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Customer Impact Analysis for Energy Queensland's Revised Tariff Structure Statement 2020-25

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About CEEM

The UNSW Centre for Energy and Environmental Markets (CEEM) undertakes interdisciplinary research in the design, analysis and performance monitoring of energy and environmental markets and their associated policy frameworks. CEEM brings together UNSW researchers from the Faculty of Engineering, the Australian School of Business, the Faculty of Arts and Social Sciences, the CRC for Low Carbon Living, the Faculty of Built Environment and the Faculty of Law, working alongside a number of Australian and International partners.

CEEM's research focuses on the challenges and opportunities of clean energy transition within market oriented electricity industries. Key aspects of this transition are the integration of large-scale renewable technologies and distributed energy technologies – generation, storage and 'smart' loads – into the electricity industry. Facilitating this integration requires appropriate spot, ancillary and forward wholesale electricity markets, entirely reenvisaged retail markets that suitably facilitate distributed resources, efficient network regulation that also supports beneficial innovation and incentivises distributed resources to provide competitive network services, and coherent and comprehensive wider energy and climate policies that can deliver the low carbon energy future required to address dangerous global warming.

Distributed Energy Resources (DERs) are a vitally important set of technologies, with vitally important stakeholders, for achieving low carbon energy transition and CEEM has been exploring the opportunities and challenges they raise for the future electricity industry for over a decade. More details of this work can be found at the Centre website. We welcome comments, suggestions and corrections on this submission, and all our work in this area. Please feel free to contact Associate Professor Iain MacGill, Joint Director of the Centre at i.macgill@unsw.edu.au.

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1 Background

This report follows on from the report 'Customer Impact Analysis for Energy Queensland's Tariff Structure Statement 2020-25, August 2019'. It is intended to help Energy Queensland (EQL) and stakeholders understand the customer impacts of the network tariffs proposed for the Energex and Ergon Energy 2020-25 revised Tariff Structure Statements. It uses the revised network tariffs as of November 2019. No assessment of retail tariffs is undertaken. The focus is on residential and small business customers with consumption less than 100 MWh per year connected to the LV network, as well as Life Support customers.

The aim is to understand the impacts on customers of shifting from energy-based network tariffs towards tariff structures with kW demand charges. The analysis presented here is a 'static' assessment of the network tariff impacts on different customer groups, meaning that no allowance has been made for changes in response to price signals or uptake of different technologies. A dynamic assessment is undertaken in a separate report.

2 Method

The UNSW Tariff Tool[1] was used to model the impact of different network tariffs on households and businesses in EQL's networks. Where network tariffs have a more complex structure, additional linear programming methods were used to supplement the Tariff Tool. For the remainder of this document, where we refer to tariffs, this should be understood to mean network tariffs.

2.1 Load data

The sample load data was provided by EQL and covered the Ergon Energy (East and West) and Energex (South East) pricing zones. It is intended to be statistically representative of the wider population in Queensland.[2] The East/West data are for financial year 2016-17 and the South East data are for calendar year 2017. The data includes load control but not solar export. Load data for Life Support customers was also provided, as discussed below.

Table 1 shows the number of customers with and without solar photovoltaics (PV) in each region. Table 2 shows the minimum, maximum and average sizes in each region. Figure 1 and Figure 2 show the size distribution of residential and business PV systems respectively.

It can be seen that the uptake of solar PV is higher for residential customers and for the South East region. The residential systems are on average larger in the Ergon West region, with the Ergon East systems being slightly larger than for the South East, which is consistent with trends in other states (larger houses in rural areas have larger roofs). The business PV systems show a greater difference in size, with the Ergon West systems being on average much smaller, although this is from a relatively small sample size.

Table 1 Number of customers with/out solar PV in the sample load data

Region	Customer type	No PV	Percentage	With PV	Percentage	Total
South East	Residential	2,741	54%	2,293	46%	5,034
	Business	1,788	94%	108	6%	1,896
Ergon East	Residential	964	71%	394	29%	1,358
	Business	1,430	89%	183	11%	1,613

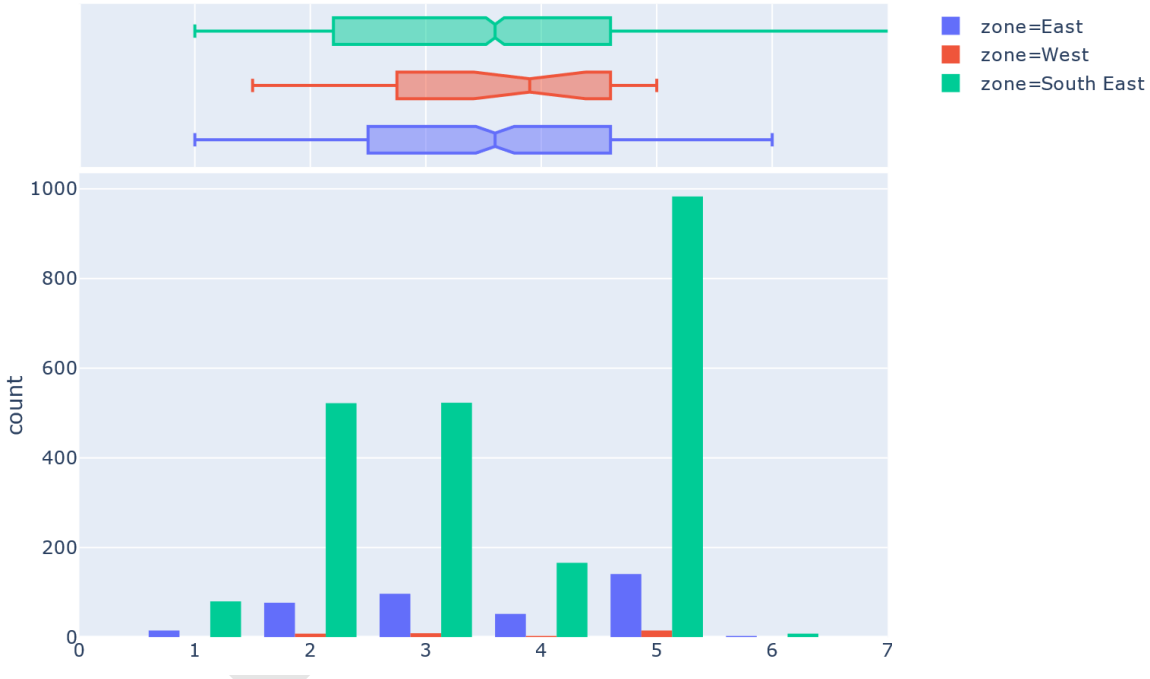
[1] More information on the Tariff Tool is available here http://www.ceem.unsw.edu.au/cost-reflective-tariff-design

[2] Each individual customer load includes a 'scaling factor'. Multiplication of the loads by their scaling factors results in a total load profile that is intended to be statistically representative of the wider population in Queensland.

Ergon West	Residential	116	67%	36	24%	152
	Business	163	86%	26	14%	189
TOTALS		7,202		3,040		10,242

Table 2 Size distribution of solar PV (by inverter)

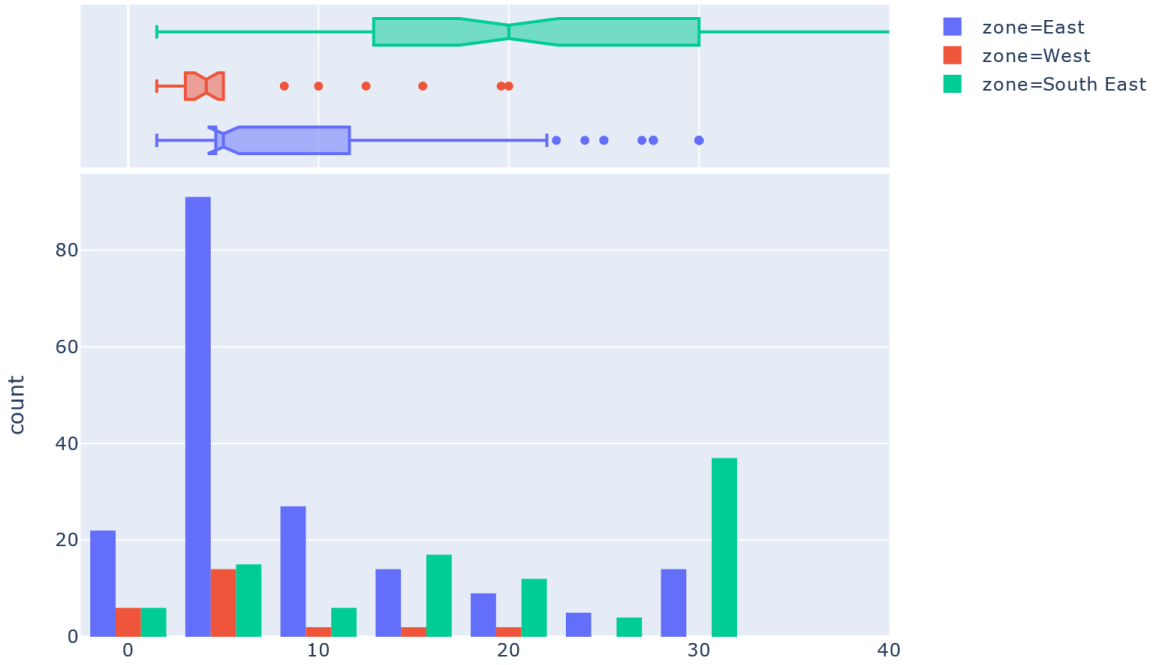
Region	Customer type	Minimum (kW)	Maximum (kW)	Average (kW)	Median (kW)
South East	Residential	1	12.95	1.34	3.6
	Business	1.5	100	17.2	20
Ergon East	Residential	1	15	1.63	3.6
	Business	1.5	366	27.6	5
Ergon West	Residential	1.5	15	2.29	3.9
	Business	1.5	20	5.29	4.1



kW	1 (0.5-1.5)	2 (1.5-2.5)	3 (2.5-3.5)	4 (3.5-4.5)	5 (4.5-5.5)	6 (5.5-6.5)	>6.5
East	15	77	97	52	141	3	9
West	0	8	9	3	15	0	1
South East	80	522	523	166	983	8	11

Figure 1 Size Distribution of Residential Systems

The 'pinch point' in the box represents the median, the ends of the box are the upper and lower 25th percentile, which creates the Interquartile Range (IQR), the ends of the whiskers are 1.5 times the IQR. Note that the very largest systems have been excluded from this chart in order to make the rest clearer.



kW	0 (<2.5)	5 (2.5-7.5)	10 (7.5-12.5)	15 (12.5-17.5)	20 (17.5-22.5)	25 (22.5-27.5)	30 (27.5-32.5)	>32.5
East	22	91	27	14	9	5	14	1
West	6	14	2	2	2	0	0	0
South East	6	15	6	17	12	4	37	11

Figure 2 Size Distribution of Business Systems

The 'pinch point' in the box represents the median, the ends of the box are the upper and lower 25th percentile, which creates the Interquartile Range (IQR), the ends of the whiskers are 1.5 times the IQR, and the dots are outliers. Note that the very largest systems have been excluded from this chart in order to make the rest clearer.

Life Support

EQL also provided interval data for 24 residential customers identified as Life Support, 11 of which had solar PV systems. These customers are analysed in Section 3.2.

2.2 Tariffs

The tariffs assessed for each pricing zone are listed for the South East (Table 3) and Ergon East (Table 4), with the price details for each tariff listed in Appendix A. Unless otherwise stated, all tariffs are as proposed for 2020/21.

Table 3. Energex South East Network Tariffs

Customer type	Tariff Name	Explanation
Residential	Flat (2019/20)	Flat energy charge
	Flat	Flat energy charge
	TOU Energy	Peak energy rate 4pm to 9pm, shoulder 9pm to 9am, off peak 9am to 4pm all days
	Transitional Demand	The peak demand charge is paid 4pm to 9pm all days
	Demand	The peak demand charge is paid 4pm to 9pm all days

	Economy Load Control	Paid only on controlled load
Small Business	Flat (2019/20)	Flat energy charge
	Flat	Flat energy charge
	Wide IFT	Applies to small business customers with basic metering and consuming more than 20MWh per year. As the annual electricity use increases through each 20MWh band the daily fixed charge increases
	TOU Energy	Is as for the Wide IFT but also has a peak energy rate 4pm to 9pm weekdays, shoulder 4pm to 9pm weekends and 9pm to 9am all days, off peak 9am to 4pm all days
	Transitional Demand	Has a demand charge based on the monthly peak 4pm to 9pm weekdays
	Demand	The peak demand charge is paid 4pm to 9pm weekdays
	Primary Load Control	Paid only on controlled load

Table 4. Ergon East Network Tariffs

Customer type	Tariff Name	Explanation
Residential	Inclining Block Tariff (2019/20)	Block 1, 0-<1MWh/yr; block 2, 1-6MWh/yr; block 3 6-100MWh/yr
	IBT	As for IBT 2019/20
	TOU Energy	Peak energy rate 4pm to 9pm, shoulder 9pm to 9am, off peak 9am to 4pm all days
	Transitional Demand	The peak demand charge is paid 4pm to 9pm all days
	Demand	The peak demand charge is paid 4pm to 9pm all days
	Volume Controlled	Paid only on controlled load
Small Business	Inclining Block Tariff (2019/20)	Block 1, 0-<1MWh/yr; block 2, 1-20MWh/yr; block 3 20-100MWh/yr
	IBT	As for IBT 2019/20
	Wide IFT	Applies to small business customers with basic metering and consuming more than 20MWh per year. As the annual electricity use increases through each 20MWh band the daily fixed charge increases
	TOU Energy	Is as for the Wide IFT but also has a peak energy rate 4pm to 9pm weekdays, shoulder 4pm to 9pm weekends and 9pm to 9am all days, off peak 9am to 4pm all days
	Transitional Demand	Has a demand charge based on the monthly peak 4pm to 9pm week days
	Demand	The peak demand charge is paid 4pm to 9pm week days
	Primary Load Control	Paid only on controlled load

2.3 Analyses Undertaken

2.3.1 Load Data Analysis

Load data analysis can provide a useful context for the outcomes of the tariff analysis. For each pricing zone the following analyses were undertaken separately for residential main load, residential controlled load and business load. The results of the load analysis are in Appendix B.

1. Aggregated annual load profile

This is used to identify broad trends of high or low electricity use.

2. Aggregated annual daily load

This is useful at a high level to characterise the times of the day when electricity is used the most and the least throughout the year.

3. Aggregated monthly daily load

This is useful at a high level to characterise how the average daily use changes from month to month.

4. Week of peak day of aggregated load

This is useful to identify the day and time when the aggregated peak demand occurs, including whether this is also evident during the days either side.

5. Histogram of electricity use for all customers

This illustrates the spread of customer electricity use and is useful to show whether they are clustered around a certain point (or points) and the number and extent of outliers.

2.3.2 Tariff Impact Analysis

The overarching aims of the tariff analysis are:

a) To understand the impacts of shifting from energy-based network tariff structures to kW demand charges,

b) To help identify which customers would be winners and losers,

Two separate assessments were undertaken: one of the outcomes of different tariffs for 'All customers', and one for the outcomes for customers with and without solar PV. Where calculations involved the aggregation of customers (such as average load profiles etc), individual customer loads were first multiplied by their scaling factor.

'All Customer' impacts

The aggregated impact on each of the following customer groups was assessed:

i. South East Residential
ii. South East Small Business
iii. Ergon East Residential
iv. Ergon East Small Business
v. Life Support Residential Small
vi. Life Support Business Large

Comparing Customers with and without Solar PV

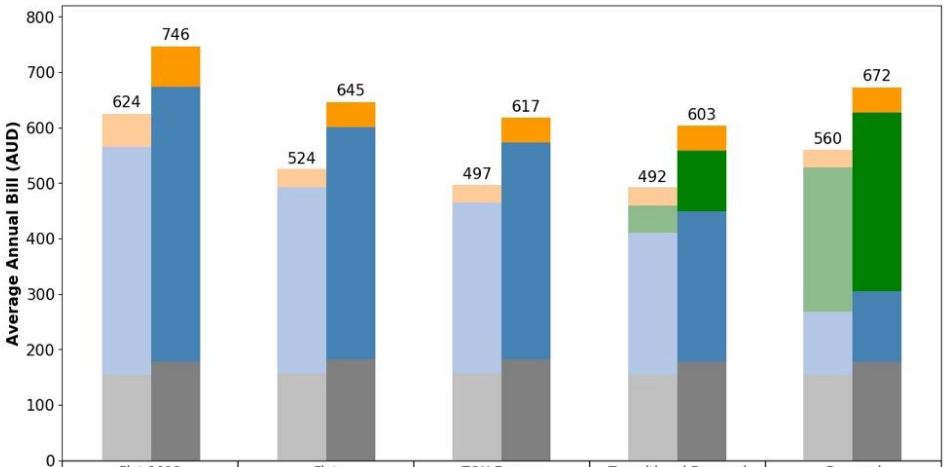
The impacts of the different tariff options on customers with PV were compared to the impacts on customers without PV. Note that, being a static analysis, this does not assess the impact of actually installing PV, it only compares the impacts of different tariffs on customers that current have, or do not have, PV – whose electricity use and therefore bills could differ for other reasons. To understand the impact of actually installing PV, a dynamic assessment must be undertaken. Also, this analysis included only the DUOS and NUOS impacts and so did not include the value of solar export.

2.4 How to read the charts

This section explains how to read the four types of charts that are used in this report.

2.4.1 Column charts

The column charts compare the annual average bills under each tariff. Example Figure 1 compares the average annual bills for residential customers in South East Queensland under the different 2020/21 tariffs to the 2019/20 tariff. Each of the columns split into the different bill components: daily fixed charge, volume charge and demand charge where relevant.

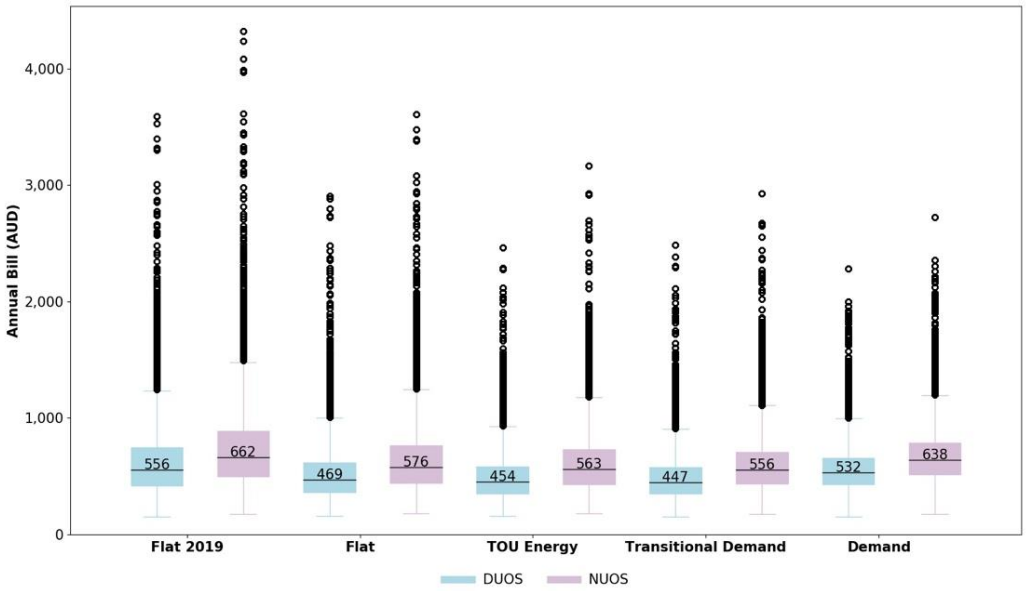


	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	59	72	32	45	32	45	32	45	32	45
CL Daily Charge	0	0	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	49	110	261	322
Main Energy Charge	412	496	336	418	308	391	258	270	114	127
Main Daily Charge	154	178	157	182	157	182	154	178	154	178

Example Figure 1. Column Chart Comparison of Average Annual Bills, South East Residential

2.4.2 Box and whiskers

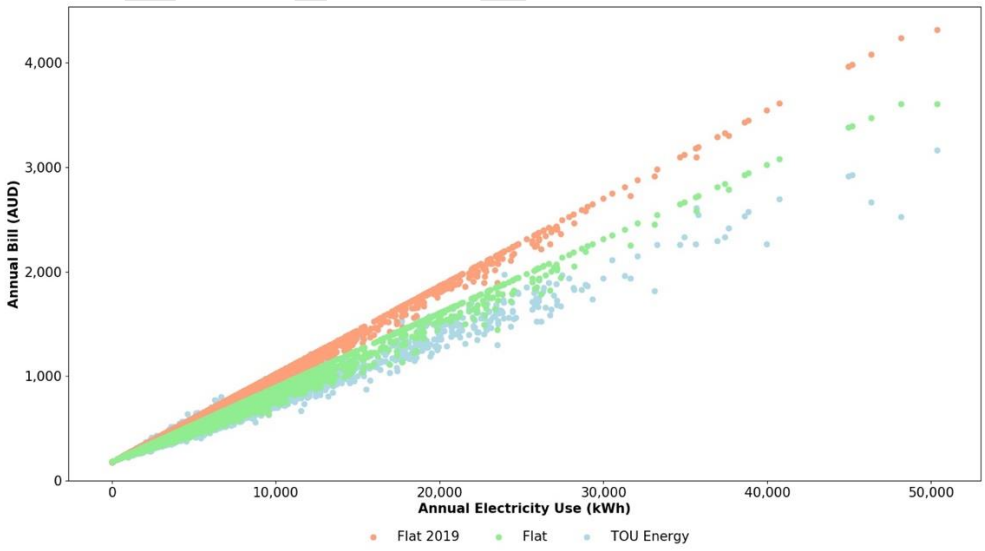
Box and whiskers charts are useful to show the range or spread in the customer bills. Example Figure 2 shows the same outcomes as Example Figure 1 above. The line in the middle of the box represents the **median** bill. The median bill is obtained by firstly arranging all the bills in order of increasing value, then selecting the 'middle' customer's bill (for example, if there are 9 customers, then after they are arranged in order of increasing bills, customer number 5 would have the median bill). The average shown in the column charts can be increased by a small number of very high use customers (the outliers discussed below). In this case, the median can provide a better indication of the 'typical' bill impact. The ends of the **box** are the upper and lower 25th percentile, which creates the Interquartile Range (IQR). This means that 25% of customers are above the top of the box and 25% are below the bottom, so the box is the middle 50%. The ends of the **whiskers** are 1.5 times the IQR, and the dots are outliers (defined as not within 1.5 times the IQR).



Example Figure 2. Box and Whiskers Chart Comparison of Annual Bills, South East Residential

2.4.3 Scatter plots

Scatter plots are useful because they show how one value is related to another value, for each customer separately. Example Figure 3 shows how the customer bills are related to how much electricity they use. If a customer is on a simple c/kWh tariff, the chart would just show a straight line, increasing as electricity use increased. The green dots scattered lower down are because those houses have controlled load (e.g. for hot water) and occur because the controlled load tariff rate is lower. The blue dots scattered higher occur on the TOU Demand tariff where customers have peakier loads and so pay more in the high price periods.



Example Figure 3. Scatterplot Comparison of Average Customer Bills for different tariffs vs Annual Electricity Use, DUOS, South East Residential

3 Results

The **Tariff** analysis presented in Section 3.1 is for each customer group within each region and:

- Compares the average and median bills under each tariff in 2020/21 to the average and median bill under the Flat tariff in 2019/20.
- Calculates the percentage of customers who are better or worse off under different tariffs.
- Uses scatter plots to show how the impact of different tariffs changes as electricity use changes.
- Compares the annual and median bills of customers with solar PV under the different tariffs available, and also compares the annual and median bills of customers with and without solar PV under each tariff in 2020/21.

3.1 Tariff Analysis

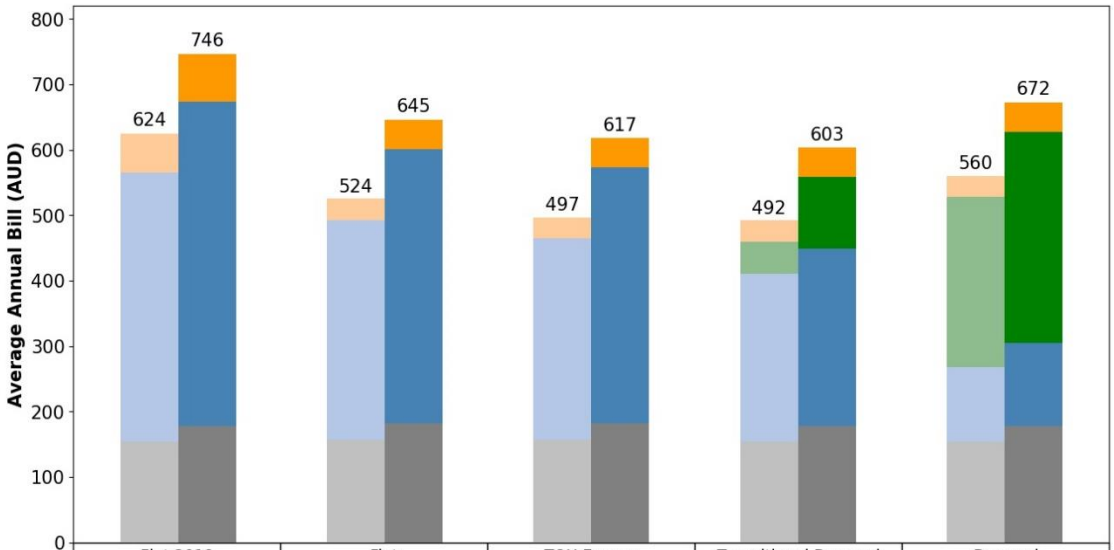
3.1.1 South East Residential

3.1.1.1 2020/21 Tariff Comparison

Figure 3 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 Flat tariff. Figure 4 compares these tariffs showing the median and spread as defined above. Table 5 shows the percentage change in the median annual bills compared to the 2019/20 tariff. Table 6 shows the percentage of customers that are either better or worse off in moving from the Flat tariff to the other 2020/21 tariffs.

Key Points:

- The average and median bills under all the 2020/21 tariffs are lower than under the 2019/20 tariff, more so for DUOS than for NUOS.
- Of the 2020/21 tariffs, the Transitional Demand tariff results in the lowest average and median bills. This is because its lower energy charge more than compensates for its demand charge.
- The bills under the Demand tariff are higher simply because its demand charge is much greater, which overcomes the benefit of the lower energy charge. Under both these demand tariffs, customers that have a peaky load (poor load factor) but can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- Under all tariffs the customer bills are fairly tightly clustered around the median, although there are some very high outliers, some of which reach over $4,000/year under the 2019/20 Flat tariff and up to $3,500 under the 2020/21 tariffs. Interestingly, the outliers have lower bills under the more cost-reflective tariffs, indicating they have better load factors.
- As shown in Table 6, compared to the Flat tariff, most customers are better off under the TOU Energy and Transitional Demand tariffs – with a greater % improvement in DUOS than in NUOS. A smaller proportion are better off under the Demand tariff, highlighting the importance of reducing demand during the tariff's peak period.



	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	59	72	32	45	32	45	32	45	32	45
CL Daily Charge	0	0	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	49	110	261	322
Main Energy Charge	412	496	336	418	308	391	258	270	114	127
Main Daily Charge	154	178	157	182	157	182	154	178	154	178

Figure 3. Comparison of Average Annual Bills, South East Residential

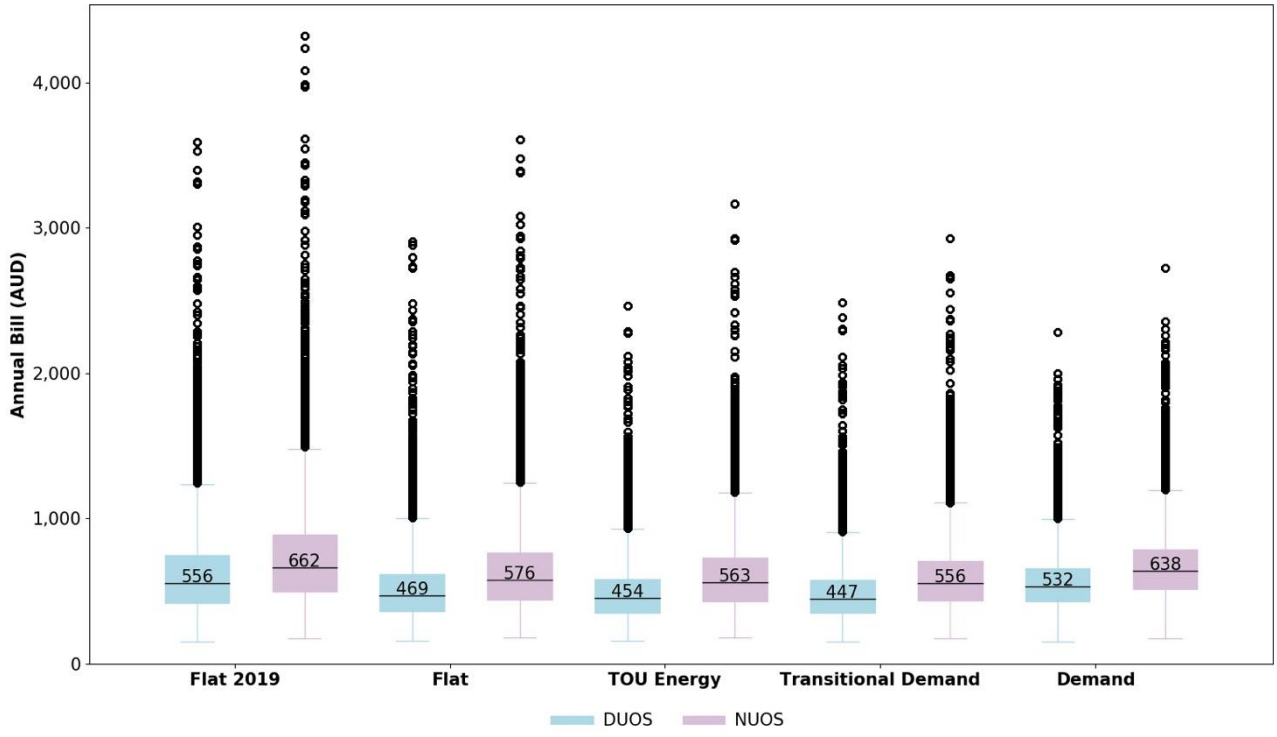


Figure 4. Comparison of Annual Bills, South East Residential

Table 5. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, South East Residential

Tariff	Change	
	DUOS	NUOS
Flat	-16%	-13%
TOU Energy	-18%	-15%
Transitional Demand	-20%	-16%
Demand	-4%	-4%

Table 6. Percentage of Customers Better Off and Worse Off When Moving from the Flat Tariff, South East Residential

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	71%	29%	69%	31%
Transitional Demand	90%	10%	75%	25%
Demand	24%	76%	30%	70%

3.1.1.2 Scatter plots of average bill versus annual electricity use

Figure 5 compares the average NUOS bills to annual electricity use, for the Flat 2019/20 tariff and the Flat and TOU Energy tariffs. Figure 6 shows the equivalent comparisons for the Transitional Demand and Demand tariffs. Figure 7 then compares the Flat, Transitional Demand and Demand tariffs. The equivalent DUOS charts are in Appendix C.

Key Points:

- As indicated above, the Flat, TOU Energy and Transitional Demand tariffs result in lower bills than the 2019/20 Flat tariff, especially as electricity use increases.
- If it were not for the impact of controlled load, both the 2019/20 and Flat tariffs would show a straight-line correlation between the annual bill and electricity use. All the points below the lines are for houses with controlled load and occur because the controlled load tariff rate is lower. The increased scatter in the Transitional Demand and Demand tariffs is due to their demand charges and customers' diverse load factors.
- The Demand tariff results in lower bills (than the 2019/20 Flat tariff) at higher levels of electricity use but can result in higher bills at lower electricity use for customers with peaky loads. This is because of the impact of the demand charge, which at lower levels of electricity use is not as well counteracted by the lower energy charge. This also occurs for the Transitional Demand tariff but to a lesser extent.
- Thus, for customers with lower levels of electricity use the Flat tariff generally results in lower bills, followed by the Transitional Demand, then the TOU Energy then the Demand tariff (although note there are some small customers that are better off under the demand tariffs). Customers with higher levels of electricity use would prefer the Demand tariff followed by the Transitional Demand and the TOU Energy, then the Flat tariff (although note the variation around the Demand tariff especially, which could make the Transitional Demand or the TOU Energy a better option).

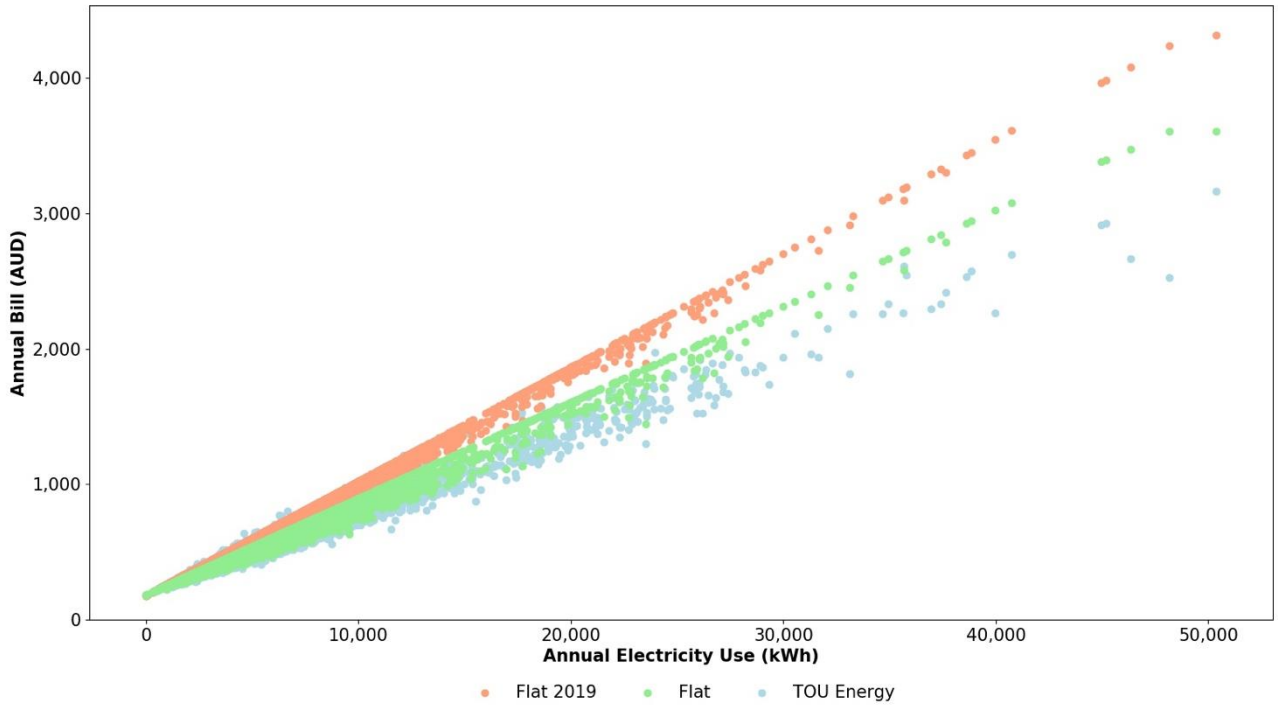


Figure 5. Comparison of Average Customer Bills for Flat 2019/20, Flat 2020/21 and TOU Energy 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Residential

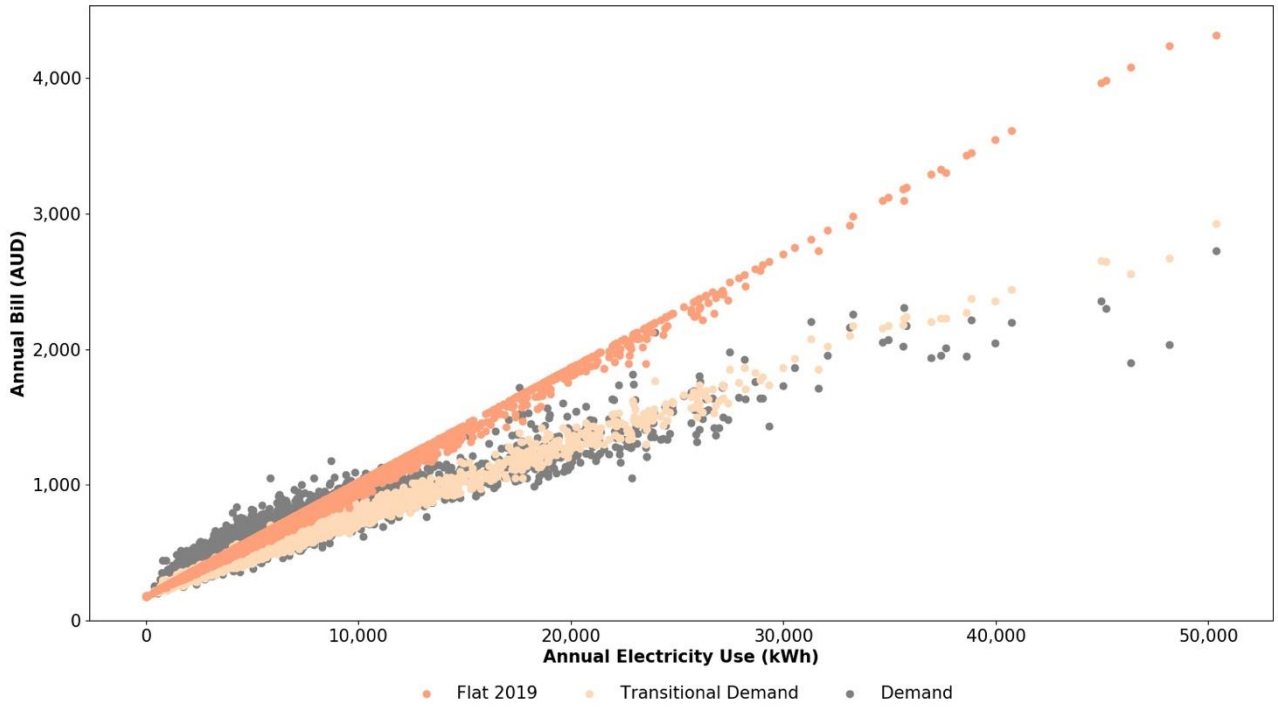


Figure 6. Comparison of Average Customer Bills for Flat 2019/20, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Residential

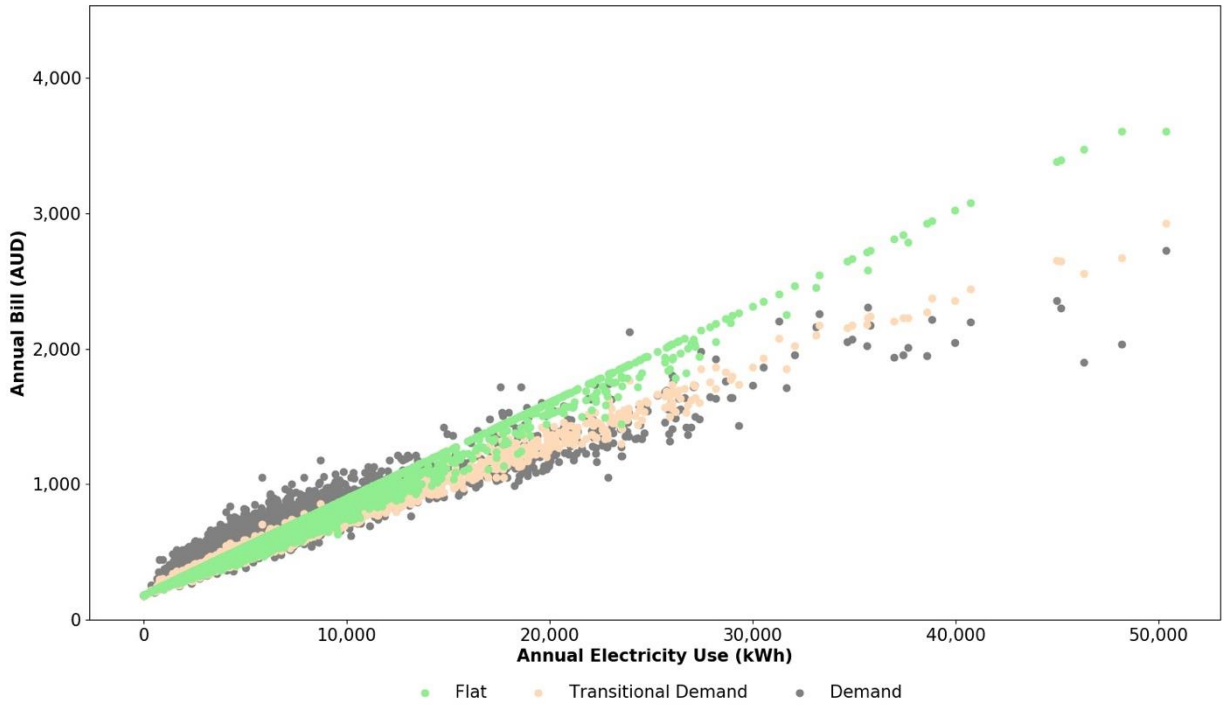


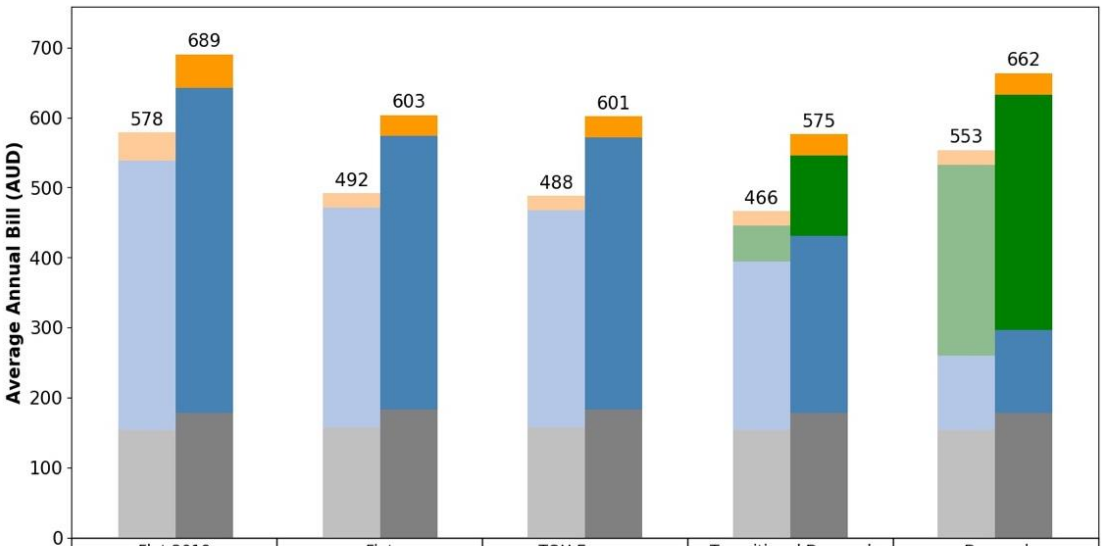
Figure 7. Comparison of Average Customer Bills for Flat 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Residential

3.1.1.3 Comparison of Residential Customers with and without Solar PV

Figure 8 and Figure 9 compare the outcomes under different tariffs for customers with solar PV, using both the average annual bills and the median and spread as defined above. Figure 10 compares the average NUOS bills for customers with and without solar PV under each of the tariffs. Table 7 shows the percentage change in the median annual bills compared to the 2019/20 tariff. Figure 11 to Figure 18 show the outcomes for customers with and without PV under different tariffs, again using both the average annual bills and the median and spread.

Key Points:

- The relative sizes of the average customer bills under the different tariffs was essentially the same as for the mix of solar and non-solar customers in Figure 3 and Figure 4, although the percentage median bill reductions are not as large, with the Demand tariff bill increasing slightly.
- Of the 2020/21 tariffs, the Transitional Demand tariff is the best option, and the Demand tariff results in higher average and median bills (although the average is lower than the 2019/20 Flat tariff).
- Compared to the Flat 2019/20 tariff, the difference in average NUOS bills between solar and non-solar customers is reduced under the 2020/21 tariffs, with the reductions greatest under the TOU Energy and Demand tariffs.
- In all cases the average and median bills are slightly lower for customers with PV, essentially because they draw less electricity from the grid. On average they draw 17.1kWh/day compared to 20.9kWh/day for non-PV customers.



	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	39	48	21	30	21	30	21	30	21	30
CL Daily Charge	0	0	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	51	115	272	336
Main Energy Charge	385	464	314	391	310	389	241	253	107	119
Main Daily Charge	154	178	157	182	157	182	154	178	154	178

Figure 8. Comparison of Average Annual Bills under Different Tariffs, customers with solar PV, South East Residential

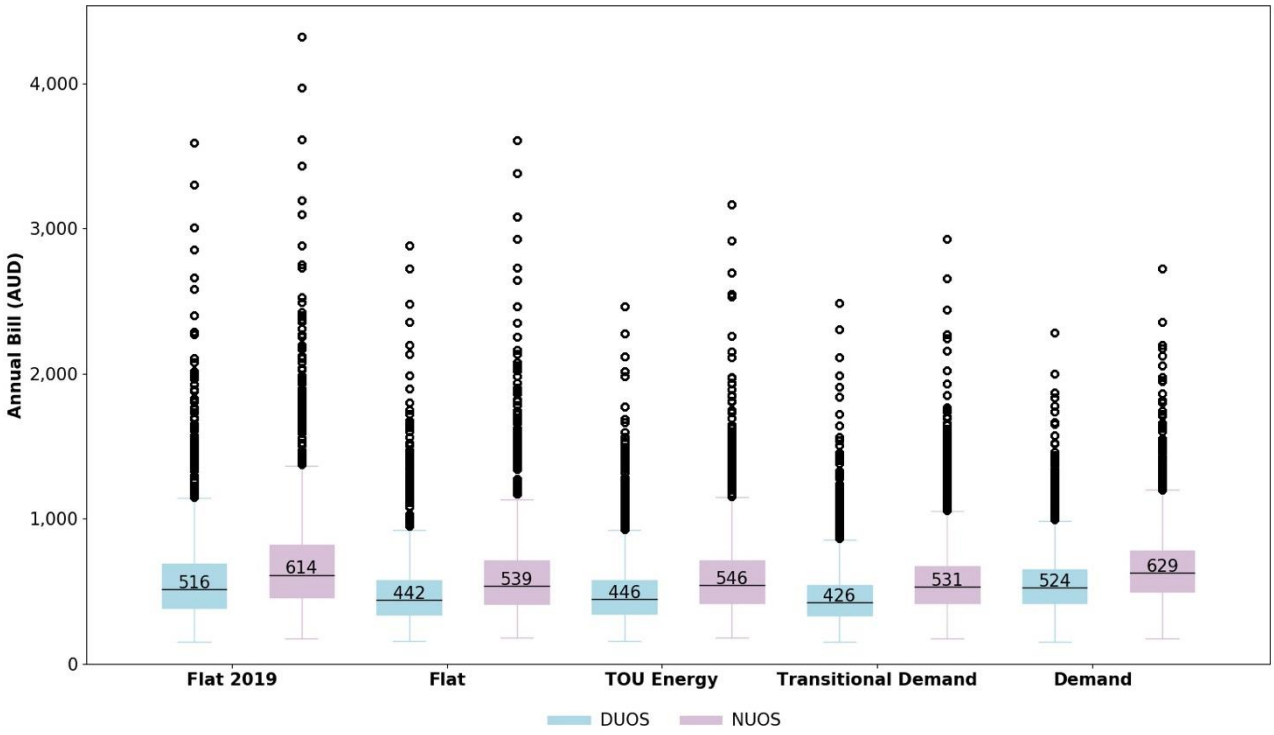
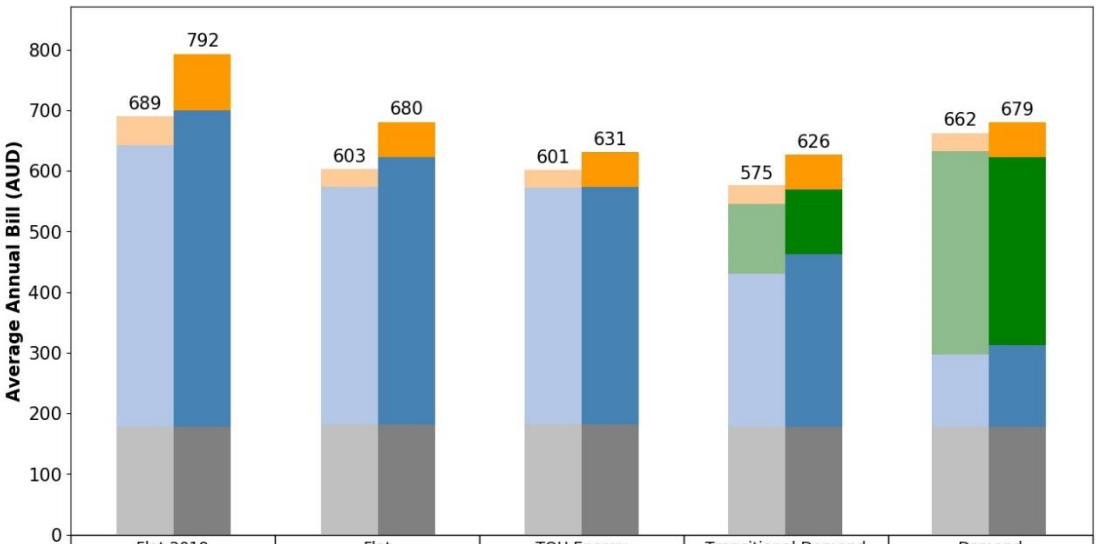


Figure 9. Comparison of Annual Bills under Different Tariffs, customers with solar PV, South East Residential

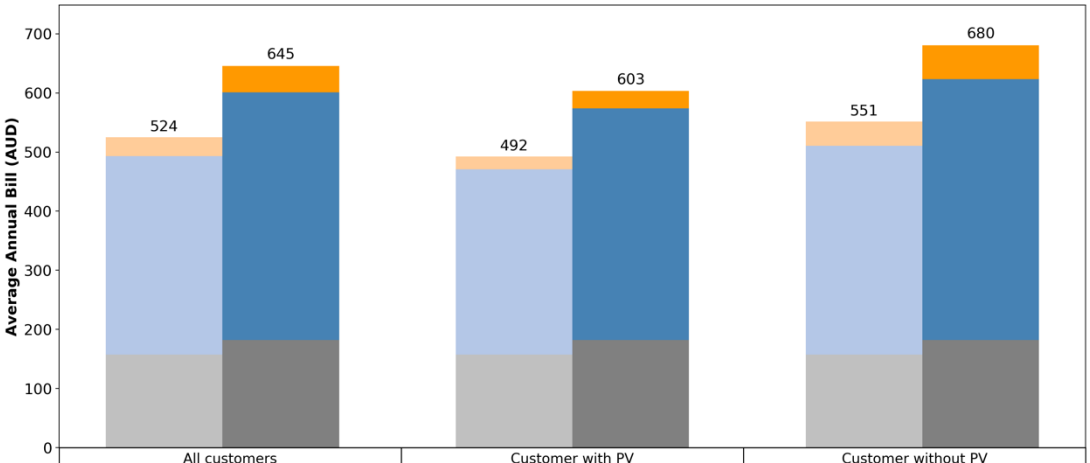


	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV
CL Energy Charge	48	92	30	57	30	57	30	57	30	57
CL Daily Charge	0	0	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	115	106	336	311
Main Energy Charge	464	522	391	441	389	392	253	285	119	134
Main Daily Charge	178	178	182	182	182	182	178	178	178	178

Figure 10. Comparison of Average Annual NUOS Bills of customers with and without solar PV under Different Tariffs, South East Residential

Table 7. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, South East Residential Customers with solar PV

Tariff	Change	
	DUOS	NUOS
Flat	-14%	-15%
TOU Energy	-14%	-11%
Transitional Demand	-17%	-14%
Demand	2%	4%



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	32	45	21	30	41	57
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	336	418	314	391	353	441
Main Daily Charge	157	182	157	182	157	182

Figure 11. Comparison of the Average Annual Bills of Customers with and without Solar PV: Flat tariff, South East Residential

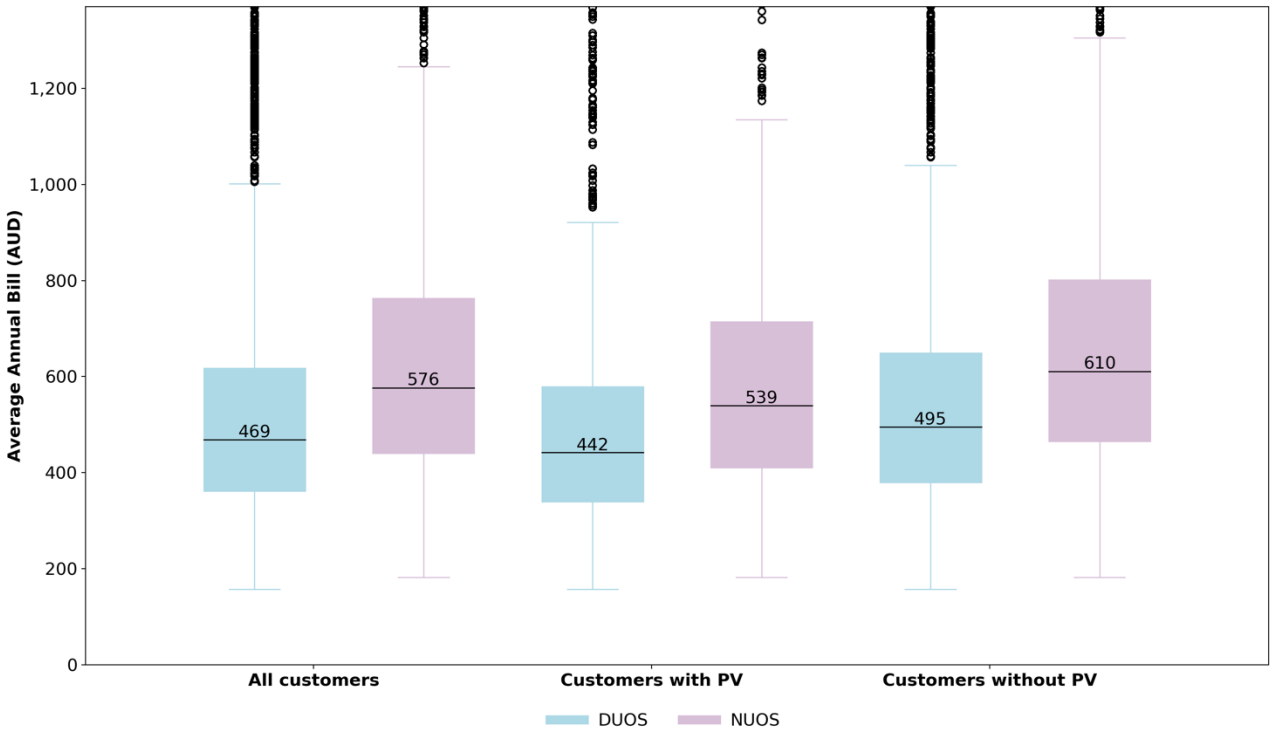
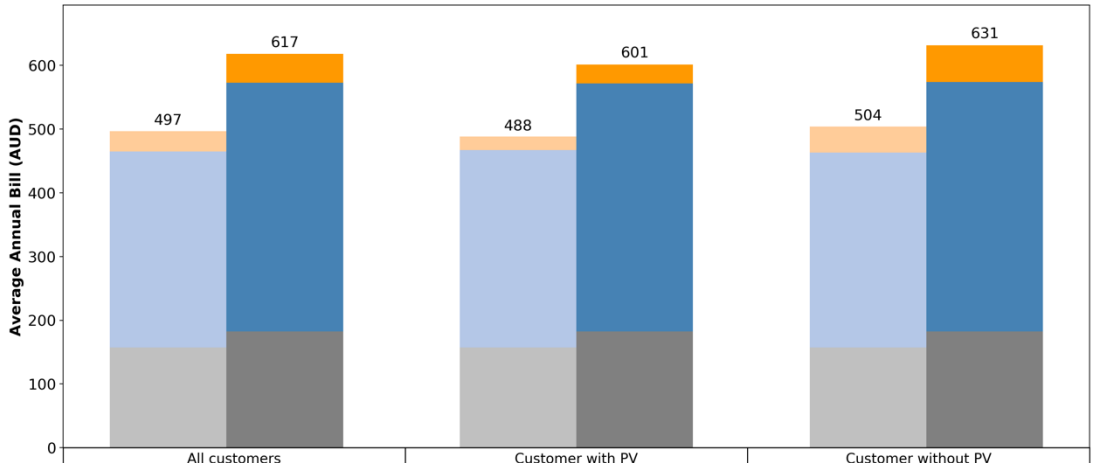


Figure 12. Comparison of the Annual Bills of Customers with and without Solar PV: Flat tariff, South East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	32	45	21	30	41	57
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	308	391	310	389	306	392
Main Daily Charge	157	182	157	182	157	182

Figure 13. Comparison of the Average Annual Bills of Customers with and without Solar PV: TOU Energy tariff, South East Residential

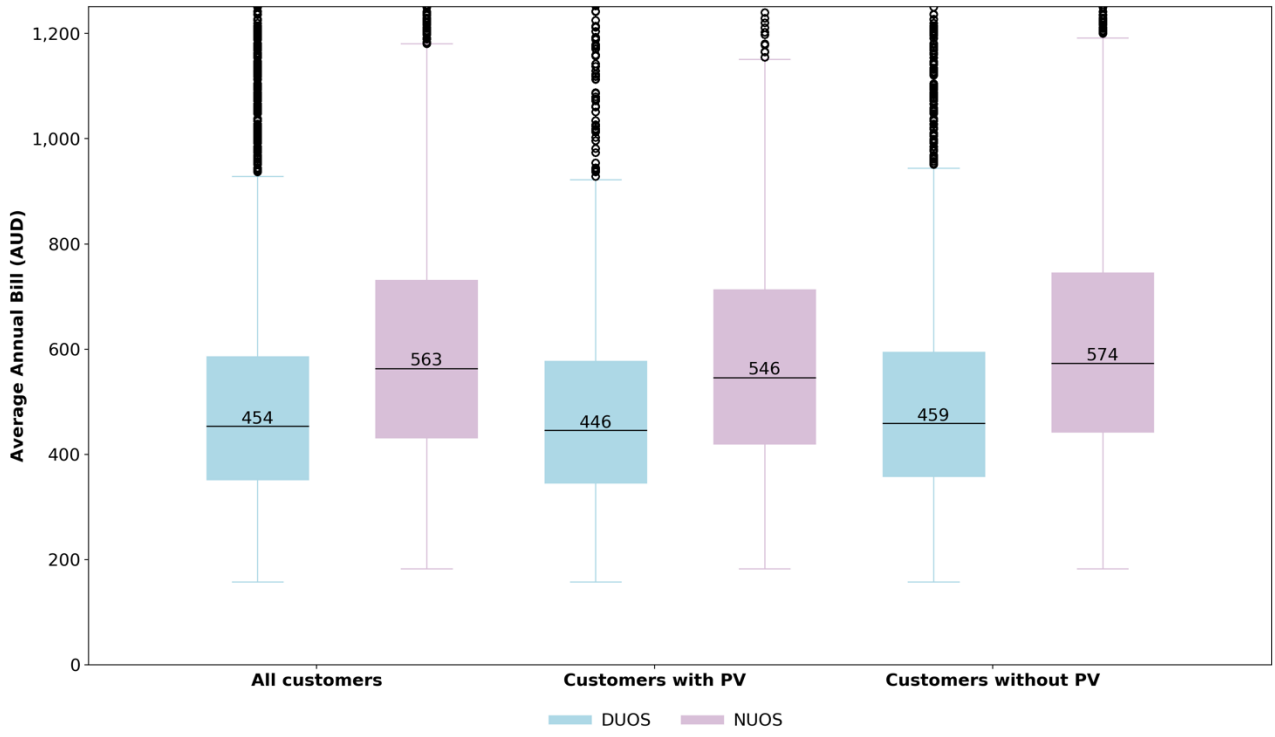
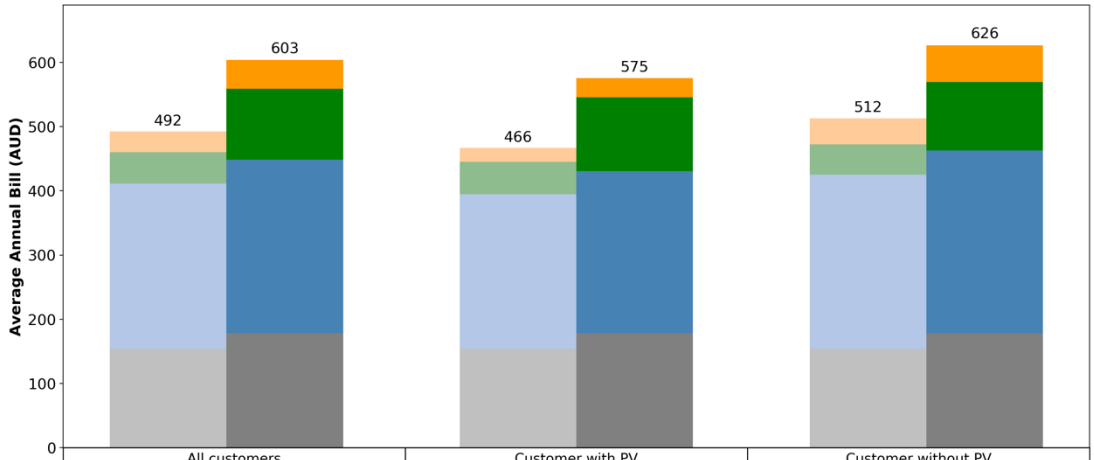


Figure 14. Comparison of the Annual Bills of Customers with and without Solar PV: TOU Energy tariff, South East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	32	45	21	30	41	57
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	49	110	51	115	47	106
Main Energy Charge	258	270	241	253	271	285
Main Daily Charge	154	178	154	178	154	178

Figure 15. Comparison of the Average Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, South East Residential

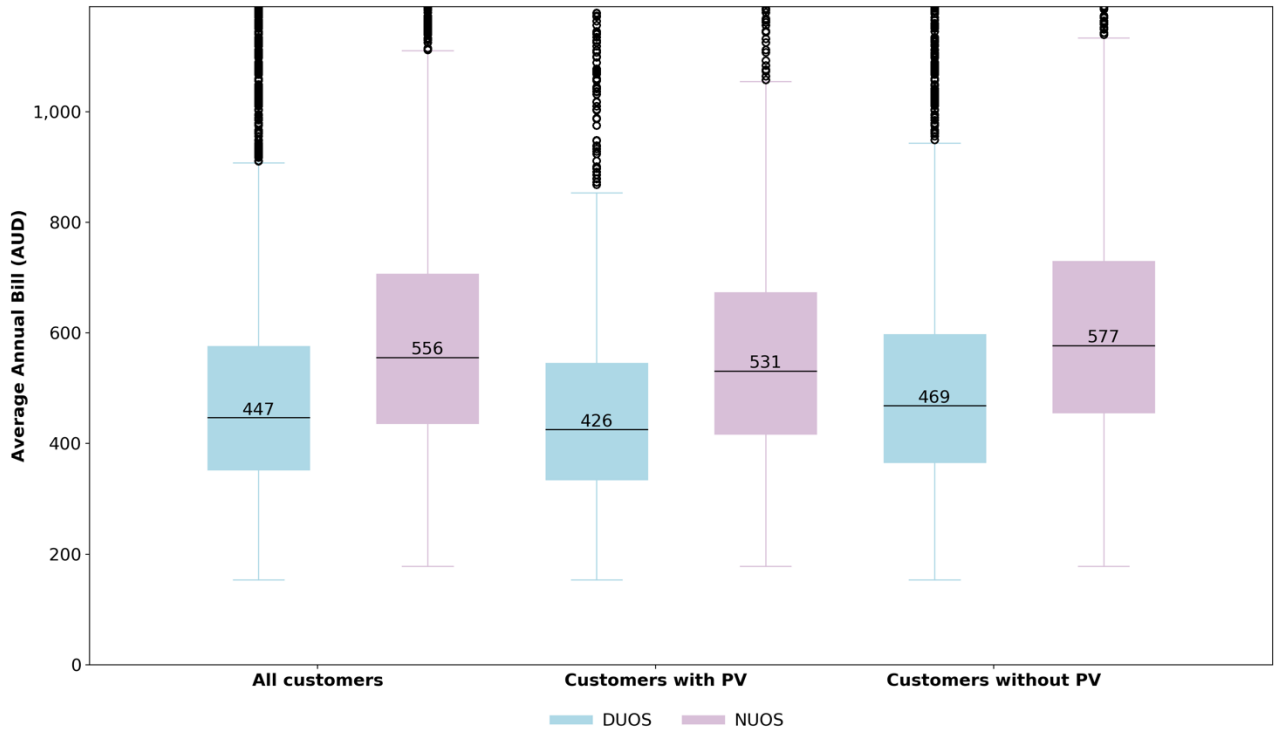
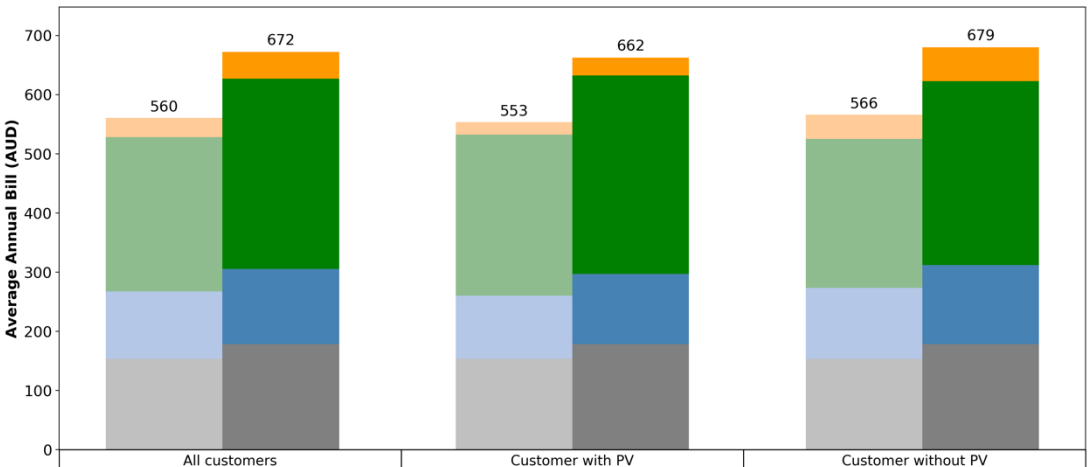


Figure 16. Comparison of the Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, South East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	32	45	21	30	41	57
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	261	322	272	336	252	311
Main Energy Charge	114	127	107	119	120	134
Main Daily Charge	154	178	154	178	154	178

Figure 17. Comparison of the Average Annual Bills of Customers with and without Solar PV: Demand tariff, South East Residential

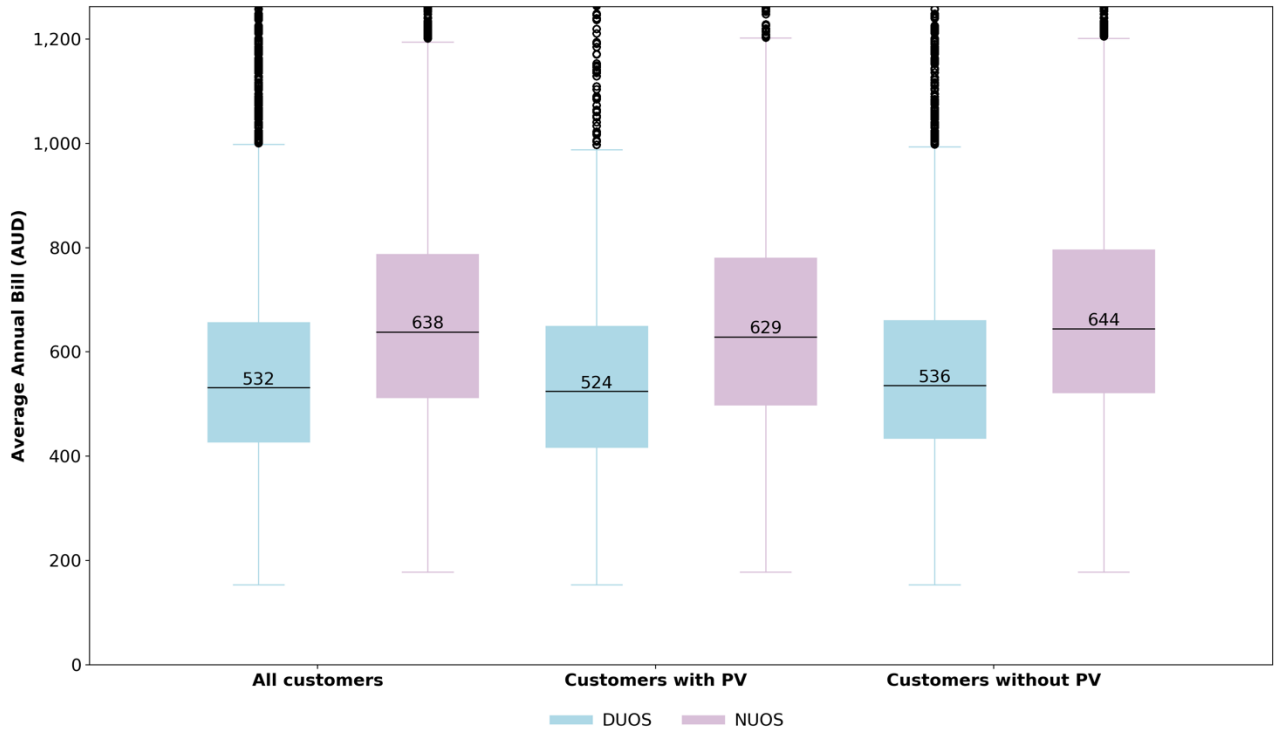


Figure 18. Comparison of the Annual Bills of Customers with and without Solar PV: Demand tariff, South East Residential

3.1.2 South East Small Business

3.1.2.1 2020/21 Tariff Comparison

This section is divided into customers using 20MWh/year or less and customers using more than 20MWh/year because they will be on different tariffs if they have a basic meter.

Customers using 20MWh/year or less

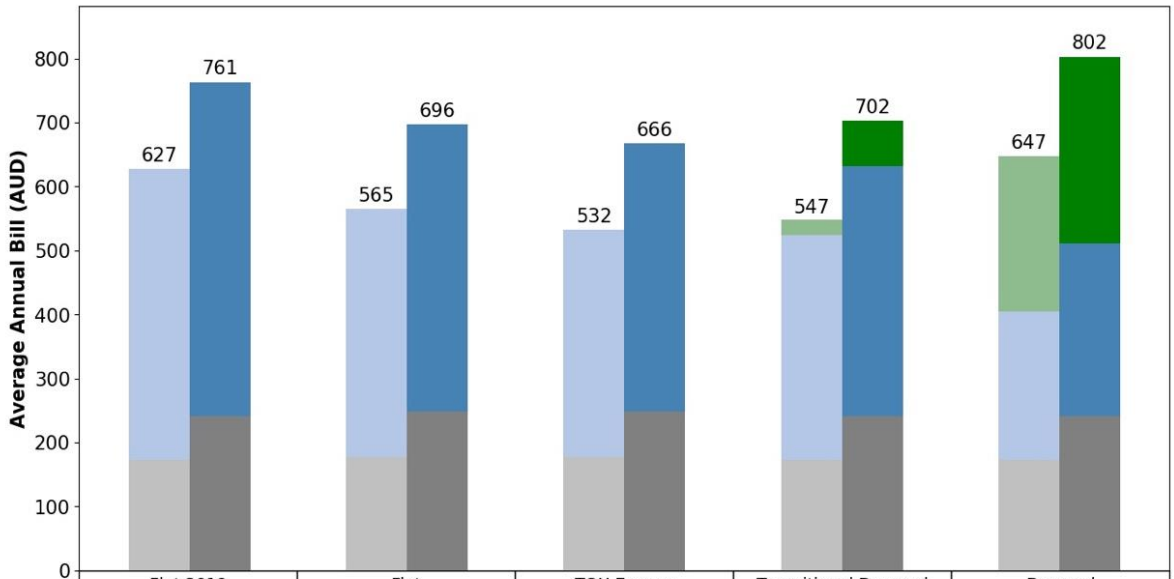
Customers on a basic meter using 20MWh/year or less are assumed to be on the Flat tariff in 2020/21.

Figure 19 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 20 compares these tariffs showing the median and spread as defined above. Table 8 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Table 9 shows the percentage of customers that are either better or worse off in moving from the Flat tariff to the other 2020/21 tariffs.

Key Points:

- Apart from under the Demand tariff, the average and median bills under all the 2020/21 tariffs are lower than under the 2019/20 tariff, more so for DUOS than for NUOS.
- Of the 2020/21 tariffs, the TOU Energy tariff results in the lowest average and median bills, followed by the Flat and Transitional Demand tariffs.
- For customers with digital meters on the Transitional Demand tariff there is some incentive to move to the TOU Energy tariff, although they may be better of just reducing their demand peaks.
- Of the 2020/21 tariffs, the Demand tariff has the highest average and median bills because of its demand charge, the impact of which is not completely overcome by the benefit of its lower energy charge. Under such demand tariffs, customers that have a peaky load (poor load factor) but can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- Under all tariffs the customer bills are fairly tightly clustered around the median, although there are some very high outliers under the Demand tariffs, reaching almost $6,000/year.
- As shown in Table 9, compared to the Flat tariff, most customers are better off under the TOU Energy and Transitional Demand tariffs – with a greater % improvement in DUOS than in NUOS. A smaller proportion are better off under the Demand tariff, highlighting the importance of reducing demand during the tariff's peak period.



	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	24	71	244	290
Energy Charge	455	520	388	449	356	419	350	390	231	270
Daily Charge	173	242	177	247	177	247	173	242	173	242

Figure 19. Comparison of Average Annual Bills, 20MWh/yr or less, South East Small Business

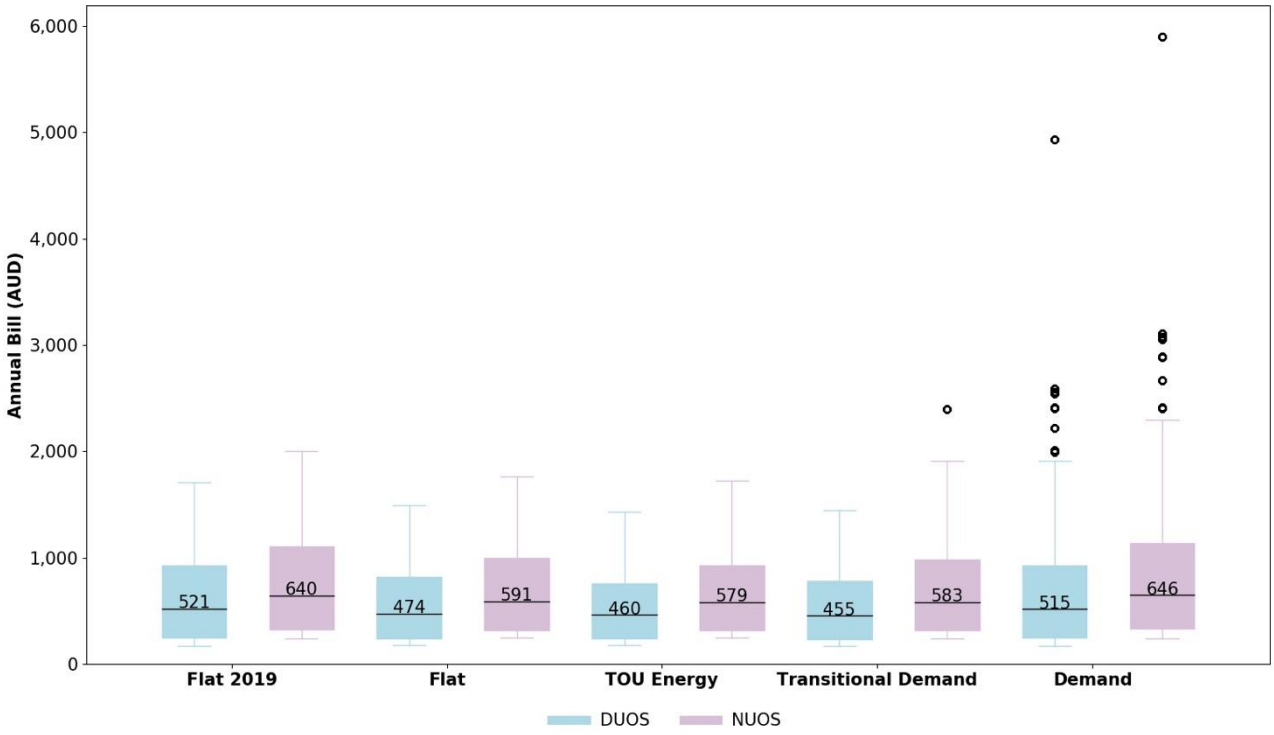


Figure 20. Comparison of Annual Bills, 20MWh/yr or less, South East Small Business

Table 8. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, 20MWh/yr or less, South East Small Business

Tariff	Change	
	DUOS	NUOS
Flat	-9%	-8%
TOU Energy	-12%	-10%
Transitional Demand	-13%	-9%
Demand	-1%	1%

Table 9. Percentage of Customers Better Off and Worse Off When Moving from the Flat Tariff, 20MWh/yr or less, South East Small Business

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	74%	16%	73%	17%[3]
Transitional Demand	91%	9%	64%	36%
Demand	43%	57%	42%	58%

Customers using more than 20MWh/year

Customers on a basic meter using more than 20MWh/year are assumed to be on the Wide IFT tariff in 2020/21.

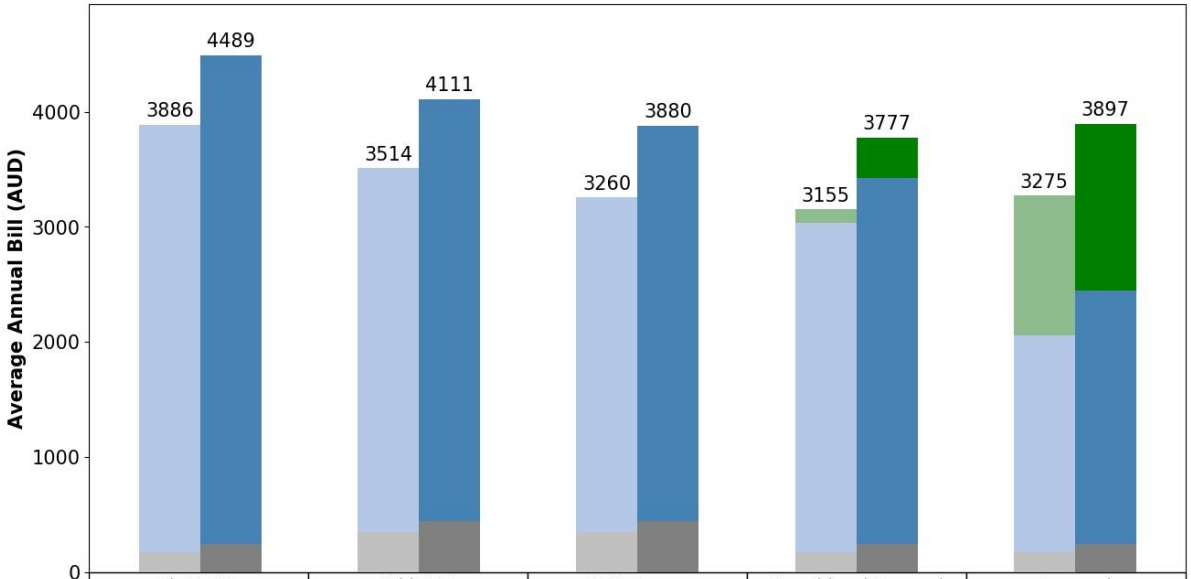
Figure 21 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 22 compares these tariffs showing the median and spread as defined above. Table 10 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Table 11 shows the percentage of customers that are either better or worse off in moving from the Wide IFT tariff to the other 2020/21 tariffs.

Key Points:

- The average and median bills under all the 2020/21 tariffs are lower than under the 2019/20 tariff, more so for DUOS than for NUOS.
- Of the 2020/21 tariffs, the Transitional Demand tariff results in the lowest average and median bills, followed by the TOU Energy tariff and the Demand tariff. This indicates that compared to the customers that use 20MWh or less, these customers have a better load factor (less peaks).
- Again, under the Demand tariff, customers that have a peaky load but can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- Under all tariffs the customer bills are less tightly clustered around the median than they were for the customers using less than 20MWh per year, and there are some very high outliers, reaching around $16,000/year under the Demand tariff (because they have a peaky load and so poor load factor)
- As shown in Table 11, compared to the Wide IFT tariff, most customers are better off under the TOU Energy, Transitional Demand and Demand tariffs – with a greater % improvement in DUOS than in NUOS.

[3] Here there were 4.2% that were neither better off nor worse off.



	Flat 2019		Wide IFT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	122	355	1217	1450
Energy Charge	3714	4248	3168	3667	2914	3437	2861	3181	1886	2205
Daily Charge	173	242	347	444	347	444	173	242	173	242

Figure 21. Comparison of Average Annual Bills, More than 20MWh/yr, South East Small Business

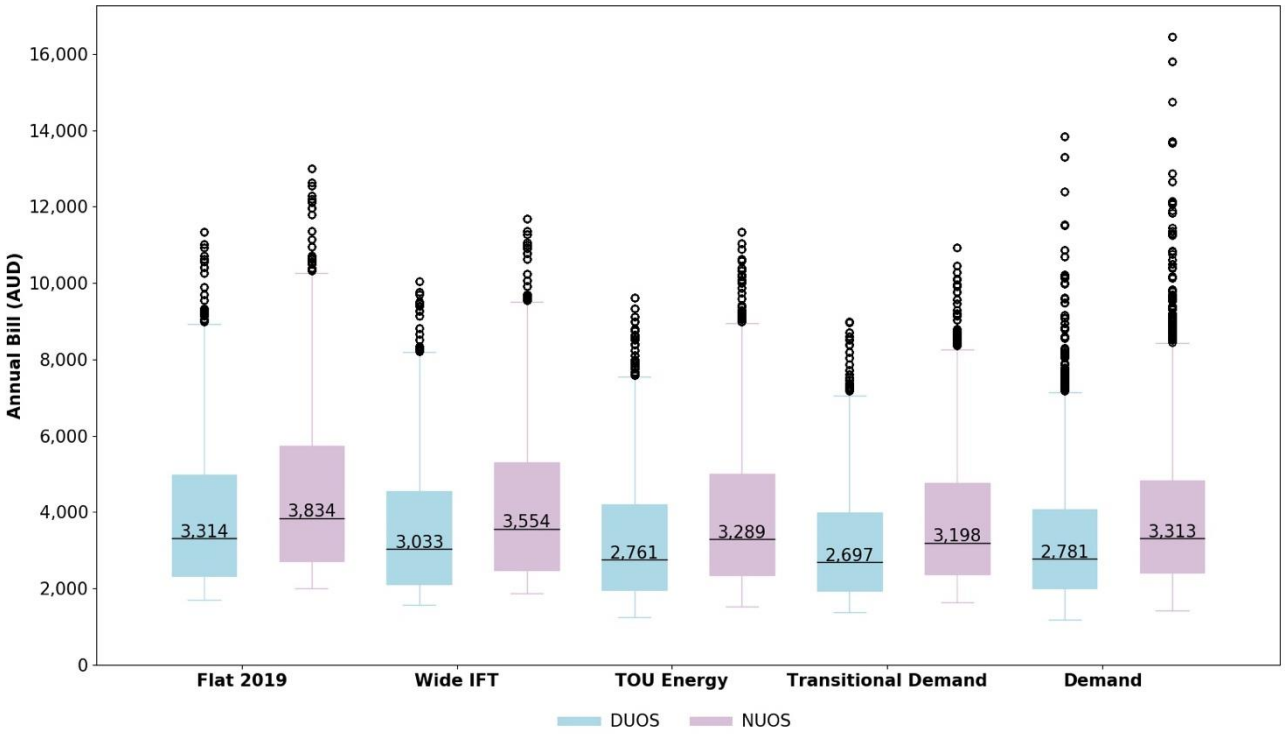


Figure 22. Comparison of Annual Bills, More than 20MWh/yr, South East Small Business

Table 10. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, More than 20MWh/yr, South East Small Business

Tariff	Change	
	DUOS	NUOS
Wide IFT	-8%	-7%
TOU Energy	-17%	-14%
Transitional Demand	-19%	-17%
Demand	-16%	-14%

Table 11. Percentage of Customers Better Off and Worse Off When Moving from the Wide IFT Tariff, More than 20MWh/yr, South East Small Business

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	88%	12%	85%	15%
Transitional Demand	99%	1%	94%	6%
Demand	73%	27%	70%	30%

3.1.2.2 Scatter plots of average bill versus annual electricity use

Figure 23 compares the average NUOS bills to annual electricity use, for the Flat 2019/20 tariff and the Flat and Wide IFT 2020/21 tariffs. Figure 24 show the equivalent comparisons for the TOU Energy, Transitional Demand and Demand tariffs. Figure 25 then compares the Flat, Wide IFT, Transitional Demand and Demand tariffs. The equivalent DUOS charts are in Appendix C.

Key Points:

- Under essentially all levels of electricity use, the 2020/21 tariffs generally result in lower bills than the 2019/20 Flat tariff, especially as electricity use increases (noting that customers with more than 20MWh/year are on the Wide IFT).
- Although the Flat and Wide IFT always result in lower bills, the TOU Energy tariff results in a significant amount of scatter because of its peak energy charge, and the Transitional Demand and Demand tariffs result in more scatter because of their peak demand charges. Although some customers under these tariffs have much higher electricity bills, the majority have lower bills, especially at higher levels of electricity use. Customers with high bills under these tariffs can of course reduce their bills by reducing their peaks.

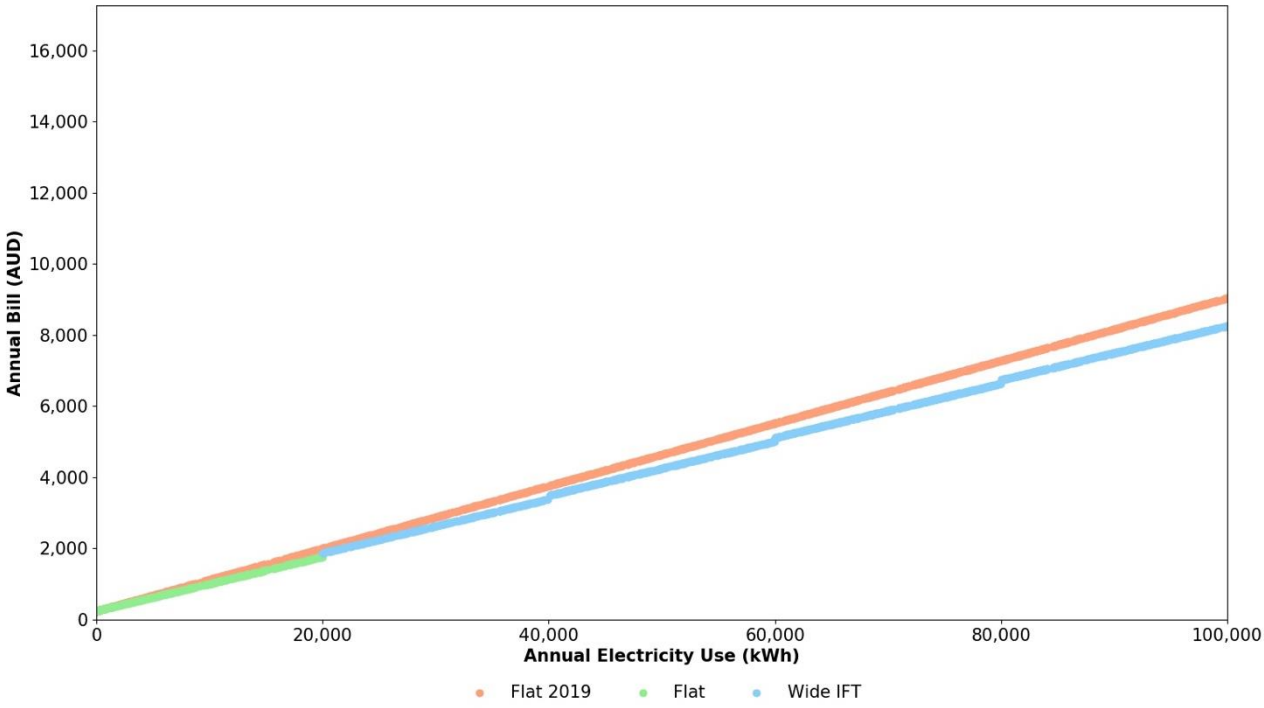


Figure 23. Comparison of Average Customer Bills for Flat 2019/20, Flat 2020/21 and Wide IFT 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Small Business

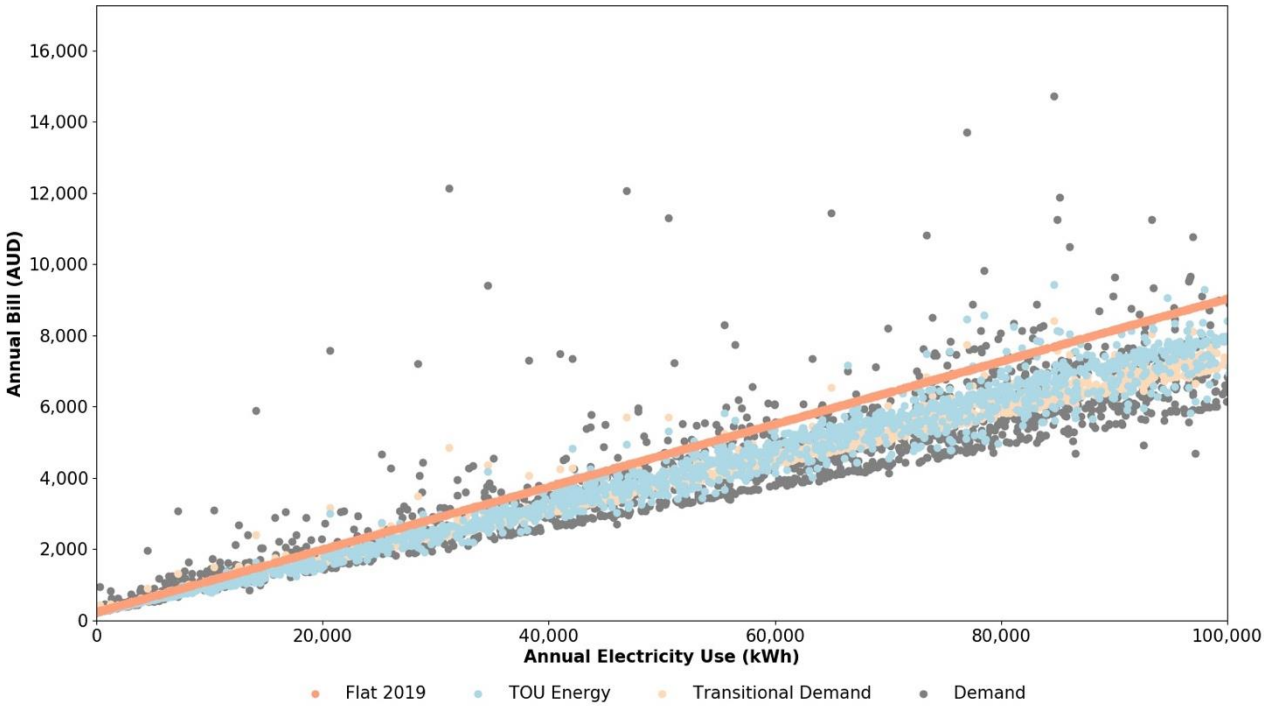


Figure 24. Comparison of Average Customer Bills for Flat 2019/20, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Small Business

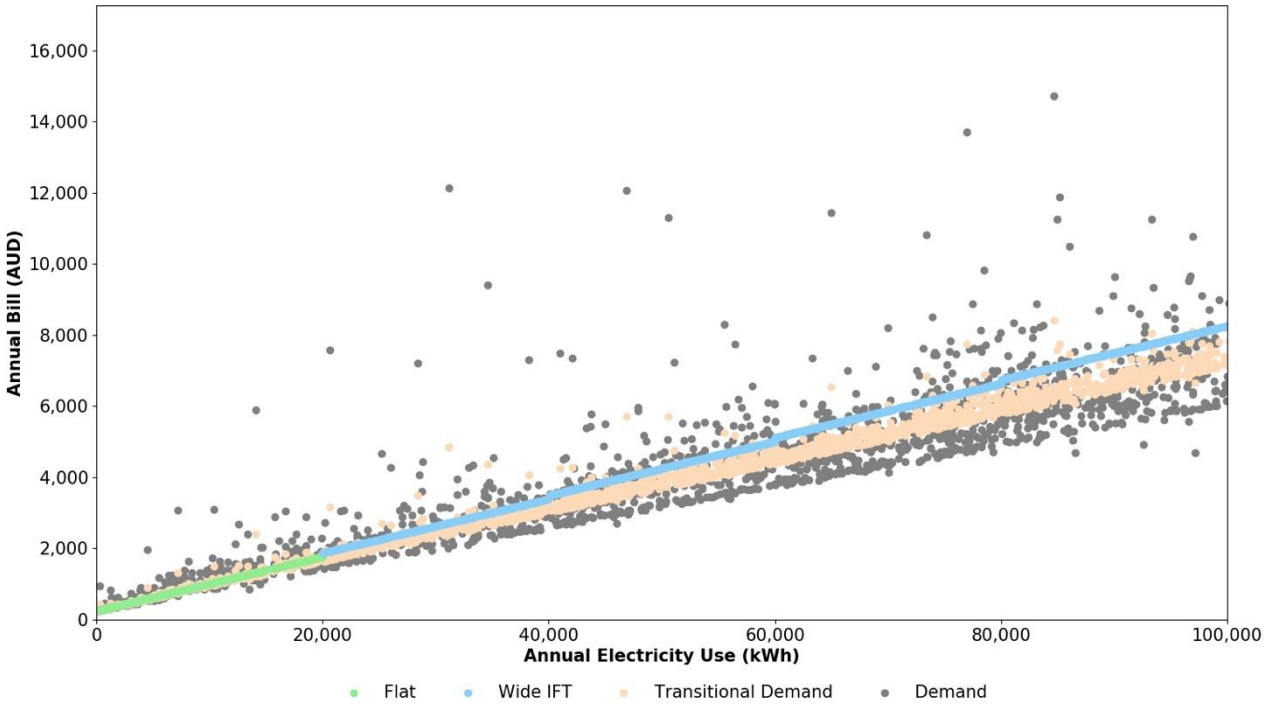


Figure 25. Comparison of Average Customer Bills for Flat 2020/21, Wide IFT 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, South East Small Business

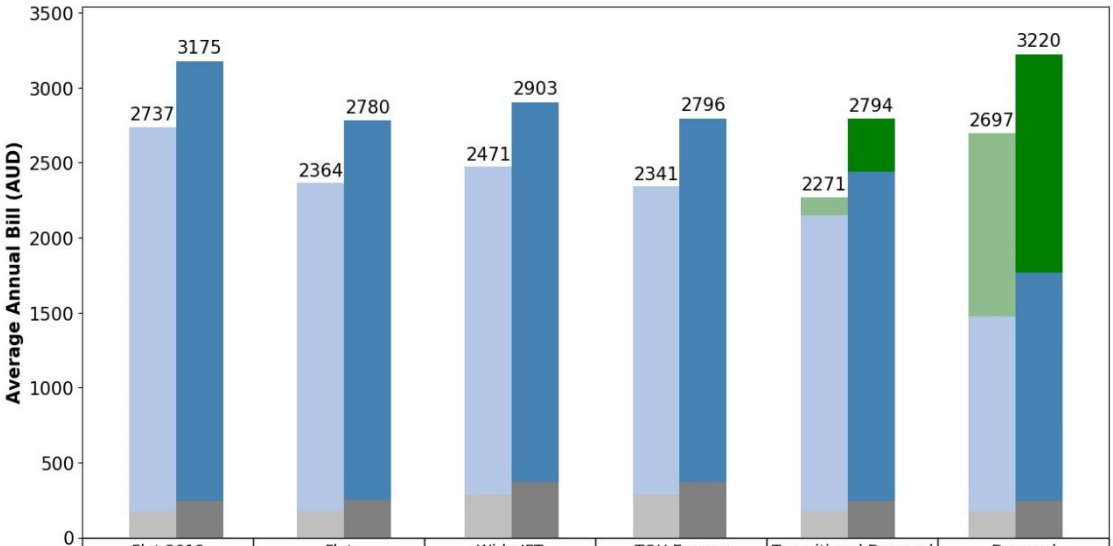
3.1.2.3 Comparison of Small Business Customers with and without Solar PV

Figure 26 and Figure 27 compare the outcomes under different tariffs for customers with solar PV, using both the average annual bills and the median and spread as defined above. Figure 28 compares the average NUOS bills for customers with and without solar PV under each of the tariffs. Table 12 shows the percentage change in the median annual bills compared to the 2019/20 tariff. Figure 29 to Figure 38 show the outcomes for customers with and without PV under different tariffs, again using both the average annual bills and the median and spread.[4]

Key Points:

- The average and median bills under all the 2020/21 tariffs are lower than under the 2019/20 tariff, apart from under the Demand tariff where the average is slightly higher (but the median is lower). Again, the percentage reduction in median bills is greater for DUOS than for NUOS.
- Of the 2020/21 tariffs, the Transitional Demand tariff results in the lowest average and median bills, followed by the TOU Energy tariff.
- In all cases the average and median bills are actually higher for customers with PV, essentially because they draw more electricity from the grid. On average they draw 91.3kWh/day compared to 48.6kWh/day for non-PV customers. This difference was most pronounced under the TOU Energy, Transitional Demand and Demand tariffs, although this may have been due to other characteristics of their load, not whether they had PV or not.

[4] Note that for ease of comparison, Figure 26 and Figure 27 apply the Flat and Wide IFT tariffs to all customers. Figure 29 to Figure 32 apply the Flat and Wide IFT tariffs only to the <20MWh and >20MWh customers respectively.



	Flat 2019		Flat		Wide IFT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	0	0	122	356	1222	1456
Energy Charge	2565	2934	2188	2533	2188	2533	2058	2425	1976	2197	1302	1523
Daily Charge	173	242	177	247	284	371	284	371	173	242	173	242

Figure 26. Comparison of Average Annual Bills under Different Tariffs, customers with solar PV, South East Small Business

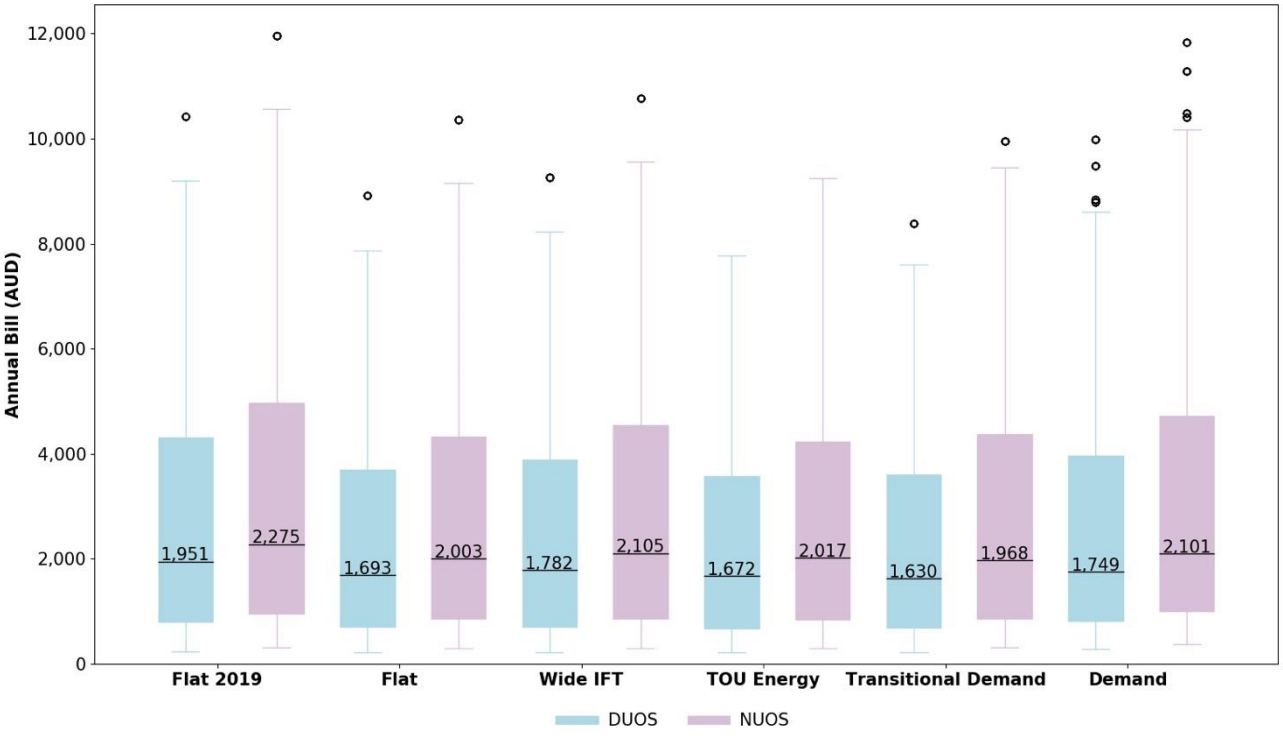
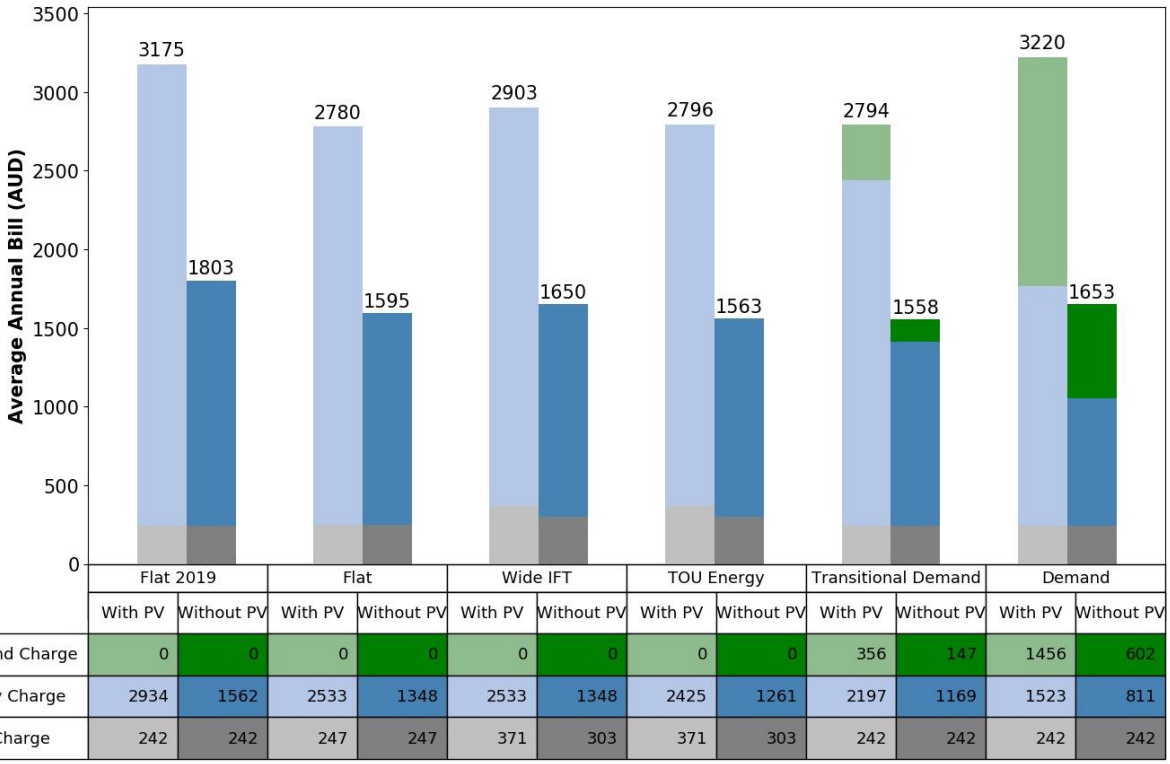


Figure 27. Comparison of Annual Bills under Different Tariffs, customers with solar PV, South East Small Business

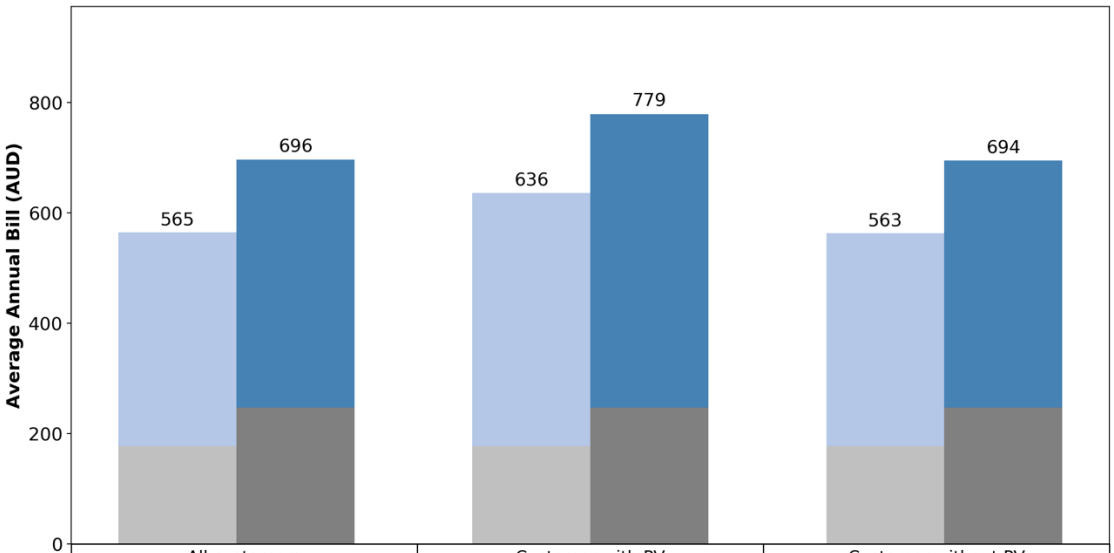


	Flat 2019		Flat		Wide IFT		TOU Energy		Transitional Demand		Demand	
	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV
Demand Charge	0	0	0	0	0	0	0	0	356	147	1456	602
Energy Charge	2934	1562	2533	1348	2533	1348	2425	1261	2197	1169	1523	811
Daily Charge	242	242	247	247	371	303	371	303	242	242	242	242

Figure 28. Comparison of Average Annual NUOS Bills of customers with and without solar PV under Different Tariffs, South East Small Business

Table 12. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, South East Small Business Customers with solar PV

Tariff	Change	
	DUOS	NUOS
Flat	-13%	-12%
Wide IFT	-9%	-7%
TOU Energy	-14%	-11%
Transitional Demand	-16%	-13%
Demand	-10%	-8%



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	388	449	459	532	387	447
Main Daily Charge	177	247	177	247	177	247

Figure 29. Comparison of the Average Annual Bills of Customers with and without Solar PV: Flat tariff, South East Small Business

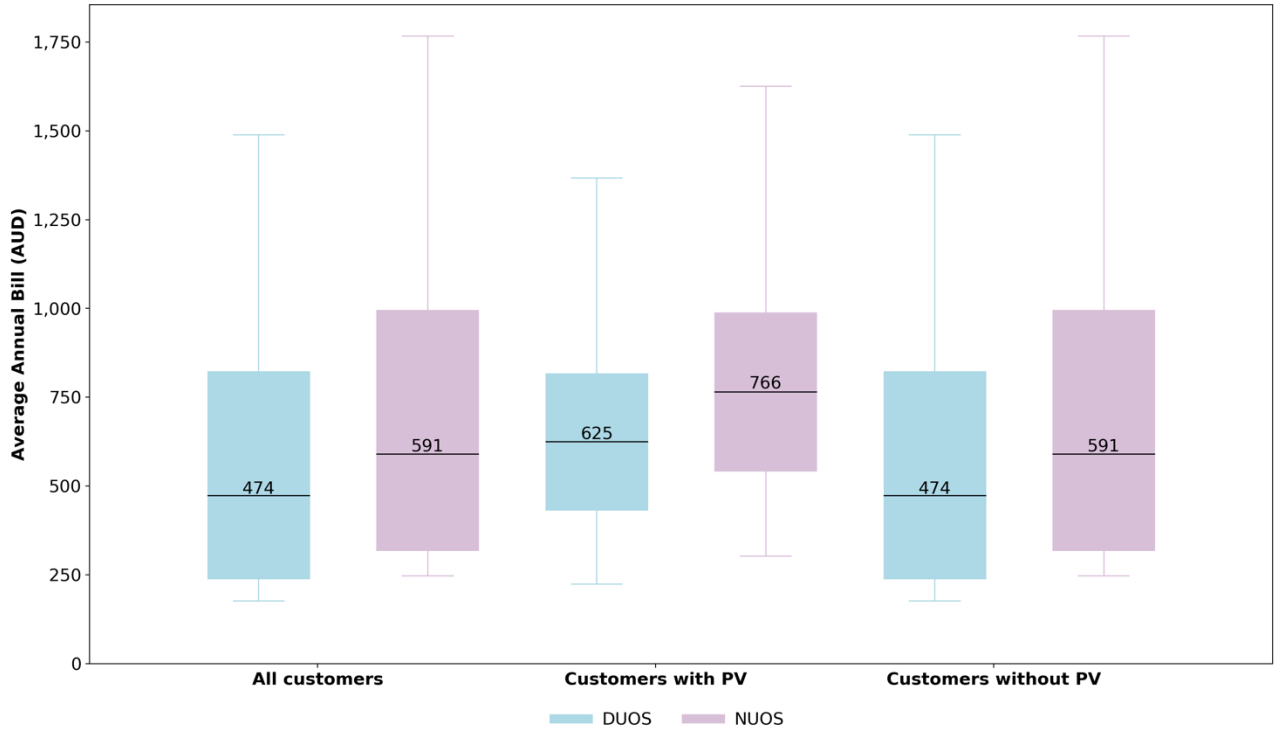
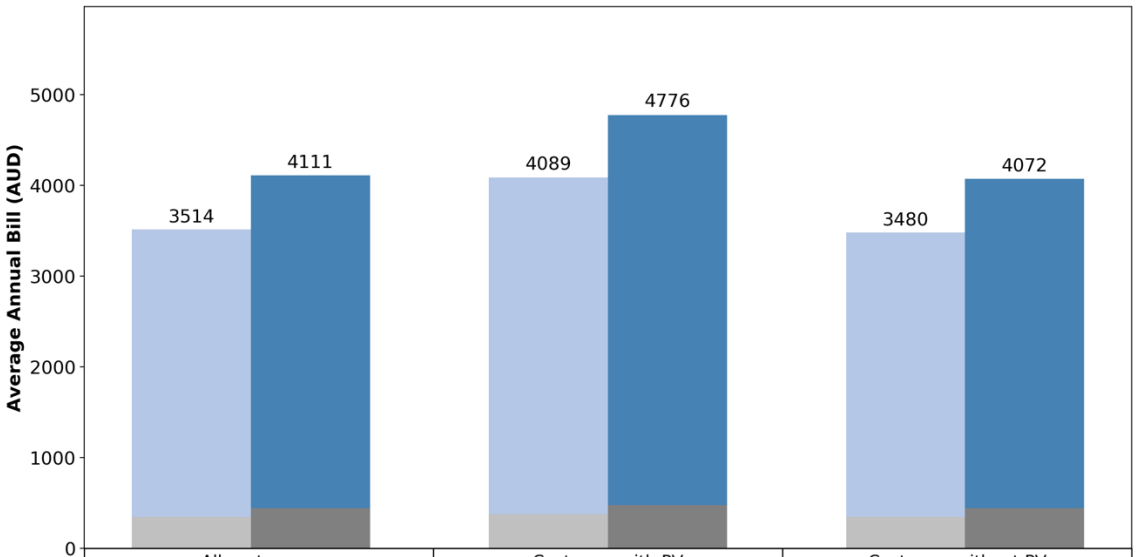


Figure 30. Comparison of the Annual Bills of Customers with and without Solar PV: Flat tariff, South East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	3168	3667	3712	4297	3136	3630
Main Daily Charge	347	444	378	480	345	442

Figure 31. Comparison of the Average Annual Bills of Customers with and without Solar PV: Wide IFT tariff, South East Small Business

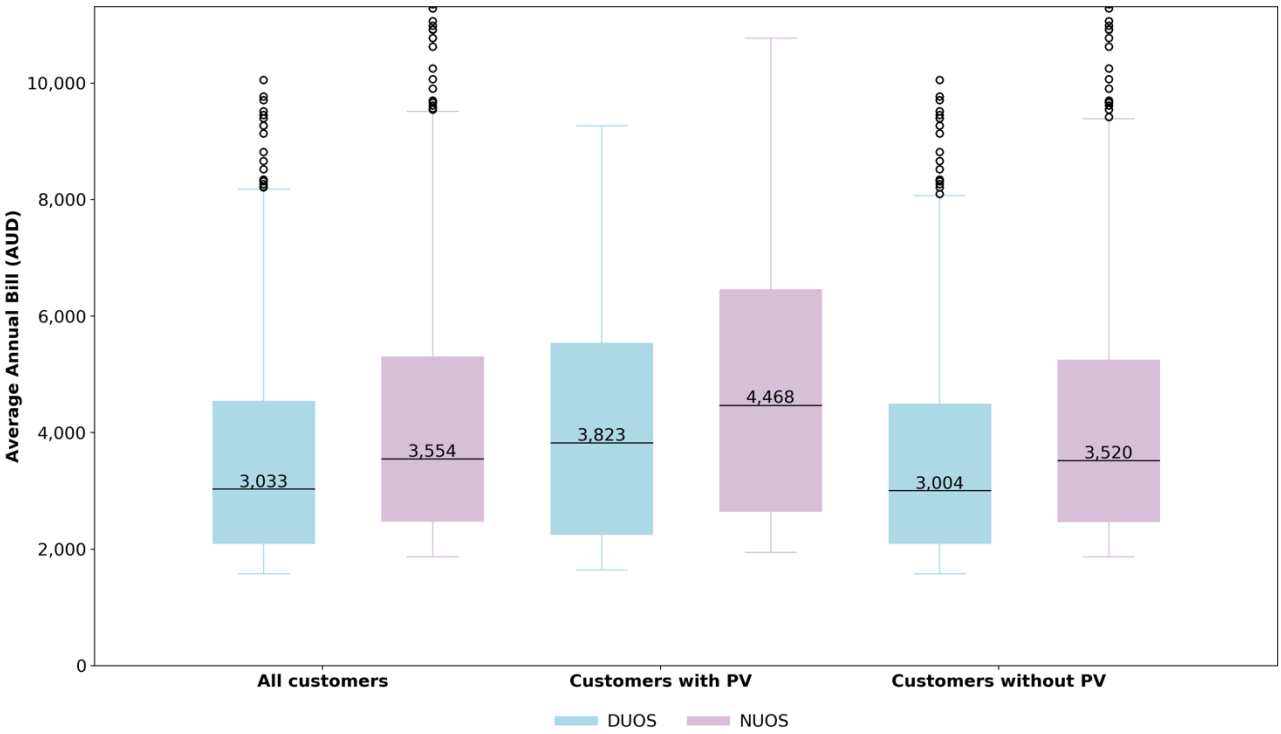
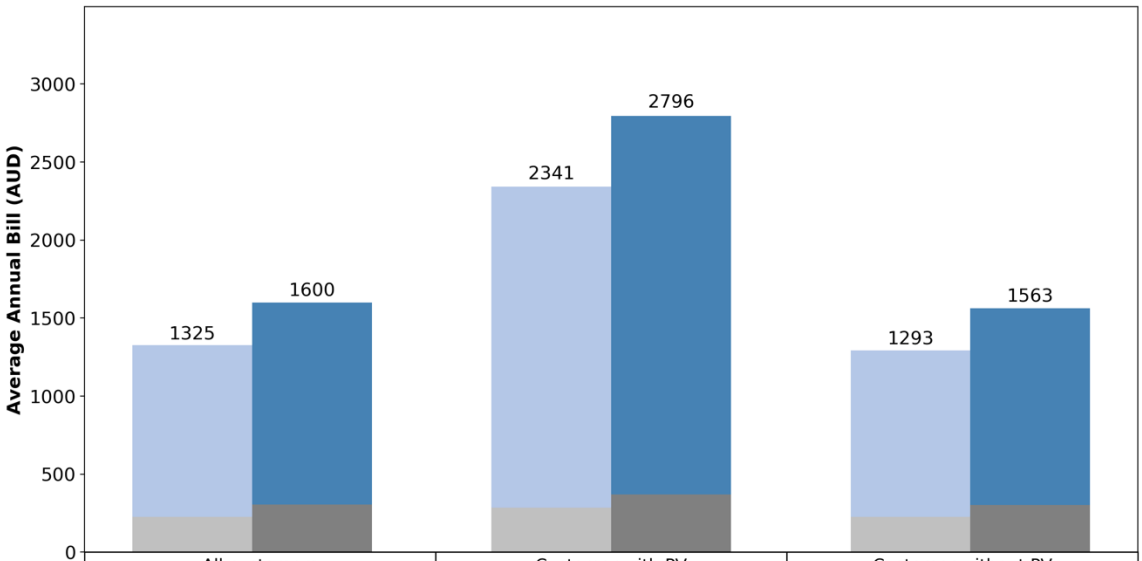


Figure 32. Comparison of the Annual Bills of Customers with and without Solar PV: Wide IFT tariff, South East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	1099	1296	2058	2425	1069	1261
Main Daily Charge	227	305	284	371	225	303

Figure 33. Comparison of the Average Annual Bills of Customers with and without Solar PV: TOU Energy tariff, South East Small Business

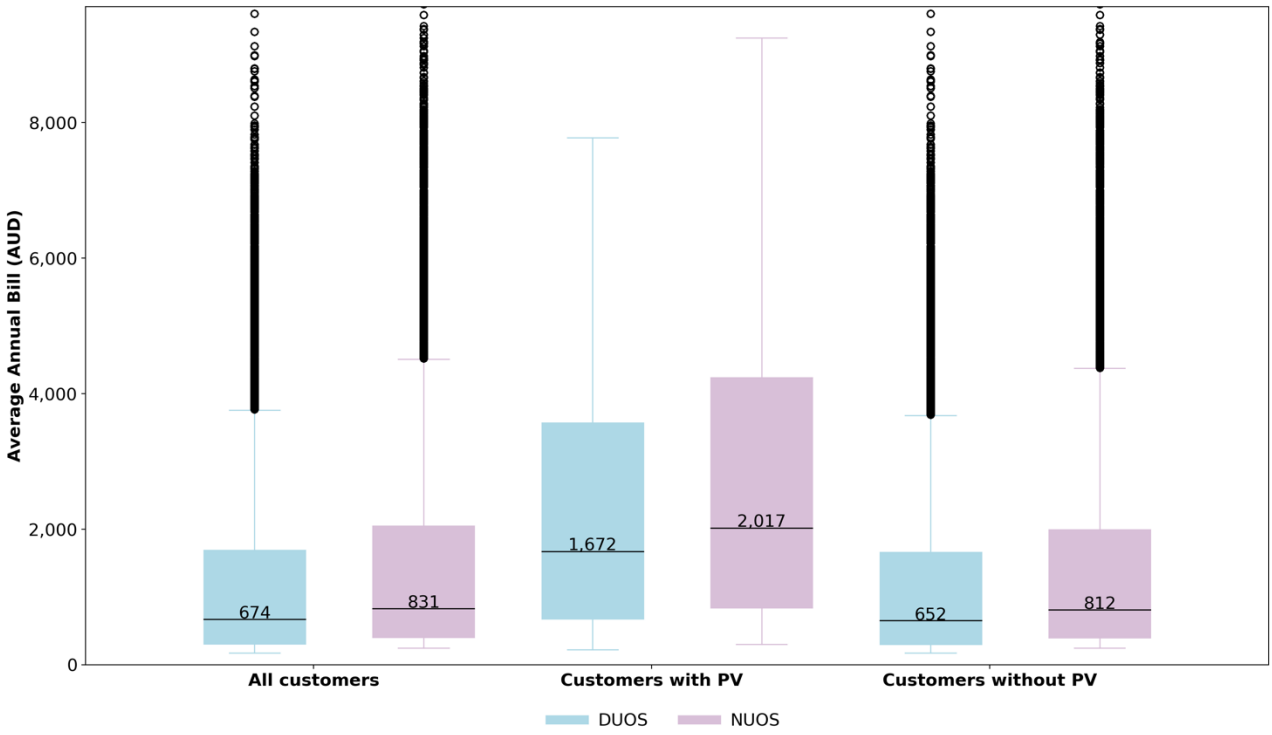
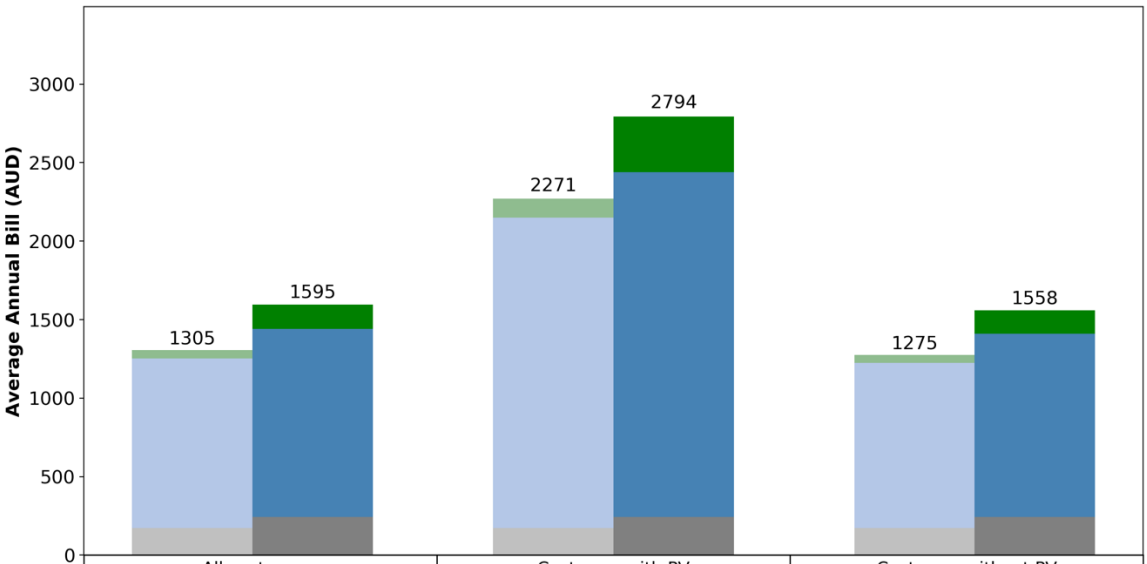


Figure 34. Comparison of the Annual Bills of Customers with and without Solar PV: TOU Energy tariff, South East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	53	154	122	356	50	147
Main Energy Charge	1080	1200	1976	2197	1052	1169
Main Daily Charge	173	242	173	242	173	242

Figure 35. Comparison of the Average Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, South East Small Business

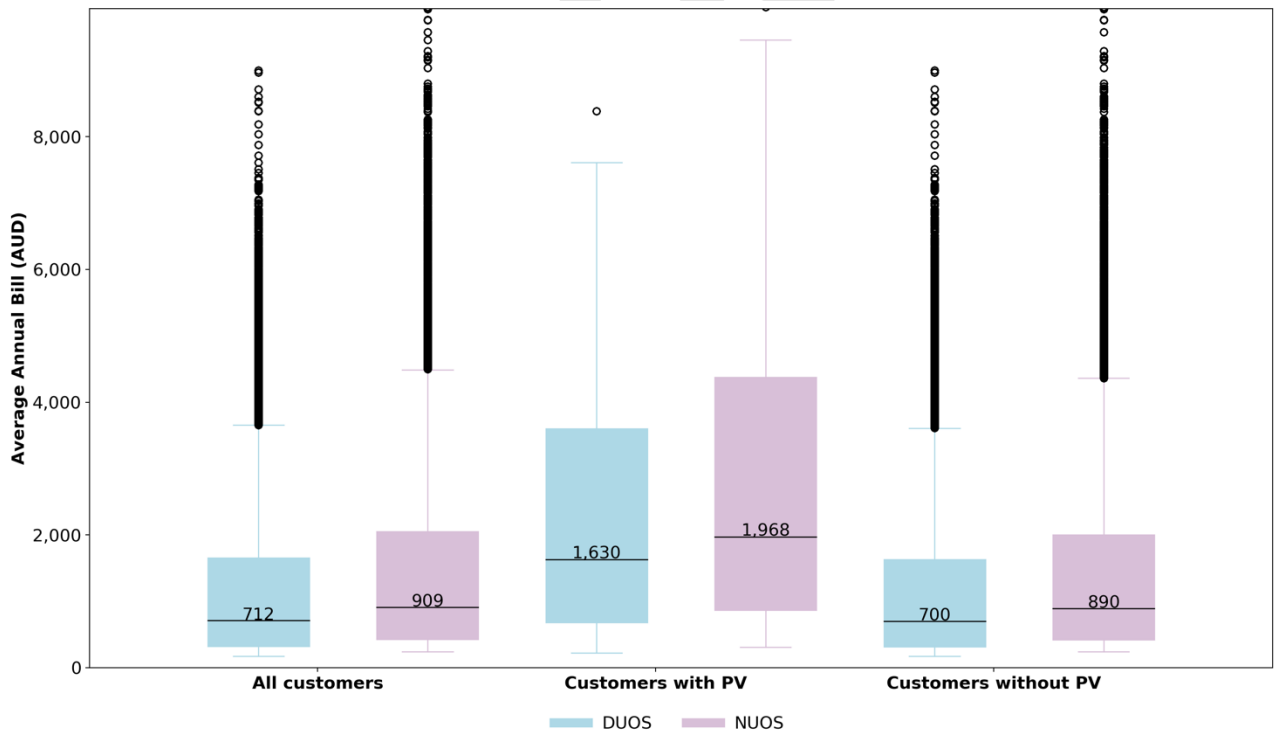
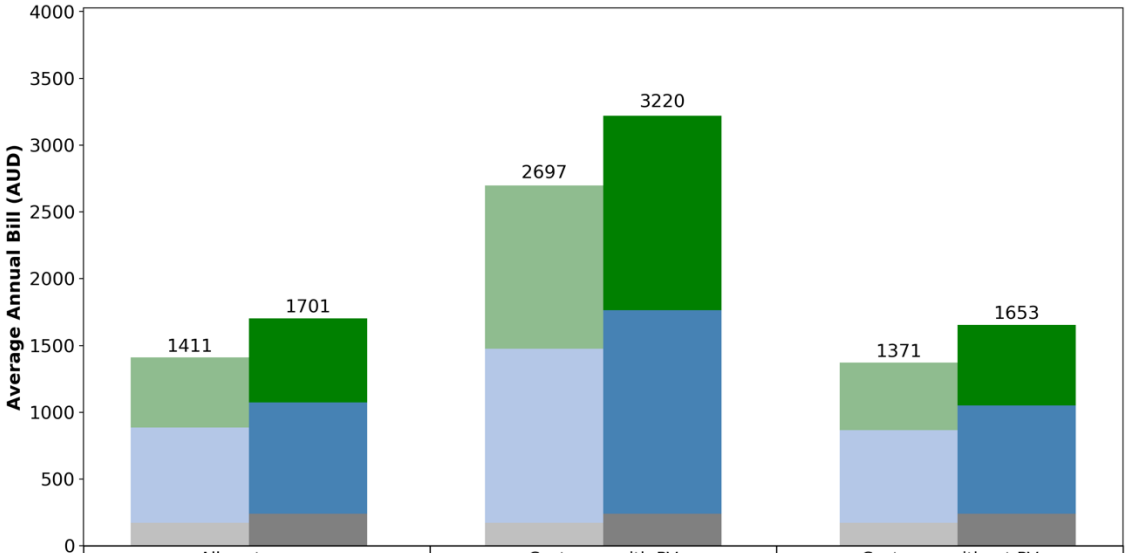


Figure 36. Comparison of the Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, South East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	527	627	1222	1456	505	602
Main Energy Charge	712	832	1302	1523	693	811
Main Daily Charge	173	242	173	242	173	242

Figure 37. Comparison of the Average Annual Bills of Customers with and without Solar PV: Demand tariff, South East Small Business

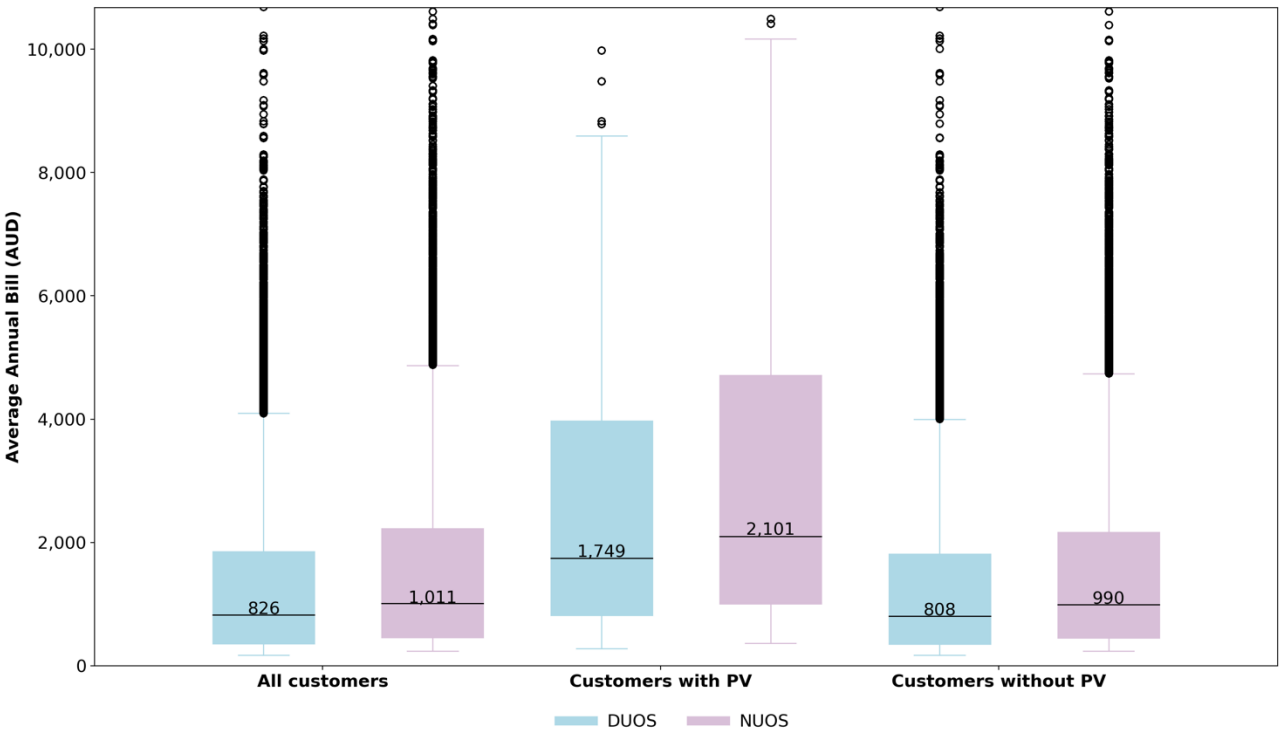


Figure 38. Comparison of the Annual Bills of Customers with and without Solar PV: Demand tariff, South East Small Business

3.1.3 Ergon East Residential

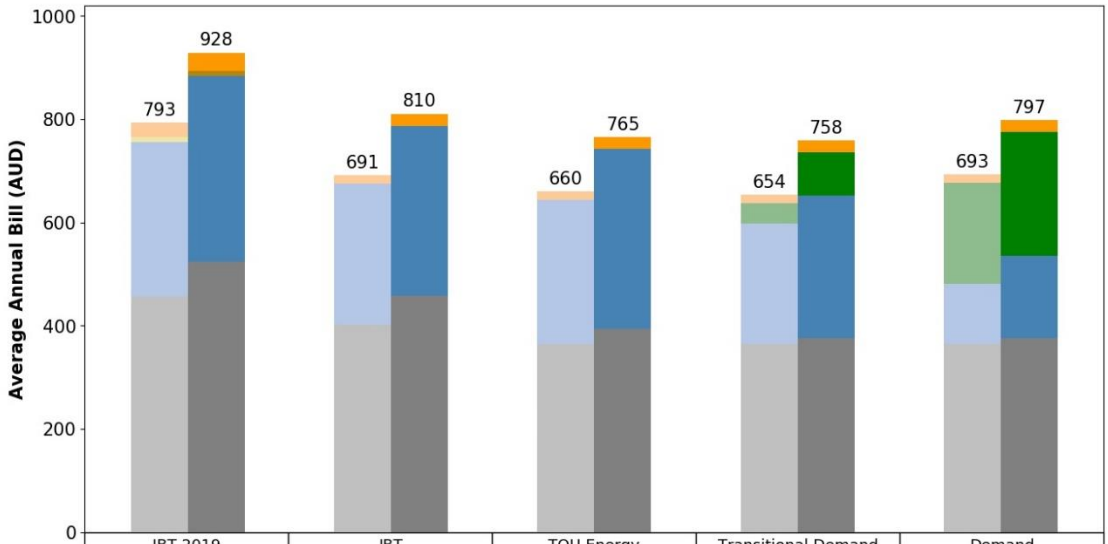
3.1.3.1 2020/21 Tariff Comparison

Figure 39 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 40 compares these tariffs showing the median and spread as defined above. Table 13 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Table 14 shows the percentage of customers that are either better or worse off in moving from the IBT tariff to the other 2020/21 tariffs.

Key Points:

- The average and median bills under the 2020/21 tariffs are all lower than under the 2019/20 tariff, more so for NUOS than for DUOS.
- Of the 2020/21 tariffs, the Transitional Demand tariff results in the lowest average and median bills. This is because its lower energy charge more than compensates for its demand charge.
- The median bills under the Demand tariff are slightly higher simply because its demand charge is greater, and so overcome the benefit of the lower energy charge.
- Under both these demand tariffs, customers that have a peaky load (poor load factor) but can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- All the tariffs had very significant fixed daily charges, especially when compared to the Energex South East tariffs, but also much lower energy charges.
- Under all tariffs the customer bills are fairly tightly clustered around the median, although there are some high outliers under the Demand tariff, reaching over $3,500/year.
- As shown in Table 14, compared to the IBT tariff, most customers are better off under the TOU Energy and Transitional Demand tariffs. A smaller proportion are better off under the Demand tariff, highlighting the importance of reducing demand during the tariff's peak period. In this case a greater % of customers are better off under NUOS than DUOS because the 2019/20 IBT tariff has a relatively larger TUOS component (Figure 39).



	IBT 2019		IBT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	28	34	16	23	16	23	16	23	16	23
CL Daily Charge	11	11	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	39	83	196	240
Main Energy Charge	299	359	273	329	279	349	234	276	117	159
Main Daily Charge	456	525	402	459	365	394	365	376	365	376

Figure 39. Comparison of Average Annual Bills, Ergon East Residential

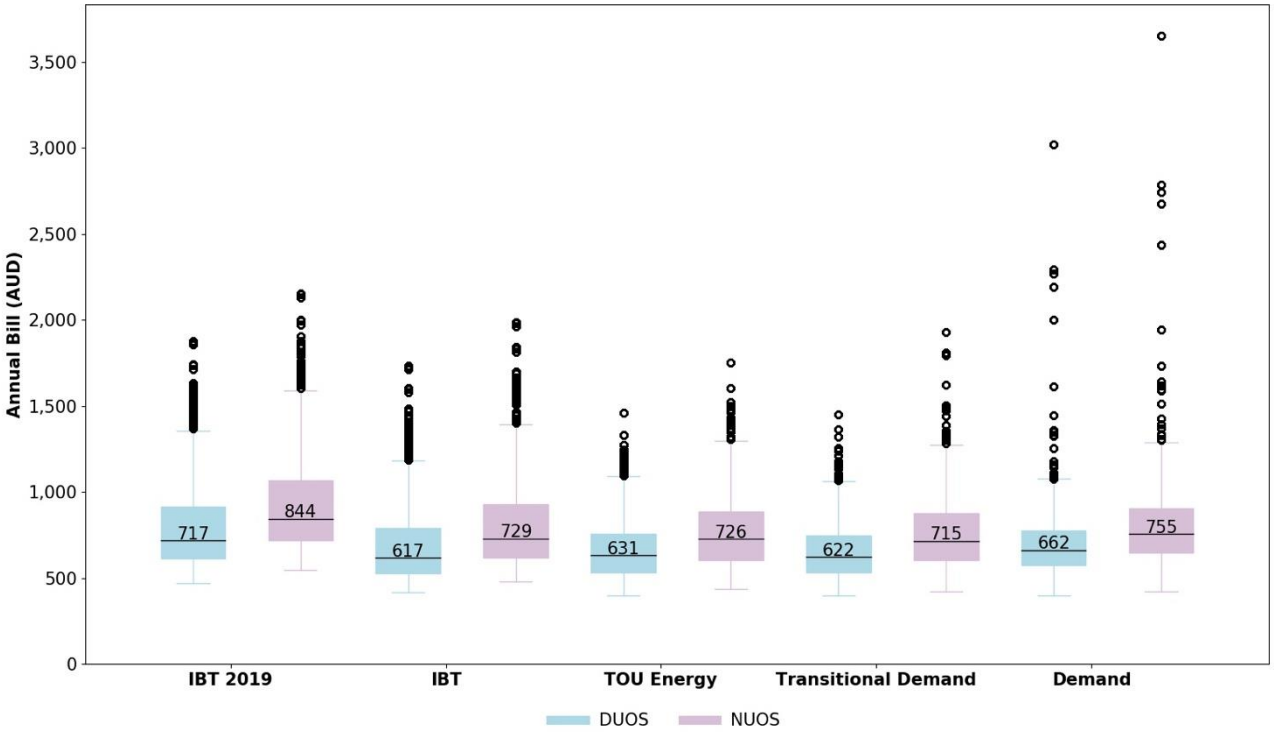


Figure 40. Comparison of Annual Bills, Ergon East Residential

Table 13. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, Ergon East Residential

Tariff	Change	
	DUOS	NUOS
IBT	-14%	-14%
TOU Energy	-12%	-14%
Transitional Demand	-13%	-15%
Demand	-8%	-11%

Table 14. Percentage of Customers Better Off and Worse Off When Moving from the IBT Tariff, Ergon East Residential

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	58%	42%	74%	26%
Transitional Demand	54%	46%	87%	13%
Demand	34%	66%	47%	53%

3.1.3.2 Scatter plots of average bill versus annual electricity use

Figure 41 compares the average NUOS bills to annual electricity use, for the IBT 2019/20 tariff and the IBT and Wide IFT tariffs. Figure 42 shows the equivalent comparisons for the TOU Energy, Transitional Demand and Demand tariffs. Figure 43 then compares the IBT, Wide IFT, Transitional Demand and Demand tariffs. The equivalent DUOS charts are in Appendix C.

Key Points:

- The IBT, TOU Energy and Transitional Demand tariffs generally result in lower bills than the IBT 2019/20 tariff for low and high electricity use customers.
- If it were not for the impact of controlled load, both the 2019/20 and IBT tariffs would show a straight-line correlation between the annual bill and electricity use. All the points below the lines are for houses with controlled load and occur because the controlled load tariff rate is lower.
- The Demand tariff also results in lower bills for customers at low and high levels of electricity use, but because it results in significantly more scatter (because of its demand charge and customers' diverse load factors), there is a small number of customers that have higher bills. This also occurs for the Transitional Demand tariff but to a lesser extent.
- Thus, for customers with lower levels of electricity use the IBT and TOU Energy tariffs generally result in lower bills, followed by the Transitional Demand, then the Demand tariff (although many small customers are worse off under the demand tariffs). For customers with higher levels of electricity use, the IBT, TOU Energy, Transitional Demand and Demand tariffs have similar outcomes, with benefits to be gained under the latter three by reducing demand peaks.

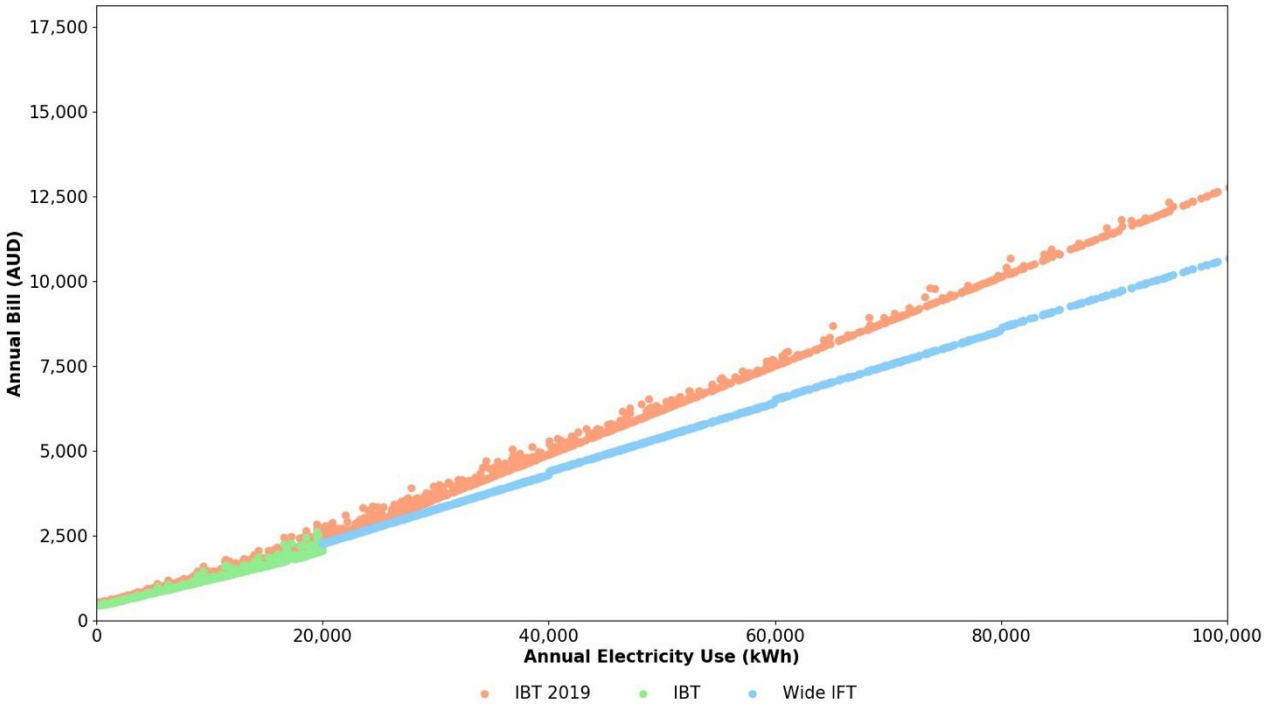


Figure 41. Comparison of Average Customer Bills for IBT 2019/20, IBT 2020/21 and Wide IFT 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Residential

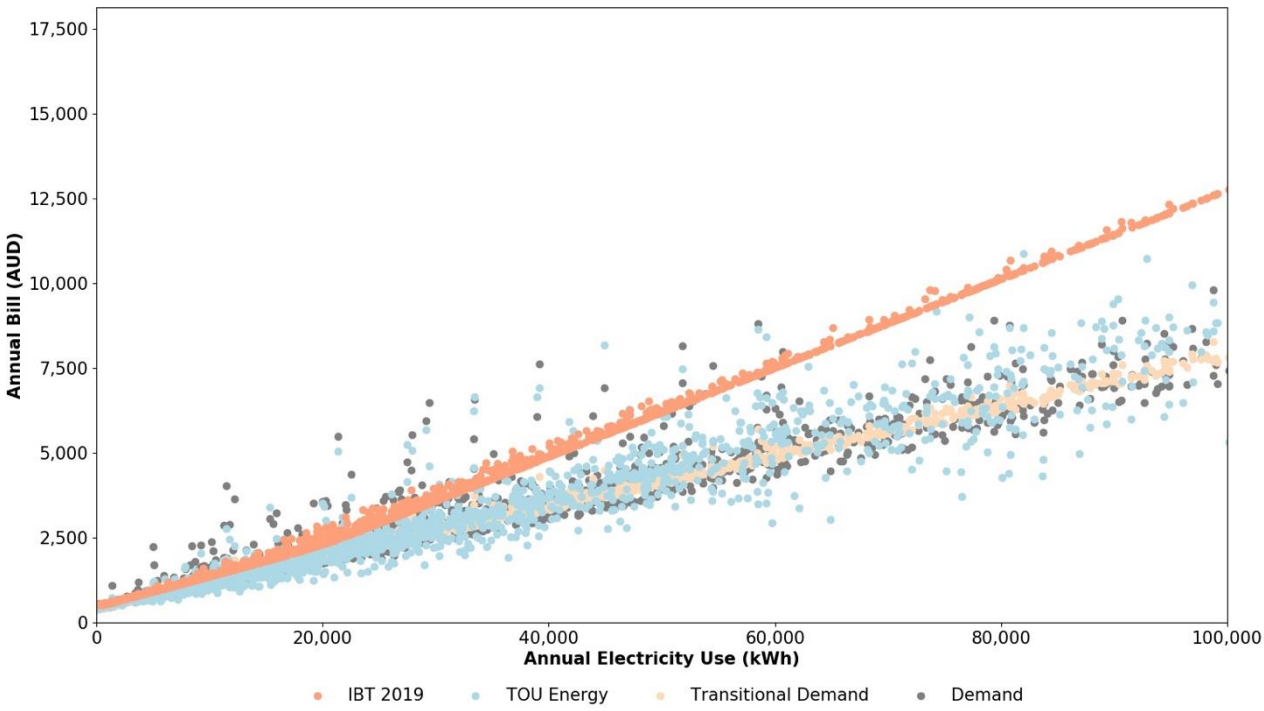


Figure 42. Comparison of Average Customer Bills for IBT 2019/20, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Residential

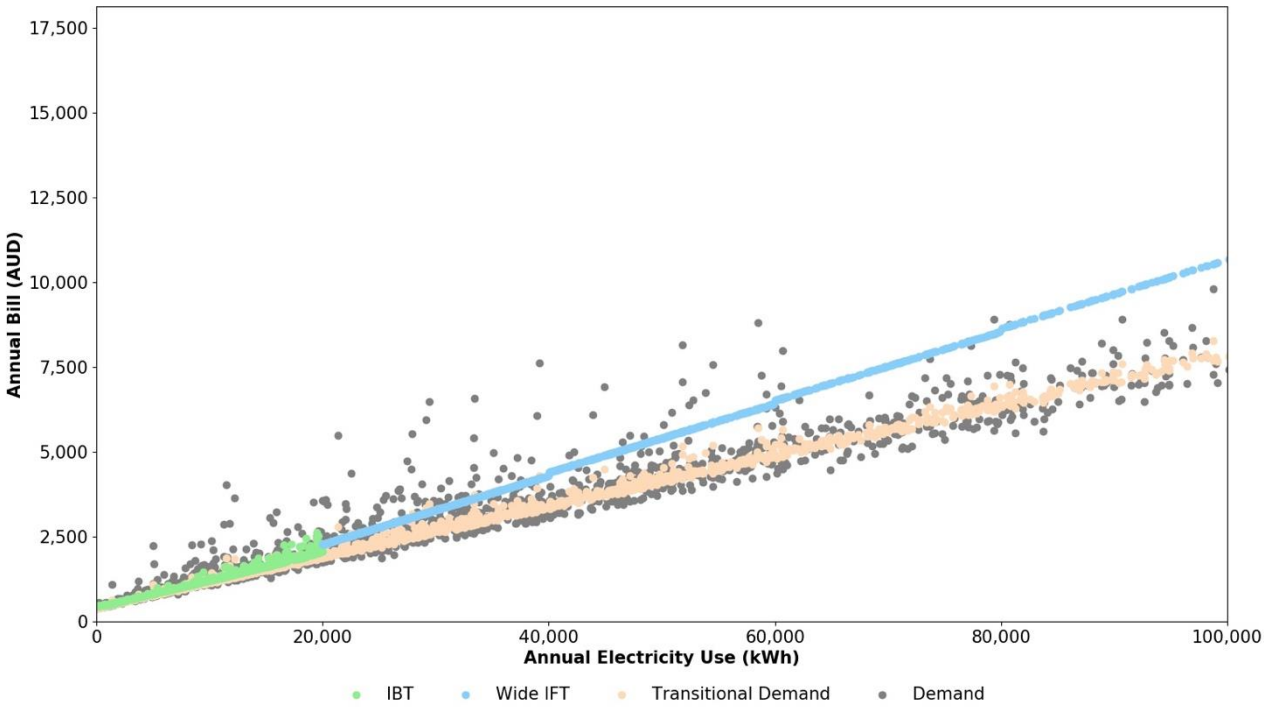


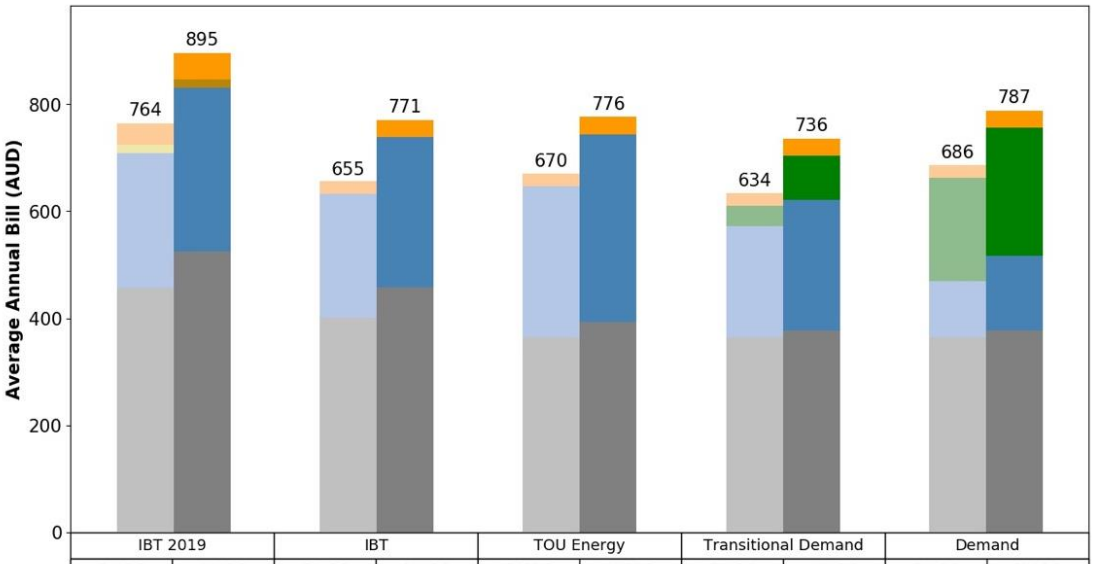
Figure 43. Comparison of Average Customer Bills for IBT 2020/21, Wide IFT 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Residential

3.1.3.3 Comparison of Residential Customers with and without Solar PV

Figure 44 and Figure 45 compare the outcomes under different tariffs for customers with solar PV, using both the average annual bills and the median and spread as defined above. Figure 46 compares the average NUOS bills for customers with and without solar PV under each of the tariffs. Table 15 shows the percentage change in the median annual bills compared to the 2019/20 tariff. Figure 47 to Figure 54 show the outcomes for customers with and without PV under different tariffs, again using both the average annual bills and the median and spread.

Key Points:

- The relative sizes of the average customer bills under the different tariffs was essentially the same as for the mix of solar and non-solar customers Figure 39 and Figure 40, except that the IBT bills are relatively lower.
- Of the 2020/21 tariffs, the Transitional Demand tariff is the best option, and the Demand tariff results in higher average and median bills (although still lower than the 2019/20 IBT tariff).
- Both the average and median bills for customers with PV are lower under all tariffs apart from the TOU Energy tariff (where they are slightly higher). This is because on average they draw 15.3kWh/day compared to 16.5kWh/day for non-PV customers.



	IBT 2019		IBT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	39	49	24	32	24	32	24	32	24	32
CL Daily Charge	16	16	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	39	83	194	238
Main Energy Charge	253	306	231	280	282	351	207	244	104	141
Main Daily Charge	456	525	402	459	365	394	365	376	365	376

Figure 44. Comparison of Average Annual Bills under Different Tariffs, customers with solar PV, Ergon East Residential

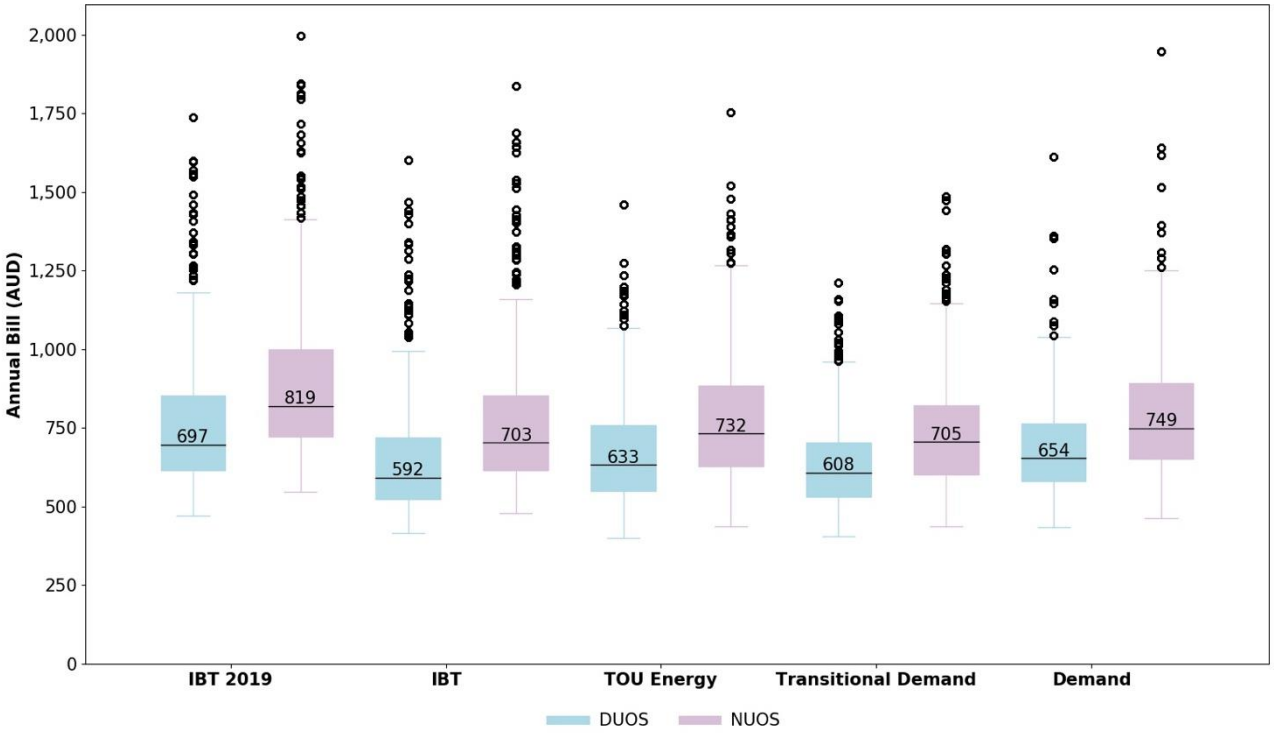
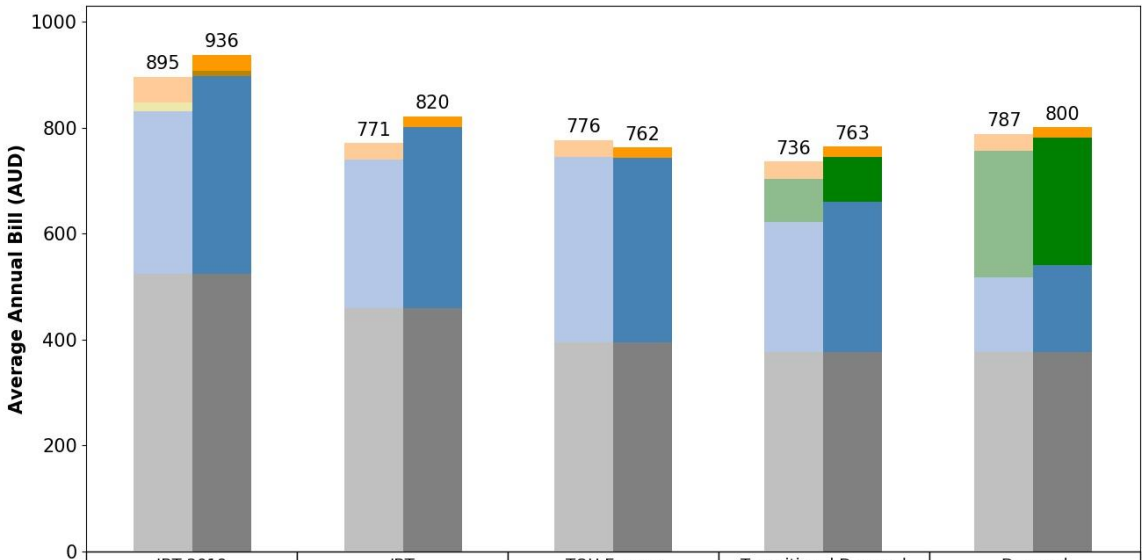


Figure 45. Comparison of Annual Bills under Different Tariffs, customers with solar PV, Ergon East Residential

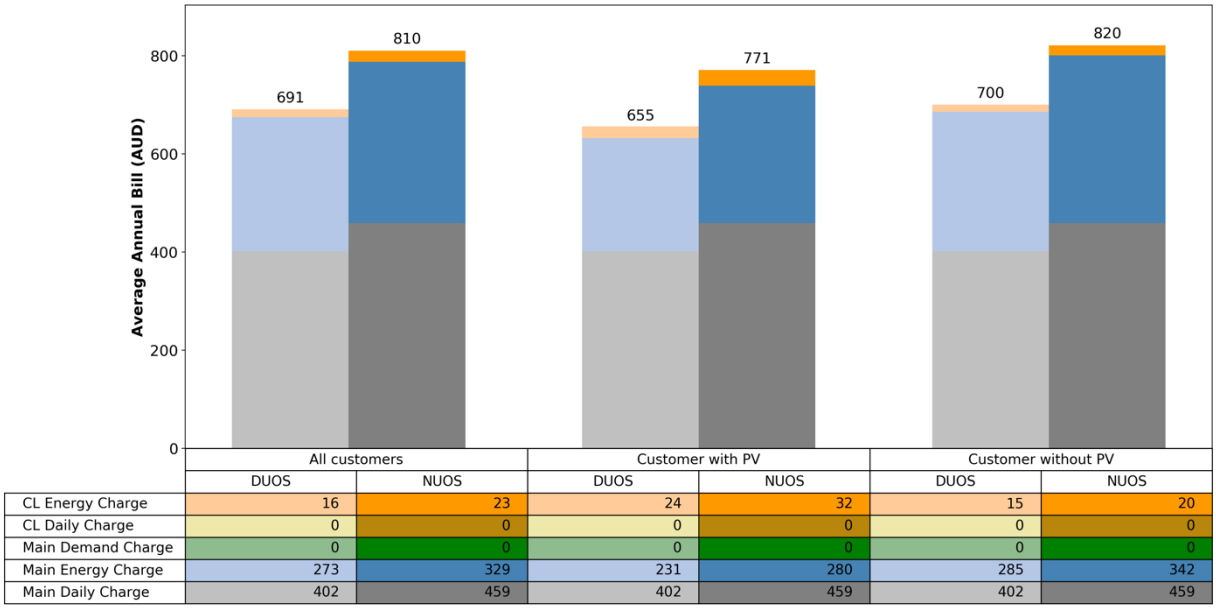


	IBT 2019		IBT		TOU Energy		Transitional Demand		Demand	
	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV
CL Energy Charge	49	30	32	20	32	20	32	20	32	20
CL Daily Charge	16	9	0	0	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0	83	84	238	240
Main Energy Charge	306	373	280	342	351	349	244	284	141	164
Main Daily Charge	525	525	459	459	394	394	376	376	376	376

Figure 46. Comparison of Average Annual NUOS Bills of customers with and without solar PV under Different Tariffs, Ergon East Residential

Table 15. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, Ergon East Residential Customers with solar PV

Tariff	Change	
	DUOS	NUOS
IBT	-15%	-14%
TOU Energy	-9%	-11%
Transitional Demand	-13%	-14%
Demand	-6%	-9%



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	16	23	24	32	15	20
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	273	329	231	280	285	342
Main Daily Charge	402	459	402	459	402	459

Figure 47. Comparison of the Average Annual Bills of Customers with and without Solar PV: IBT tariff, Ergon East Residential

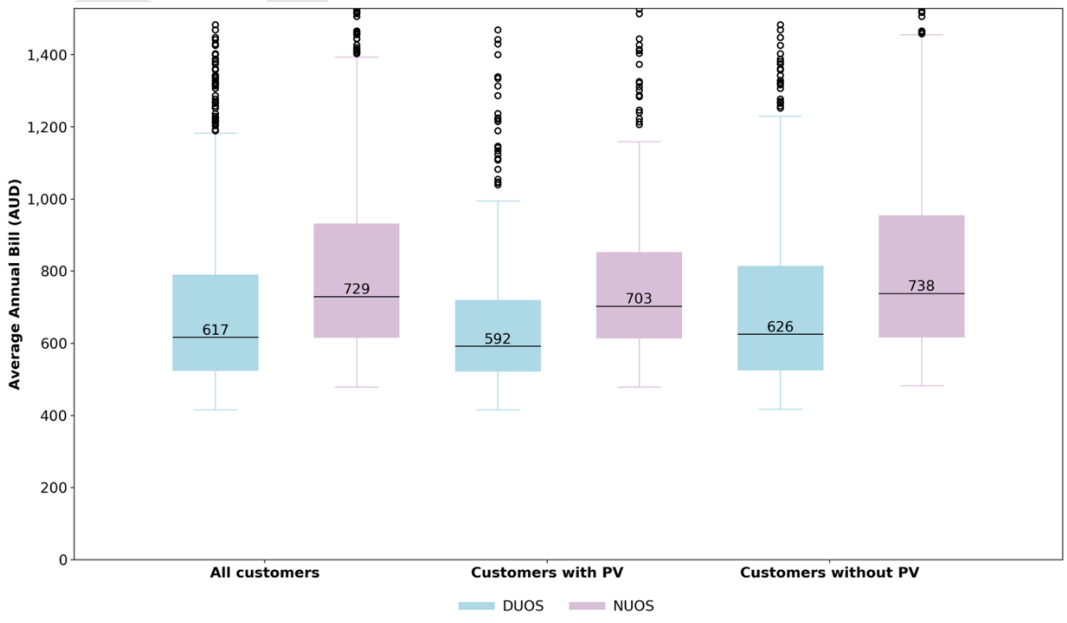
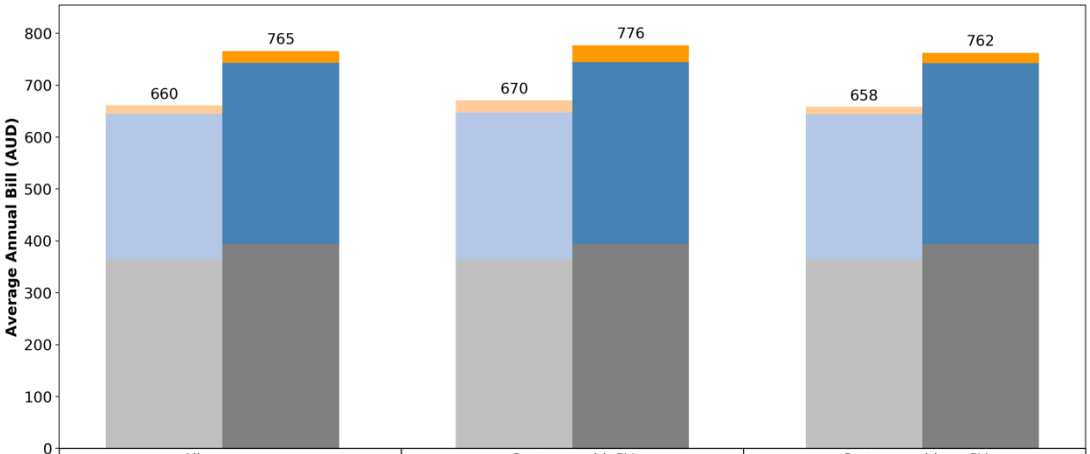


Figure 48. Comparison of the Annual Bills of Customers with and without Solar PV: IBT tariff, Ergon East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	16	23	24	32	15	20
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	279	349	282	351	279	349
Main Daily Charge	365	394	365	394	365	394

Figure 49. Comparison of the Average Annual Bills of Customers with and without Solar PV: TOU Energy tariff, Ergon East Residential

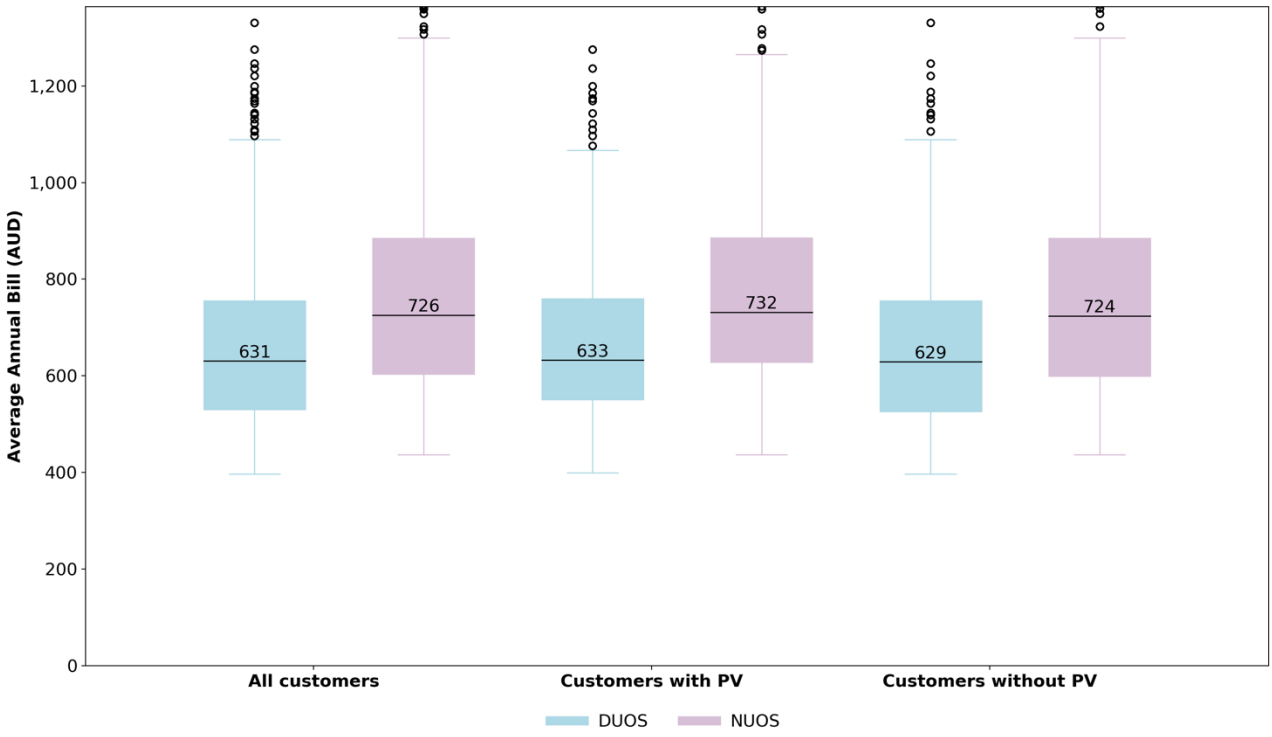
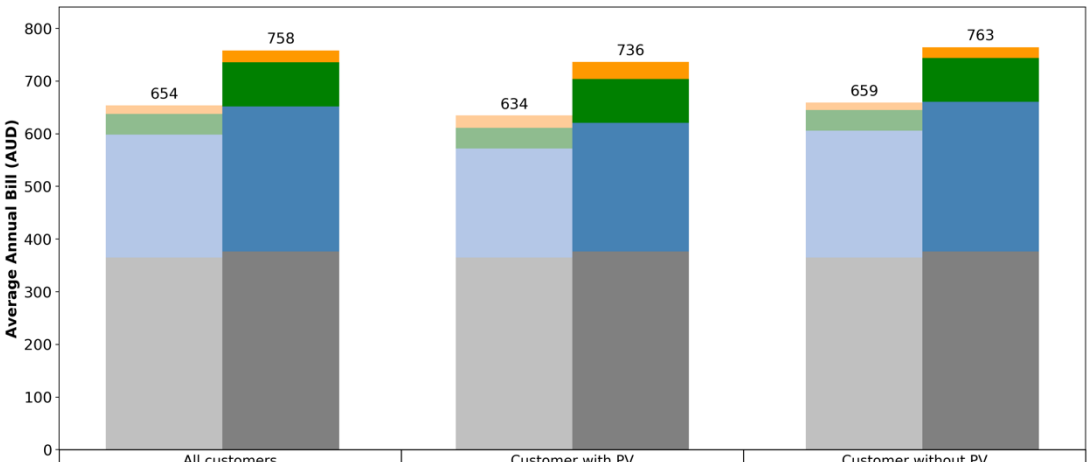


Figure 50. Comparison of the Annual Bills of Customers with and without Solar PV: TOU Energy tariff, Ergon East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	16	23	24	32	15	20
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	39	83	39	83	39	84
Main Energy Charge	234	276	207	244	241	284
Main Daily Charge	365	376	365	376	365	376

Figure 51. Comparison of the Average Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, Ergon East Residential

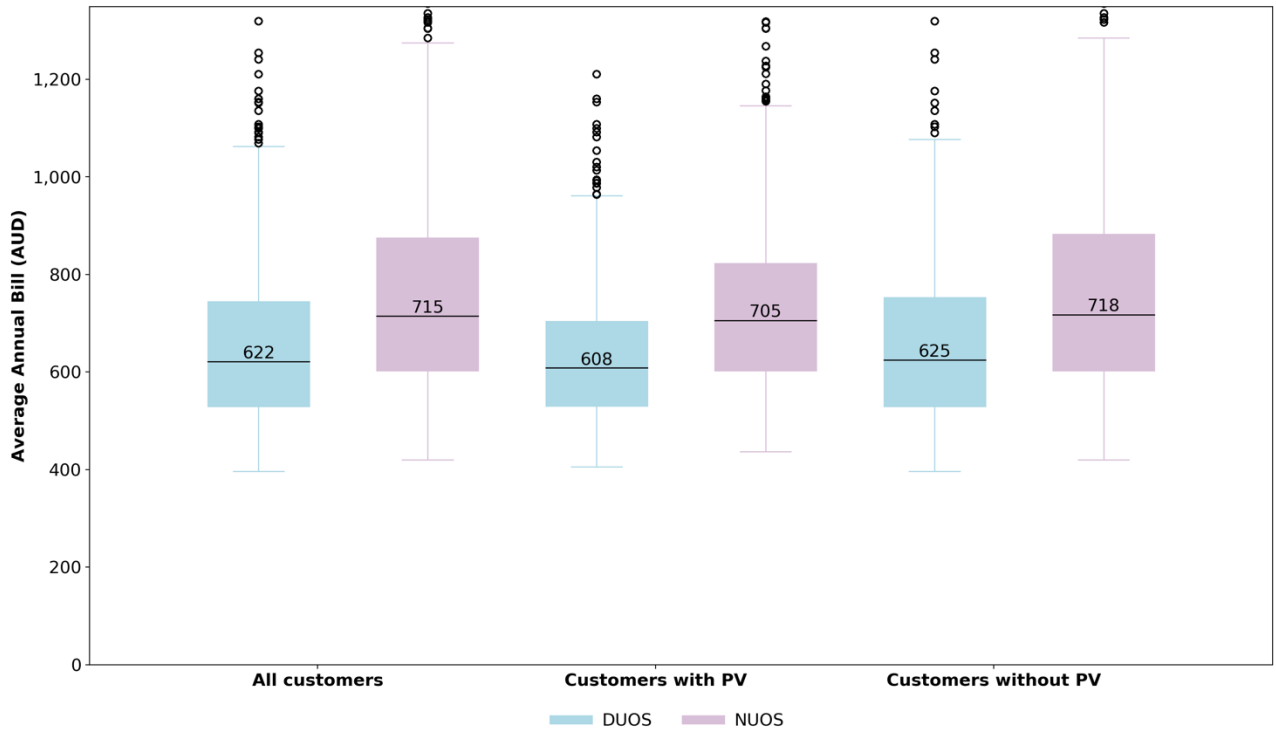
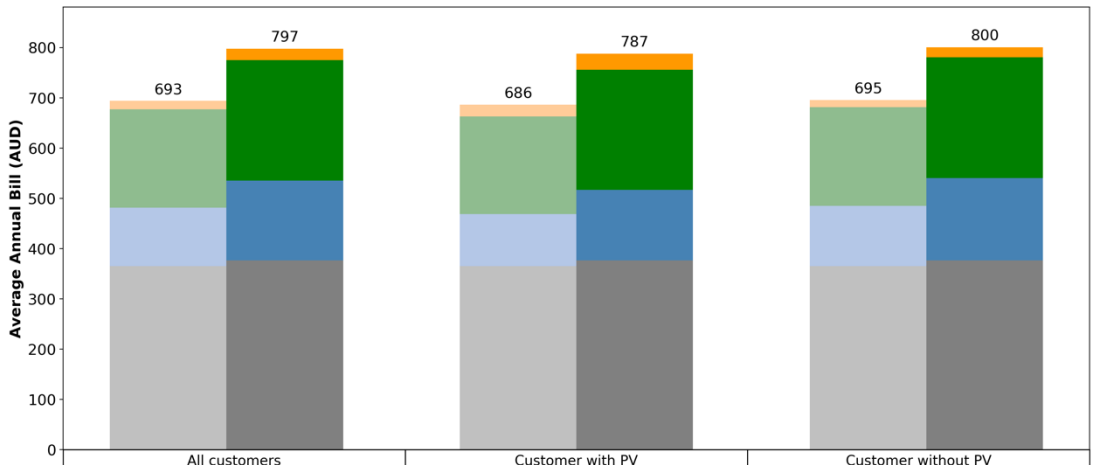


Figure 52. Comparison of the Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, Ergon East Residential



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
CL Energy Charge	16	23	24	32	15	20
CL Daily Charge	0	0	0	0	0	0
Main Demand Charge	196	240	194	238	196	240
Main Energy Charge	117	159	104	141	120	164
Main Daily Charge	365	376	365	376	365	376

Figure 53. Comparison of the Average Annual Bills of Customers with and without Solar PV: Demand tariff, Ergon East Residential

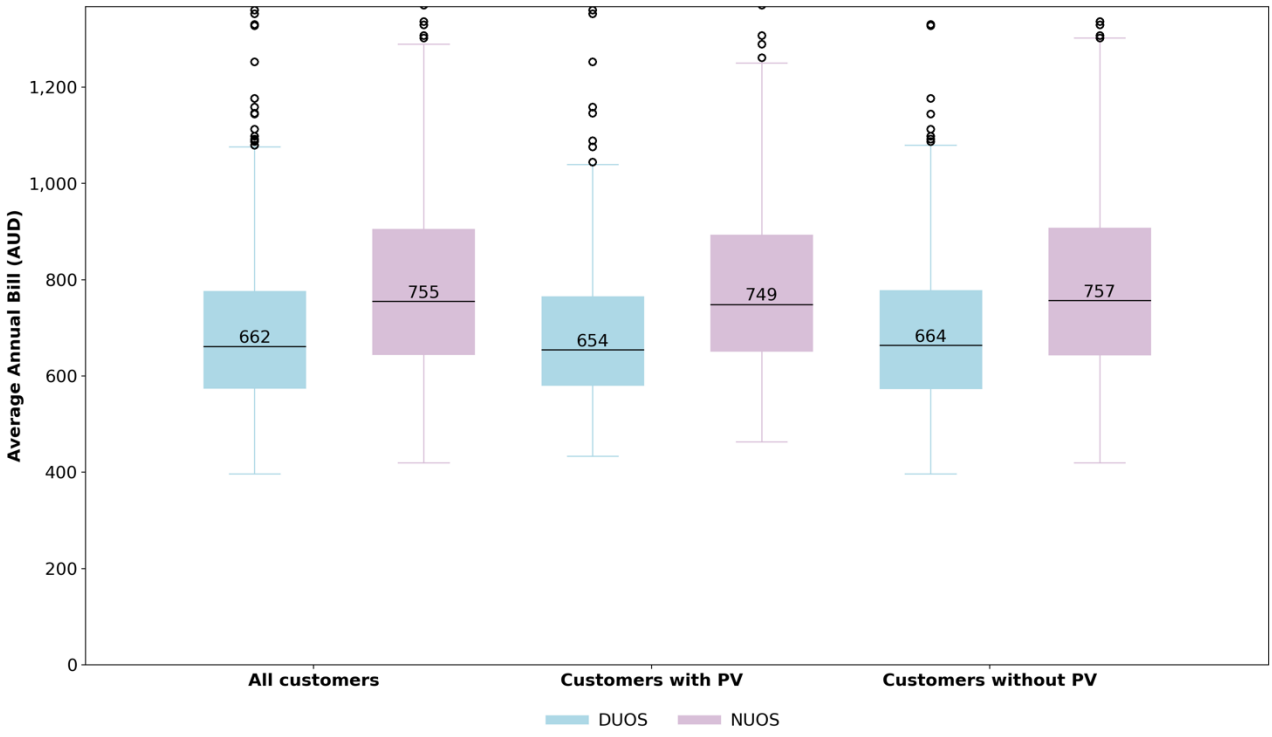


Figure 54. Comparison of the Annual Bills of Customers with and without Solar PV: Demand tariff, Ergon East Residential

3.1.4 Ergon East Small Business

3.1.4.1 2020/21 Tariff Comparison

This section is divided into customers using 20MWh/year or less and customers using more than 20MWh/year because they will be on different tariffs if they have a basic meter**.**

Customers using 20MWh/year or less

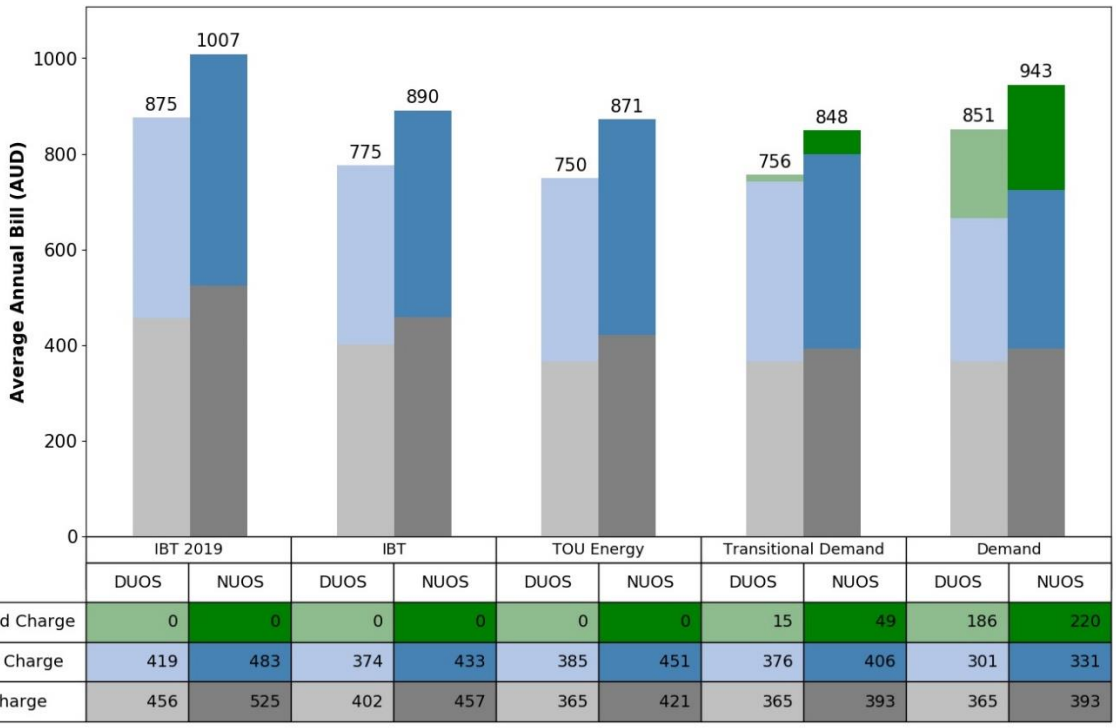
Customers using 20MWh/year or less are assumed to be on the IBT tariff in 2020/21.

Figure 55 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 56 compares these tariffs showing the median and spread as defined above. Table 16 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Table 17 shows the percentage of customers that are either better or worse off in moving from the IBT tariff to the other 2020/21 tariffs.

Key Points:

- The average bills and median bills under all the 2020/21 tariffs are all lower than under the 2019/20 IBT tariff, more so for NUOS than for DUOS under the Transitional demand and Demand tariffs.
- Of the 2020/21 tariffs, the Transitional Demand tariff resulted in the lowest average and median bills, followed by the TOU Energy tariff and IBT tariff respectively.
- Of the 2020/21 tariffs, the Demand tariff has the highest average and median bills because of its demand charge, the impact of which is not completely overcome by the benefit of its lower energy charge. Under the Demand tariff, customers that have a peaky load (poor load factor) but can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- Under all tariffs the customer bills are fairly tightly clustered around the median, although there are some high outliers, reaching over $4,000/year under the Demand tariff.
- As shown in Table 17, compared to the IBT tariff, most customers are better off under the TOU Energy and Transitional Demand tariffs. A smaller proportion are better off under the Demand tariff, highlighting the importance of reducing demand during the tariff's peak period. In this case a greater % of customers are better off under NUOS than DUOS for the Transitional demand and Demand tariffs because these tariffs have a relatively smaller TUOS component (Figure 55).



	IBT 2019		IBT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	15	49	186	220
Energy Charge	419	483	374	433	385	451	376	406	301	331
Daily Charge	456	525	402	457	365	421	365	393	365	393

Figure 55. Comparison of Average Annual Bills, Ergon East Small Business

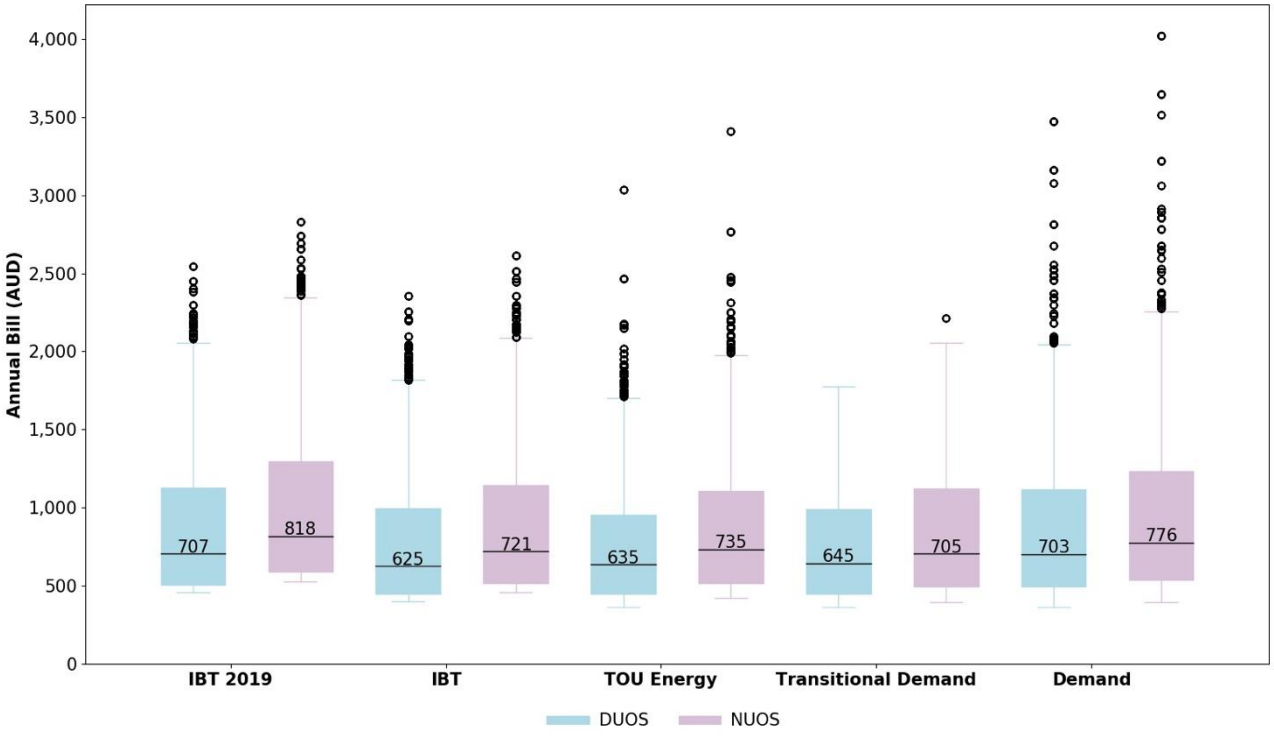


Figure 56. Comparison of Annual Bills, Ergon East Small Business

Table 16. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, Ergon East Small Business

Tariff	Change	
	DUOS	NUOS
IBT	-12%	-12%
TOU Energy	-10%	-10%
Transitional Demand	-9%	-14%
Demand	-1%	-5%

Table 17. Percentage of Customers Better Off and Worse Off When Moving from the IBT Tariff, Ergon East Small Business

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	61%	39%	58%	42%
Transitional Demand	67%	33%	92%	8%
Demand	33%	67%	50%	50%

Customers using more than 20MWh/year

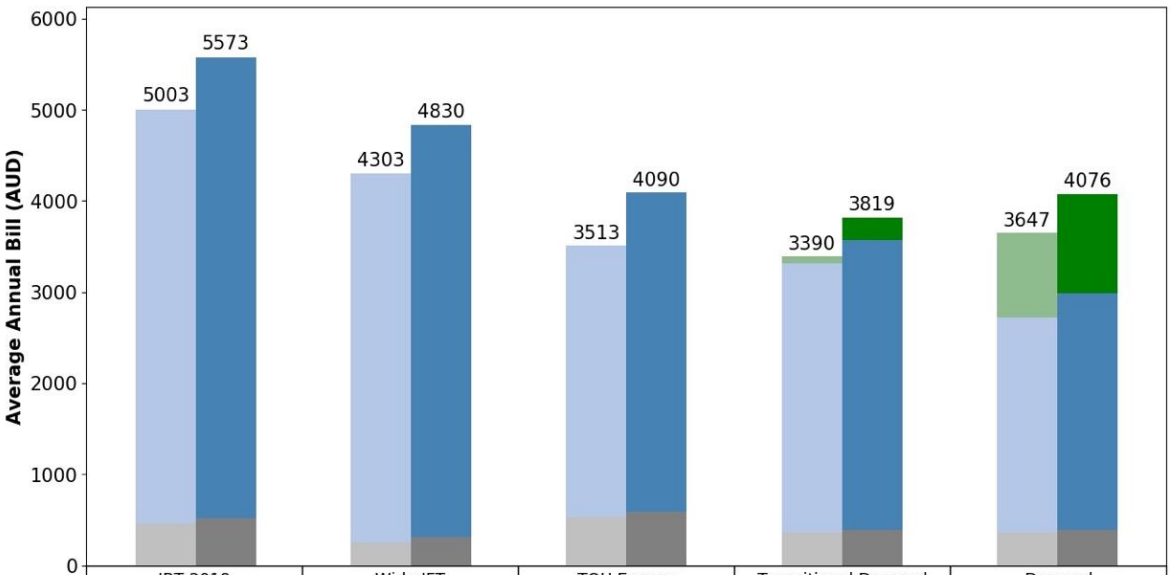
Customers using more than 20MWh/year are assumed to be on the Wide IFT tariff in 2020/21.

Figure 57 compares the average annual bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 58 compares these tariffs showing the median and spread as defined above. Table 18 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Table 19 shows the percentage of customers that are either better or worse off in moving from the Wide IFT tariff to the other 2020/21 tariffs.

Key Points:

- The average bills and median bills under all the 2020/21 tariffs are significantly lower than under the 2019/20 IBT tariff, with the % reductions in DUOS and NUOS being very similar.
- Of the 2020/21 tariffs, the Transitional Demand tariff resulted in the lowest average and median bills, followed by the Demand tariff and TOU Energy tariff respectively. Customers that can reduce demand during peak times will reduce their bills as they can derive more benefit from the lower energy charge.
- Under the 2020/21 tariffs the customer bills are more tightly clustered around the median than under the 2019/20 IBT tariff, although there are some high outliers, reaching over $14,000/year under the Wide IFT tariff (which is still lower than under the 2019/20 IBT tariff where the outliers extend up to over $17,000).
- As shown in Table 19, compared to the IBT tariff, a clear majority of the customers are better off under the TOU Energy, Transitional Demand and Demand tariffs – with a greater % improvement in DUOS than in NUOS .



	IBT 2019		Wide IFT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	77	246	923	1092
Energy Charge	4547	5049	4053	4517	2988	3503	2949	3181	2359	2591
Daily Charge	456	525	251	313	525	587	365	393	365	393

Figure 57. Comparison of Average Annual Bills, Ergon East Small Business

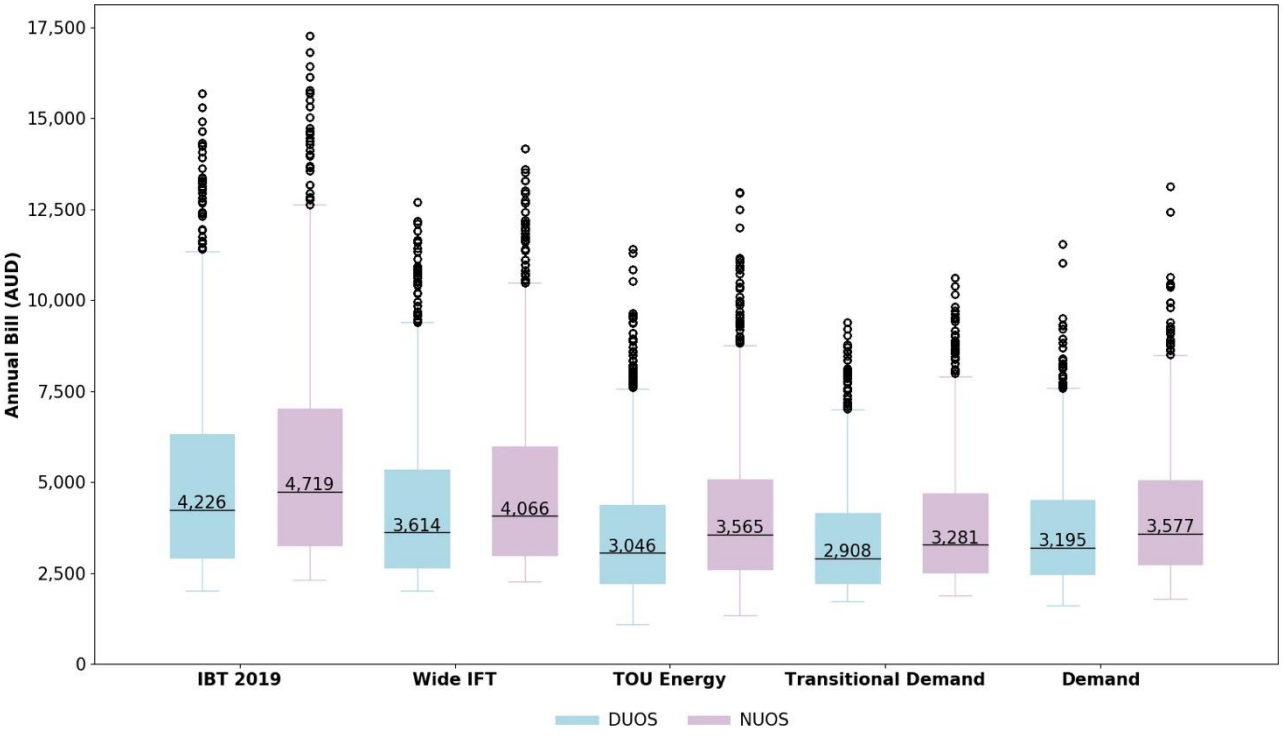


Figure 58. Comparison of Annual Bills, Ergon East Small Business

Table 18. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, Ergon East Small Business

Tariff	Change	
	DUOS	NUOS
Wide IFT	-14%	-14%
TOU Energy	-28%	-24%
Transitional Demand	-31%	-30%
Demand	-24%	-24%

Table 19. Percentage of Customers Better Off and Worse Off When Moving from the Wide IFT Tariff, Ergon East Small Business

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	89%	11%	87%	13%
Transitional Demand	100%	0%	85%	15%
Demand	85%	15%	98%	2%

3.1.4.2 Scatter plots of average bill versus annual electricity use

Figure 59 compares the average NUOS bills to annual electricity use, for the 2019/20 IBT tariff and the IBT and Wide IFT 2020/21 tariffs. Figure 60 show the equivalent comparisons for the TOU Energy, Transitional Demand and Demand tariffs. Figure 61 then compares the IBT, Transitional Demand and Demand tariffs. The equivalent DUOS charts are in Appendix C.

Key Points:

- Under essentially all levels of electricity use, the 2020/21 tariffs result in lower bills than the 2019/20 IBT tariff, especially as electricity use increases (noting that customers with more than 20MWh/year are on the Wide IFT).
- The beneficial impacts of the TOU Energy, Transitional Demand and Demand tariffs are greatest at higher levels of electricity use, with all having better outcomes for customers compared to the IBT tariffs. At lower levels of electricity use, the impact of the TOU Energy peak volume charge and the Transitional Demand and Demand tariff's demand charge results in some customers being worse off. This highlights the importance of reducing demand during these peak periods.

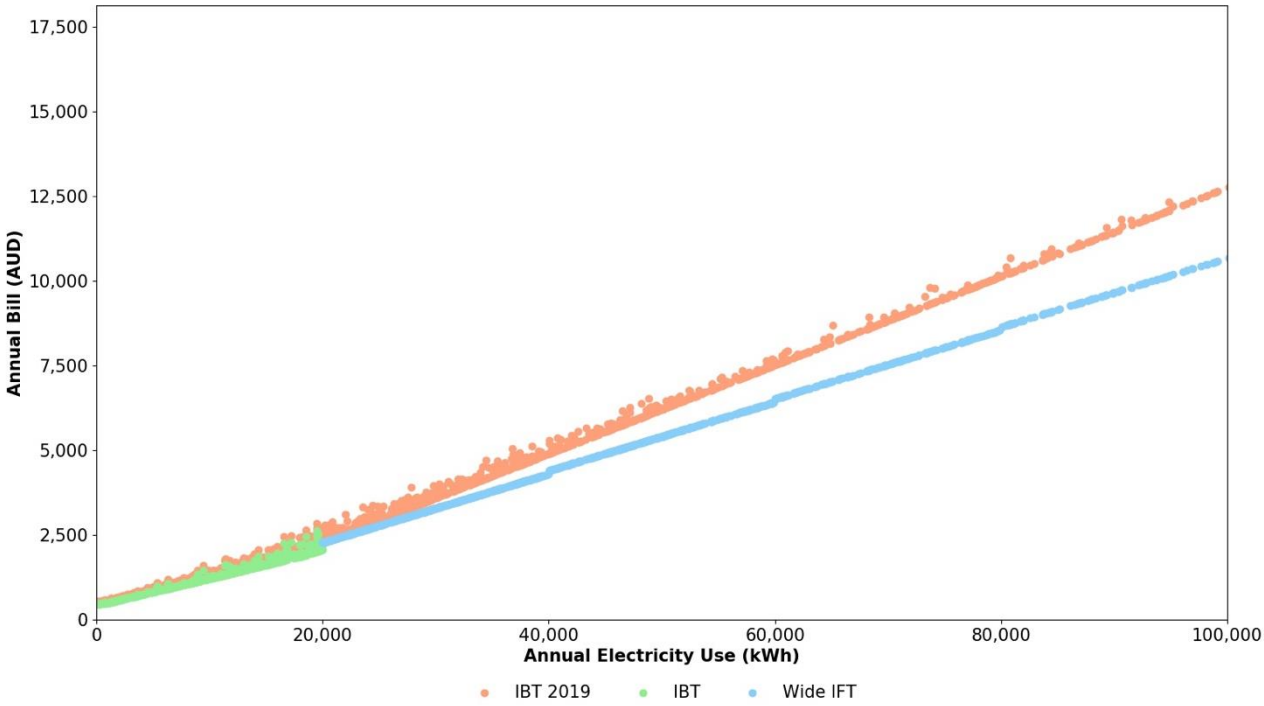


Figure 59. Comparison of Average Customer Bills for IBT 2019/20, IBT 2020/21 and Wide IFT 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Small Business

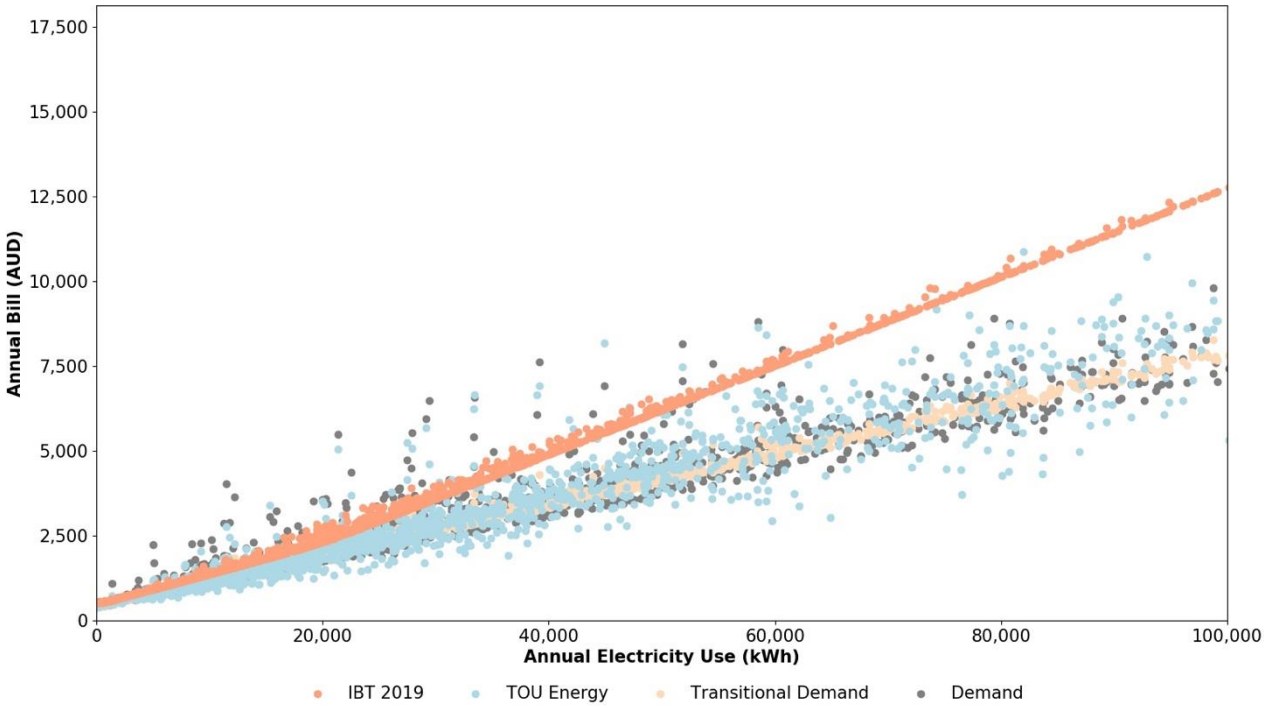


Figure 60. Comparison of Average Customer Bills for IBT 2019/20, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Small Business

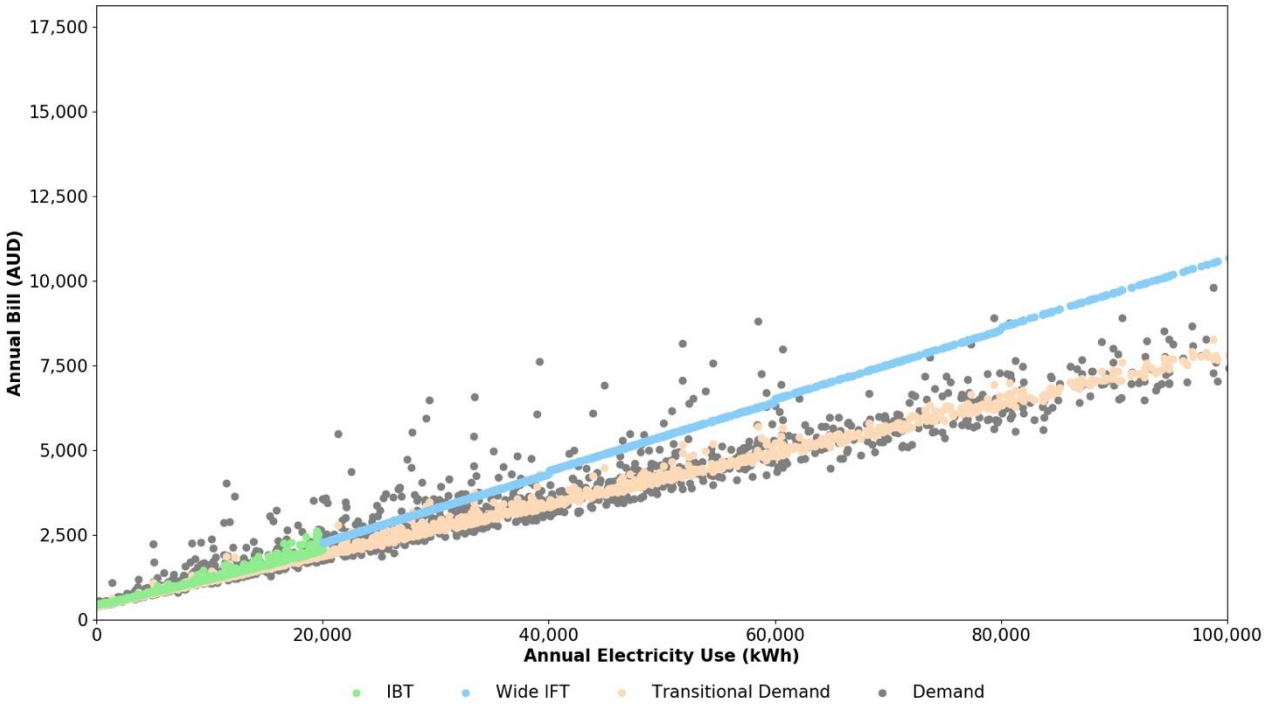


Figure 61. Comparison of Average Customer Bills for IBT 2020/21, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Ergon East Small Business

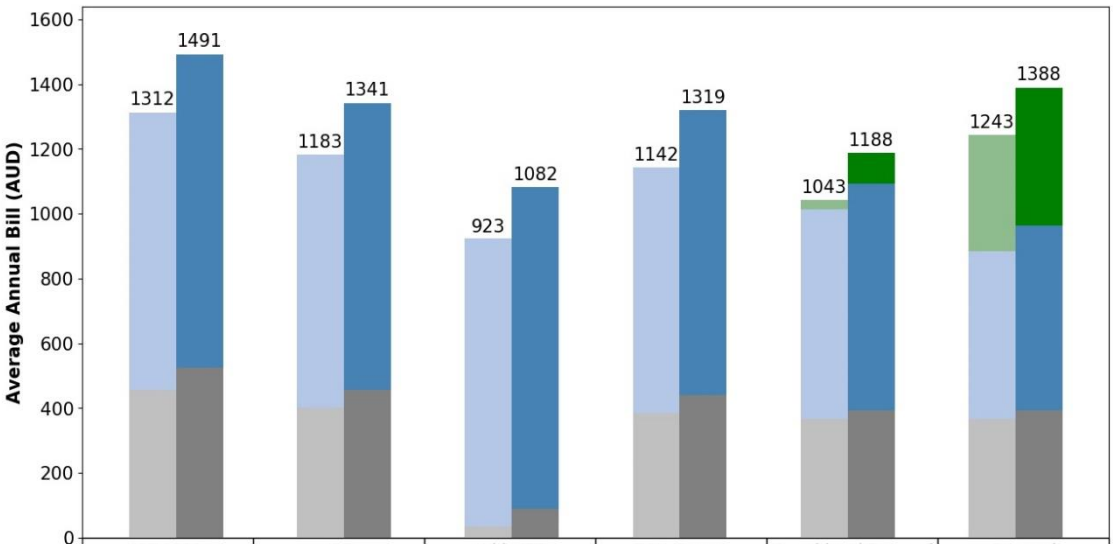
3.1.4.3 Comparison of Small Business Customers with and without Solar PV

Figure 62 and Figure 63 compare the outcomes under different tariffs for customers with solar PV, using both the average annual bills and the median and spread as defined above. Figure 64 compares the average NUOS bills for customers with and without solar PV under each of the tariffs. Table 20 shows the percentage change in the average median bills compared to the 2019/20 tariff. Figure 65 to Figure 74 show the outcomes for customers with and without PV under different tariffs, again using both the average annual bills and the median and spread.[5]

Key Points:

- The average and median bills under all the 2020/21 tariffs are lower than under the 2019/20 tariff.
- Of the 2020/21 tariffs, the Wide IFT tariff results in the lowest average and median bills, followed by the Transitional Demand tariff. The Wide IFT bills being lower is essentially an artefact resulting from inclusion of all customers in the analysis as it includes customers that use less that 20MWh/year that would not normally be on this tariff (and so don't use enough electricity to trigger the daily charge).
- Compared to the IBT 2019/20 tariff, the difference in average NUOS bills between solar and non-solar customers is reduced under the TOU Energy, Transitional Demand and Demand tariffs.
- In all cases the average and median bills are lower for customers with PV, essentially because they draw less electricity from the grid. On average they draw 26.9kWh/day compared to 43.5kWh/day for non-PV customers. This difference was least pronounced under the TOU Energy, Transitional Demand and Demand tariffs, indicating the solar customers have worse load factors, although this may have been due to other characteristics of their load.

[5] Note that for ease of comparison, Figure 62 and Figure 63 apply the IBT and Wide IFT tariffs to all customers. Figure 65 to Figure 68 apply the IBT and Wide IFT tariffs only to the <20MWh and >20MWh customers respectively.



	IBT 2019		IBT		Wide IFT		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	0	0	30	96	360	426
Energy Charge	857	967	782	884	891	993	758	878	649	700	519	570
Daily Charge	456	525	402	457	33	89	385	442	365	393	365	393

Figure 62. Comparison of Average Annual Bills under Different Tariffs, customers with solar PV, Ergon East Small Business

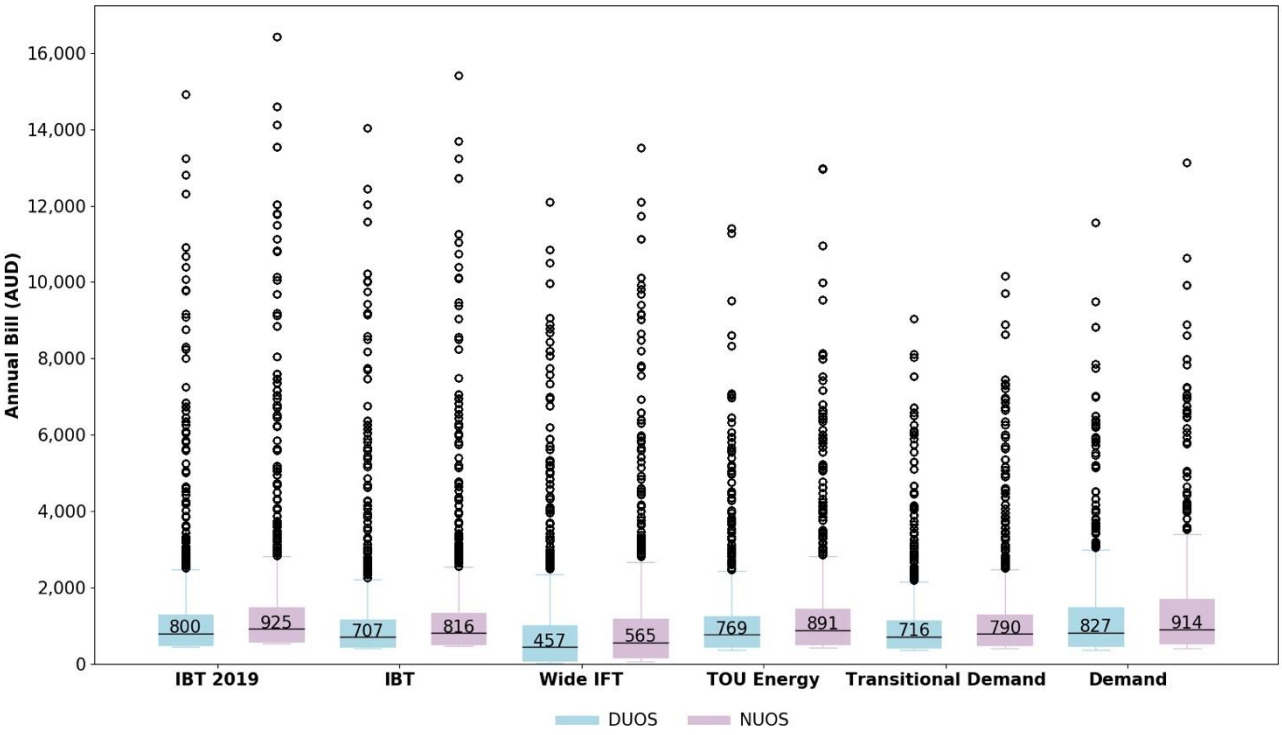
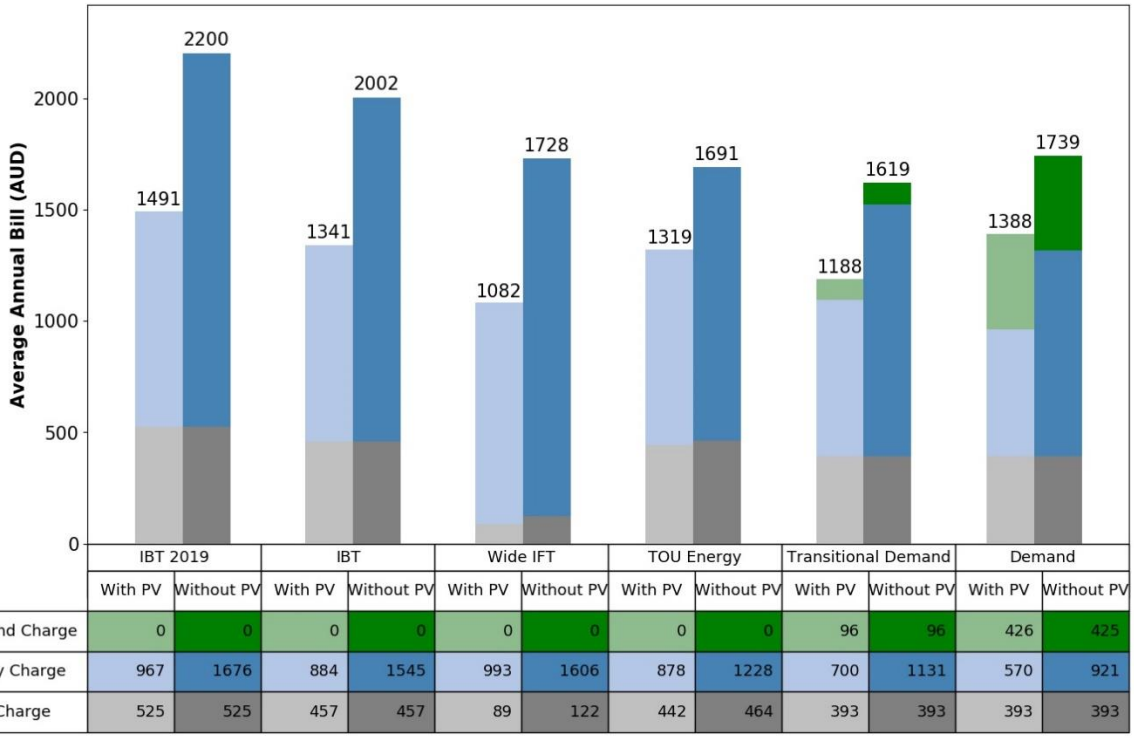


Figure 63. Comparison of Annual Bills under Different Tariffs, customers with solar PV, Ergon East Small Business

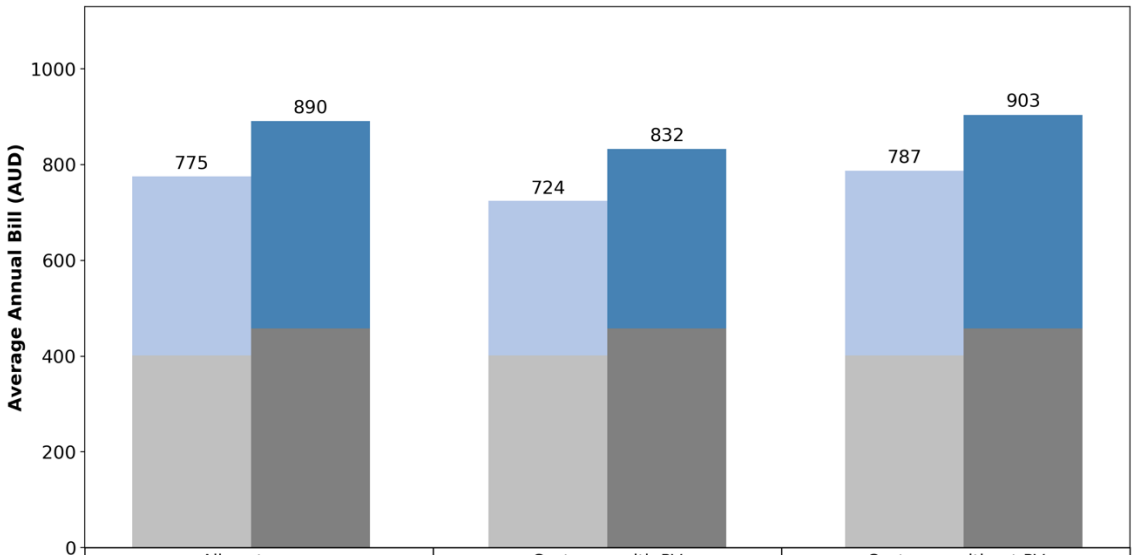


	IBT 2019		IBT		Wide IFT		TOU Energy		Transitional Demand		Demand	
	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV	With PV	Without PV
Demand Charge	0	0	0	0	0	0	0	0	96	96	426	425
Energy Charge	967	1676	884	1545	993	1606	878	1228	700	1131	570	921
Daily Charge	525	525	457	457	89	122	442	464	393	393	393	393

Figure 64. Comparison of Average Annual NUOS Bills of customers with and without solar PV under Different Tariffs, Ergon East Small Business

Table 20. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff, Ergon East Small Business Customers with solar PV

Tariff	Change	
	DUOS	NUOS
IBT	-12%	-12%
Wide IFT	-43%	-39%
TOU Energy	-4%	-4%
Transitional Demand	-11%	-15%
Demand	3%	-1%



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	374	433	323	375	386	446
Main Daily Charge	402	457	402	457	402	457

Figure 65. Comparison of the Average Annual Bills of Customers with and without Solar PV: IBT tariff, Ergon East Small Business

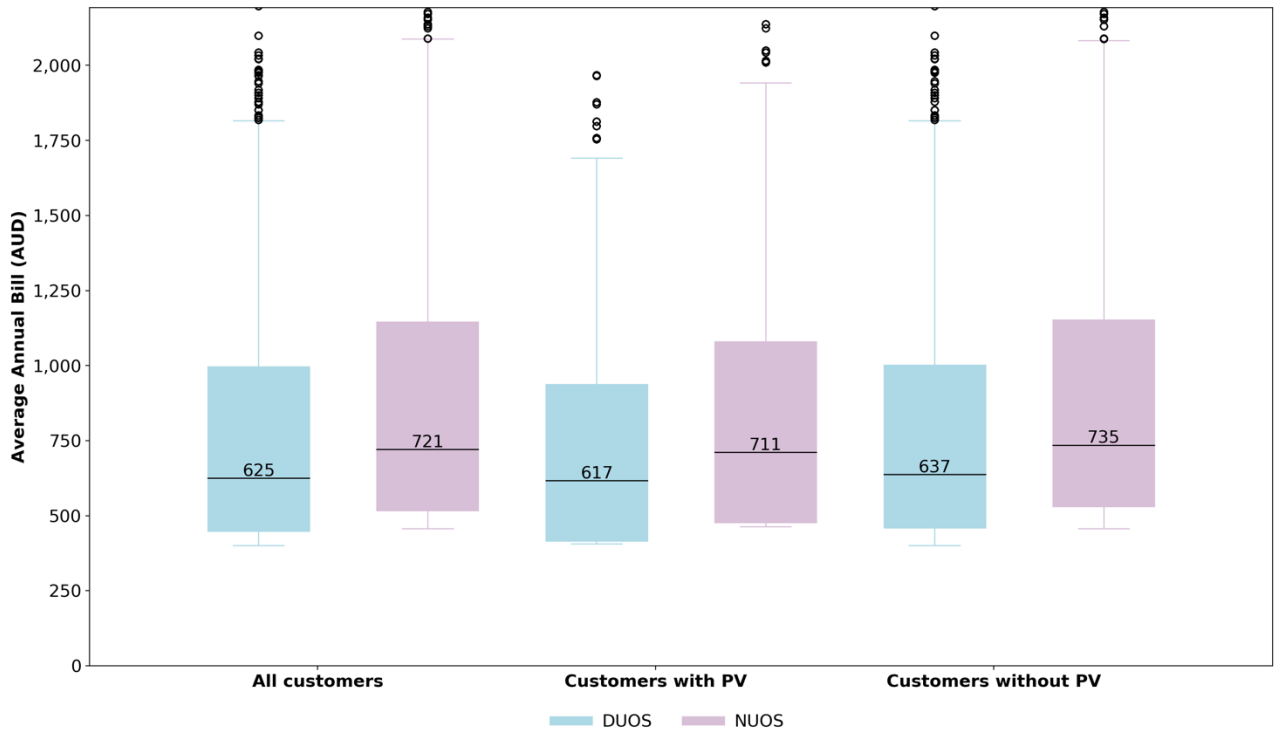
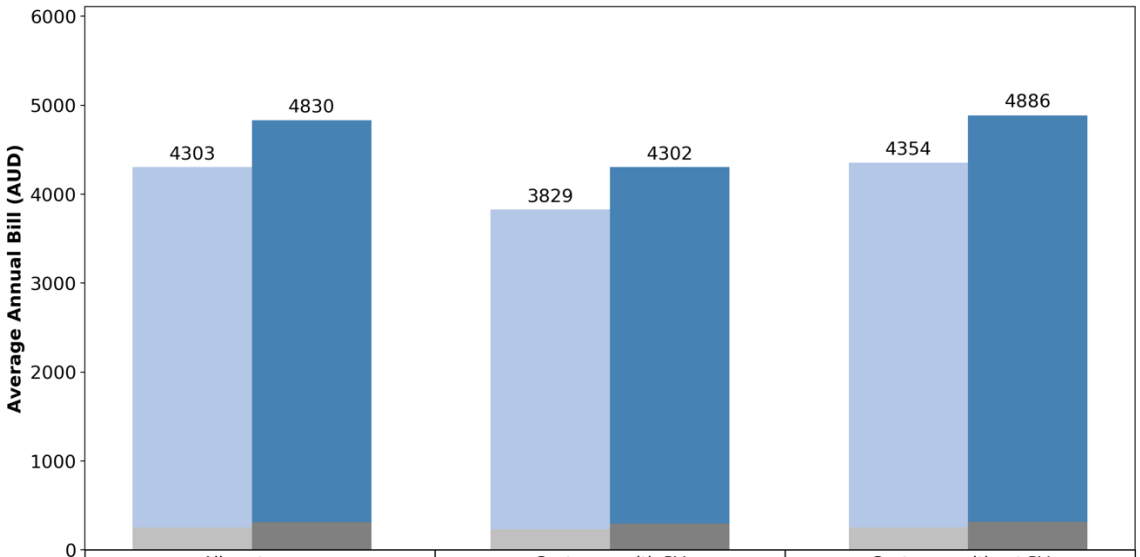


Figure 66. Comparison of the Annual Bills of Customers with and without Solar PV: IBT tariff, Ergon East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	4053	4517	3595	4006	4101	4571
Main Daily Charge	251	313	235	296	253	315

Figure 67. Comparison of the Average Annual Bills of Customers with and without Solar PV: Wide IFT tariff, Ergon East Small Business

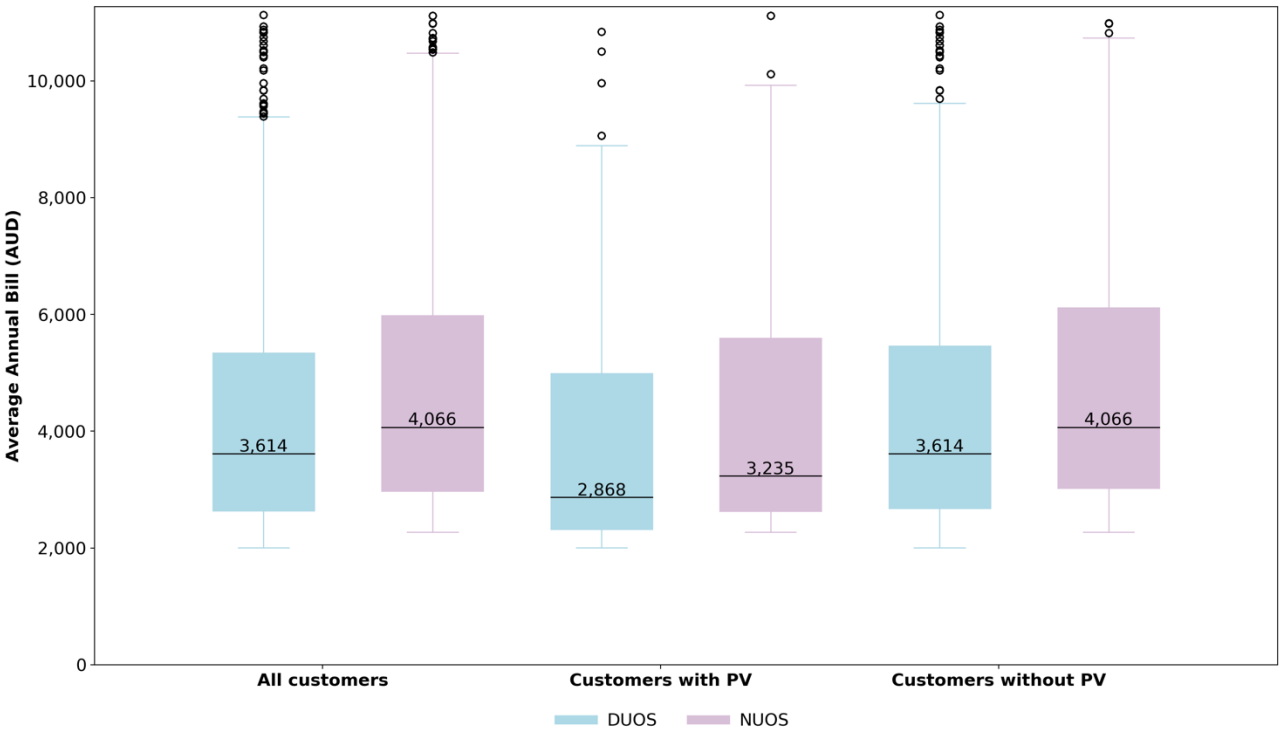
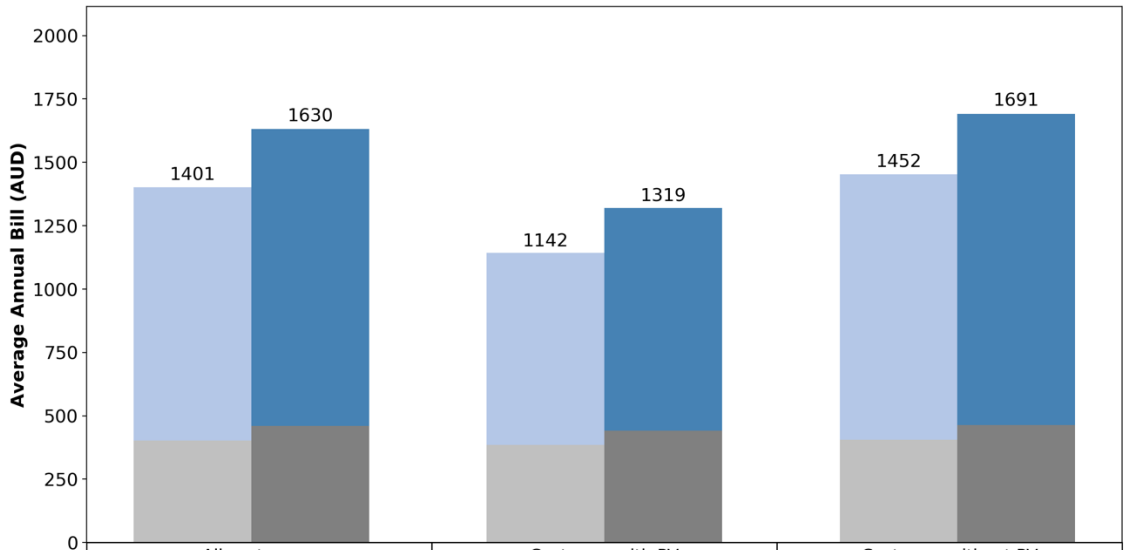


Figure 68. Comparison of the Annual Bills of Customers with and without Solar PV: Wide IFT tariff, Ergon East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	0	0	0	0	0	0
Main Energy Charge	999	1171	758	878	1046	1228
Main Daily Charge	403	460	385	442	406	464

Figure 69. Comparison of the Average Annual Bills of Customers with and without Solar PV: TOU Energy tariff, Ergon East Small Business

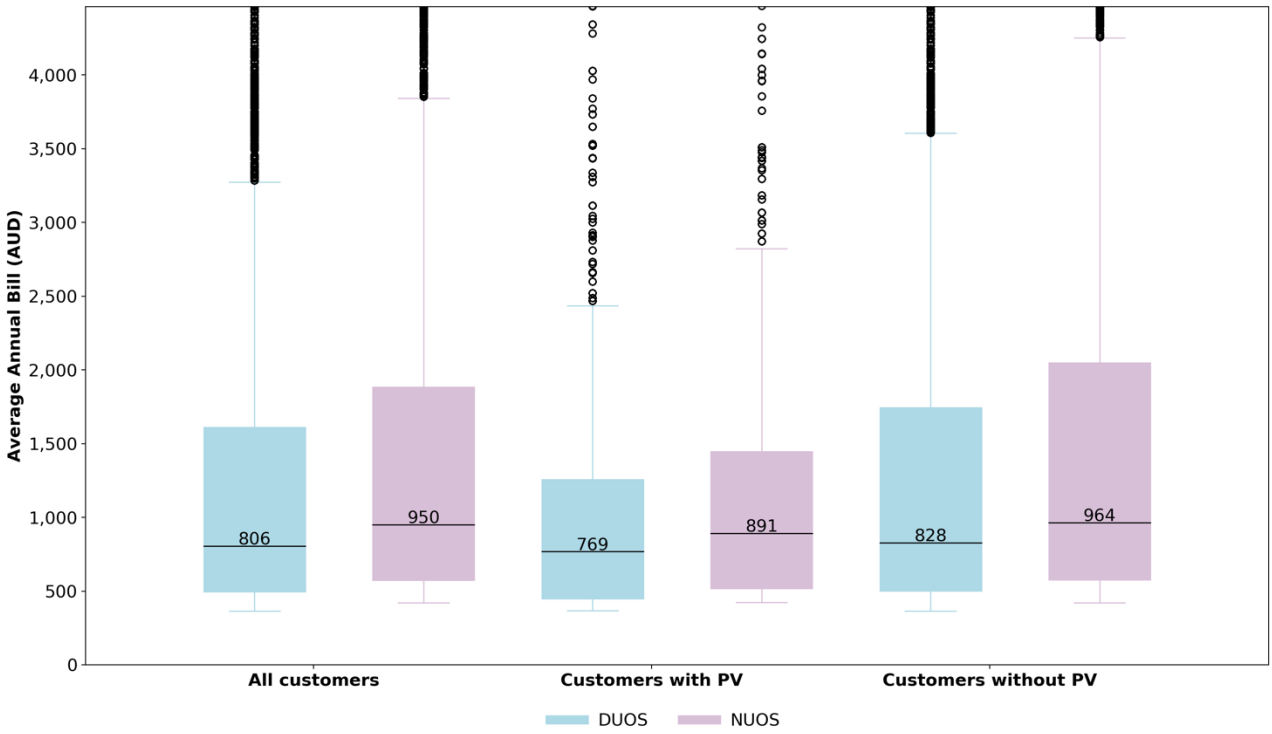
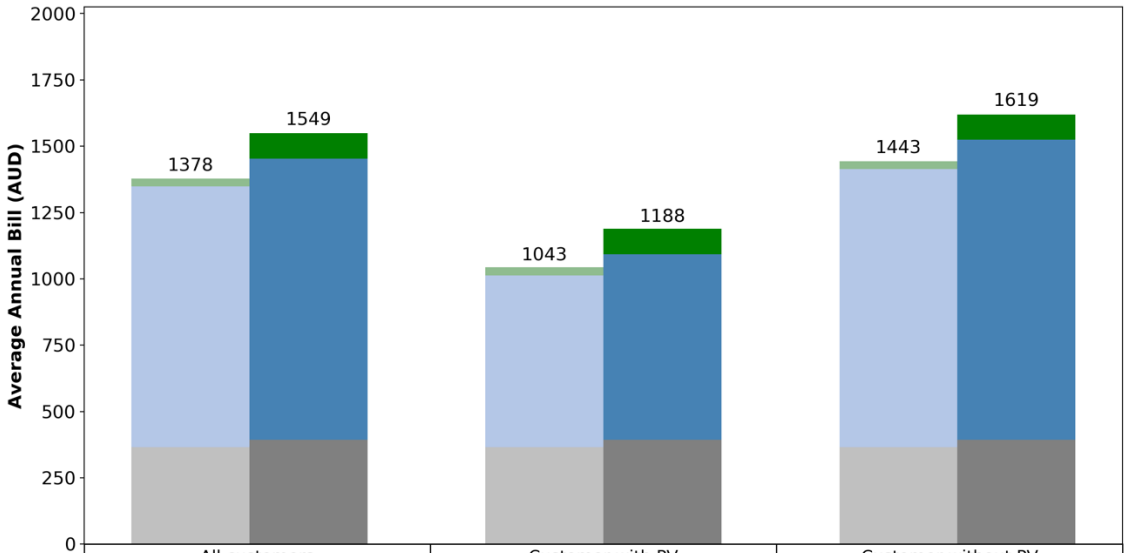


Figure 70. Comparison of the Annual Bills of Customers with and without Solar PV: TOU Energy tariff, Ergon East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	30	96	30	96	30	96
Main Energy Charge	983	1060	649	700	1049	1131
Main Daily Charge	365	393	365	393	365	393

Figure 71. Comparison of the Average Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, Ergon East Small Business

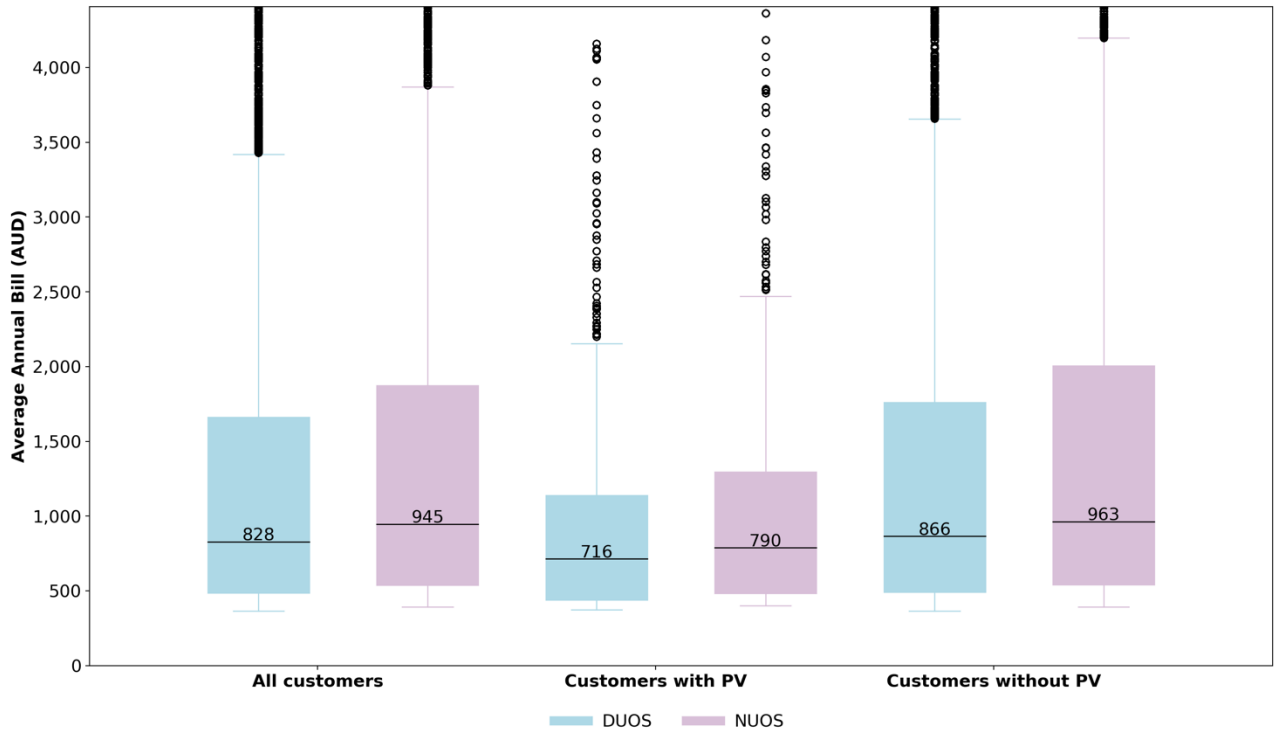
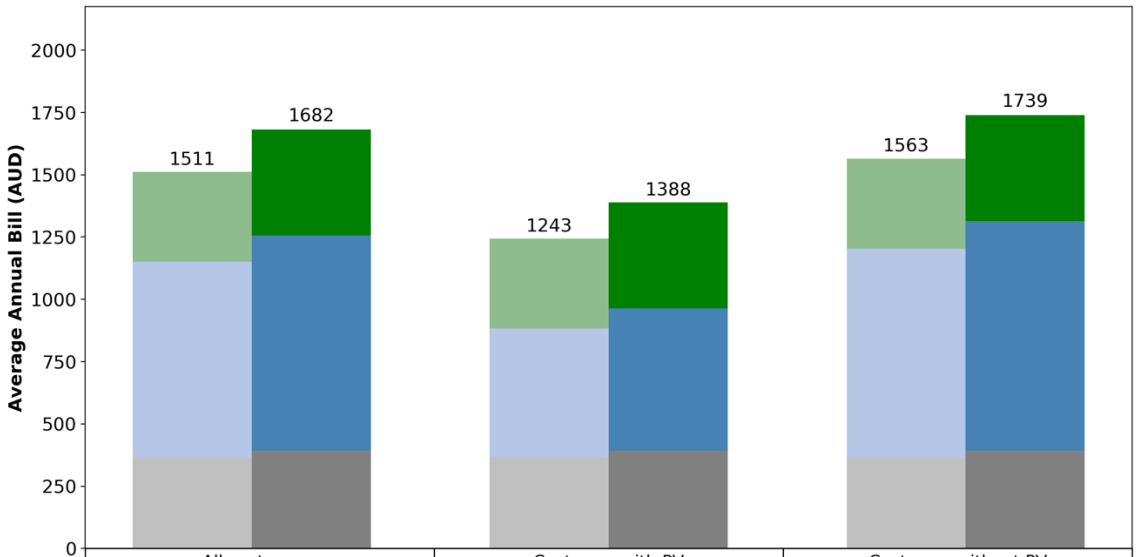


Figure 72. Comparison of the Annual Bills of Customers with and without Solar PV: Transitional Demand tariff, Ergon East Small Business



	All customers		Customer with PV		Customer without PV	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Main Demand Charge	360	425	360	426	360	425
Main Energy Charge	787	864	519	570	839	921
Main Daily Charge	365	393	365	393	365	393

Figure 73. Comparison of the Average Annual Bills of Customers with and without Solar PV: Demand tariff, Ergon East Small Business

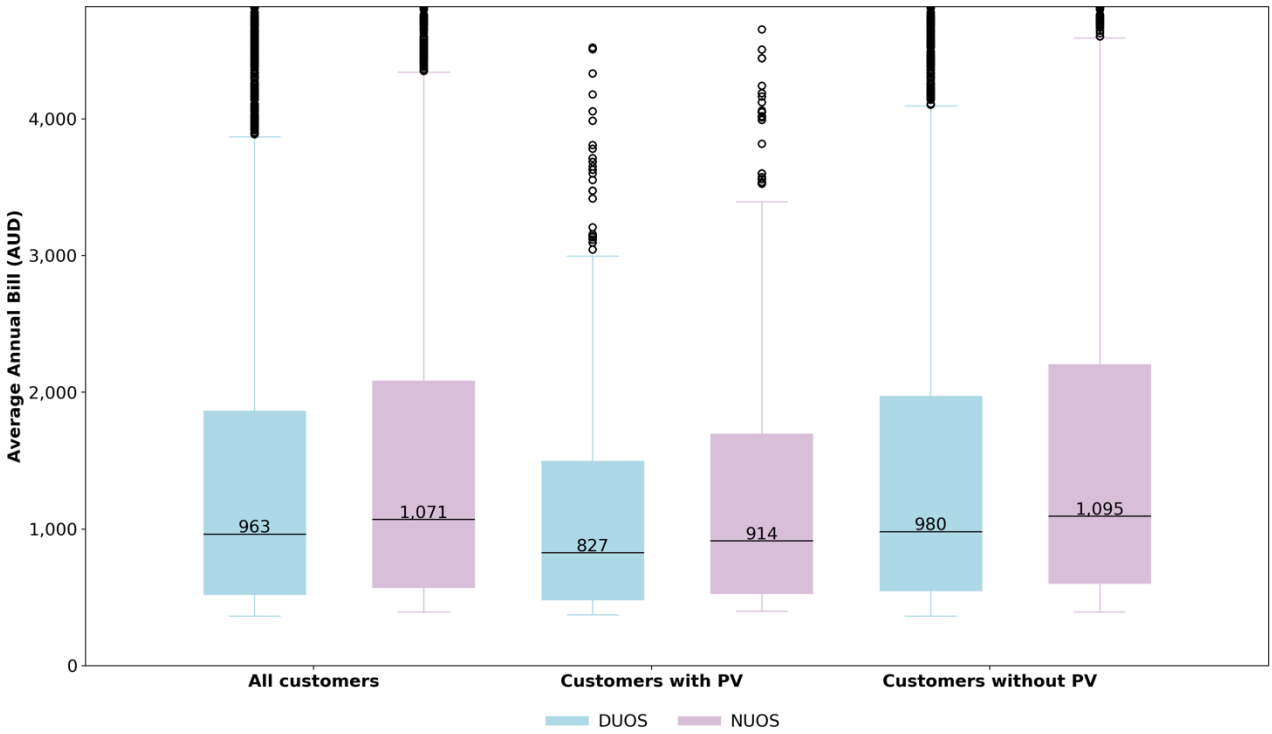


Figure 74. Comparison of the Annual Bills of Customers with and without Solar PV: Demand tariff, Ergon East Small Business

3.2 Residential Life Support Customers

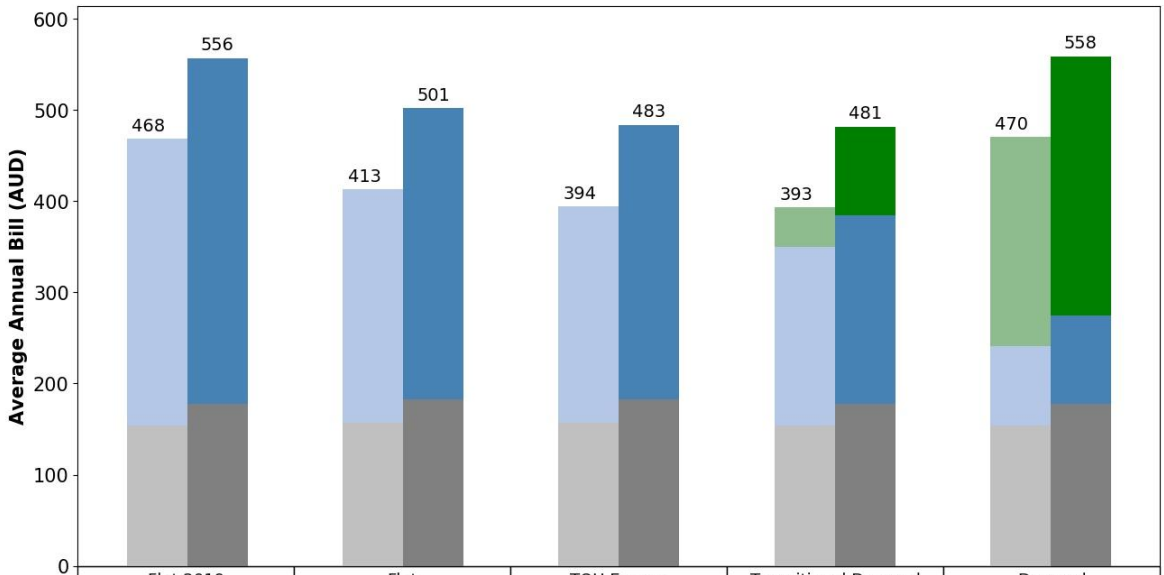
Note that the following analysis has been performed on a very small number of customers, so caution should be used when extrapolating these findings to other Life Support customers. All the tariffs used are Energex South East tariffs.

3.2.1 2020/21 Tariff Comparison

Figure 75 compares the average bills under the different 2020/21 tariffs to the 2019/20 tariff. Figure 76 compares these tariffs showing the median and spread as defined above. Table 21 shows the percentage change in the median annual bills compared to the 2019/20 tariff.

Key Points:

- The Flat, TOU Energy and Transitional Demand tariffs all result in similar average and median bills, that are lower than under the 2019/20 Flat tariff, with the DUOS decreasing slightly more than the NUOS. The Demand tariff bills are slightly higher than under the 2019/20 Flat tariff.
- Of the 2020/21 tariffs, the Transitional Demand tariff results in the lowest average and median bills.
- The scatter is less under all the 2020/21 tariffs than under the 2019/20 Flat tariff, being lowest under the Transitional Demand tariff.
- As shown in Table 22, compared to the Flat tariff, most customers are better off under the TOU Energy and Transitional Demand tariffs. A smaller proportion are better off under the Demand tariff, highlighting the importance of reducing demand during the tariff's peak period.



	Flat 2019		Flat		TOU Energy		Transitional Demand		Demand	
	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS	DUOS	NUOS
Demand Charge	0	0	0	0	0	0	43	97	229	283
Energy Charge	315	379	256	319	237	301	197	206	87	97
Daily Charge	154	178	157	182	157	182	154	178	154	178

Figure 75. Comparison of Average Annual Bills, Life Support, Residential

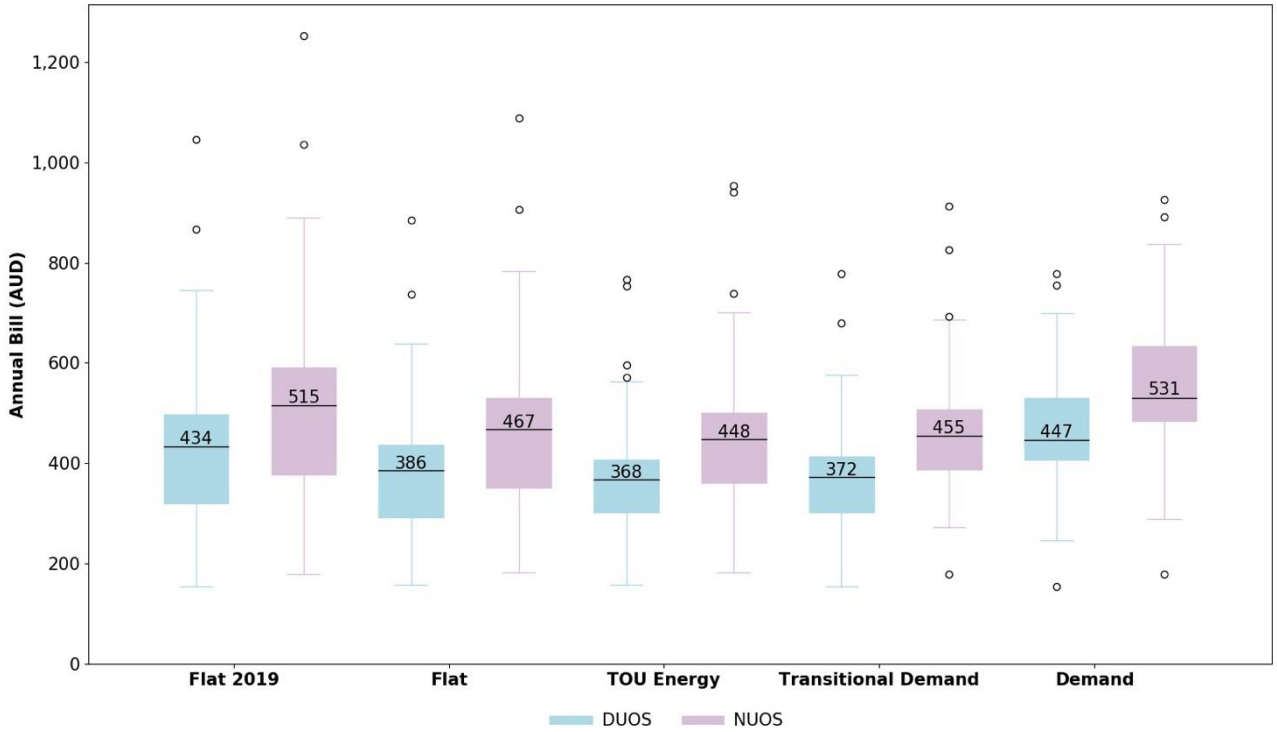


Figure 76. Comparison of Annual Bills, Life Support, Residential

Table 21. Percentage Change in Customer Median Bills Compared to the 2019/20 Tariff

Tariff	Change	
	DUOS	NUOS
Flat	-11%	-9%
TOU Energy	-15%	-13%
Transitional Demand	-14%	-12%
Demand	3%	3%

Table 22. Percentage of Customers Better Off and Worse Off When Moving from the Flat Tariff, Life Support, Residential

Tariff	DUOS		NUOS	
	Better Off	Worse Off	Better Off	Worse Off
TOU Energy	62%	35%	62%	35% [6]
Transitional Demand	81%	19%	65%	35%
Demand	15%	85%	23%	77%

[6] For the TOU Energy tariff 3.8% of customers were neither better off nor worse off.

3.2.2 Scatter plots of average customer bill versus annual electricity use

Figure 77 compares the average NUOS bill to annual electricity use, for the Flat 2019/20 tariff and the Flat and TOU Energy 2020/21 tariffs, for DUOS and NUOS respectively. Figure 78 shows the equivalent comparisons for the Transitional Demand and Demand tariffs. Figure 79 then compares the IBT, Transitional Demand and Demand tariffs. The equivalent DUOS charts are in Appendix C.

Scatter plots are useful because they show the impacts of the tariffs that pick up on a household's peaks and troughs in demand. The dots that are scattered higher than most are households with peakier loads, whereas the dots that are lower have less peaky loads.

Key Point:

- With the small number of customers used here, the main additional conclusion from these charts is that although for most customers the 2020/21 tariffs result in lower bills, the Demand tariff can result in higher bills for lower electricity use customers.

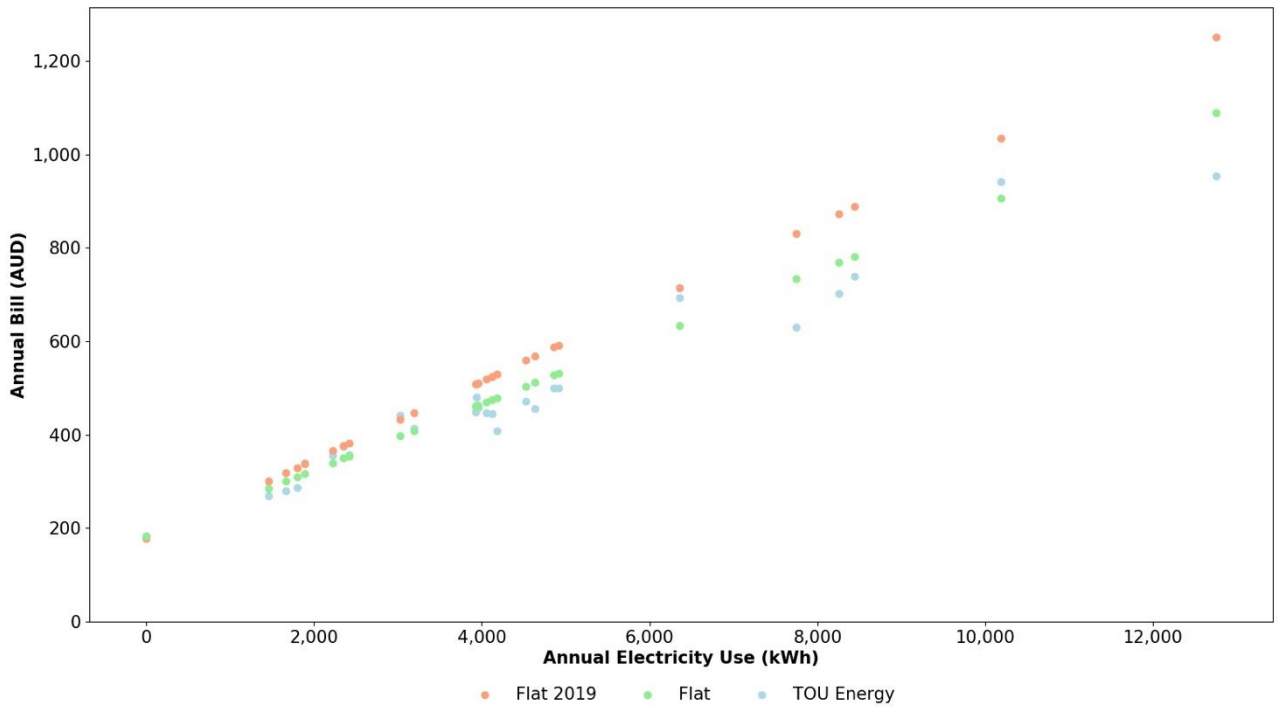


Figure 77. Comparison of Average Customer Bills for Flat 2019/20, Basic 2020/21 and TOU Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Life Support, Residential

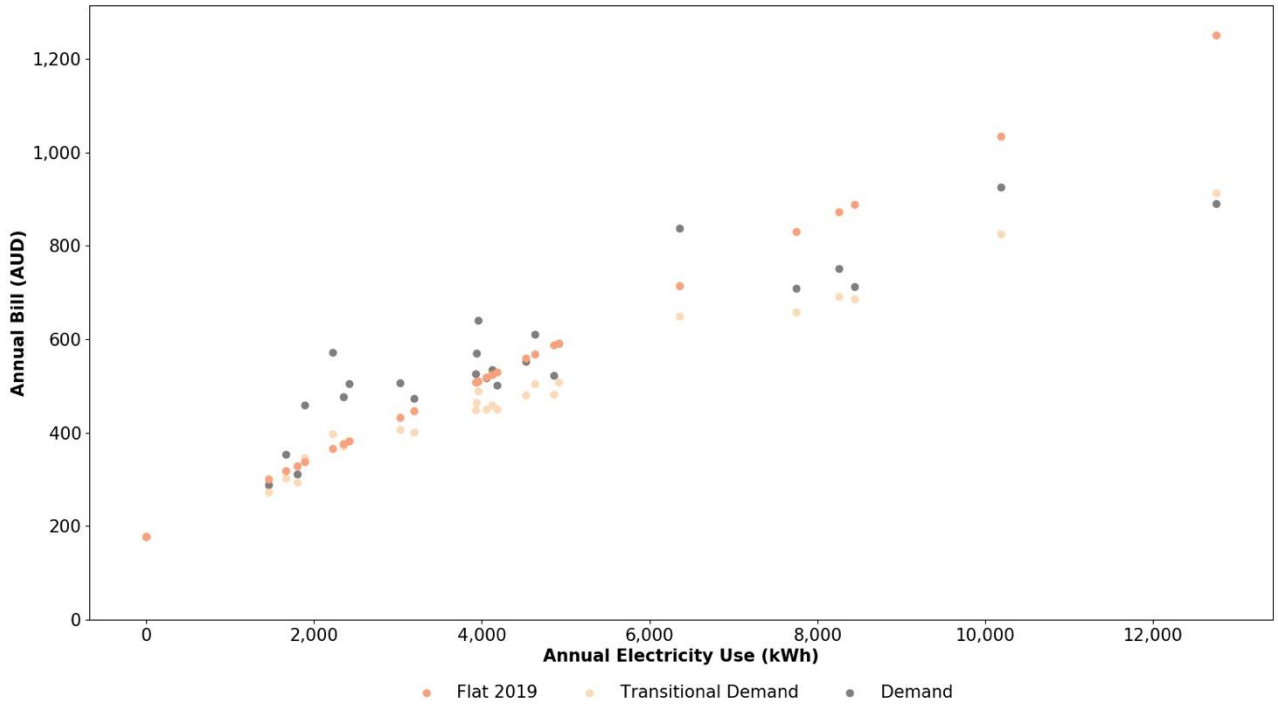


Figure 78. Comparison of Average Customer Bills for Flat 2019/20, Basic 2020/21 and TOU Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Life Support, Residential

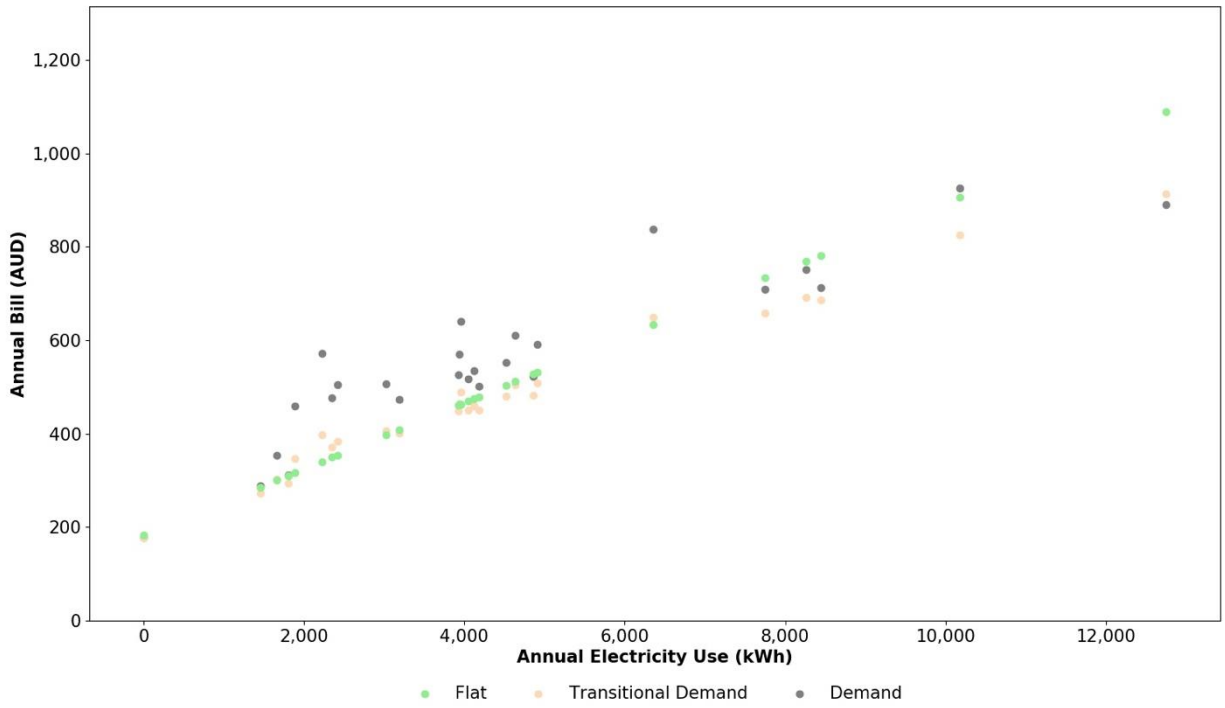


Figure 79. Comparison of Average Customer Bills for Flat 2020/21, Basic 2020/21 and TOU Demand 2020/21 Tariffs and Annual Electricity Use, NUOS, Life Support, Residential

3.3 Average Customer Commentary

EQL provided the information in Table 23 as representative of different customer types. Table 24 shows the average electricity use for residential customers in each of the regions based on the data used in this report (including the use of scaling factors). Table 25 shows the equivalent median values. Note that for solar PV customers the electricity usage represents what was drawn from the grid and so does not include self-consumed solar electricity.

It can be seen that the average electricity use in the South East region is much closer to the value used to represent large customers, and the average electricity use in the Ergon East region is midway between the values used to represent medium and large customers (slightly closer to the Median (average) value). The Ergon West region average is slightly higher than for Ergon East, with the 'with PV' customers being much higher.

The median values avoid the impact of the high outliers and are closer to the Median (average) used by EQL, however the South East value calculated here is till about 25% greater, and the East value is 7% greater.

As illustrated above, such averaged customer values should be treated with great caution when tariffs that include TOU components are used – especially when they do not only include kWh components but also demand-based (kW) components. Customers with identical kWh use can have very different bills when such tariffs are used.

Table 23. Electricity use for different customer types (provided by EQL)

Customer type	Small (kWh/year)	Median (average) (kWh/year)	Large (kWh/year)
South East Residential	3,150	4,863	7,314
East Residential	2,917	4,865	7,289

Table 24. Average electricity use for different customer types (based on data used in this report)

Customer type	Average no PV (kWh/year)	Average with PV (kWh/year)	Average Total (kWh/year)
South East Residential	7,636	6,254	7,014
Ergon East Residential	6,016	5,571	5,921
Ergon West Residential	5,869	6,816	6,119

Table 25. Median electricity use for different customer types (based on data used in this report)

Customer type	Median no PV (kWh/year)	Median with PV (kWh/year)	Median Total (kWh/year)
South East Residential	6,683	5,352	6,068
Ergon East Residential	5,314	4,898	5,216
Ergon West Residential	5,010	7,149	5,206

4 Appendix A: Network Tariffs

The indicative rates used for the customer impact analysis in this report can be found in the Ergon Energy and Energex Indicative Price Schedules submitted as part of their Revised 2020-25 Tariff Structure Statements.

5 Appendix B: Load Data Analysis

The following sections summarise the relevant characteristics of the load data used for the financial analysis undertaken here.

5.1.1 South East data

5.1.1.1 Residential

Figure 80 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. The increase in load peaks during the hotter months, due to higher cooling demands, can be clearly seen. Unlike the Ergon West data, there is only a small increase in winter heating loads.

Figure 81 shows the characteristic residential load curve, and Figure 82 shows that January and February, followed by December and March, are primarily responsible for the highest peak demands. These hotter months also have higher loads during the day, whereas the winter months have much lower day time loads but higher early morning peaks. Figure 83 illustrates the week including the highest peak day for the aggregated loads, being on Monday 13th February 2017.

Figure 84 shows the number of customers versus their average daily electricity use. It can be seen that although the customers are clustered with a peak below the average of 19.2kWh/day, they do extend up to over 120 kWh/day.

Figure 85 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, although the average demand peaks are tightly clustered, with the peak at 4kW, they do extend up to over 20 kW, which is very high.

Figure 86 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that although there is some scatter (with some high average peaks), there is quite a good correlation between average monthly demand and annual electricity use.

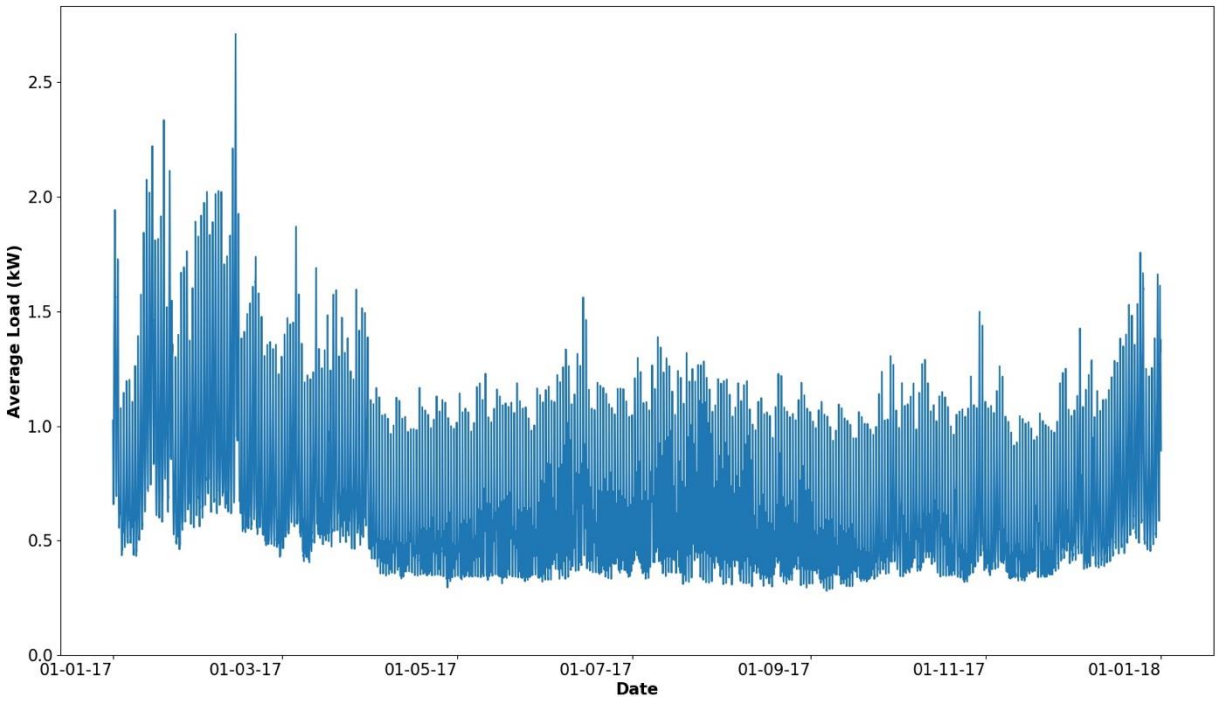


Figure 80. Aggregated Load of all Customers over the Year: South East, Residential, 2017

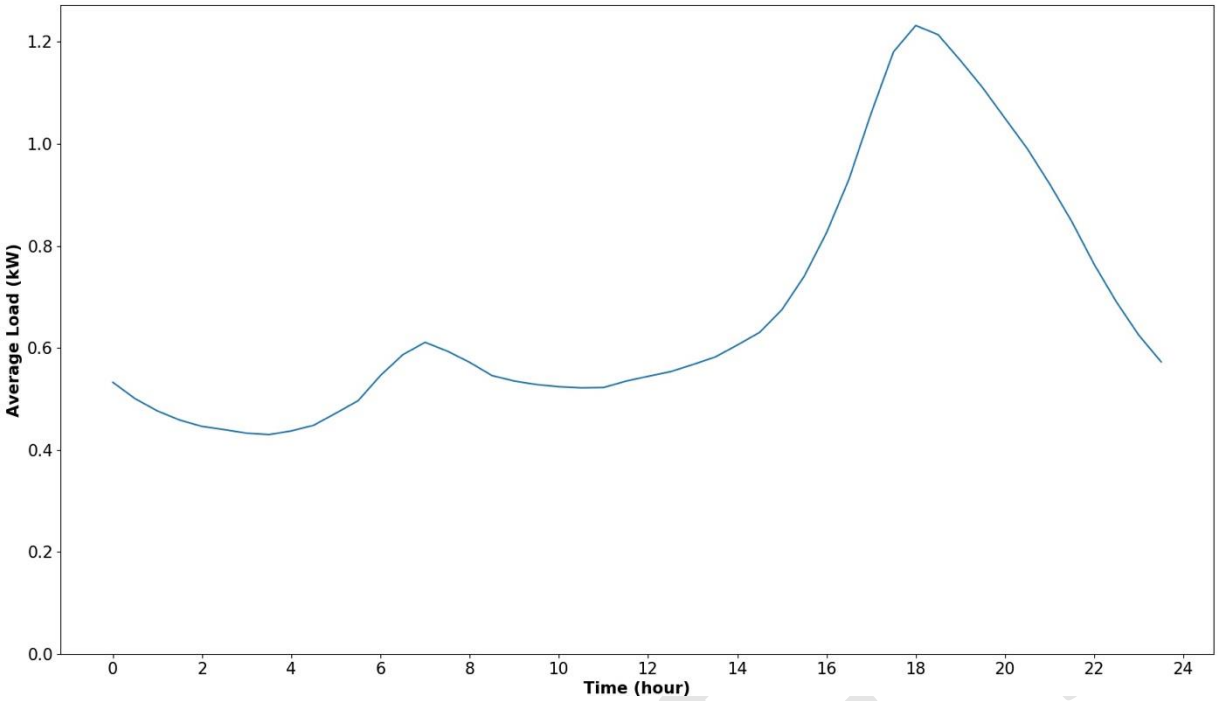


Figure 81. Average Daily Load of all Customers over the Year: South East, Residential, 2017

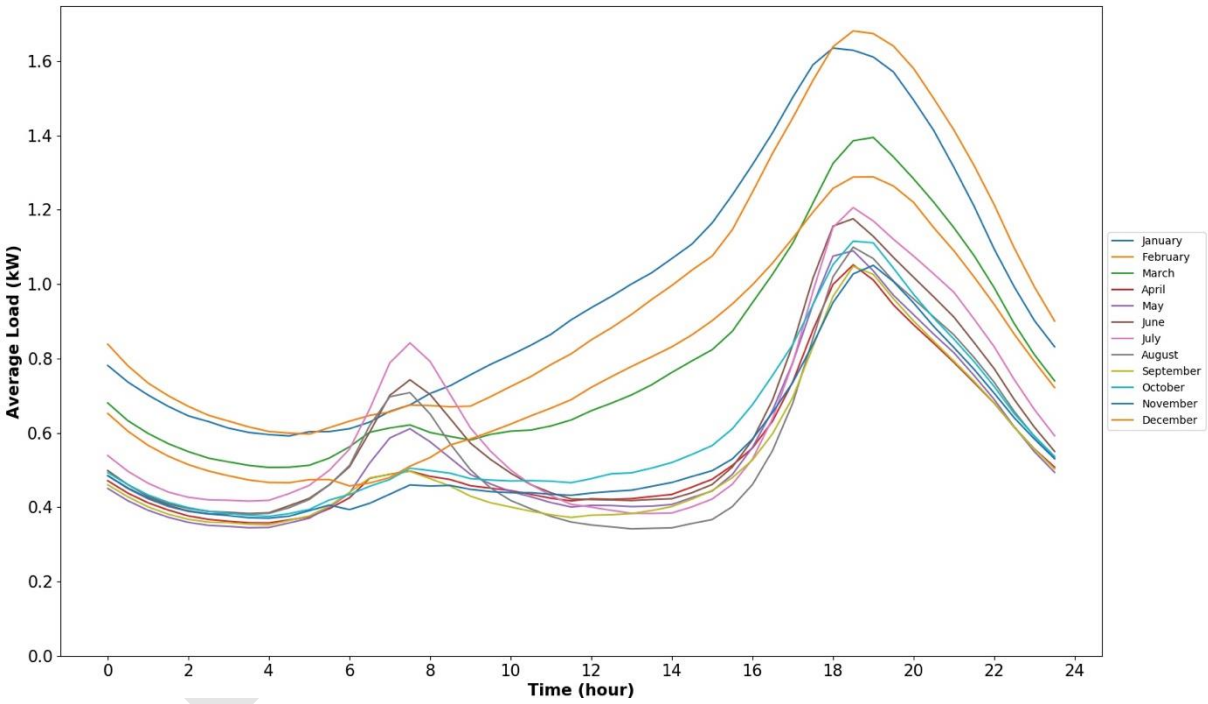


Figure 82. Average Daily Load of all Customers for Each Month: South East, Residential, 2017

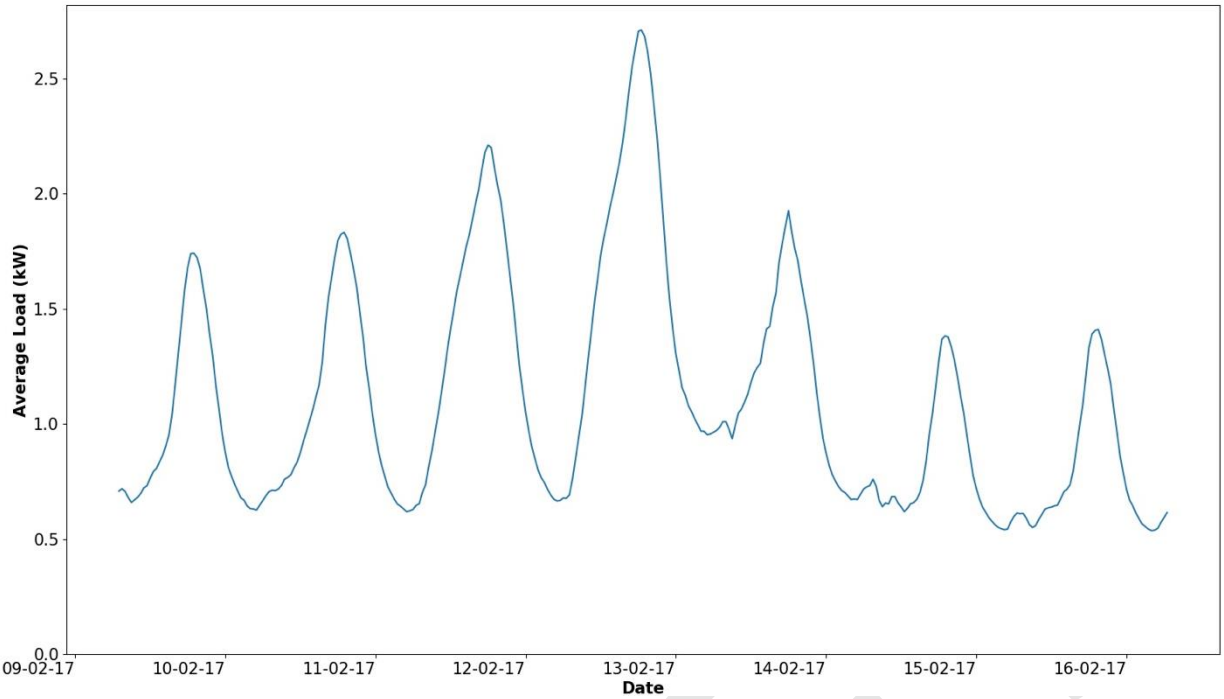


Figure 83. Week of Peak Day of Aggregated Customers: South East, Residential, 2017

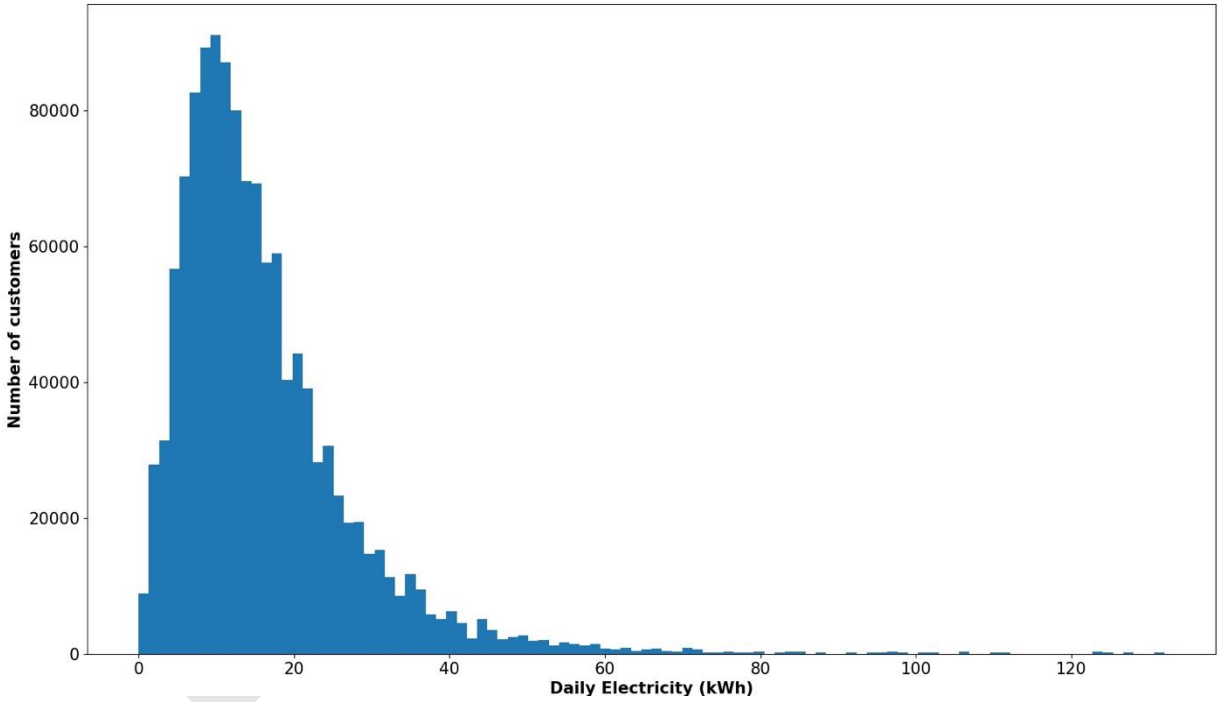


Figure 84. Histogram of Electricity Use of all Customers: South East, Residential, 2017

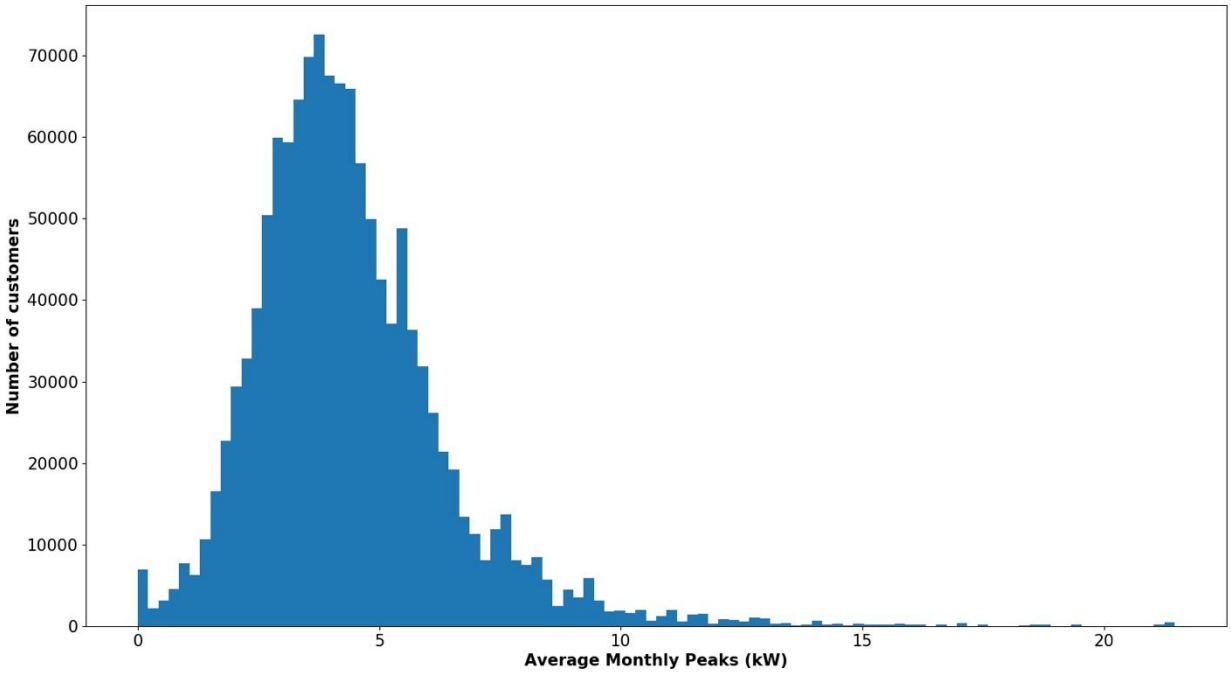


Figure 85. Histogram of Average Monthly Demand Peaks of all Customers: South East, Residential, 2017

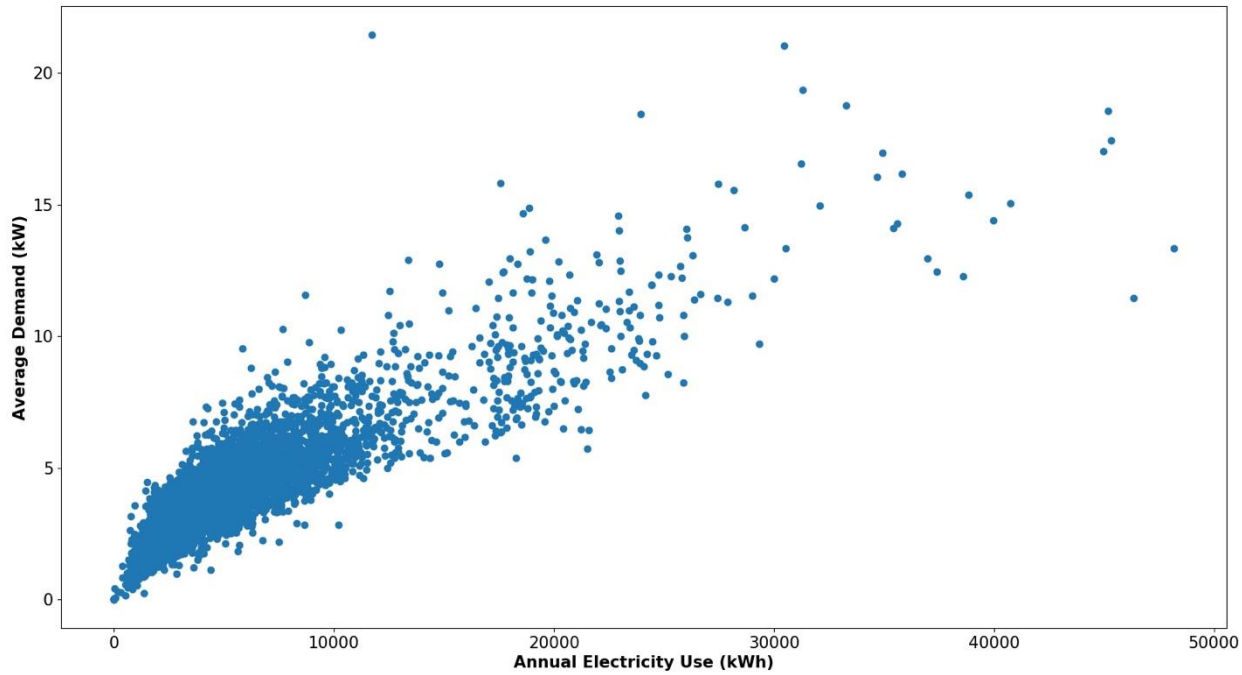


Figure 86. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: South East, Residential, 2017

5.1.1.2 Controlled Load

Figure 87 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. As expected, with water heating being a controlled load, the controlled load peaks are greatest in the winter months.

Figure 88 shows that although CL is highest in the evening, it occurs throughout the day and has a smaller morning peak. Figure 89 confirms that the winter months have the highest peaks, both in the morning and evening.

Figure 90 illustrates the week including the highest peak day for the aggregated loads, being on Thursday 15th June 2017. Figure 91 illustrates the week including some of the lowest peak days for the aggregated loads, in February. It can be seen that the load profile has essentially the same shape, but is just smaller – indicating that the same devices are being used, just less, and so they are most likely used for heating.

Figure 92 shows the number of customers versus their average daily electricity use. This shows that many customers do not have controlled load, and that although the other customers are clustered with a peak slightly below the average of 5.6kWh/day, they do extend to over 35 kWh/day.

Figure 93 shows the number of customers versus their average monthly demand peaks. It can be seen that they are quite spread out, although there are a clear peaks at 1.8kW and 3.6kW.

Figure 94 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that there is about as much scatter as for the main load (in Section 5.1.1.1). It only appears more scattered because it lacks the very high points that result in compression of the chart.

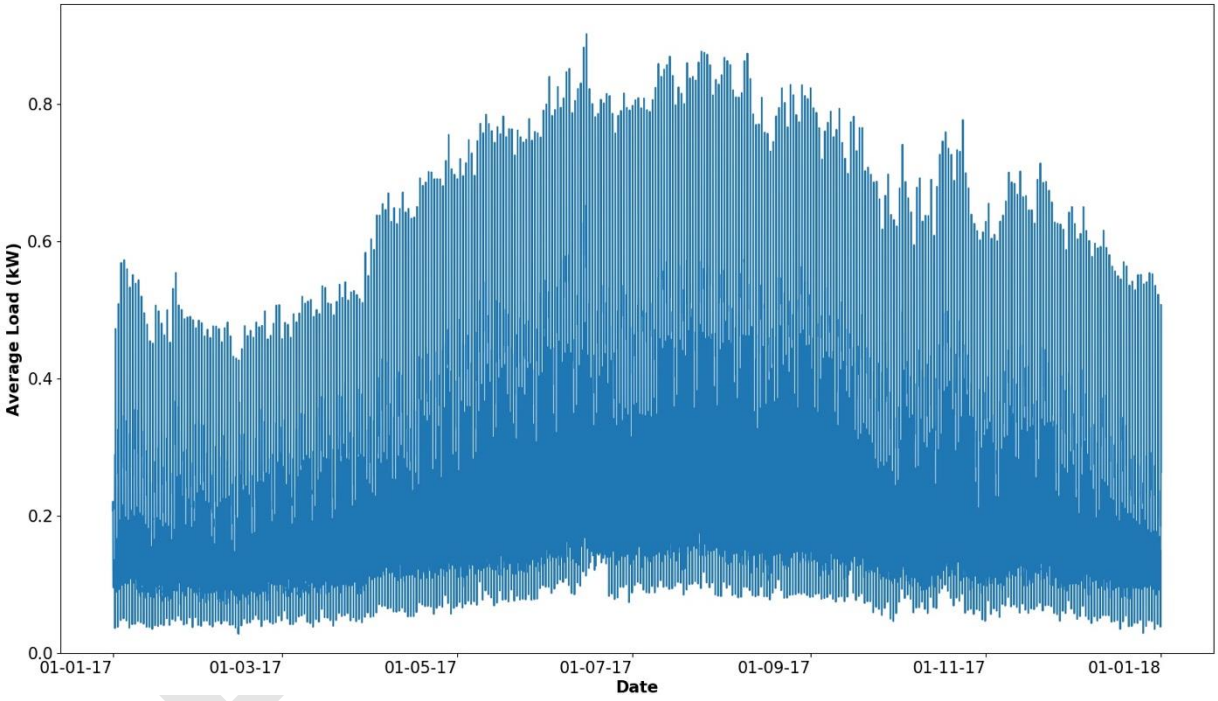


Figure 87. Aggregated Load of all Customers over the Year: South East, Residential CL, 2017

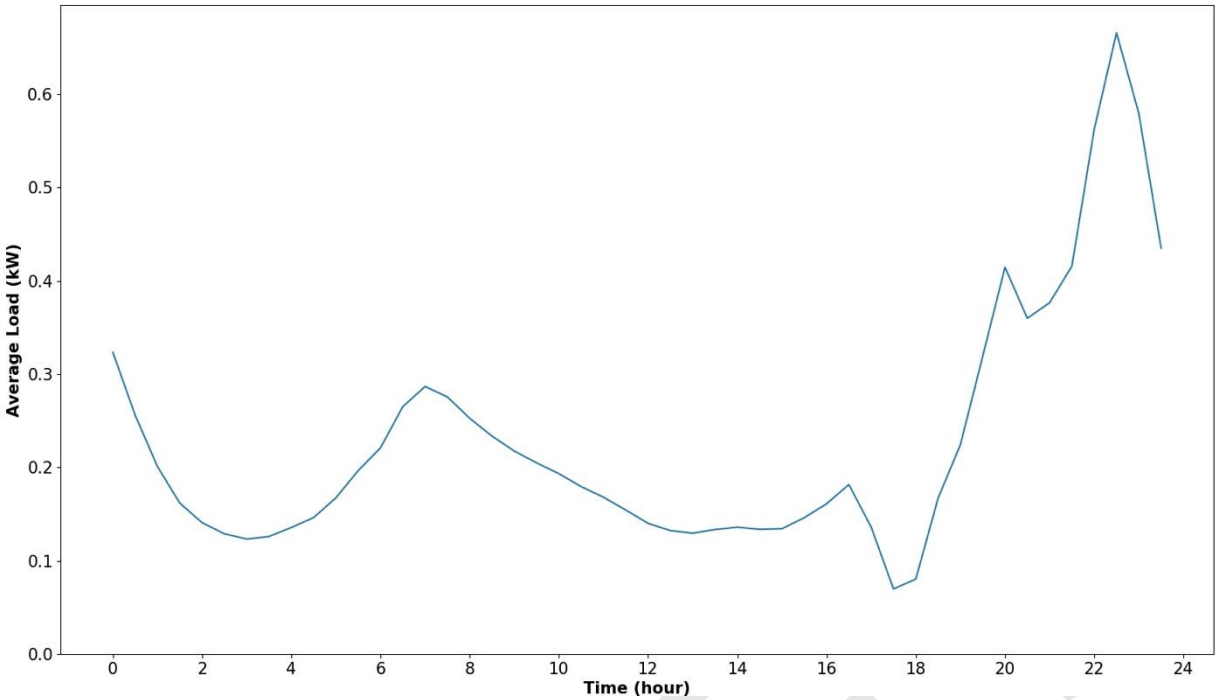


Figure 88. Average Daily Load of all Customers over the Year: South East, South East, Residential CL, 2017

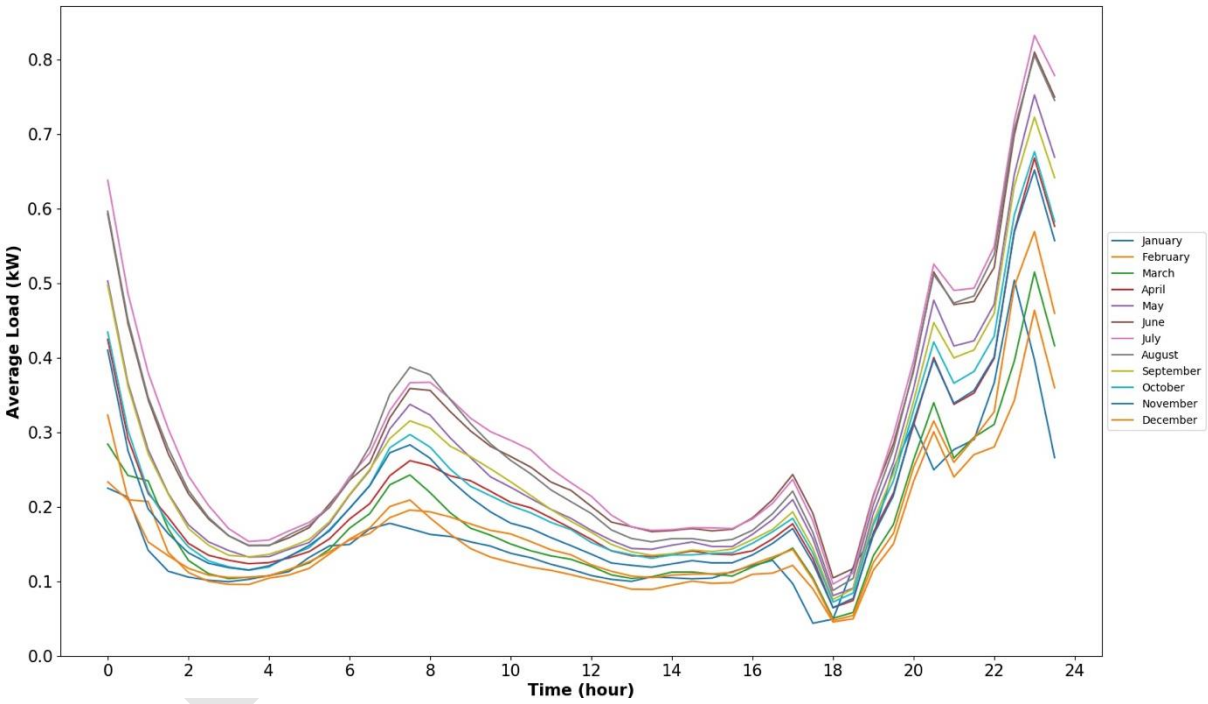


Figure 89. Average Daily Load of all Customers for Each Month: South East, South East, Residential CL, 2017

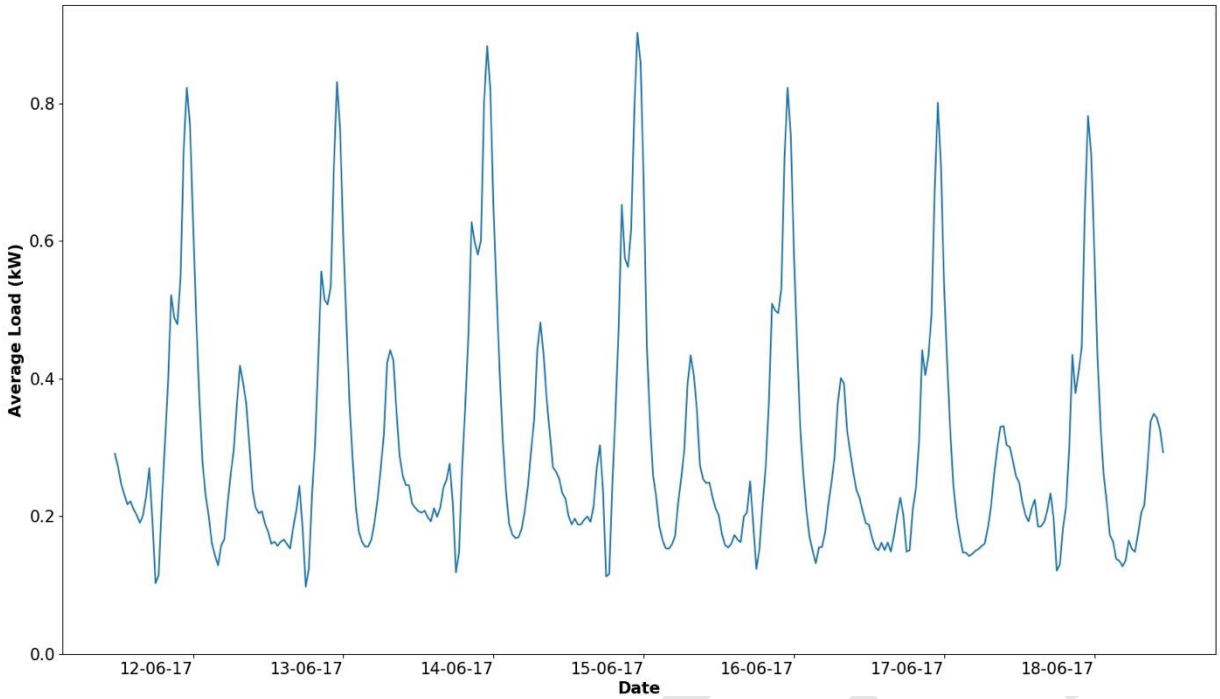


Figure 90. Week of Peak Day of Aggregated Customers: South East, South East, Residential CL, 2017

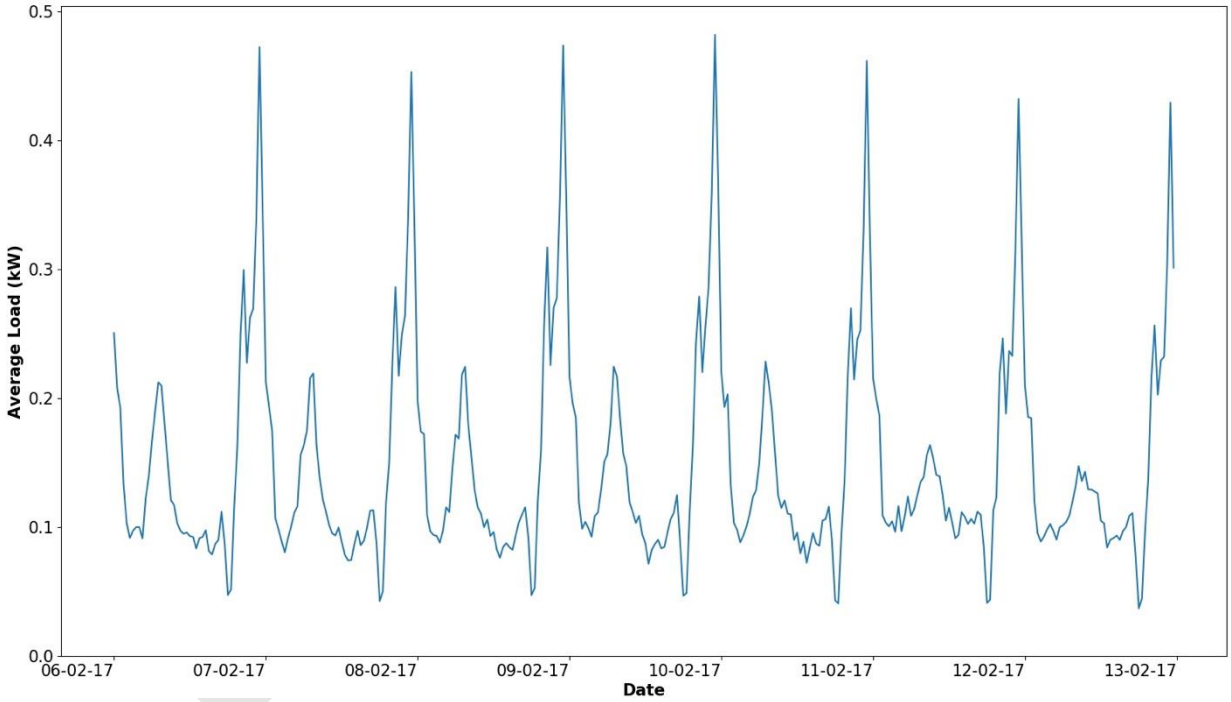


Figure 91. Day of Lowest Peak for Aggregated Customers: South East, South East, Residential CL, 2017

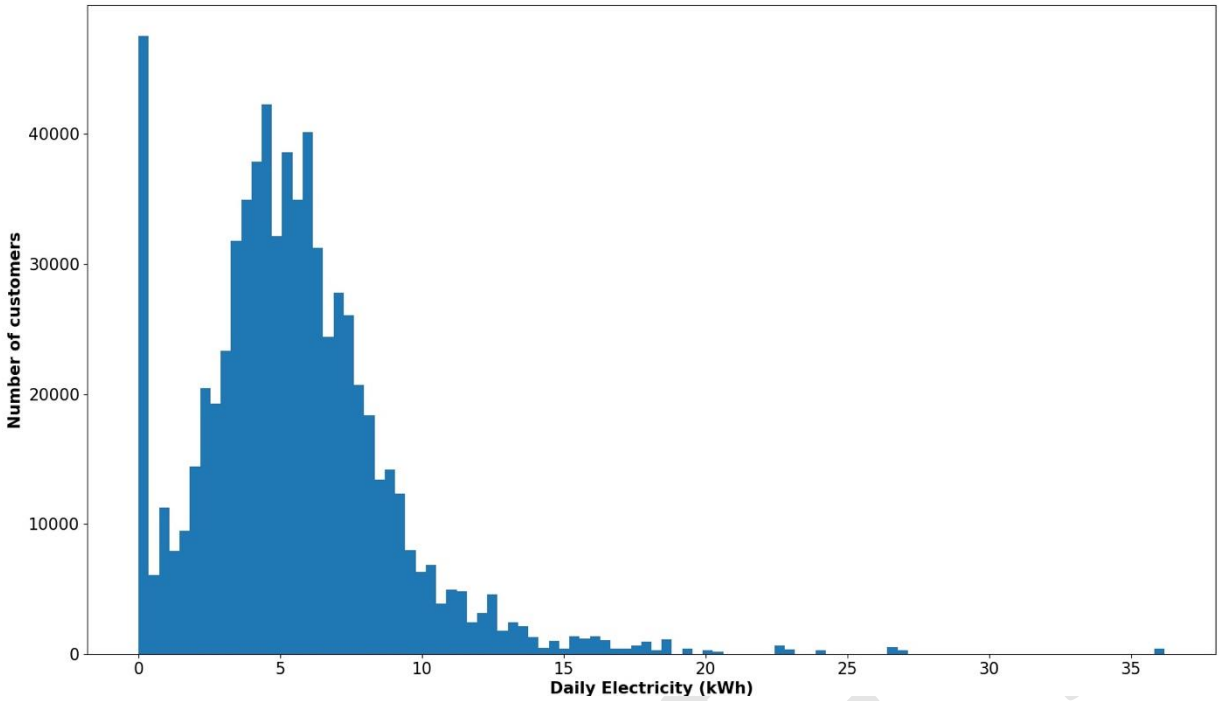


Figure 92. Histogram of Electricity Use of all Customers: South East, South East, Residential CL, 2017

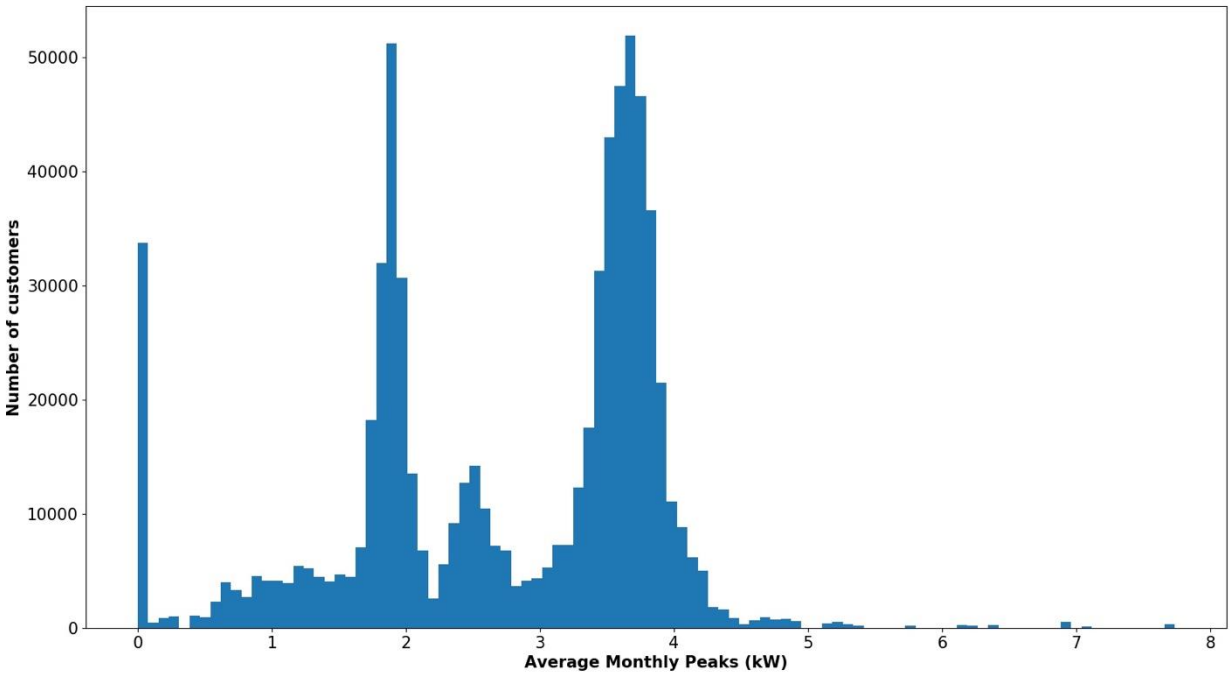


Figure 93. Histogram of Average Monthly Demand Peaks of all Customers: South East, Residential, 2017

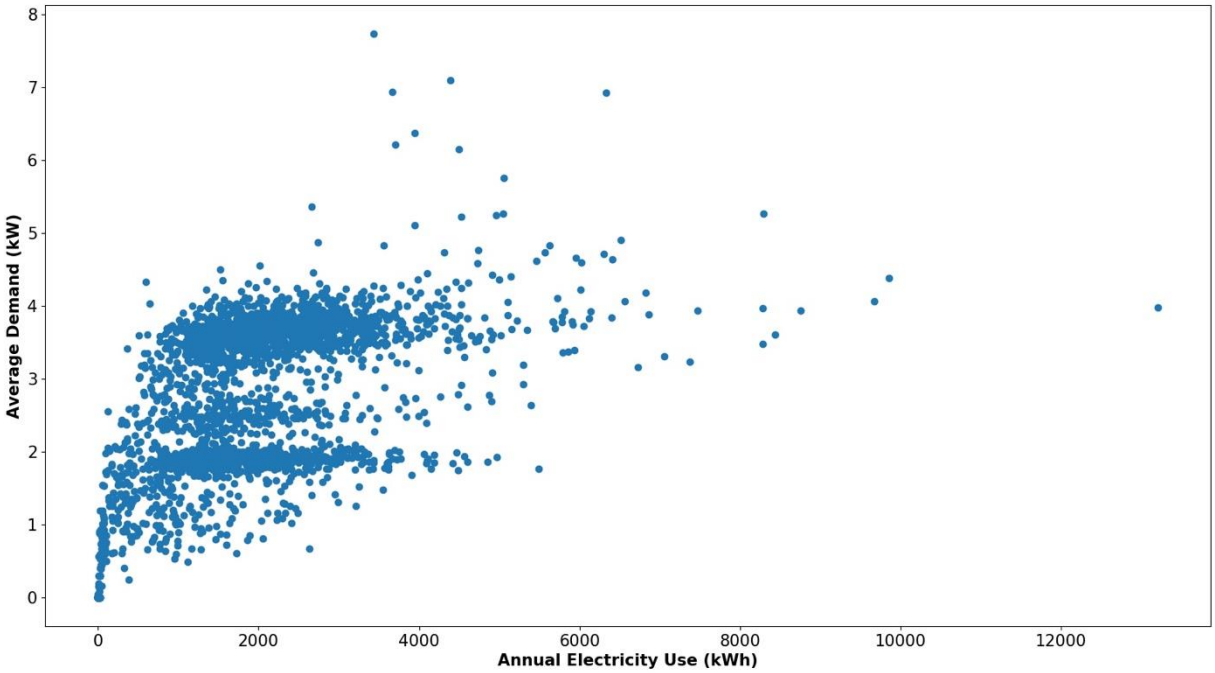


Figure 94. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: South East, Residential, 2017

5.1.1.3 Business

Figure 95 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. As occurred for the residential customers, the increase in load peaks during the hotter months, due to higher cooling demands, can be clearly seen. The drop in demand over the weekends is also apparent, as is the decrease during the Christmas holiday period.

Figure 96 shows the characteristic commercial load curve, and Figure 97 shows that February and March, followed by January and November, are primarily responsible for the highest peak demands. December is lower because of the holiday season. Figure 98 illustrates the week including the highest peak day for the aggregated loads, being on Monday 13th February 2017, the same day as for the residential customers.

Figure 99 shows the number of customers versus their average daily electricity use. It can be seen that although the average is 49.9kWh/day, the customers are spread up to around 300 kWh/day, with some extending up to just under 400 kWh/day. There were 70 customers that have zero load (this is the number of customers prior to applying the scaling factor).

Figure 100 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, they are tightly clustered down towards zero, but extend up to over 220kW.

Figure 101 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that there is a high degree of scatter, especially as electricity use increases.

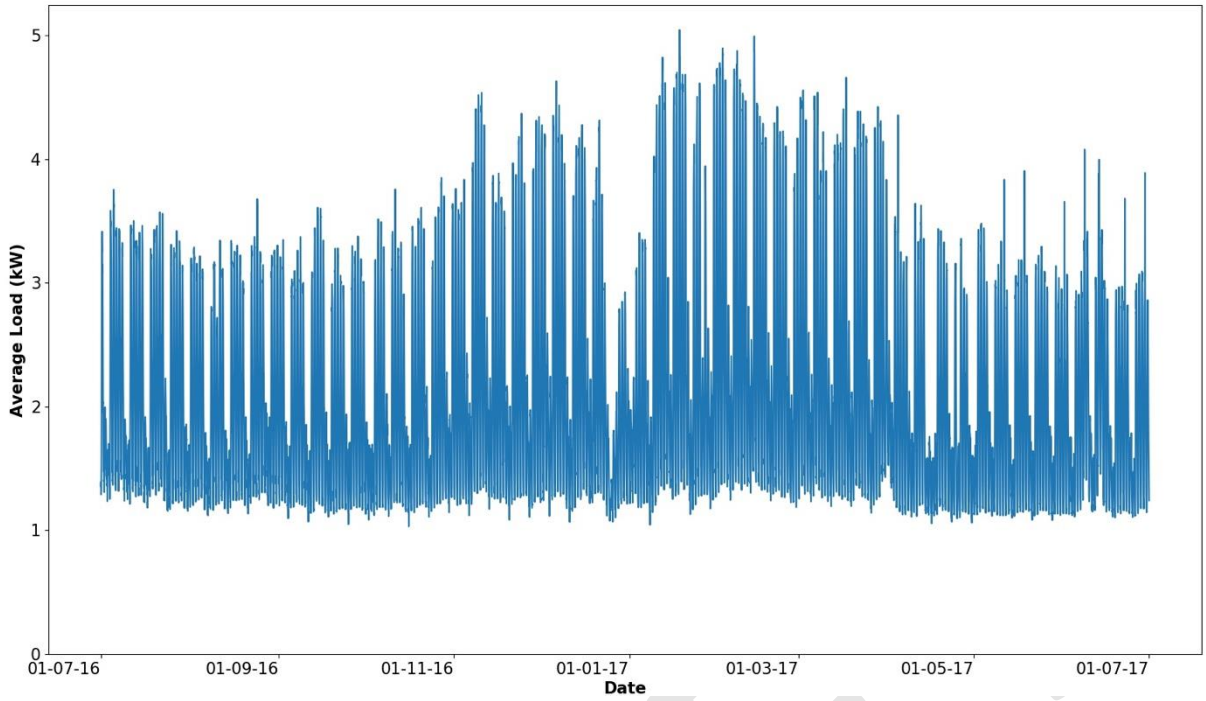


Figure 95. Aggregated Load of all Customers over the Year: South East, Business, 2017

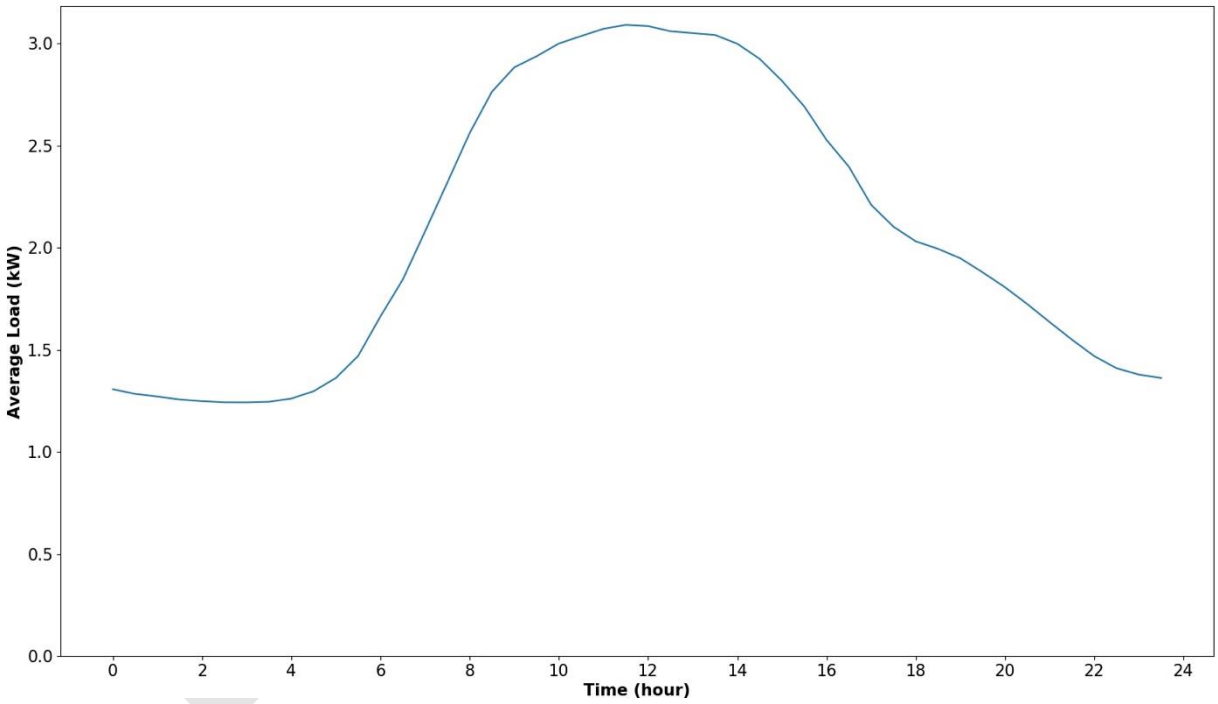


Figure 96. Average Daily Load of all Customers over the Year: South East, Business, 2017

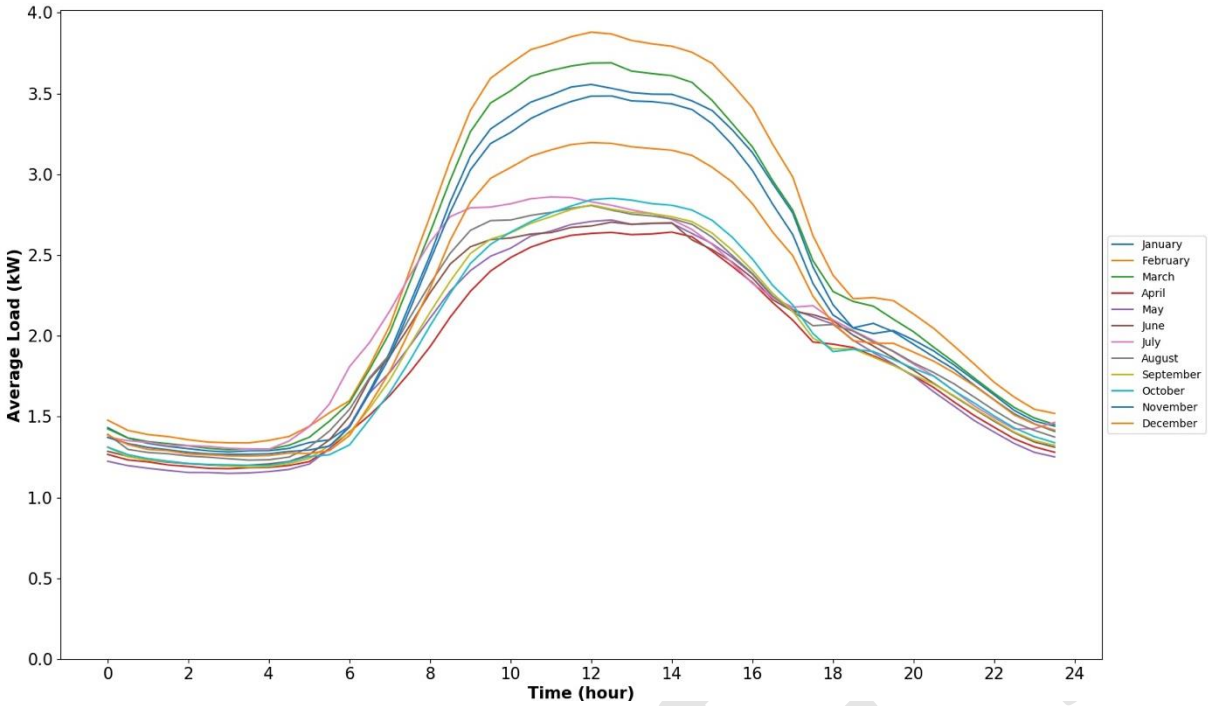


Figure 97. Average Daily Load of all Customers for Each Month: South East, 2017

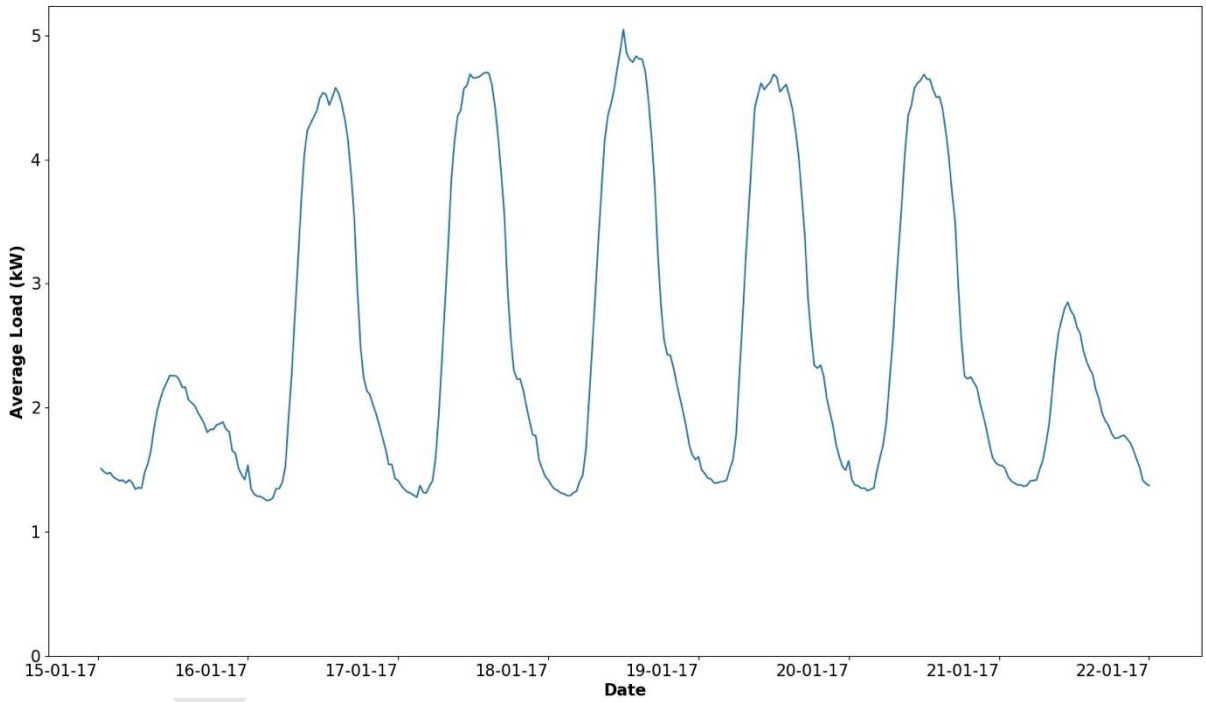


Figure 98. Week of Peak Day of Aggregated Customers: South East, Business, 2017

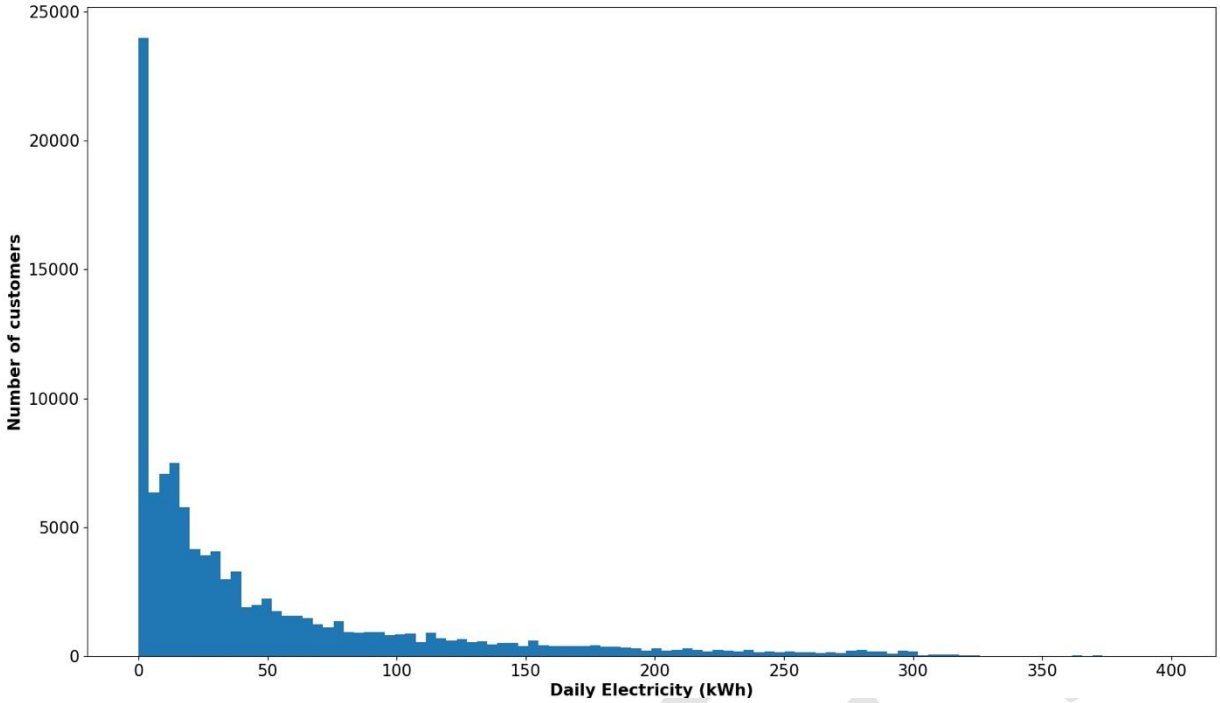


Figure 99. Histogram of Electricity Use of all Customers: South East, Business, 2017

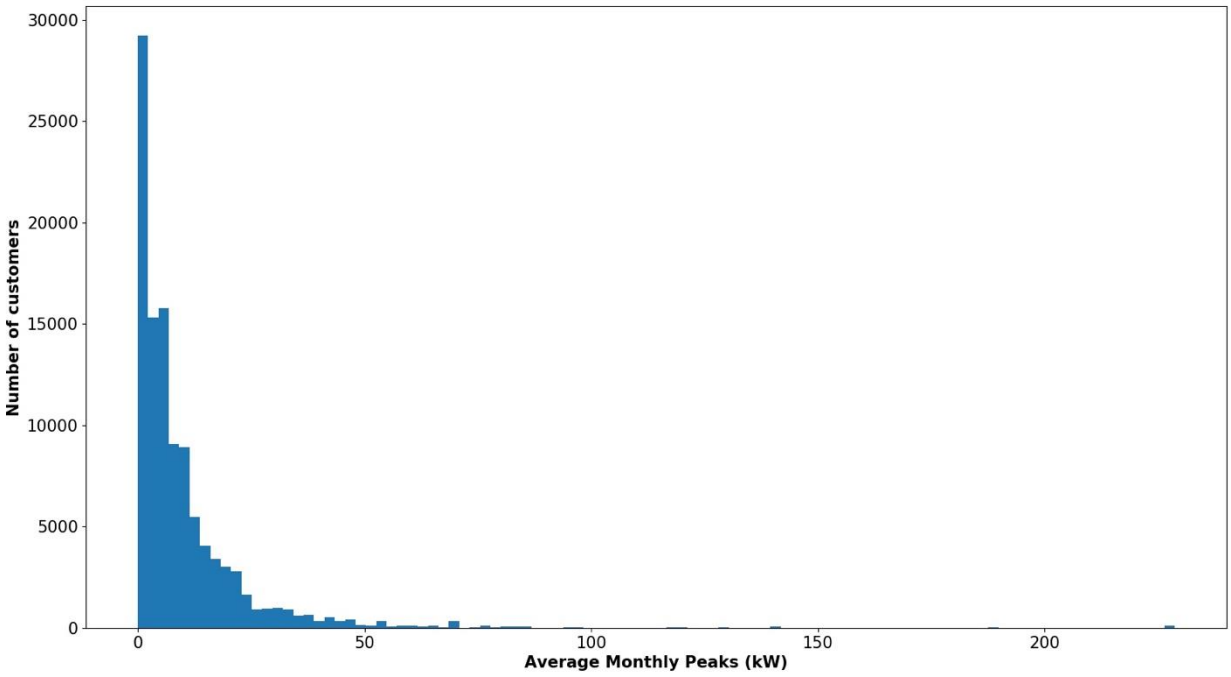


Figure 100. Histogram of Average Monthly Demand Peaks of all Customers: South East, Residential, 2017

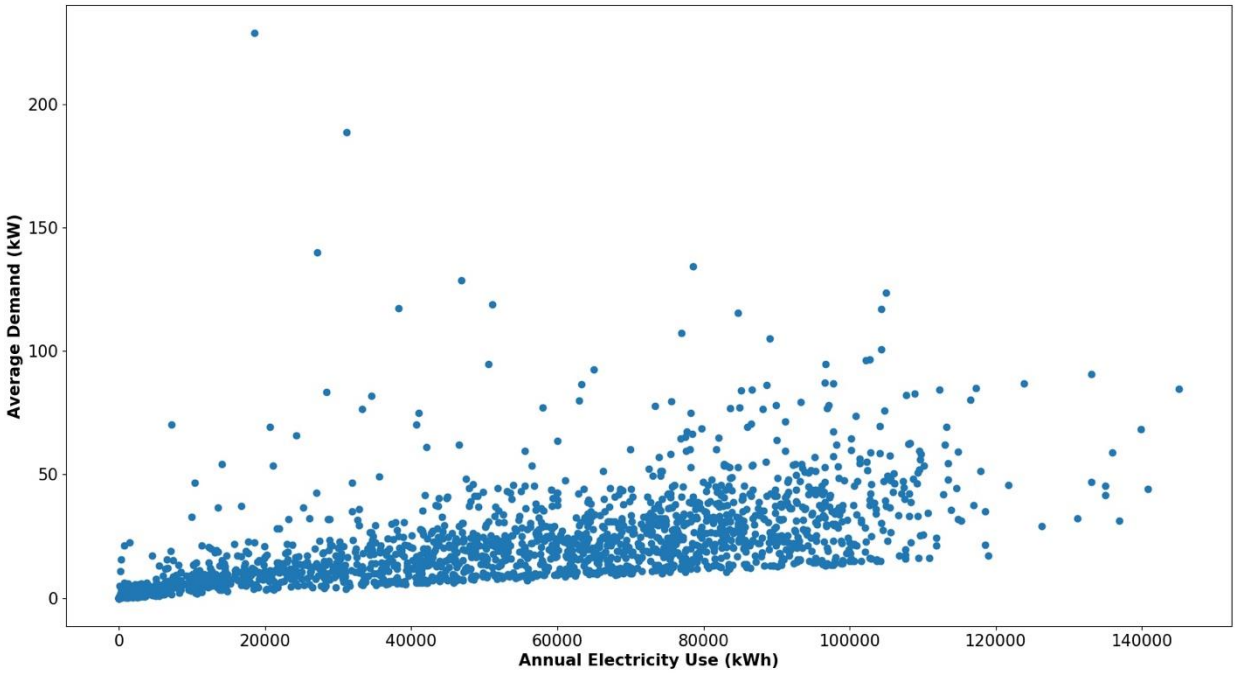


Figure 101. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: South East, Residential, 2017

5.1.2 Ergon East data

5.1.2.1 Residential

Figure 102 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. The increase in load peaks during the hotter months, due to higher cooling demands, can be clearly seen. This has higher winter heating loads than the South East data but not as high as the Ergon West data.

Figure 103 shows the characteristic residential load curve, and Figure 104 shows that January and February, followed by December and March, are primarily responsible for the highest peak demands. In contrast to the South East loads, the winter months are now also contributing to the evening peaks. Figure 105 illustrates the week including the highest peak day for the aggregated loads, again being on Monday 13th February 2017.

Figure 106 shows the number of customers versus their average daily electricity use. This has a similar distribution to the South East customers, and it can be seen that although the customers are clustered with a peak below the average of 16.2kWh/day, they do extend up to just over 50 kWh/day.

Figure 107 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, although the average demand peaks are tightly clustered, with the peak at 3.5kW, they do extend up to over 50 kW, which is very high.

Figure 108 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that although there is some scatter (with some very high average peaks), there is quite a good correlation between average monthly demand and annual electricity use.

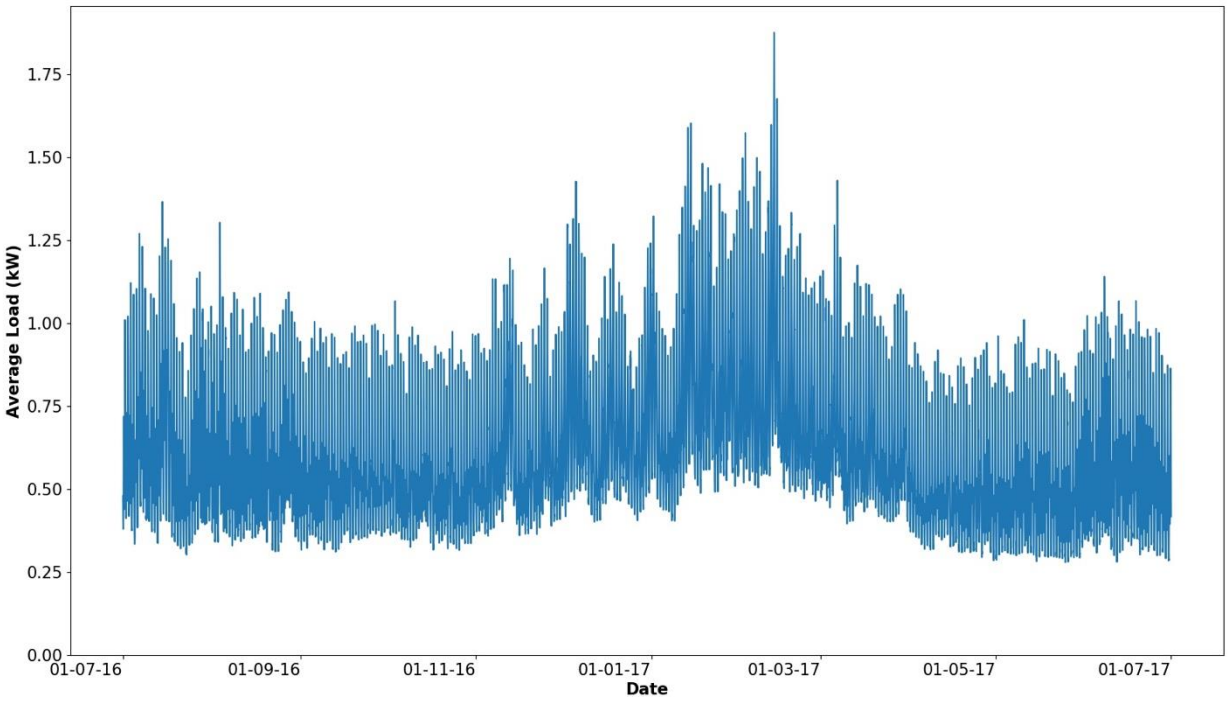


Figure 102. Aggregated Load of all Customers over the Year: Ergon East, Residential, 2016/17

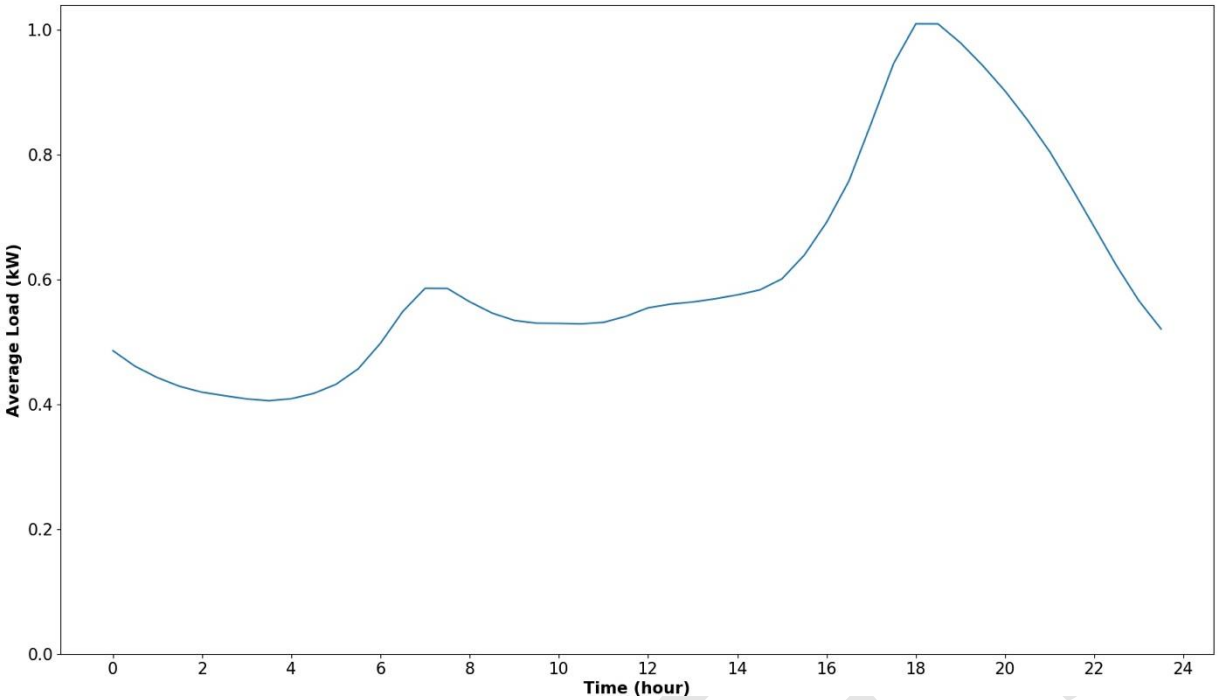


Figure 103. Average Daily Load of all Customers over the Year: Ergon East, Residential, 2016/17

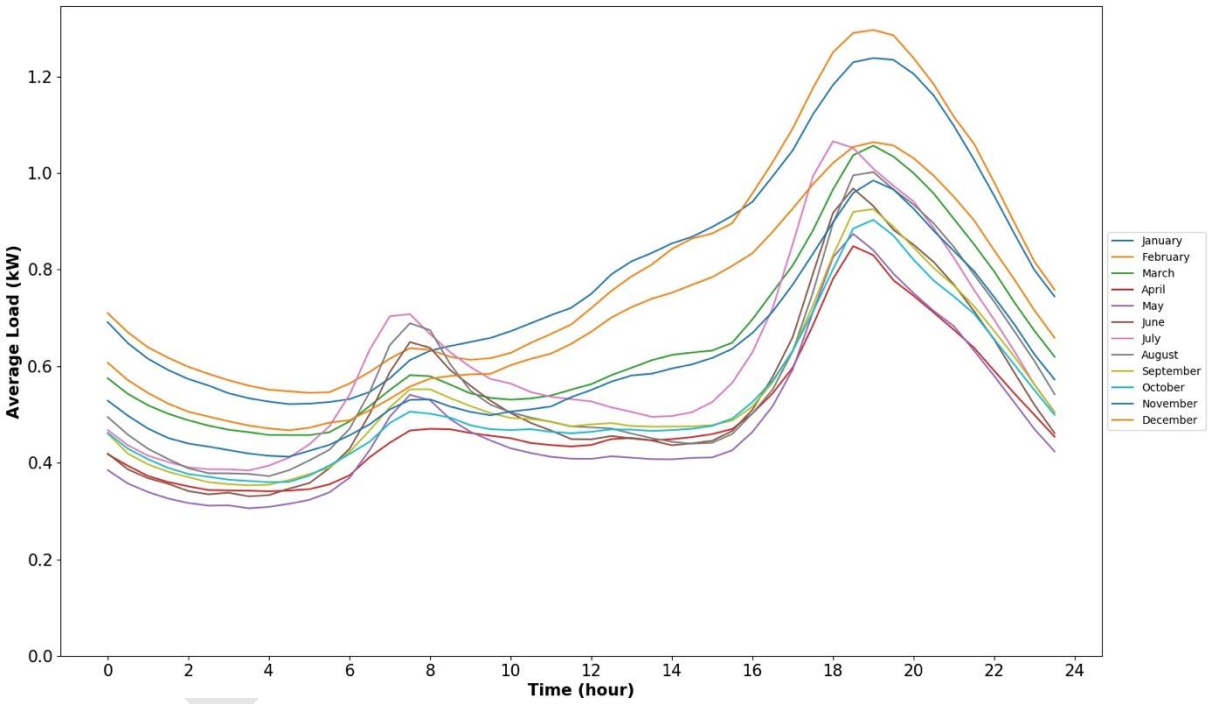


Figure 104. Average Daily Load of all Customers for Each Month: Ergon East, Residential, 2016/17

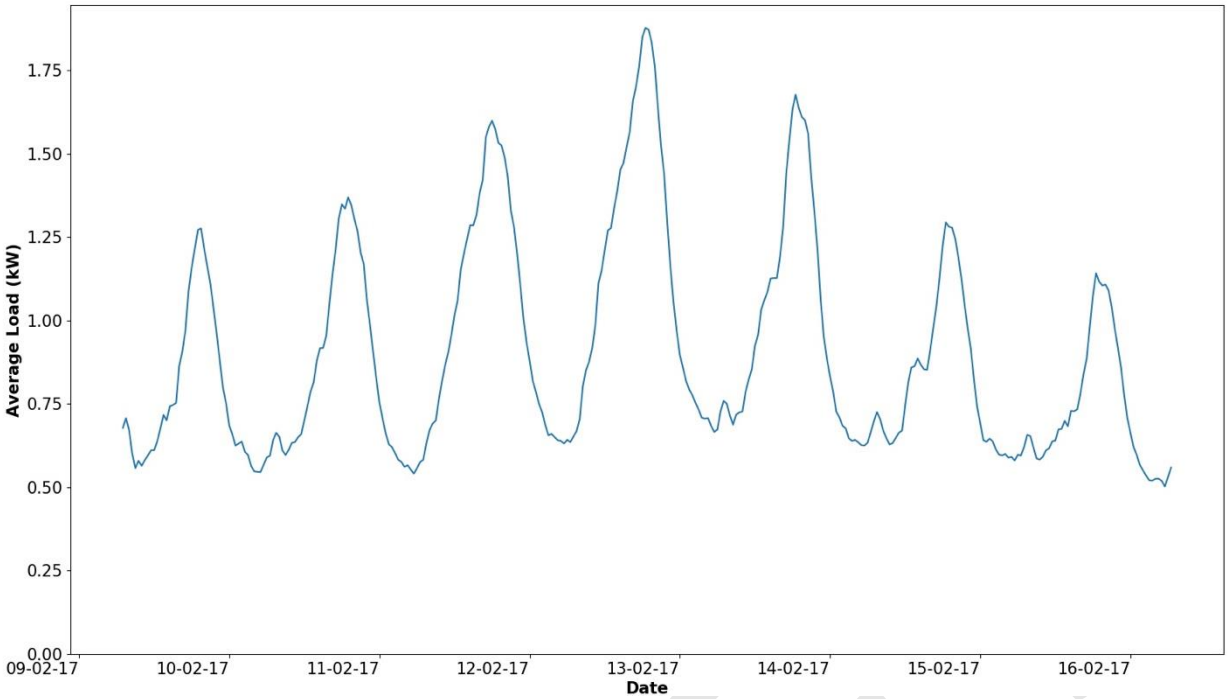


Figure 105. Week of Peak Day of Aggregated Customers: Ergon East, Residential, 2016/17

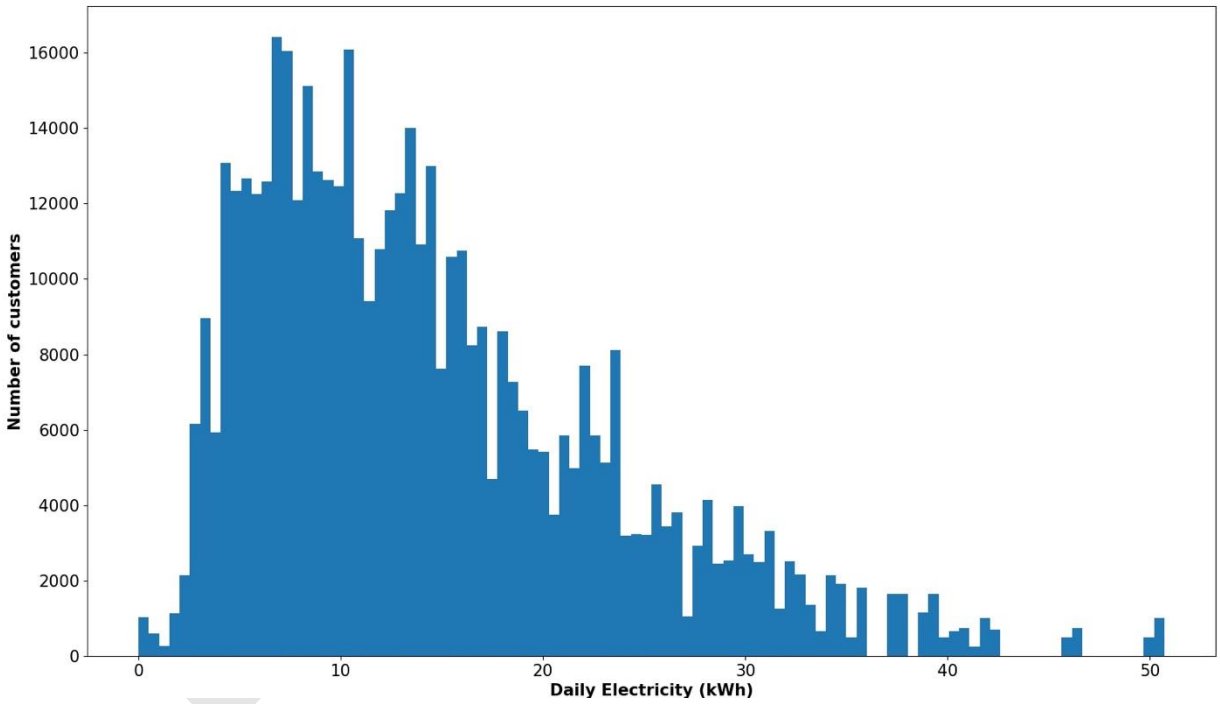


Figure 106. Histogram of Electricity Use of all Customers: Ergon East, Residential, 2016/17

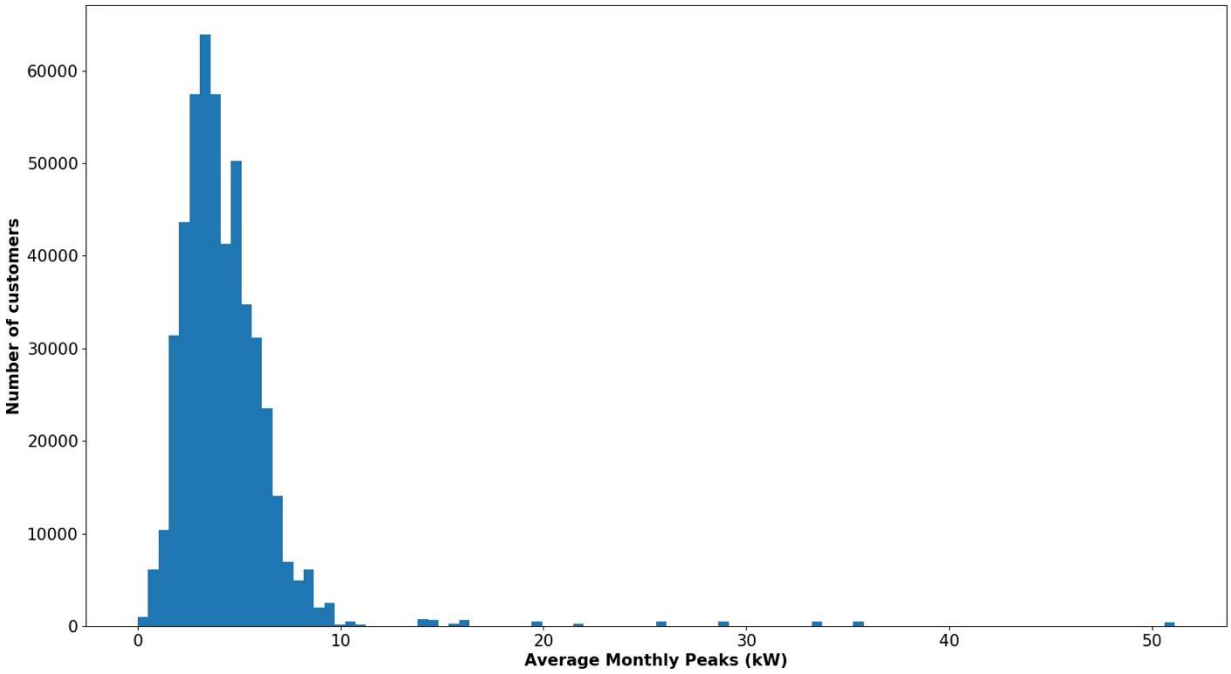


Figure 107. Histogram of Average Monthly Demand Peaks of all Customers: Ergon East, Residential, 2017

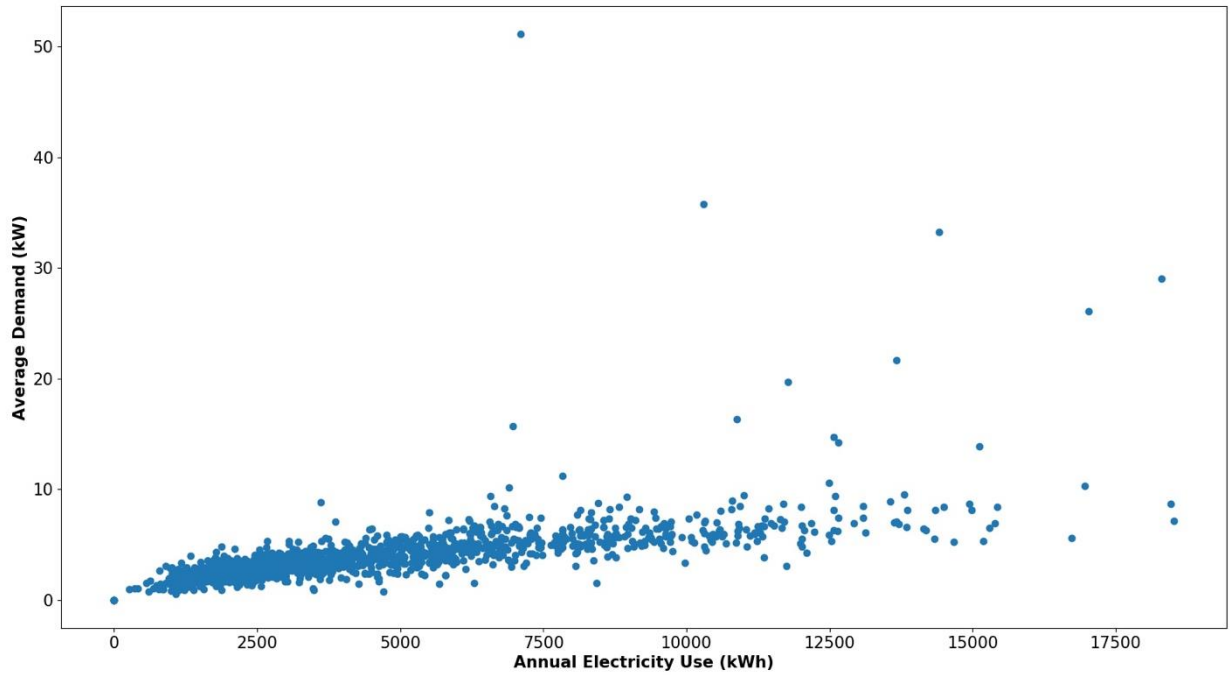


Figure 108. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon East, Residential, 2017

5.1.2.2 Controlled Load

Figure 109 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. As expected, with water heating being a controlled load, the controlled load peaks are greatest in the winter months. Interestingly, in contrast to the South East region, there is a very significant decrease during all the non-winter months.

Figure 110 shows that although CL is highest in the evening, it occurs throughout the day and has a significant morning peak – which is much greater than that of the South East customers. Figure 111 confirms that July and August are responsible for the highest peaks, but also have the lowest demand around 5pm to 6pm. May, June and Sept are then responsible for the next highest peaks.

Figure 112 illustrates the week including the highest peak day for the aggregated loads, being on Thursday 10th Aug 2017. Figure 113 illustrates the week including some of the lowest peak days for the aggregated loads, in March. Unlike the South East customers, the load profiles are quite different, with the first peak of the day being only slightly smaller and the last peak of the day being much smaller. This indicates that the second peak most likely has a larger temperature dependent component (i.e. is higher in winter because of heating).

Figure 114 shows the number of customers versus their average daily electricity use. This shows that many customers do not have controlled load, and that although the other customers are clustered with a peak slightly below the average of 5.5kWh/day, they do extend to 28 kWh/day.

Figure 115 shows the number of customers versus their average monthly demand peaks. It can be seen that they are quite spread out, although there is a clear peak at 1.8kW.

Figure 116 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that there is about as much scatter as for the main load (in Section 5.1.2.1). It only appears more scattered because it lacks the very high points that result in compression of the chart.

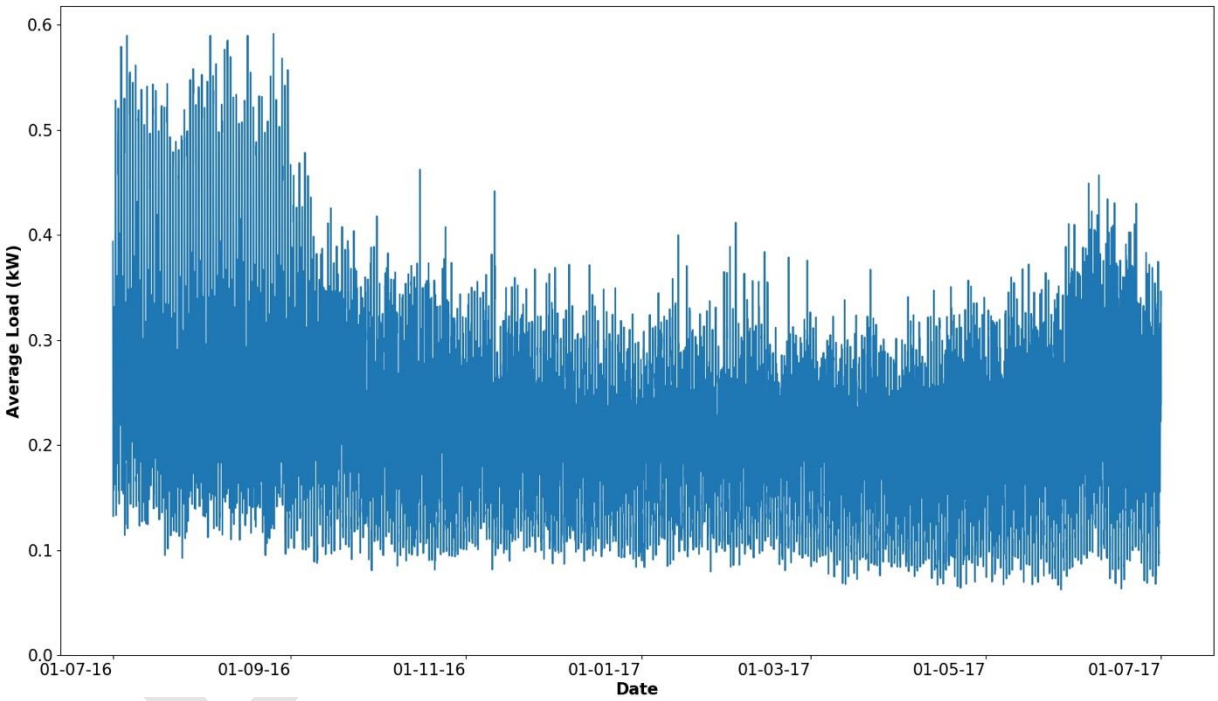


Figure 109. Aggregated Load of all Customers over the Year: Ergon East, Residential CL, 2016/17

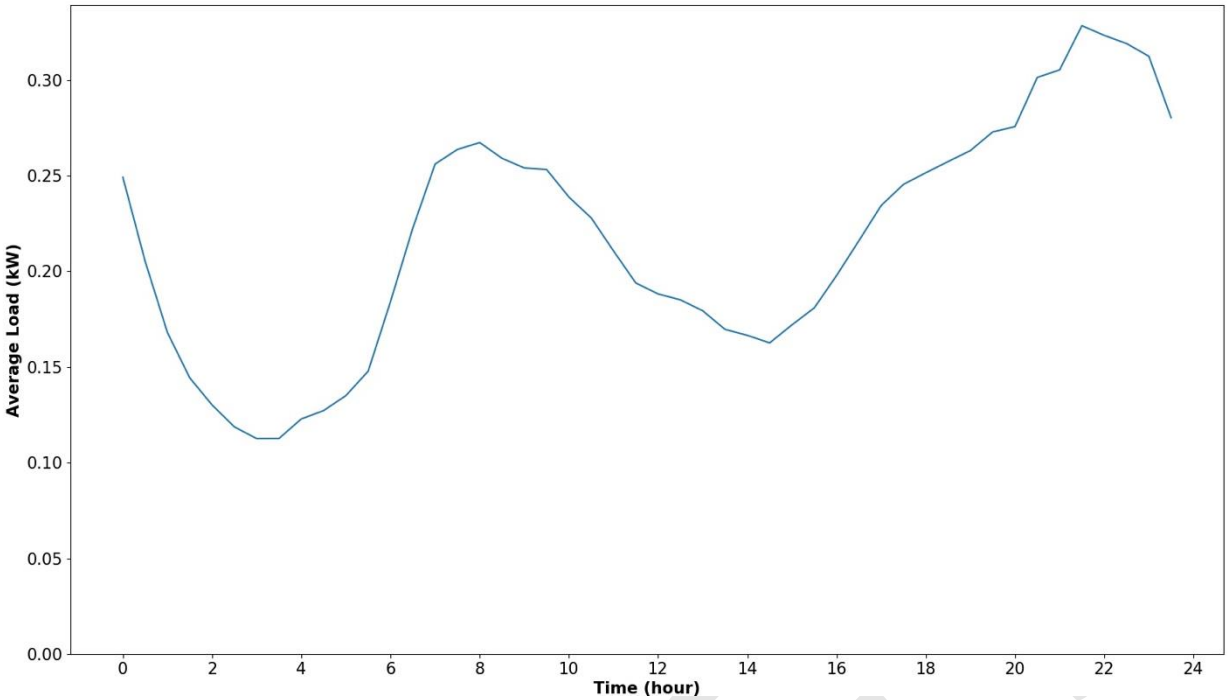


Figure 110. Average Daily Load of all Customers over the Year: Ergon East, Residential CL, 2016/17

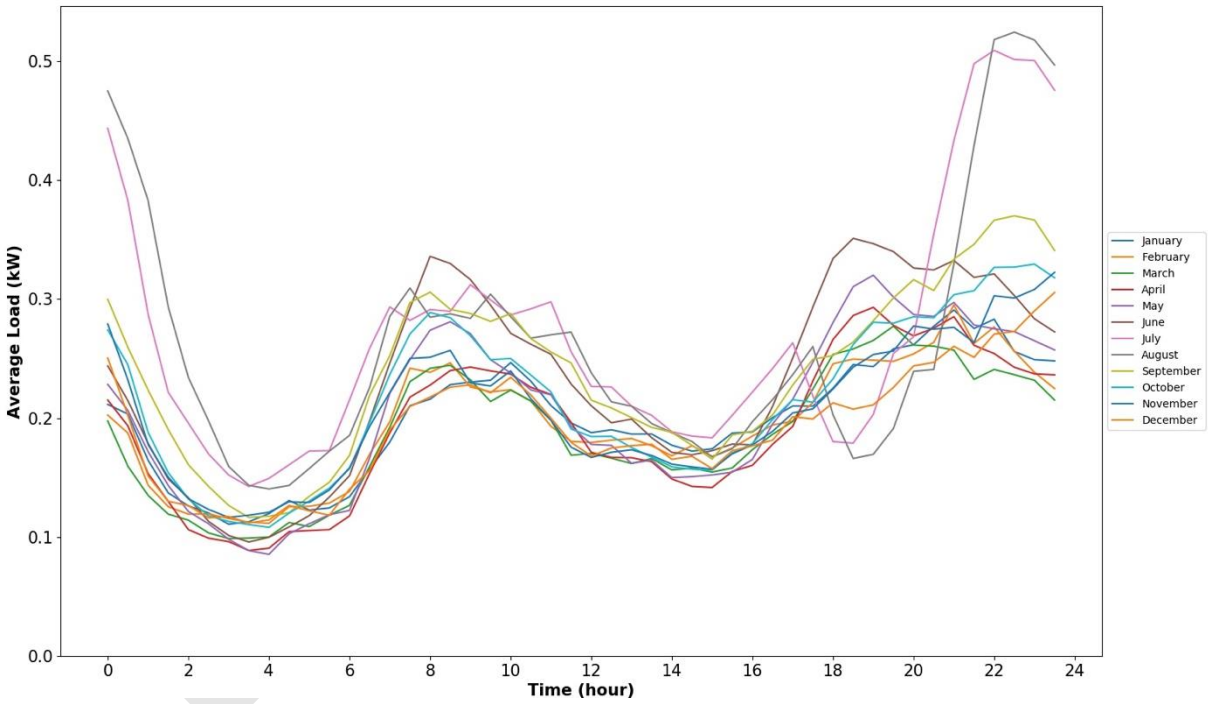


Figure 111. Average Daily Load of all Customers for Each Month: Ergon East, Residential CL, 2016/17

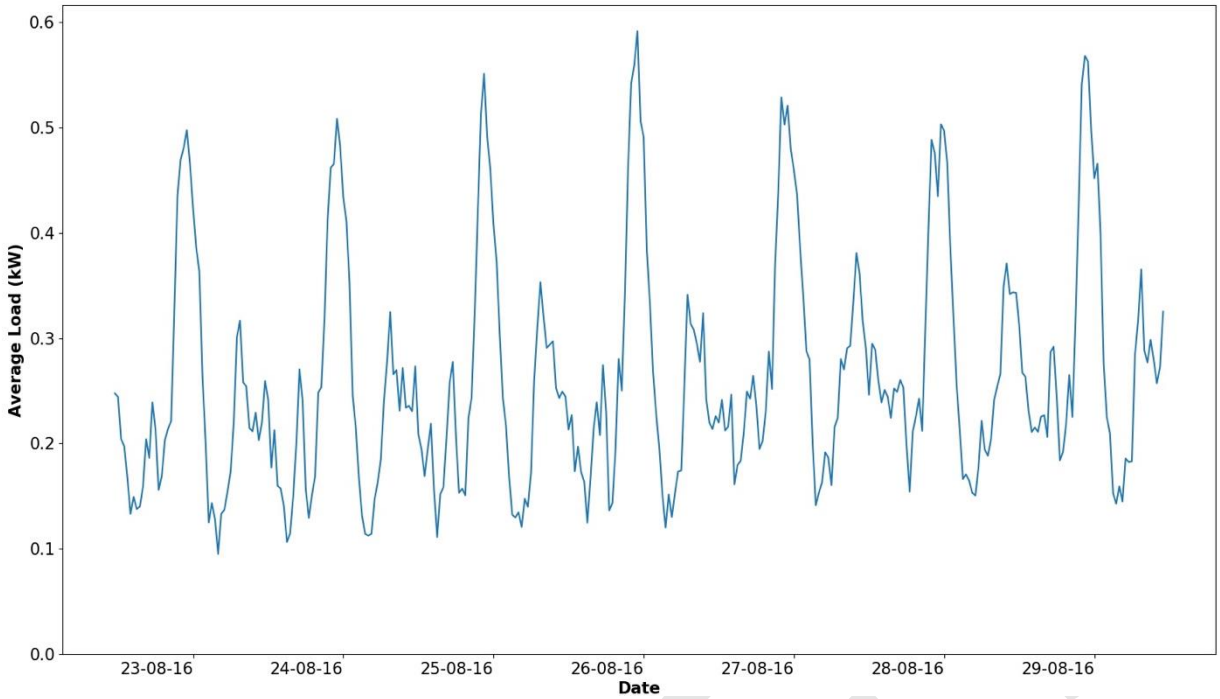


Figure 112. Week of Peak Day of Aggregated Customers: Ergon East, Residential CL, 2016/17

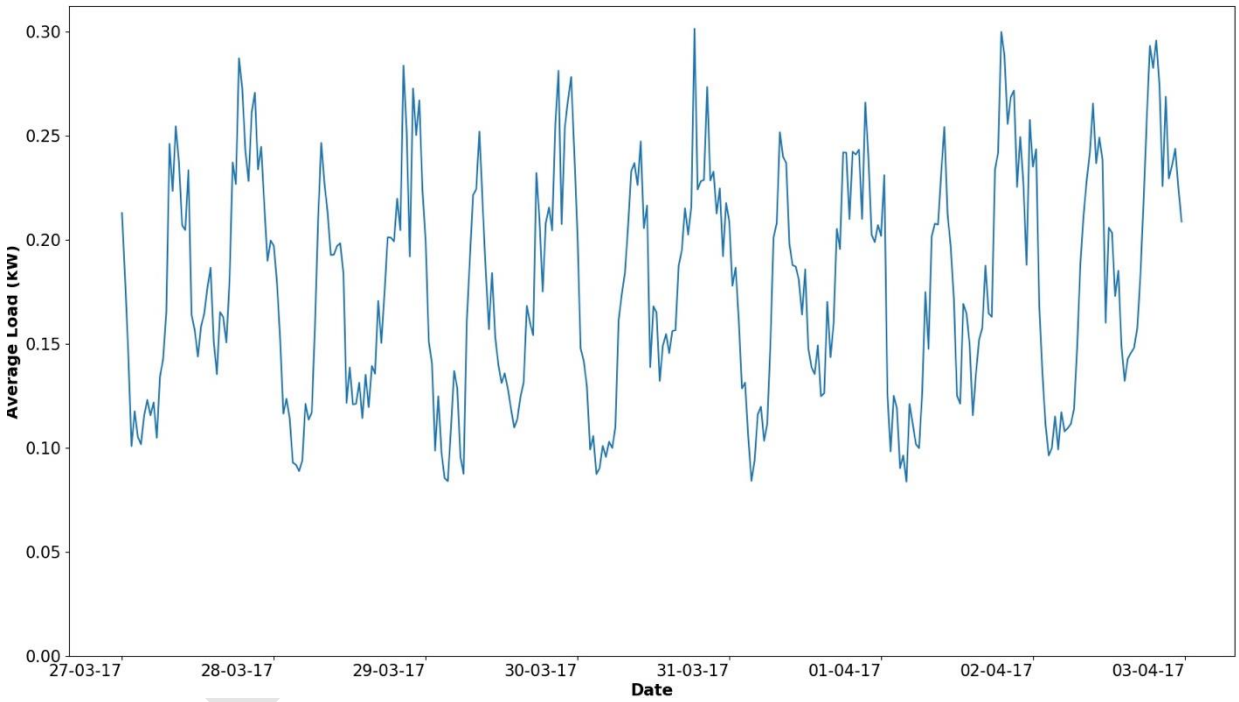


Figure 113. Day of Lowest Peak for Aggregated Customers: Ergon East, Residential CL, 2016/17

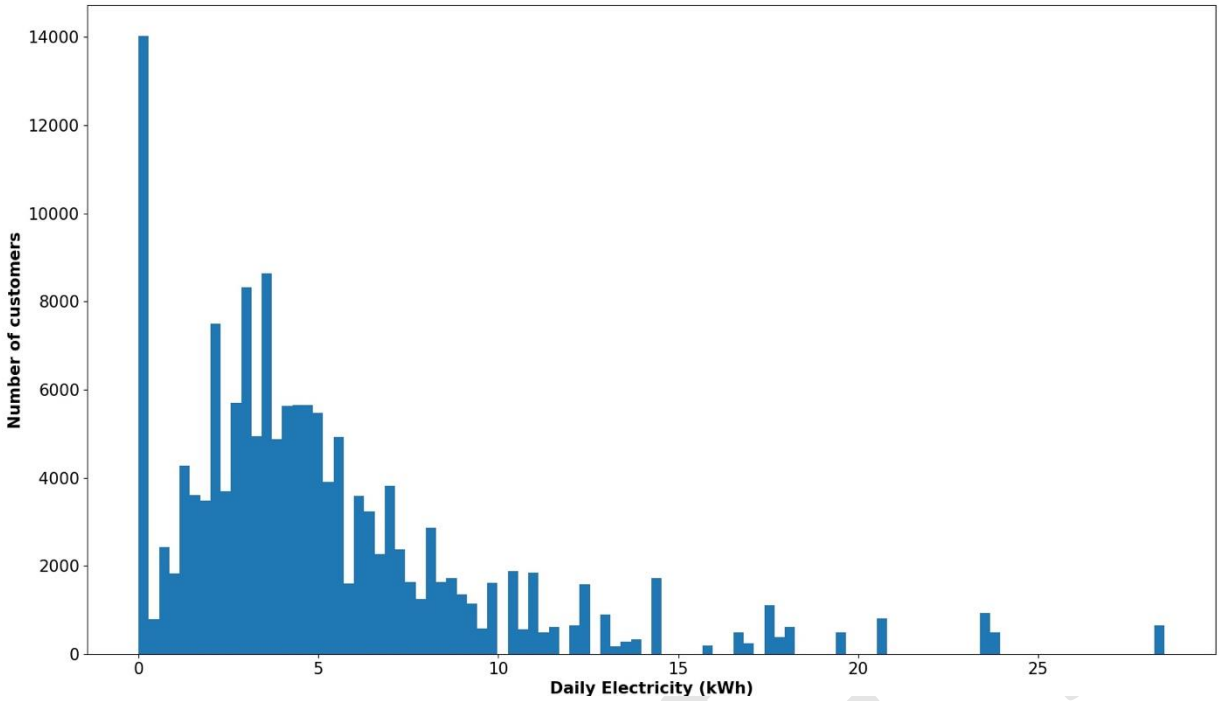


Figure 114. Histogram of Electricity Use of all Customers: Ergon East, Residential CL, 2016/17

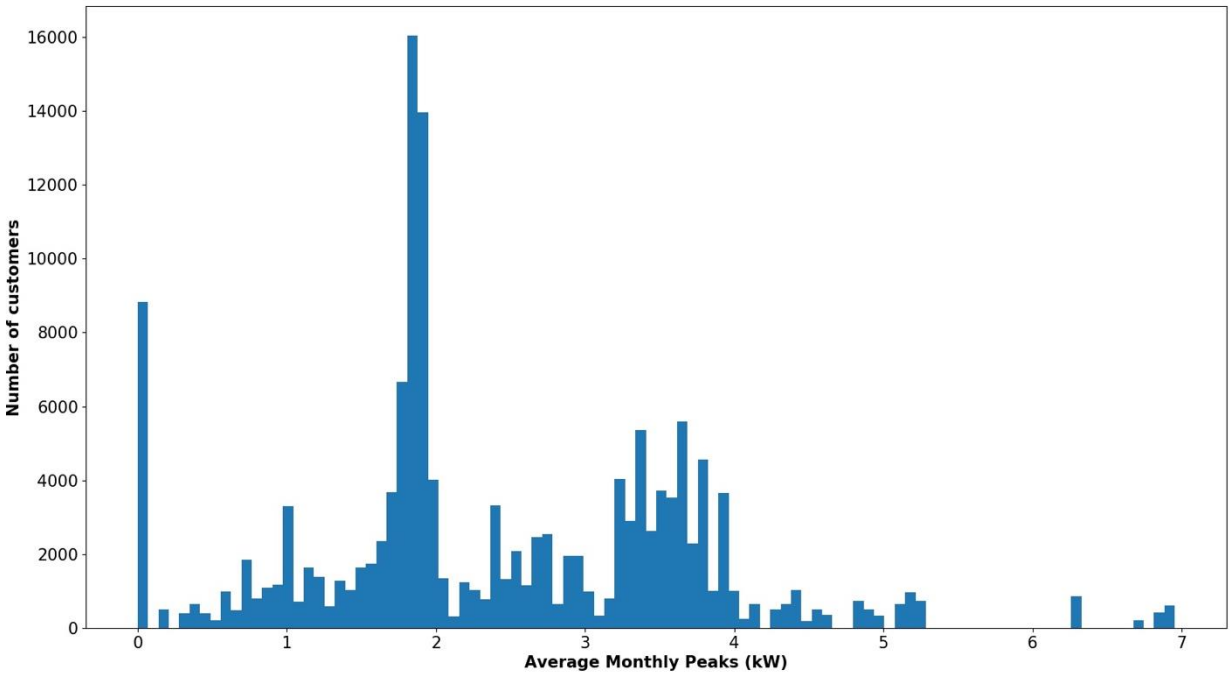


Figure 115. Histogram of Average Monthly Demand Peaks of all Customers: Ergon East, Residential, 2017

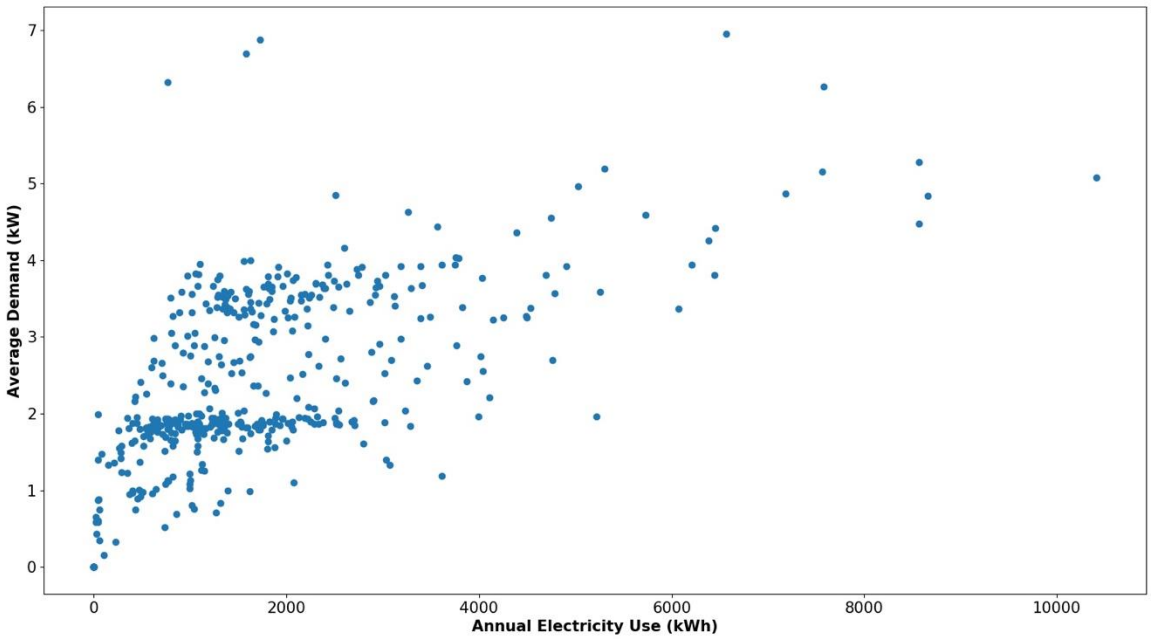


Figure 116. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon East, Residential, 2017

5.1.2.3 Business

The business customer findings for Ergon East were very similar to those for the South East customers. The only differences being:

- March dropped from being the second highest month to the third highest.
- The histogram of daily electricity use showed greater concentration below 50 kWh/day, with the average at 40.8kWh/day.
- The histogram of average monthly demand extends up to 170kW.

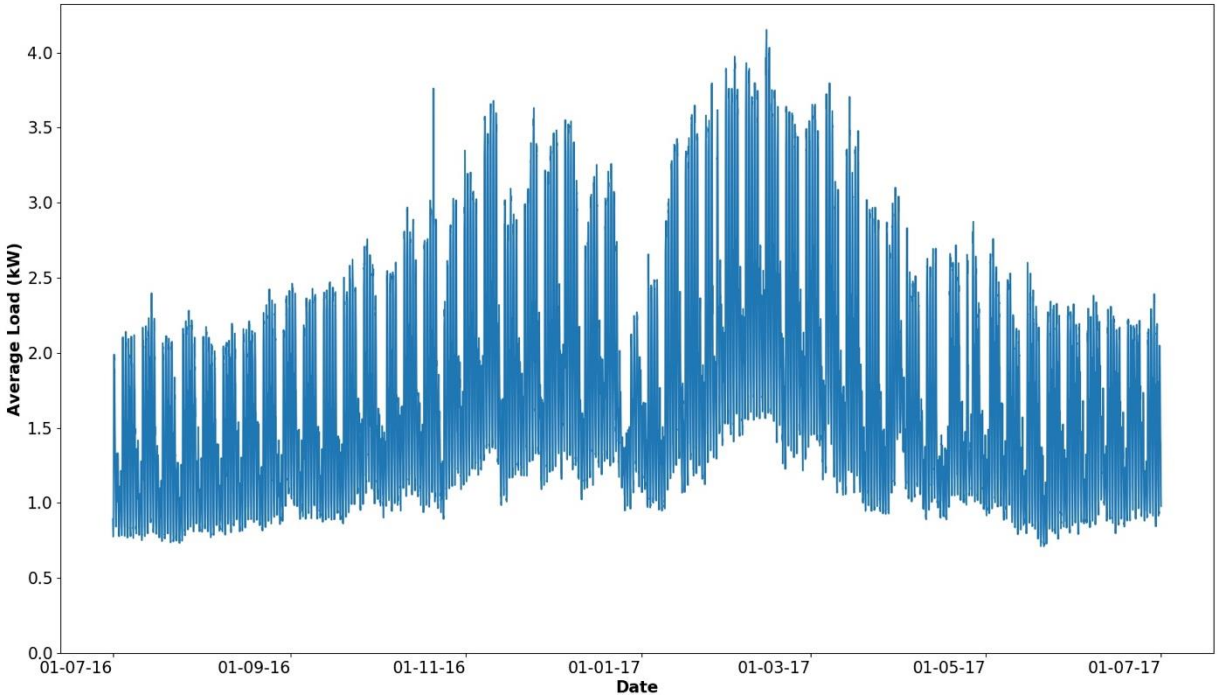


Figure 117. Aggregated Load of all Customers over the Year: Ergon East, Business, 2017

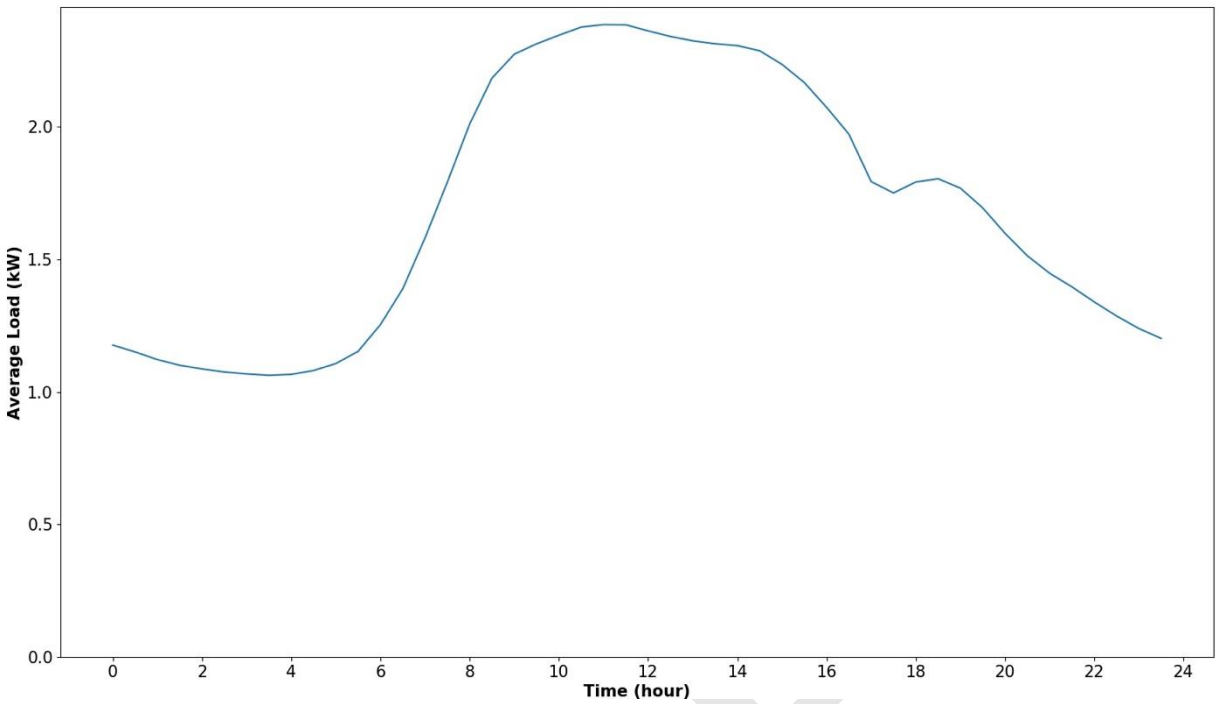


Figure 118. Average Daily Load of all Customers over the Year: Ergon East, Business, 2017

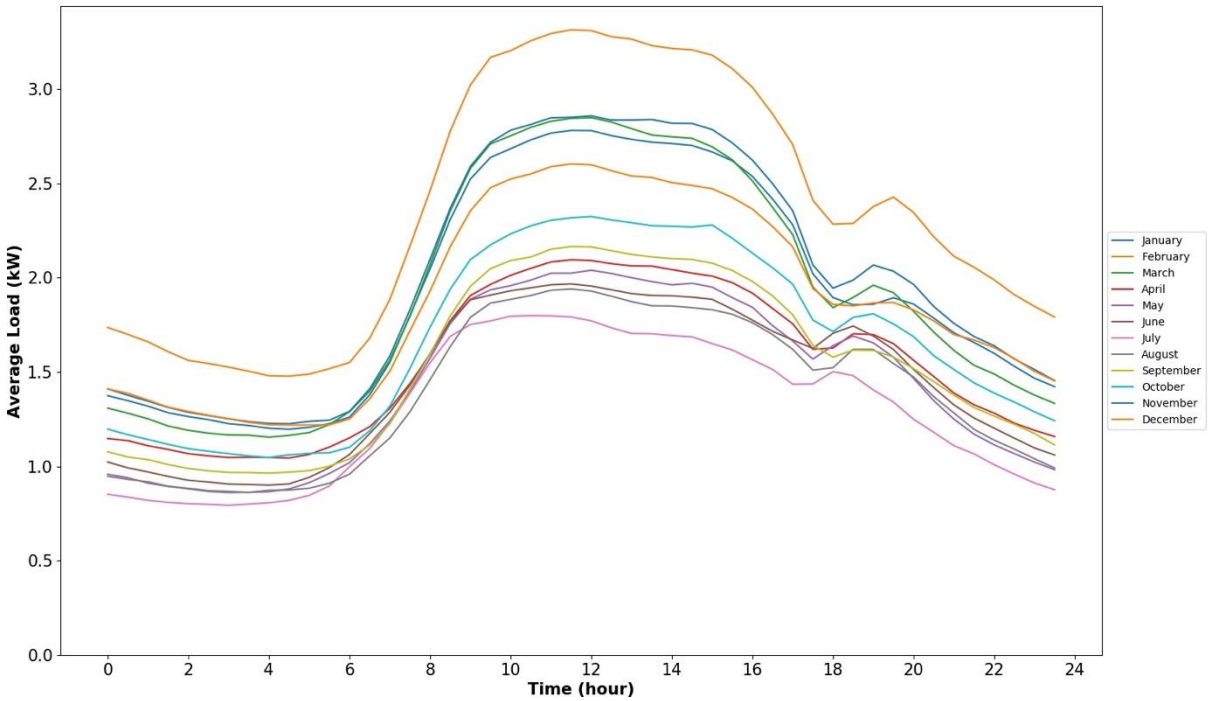


Figure 119. Average Daily Load of all Customers for Each Month: Ergon East, Business, 2017

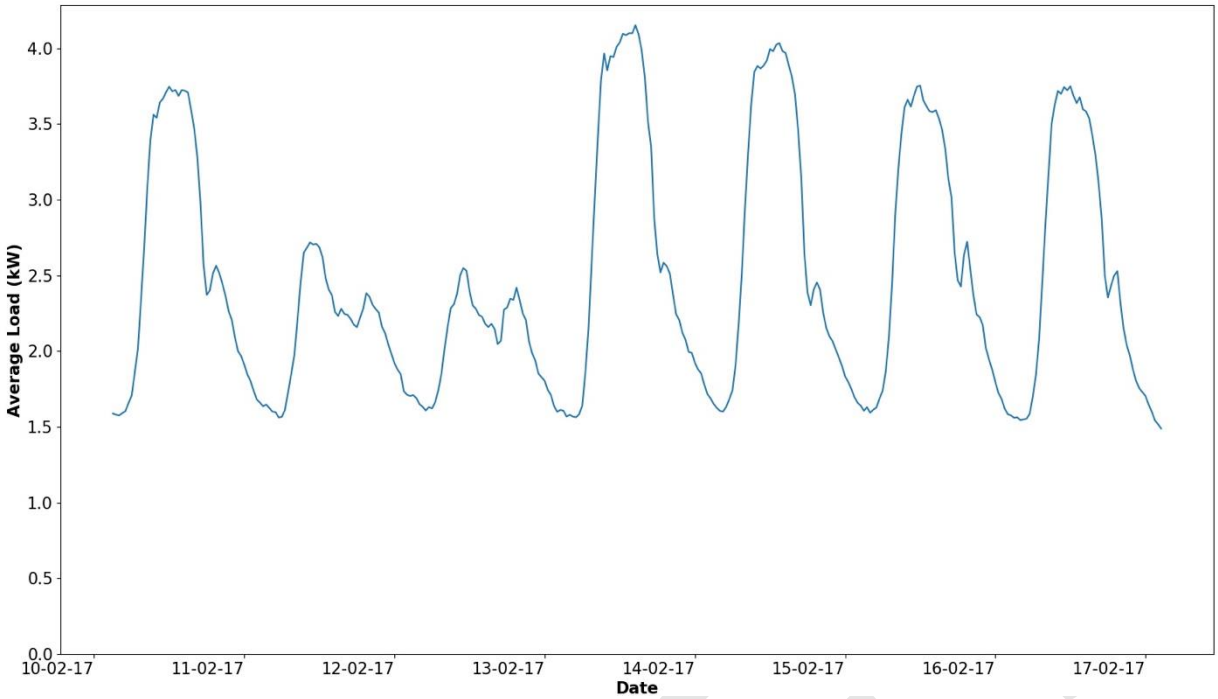


Figure 120. Week of Peak Day of Aggregated Customers: Ergon East, Business, 2017

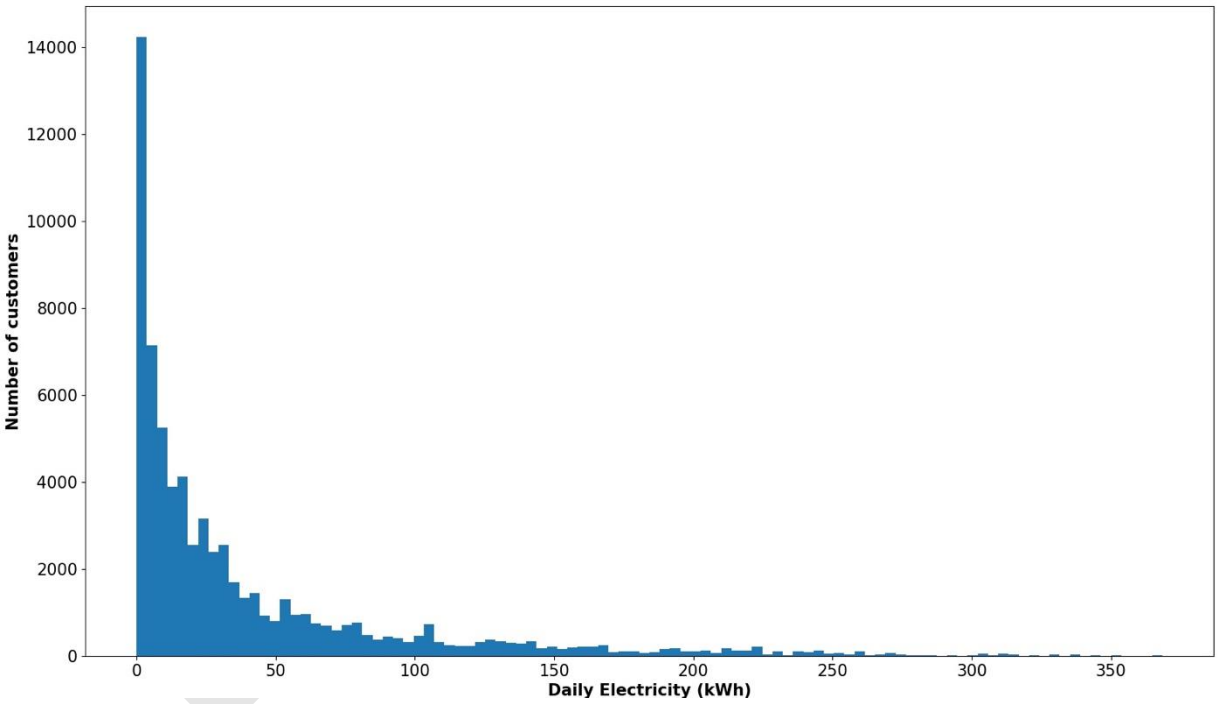


Figure 121. Histogram of Electricity Use of all Customers: Ergon East, Business, 2017

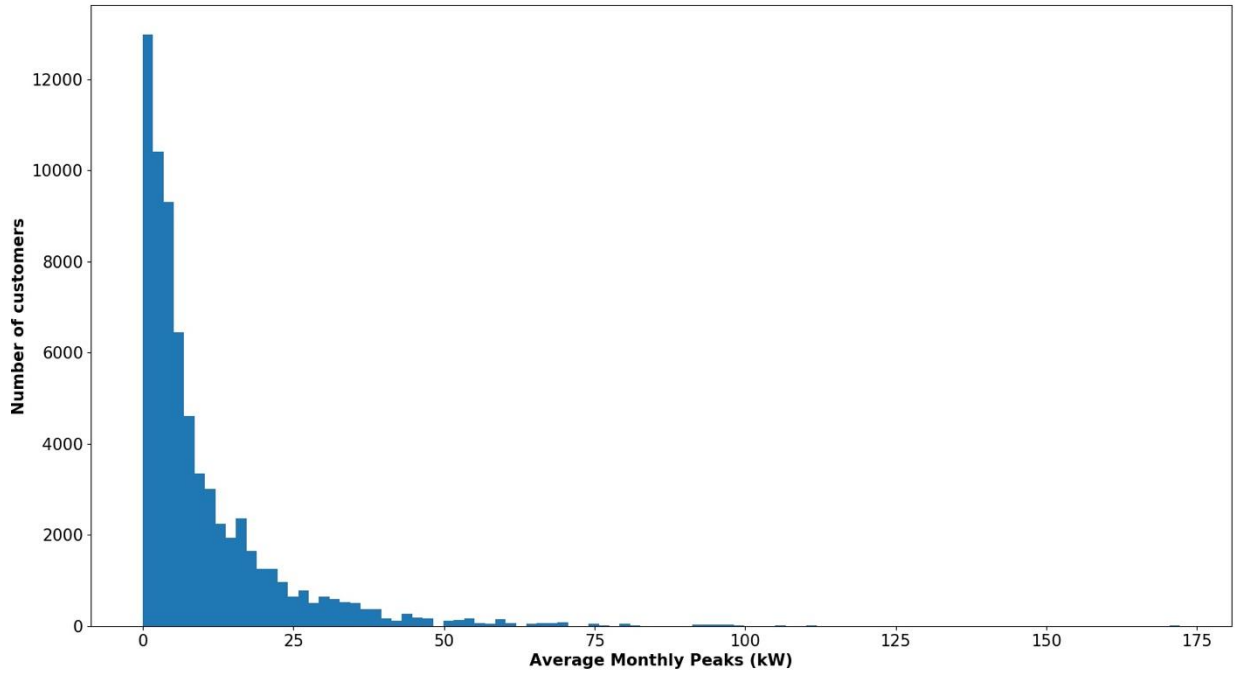


Figure 122. Histogram of Average Monthly Demand Peaks of all Customers: Ergon East, Residential, 2017

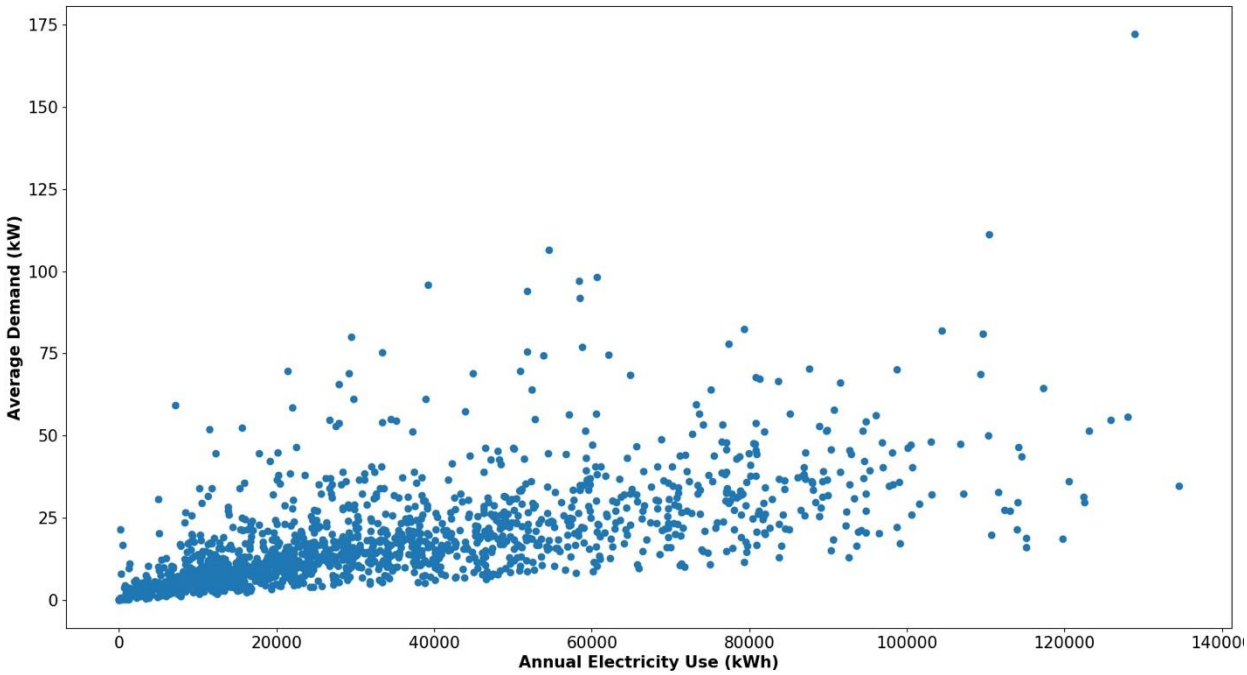


Figure 123. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon East, Residential, 2017

5.1.3 Ergon West data

5.1.3.1 Residential

Figure 124 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. The increase in load peaks during the hotter months, due to higher cooling demands, can be clearly seen. Here there is a greater increase in winter heating loads, as well as a clear increase around December compared to the Ergon East and the South East customers.

Figure 125 shows the characteristic residential load curve, and Figure 126 shows that January and February, followed by December and March, and primarily responsible for the highest peak demands. Like the South East loads, the winter months have lower evening peaks on average. This is something of a surprise since inland areas would be expected to have lower winter temperatures, but is consistent with the higher winter loads in Figure 124. Figure 127 illustrates the week including the highest peak day for the aggregated loads, again being on Monday 13th February 2017.

Figure 128 shows the number of customers versus their average daily electricity use. It can be seen that although the customers are clustered generally below the average of 16.8kWh/day, a small number extend up to almost 60 kWh/day.

Figure 129 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, although the average demand peaks are tightly clustered, with the peak at 4.5kW, they do extend up to just under 30 kW, which is very high.

Figure 130 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that although there is some scatter (with one very high average peak), there is quite a good correlation between average monthly demand and annual electricity use.

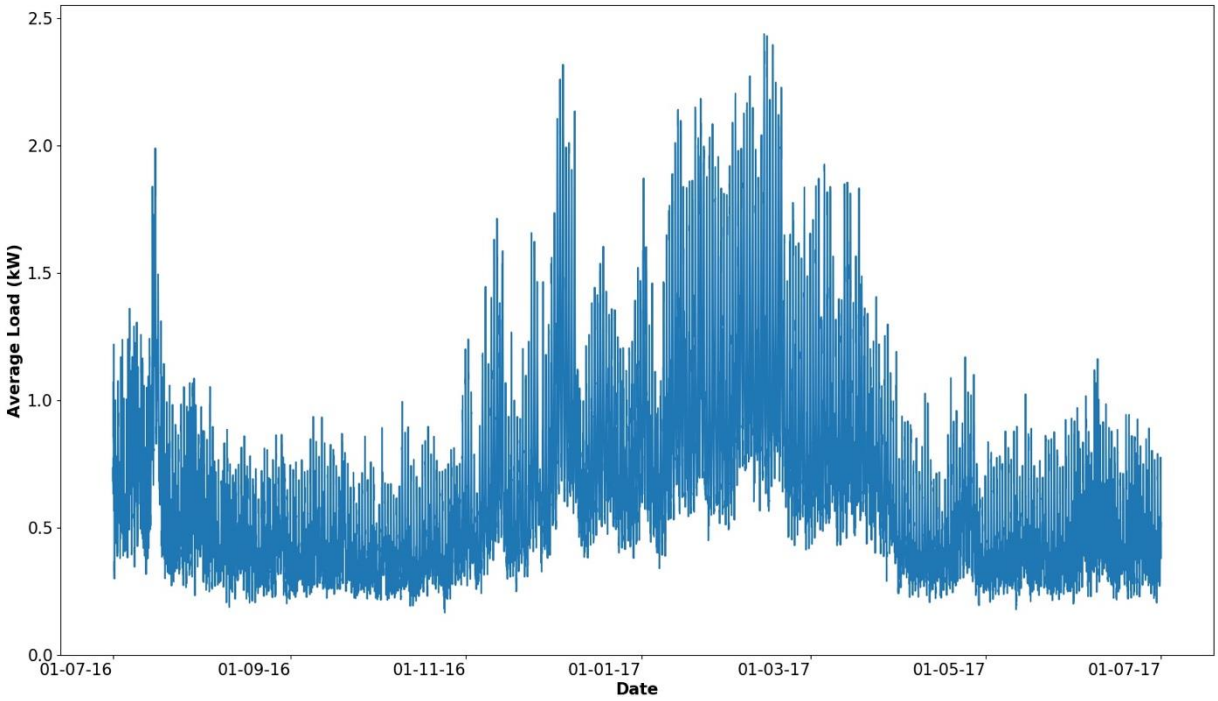


Figure 124. Aggregated Load of all Customers over the Year: Ergon West, Residential, 2016/17

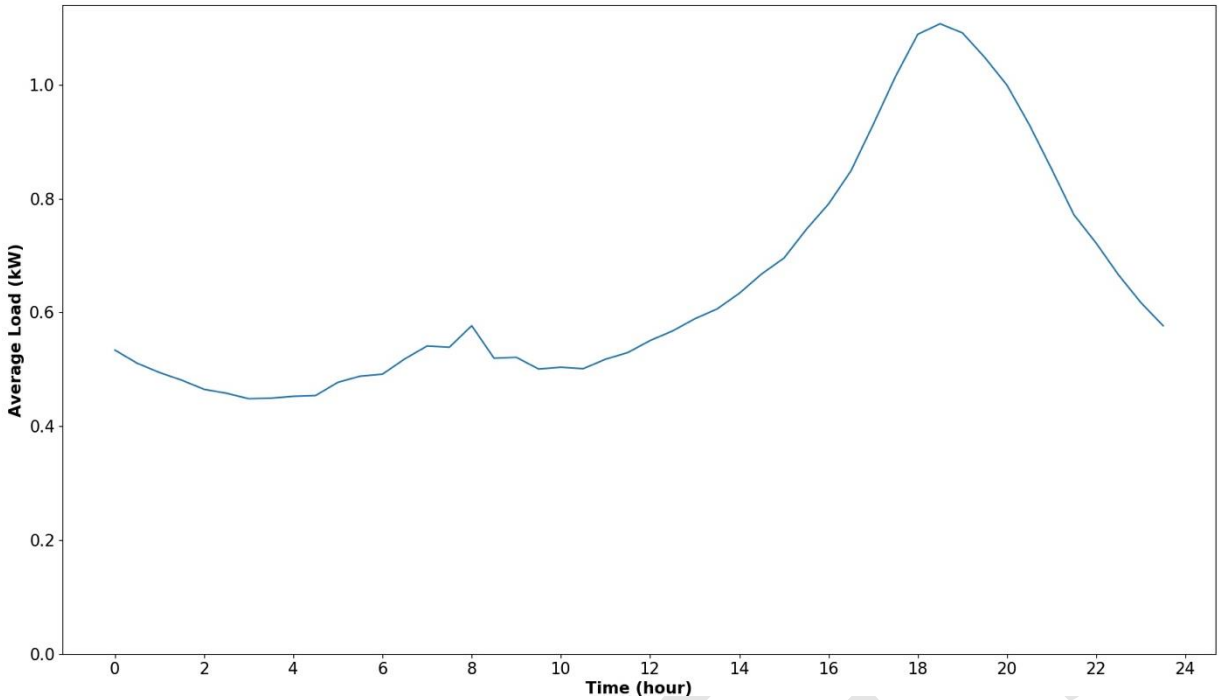


Figure 125. Average Daily Load of all Customers over the Year: Ergon West, Residential, 2016/17

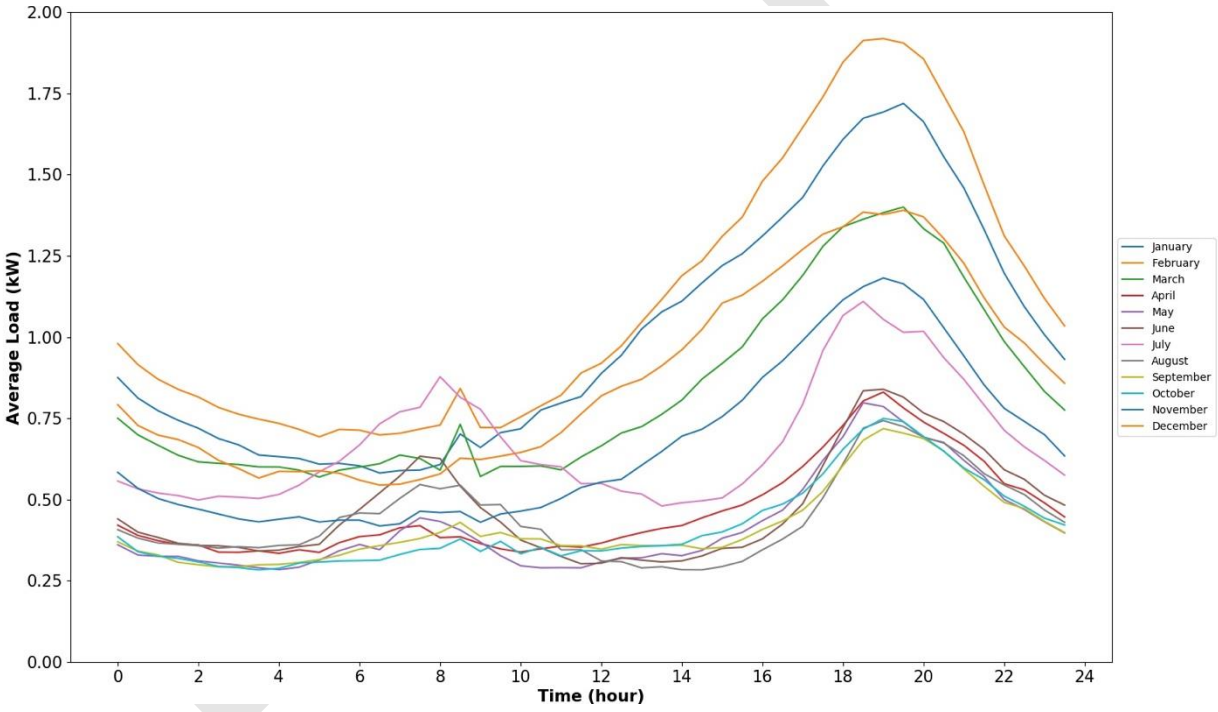


Figure 126. Average Daily Load of all Customers for Each Month: Ergon West, Residential, 2016/17

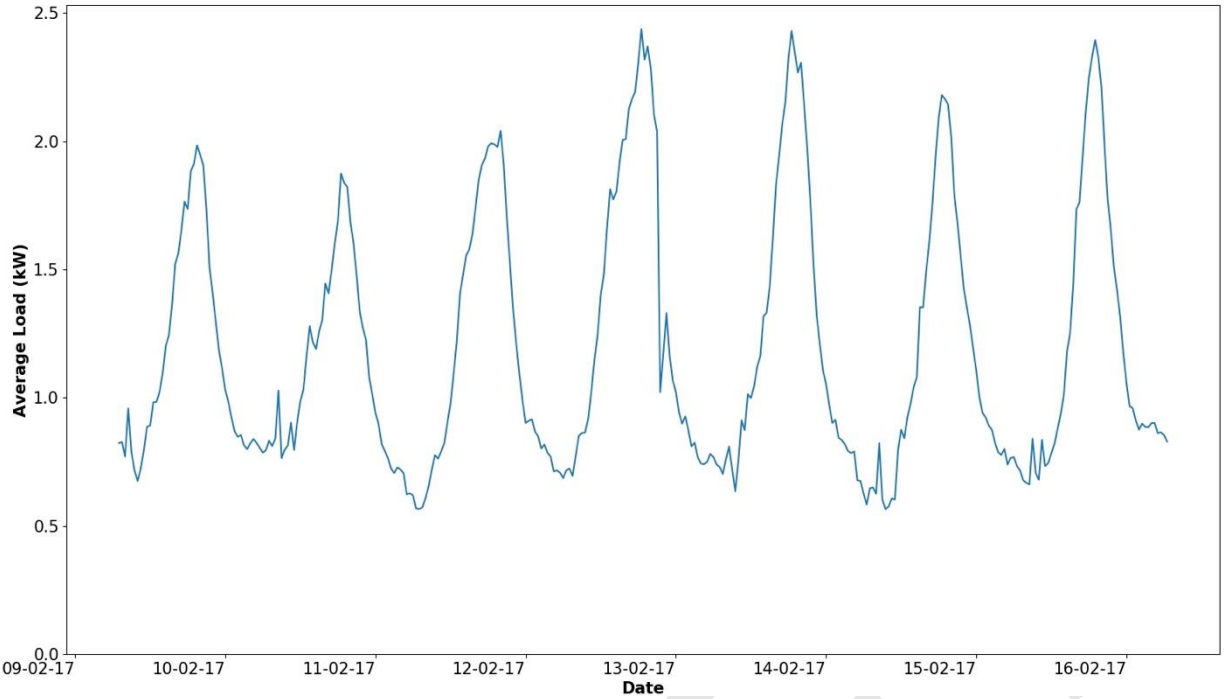


Figure 127. Week of Peak Day of Aggregated Customers: Ergon West, Residential, 2016/17

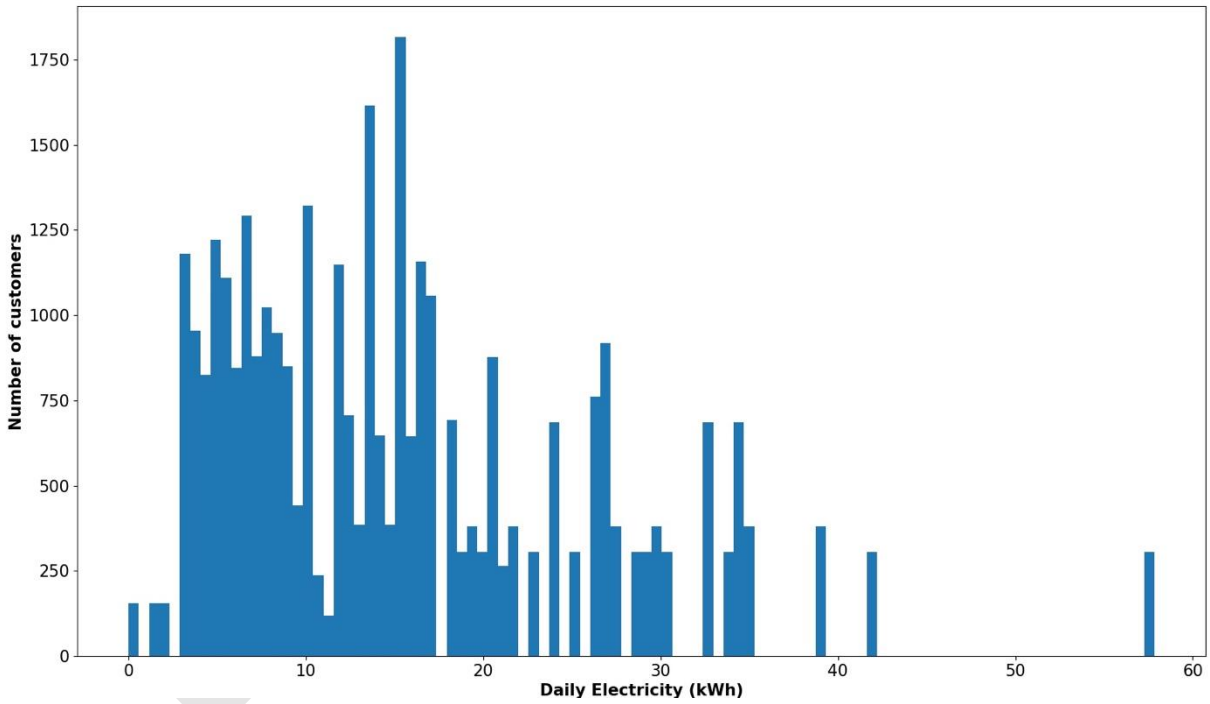


Figure 128. Histogram of Electricity Use of all Customers: Ergon West, Residential, 2016/17

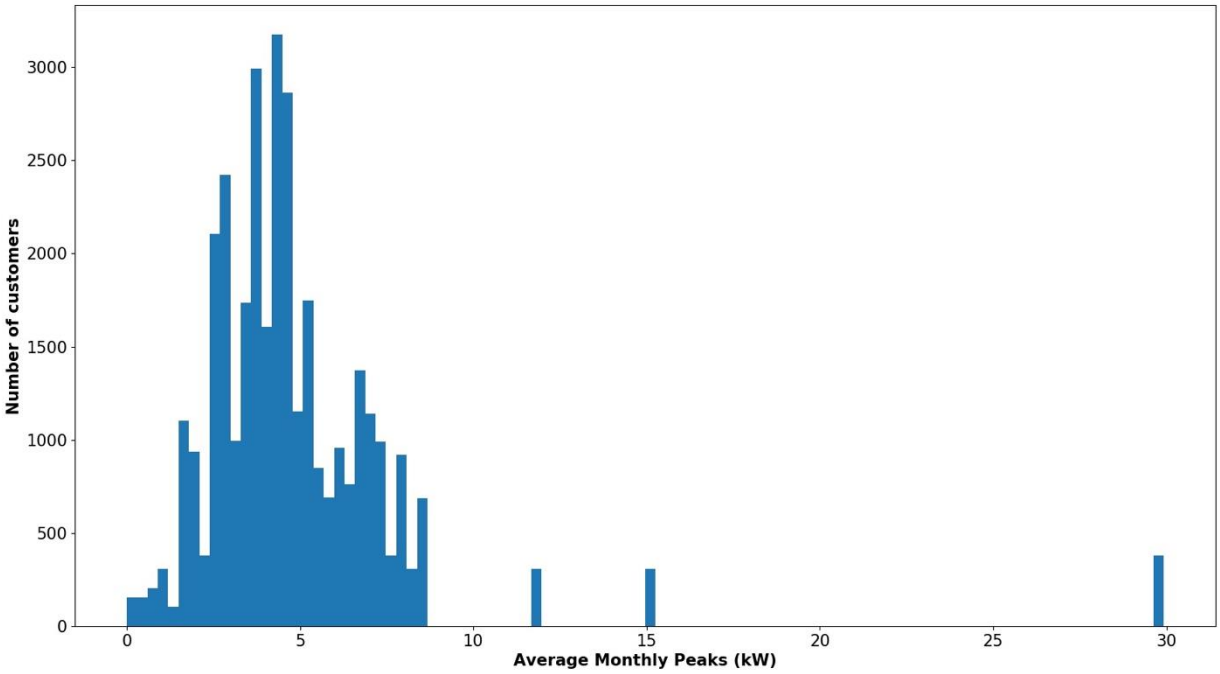


Figure 129. Histogram of Average Monthly Demand Peaks of all Customers: Ergon West, Residential, 2017

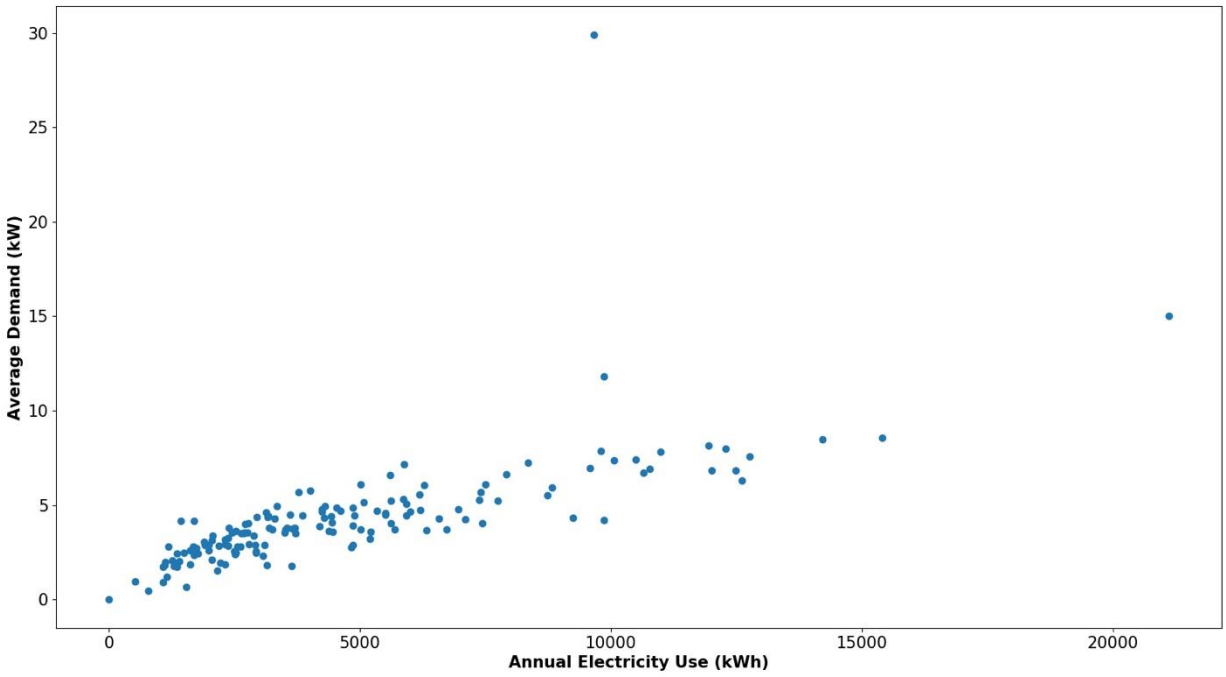


Figure 130. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon West, Residential, 2017

5.1.3.2 Controlled Load

Figure 131 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. This is similar to the Ergon East chart, but with a less pronounced decrease in controlled load during all the non-winter months.

Figure 132 is similar to the Ergon East customers, but is much more irregular, in part due to the smaller number of customers in the sample, but also possibly because a greater number of different types of devices

are on controlled load. Thus, although CL in highest in the evening, it occurs throughout the day and has a significant morning peak. Figure 133 confirms that July and August are responsible for the highest peaks, but in contrast to the Ergon East customers, July also has the highest demand around 5pm to 6pm.

Figure 134 illustrates the week including the highest peak day for the aggregated loads, being on Saturday 27th Aug 2016. Figure 135 illustrates the week including some of the lowest peak days for the aggregated loads, being in October. Given the irregular nature of the load profile it is difficult to see any real difference between the two.

Figure 136 shows the number of customers versus their average daily electricity use. This shows that many customers do not have controlled load, and that although the other customers are clustered around the average of 5.3kWh/day, they do extend to 28 kWh/day.

Figure 137 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, the average demand peaks are fairly scattered, with the peak at 3.6kW.

Figure 138 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that although there is some scatter, this is to be expected with such a small sample.

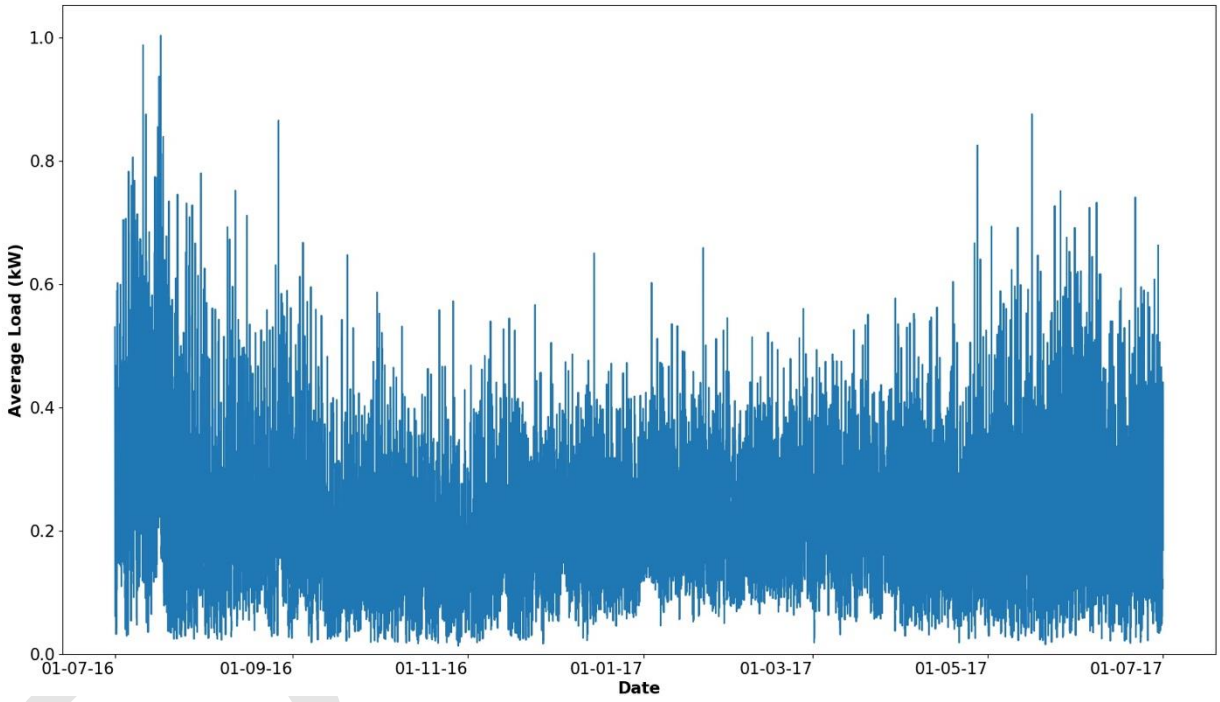


Figure 131. Aggregated Load of all Customers over the Year: Ergon West, Residential CL, 2016/17

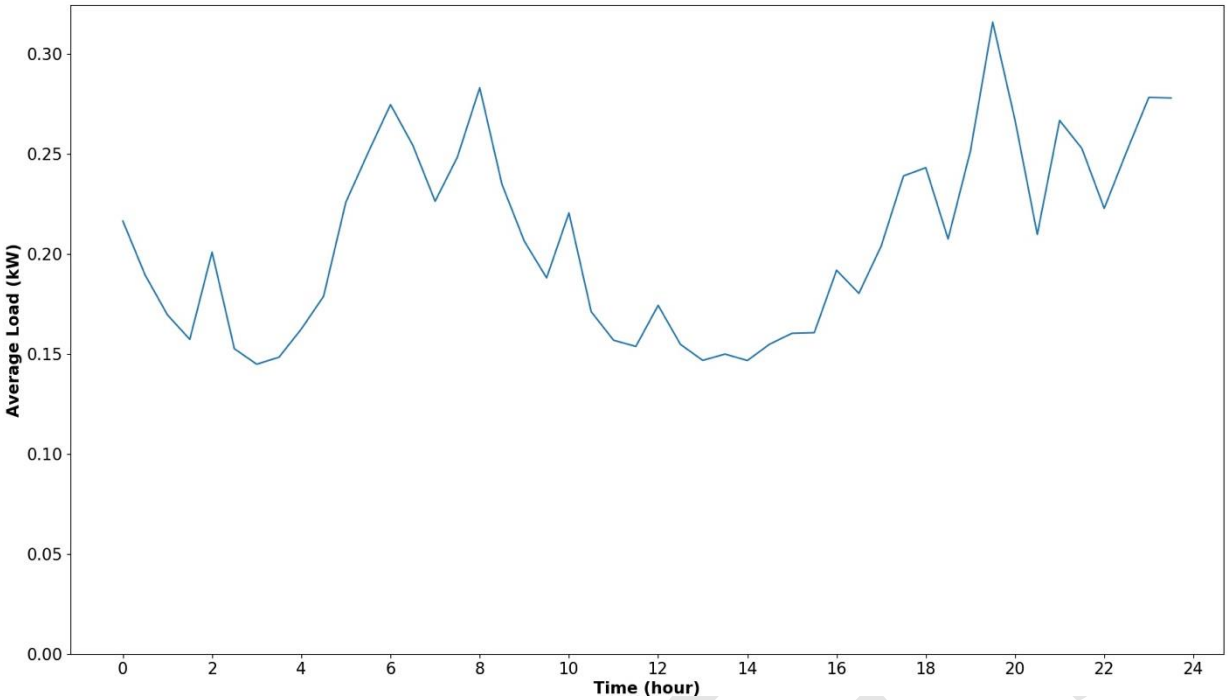


Figure 132. Average Daily Load of all Customers over the Year: Ergon West, Residential CL, 2016/17

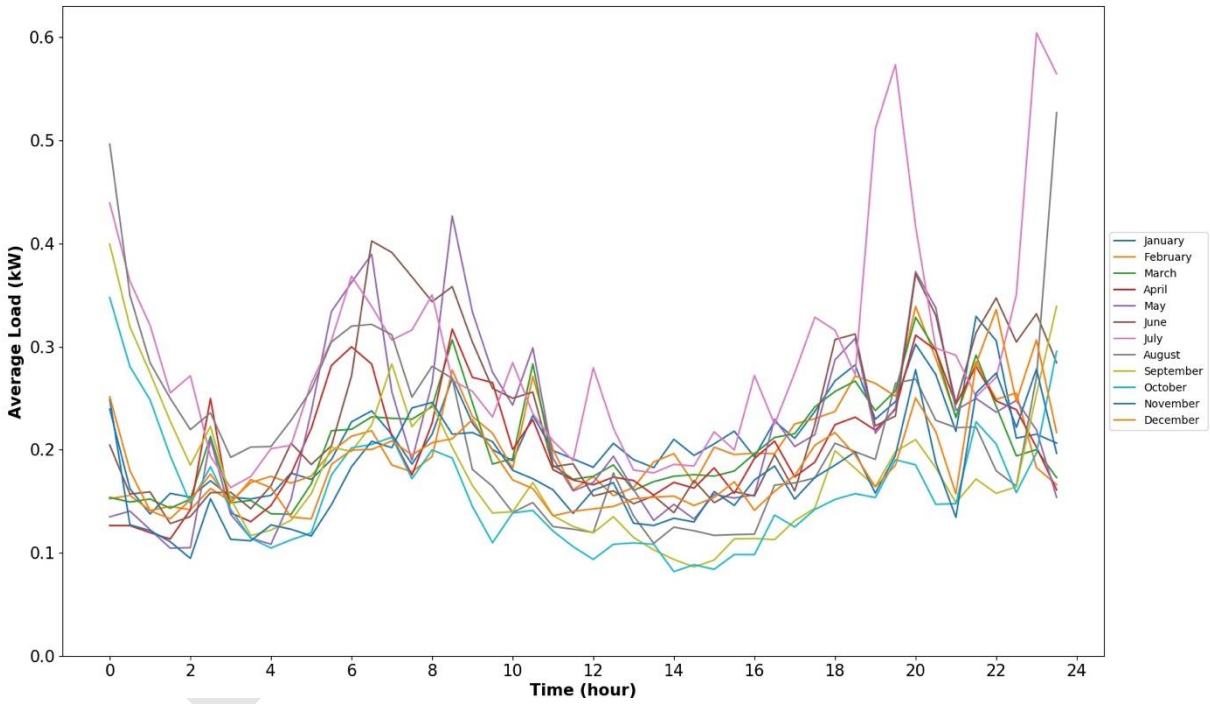


Figure 133. Average Daily Load of all Customers for Each Month: Ergon West, Residential CL, 2016/17

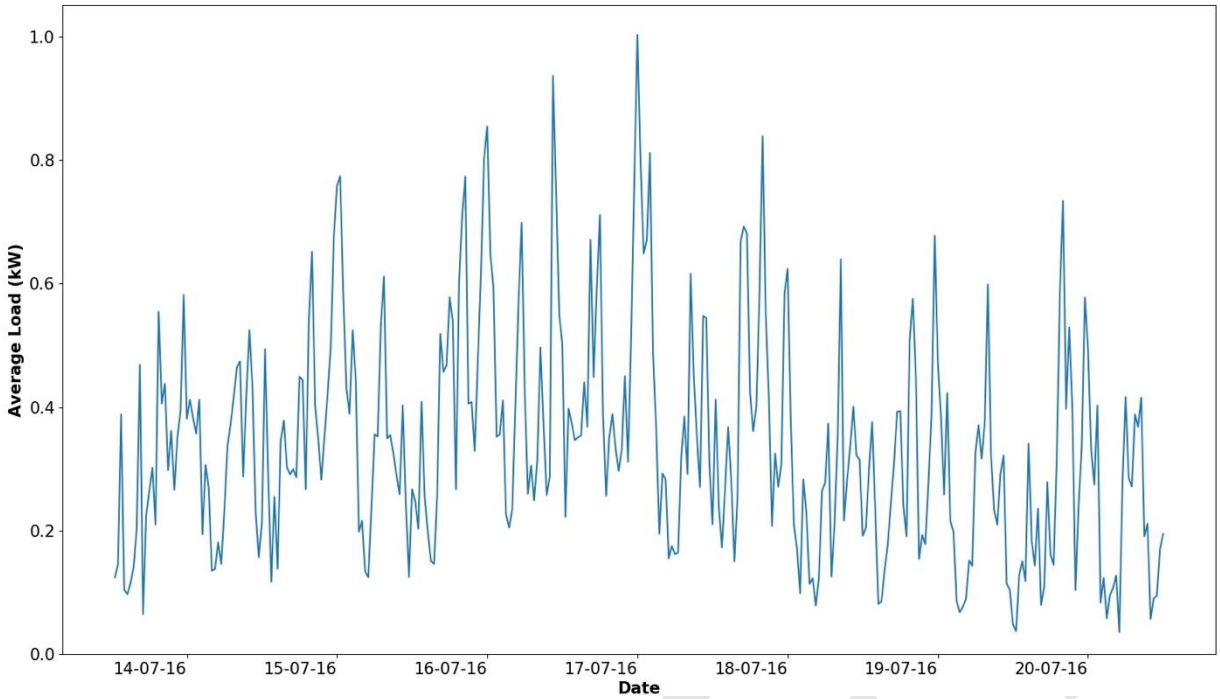


Figure 134. Week of Peak Day of Aggregated Customers: Ergon West, Residential CL, 2016/17

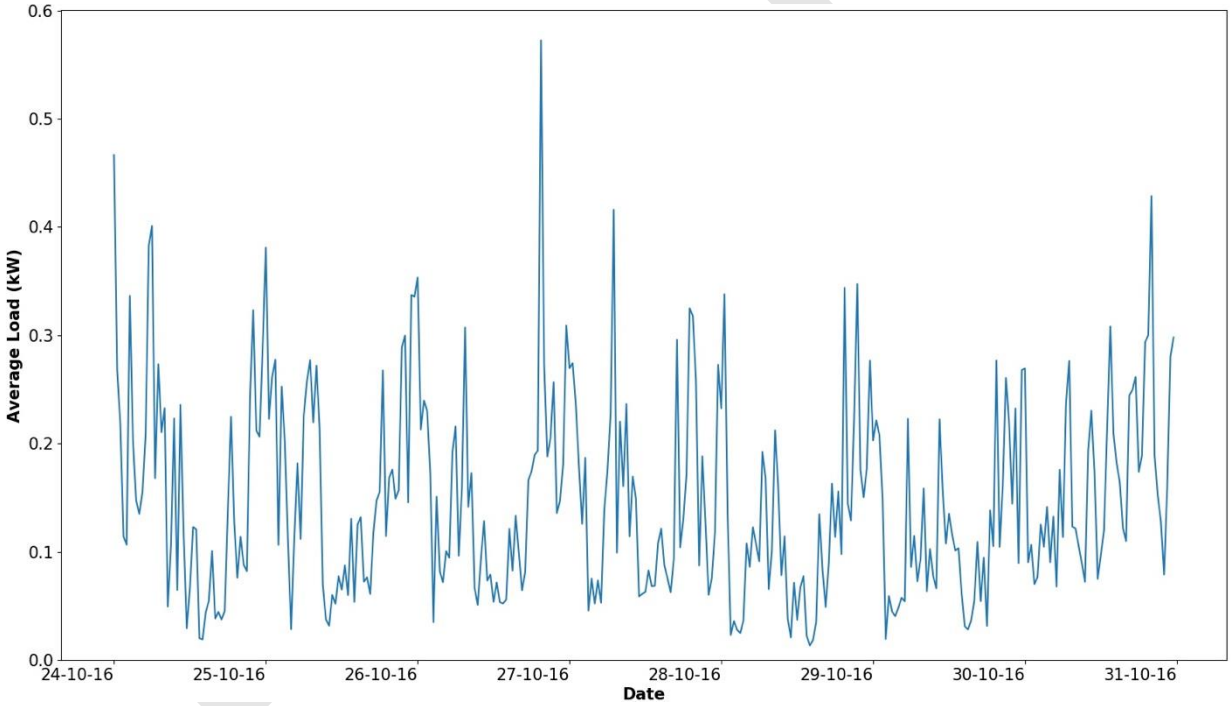


Figure 135. Day of Lowest Peak for Aggregated Customers: Ergon West, Residential CL, 2016/17

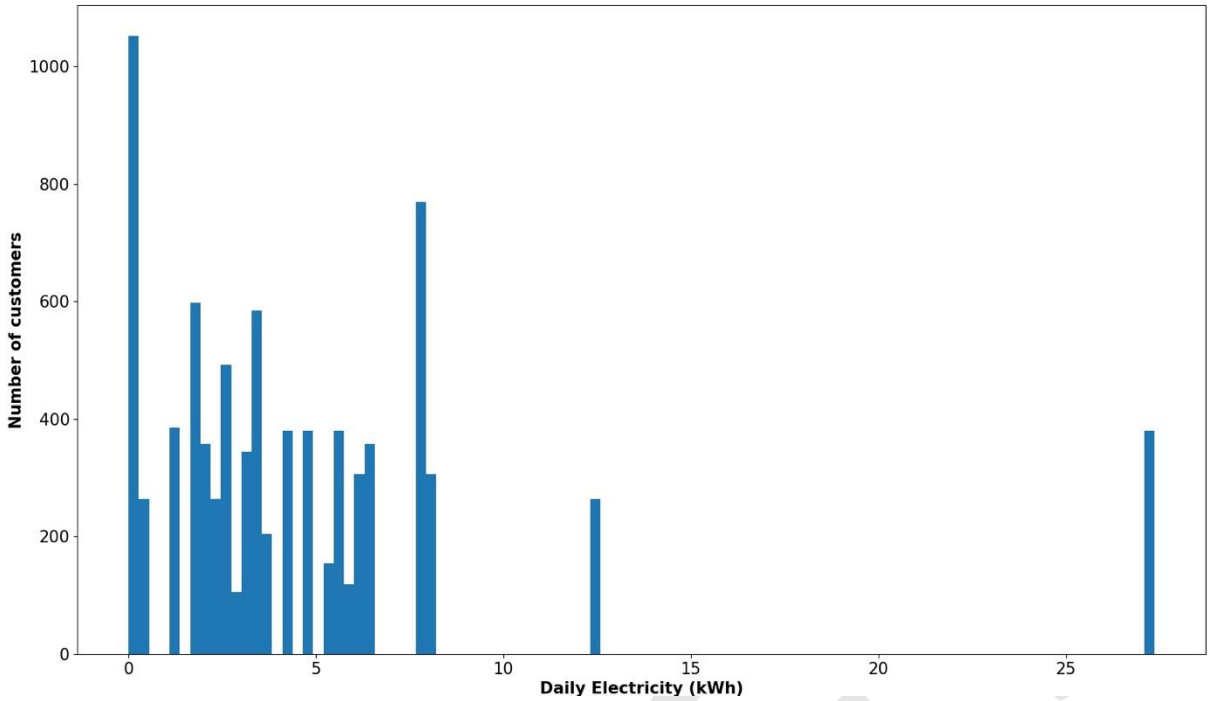


Figure 136. Histogram of Electricity Use of all Customers: Ergon West, Residential CL, 2016/17

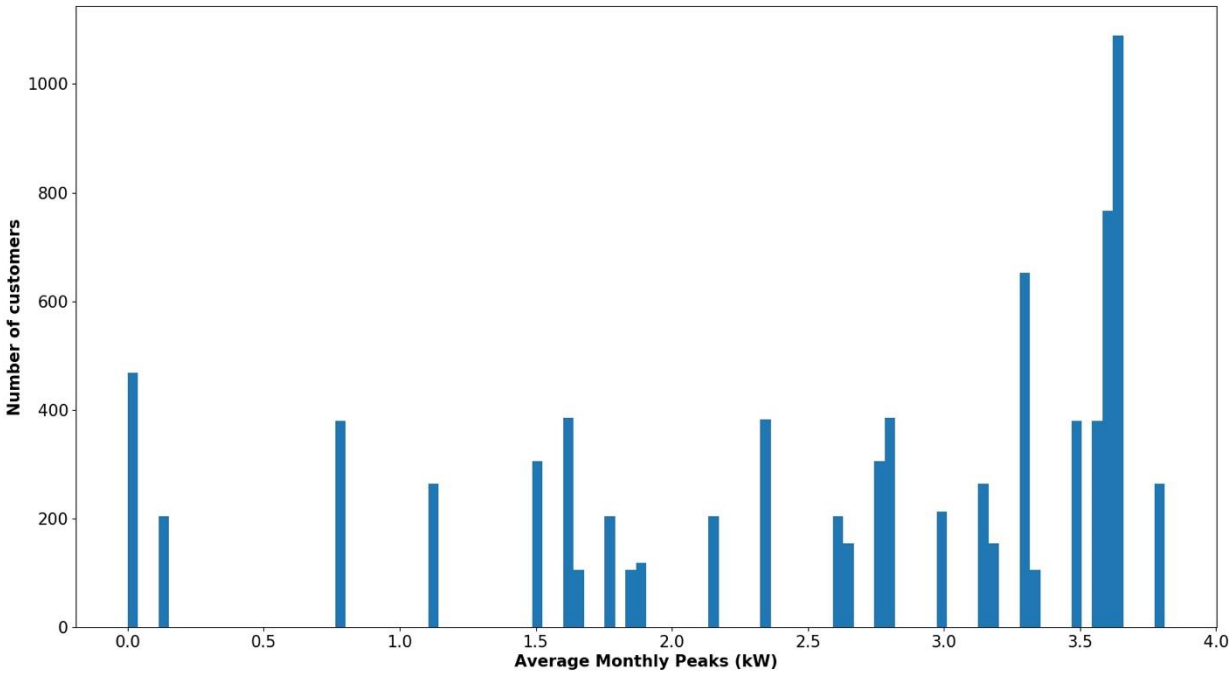


Figure 137. Histogram of Average Monthly Demand Peaks of all Customers: Ergon West, Residential, 2017

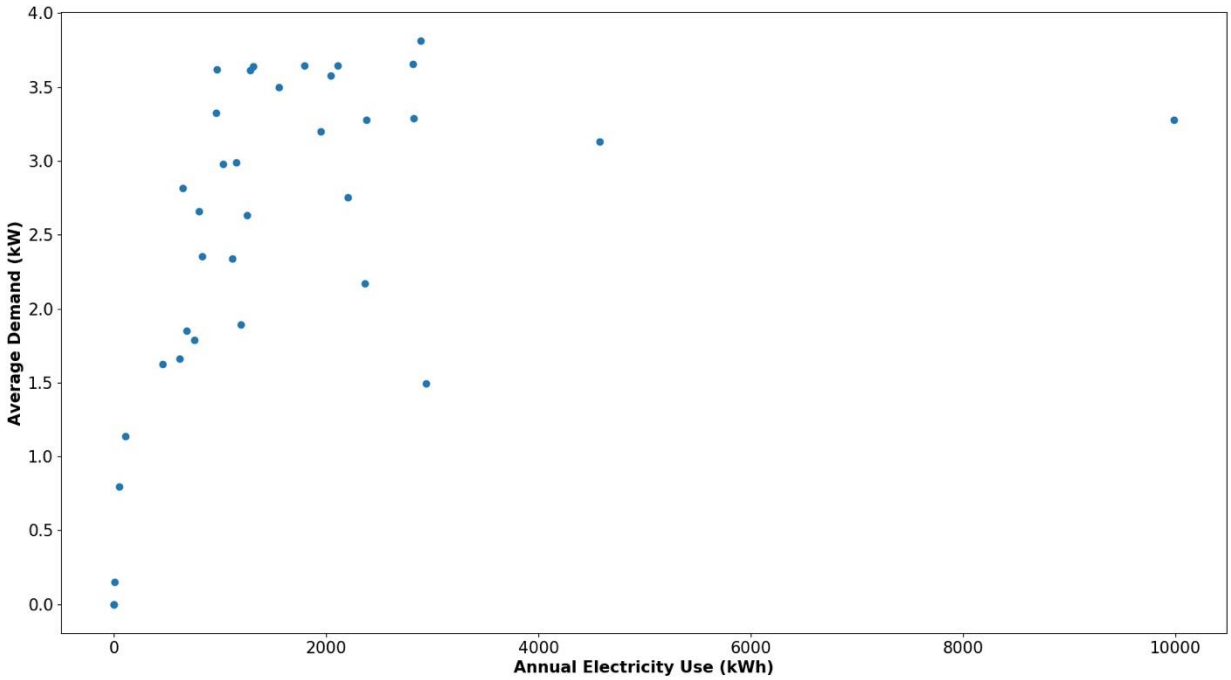


Figure 138. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon West, Residential, 2017

5.1.3.3 Business

The business customer findings for Ergon West were essentially identical to those for the Ergon East customers. In this case the average is 36.1kWh/day, which is slightly lower.

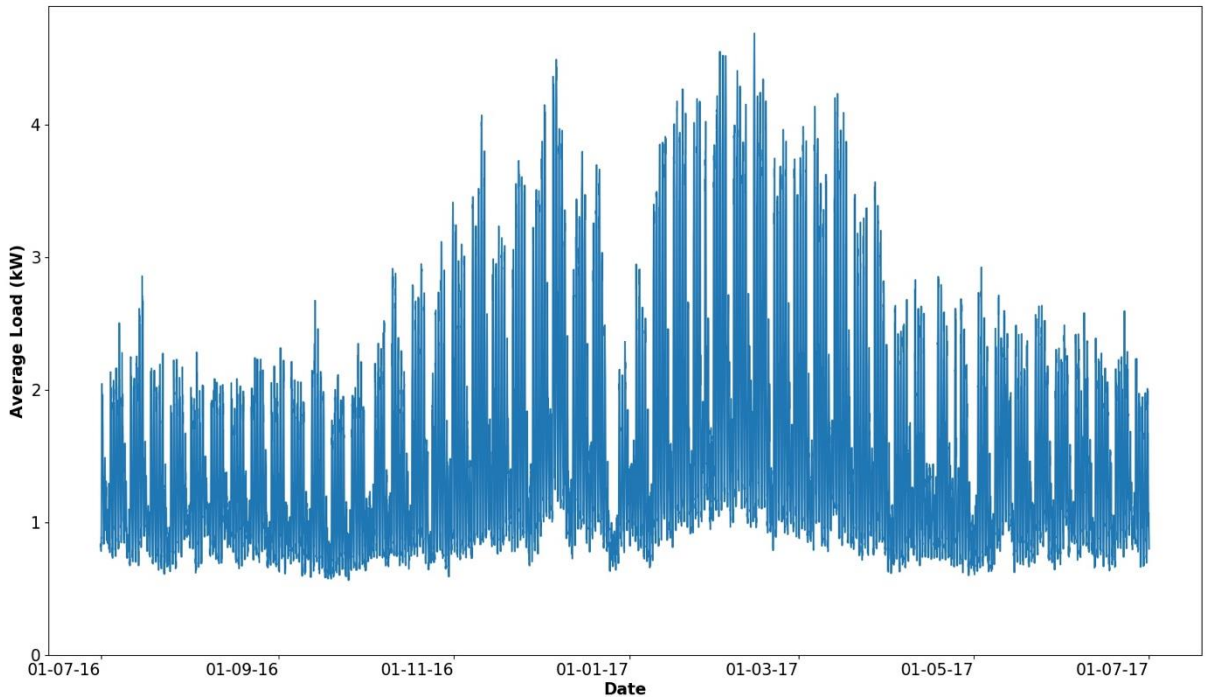


Figure 139. Aggregated Load of all Customers over the Year: Ergon West, Business, 2017

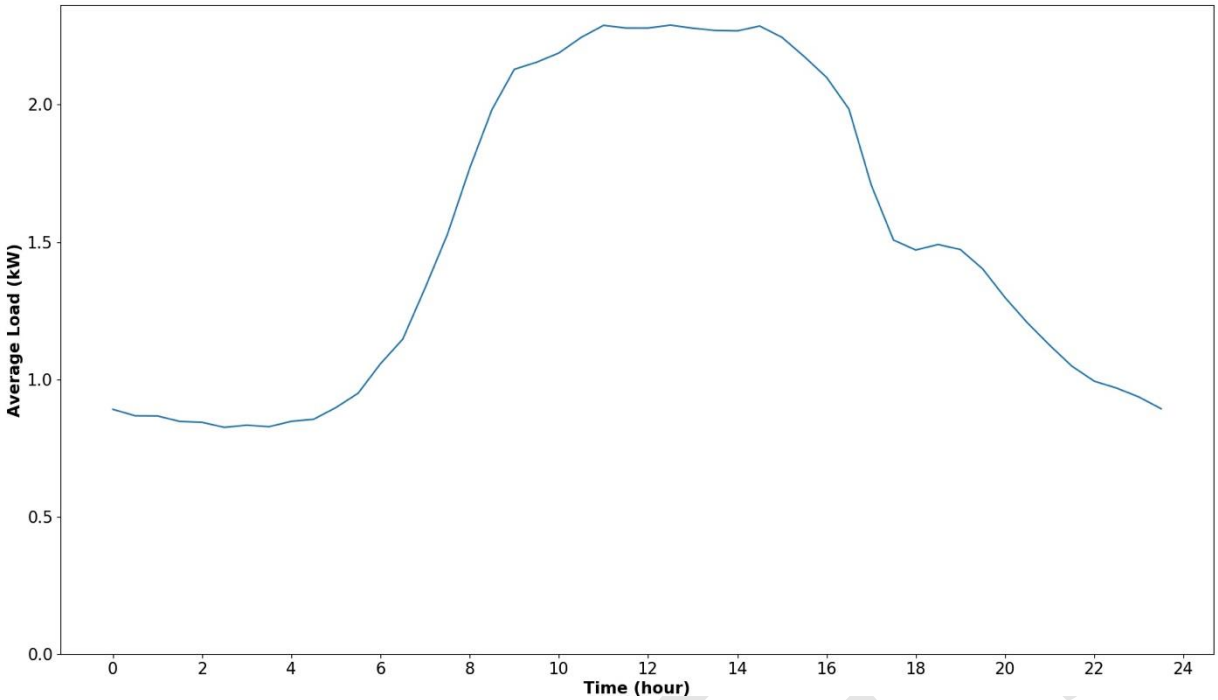


Figure 140. Average Daily Load of all Customers over the Year: Ergon West, Business, 2017

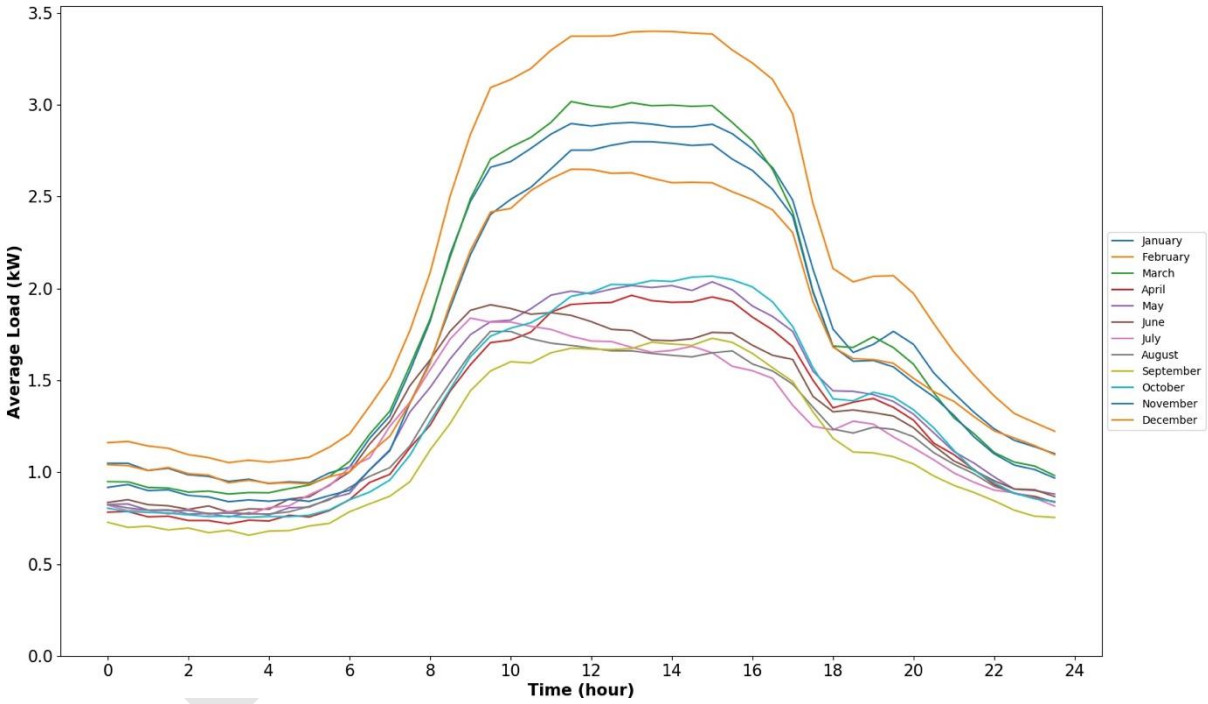


Figure 141. Average Daily Load of all Customers for Each Month: Ergon West, Business, 2017

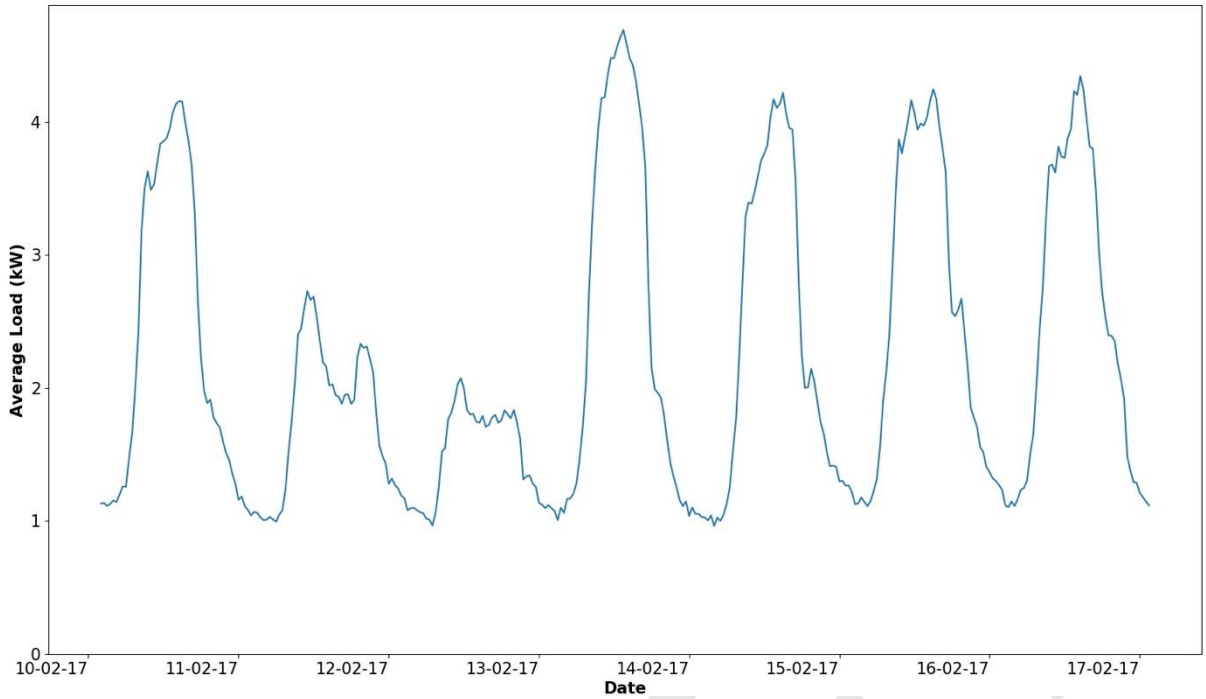


Figure 142. Week of Peak Day of Aggregated Customers: Ergon West, Business, 2017

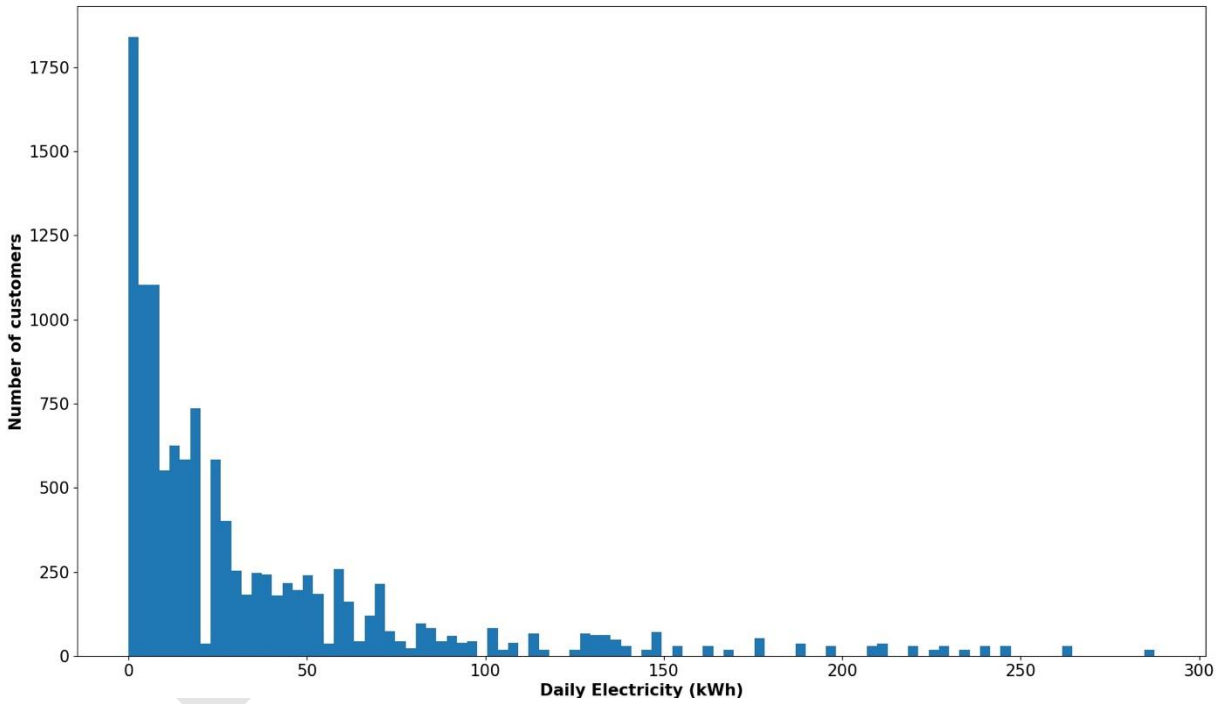


Figure 143. Histogram of Electricity Use of all Customers: Ergon West, Business, 2017

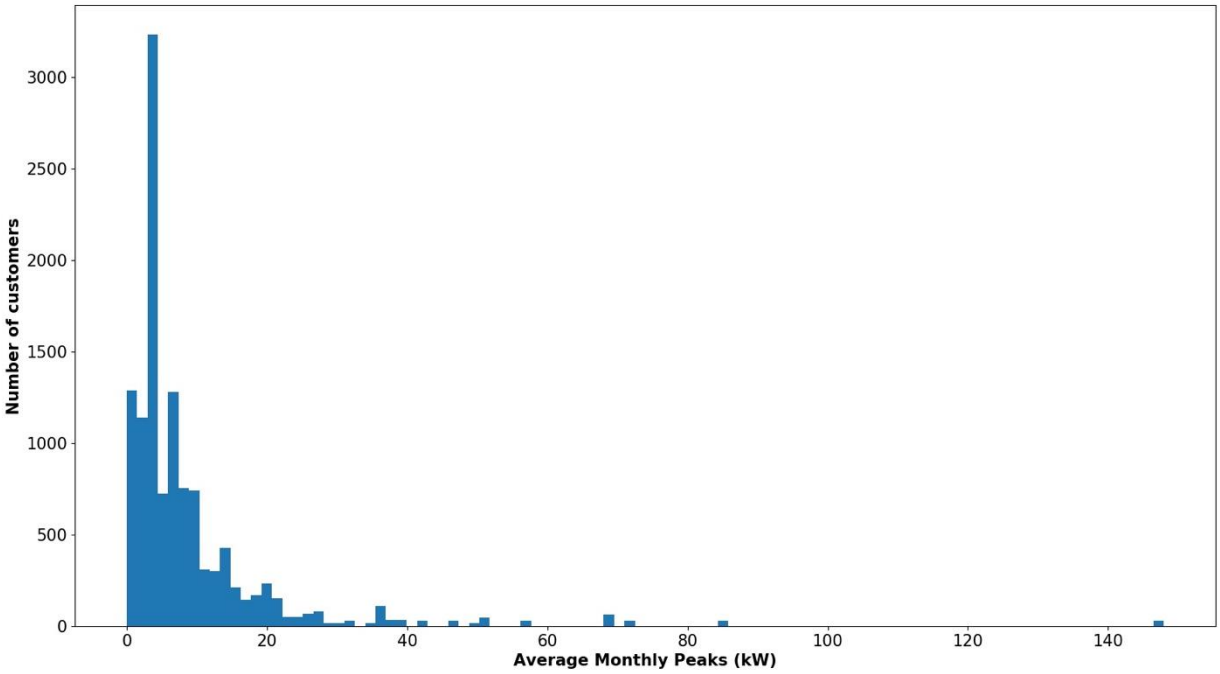


Figure 144. Histogram of Average Monthly Demand Peaks of all Customers: Ergon West, Residential, 2017

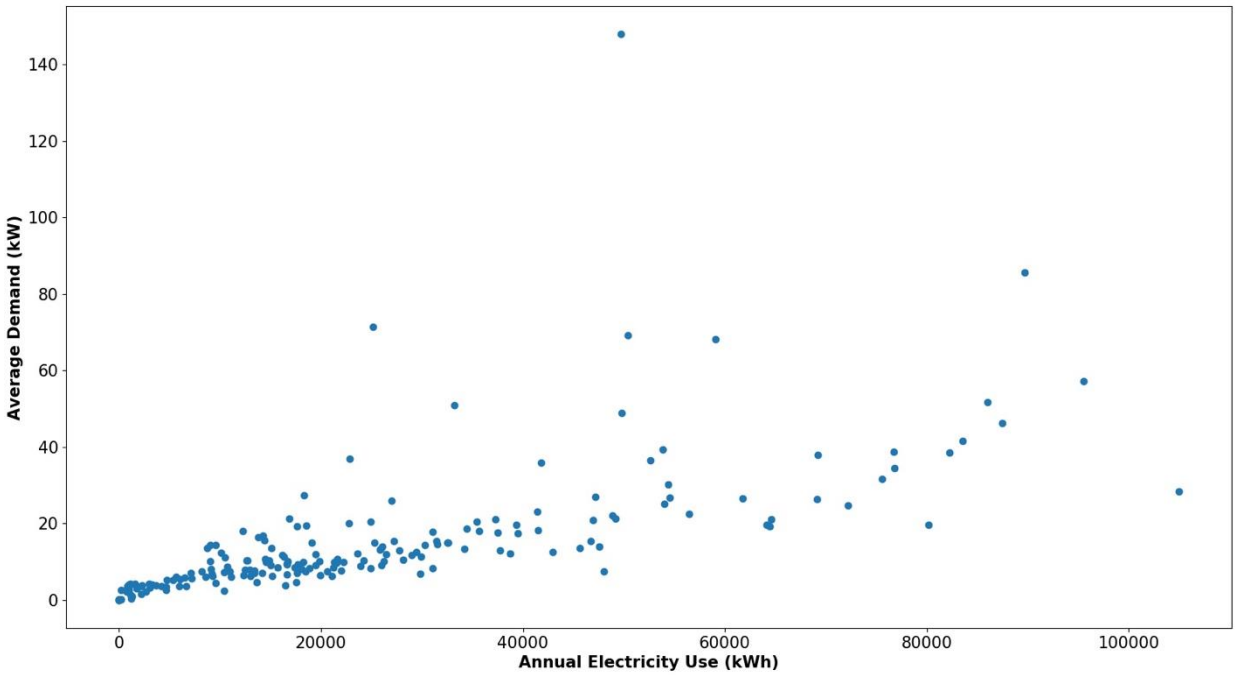


Figure 145. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: Ergon West, Residential, 2017

5.1.4 Life Support Data

5.1.4.1 Residential

Figure 146 shows the aggregated load of all customers in the EQL sample provided to ITP over the year. It is most similar to the South East and Ergon East data, with an increase in load peaks during the hotter months, due to higher cooling demands, and a small increase in winter heating loads. However, one clear difference to the South East, Ergon East and Ergon West profiles is the number of large peaks outside the summer period.

Figure 147 shows the characteristic residential load curve, and Figure 148 shows that January, February and March, are primarily responsible for the highest peak demands. These hotter months also have higher loads during the day, whereas the winter months have much lower day time loads but higher early morning peaks. Figure 149 illustrates the week including the highest peak day for the aggregated loads, being on Monday 3rd December 2018.

Figure 150 shows the number of customers versus their average daily electricity use. It can be seen that the customers are spread over a range, extending up to 35 kWh/day.

Figure 151 shows the number of customers versus their average monthly demand peaks. It can be seen that, like their electricity use, they are spread over a range, up to 6.7kW.

Figure 152 uses a scatterplot to compare the average monthly demand peaks to the annual electricity use, and it can be seen that although there is some scatter, this is to be expected with such a small number of customers.

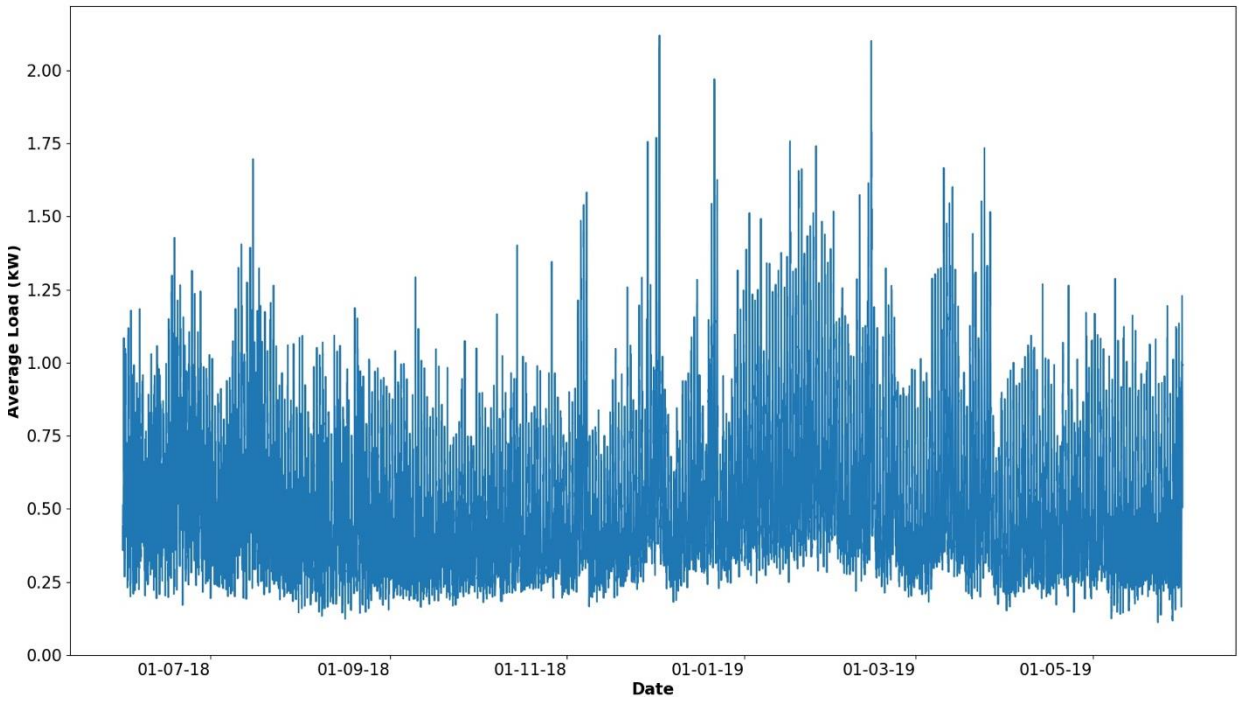


Figure 146. Aggregated Load of all Customers over the Year: Life Support, Residential, 2018/19

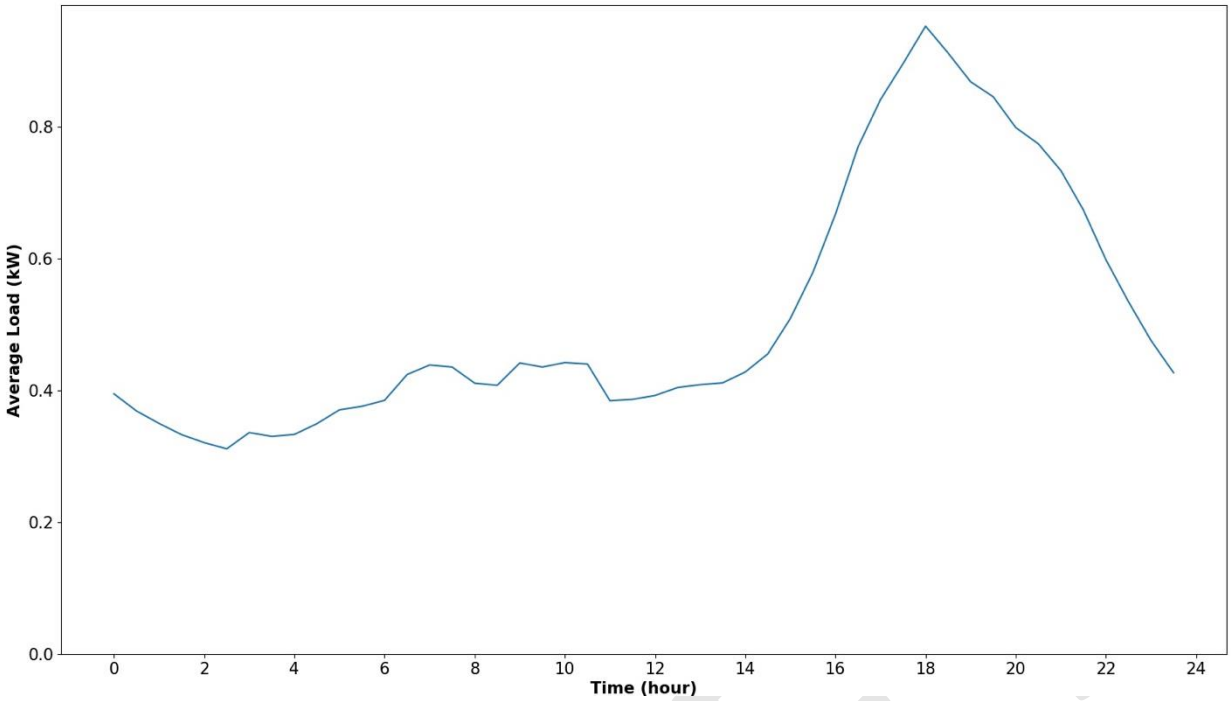


Figure 147. Average Daily Load of all Customers over the Year: Life Support, Residential, 2018/19

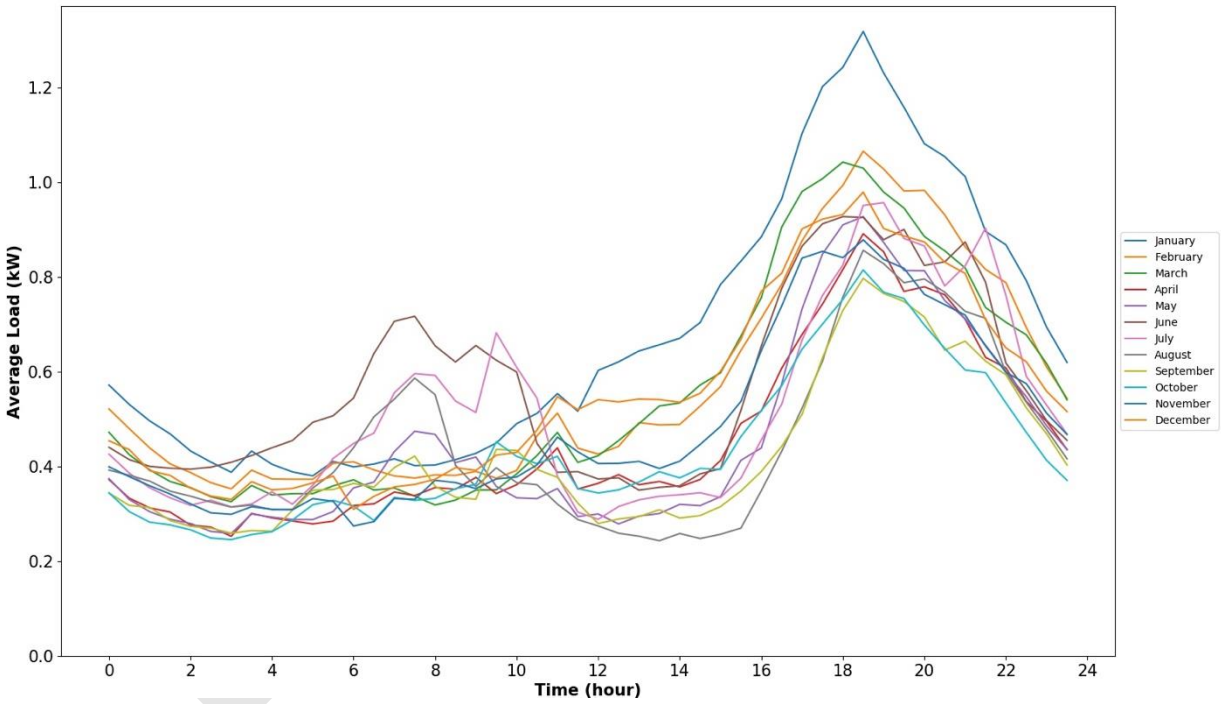


Figure 148. Average Daily Load of all Customers for Each Month: Life Support, Residential, 2018/19

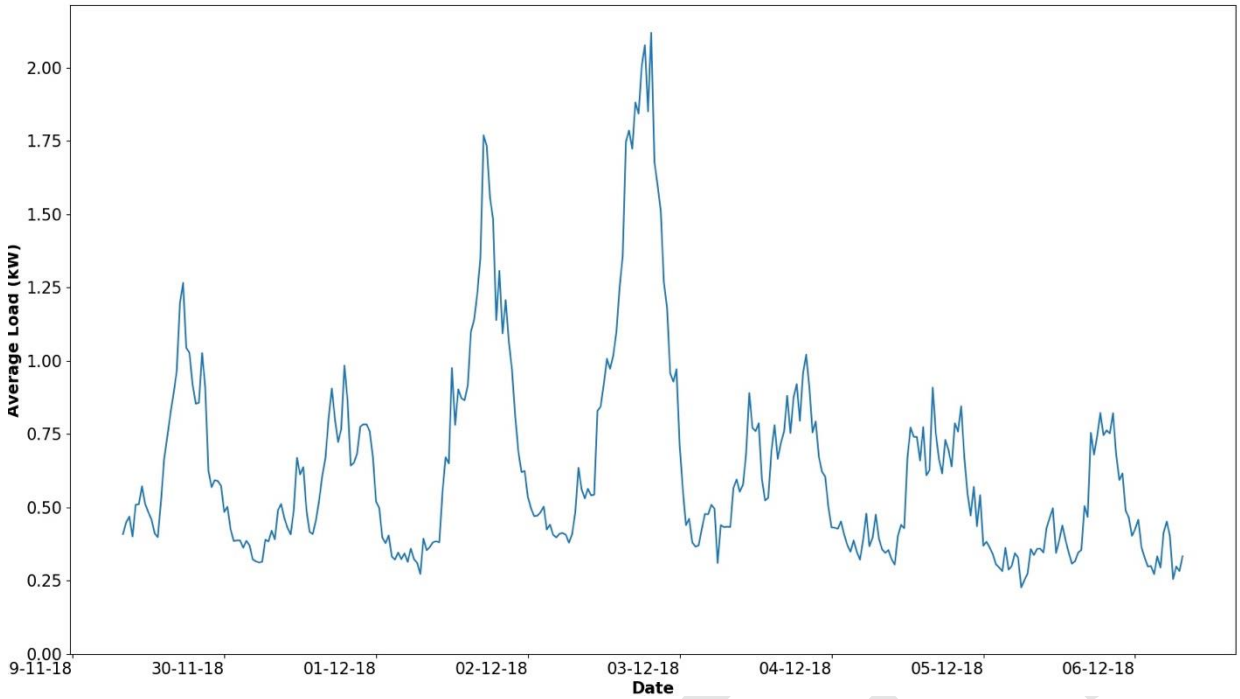


Figure 149. Week of Peak Day of Aggregated Customers: Life Support, Residential, 2018/19

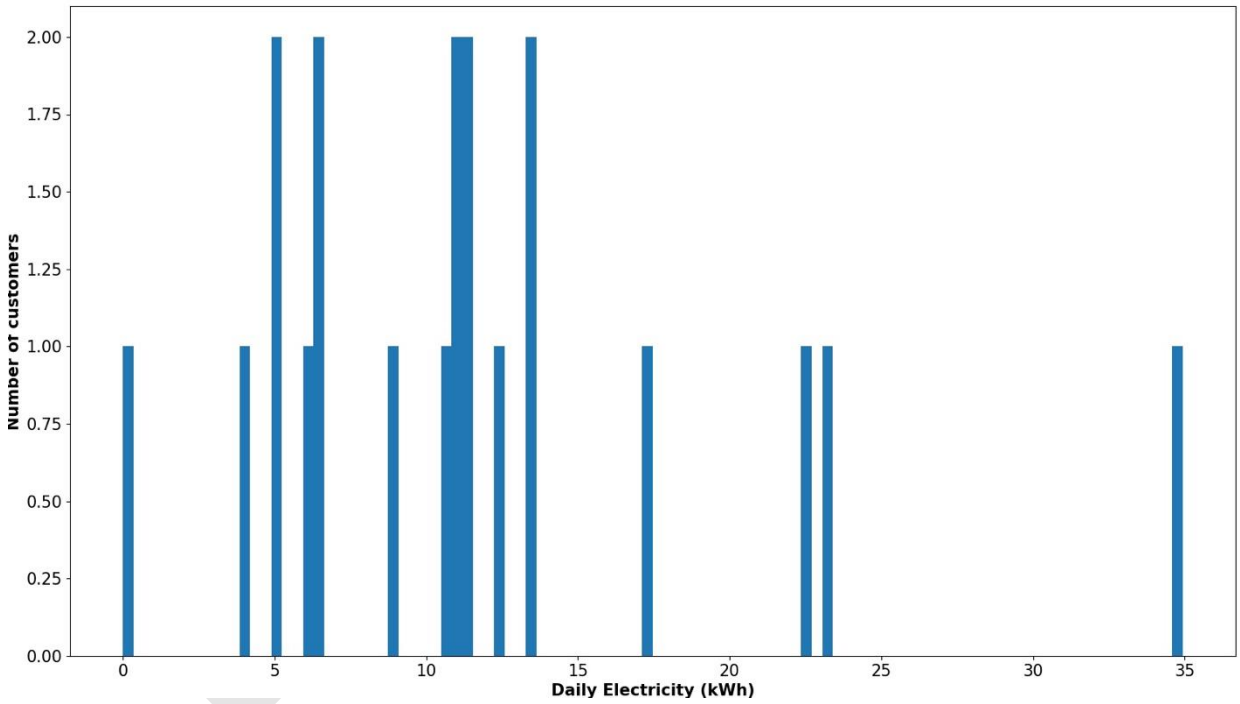


Figure 150. Histogram of Electricity Use of all Customers: Life Support, Residential, 2018/19

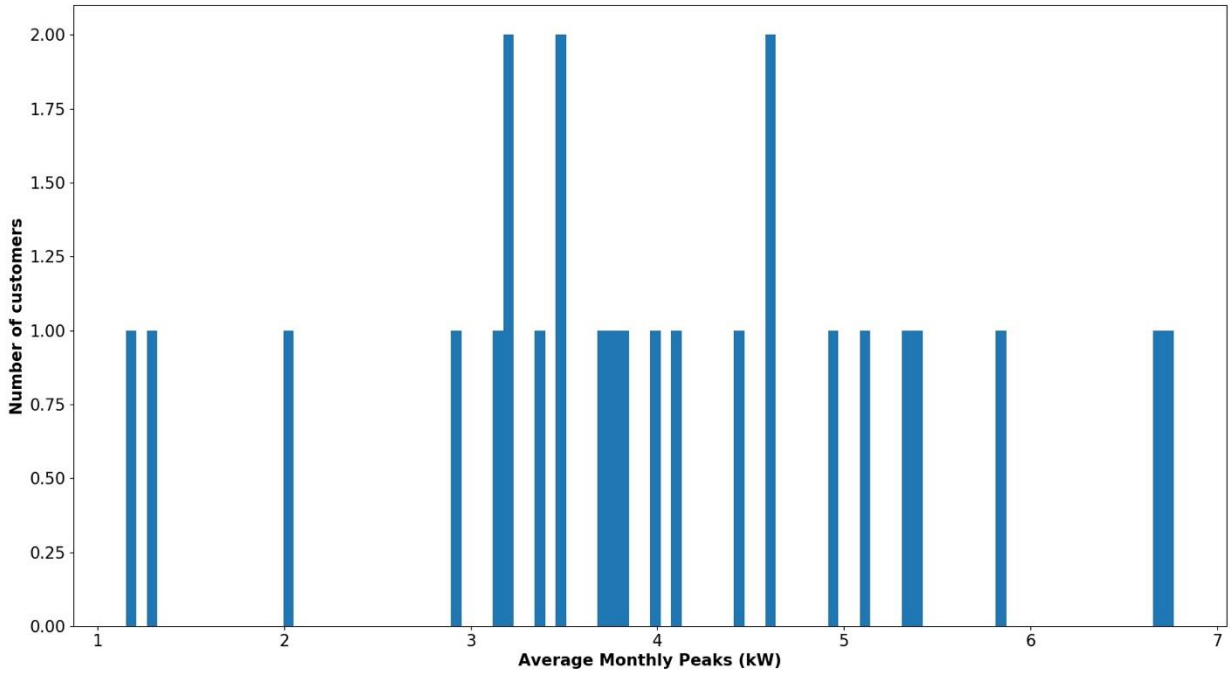


Figure 151. Histogram of Average Monthly Demand Peaks of all Customers: South East, Residential, 2017

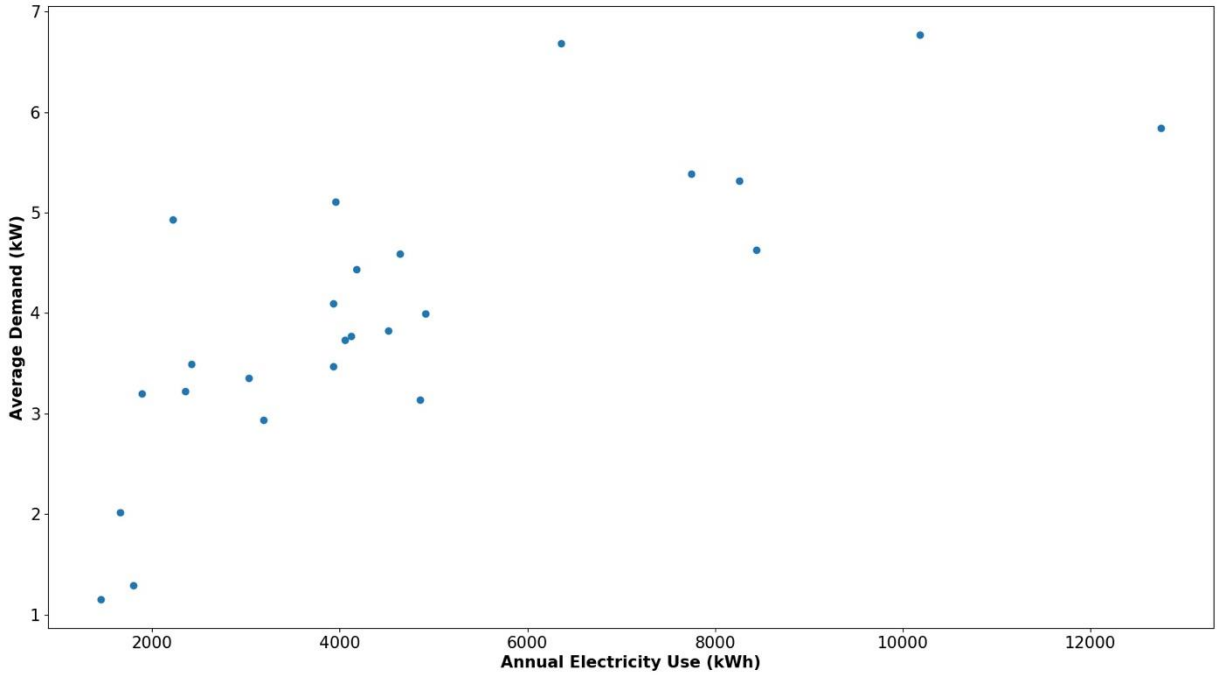


Figure 152. Comparison of Average Monthly Demand Peaks with Electricity Use of all Customers: South East, Residential, 2017

6 Appendix C: DUOS Scatter Plots

The scatter plots of the Distribution Use of System (DUOS) bills for the Energex and Ergon residential and small business customers, as well as the Life Support customers, are below.

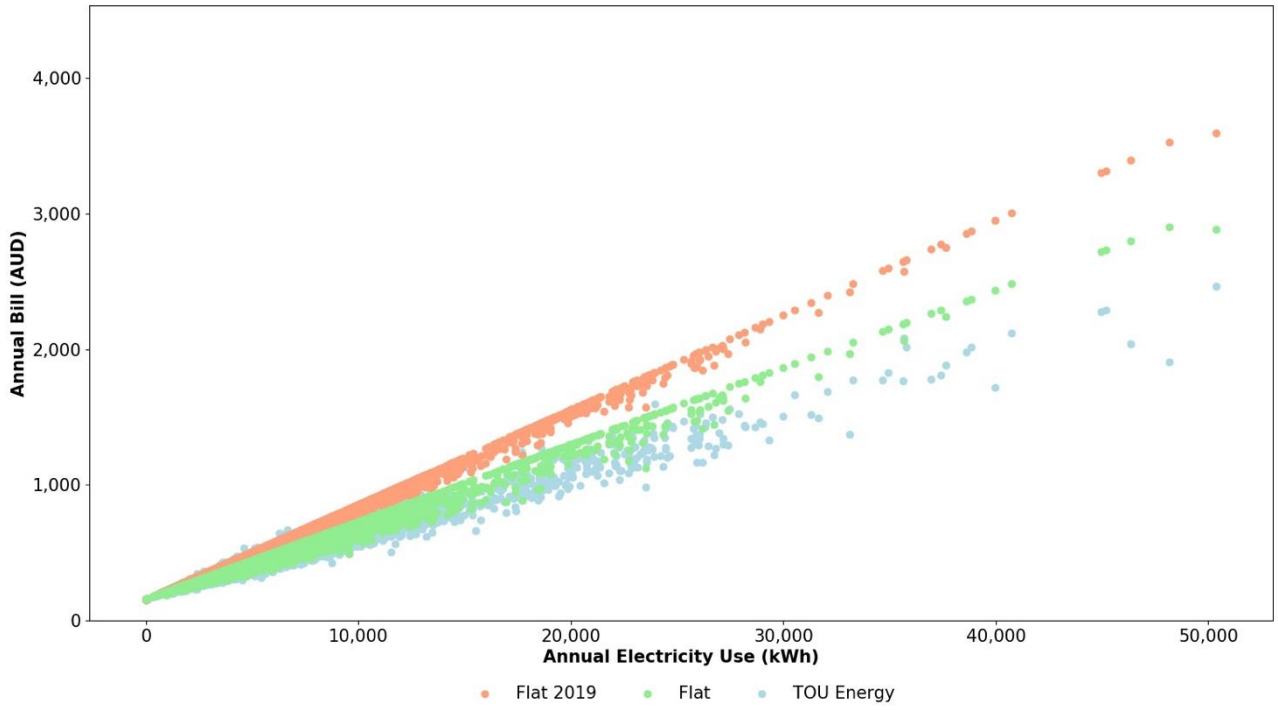


Figure 153. Comparison of Average Customer Bills for Flat 2019/20, Flat 2020/21 and TOU Energy 2020/21 Tariffs and Annual Electricity Use, DUOS, South East Residential

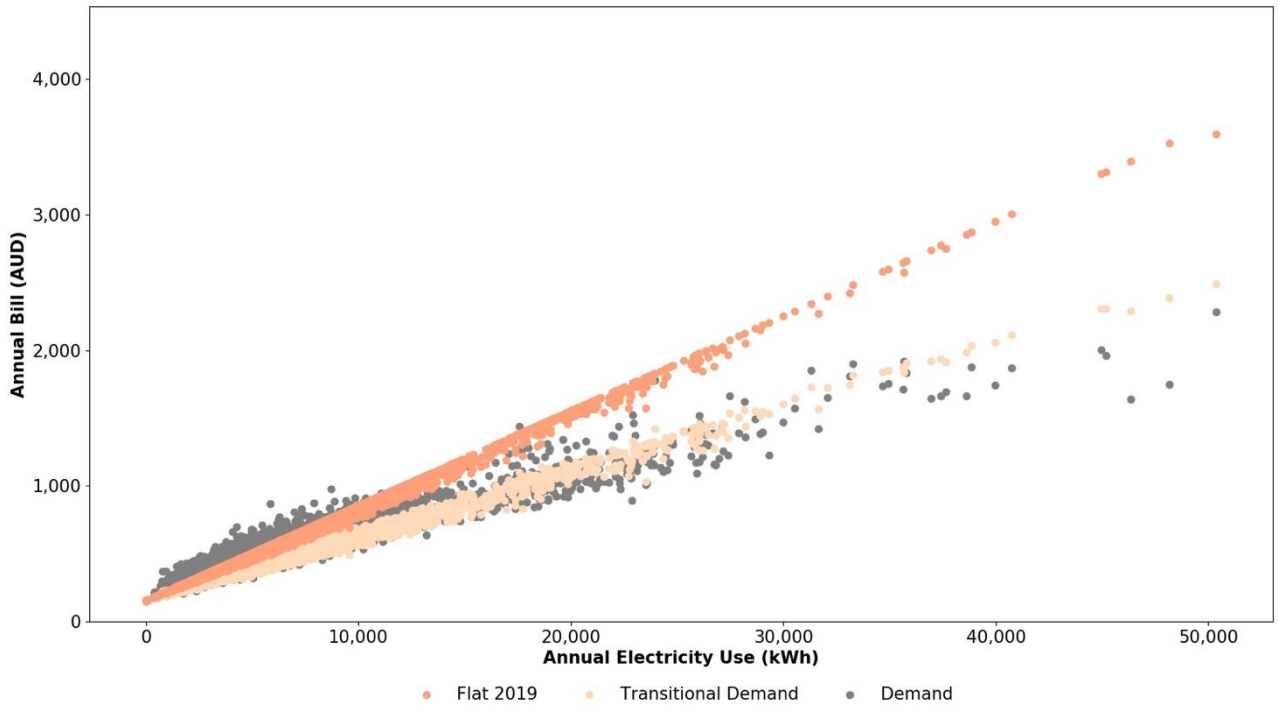


Figure 154. Comparison of Average Customer Bills for Flat 2019/20, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, South East Residential

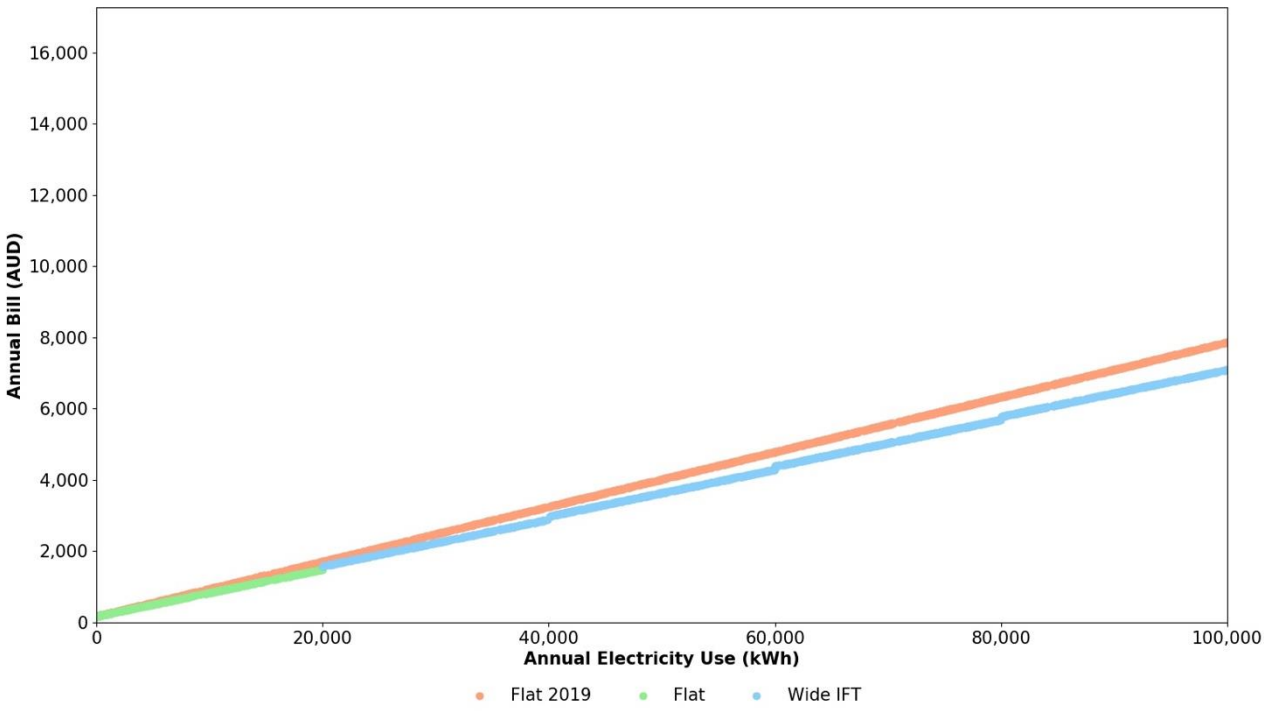


Figure 155. Comparison of Average Customer Bills for Flat 2019/20, Flat 2020/21 and Wide IFT 2020/21 Tariffs and Annual Electricity Use, DUOS, South East Small Business

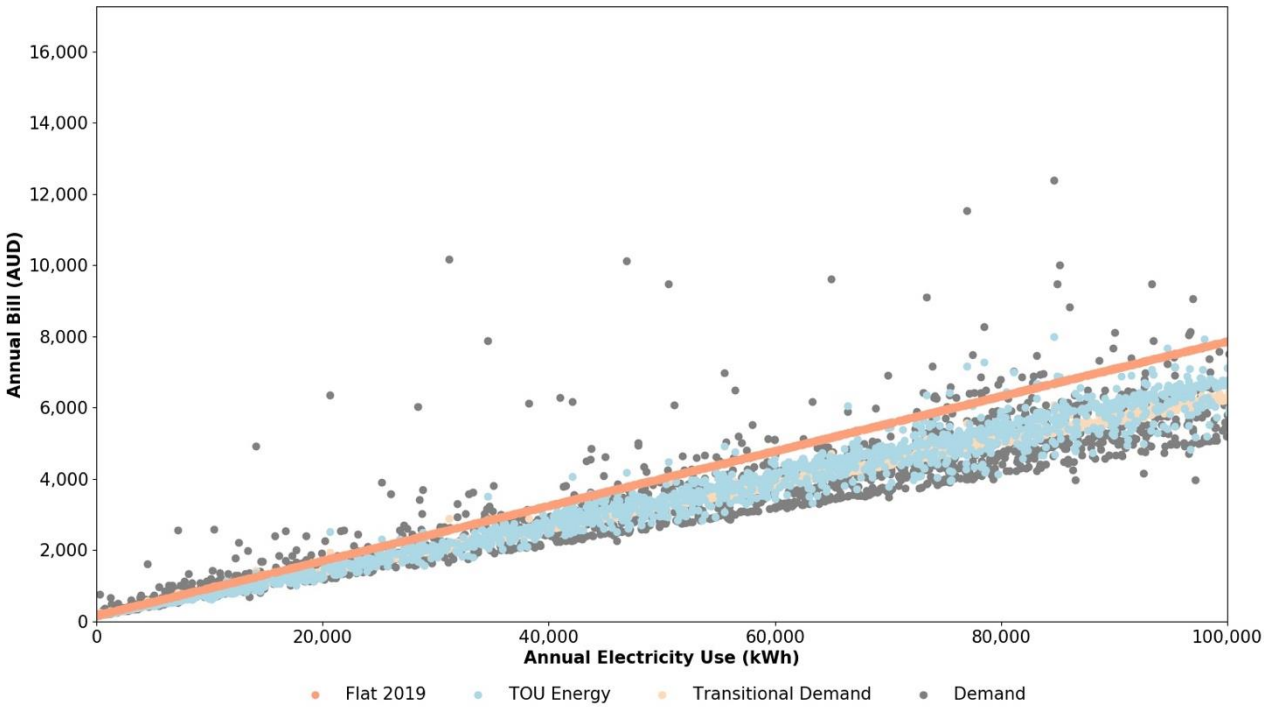


Figure 156. Comparison of Average Customer Bills for Flat 2019/20, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, South East Small Business

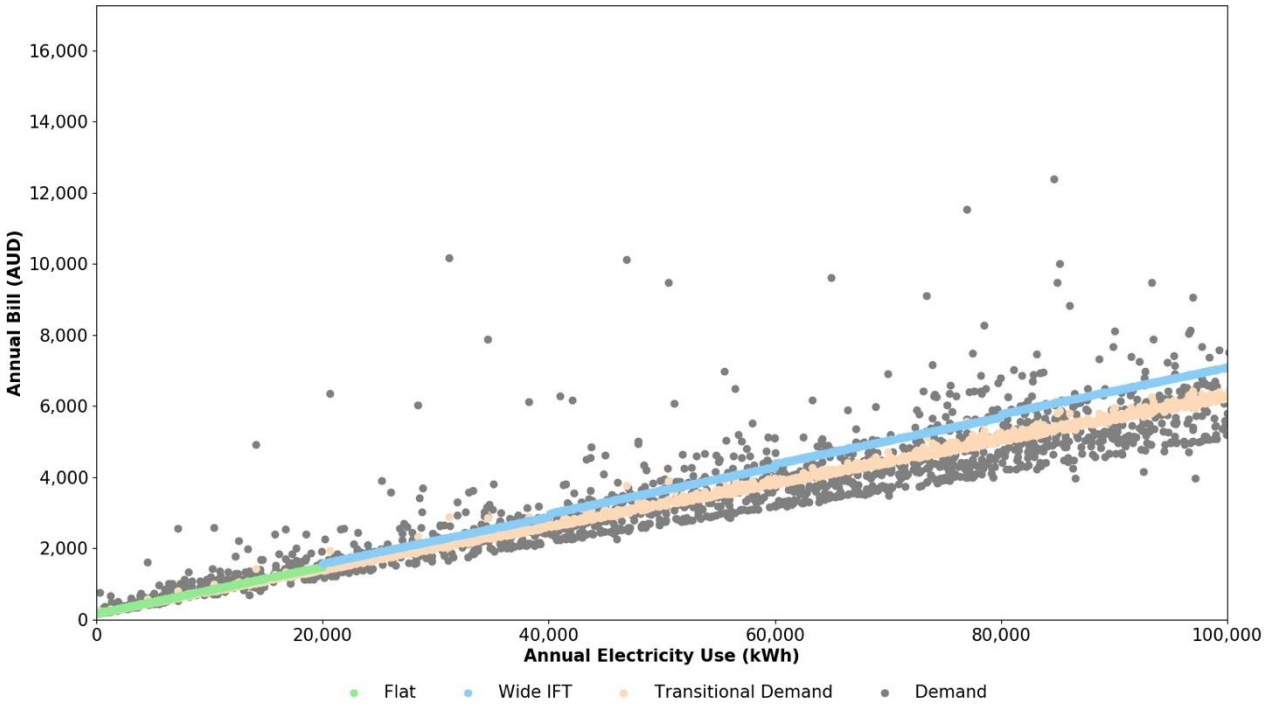


Figure 157. Comparison of Average Customer Bills for Flat 2020/21, Wide IFT 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, South East Small Business

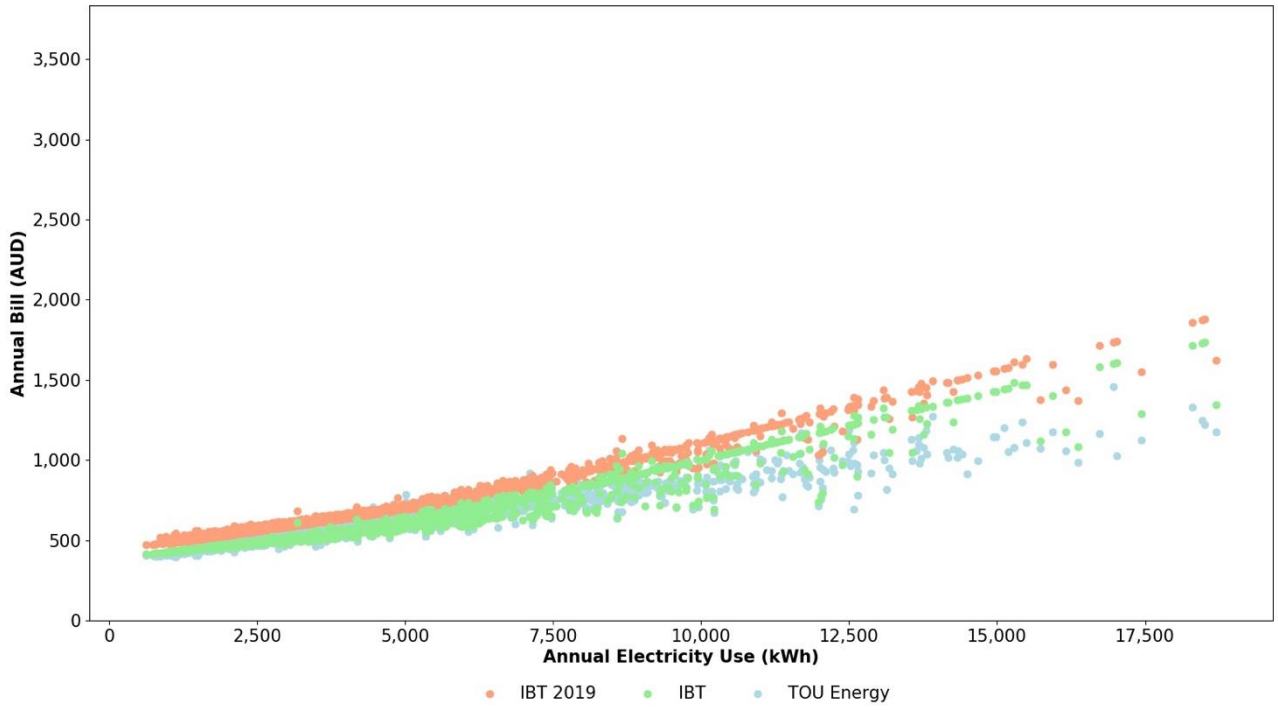


Figure 158. Comparison of Average Customer Bills for IBT 2019/20, IBT 2020/21 and TOU Energy 2020/21 Tariffs and Annual Electricity Use, DUOS, Ergon East Residential

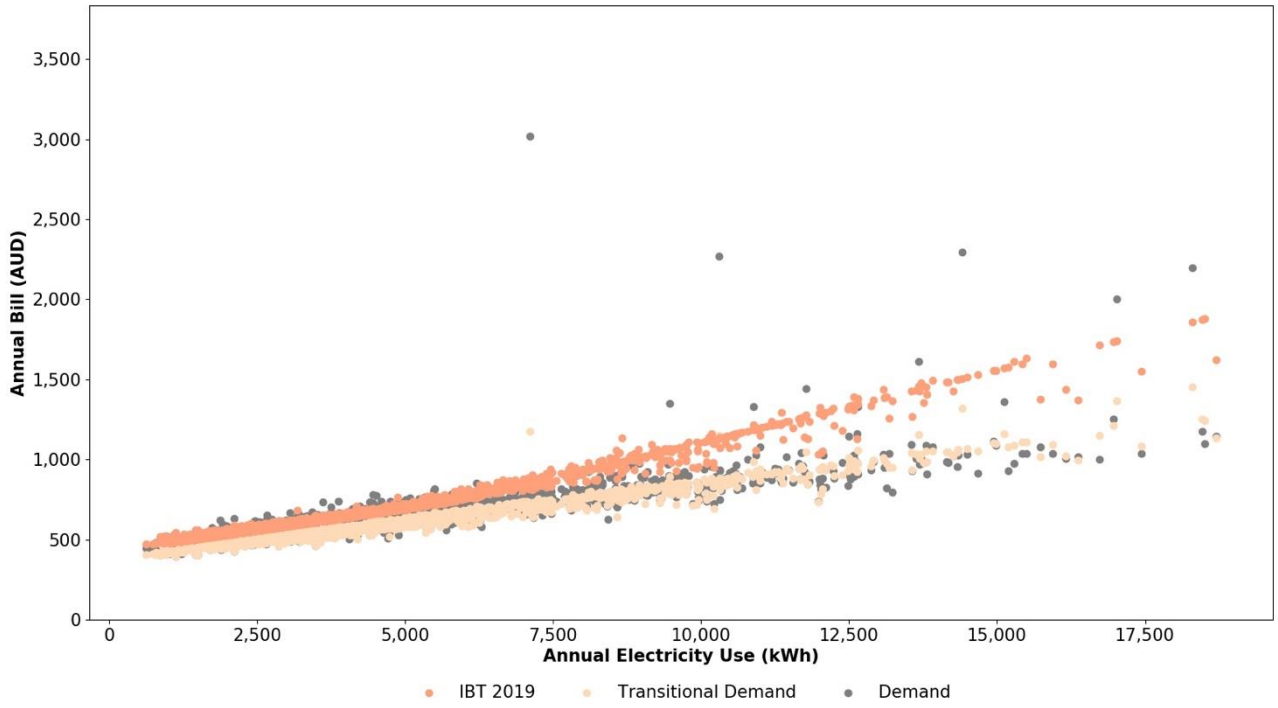


Figure 159. Comparison of Average Customer Bills for IBT 2019/20, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, Ergon East Residential

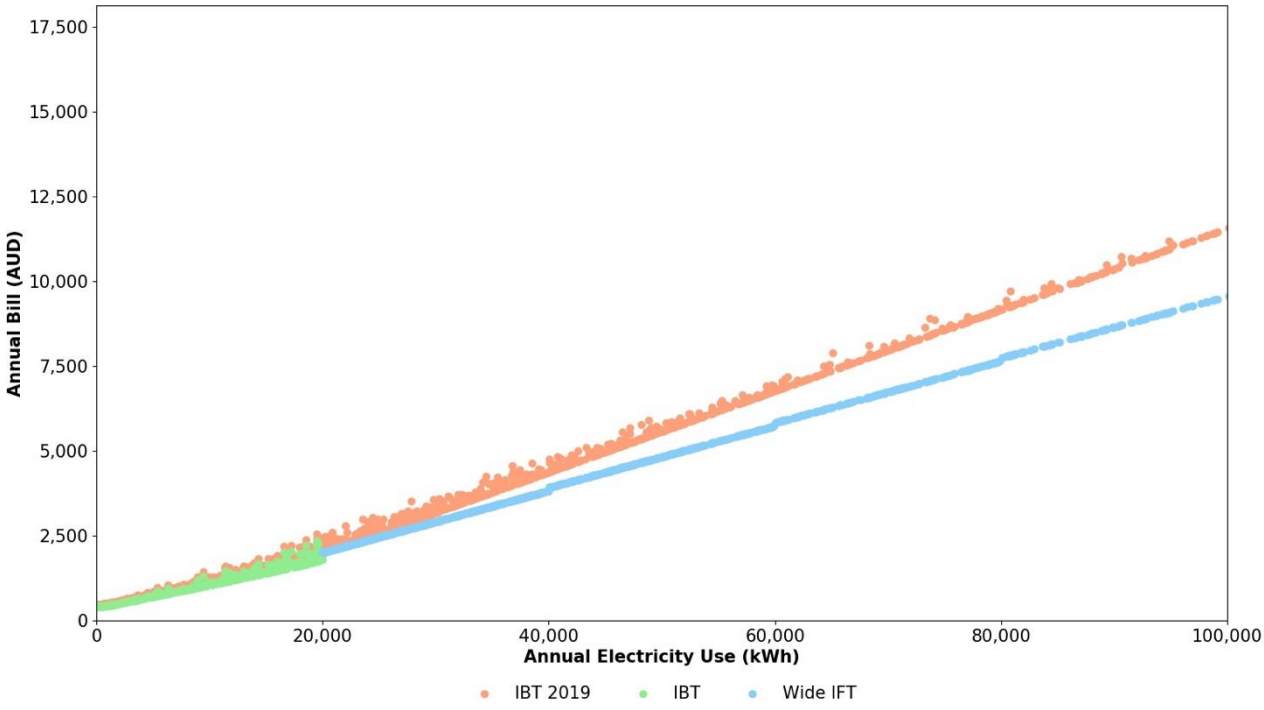


Figure 160. Comparison of Average Customer Bills for IBT 2019/20, IBT 2020/21 and Wide IFT 2020/21 Tariffs and Annual Electricity Use, DUOS, Ergon East Small Business

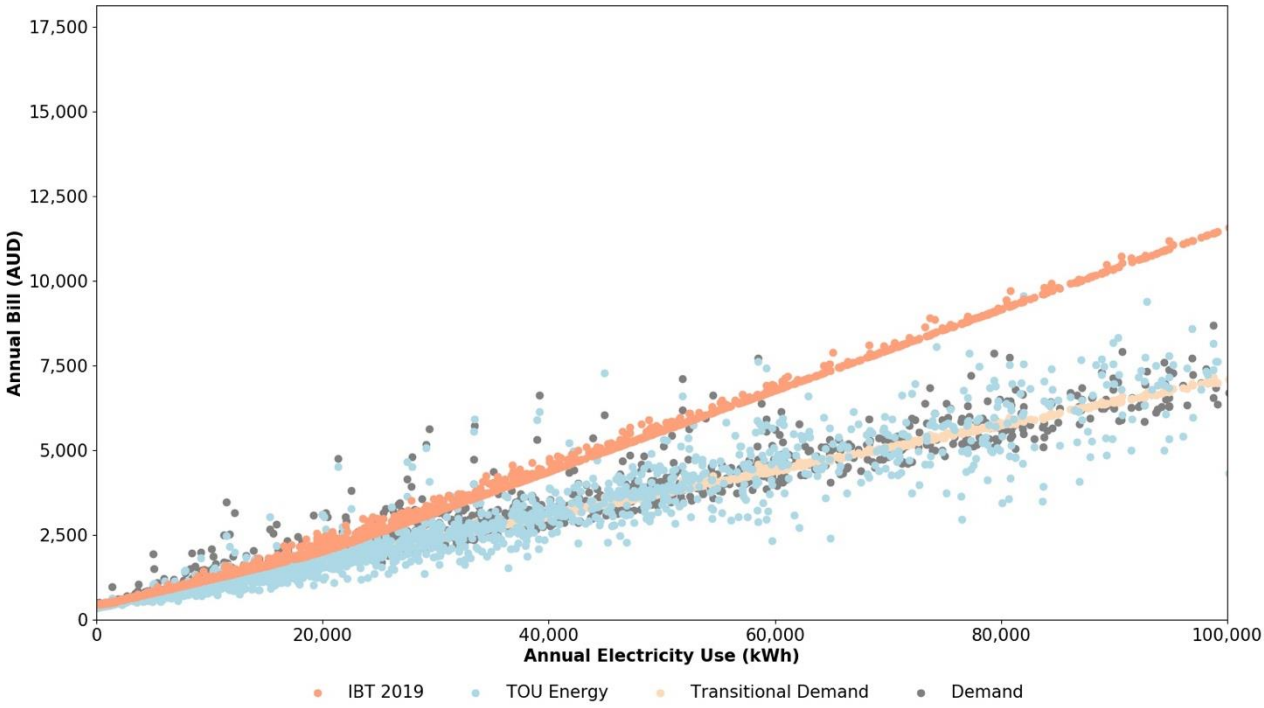


Figure 161. Comparison of Average Customer Bills for IBT 2019/20, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, Ergon East Small Business

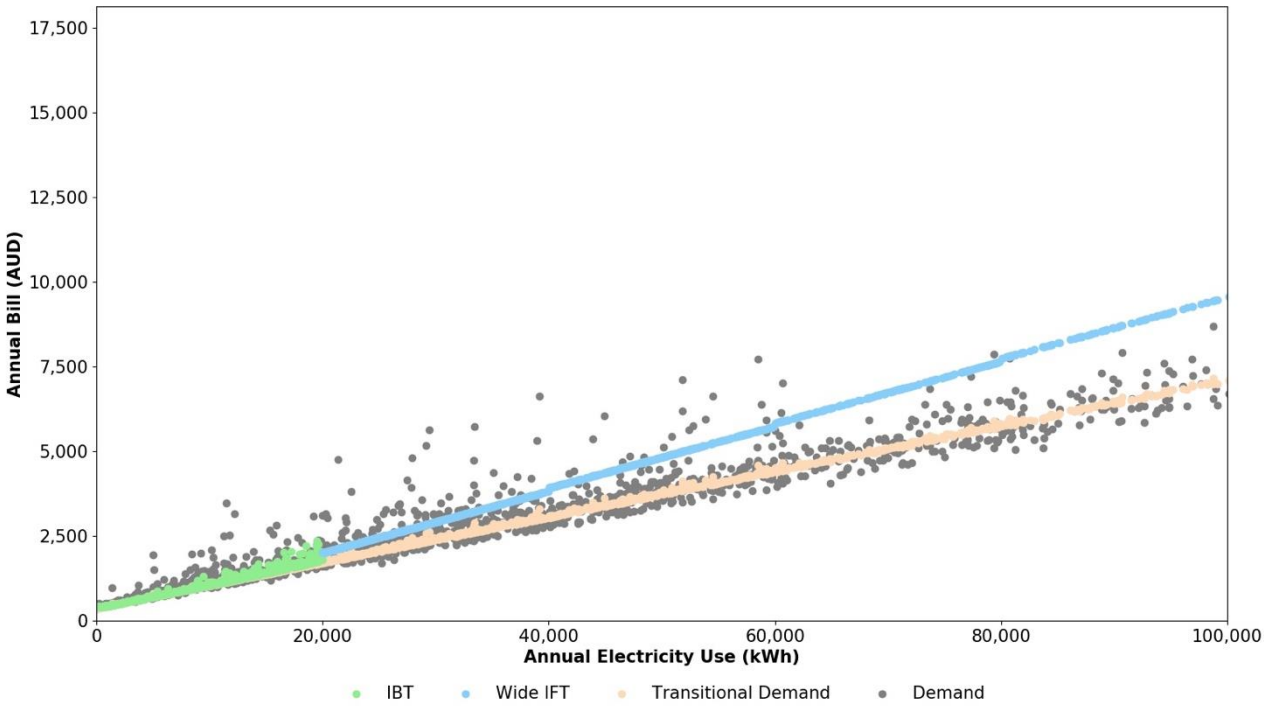


Figure 162. Comparison of Average Customer Bills for IBT 2020/21, TOU Energy 2020/21, Transitional Demand 2020/21 and Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, Ergon East Small Business

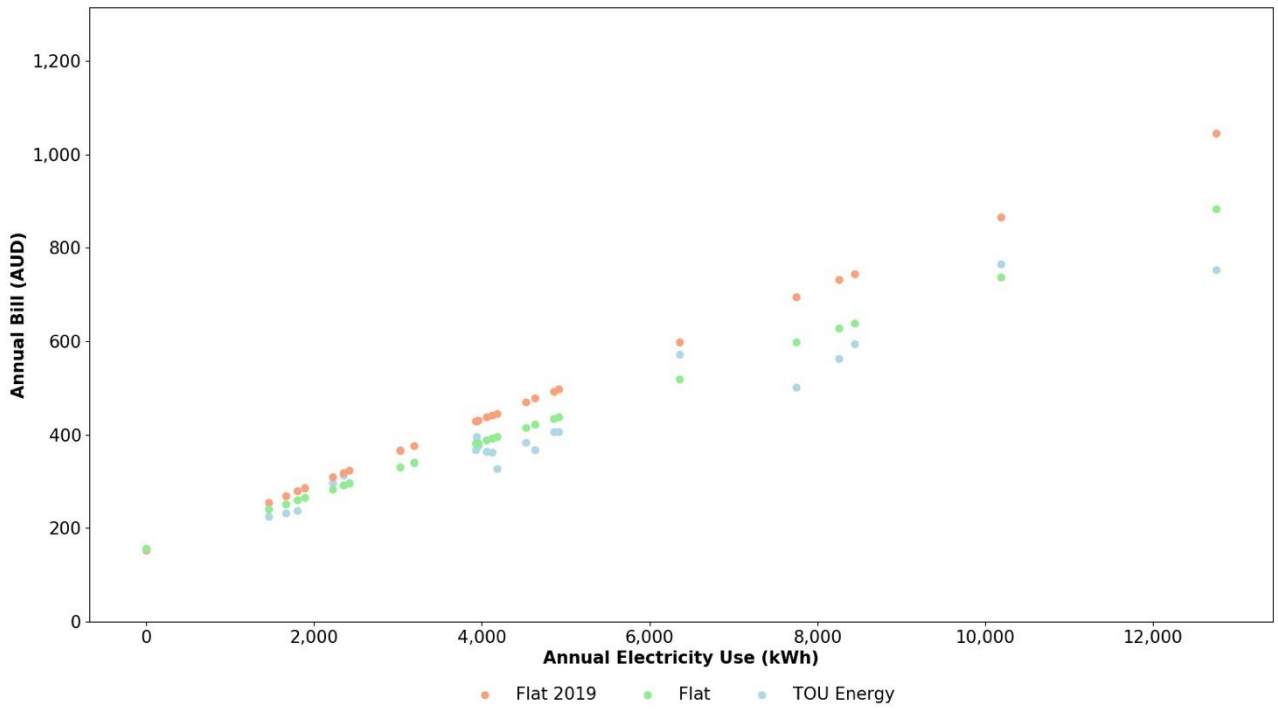


Figure 163. Comparison of Average Customer Bills for Flat 2019/20, Basic 2020/21 and TOU Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, Life Support, Residential

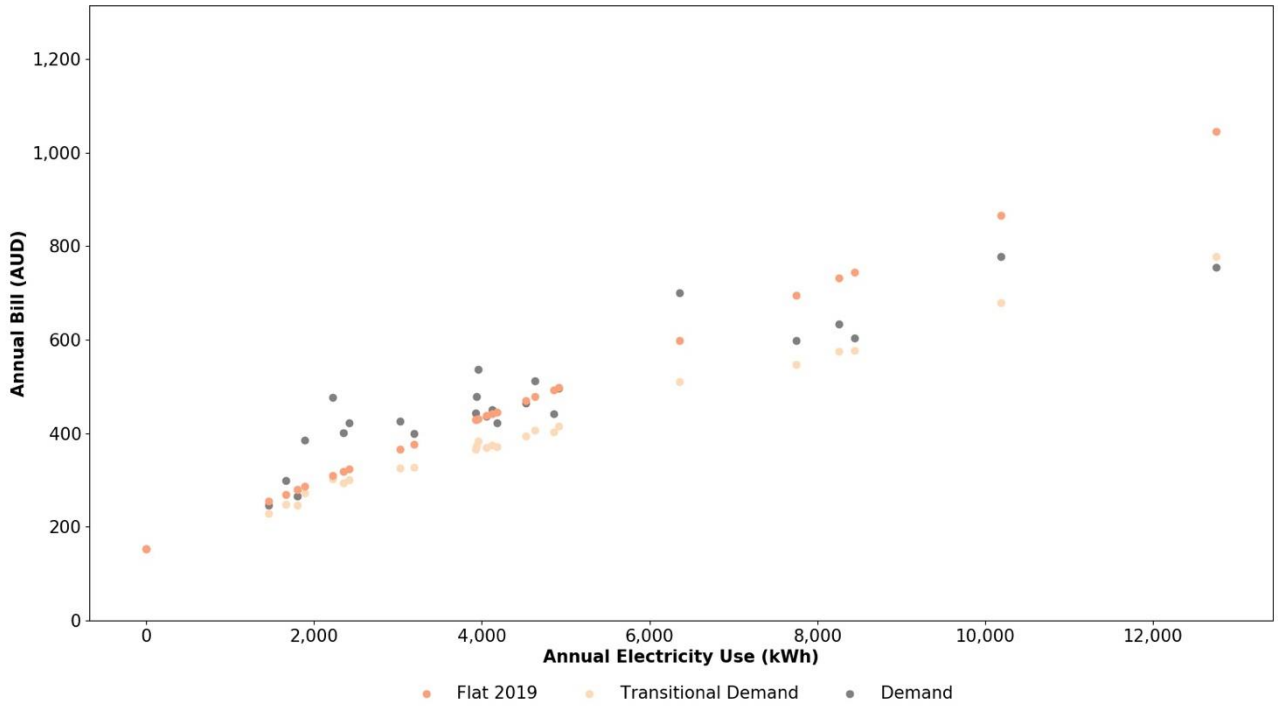


Figure 164. Comparison of Average Customer Bills for Flat 2019/20, Basic 2020/21 and TOU Demand 2020/21 Tariffs and Annual Electricity Use, DUOS, Life Support, Residential