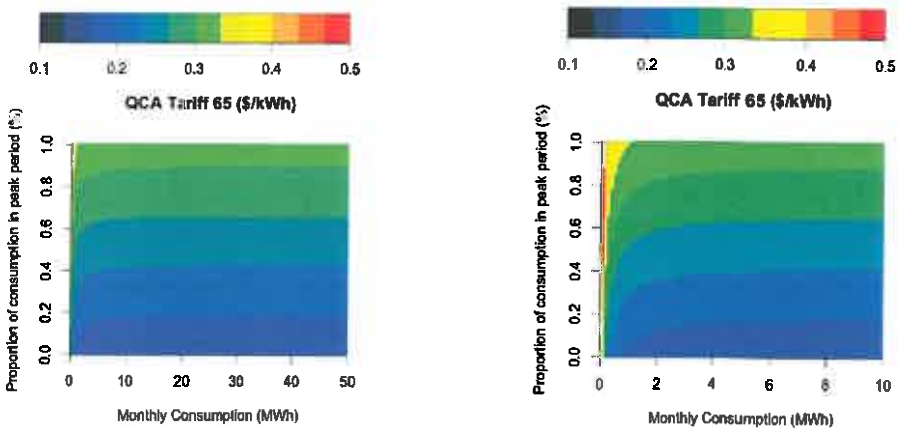
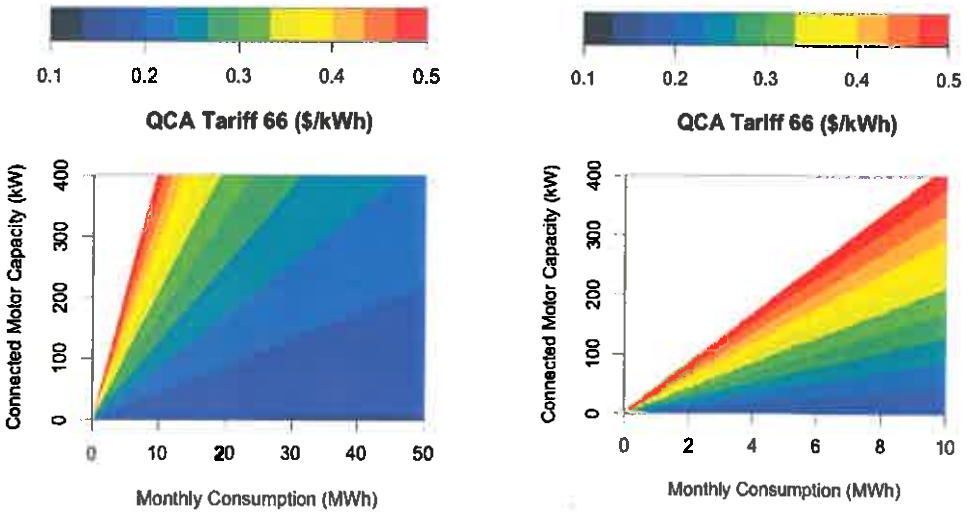


Figure 24. Tariff 66 (a) 0 - 50 MWh per month (b) 0 - 10 MWh per month



In the 2014-15 determination, the Queensland Competition Authority (QCA) noted[10] that customers on tariffs 62 and 65 who elect to leave these tariffs will move to large business demand-based tariffs 44, 45, 46. Since July 1 2012, large user irrigators who consume more than 100 MWh p.a. can choose between Tariff 44, 45 or 46. These retail tariffs correspond to the applicable demand-based Ergon Energy network tariffs (Demand Small (EDST1), Demand Medium (EDMT1) and Demand Large (EDLT1)).

[10] p. 89/121 of QCA Determination 2014/15

For those large users on Tariff 66, the QCA note those users will align with either Tariff 44, 45, 46 for large business customers.[11]

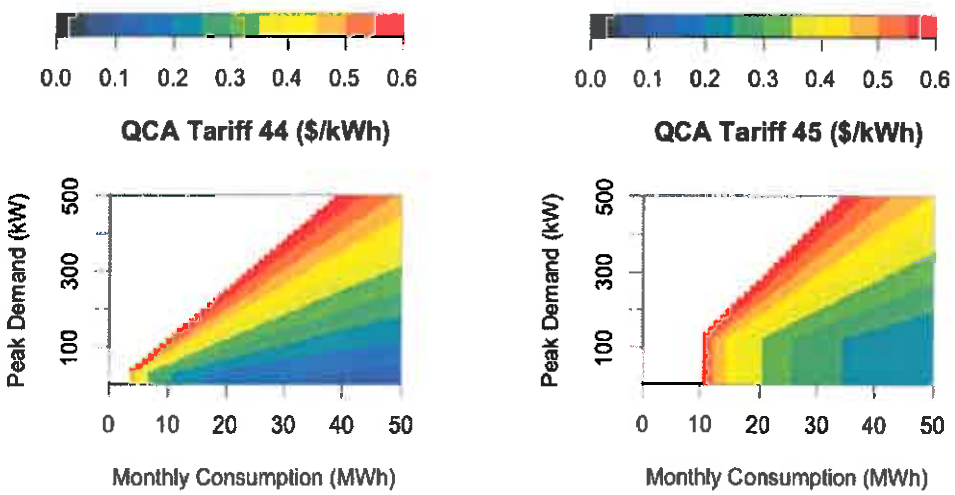
The demand charge in these retail tariffs is calculated in the same way as in the Ergon Energy demand-based network tariffs. If the peak demand measured over a half hourly period is less than the threshold demand, the demand charge is zero for that month. If the monthly peak demand is greater than the peak demand, the demand charge is the difference between the recorded peak demand and the threshold demand.
The retail Tariff code and the corresponding network Tariff is shown in Table 6.

Table 6. QCA Retail Tariff and the corresponding network Tariff

Demand Threshold	Retail Tariff	Network Tariff
30 kW	Tariff 44	Demand Small
120 kW	Tariff 45	Demand Medium
400 kW	Tariff 46	Demand Large

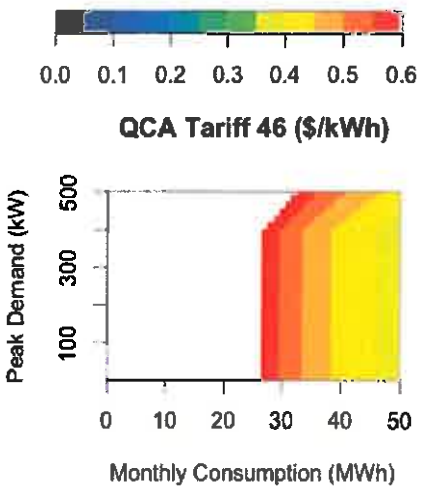
The heat maps for Tariff 44 and Tariff 45 are shown in Figure 25, and Tariff 46 in Figure 26. The areas shown as white in these heat maps have prices above 60 cents per kWh.

Figure 25. QCA Tariff 44 and 45 heat maps



[11] p. 84/114 of QCA Determination 2015/16

Figure 26. QCA Tariff 46 heat map



4 Network Tariff case studies

This section presents analysis of irrigator tariff case studies based on the data provided to us for irrigators in South Australia and Queensland:

- For Queensland we chose two profiles from a set of nine irrigators that are supplied by Ergon Energy: a 25 MWh p.a. irrigator (small), and a 403 MWh p.a. irrigator (large).
- For South Australia we chose two from a set of thirteen irrigators: a 478 MWh p.a. irrigator (small) and an 8200 MWh p.a. irrigator (large).
- For Victoria we chose one of two profiles from a large irrigator: a 6237 MWh p.a. irrigator.

Each case study presents charts showing the annual bill, average price ($/kWh), and the break-down of the bill between the various elements of the tariff. These are all shown from 2008 to 2016 and by bill element (supply, volume and demand) - by applying the same year's worth of half hourly demand data to the tariffs that applied in those years.

In the case of the Queensland case studies where regulated retail tariffs apply, both retail tariff and network tariff outcomes are shown.

Appendix B has charts that compare bills and prices for all of the 9 Queensland and 13 South Australian irrigator load profiles.

4.1 South Australia: small irrigator

Figure 27 shows the annual bills, Figure 28 the average price and and Figure 29 the breakdown of the bill into its various elements.

Figure 27. SA Irrigator 478 MWh p.a. network annual bill

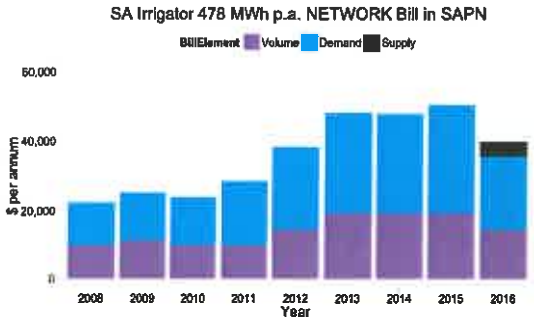


Figure 28. SA Irrigator 478 MWh p.a. network average price

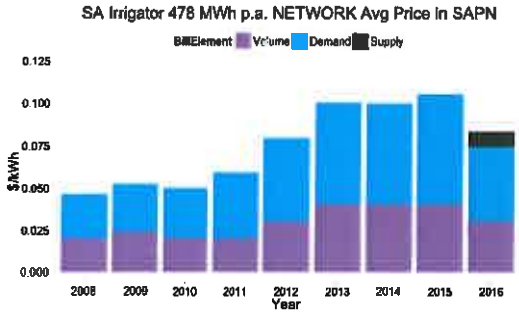
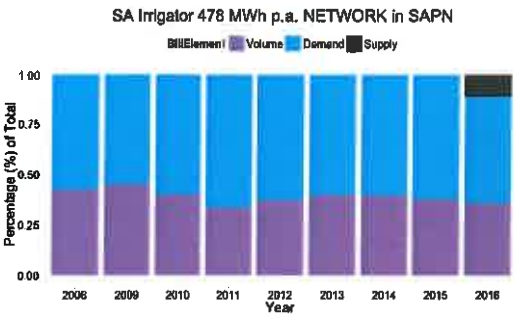


Figure 29. SA Irrigator 478 MWh p.a. network bill breakdown



We assume the SA irrigator prior to 2015/16 was on the "Low Voltage Stepped Demand (KVA)" Tariff. While the overall outcome was lower in 2016, SAPN has introduced a supply charge component.

4.2 South Australia: large irrigator

Figure 30 shows the annual bill, Figure 31 the average price and Figure 32 the bill breakdown.

Figure 30. SA Irrigator 8200 MWh p.a. network annual bill

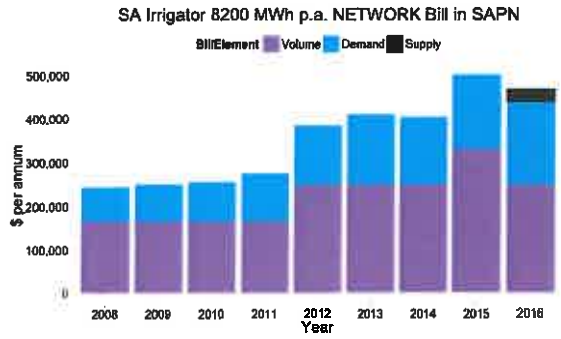


Figure 31. SA Irrigator 8200 MWh p.a. network average price

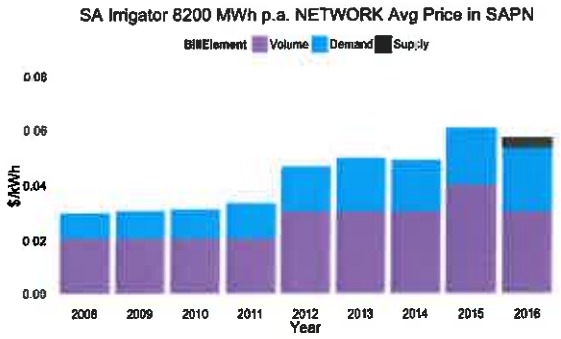
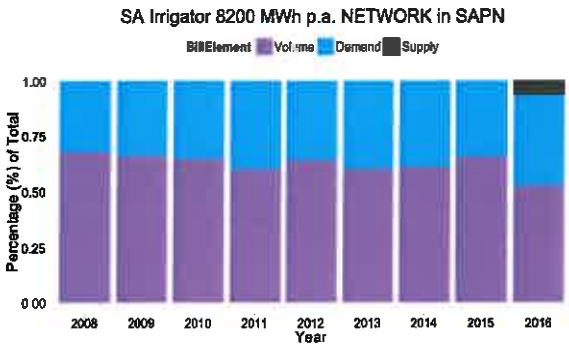


Figure 32. SA Irrigator 8200 MWh p.a. network bill breakdown



As with the LV irrigator, prior to 2016 it is assumed the large irrigator was on the "High Voltage Stepped Demand (KVA)" Tariff.

4.3 Queensland: small irrigator

Figure 33 shows the bills, Figure 34 the average price and Figure 35 the bill break down.

Figure 33. QLD Irrigator 25 MWh p.a. network annual bill

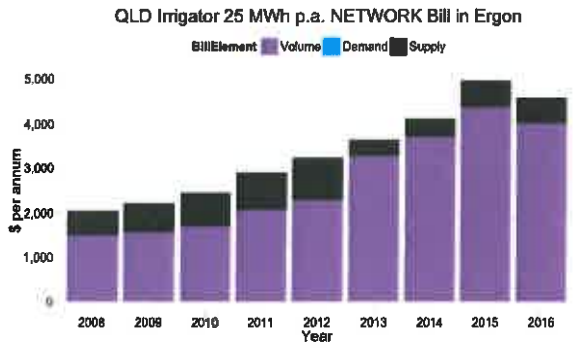


Figure 34. QLD Irrigator 25 MWh p.a. network average price

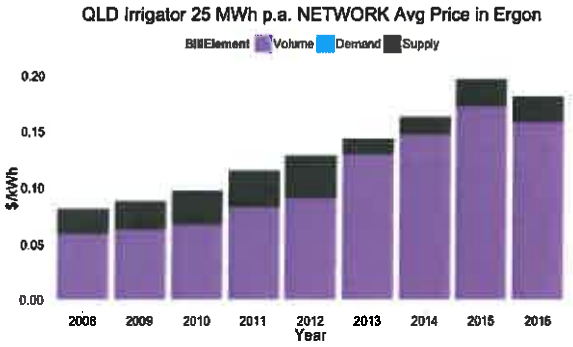
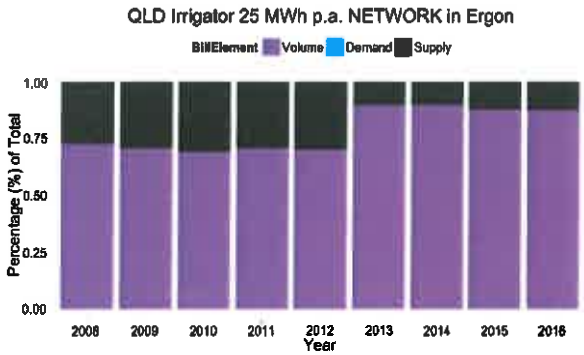


Figure 35. QLD Irrigator 25 MWh p.a. network bill breakdown



For a small irrigator, we assume the volume-based EVLT1 Tariff applied until 2014 when it was discontinued. For 2015 and 2016, we assumed the IBT Business (EBIBT1) Tariff.

4.4 Queensland large irrigator

For the large irrigator, we used a 403 MWh p.a. irrigator within the Ergon Energy distribution region. This irrigator works in flood irrigation from a bore 70 foot deep. If the large irrigator decided to move off Tariff 62, they would get to choose between three demand-based retail tariffs (Tariff 44, 45, 46) and therefore their respective demand-based network tariffs (EDST1, EDMT1, EDLT1). The EDST (Demand Small) Tariff has a lower demand threshold at 30kW per month, the EDMT (Demand Medium) Tariff has a demand threshold of 120kW with a higher supply charge and EDLT with a demand threshold of 400kW and even high supply charge.

A customer choosing a demand-based tariff with a higher demand threshold reduces their demand bill since the peak demand charge does not apply until it exceeds the demand threshold. However demand-based tariffs with a higher demand threshold have a higher supply charge. The customer would need to weigh up the impact of choosing a tariff with a higher demand threshold (reducing the demand charge) but a higher supply charge. For example a customer with a low peak demand would mostly likely choose a EDST since their peak demand charges would not be high and would pay the lowest supply charge. Large peak demand customers would choose EDLT (Demand Large) to reduce their peak demand charges and accept the higher supply charge since the demand threshold in EDST would result in an exceedingly high demand bill. As before, the total bill, average price and bill break down are shown.

Outcomes with EDST1 (Demand Small)

Figure 36. QLD Irrigator 403 MWh p.a. network annual bill (EDST1)

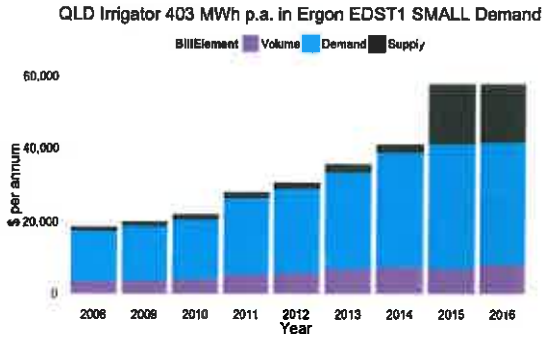


Figure 37. QLD Irrigator 403 MWh p.a. network average price (EDST1)

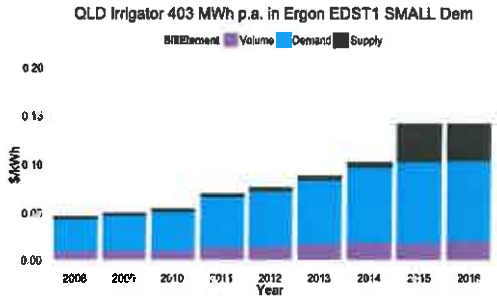
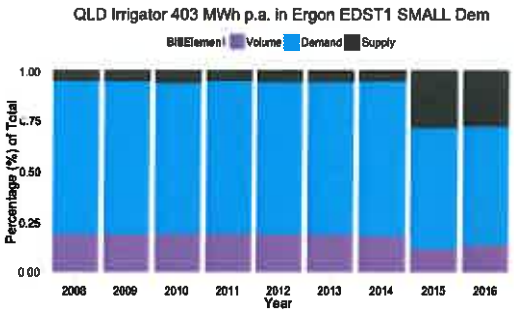


Figure 38. QLD Irrigator 403 MWh p.a. network bill breakdown (EDST1)



Significant increases in the supply charge are observed with EDST1.

Outcomes with EDMT1 (Demand Medium)

Figure 39. QLD Irrigator 403 MWh p.a. network annual bill (EDMT1)

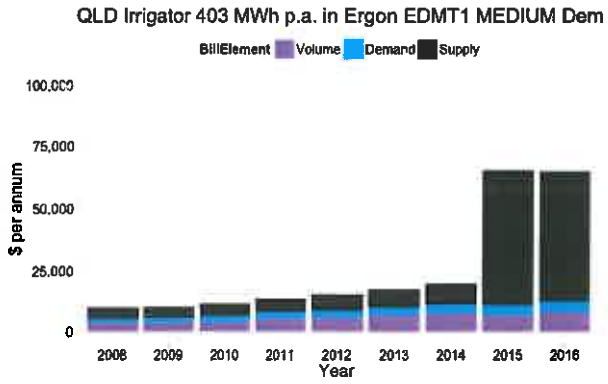


Figure 40 QLD Irrigator 403 MWh p.a. network average price (EDMT1)

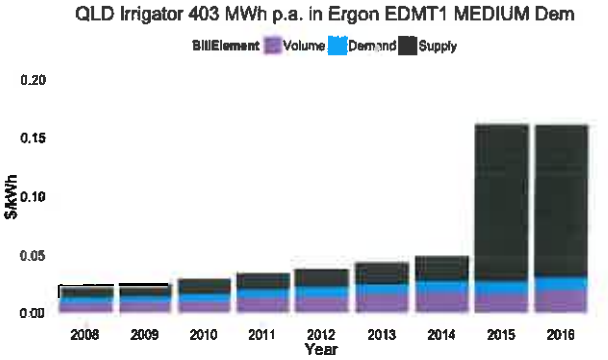
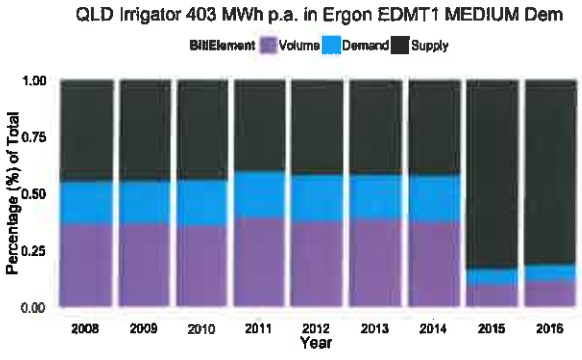


Figure 41 QLD Irrigator 403 MWh p.a. network bill breakdown (EDMT1)



Bizarrely large increases in the supply charge are observed in the EDMT1 Tariff outcomes.

Outcomes with EDLT1 (Demand Large)

Figure 42 QLD Irrigator 403 MWh p.a. network annual bill (EDLT1)

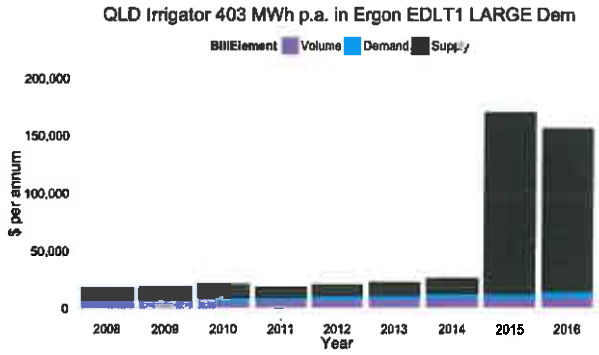


Figure 43. QLD Irrigator 403 MWh p.a. network average price (EDLT1)

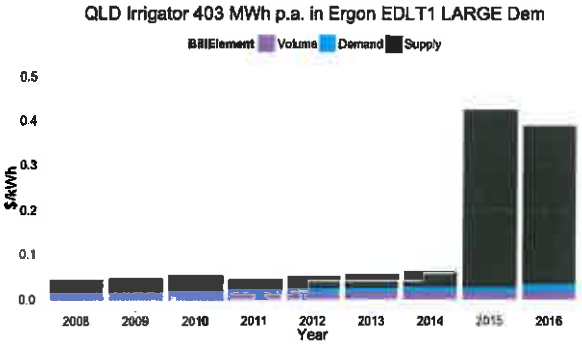
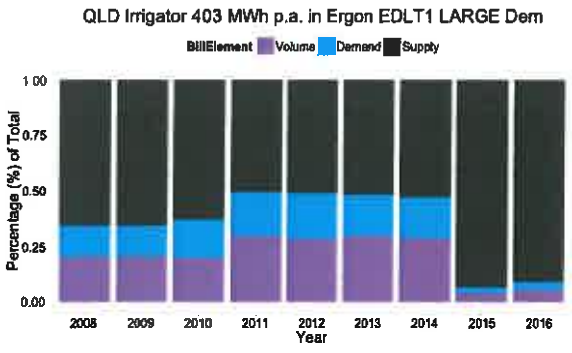


Figure 44. QLD Irrigator 403 MWh p.a. network percentage (%) of total (EDLT1)



On the Demand Large Tariff, the bill increases by a factor of about 10, average prices by about the same amount and the supply charge is now an astounding 96% of the total bill.

4.5 Victoria: large irrigator

For the large irrigator, we used a 6 238 MWh p.a. irrigator within the Powercor distribution region. This irrigator uses electricity to lift water from a dam for irrigation. The large irrigator would be assigned to Powercor's DL "Large Low Voltage Demand" Tariff which includes a demand charge based on maximum demand and a time-variant volume charge (peak and off-peak).

Figure 45. VIC Irrigator 6238 MWh p.a. network annual bill

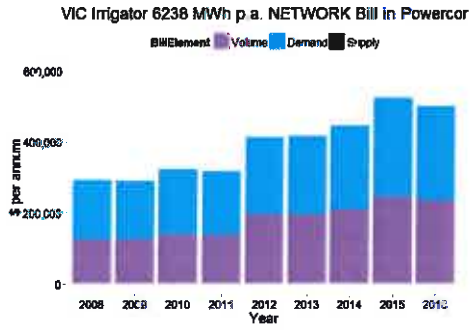


Figure 46. VIC Irrigator 6238 MWh p.a. network average price

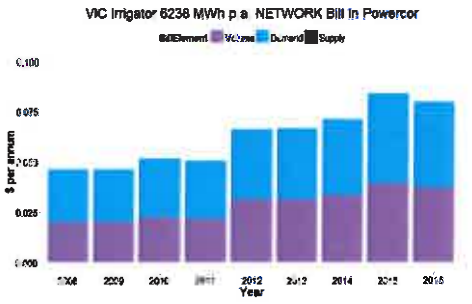
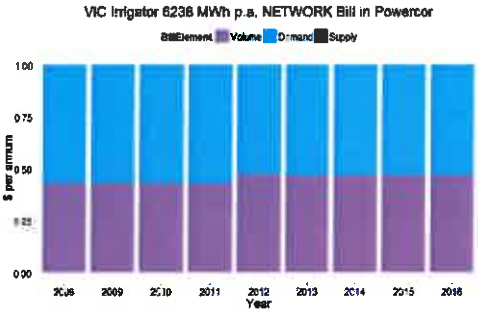


Figure 47. VIC Irrigator 6238 MWh p.a. network percentage (%) of total



5 Queensland regulated retail tariff case studies

This section presents calculations based on regulated retail tariffs in Queensland. It examines two case studies (25 MWh per annum and 403 MWh per annum) and compares outcomes on tariffs 62 and 22 (for 25 MWh annum case study) and Tariff 62 versus 44, 45 and 46 for the 403 MWh per annum customer.

Before 30 June 2015, a small irrigator who elected to move off Tariff 62 or Tariff 65 could have chosen Tariff 22 (Business Time-of-use). After 1 July 2015, this is now obsolete and only available for existing Tariff 22 customers until 30 June 2017. Tariff 22 has been replaced with Tariff 22A (Business Time-of-use), introduced in the 2015/16 QCA Determination. Small irrigators on retail tariffs 62 and 22 have typically been assigned the Ergon Energy EBIBT "IBT Business" Ergon network Tariff. The new Tariff 22A is reflective of the new Ergon Energy "EBTOUT TOU Business" network Tariff[12].

A large irrigator who chooses to move off Tariff 62 or Tariff 65 can choose between one of three demand-based retail tariffs, Tariff 44, 45 or 46. The irrigator has to consume more than 100 MWh p.a. to qualify for either of these tariffs. The retail tariffs 44, 45, 46 correspond to the Ergon network tariffs, EDST, EDMT and EDLT. Each retail tariff has a demand threshold which corresponds with the demand threshold of the applicable Ergon network tariff, summarised in Table 7.

Table 7. Large irrigator retail Tariff and the corresponding network Tariff

Demand Threshold	Retail Tariff	Network Tariff
30 kW	Tariff 44	Demand Small
120 kW	Tariff 45	Demand Medium
400 kW	Tariff 46	Demand Large

Similar to the network tariff options, the irrigator who chooses a demand-based tariff with a higher demand threshold (and consequently lower demand bill) pays a higher supply charge. The customer would need to weigh up the impact of choosing a tariff with a higher demand threshold (reducing the demand charge) and a higher supply

[12] p. 26/114 of QCA 2015/16 Determination

charge. For example a customer with a low peak demand would mostly likely choose Tariff 44 since this tariff has the lowest supply charge without a high demand bill. Large peak demand customers would choose Tariff 46 to reduce their peak demand charges and accept paying the high supply charge.

5.1 25 MWh per annum case study on Tariff 62

The outcomes for the 25 MWh p.a. small irrigator on Tariff 62 are shown. The annual bill is shown in Figure 48, the average price in Figure 49 and the bill breakdown in Figure 50.

Figure 48. QLD Irrigator 25 MWh p.a. retail annual bill (Tariff 62)

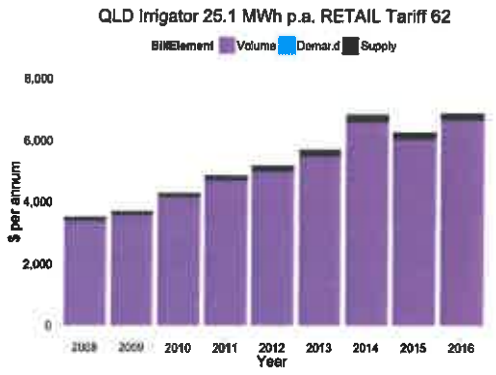


Figure 49. QLD Irrigator 25 MWh p.a. retail average price (Tariff 62)

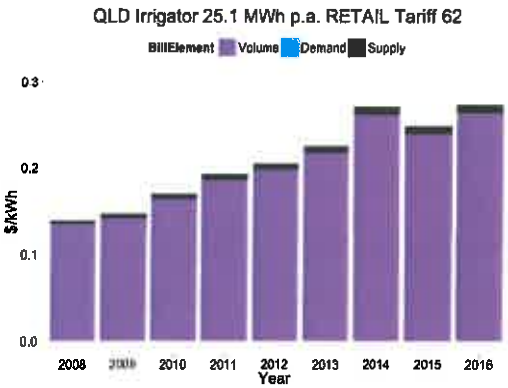
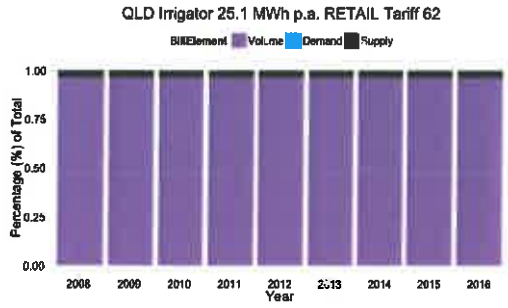


Figure 50. QLD Irrigator 25 MWh p.a. retail bill breakdown (Tariff 62)



The supply charge component is less than 3% in all years.

5.2 25 MWh per annum case study on Tariff 22

If this 25 MWh per annum irrigator was on Tariff 22, Business Supply, their outcomes would be as shown in Figure 51,
Figure 52 and Figure 53.

Figure 51. QLD Irrigator 25 MWh p.a. retail annual bill (Tariff 22)

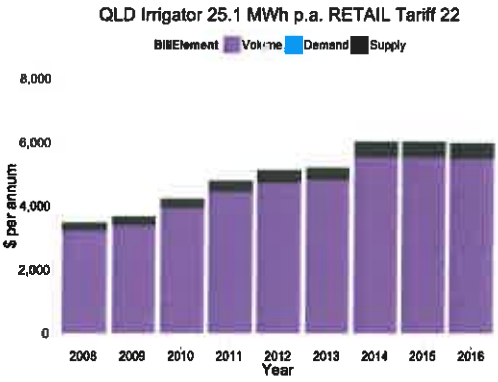


Figure 52. QLD Irrigator 25 MWh p.a. retail average price (Tariff 22)

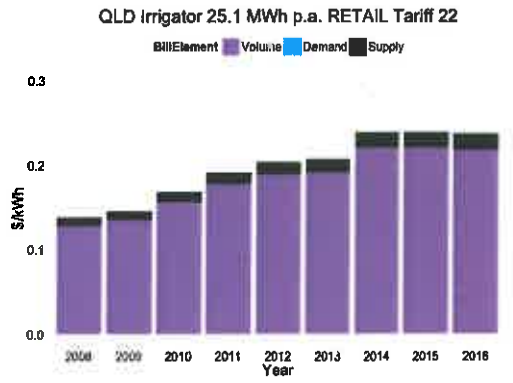
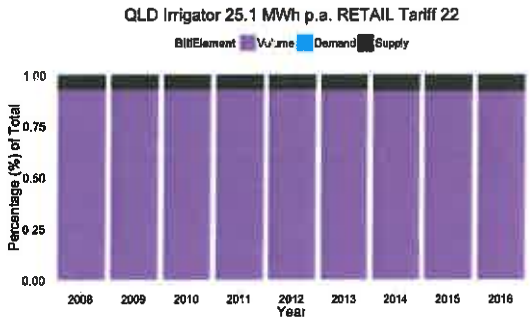


Figure 53. QLD Irrigator 25 MWh p.a. retail bill breakdown (Tariff 22)



Compared to Tariff 62, this irrigator would be pay a comparable annual bill if they were supplied on Tariff 22, but their bill has a (slightly) higher supply charge component.

5.3 403 MWh per annum case study on Tariff 62

How would the 403 MWh per annum irrigator fare on Tariff 62? The annual bill is in Figure 54 , the average price in Figure 55 and the bill breakdown in Figure 56.

Figure 54. QLD Irrigator 403 MWh p.a. retail annual bill (Tariff 62)

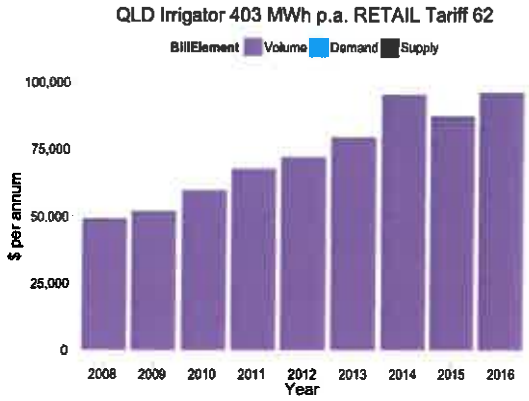


Figure 55. QLD Irrigator 403 MWh p.a. retail average price (Tariff 62)

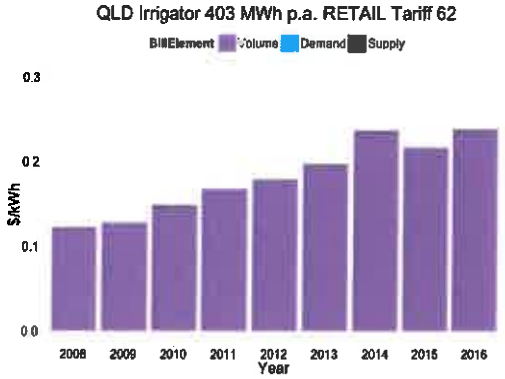
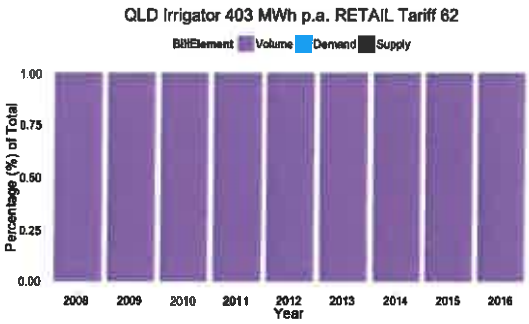


Figure 56. QLD Irrigator 403 MWh p.a. retail bill breakdown (Tariff 62)



The supply charge for a 403 MWh per annum customer is less than 0.3% of the total bill.

Large user irrigators (>100 MWh p.a.) who wish to leave Tariff 62 or 65 could move onto demand-based tariffs 44, 45 and 46, which have been available since 1 July 2012. If the large irrigator decided to move off their existing Tariff 62 or 65, we show the

outcomes if the 403 MWh p.a. irrigator decided to choose either of these three demand-based tariffs. The outcomes for the 403 MWh p.a. irrigator assuming Tariff 44 is shown in Figure 57, Figure 58 and Figure 59.

Figure 57. QLD Irrigator 403 MWh p.a. retail annual bill (Tariff 44)

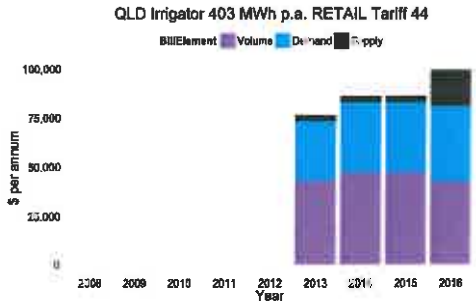


Figure 58. QLD Irrigator 403 MWh p.a. retail average price (Tariff 44)

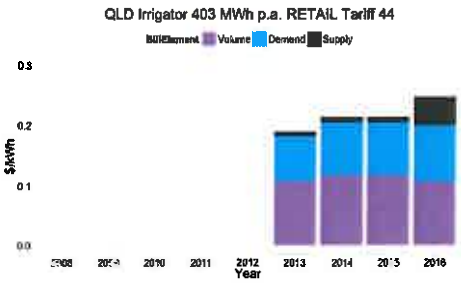
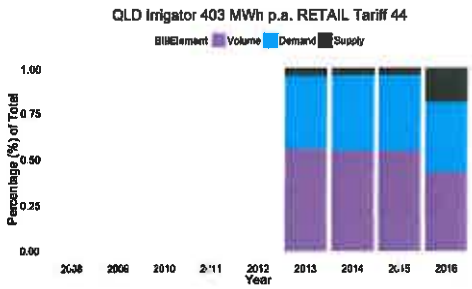


Figure 59. QLD Irrigator 403 MWh p.a. retail bill breakdown (Tariff 44)



In 2016, a significant increase in the supply charge was observed. Overall however the total annual bill is comparable to the amount that would be paid on Tariff 62.

We now examine the outcomes for the 403 MWh p.a. irrigator if they chose Tariff 45. The outcomes are shown in the retail annual bill in Figure 60, the average price in Figure 61 and the bill breakdown in Figure 62.

Figure 60. QLD Irrigator 403 MWh p.a. retail annual bill (Tariff 45)

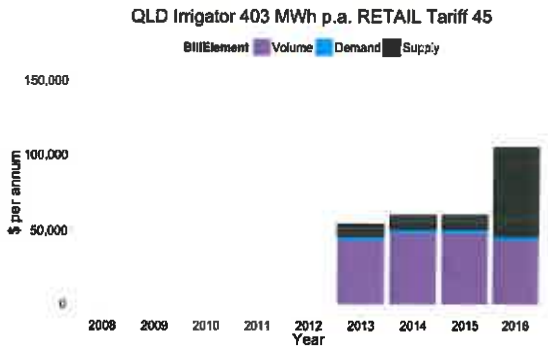


Figure 61. QLD Irrigator 403 MWh p.a. retail average price (Tariff 45)

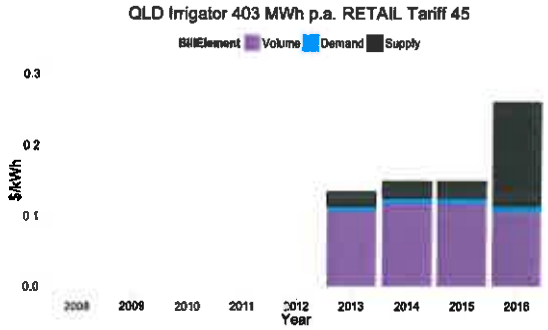
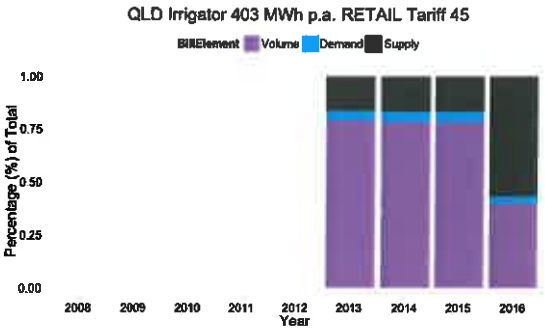


Figure 62. QLD Irrigator 403 MWh p.a. retail bill breakdown (Tariff 45)



The total bills are marginally higher for the irrigator if they chose Tariff 45 (~5% higher), however the supply charge element is significantly higher than Tariff 62 at approximately 60% of the total bill.

Finally, the outcomes if the large 403 MWh p.a. irrigator chose Tariff 46 (Demand Large) are shown. The annual bill is in Figure 63, the average price in Figure 64 and the bill breakdown in Figure 65.

Figure 63. QLD Irrigator 403 MWh p.a. retail annual bill (Tariff 46)

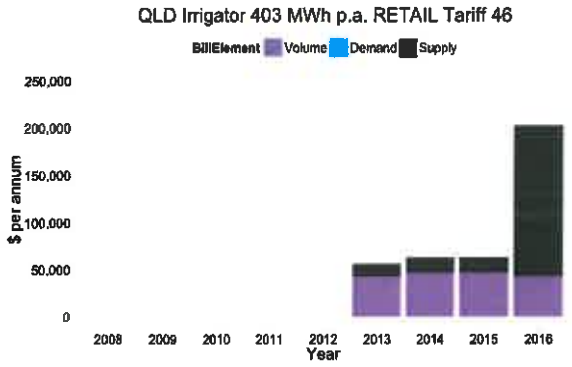


Figure 64. QLD Irrigator 403 MWh p.a. retail average price (Tariff 46)

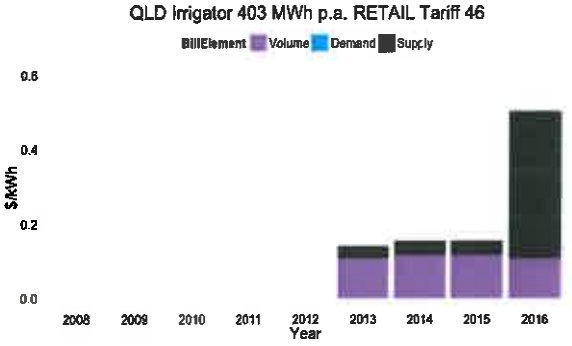
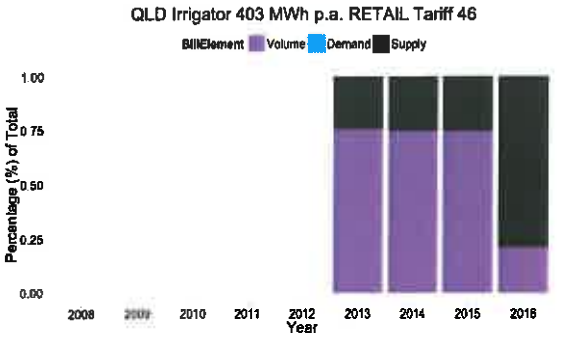


Figure 65. QLD Irrigator 403 MWh p.a. retail bill breakdown (Tariff 46)



The annual bill is more than double under Tariff 46 than Tariff 62 and the supply charge element of the bill is an astounding 80%.

6 Discussion

This section summarises the main observations and then makes various recommendations on the design of tariffs suitable to irrigators.

6.1 Observations

- Over the period 2008/9 to 2015/6, prices have increased significantly in all areas of the NEM but the increases have been the highest, by far, in QLD.

- Comparing the network tariff outcomes across Queensland (Ergon Energy), NSW (Essential Energy), Victoria (Powercor and Ausnet Services), Tasmania (TasNetworks) and SA (SA Power Networks) reveals the highest average price ($/kWh) for small irrigators (< 100 MWh p.a.) are within the Ergon Energy distribution network.

- Prices have stabilised in SA, although the introduction of a supply charge in 2016 has increased the "fixed" proportion of the bill, reducing the irrigators' ability to reduce their bill outcome by reducing their consumption. However the proportion of the Tariff that is fixed does not seem to be excessive.

- Small irrigators in Queensland who are currently on the regulated retail Tariff 62 or 65 are not required to leave those tariffs until 30 June 2020 and Tariff 62 continues to be available for customers in the Ergon region. Prices for these tariffs over the last three years have stabilised, albeit at high levels compared to those paid by irrigators elsewhere in Australia.

- The QCA in their 2014/15 Determination indicated small irrigators on the regulated retail tariffs 62 or 65 are expected to move to Tariff 22 "Business Time-of-Use". Our case study revealed that if a small irrigator decided to move to this Tariff the outcomes would be comparable with their bill (on 62 or 65) but they would pay a higher supply charge (from ~$0.65 per day to $1.30 per day) and the gap between peak and off-peak prices would be smaller, reducing the time-variance in prices compared with those in Tariff 62 and 65. However in the

2015/16 Determination, the QCA has since made this Tariff 22 obsolete as of 1 July 2015, and will be removed as of 30 June 2017. For those customers currently on Tariff 22, they will be transferred to Tariff 22A with higher peak charges and no relief in the off-peak charge. Comparing tariffs 22A, 62 and 65, the heat maps shows that small irrigators will be worse off should they leave their current Tariff 62 or 65 for Tariff 22A.

- Large irrigators in Queensland currently on retail Tariff 62 or 65 have the option to leave this volume-based tariff and move to a demand-based retail tariff which has been available since 1 July 2012. The large irrigators can choose between three demand-based tariffs (Tariff 44, 45, 46). Each has a different demand threshold and supply charge. Irrigators that choose a low demand threshold, pay a higher demand bill, however they also pay a lower supply charge. The case study showed that the large irrigator would pay a comparable total bill if they left their Tariff 62 for a demand-based Tariff (Tariff 44). However more than three-quarters of their bill would be a mixture of supply and demand charges. Large irrigators would pay far higher bills if they switched to tariff 46 and their bill would become almost completely fixed.

- The demand-based Ergon network tariffs available to large irrigators have seen a significant increase in the fixed charge in 2015 and 2016 with little variation in other tariff elements (volume or demand). For example, supply charge in the "Demand Large" Tariff increased thirteen fold from 2014 to 2015. The Tariff 46 supply charge increase ten fold from 2015 to 2016.

- Evidently electricity tariffs in Ergon's area have been problematic for some time. New tariffs are described as "cost reflective" but they do not satisfy this claim. To the contrary they rely on extraordinary increases in fixed charge – contrary to the principles promoted by the Australian Energy Markets Commission that tariffs should be based on long run marginal costs. The network charges in Ergon's tariffs 44, 45 and 46 reflect incentives arising under a system of tariff equalisation, which encourages Ergon to increase network charges in order to maximise tariff equalisation payments.

- The best that might be said in the current situation in Queensland is that irrigators in Queensland can at least choose to remain on their existing tariffs. If irrigators are in future forced to change to new tariffs, irrigators should insist that those tariffs are economically sensible. The currently proposed tariffs 44, 45 and 46 do not satisfy this requirement.

6.2 Recommendations on the design of tariffs applicable to irrigators in the National Electricity Market

We have been asked to advise on the appropriate design of network tariffs for irrigators in the NEM. We do this and also reflect briefly on the design of retail tariffs.

Electricity pricing is complex, and it has given rise to a vast academic and practitioner literature. The structure of prices has to reflect a compromise between many competing factors and in particular:

- customers' desire for fairness over time and relative to each other (though fairness can not be objectively defined);
- customers' right to be protected from the risk that their investment in electricity consumption infrastructure (in the case of irrigators, their electrical water pumps and connection assets) becomes stranded because failures in industry regulation and governance have resulted in excessive prices;
- the value to consumers, producers and distributors of simplicity and understandability;
- the objective that prices reflect the incidence of likely future costs, so that those customers' whose consumption induces higher expenditure by the producers and distributors that serve them, pay higher prices.
- regulated utilities' entitlement under the current arrangements (whether customers agree with it or not) to recover regulated revenues through monopoly charges;

It is easy to agree on the list of factors to be taken into account in designing tariffs but several of these objectives conflict with one another and can plausibly be interpreted in a variety of ways. Various stakeholders will, plausibly, have different views on which

objective should take precedence. With this in mind, the main points of our advice on tariff structures are as follows:

- **Supply charges:** These charges are connection-specific and do not vary with consumption. They should be set at a level high enough to recover individual customer specific costs – such as for reading and supplying meters – (i.e. costs that are not shared with other consumers and which do not vary with the customers' level of consumption or demand. We would expect that such charges would not exceed $130 per connection per year.

- **Consumption charges:** These charges are levied per kWh consumed. They should be set to cover costs that are variable in the short term and also to make a contribution to the recovery of reasonably incurred sunk costs. The design of consumption charges should also reflect the following considerations:

    a) It may be sensible to have consumption charges that vary by time of day: such as peak and off-peak or peak, standard and off-peak and where applicable should reflect seasonal variations.
    b) The difference between peak, off-peak and if applicable standard rates should reflect the existence of temporally defined capacity constraints and customers' temporally varying elasticity of demand.
    c) If there are to be significant differences between the peak and off-peak rates (peak rates greater than, say, twice off-peak rates) then it is important that the peak rates apply for limited intervals – not longer than say three hours - so that irrigators can respond to those prices by reducing their consumption.

- **Demand charges:** Charges for peak demand in addition to, or as an alternative to consumption charges, introduce additional complexity in metering and billing: specifically the requirement for half-hourly remotely read meters. Demand charges are plausible for higher consumption customers (those that are likely to consistently consume more than 100 MWh per year). An economically sound specification of demand changes should reflect the following:

a) Demand charges should not be subject to minimum chargeable demand levels. Such minimum thresholds simply turn demand charges into fixed charges, which defeats the rationale for their inclusion.
b) It is plausible to differentiate demand charges by voltage of supply (in recognition of the greater amount of infrastructure required to supply lower voltage customers relative to higher voltage customers).
c) It is not plausible to differentiate demand charges on the basis of subscribed or minimum maximum demands.
d) Demand charges should signal expected future network capacity shortfalls that may arise (depending on the network) during periods of simultaneous peak demands. The applicable period should be short (no more than three hours). This is adequate to capture the time periods when peak demands are most likely to arise. Sufficiently short peak demand charge periods are also necessary to provide irrigators with an opportunity to reduce their bills by reducing demand in those periods.

Appendix A: Network versus non-network: Queensland case study

See separate document.

Appendix B – Analysis of irrigator demand data

See separate document.