Victorian Electricity Distributors Regulatory Proposals 2021-2026

Submission

June 2020

ENERGY CONSUMERS AUSTRALIA

Version history

VERSION	DATE	COMMENTS
1	16 June 2020	Final

Contents

Overview

Affordability continues to be energy consumers' number one priority. Great care needs to be taken to ensuring that an over-emphasis on the reliability of electricity networks is not used to justify overinvestment and inappropriate price rises for consumers.

Energy Consumers Australia is the national voice for residential and small business energy consumers. Established by the Council of Australian Governments Energy Council in 2015, our objective is to promote the long-term interests of consumers with respect to price, quality, reliability, safety and security of supply.

We appreciate the opportunity to provide the Australian Energy Regulator (AER) with a detailed response to the regulatory proposals submitted by the Victorian electricity distributors for the revenue each business proposes to collect from its customers through distribution charges from 1 July 2021 to 31 June 2026.

In place of the usual public forum which was cancelled due to COVID-19, Energy Consumers Australia provided detailed preliminary feedback on the distributors' proposals in April 2020 which the AER has published with other presentations. Energy Consumers Australia also responded to questions from the Consumer Challenge Panel (CCP) which are also available on the AER website. This submission builds on these contributions.

There is substantial alignment between the distributors proposals and the interests of household and small business energy consumers. However, in our view there are outstanding matters, where further assurance is needed, to enable the proposals to be considered capable of acceptance.

Specifically:

- Efficient operating expenditures (OPEX)
- Incentive schemes justification
- Depreciation plans
- Information technology value for money
- Bushfire related insurance and other costs
- Clarity about costs associated with supporting consumer investments in solar and other technologies
- Innovation in network tariff design.

Thank you for the opportunity to make this submission. If you would like to discuss the issues we raise further, please do not hesitate to contact Shelley Ashe, Associate Director – Networks, via email at [redacted].

Our approach

Energy Consumers Australia welcomes the commitment by the Victorian distributors to engage with consumers and advocacy groups, and the efforts made so far to find the appropriate balance between affordability and the future needs of their infrastructure. We have also reflected on the impact of COVID-19 on consumers and the distributors as part of our assessment of the proposals.

As noted in our response to the draft regulatory proposals from the businesses, affordability continues to be consumers' number one priority. Great care needs to be taken to ensure that an over-emphasis on the reliability of electricity networks is not used to justify overinvestment and inappropriate price rises for consumers. In seeking the right balance, our principles are the following.

- *Affordability* must be a constraint on investment and decisions about energy – an explicit criterion in decision making up and down the supply chain.
- Energy services must be built around individuals to reflect their own use and costs – whether that is consumers who are innovating and engaged; or the majority of consumers who are focused on affordability and costs; or consumers with vulnerabilities.
- Investment in the power system – networks, generation and retail – must be *optimised* together with consumers' investments on their side of the meter.
- In reviewing the revenue proposals and the proposed network tariffs put forward by the Victorian electricity network distribution businesses, we start with consumers and the decisions they make that have implications for their power bills.

Energy Consumers Australia undertakes research into the consumer experience in the energy market today, and consumers' expectations about what a future energy market could deliver to them. What is clear from our research is that consumers want a better energy market, that enables them to use the power they need at an affordable cost.

The current experience of Victorian energy consumers

Our Energy Consumer Sentiment Survey (ECSS) reports trends over time in a range of consumer metrics, expressed as a percentage reporting positive scores of more than 7 out of 10.

Figure 1 shows the trends in value for money, reliability and consumer confidence that the market is working in their interests.

From a low in December 2017, there has been a recovery in value for money and trust, amongst Victorian households.

This has occurred at the same time as price growth has slowed and reforms have been implemented to improve energy retailers' communications and assistance programs for people experiencing payment difficulties.

Figure 1 Victorian household trends

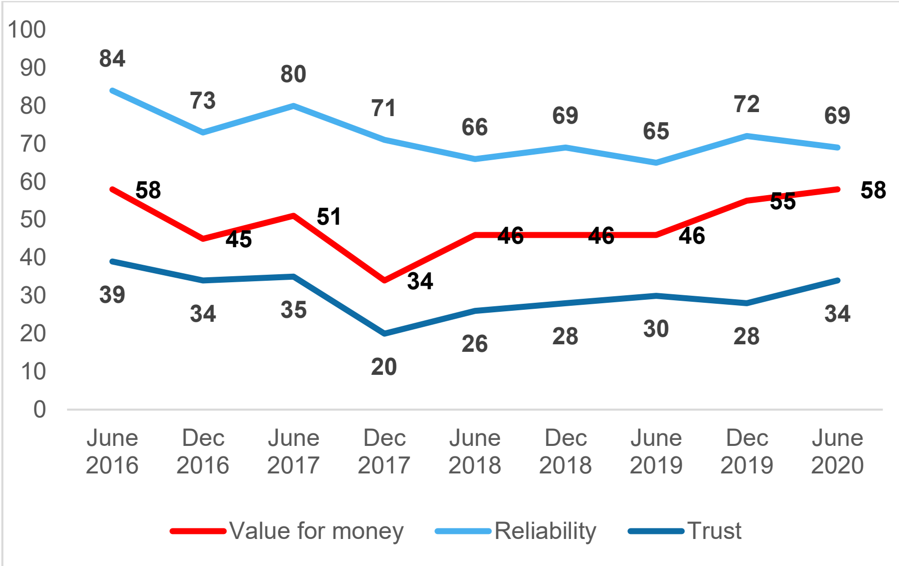
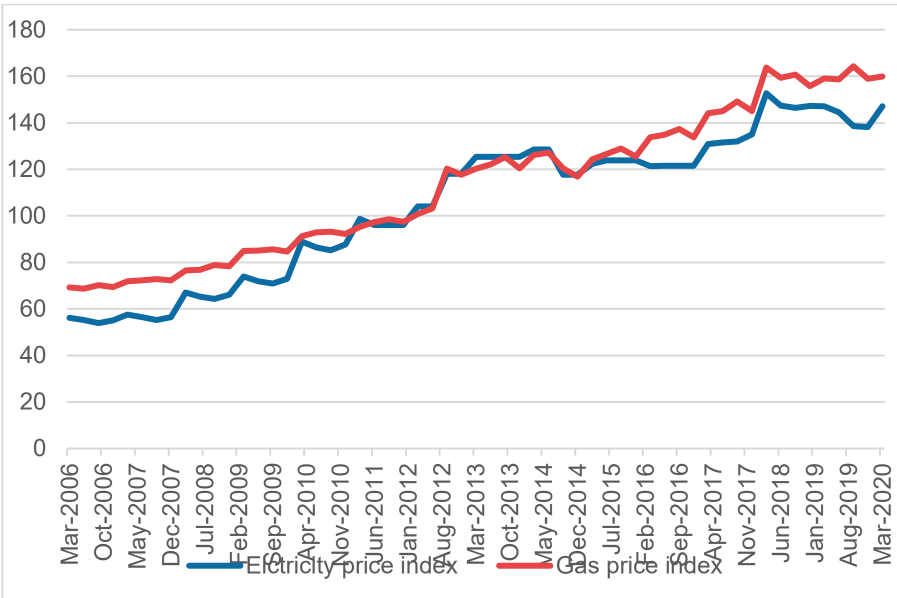


Figure 2 Electricity and gas prices, Victoria



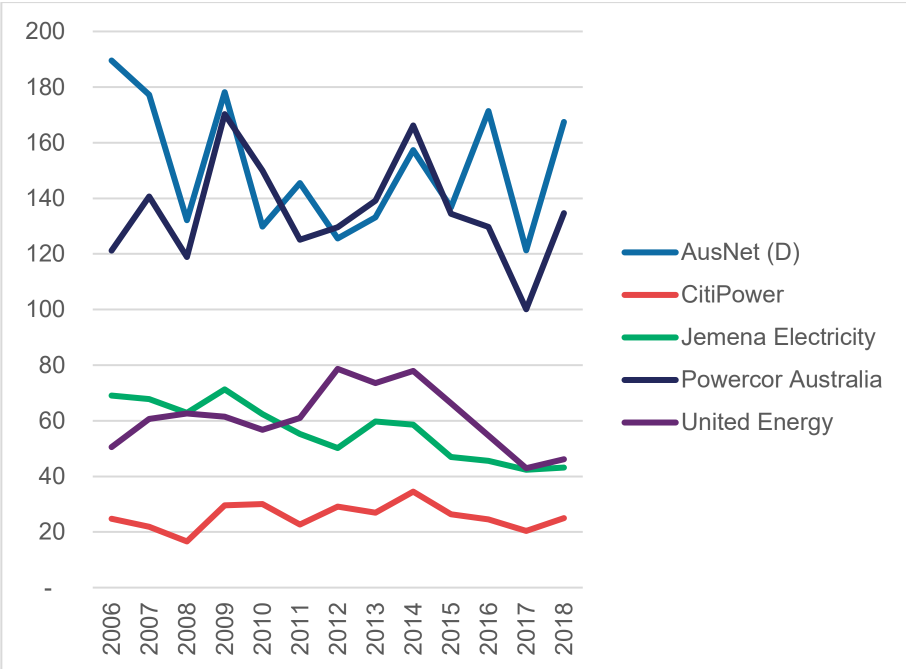
Source; 6401.0 Consumer Price Index, Australian Bureau of Statistics

On the other hand, the recent experiences of outages are being reflected in consumers viewing reliability less positively, notwithstanding that reliability of most Victorian distributors remains high.

Figure 2 shows the trend in energy prices, with price growth slowing over the same period as the ECSS.

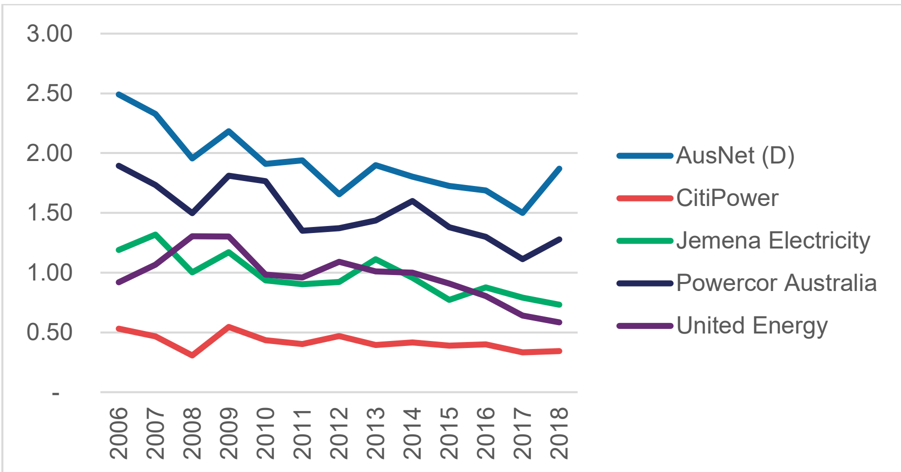
Over the period to 2018, reliability of electricity distribution networks has either been maintained (duration) or improved (frequency) – shown in Figures 3 and 4.

Figure 3 Outages (duration), Victorian electricity distribution networks



Source; Regulatory Information Notices data, Australian Energy Regulator

Figure 4 Outages (frequency), Victorian electricity distribution networks



Source; Regulatory Information Notices data, Australian Energy Regulator

Consumer expectations of the future energy market

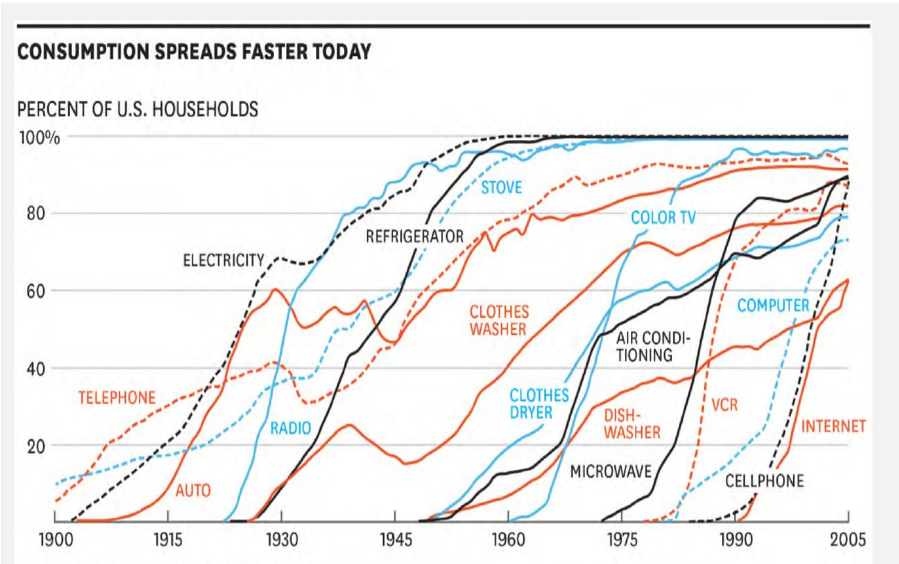
Consumers are telling us in our research that in the future they want power that is cheap and clean.

As power is necessary for their lives and livelihoods - in their homes, their jobs and their businesses – they want managing it at an affordable cost to be simpler.

Consumers cannot ‘avoid’ grid supplied electricity cost effectively and have been willing investors in electricity generation and storage assets on their side of the meter. They are already ‘integrated’ into the energy market, more so than ever before.

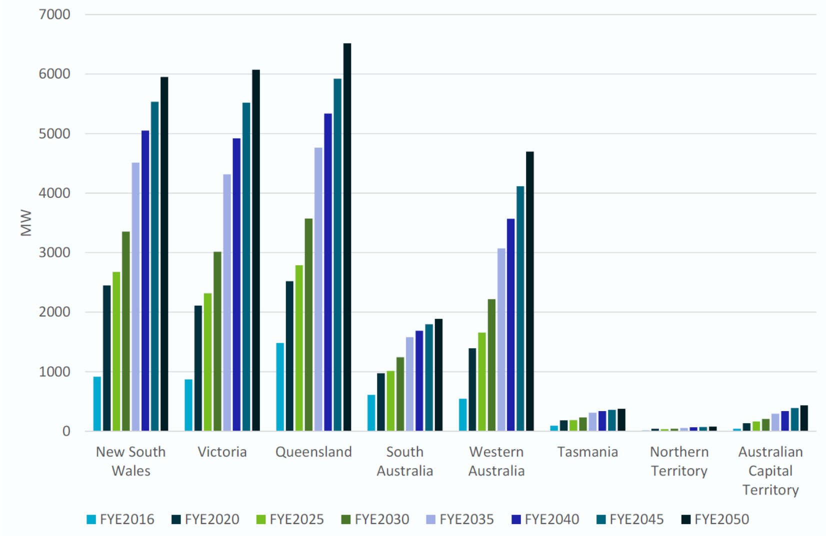
The uptake of a range of technologies – all of which require electricity for charging – are shown in Figure 5 and the CSIRO projections for uptake of solar, batteries and electric vehicles are shown in Figures 6, 7 and 8 respectively.

Figure 5 Consumer uptake of technology



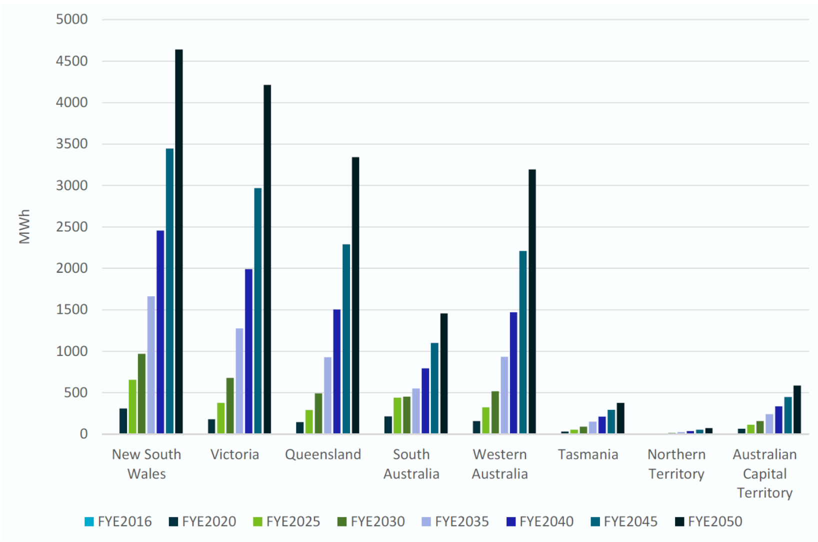
Source: Cameron Tonkinwise, Transition Design, Foresighting Forum 2021

Figure 6 Projections of roof-top solar systems (moderate scenario)



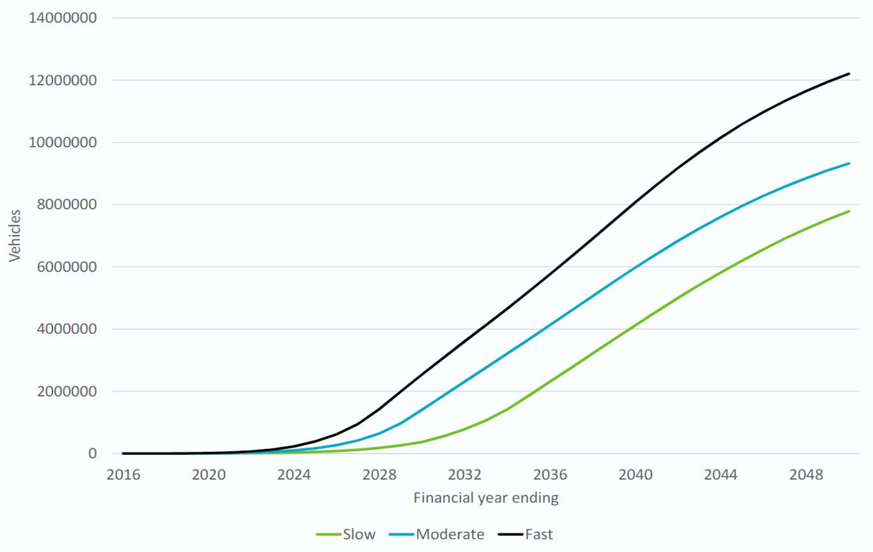
Source: CSIRO, Projection for small scale embedded technologies, June 2018

Figure 7 Projections of residential batteries (moderate scenario)



Source: CSIRO Projection for small scale embedded technologies, June 2018

Figure 8 Projected electric vehicle numbers, Australia



Source: CSIRO Projection for small scale embedded technologies, June 2018

In its report for AEMO, CSIRO projects that electric vehicle numbers in Victoria could increase from 3,500 in 2020-21 up to 220,000 by 2025-26. On our “rough” calculations, depending on how many electric vehicles per home, that is between 5-10% of Victorian homes.

It is critical that Victoria establishes retail off-peak charging rates now, that incentivise social practices that will enable current assets to be utilised effectively, and only invest what is needed in additional capacity.

Trusted technology and services

Consumers say they are willing to use technology to manage their power use, but it also has to be convenient and trusted. Investing in home energy management systems, controllable electrical appliances, generation and storage technologies or in electric vehicles with vehicle to grid capacity are potentially all ways in which consumers can control their energy use and avoid bill shock. Most consumers are not energy experts and nor should they be expected to be. They say that they want technology to be set and forget that is easy to over-ride or change settings if something in their lives or their business changes.

Given the significant changes that are facing us as a community – including changing technology but also greater extremes in our weather which is being seen in more intense bushfires and prolonged drought – consumers are also telling us that they want to have their say in the design of the future energy market.

The cumulative experience over the past decade of repeated power bill shocks and the negative impacts on the cost of living of higher power prices have all contributed to low trust in decision-makers generally in the energy market, whether industry, government or regulators.

Navigating the future of the energy market, requires engaging with consumers and responding to their views. This goes beyond simple engagement on specific decisions and proposals, to building trust through a new compact with the community to demonstrate how their values will be incorporated into the design of a future energy market that delivers the outcomes they want.

Designing for flexibility to reduce costs for everyone

A critical element in the design of the future energy market is how consumers will be rewarded and provided with incentives to be flexible in their electricity use, and/or electricity production (from solar systems, home or community storage or electric vehicles with vehicle to grid- capacity.

Without well-designed pricing and incentives that recognise and respect social practice and ways of working in our homes and our businesses, we will fail to unlock the immense potential on the consumers side of the meter.

This means changing the way we think about ‘capacity’ – which has almost exclusively focussed on the supply chain made up of large scale electricity generation and network assets – and thinking about not only the capacity that can be avoided by energy efficiency but also the capacity that can be released by voluntary load shifting, shedding and shaping in every home and every business.

This ‘demand’ capacity can be unlocked to contribute in a range of ways to reducing costs in the energy market, including reducing future investment in electricity generation and network assets, increasing the utilisation of current assets, dampening volatility in electricity prices and incentivising storage.

We have reviewed the expenditure and tariff proposals of the Victorian electricity distribution network businesses in this broader context.

Response to the revenue proposals

Overview

The views of Energy Consumers Australia on the revenue proposals have been informed by detailed analysis by the expert consultancy Spencer & Co. The Spencer & Co analysis is attached for the information of the AER and stakeholders (Attachment 1).

Energy Consumers Australia acknowledges the complexity of revenue determinations for electricity distributors. There remains considerable ground to be covered in discussions with all parties. While there are points of difference between us and the distributors at this stage, it is important to acknowledge areas of alignment.

- *Engagement* – the Victorian distributors have generally undertaken strong and collaborative engagement with their customers. We note they have committed to further engagement as a normal business activity and to deepening relationships.
- *Lower prices* – the distributors' proposals mean that consumers in Victoria can expect lower prices during the next regulatory period.
- *Affordability* - those proposals reflect genuine attempts to consider the impact of distribution charges on consumers.
- *Drivers for change* – it has been helpful for advocates to have the distributors present proposed expenditure alongside the detail of expenditure in the previous period and an explanation of what is driving change.
- *Distributed Energy Resources (DER) programs* – all the Victorian distributors have engaged in a constructive manner to realise more benefits from rooftop solar for households and businesses.
- *Metering costs* – it is positive that the cost of metering for consumers in all networks will fall significantly in the 2021-26 period.
- Specific comments on the tariff proposals of the businesses are provided later in this submission

Stakeholder engagement

We recognise the distributors' efforts to engage with Energy Consumers Australia and other advocates before and after submitting their regulatory proposals.

The businesses have engaged with their customers in detailed and open discussions about priorities and choices that will impact the final determination by the AER.

It is apparent that all the businesses have sought to accommodate consumer input into aspects of their regulatory proposals.

AusNet is acknowledged for the first trial under the umbrella of the *New Reg: Towards Consumer-Centric Energy Network Regulation* project.[1] This trial enabled the Customer Forum to provide constructive feedback on the timing of some proposed augmentation projects that sought to balance consumer concerns for affordability and reliability.

The Customer Forum tested step changes proposed by AusNet and encouraged AusNet to absorb several of these as part of its pursuit of cost efficiency. Most importantly, the Customer Forum undertook extensive engagement itself which brought the 'voice of the customer' to the table and challenged AusNet's assumptions.[2]

The Customer Forum has shown how people from different walks of life, who are not energy experts, can effectively scrutinise elements of a regulatory proposal. It is unfortunate, in hindsight, that the scope established for AusNet's Customer Forum's scrutiny was limited to 7% of the total proposed CAPEX.

We see this process as a guide to how AusNet can obtain more value from its Customer Forum in the future. Further, it has demonstrated its value amongst the range of approaches that have been taken by distributors to better engagement, and that could be further developed in the future.

We are aware of concerns that consumer preferences can have the potential for significant costs that would be reflected in bills. It would assist further engagement, and the AER as the final decision-maker, if the businesses could show how they have balanced the desires of customers with considerations of affordability.

Affordability

Energy Consumers Australia is pleased that most of the proposals would reduce overall energy prices for Victorian households during the next period.

Tables 1 and 2 below summarise the typical bill impacts outlined in the Appendix A of the AER's Issues Paper.

This shows that consumers will likely see a larger reduction in the first year, followed by price rises linked to inflation in subsequent years. The AER's analysis presents "…indicative price impacts based on the demand forecasts of each of the distributors".[3]

In our submission to the AER on Energy Queensland's regulatory proposals for 2020-25, we did not support a price path that saw an initial reduction followed by increases.

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[1] Information on the New Reg project is available on the Energy Consumers Australia website https://energyconsumersaustralia.com.au/projects/newreg, and on the Australian Energy Regulator's website https://www.aer.gov.au/networks-pipelines/new-reg.
[2] Information on the work of the Customer Forum is available here - https://www.ausnetservices.com.au/en/Misc-Pages/Links/About-Us/Charges-and-revenues/Electricity-distribution-network/Customer-Forum
[3] AER Issues Paper, page 58

In that case, the analysis indicated there may be other opportunities for further savings that could be used to offset these price increases. In this instance however, we note that the increases in subsequent years reflect changes in the Consumer Price Index (CPI), noting that the outcome will depend on consumption forecasts being realised.

Nevertheless, we suspect that further reductions in costs for key elements of the building blocks are possible. We also note that without the significant changes in the Weighted Average Cost of Capital (WACC) – a key parameter in the revenue calculations – prices would increase across the board in the next period.

Energy Consumers Australia have a preference for a smooth price path that minimises price volatility for customers.

Table 1: Residential – indicative impact of proposed 2021-26 revenue on the distribution network component of annual electricity bills ($nominal)

NETWORK BUSINESS	2021-22	2022-23	2023-24	2024-25	2025-26	TOTAL 2021-26
AusNet Services	-12	25	25	26	27	90
CitiPower	-23	5	5	5	6	-1
Jemena	-34	3	7	7	7	-10
Powercor	-4	5	5	5	6	18
United Energy	-42	6	6	6	6	-17

Table 2: Small business – indicative impact of proposed 2021-26 revenue on the distribution network component of annual electricity bills ($nominal)

NETWORK BUSINESS	2021-22	2022-23	2023-24	2024-25	2025-26	TOTAL 2021-26
AusNet Services	-17	44	45	46	47	165
CitiPower	-62	23	24	24	25	33
Jemena	-88	10	23	23	23	-9
Powercor	6	23	23	23	24	98
United Energy	-181	32	32	33	34	-50

The Victoria distributors point to measures of their efficient operational performance relative to distributors in other jurisdictions. Citipower, Powercor and United Energy argue that their OPEX efficiency means that they require greater increases to cover new costs.

Yet at the same time, the businesses have not fully delivered their capital investment programs for the current regulatory period.

There is a question which the AER should explore about whether these 'underspends' reflect real cost efficiencies or are a product of poor cost forecasts at the start of the period. It is not to the benefit of consumers if a distributor overestimates or front-end loads its expenditure programs.

This is particularly the case where networks follow a 'boom and bust' approach to investment, which can result in a bow wave of investment. The impact of this approach on small consumers could be price shocks. A steadier approach could help to mitigate this impact.

Changed economic circumstances due to COVID-19 make it even more important than ever that customers do not pay more than they need to. In recent discussions with the distributors, all parties have acknowledged the need to reconsider the assumptions in the distributor's regulatory proposals.

We therefore support the AER and the distributor's plans to review the key inputs including the forecast of economic growth, customer connections, consumer demand, growth in solar take-up, the delivery of capital works, labour costs, and the cost of debt.

Specific comments on expenditure

We note that the AER's recent decision on tax and the lower WACC have contributed significantly to lower revenues. Against this, other building blocks are proposed to be increased. The distributors are all seeking more OPEX than they spent last period. In addition, proposed CAPEX programs are larger (with one exception) and the proposals include large incentive payments.

OPEX

Proposed OPEX is a concern, with the five distributors proposing additional revenues of $233 million in the next period based on step changes alone. A step change is a permanent change in costs that requires a significant change in the way the costs are accounted for.

We understand this will equate to, for example, an increase in costs of more than 9 per cent for United Energy and $120 in extra charges for Jemena's customers over five years.

It is notable that no negative step changes (i.e. changes which would reflect permanent reductions in costs) have been proposed. We are concerned that the lack of symmetry in these proposals may reflect the fact that businesses will receive greater rewards via the Efficiency Benefit Sharing Scheme (EBSS) if costs are maintained at the start of the period are lowered once the period has begun.

Incentive schemes

We are similarly concerned about the approach proposed in relation to incentive schemes.

These mechanisms rightly are aimed at sharing the benefits of improved operational performance between consumers and the distributors.

For consumers to continue supporting these mechanisms there must be clarity as to whether these payments are rewarding efficient behaviour and positive outcomes or are the result of, in the case of the Capital Expenditure Sharing Scheme (CESS), gaps between forecast effort and actual delivery. In our view the proposals for CESS and Guaranteed Service Level (GSL) payments warrant closer scrutiny.

Energy Consumers Australia recommends a cautious approach to the new Customer Service Incentive Scheme (CSIS) at this time.

Broadly we share the concerns raised by Jemena's customers. A level of good service should be provided through the base charges for distribution services. The CSIS carries a risk of consumers being asked to pay twice for the same level of 'good' service. This is especially the case if the CSIS is to be set using historical performance.

Conversely it appears that some incentive schemes are not being used as they might to deliver benefits for the distributors and consumers. The demand management incentive schemes (DMIA and DMIS) are an example and we note the positive outcomes reported by United Energy.

We also note that AusNet is the only distributor that is seeking an allowance for innovation. Its proposed program has been reviewed by the Customer Forum. Given AusNet's record of innovation investment, and the support given by the Customer Forum for $7.5 million of costs, we do not oppose this proposal.

Depreciation

Energy Consumers Australia agrees with the approach taken by the CCP on changes to depreciation proposed by the distributors. Our view is that significant changes to asset lives should be viewed with caution. We look forward to engaging with the AER on its scrutiny of this part of the distributors' proposals.

Information Technology

The level of spending on IT is proposed to grow further in the next regulatory period (except for Jemena). The question remains for consumers as to the benefits they can expect in customer service or lower prices. At the least it would be helpful to have information about whether spending in this area is resulting in offsetting improvements in greater productivity or reductions in OPEX.

Impact of bushfires

Victorian distributors and consumers continue to face costs resulting from the 2009 Black Saturday bushfires. The Rapid Earth Fault Current Limiter (REFCL) program alone is proposed to cost $400m in this next period on top of $600m already spent on this program.

Energy Consumers Australia asks for more information on the interaction between the REFCL program and proposed increases in spending on pole maintenance and replacement.

Given the impact of the REFCL program in reducing fire starts it is important that consumers can understand how the reduction of risk has been reflected in plans for poles and whether this has led to reduced costs for consumers. This would also enable a better understanding of the trade-offs inherent in the efforts by Powercor to address community concerns about bushfire risks.

Similarly, we understand that REFCLs are impacting negatively on reliability in some areas. Powercor is seeking $13m to fund Automatic Circuit Reclosers (ACRs) to restore reliability to normal levels.

We would appreciate clarification that these poorer reliability outcomes are reflected in proposed Service Target Performance Incentive Scheme (STPIS) payments.

All the distributors are facing challenges in obtaining insurance of appropriate coverage. However, the increase in costs varies across the five distributors. In our view AER should consider applying a standard approach to the treatment of insurance across the businesses. We consider that the pass-through mechanism is the appropriate mechanism to address the issue of gaps in insurance coverage.

Investment for solar

It is pleasing that all the distributors have engaged with their customers about rooftop solar PV and opportunities to create more benefits for consumers and the businesses.

However, we note that the distributors have taken different approaches to modelling the impact of rooftop solar PV on their respective networks. It has been challenging to understand the likely costs per customer of proposed distributed energy resource (DER) programs since the distributors have chosen a variety of ways of allocating costs to programs.

Our understanding is that the actual costs of the programs are based on modelling which itself is based on forecasts of load growth and solar take-up. We have appreciated the explanation of the modelling approach, but the build-up of cost estimates is less clear.

We note that simple calculations of DER costs / customer do not take account of economies of scale, but we think that some comparative cost across networks is a reasonable approach. We expect to explore this further but at this stage we would prefer that the AER take a conservative approach to these CAPEX allowances in this period, particularly given the uncertain economic circumstances and the potential impact on take-up.

Response to the TSS

Stakeholder engagement is a necessary step in developing more cost-reflective pricing that could potentially result in retail pricing options that reward consumers for shifting their energy use.

The three forums on tariffs that were convened by the Victorian electricity distribution networks over the past two years were invaluable in supporting stakeholders to explore the potential pathways for realising the benefits of network tariff reform in the Victorian context. They were all well-facilitated, with outcomes shared in workshop reports which was very much appreciated by participants.

In this section of our submission:

- we review the experience so far with empowering consumers to manage their energy use and change behaviour, linked to the roll-out of digital meters;
- we comment on the tariff proposals put forward by the Victorian electricity distribution network businesses;
- we take the view that the proposed default tariffs and the tariff assignment can be accepted by the AER as they are currently framed, with the exception that all customers should be able to opt-out to a flat tariff;
- we would not support the alternative of a mandatory assignment of all Victorian energy consumers to the proposed time of use (ToU) or monthly maximum demand tariffs (MMD), and we explain why; and
- we propose that to achieve the benefits of tariff reform, the network businesses should be required to include in their TSS a voluntary tariff, that would be suitable for rewarding electric vehicle owners to charge off-peak. The proposed ToU tariff put forward by the Victorian electricity distribution network businesses is not a sufficiently attractive tariff for rewarding consumers to shift the use of any electrical appliance, including electric vehicles.

The context for changes to more cost-reflective network tariffs

This is the second round of Tariff Structure Statements submitted by the Victorian electricity distribution network businesses since the National Electricity Rules were changed in December 2014.

They are also the last of the proposed Tariff Structure Statements to be submitted in this round of regulatory determinations undertaken by the AER.

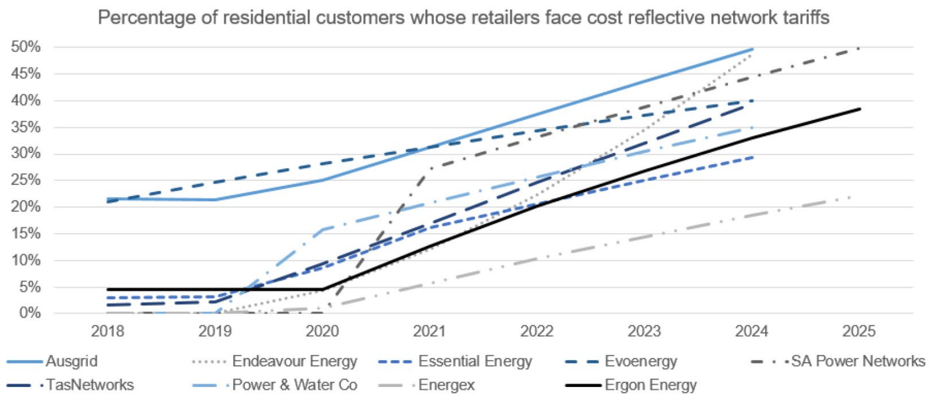
Changes to the National Electricity Rules (NER) in December 2014, introduced pricing principles to regulate the setting of electricity distribution network tariffs on a more cost-reflective basis.

The aim was that energy retailers would then develop retail offers for consumers with digital meters that gave them a choice to remain on flat tariffs or to take up offers that gave them an opportunity to shift energy use to off-peak times and lower their bills.

The roll-out of digital meters was first initiated on government mandated basis in Victoria in 2005 (and on an industry led basis in NSW and the ACT at around the same time). With changes in the National Electricity Rules since December 2017, all new and replacement meters in the National Electricity Market mut be digital meters.

In Victoria, consumers had the option to take up retail offers based on cost-reflective network tariffs, including first ToU rates and later MMD. In other jurisdictions, default cost-reflective network tariffs began to be introduced from 1 December 2017 onwards, usually with an opt-out to a flat network tariff. The exception was the ACT, where consumers could no longer opt out to a flat rate network tariff.

Figure 9 AER analysis of the uptake of cost-reflective network tariffs



Source: AER

Figure 9 shows the impact of the various TSS decisions since 2017. Note that both EvoEnergy and Ausgrid had significant numbers of customers with digital meters prior to the rule changes.

In designing their tariff structures the network businesses were required to balance the steepness of the peak rates, and the duration in which peak rates applied, against the impact on customers who used more energy at peak times, who would experience substantial bill increases unless they shifted their energy use.

The practicalities of shifting energy use, for example the use of air-conditioners on hot days, were matters that were not considered in the making of changes to the National Electricity Rules.

Nor was it considered in the rules how consumers could make decisions about changing their energy use behaviour when the only source of information on the costs of their use of energy in their home at peak times was provided in their bill, which arrived months later.

Given that there were potentially significant impacts for a proportion of consumers who could shift their behaviour, the network tariffs that were introduced were designed to minimise bill changes for up to 80% of customers.

The result is that cost-reflective pricing has been achieved, with some reallocation of costs to those with the peakiest loads, without the intended benefits of the reduction in future investment in generation and network capacity, that comes from behaviour change.

This is not a desirable outcome. Without detailed, socio-economic and demographic impact analysis we do not know whether the impact of cost-reflective network tariffs is progressive or regressive. It is likely to be impacting more heavily on larger families, regions where the weather is more extreme including in the outer suburbs of our cities and on people in poor housing with cheap appliances, usually renters.

Our position on the proposed tariffs

As they did previously, the Victorian businesses have proposed network tariff structures that are aligned, so that there is a ‘uniform’ tariff structure across Victoria although the rates will vary across the network businesses because they have different revenues and regulatory asset bases to recover.

Retailers are to be charged a default ToU from 1 July 2021, applying to:

- all new connections of residential and small business customers; and
- customers who install rooftop solar PV, home batteries, or who upgrade their connection from single phase to three phase power.

It is not clear whether customers whose digital meters are replaced under other circumstances will be treated as new connections or allowed to remain on their current tariff – whether a legacy ToU or a flat rate.

Under this assignment policy, customers (or their retailer on their behalf) will be able to opt-out to a flat tariff, except in the case of Ausnet Services where customers only alternative to the default ToU tariff is a monthly maximum demand tariff.

Any customer can also opt-in under these arrangements to a monthly maximum demand tariff.

We support the default tariff assignment proposed by the Victorian electricity distribution networks, with the exception that Ausnet Services should be required to offer an opt-out to a flat rate network tariff.

This is the position that Energy Consumers Australia argued in response to both the Ausgrid and SA Power Networks tariff proposals.

Our view was based on the risk that, without a flat network tariff, consumers could be denied the choice of a flat rate at the retail level.

This position is informed by our experience in the Australian Capital Territory with the major local retailer ActewAGL.

Our understanding is that consumers with this retailer who have had a digital meter installed after 1 December 2017, are no longer able to choose to have a flat rate retail tariff.

The lack of retail choice - an MMD default tariff with an opt out to a ToU - has caused considerable consumer dissatisfaction, for minimal gain in reducing future investment in network capacity. By eliminating retail choice, the case for genuine innovation and more cost-reflective pricing is even more difficult to make out.

We appreciate that the AER could have a different view on whether to allow an opt-out from the default tariff to a flat rate network tariff.

Energy Consumers Australia also took the view in the NSW determination on the TSS that there should be no retrospectivity, so that if consumers already had a digital meter before the date on which default tariffs were introduced, they should only voluntarily choose to move to the default tariff.

We accept that there is an argument that preserving an opt out to a flat rate at the network level, means customers can be restored to the current status quo. However, migrating more than 2 million Victorian customers with a digital meter across to a ToU tariff without their consent is not consistent with principles of openness and good consumer engagement.

With trust in the energy market low, the pathway to “reward” pricing needs to be achieved with transparency, be consumer led, with measures and support in place to enable consumers to manage their energy use.

Our research findings and analysis, and our views on a consumer led approach to developing pathways for reward pricing are presented in the Appendix to this report.

A voluntary tariff for electric vehicles

Without changes that put power into the hands of consumers, with information and technology to manage risk, the Victorian electricity distribution network businesses have put forward tariff proposals that maintain the status quo.

The research undertaken by the Victorian electricity distribution network businesses, and the work we commissioned by Energeia, has been critical in Energy Consumers Australia forming a view that what is needed is a voluntary tariff that rewards and incentivises consumers to manage their energy use and change their behaviour.

This is to be preferred to mandating ToU tariffs that are not fit-for purpose in achieving the outcome of reducing future investment in electricity generation and network capacity.

A voluntary tariff is something that can unite the industry – both retailers and networks – to provide a retail pricing offer that is attractive to consumers.

This is why Energy Consumers Australia has developed a ‘prices to devices’ cost-reflective tariff proposal to be adopted by the Victorian electricity distribution network businesses, in this regulatory period.

This would see electric vehicle owners charged a retail price for off-peak charging of 10 cents a kilowatt hour, with peak rates only charged 2% of the time.

In developing these rates Energeia used publicly information available on network costs and made assumptions about avoidable network costs and wholesale costs that will need to be tested with stakeholders.

The Energeia report is attached (Attachment 2). We will be engaging with stakeholders in the course of the Victorian electricity network businesses developing their revised revenue proposals.

Appendix: Our research and our consumer-led approach

Research findings and analysis

In the course of our engagement with the various TSS processes in the past few years Energy Consumers Australia developed both principles, and commissioned research to understand the outcomes of network tariff changes at the retail level.

This work is summarised in this section, and we also comment on the research commissioned by the Victorian electricity distribution businesses.

Together this body of research has been helpful in demonstrating the barriers to network tariff reform

Pricing principles

Our approach to retail pricing builds on the foundation of the principles that were established by Energy Consumers Australia with the AER's Consumer Challenge Panel for the NSW revenue determinations, in consultation with other consumer advocates.

The Pricing Directions paper will be available on Energy Consumers Australia's website, together with the commissioned reports from Energeia.

Electricity Distribution Network Tariffs, Principles and Analysis of Options, April 2018

In the course of their engagement, the Victorian electricity distribution network businesses commissioned The Brattle Group to undertake a study, that focussed on the role of retailers in achieving the intended outcomes of network tariff reform. In the discussion on this work and the subsequent work by the Australian Energy Council, the concept of charging retailers on an aggregate basis for the use of the network by their customers was raised.

We still see merit in exploring this approach further, so that retailers would be charged on a similar basis to the way they purchase electricity in the wholesale market for their customers, rather than a customer account basis. The current arrangements favour a simple mark-up or pass through of network costs.

If retailers could "hedge" their exposure to peak network costs, they would develop targeted offers for customers who could manage their use and provide them with information and tools.

An example of how an energy retailer works with customers to hedge their price exposure – in this case the wholesale price – is Octopus Energy in the UK. Some retailers are offering similar products in Australia, but their take up is still relatively small (Pooled Energy, Amber).

Alternatively, retailers are offering other consumers who don't wish to be exposed to a "risk" product, predictable pricing without volatility.

Retail Choice project – NSW and the ACT (2018)

Energy Consumers Australia commissioned Energeia to review how the major retailers in New South Wales and the ACT had responded in their retail pricing for residential and small business customers, following the introduction of changes to how they were charged by the electricity distribution network businesses in those jurisdictions.

- In the ACT, there had been a long-standing policy that all residential and small business customers that had a digital meter installed were moved from a flat network tariff to a time-of use network tariff. The AER approved Evoenergy changing these arrangements, so that from 1 December 2017, the energy retailer would be charged what Evoenergy called a peak demand tariff for these customers. No arrangements were made for customers to be opted out to a flat network tariff, but they could switch to an alterative ToU tariff.
- In New South Wales (NSW) the AER approved ToU tariffs for customers who had a digital meter installed after 1 July 2018, on an opt-out basis for the three electricity network distribution businesses. In a similar situation to the ACT, Ausgrid already had a significant number of customers with digital meters on a time-of-use tariff which were reflected in retail offers.

Figure 10 Retail component share of the bill, residential customers, Sydney

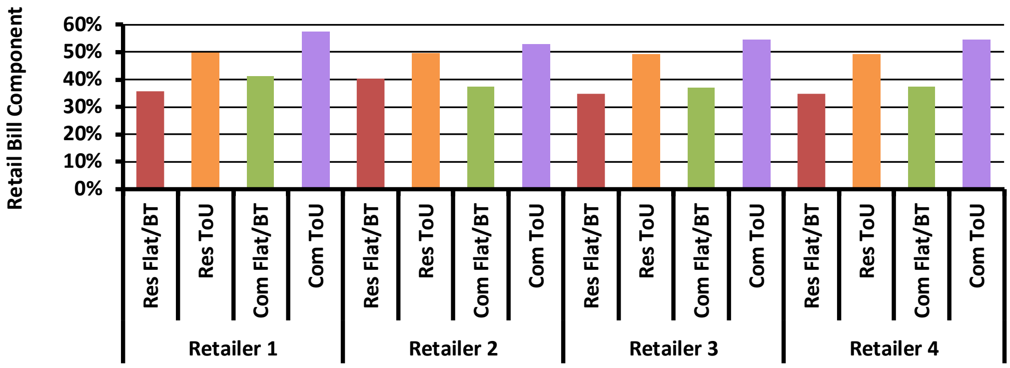
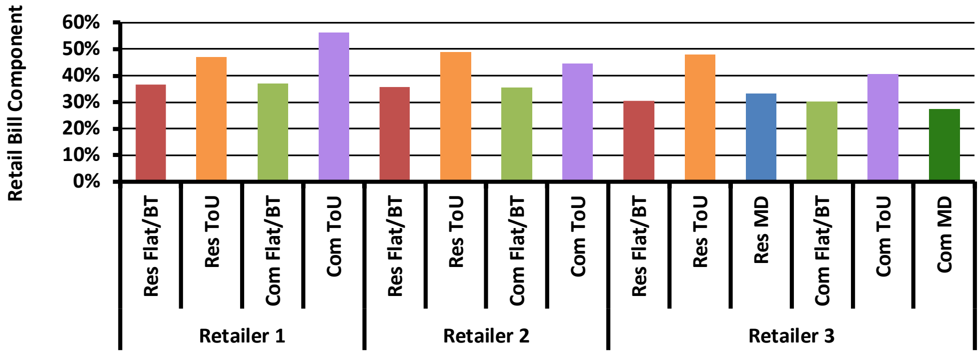


Figure 11 Retail component share of the bill, residential customers, ACT



The Energeia analysis for residential customers found a similar pattern in NSW and the ACT, where the retailer share of customer bills is higher for ToU retail offers than for flat rate offers, suggesting that there is a greater 'mark-up' on ToU retail offers. The mark up across the three major retailers does vary according to the electricity distribution network area.

What this means for customers is that cost-reflective pricing is generally more expensive than flat rate retail pricing offers, and this was the earlier experience in Victoria with the introduction of flexible pricing.

Energeia also compared the bill outcomes for residential customers switching from a flat rate to a ToU rate, with the same retailer, in these jurisdictions.

This analysis revealed the high search costs facing consumers. Consumers are not able to choose their network area, but in NSW depending on which network area they are in and which retailer they choose, they could be better off, worse off, or much the same by switching to a ToU rate.

Figure 12 Switching impacts, residential customers, NSW (% better off)

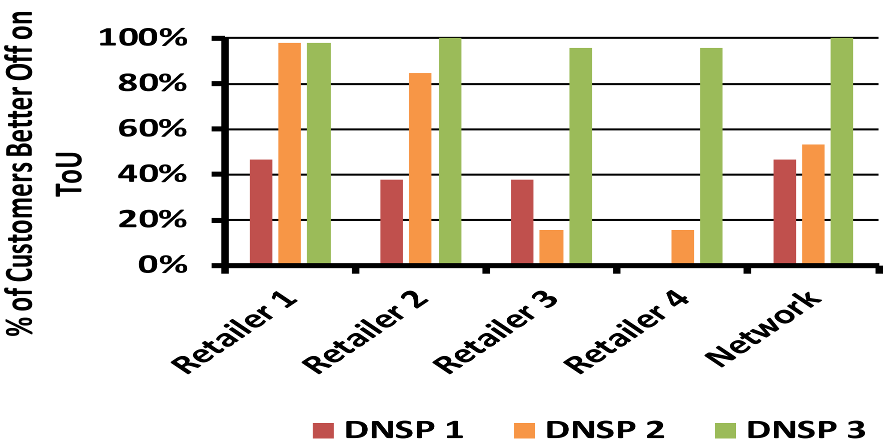
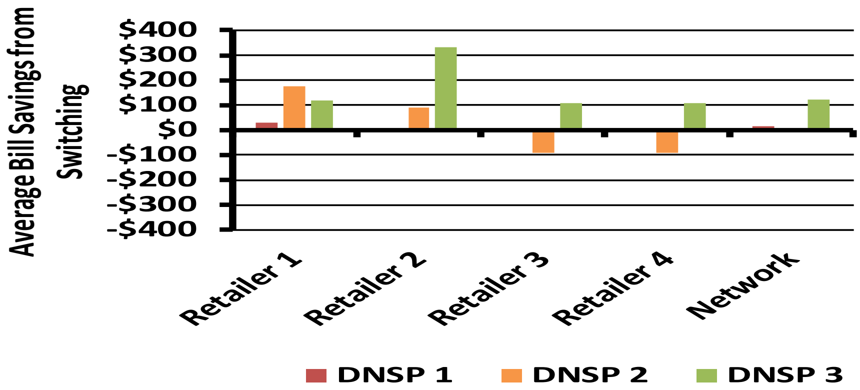


Figure 13 Switching impacts, residential customers, NSW (average bill impact)



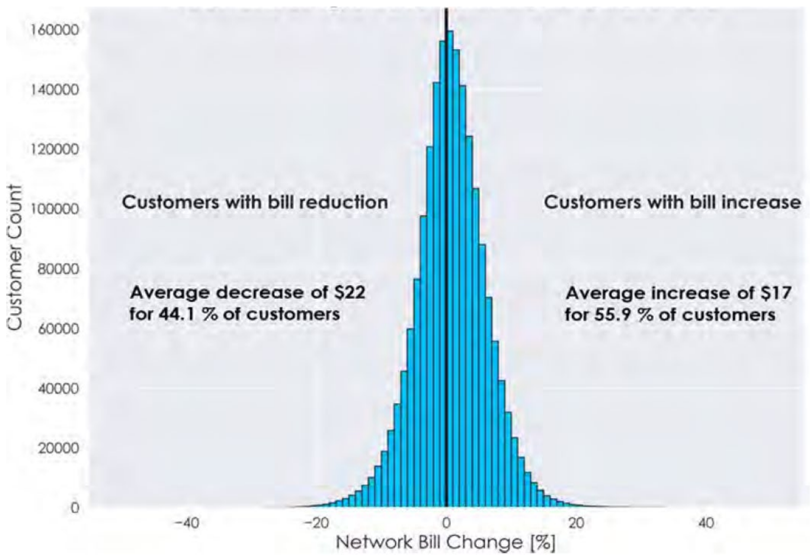
Energy Consumers Australia will be publishing the full report of this analysis as the Retail Choice Project report.

Victorian DNSP vulnerable customer analysis, 20 March 2019

The data from the Victorian survey that underpinned the ACIL Allen analysis, is publicly available on a limited and de-identified basis. Energy Consumers Australia is supporting the inclusion of this data set in the University of New South Wales Tariff Tool.[4]

The Victorian electricity distribution network businesses reported on aggregate the customer impacts.

Figure 14 Customer bill impacts of mandating ToU (excl legacy ToU)



[4] Available from the on the Centre for Energy and Environmental Markets, http://www.ceem.unsw.edu.au/cost-reflective-tariff-design

Figure 14 shows that 44% of customers would be better off with mandating all customers to the proposed ToU (except legacy ToU customers), and 56% would be worse off. It is not clear if this is on a revenue neutral basis.

The bill impacts on average are small - $22 annually for those who are better off and $17 for those that are worse of. However, at the 'tails' of the distribution there are customers who are significantly better off – which will include those with relatively less peaky consumption – and those that will be significantly worse off, which will include those who use a larger proportion of their consumption during the peak hours set by the network of 3pm to 9 pm, every day.

What this customer impact analysis cannot do is identify what types of customers are impacted - it relies only on load profiles.

Using the data from the ACIL Allen survey, the Victorian electricity distribution network businesses have been able to report the bill impacts of their ToU tariffs, for vulnerable customers under different assumptions about assignment and a retail mark-up.

The reported results are shown in Table 3.

Table 3: Bill impacts of ToU pricing

	VULNERABLE	OTHER
Proportion of customers with bill decrease	32%	19%
Proportion of customers with no change (+/-10%)	41%	41%
Proportion of customers with bill increase	27%	40%
Sample	293	1658

Source: ACIL Allen presentation, 20 March 2019

While this analysis was useful, there is not sufficiently granular information on which to design measures to address negative impacts – such as housing improvements or appliance replacement programs, as well as targeted income support. Further analysis of the dataset – using the UNSW Tariff Tool – based on the current tariff structures and rates would be very useful. Energy Consumers Australia will be working with the Victorian advocates to undertake this analysis, prior to the proposals being revised.

Retail Choice project – Victoria (2020)

Energy Consumers Australia commissioned Energeia to do a bill impact analysis at the retail level, similar to that it undertook in NSW and the ACT, on a revenue neutral basis. The results of this analysis are shown in Figure 15. A positive impact is a bill increase, while a negative impact is a bill decrease.

Figure 15 shows at the network level, depending on the network most customers are better or worse off by a small amount (the difference with the horizontal axis. Just as reported by the networks there are a significant proportion whose bill increases to a greater extent.

At the retail level, most customers of Powercor and United are now better off, while at the retail level the outcome for Citipower customers is much the same as the distribution at the network level. For Ausnet Services and Jemena customers, most customer have an increase in their average retail bill. However, the average bill impacts (Figure 16) are relatively small across all of the network areas.

Figure 15 Percentage customers better off by moving tariff

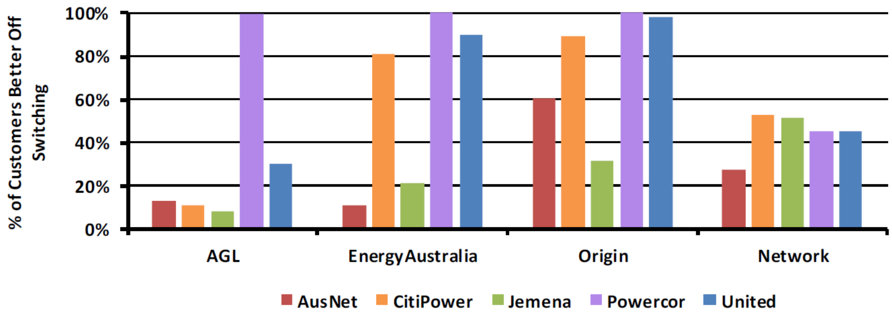
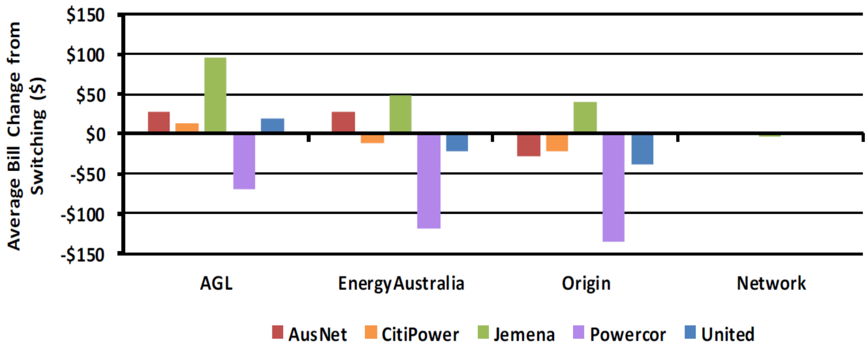


Figure 16 Average retail bill impacts of moving tariff



Energeia also analysed whether there were any systemic factors revealed in the survey that could predict whether a residential customer would be better or worse off. What this analysis showed is that it is social practice in the home, including whether people are home during peak times and not income etc. that determines bill impacts.

Pathways to reward pricing

Energy Consumers Australia considers that a fundamentally different approach needs to be taken to empowering consumers to manage their energy use and change behaviour, to lower the future costs of investing in generation and network capacity.

As Professor Cameron Tonkinwise, from the University of Technology, said at our Foresighting Forum 2020, we need to understand using electricity is a social practice in our homes and at work.[5]

Rewarding and enabling behaviour change

With the right reward, and the right tools to manage their risk by set and forget using technology, more consumers will be willing to take up peak and off-peak retail pricing.

Just as with other services that have peak pricing, for example cinemas, hotel accommodation, airline flights, some consumers will want to purchase off-peak and others will pay for certainty or predictability.

In our view, the opportunities for consumers to conveniently change their behaviour in how they use electricity in their homes are greatest for pool pumps, hot water systems and electric vehicles, as people care only that these appliances are ready when they need to use them.

While cooling and heating are the most significant drivers of peak use in our homes, they are also critical to people's perceptions of comfort and quality of life during weather extremes.

Changing the energy efficiency of our appliances and the efficiency of our homes, is likely to have a greater pay-off and more community support than asking people on a consistent basis live in homes they find too cold or too hot. This is where there is a role for asking the community to change behaviour only on a few critical days, and over 75% of consumers in our ECSS say they will voluntarily reduce their use for little or no reward.

A consumer led approach

Without a consumer led approach, the barriers to of network tariff reform are insurmountable.

Such an approach recognises that consumers should have choice, of whether they want to have the opportunity to manage their use and change their behaviour to take advantage of lower prices outside of peak times.

Consumers should have the choice of predictability if that is what they would prefer. Other consumers, who may be more easily able to shift their energy use, including through automation. will want volatility so long as it can be managed.

Retailers have to be front-and-centre of any design, communicating with their customers the potential on an individual basis, and equipping consumers with the information and tools so that their actual experience matches their expectations.

At the foundation of this approach is unlocking the value of consumer data, enabling challenger brands with innovative retail products to win market share. This vision is very different to what consumers experience today, with high search costs and bill shock, because the connection between energy use in our homes and at work is only signalled in the bill.

[5] https://energyconsumersaustralia.com.au/projects/foresighting-forum

In their most recent review of pricing, and the opportunities for wider acceptance, Dr Faruqui of The Brattle Group identified five factors that are critical to retail ToU pricing at scale:

- design cost-reflective rates but make sure they are customer friendly, and offer choices
- learn how customers think and market the rates using the customer's language
- educate the customers on how to benefit from the rates
- use enabling technologies and behavioral messaging to enhance the price signal
- transition gradually and consider providing bill protection.[6]

There are both opportunities and challenges in making progress towards pricing that rewards consumers for managing their energy use, and where they are willing or able to shift behaviour. There is no silver bullet, and every home – and every business – is different, in how they rely on energy for the quality of their lives and livelihoods.

[6] The Brattle Group, *Bridging the Chasm, Moving From Pilots to Full-Scale Deployments of Time-of-Use Rates,* 16 April 2020

ENERGY
CONSUMERS
AUSTRALIA

Attachment 1

Report to Energy Consumers Australia

A review of Victorian Distribution Networks

Regulatory Proposals 2021-2026

Spencer&Co

Business advisory services

Table of contents

Introduction

Changes to the framework

The Regulatory Framework has changed in recent years to provide for formal customer representation in regulatory processes via the Customer Challenge Panel and greater support for local customer advocates via the nationally funded body, Energy Consumers Australia (ECA).

The removal of rights to appeal the merit of regulatory decisions has led business to look to customers and their advocates to provide assurance to the Australian Energy Regulator (AER) that regulatory proposals are in customers' interests.

Businesses are now engaging with customers directly and taking on feedback with the goal that with sufficient support and endorsement from customers and advocates, proposals are capable of acceptance. Proposals are still subject to AER's assessment.

Our objective

The objective of this report is to highlight issues on behalf of ECA and customers to help the AER determine if the Victorian distributors regulatory proposals are in the long-term interests of customers and should be accepted.

Promoting the long-term interests of consumers means that current and future consumers pay no more than they need to for the quality of service they require.

In simple terms it means:

> *Not one dollar more is spent than necessary; Not one day earlier than needed.*

The Regulatory proposals must show how the networks will deliver distribution and metering services that promote the long-term interests of customers with respect to price, reliability, quality and security of supply.

Further, the proposals must comply with the requirements of the Rules including being able to demonstrate engagement with customers.

Scope of works

Spencer&Co has been engaged by ECA to review the regulatory proposals put forward by the five distribution networks in Victoria - Jemena, AusNet Services, Citipower, Powercor and United Energy.

Spencer&Co were engaged by ECA to review the Draft Plans put forward by the Victorian networks in February 2019 and as part of that process, Spencer&Co was involved in several 'Deep Dive' workshops and stakeholder information forums.

We are grateful for the opportunity to contribute to this process and to contribute to the long term interests of electricity customers in Victoria.

Key questions

In compiling this report we have looked for answers to these key questions from the Rules:

- Do the proposals reflect prudent and efficient investments?
- Are they designed with the long term interests of customers in mind?
- Do they promote long term interests in terms of price, quality, safety, reliability and security of energy supply?

In addition, the ECA has asked us to consider:

- Have the businesses shown an understanding of the strategic context in which they operate?
- Have they reflected these trends in their proposals?
- Have they shown evidence they are focusing on their customers?
- Have they attempted to balance competing priorities and shown what they have traded off?

Key findings

Customer engagement

- **Good customer engagement will lead to customer centricity.** We suspect the approaches that have involved building ongoing relationships with customers will be most effective and longer lasting.
- **We should not lose sight of the starting point** - the price customers in each franchise pay for the quality of service they receive.
- The customer forum has been invaluable in bringing the voice of the customer to the table.

Expenditure

- **Expenditure has gone up** despite concerns about affordability.
- **Prices would be rising significantly** in a steady WACC environment.
- **Scrutiny of investment programs is still important** even as revenues are declining, because customers should not pay more than they need to at this time.
- **RAB is growing** despite concerns about affordability.

Capex

- **Replacement expenditure is higher than last period** and subject to discretion re: timing. This makes it easier for programs to be deferred to deliver CESS benefits. Programs require technical review.
- **DER forecasts are too high** and must be revised down to reflect slow down in growth. Cost estimates underlying investment programs need to be scrutinised. Equity outcomes of the programs (remaining constraints) should be considered.
- **IT costs are going up** for Citipower, Powercor and United Energy. It is not clear how the benefits of IT expenditure have been captured in lower forecast costs. IT costs for Jemena and AusNet are lower than previous period but are coming off a high base.
- **Bushfire costs are high** and subject to review by Energy Safe Victoria (ESV). We encourage networks to work with ESV to reduce costs as much as possible in the revised proposal.

Opex

- **Reclassification of costs** is changing the starting point and making it hard to compare starting points. We are surprised at the timing of these changes and concerned about the affordability impacts on opex.
- **Step changes are significant** and need scrutiny. EPA, HBRA and REFCL costs have been withdrawn or reduced. Other step changes should be reconsidered.
- **Similar mechanisms should be used** across DNSPs to recover similar costs such as ESV levies, EDO fuse replacement, and insurance premium rises which are all subject to different approaches in the proposals.
- **Cost escalation does not reflect current economic circumstances**. The use of more than one forecaster at this time of uncertainty would be prudent.

Other issues impacting revenue

- **AusNet's accelerated depreciation** is at odds with concerns about affordability. AusNet's approach requires review.
- **Incentives schemes** need to be justified and must be designed to deliver services that are better than the baseline of services that customers expect. Where services meet the baseline, there should be no reward.
- We welcome the AER's approach to a flexible design of the draft Customer Service Incentive Scheme but are concerned that targets be set to reflect the expected step change in performance that is expected as a result of IT investment.
- Parameters should be consistently defined and measured wherever possible. Schemes should target poorest performance first rather than marginal improvements to moderately good performance.

Pricing proposal

- **Pricing proposals lack ambition.** Proposed tariff reform does not take advantage of declining revenue environment.
- **The balance** between simplicity and cost reflectivity could be improved.

Strategic context

Climate change and the move to renewables

Australian business and Governments are committed to actions to reduce Australia's green house gas emissions. A key input to the Victorian Government's strategy is its Solar Homes Scheme that subsidises 650,000 residential customers to install PV up to 2026.

In addition, Victoria is experiencing increasing levels of investment in large scale, Grid-connected renewable investments made possible through ARENA funding, but increasingly without funding as the economics of investment in renewables improves.

Smart Grid / Future Grid

The increasing penetration of solar throughout the low voltage network is causing capacity constraints as low voltage networks, designed for one-way flow of electricity, are being used for two-way flows. The investment in network capacity to facilitate solar export is a key component in the Victorian networks' proposals and contributes $230m worth of new investment.

The availability of smart meter data for all customers on the network provides a unique data source for Victorian networks to use in their analysis of forecast constraints.

The future of electrified transport including electric vehicles is not a major theme in the Victorian proposals as the take-up of EVs is slow at present and difficult to forecast with certainty.

Bush fire risk mitigation

The Victorian Government continues to drive reductions in the risk of bush fire starts following the catastrophic outcomes of the 2009 Black Saturday bush fires and subsequent Bush Fire Royal Commission. A substantial program of investment in Rapid Electrical Fault Current Limiters (REFCLs) at locations across Victoria's distribution network will add more than $1 billion of capital investment to the network to mitigate future risk of bush fire damage by the end of the 2021-26 period. In addition, changes to pole replacement practices have been recommended for some networks bringing forward ~$230m of pole replacement.

The cost of improving energy safety is also being felt in higher levies to fund Energy Safe Victoria - the Governments' energy safety regulator.

Focus on customers and improved customer service

The regulatory regime has changed in recent years to explicitly require networks to show how their proposals represent the views of customers.

The Victorian distributors have made considerable efforts to engage with customers and reflect their preferences in their proposals. More than ever before, network businesses are considering the benefits to customers of their investments and operations and taking tangible steps to improve their customers' experience.

Affordability of energy

Customer engagement by Victorian networks shows that energy affordability remains customers' highest priority. Reliability is also valued but the majority of customers were happy with existing levels of reliability and did not want to pay for reliability improvements.

The Government's decisions on bush fire risk mitigation and action on climate change has added to the cost of service delivery and works against energy affordability in the short term.

Population growth and development in Melbourne

Melbourne is one of the fastest growing cities in Australia. Despite forecast energy growth being relatively flat, urban in-fill, changing land use for residential development and Government investment in infrastructure is contributing to pockets of high growth necessitating augmentation of the network and high levels of customers connections. However, recent economic circumstances brought on by the global COVID-19 pandemic will impact economic growth, particularly in the short-medium term and is likely to have wide ranging impacts on networks' revised proposals.

The impact of COVID-19

The COVID-19 pandemic has disrupted social behaviours, business operations and Australia's economic outlook dramatically. It is unclear how long the pandemic will last, or how long the economic impacts will endure. Happily, as of May 2020, Australia appears to be one of a handful of countries that is managing the health impact well. It remains to be seen whether Australia's economic experience can be managed as well.

The assumptions upon which the Victorian distributors proposals are based have fundamentally changed since they were submitted just four months ago. The regulatory period will begin on 1 July 2021, some 15 months away. However, the unfolding economic crisis will have negative impacts on economic growth forecasts, which in turn, will drive changes to investment timing. Each business is aware that it will need to review its forecasts to reflect the economic impact of COVID-19 in its Revised Proposals.

We expect the following inputs to be reviewed and investment plans updated to reflect the new economic circumstances:

- Forecasts for **economic growth** will soften as economists predict a recession at best (two quarters of negative economic growth), or an economic depression at worst (a sustained down turn in negative economic activity).
- **Small connections** are likely to slow as financial uncertainty prompts customers to defer or delay decisions to invest in new property, housing or business activities.
- **Large connections**, particularly those driven by Government spending will be less impacted by COVID-19 as Governments will be incentivised to drive economic activity through investment in infrastructure.
- The rate of **uptake of solar** may slow as many customers face financial uncertainty and reduce spending on non-essential items.
- **Consumption** of energy and **demand for network capacity** will vary by sector, and will drive changes in investment:
  - **Residential** consumption is increasing in the short term as Australians are forced to stay at home. The majority of workers and children working and learning from home is driving increased residential energy consumption, but is less likely to drive changes to demand.
  - **Commercial** consumption and peak demand has been negatively impacted as retailers and the hospitality sector close. In contrast to the residential growth, the recovery to underlying trends is likely to be slower as the economic crisis takes its toll on businesses, not all of which will re-emerge when the health crisis abates.
  - The **industrial** sector will also be negatively impacted as demand for goods slows. Like the commercial sector, a slower recovery to underlying levels is expected.
- **Capital works delivery** is likely to be delayed by a slow down in project approvals and delivery of works as a result of disruption to normal operations and work practice restrictions. We expect this delay to be short lived and may result in a delay in project timing.
- **Wage growth** assumptions - expected pressure on wages is unlikely to occur at levels predicted before this crisis. We would expect all distributors to revise their forecasts to reflect softening labour market conditions.
- **Output growth** assumptions - an economic recession will stall output growth rates. We expect this to manifest itself in delays to investments underpinned by economic growth forecasts (i.e. connections, augmentation programs). It is unclear whether COVID-19 will cause scarcity of construction resources locally. Governments will be taking actions to ensure that international supply lines are open despite travel bans and border entry restrictions on people.
- **Bond rates** have fallen as investors flee to safer investment options and drive bond yields to historic lows. The trailing average approach to debt will ensure that the return on debt awarded to businesses tracks the underlying economic conditions.
- **Wholesale market changes** including the compliance date for the application of new rules will likely be delayed and change the timing of some expenditure.
- **Decarbonisation** of the economy may take a back seat in the short term as companies try to survive financially. The underlying necessity of decarbonising business operations is a long term trend that may be slowed, but not abandoned.
- **Power Quality** investments will need to be reviewed as projects are often tied to growth forecasts.

We understand the complexity in forecasting 7-10 years in advance in such unprecedented and uncertain times. Nevertheless, we look to businesses to keep customers at the forefront of their considerations when updating forecasts.

'New Reg' process

AusNet Services is the first business to undertake the 'New Reg' process to negotiate and review its regulatory proposal.

Has it been a success?

The Customer Forum has helped AusNet obtain a level of customer insight in its proposal that would not have been achievable otherwise. The process has shown how 'lay people' can effectively scrutinise elements of the regulatory proposal, and that the absence of specific regulatory knowledge is a temporary issue, not one that should preclude their involvement. That said, there has been significant investment on behalf of AusNet and Forum Members to understand and explain the regulatory regime and environment. It would be a lost opportunity if this new-found knowledge was not used again.

Was the scope too limited?

Only 7% of capex was included within the scope. Given the detail to which The Customer Forum delved, it is disappointing that more of the program was not subject to its scrutiny. The Forum was very successful in challenging the timing of major augmentation projects. It would have been good to see the same analysis and pressure put on AusNet's replacement program to see if a similar result of deferred timing on the basis of affordability and minimal increase in risk would have eventuated for repex.

Was the process worth the costs and time involved?

The costs of The Customer Forum and the cost in both time and resources expended by ECA and AER are not publicly available.

AusNet has reported the process took up a significant amount of time on top of preparing its regulatory proposal. However, when asked, AusNet confirmed it considered the process to have been worth it, particularly in terms of customer insights and driving customer focus internally. The process may prove more worthwhile from a network perspective if the AER chooses to apply a lower level of scrutiny to AusNet's proposal than to those of other networks.

How should the AER approach the assessment of capex and opex following involvement of the forum?

AusNet does not perform as well as its peers in the AER's benchmarking analysis, with opex efficiency declining significantly from 2010-2016. AusNet has undertaken a transformation program in recent years. However, the evidence suggests that AusNet's opex starting point is high relative to peers and should be reviewed downward. We note AusNet has agreed to 1% efficiency trend to apply as a means of sharing future efficiencies immediately with customers.

As mentioned earlier, The Customer Forum was effective in challenging AusNet's augmentation forecast and the timing of some major replacement projects. The AER should review AusNet's other capital forecasts to ensure customers are not paying more than they should, particularly in the current economic environment.

What improvements in the process could be made for future applications?

There was benefit in Forum members being recruited from outside the industry. These members brought fresh thinking and drove a relentless focus on customer benefits as there was no assumed knowledge of how customers benefit from investment decisions.

The Customer Forum's research and expertise lifted AusNet's engagement activity in both volume and quality which proved invaluable. As engagement becomes more of a BAU skill for networks, this expertise may not be as critical in future processes. However, the ability to challenge findings will always be important.

It was useful for stakeholders to be involved in the process and see members of the Forum in action. It not only provided stakeholders with confidence, but it also provided an opportunity to add issues to their consideration. More opportunities to engage with the Customer Forum would be beneficial.

The scope for the Forum should be widened to make use of their insight and expertise. The Forum's review of replacement capex was limited. Given the complexity members were able to get across, limiting scope to major augmentation projects was a lost opportunity.

Common proposal themes

Customer engagement

All Victorian distributors have spent significant resources and time engaging with their customers. All businesses have been able to articulate customers priorities and have demonstrated how these priorities have been reflected in their proposals

There is variation in the approach taken to engagement but all approaches have been effective in increasing each network's understanding of their customers. There is evidence that the culture of all businesses is changing to become more customer focused, albeit with different rates of change.

Efficiency

The Victoria businesses have all celebrated their relative efficient operational performance relative to other networks in other jurisdictions. However, Citipower, Powercor and United Energy, argue their opex efficiency means they are less able to absorb costs and consequently, require greater increases in opex to cover new costs.

Regulatory cost increases

All five businesses are seeking step increases in opex to cater for new or extended regulatory obligations. Higher licence fees have a similar impact across all five businesses but the mechanism sought to recoup the costs varies between businesses.

New EPA regulations have been interpreted differently by networks resulting in large variations in cost increases being sought.

Insurance

All networks are seeking ways to cater for forecast insurance cost increases. The increases vary markedly between the three businesses, as does the mechanism each business proposes to use to accommodate these costs.

Asset Replacement

All businesses have proposed increases to replacement capital compared to last period and a change in focus to substation components (i.e. switchgear) and smaller equipment such as service lines and the low voltage network.

Bush fire

Bush fire compliance continues to drive costs in Victoria, particularly for AusNet and Powercor. REFCL compliance will cost up to $400m this period (and total more than $1billion overall).

Future Grid / DER

All networks have incorporated investment plans to deliver the Future Grid that includes investment in devices to monitor energy flows on the low voltage network, that in turn will help better target augmentation capital and enable greater solar export at least cost.

Four of five companies have modelled AMI data points to identify future constraints as the basis for their cost projections. Jemena has used a higher level model that delivers a forecast of required capital.

Customer Service Incentive Scheme (CSIS)

All businesses have considered the CSIS but there is no consistency in its treatment. The Customer Forum has reviewed and supports AusNet's proposal. Citipower, Powercor and United Energy intend to submit a CSIS in their Revised Proposals. The scheme is currently being designed.

Jemena has withdrawn its proposal for a CSIS in support of its customers who gave a clear message that they expect good customer service to be included in the base price for distribution services and do not support providing additional incentives to businesses to deliver services that they consider to be a standard level of service.

Cost escalation

All five businesses have applied cost escalation to forecasts. However there is debate as to the most accurate forecast to use now that the AER has moved away from its previous policy of averaging cost escalation forecasts by two respected forecasters. Economic circumstances have changed significantly since proposals were submitted and cause pressures on wages to soften.

Electric vehicles (EV)

The uncertainty in vehicle uptake has led networks to propose an EV Event as a pass through.

Recommendations for revised proposals

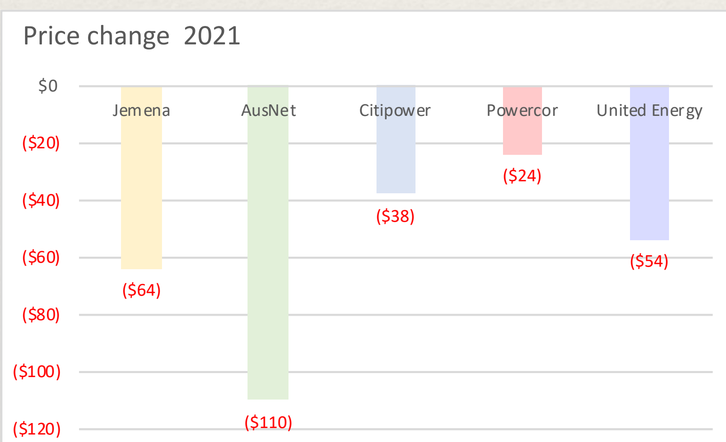
Issue	What we liked	Issue	What we would like to see
Network prices down	Falls in network prices are welcomed by customers whose main priority is the affordability of energy supply. Affordability is even more important in an environment of economic slow down and rising unemployment.	**Expenditure is high**	We are concerned that expenditure is much higher than last regulatory period despite concerns about affordability. This is particularly concerning in context of large capex-underspends. We recommend networks review investment programs to ensure price falls are not reliant on changes in WACC and tax only.
Customer experience is a focus	Several businesses have reviewed their customer touch points and have committed to process and service improvements with key outcomes and milestones applied. We recommend all networks commit to a series of improvements and report against them.	**COVID-19 impact**	We expect to see a thorough review of forecasts to take account of the impact of COVID-19. The impact is most likely to be see in connections, DER, and cost escalation.
Ongoing engagement	The networks have committed to ongoing engagement as a normal business activity into the future. Engagement in longer-lasting relationships appears most beneficial in driving cultural change.	**DER**	We would like to see more information about how cost estimates for network's DER programs have been estimated. We are concerned to ensure that estimates are based on an appropriate mix of possible solutions that can be justified. We are also interested in a phased approach to manage costs.
Customer friendly information	We appreciate the effort networks have made to deliver information that is accessible and relatively easy to read.	**Connections**	We would like to see an update of connections expenditure that takes account of the economic slow down and explicitly tests forecasts against more than one forecast methodology.
Proposals linked to feedback	Engagement with customers was extensive. Networks went to great effort to link proposals to feedback. Networks need to be careful not to 'lead the witness' to ensure they get the right answer.	**REFCL**	Given the +$1billion cost of the REFCL program for Victorian customers, we would like to see networks continue to work with ESV to revise costs down as much as possible, particularly in this economic environment.
Enabling solar export	All businesses engaged with customers on the issue of solar. There is evidence that customers want more than they can afford, or are prepared to pay.	**Pole replacement**	We are concerned that the decision to increase pole replacement has not taken into account the reduced bush fire risks REFCL has created. We seek assurance that the risk assessment has taken this improvement into account.
Investment programs in context	We liked presentation of expenditure in context of previous period expenditure with an explanation of what is driving any change. Jemena and AusNet both provided good detail. In some cases, obvious comparisons were missing.	**Step changes**	We would like to see a rationalisation of the step changes being requested by networks and more rigorous assessment of what costs are part of normal operations, particularly in the context of significant EBSS rewards for some businesses.
Opex cost efficiency	Networks have all been working to improve cost efficiency. We would like to see a common approach taken to cost recovery for similar costs (ie ESV levy, insurance, minor repairs)	**Incentives**	We seek assurance that the proposed CSIS will produce service improvements to customers that are well above what customers would expect from the investments in IT that have been proposed. Customers should not pay twice.

Revenue & Price

Prices for residential customers will fall

Residential customers in Victoria will receive reductions in the price of distribution service in 2021 from between $110 to $24.

Price reductions are gratefully received by customers. There is evidence that price reductions being offered are not large enough in the circumstances



Are revenues falling as much as they should be?

The AER's chart (right) shows the drivers of revenue in 2021-26 compared to the current period 2016-21.

The Weighted Average Cost Of Capital (WACC) which is used to determine the return on investment is calculated using market factors including 10-year bond rates which are at very low rates.

Together with the AER's recent decision on tax that has reduced the revenue businesses receive as tax compensation, the lower WACC and the tax decision mask the fact that most of the other building blocks are actually increasing - opex is higher (except AusNet and United Energy), capex programs are larger (except AusNet), incentive payments are high, and depreciation is also higher (except Jemena).

In the absence of the lower WACC, revenues and prices would be rising. We therefore question whether networks would be making the same investment decisions if WACC was steady? Are networks investing for the benefit of customers? Are customers paying more than they need to at this time?

Drivers of revenue change (SCS and metering services

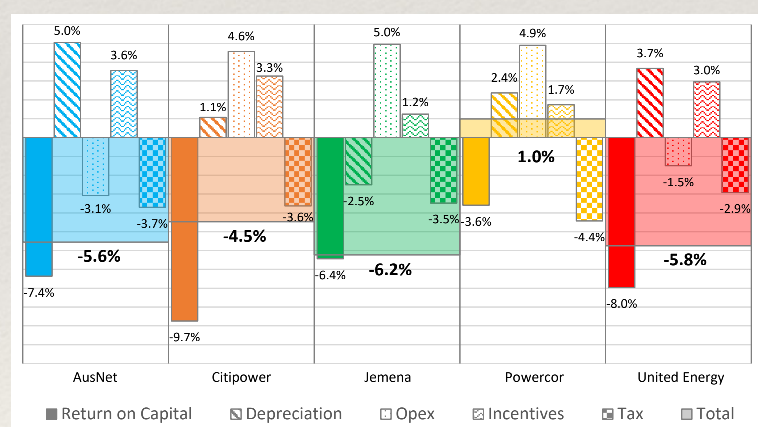


Chart reproduced from AER Issues paper, April 2020 p27

We encourage the AER to apply the same level of scrutiny to the regulatory building blocks in this period as they would in a higher WACC environment.

That said, we are aware that a declining revenue environment provides opportunities to make some important decisions that would be more difficult if revenues were rising - decisions to invest in new technology, and to implement tariff reform. This opportunity should not be overlooked.

What are the long term implications for affordability?

The AER must balance the needs of today's consumers with those of tomorrow's customers. In all cases, except AusNet, the Regulatory Asset Base (RAB) is growing in real terms, which means that future customers will have a larger cost burden than todays' customers.

ECA is keen that networks plan their investments with a strategic long-term focus to ensure that programs are forward thinking and do not display the boom-bust cycle of investment.

It is important that networks consider the long term sustainability of their investments and aim for a stable RAB to ensure that customers face an affordable future. To that end, only AusNet shows a reduction in RAB, albeit from a very high base following 10 years of investment in bush fire resilience.

Key numbers

Issue	Jemena	AusNet services	Citipower	Powercor	United Energy
Average price change - residential (p.a.)	-$64	-$110	-$38	-$24	-$54
- small business (p.a)	-$148	-$62	-$119	-$68	-$238
Total revenue	$1285m	$3182m	$1,611m	$3,690m	$2,247m
RAB change (2021-26) per customer	4.2%	-6.3%	5.0%	7.4%	7.4%
Opex	$576.6m	$1222m	$569m	$1537m	$798m
Step change - positive	**+ $42.4m**	**+ $14m**	**+ $43.7m**	**+ $98m**	**+ $85.6m**
Capex	$781m	$1478m	$852m	$2140m	$1219m
Repex	Up 5%	Up 14%	Up 166%	Up 53%	Up 47%
IT	-18%	-12%	Up 65%	Up 18%	Up 48%
Connections (net)		$210.2m	$134.8m		$129.3m
REFCL (capex)	$52m	$197.3m	n/a	$173m	n/a
DER capex	**$34.8m**	**$42.85m**	**$44.6m**	**$74.3m**	**$61.8m**
Incentive payments	**$49m**	**$141.7m**	**$54.1m**	**$76.3m**	**$117.9m**
Metering price change	-37%	-31%	-21%	-13%	-14%
Capital underspend (2016-21)	$95m (13%)	$102m (5.5%)	$228m (28%)	$200.6m (11%)	$166m (17%)
Revenue / customer	**$3645**	**$4655**	**$4701**	**$4415**	**$3280**

Capex - augmentation

The Victorian networks have sophisticated investment programs that are underpinned by high quality engineering and sophisticated investment models refined over many years. We have reviewed the forecast methodologies of each network which are largely similar and appear consistent with best practice.

Augmentation expenditure (Augex) is driven by network constraints caused by higher demand from new and existing customers. Augex is typically lumpy and needs to be considered on a case by case basis.

Peak demand is forecast to be relatively flat by all networks over the 2021-26 period. Localised pockets of higher growth due to land rezoning and urban infill are driving specific projects.

Augex also considers network constraints driven by solar export. This issue of managing Distributed Energy Resources (DER) is discussed separately.

AusNet

We note that the Customer Forum reviewed AusNet's augex program which is relatively small compared to its other programs. Further we note that the Customer Forum challenged AusNet to defer several zone substation augmentations on the basis that customers were concerned about affordability and the reliability impact of deferring these projects was relatively minor.

We consider… that the process of challenging the timing of major augmentation works should be applied across all networks.

In an environment where focus on affordability is top of mind, projects should be deferred where the reliability impacts are relatively minor, not simply triggered when the investment criteria is met. This is particularly the case as:

- demand forecasts are often made 7-8 years in advance and actual demand can deviate from the forecast over that time particularly if economic conditions change,
- deferring capex out of the regulatory period can mitigate the likelihood that businesses are rewarded for capex deferral regardless of whether it is the result of a change in demand, or whether the project simply runs late.

It is in customers' interests that timing of major projects be challenged and weighted in favour of deferral where reliability impacts of doing so are minimal. This will help to reduce the financial impost on customers.

Jemena

Jemena has forecast a 58% increase in augmentation expenditure compared to the current period. A large proportion of this expenditure relates to REFCL and DER, both of which we have commented on separately in this report.

Jemena's remaining capital projects have been the subject of customer engagement, detailed analysis and testing for non-network solutions.

Jemena's compliance with ISO 55001 asset management standards provides us with comfort in its augmentation program.

That said, we would ask the AER to challenge the timing of major projects to ensure that the impact of a slowing economic environment is taken into account.

Citipower

Citipower's augmentation program is designed to address forecast increases in demand driven by rezoning of land near Melbourne's CBD, as well as upgrading of ageing zone substations that show deteriorating asset condition.

We support Citipower's strategy to upgrade supply in the Fisherman's Bend, Brunswick and CBD areas and support the progressive removal of historical 6.6kV distribution assets with higher capacity and more efficient equipment that provides improved flexibility in future. This is consistent with strategies in other networks both in Victoria and NSW.

We are not convinced by the need to install communication devices at contestable metered sites as part of the Digital Network Program. We consider that efforts should be made to gain access to the existing contestable meter data before investing in a $5.5m program to install separate equipment to duplicate the information.

Capex - augmentation (2)

Powercor

Powercor's augmentation program is dominated by the REFCL program and its solar enablement program. These are both discussed elsewhere.

Powercor hopes to spend $9.1m to upgrade supply in Western Victoria. This project, consists of four feeder upgrades from single phase to three phase supply. It reflects the outcome of customer engagement and strong community support.

We note concerns about whether all customers should pay for the upgrade. However, we consider that there are many instances where customers who are not beneficiaries of projects are asked to pay for them. The key issues from our perspective are:

- The current VCR methodology is not sufficiently granular to reflect the value specific rural communities place on reliability, and
- Should the AER allow economic benefits of this project to be incorporated into the cost-benefit analysis due to the problems with VCR above?

We would encourage the AER to work collaboratively with Powercor to find a way to support projects such as this which are being driven by customers.

This project demonstrates that the industry is changing to reflect the voice of the customer and willing to collaborate to find solutions. We consider the draft criteria put forward to be a reasonable starting point for circumstances where economic benefits are included.

We have reviewed the major projects and a selection of feeder projects and we are satisfied with the analysis and modelling that underpins the projects. We note our previous comments about investment timing and ask the AER to review timing of projects and defer projects where there is minor reliability impact of doing so. Powercor note that certain feeder projects could be delayed with DM. They have confirmed that there is no DM assumed in the proposal and that this document, together with the Annual Distribution Planning Report is a call for DM.

Powercor argues that a proactive replacement program to remove all EDO fuses from the network this period has higher benefits than a partial program - it also has a higher cost. In circumstances where customer's primary concern is affordability, a smaller program should be activated. We also question why a proactive program such as this would not be considered repex. Given the number of step changes Powercor is seeking and the pressure on prices we would recommend the program be considered as part of a general replacement program.

United Energy

Like Powercor and Citipower, United Energy has a robust investment framework. We are pleased to see United Energy's commitment to DM continue through its Summer Saver scheme and the fact that the scheme continues to defer investment.

We are satisfied with the underlying driver of the major projects. However, we will again leave it to the AER to determine whether projects can be deferred further if reliability impacts are minimal.

We note that United Energy, like Citipower and Powercor have argued that the LV network augmentation programs do not overlap with the solar enablement program. The explanations appear reasonable but given the size of the solar enablement program, we support the AER's investigation to confirm there is no overlap.

Capex - Connections

Customer connection volumes are difficult to predict, particularly in uncertain economic times. The current economic slow down is likely to slow growth rates compared to previous periods. However, Government investment to counter the impacts of slower economic growth will no doubt continue if not increase. However, large projects are generally one-off projects that are lumpy and do not contribute to the underlying trend.

All networks have shown pockets of high growth where new connections are forecast to be highest - areas on the urban fringe, inner city urban in-fill and areas where land has been rezoned from industrial to medium- and high-density housing. Much of this is driven by population growth which we expect to slow in the short term. Powercor also notes the increase in connection of embedded generation. It is unclear what the economic impacts will be on this sector.

United Energy

United Energy is expecting to connect 55,000 new connections at a cost of $129.3m capex (net cap cons). United Energy describes its forecasting methodology and compares the forecasts to others derived using alternative methods. We appreciate the robustness of the approach, but note that the changing economic circumstances mean the forecast must be reviewed.

United Energy intends to launch a new portal to streamline connection requests as Citipower and Powercor have done during this period.

We are concerned that … the expected cost savings from the portal were not shown in lower cost estimates in future. We expect customers to benefit from this strategy as soon as it is implemented.

We note that United Energy has tried to benchmark its unit cost rates using RIN data and refers to shortcomings in the RIN data. We rely on AER to assess whether the unit rates are reasonable but note that United Energy is seen as efficient in the AER's benchmarking analysis.

Powercor & Citipower

Citipower and Powercor have adopted United Energy's approach to forecasting that was accepted by the AER in 2016 and has applied this method to its foreccast since the Draft Plans in 2019. The new methodology has resulted in a significant reduction in forecast connections capex for Powercor and a smaller reduction for Citipower.

We are pleased to see the efforts Powercor and Citipower are making to streamline connections processes and note that the online portal has lowered costs. We are also pleased with Powercor and Citipower's commitment to connections timeframes following feedback from customers.

Powercor was expecting to connect 114,000 new customers at a cost of $336m and Citipower 17,700 costing $135m (both net of cap cons).

We expect …to see this forecast fall due to the economic slowdown triggered by COVID-19.

Jemena

Jemena has forecast a 6% growth in net expenditure on customer connections compared to 2016-21 period (13% growth in total customer connections). Jemena has based its connection forecast on ACIL Allen's growth forecasts as well as specific construction activity forecasts provided by ACIF for commercial activity.

We note that commercial/industrial customers connections contribute 50% of Jemena's forecast expenditure.

We consider… Jemena's forecast to be too high given the current economic slow down, and the pause in movement of people to Victoria.

AusNet

AusNet forecasts 30,000 new connections at a cost of $135m (net cap cons). AusNet has used historical averages over periods of 3-5 years to establish its forecast.

We are concerned… that history will not reflect the slow down in economic conditions. We are also surprised by the lack of independent forecasts used.

We recommend AusNet review its forecast given new economic circumstances and also consider independent forecasts for growth in construction activity and customer number growth as a check on any future forecasts.

Capex - DER

Victorian Government solar homes program

The Victorian Government solar homes initiative is turbo charging solar uptake by residential customers in Victoria.

Growth rates for solar uptake vary by network due to socio-economic factors such as income, dwelling type, and home ownership as well as the size of the subsidy offered by the Government which varies by postcode.

Approximately 30% of Victorian customers are forecast to have PV installed by 2026.

Customer research

Research by Victorian businesses shows a majority of customers support renewables and investment in a smarter grid.

Program design

The DER programs have been designed to optimise investment by improving the visibility of load flows on the low voltage network through enhanced connectivity models, improved visibility behind the meter (i.e. which customers have solar), and modelling future constraints based on forecasts of PV uptake. Together, this information allows networks to target investment to relieve network constraints where the benefits outweigh the costs.

Should all customers pay?

The networks will charge all customers for the costs of enabling DER. Powercor, Citipower and United Energy asked their customers whether all customers should pay for investments to facilitate solar exports. A majority of customers responded that only customers with solar should pay for network augmentation to facilitate solar export.

However, Citipower, Powercor & United Energy decided, as did AusNet and Jemena, that all customers should pay for DER on the basis that the benefits such as lower wholesale energy costs would flow to all Victorian customers.

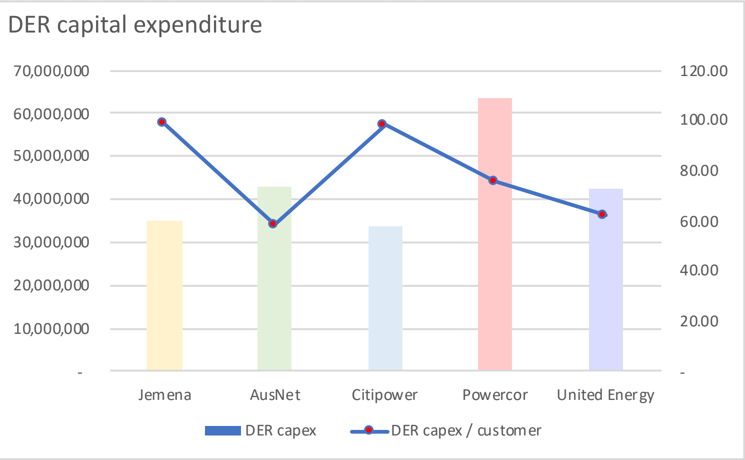
We have sympathy with the 'user pays' approach advocated by customers. We also support decisions that put downward pressure on prices for vulnerable customers who are less likely to be home owners and have PV.*

However, we note that the approach taken by the businesses is consistent with the Victorian Government's policy intent where the costs of the Solar Homes rebate scheme is borne by all Victorian tax payers, and the benefit of the program is the reduction in reliance on fossil fuels in Victoria which also accrue to all customers. With this in mind, we are comfortable with the DER program costs being borne by all Victorian customers.

*We note that some vulnerable customers such as pensioners may be home owners.

Program costs are high

The cost of the DER programs across Victoria is more than $230m which works out as approximately $60-$100 per customer over the 2021-26 period. This is a significant new cost.



The size of the program is larger for larger networks, but we note that the cost per customer is highest in networks with a smaller customer base. We are concerned about the costs for Citipower in particular given its CBD locale.

It is also important to compare the types of program included in the DER costs. If Citipower, Powercor and United Energy's Digital Network Program is included in costs (the program is required to operationalise the solar enablement program) it adds a further $41m which increases costs per customer of these networks to $130 (Citipower), $89 (Powercor), and $90 (United Energy). AusNet becomes an outlier in terms of lower costs.

Capex - DER

Program assumptions are not all clear

The businesses have taken different approaches to modelling the impact of PV on the network and calculating the cost of the DER programs.

Citipower, Powercor and United Energy have modelled forecast constraints on the network using AMI data. The businesses have designed the program to enable 5kVA to be exported onto the grid 95% of the time. Without the program, the modelling suggests that customers would forgo significant benefits of lower cost wholesale energy.

AusNet has modelled its outcomes in terms of voltage improvements rather than removal of constraints. Although the two concepts are related, voltage improvement has a wider reach across the customer base. It appears that the extent of constraints being lifted in AusNet's network area is lower than in Citipower, Powercor and United Energy's network areas.

Jemena has not yet modelled its LV network and its modelling of constraints is higher level in comparison to other networks. It should be noted that Jemena's lower level of solar installation provides time for Jemena to develop its network models before constraints start to bind. That said, we are concerned that better, more granular information will show that initial estimates have been overly conservative and are higher than required.

It is generally unclear how the costs of relieving constraints has been calculated. Citipower, Powercor and United Energy commissioned Jacobs to identify the costs of likely remedies. We know that there is a range of possible remedies for voltage issues from phase balancing to upgrading feeder capacity, but it is unclear what mix of these remedies has been used to build program costs.

Citipower, Powercor and United Energy note that investment in Digital Network Program will help them operationalise the solar enablement program.

We are concerned… that conservative assumptions have been used to develop costs and that when LV models are operational, better information will reveal that lower levels of investment are required.

We recommend… AER take a conservative approach to awarding capex allowances in this period given the models on which the programs are based are yet to be finalised. In addition, AER should review the cost of remedies included in program costs to ensure they represent a realistic mix and an efficient cost.

Finally, we note the costs of the DER programs are linked to constraints which are linked to forecasts of PV uptake. A COVID-19 driven economic recession could slow the uptake of PV and push out constraint timing. If this is the case, we would expect program costs to fall in the 2021-26 regulatory period.

BUSINESS	Customers with solar		DER investment outcomes	Capex		Opex
	2020	2026				
Jemena	13%	28%	All solar customers can export 5kVA	$34.8m		$3.8m
AusNet	19%	31%	99% customers enjoy improved voltage, 70% of previously constrained export is enabled	$42.85m		$0.0m
Citipower	4%	24%	All customers can connect solar, 5kVA solar export enabled 95% of the time. Constraints are removed where economic benefit is higher than cost	$33.6m	($44.6m)	$1.3m
Powercor	18%	34%		$63.3m	($74.3m)	$6.2m
United Energy	11%	23%		$42.4m	($61.8)	$4.2m
Total costs			*Note: costs in brackets include the Digital Network Program	**$217m**	**($258m)**	**$15.5m**

Capex - REFCL

REFCLs will cost customers more than $1billion

The Rapid Earth Fault Current Limiter (REFCL) program was an outcome of the Victoria Government's response to the 2009 Black Saturday bush fires. Ten years later, REFCL remains a significant driver of capex for Powercor, AusNet and to a lesser extent, Jemena.

Much of the REFCL program has been delivered but Tranche 3 will be delivered in 2021-26 period. Powercor and AusNet have borne the brunt of the REFCL requirements with 22 REFCLs required in each network. Jemena has one REFCL to install this period in a joint project with AusNet.

Compliance with the REFCL requirements is costly in terms of capex but also requires ongoing testing.

Does REFCL work?

Several REFCLs were operational during the 2019-20 summer and there is evidence from both AusNet and Powercor that REFCL did its job and protected customers from more than 100 potential fire starts. The program has been an expensive government initiative for Victorian customers.

Research conduced by the Victorian businesses, particularly AusNet and Powercor showed that customers were very concerned about bush fire safety and prepared to pay more to lower bush fire risks. However, it is not clear that the billion dollar of the REFCL program was communicated to customers during that engagement.

Costs in 2021-26

Powercor is seeking $186m for Tranche 3 and for testing this period, AusNet $153m, and Jemena $53m. Together the REFCL program is forecast to cost $400m in this period which is more than $200 / customers within these networks. This is a significant new cost for customers to bear.

Jemena and AusNet are working together to design a compliant REFCL installation within Jemena's network. The costs of the options being considered vary widely and discussions are underway between AusNet, Jemena and ESV to identify ways to reduce the expense of the Tranche 3 REFCL solution. We applaud efforts by these businesses to reduce costs to customers.

Powercor says it is seeking to reduce costs to customers by combining REFCL works with other augmentation works where possible.

It is not clear whether the businesses have updated their bushfire risk assessments for other assets (i.e. pole replacement) on the basis that the REFCLs are in place and are working to reduce the risk of fire starts.

We recommend .... AER review the capex estimates to ensure they align with exemption discussions that are currently underway to ensure they reflect any lower cost options if they are approved by ESV.

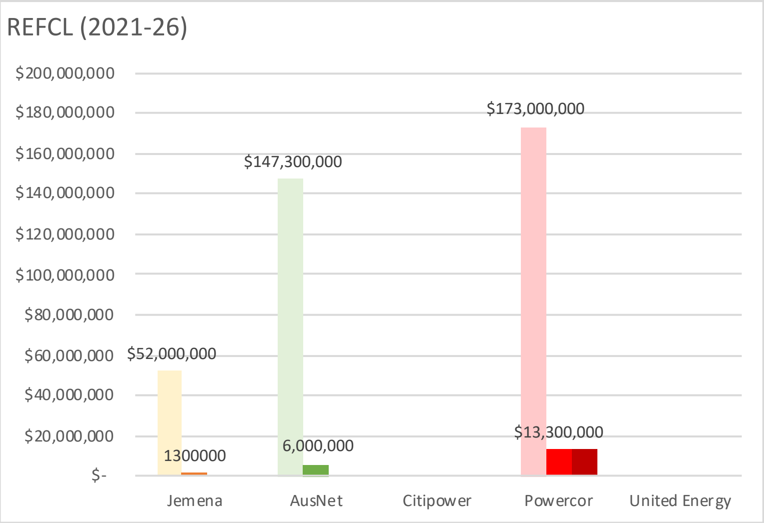
Reliability

REFCL is impacting negatively on reliability in some areas of the network. Powercor is seeking $13m to fund ACRs to restore reliability to normal levels.

Have these poorer reliability outcomes been reflected in STPIS outcomes? We would expect STPIS targets to be set to take account of the expected reliability improvement to ensure that customers do not pay twice - once for capex to fix the problem, and again when performance improves under the STPIS.

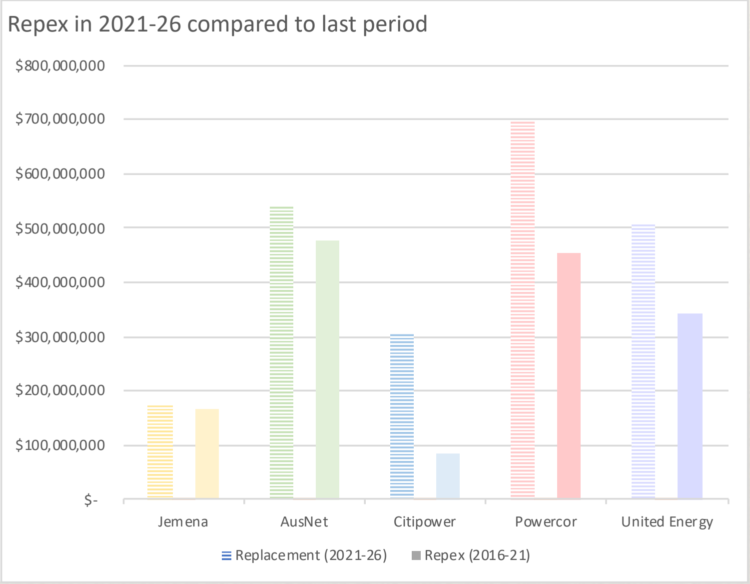
The costs of the REFCL program are over $1billion ($690m approved by AER previously, and up to $400m in this period).

We expect... active consideration of whether other bush fire related costs and risk assessments can be offset given the evidence REFCLs are working to mitigate risk.

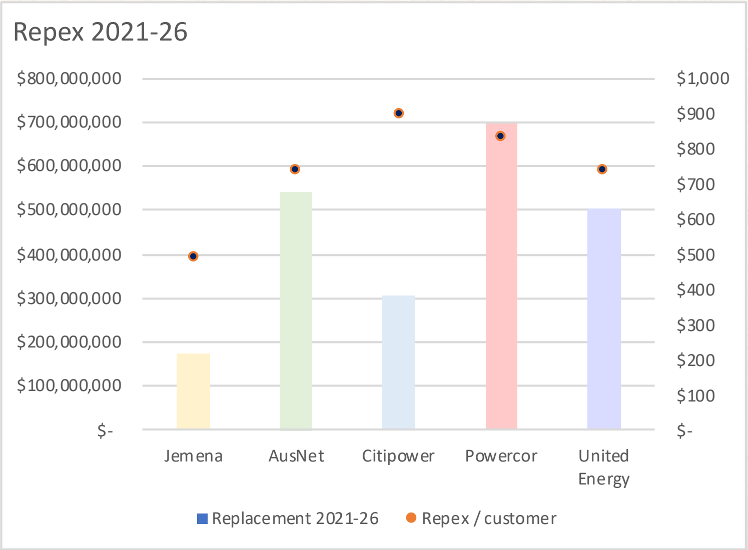


Capex - Replacement

The following chart shows the 2021-26 capital replacement expenditure forecast compared to the expected replacement expenditure in 2016-21. It shows in all cases that networks have forecast an increase in replacement in the 2021-26 period compared to last, although for Jemena, the increase is marginal.



Most businesses have applied the AER's repex model to their programs as a starting point comparison. However, not all replacement is modelled and therefore reviews of specific programs are required.



Powercor

The most significant driver for the increase in expenditure for Powercor is a change in replacement criteria for poles in response to ESV findings in relation to pole replacement criteria. 34% of Powercor's repex program is being spent on pole replacement. Pole replacement is discussed separately.

Citipower

Environmental compliance and changes to its pole replacement program are the most significant drivers of Citipower's replacement program increase.

United Energy

Environmental compliance requirements is the biggest driver of increased repex for United Energy. Environmental compliance is discussed separately.

AusNet

AusNet has proposed a $476m program for repex which is 14% higher than last period. We note that AusNet has included programs previously categorised as 'safety programs' in its repex as well as some programs previously related to metering.

The Customer Forum has negotiated $78m worth of major repex projects leaving almost $400m of repex to be reviewed by the AER.

Pole replacement makes up 33% of the total program and the level of spend is commensurate with pole replacement this period.

Jemena

Jemena's $211m replacement program represents a 10% increase on the previous period. The main drivers for the increase in expenditure are larger programs to replace zone switchgear and control systems.

The explanations provided for both programs are cogent and we take comfort in the fact that the programs have been designed under the ISO55001 asset management framework.

Repex - Applying the model

Citipower

Citipower has applied the Repex model. The total program forecast by Citipower is significantly higher than the Repex model would suggest, particularly in categories of switchgear, transformers, SCADA and protections systems as well as pole replacement, and environmental compliance (the latter two are discussed elsewhere in this report).

Citipower has a large program of major replacement works in the CBD. A risk monetisation methodology is used to determine the timing of asset replacement which we have reviewed. The replacement programs for switchgear and transformers reflect the lumpy nature of large asset replacement. We are satisfied that the major replacement projects put forward by Citipower are justified.

Citipower, Powercor and United Energy's service line replacement program forecast is higher than in previous periods due to a proactive replacement of Neutral Screen Services and Twisted PVC services over a 10 year period which contributes a ~30% uplift to the underlying program. We support this program on the basis that United Energy has specifically discussed this issue with customers and shown the likely bill impact. Customers supported these programs despite the higher cost.

Powercor

Powercor has applied the Repex model. At a total level, Powercor's repex program is significantly higher than the Repex model would suggest.

However, the largest variances are in relation to pole replacement and environmental compliance (both issues considered below). When these two programs are removed, the overall repex program is consistent with the Repex modelling provided by Powercor.

United Energy

United Energy's repex program shows forecast expenditure to be higher in every category other than overhead conductors and underground cable replacement.

The Repex model uses historic expenditure and costs to forecast expected replacement requirements. As a result, it may not reflect future conditions particularly for equipment such as switchgear and transformers which are replaced based on individual asset condition rather than as a class of assets.

We support the replacement programs for these larger asset types including United Energy's readiness program to enable greater use of mobile transformers to manage risk and consequence of transformer failure.

AusNet

AusNet's analysis shows that the majority of its replacement programs are lower than the Repex model outcomes with two exceptions - pole and switchgear replacement. We understand the limitations of the Repex model in relation to switchgear and large transformer replacement.

We are pleased to see AusNet's explanation of why its forecasts are in many cases significantly lower than the Repex model outcomes. Based on these explanations we are comfortable that AusNet's forecast does not represent under-investment in the network, and that the categories in which there are higher forecasts can be adequately explained.

We note the largest programs of conductor and service line replacement are in fact lower than previous periods. However, we are unable to analyse the programs further as the supporting documents have confidentiality claims applied. We leave it to the AER to determine whether an increase of 14% in repex is too high in the 2021-26 period, particularly in light of underspent repex in the previous period.

Jemena

Jemena has applied the Repex model. Overall, the modelled outcomes are higher in total than Jemena's forecast.

In category terms, the largest variations are in switchgear (Jemena's forecast is higher) and transformer replacement (Repex forecast is higher). Jemena explains this reflects the lumpiness of investment in these large components, and shows the change in focus in this period.

Repex - Pole replacement

Citipower, Powercor, United Energy: Pole replacement

The largest component within the repex forecast is pole replacement.

Citipower, Powercor and United Energy have all adopted new asset management practices developed by Powercor in response to ESV findings of changes to Powercor's asset management assumptions of wood strength over time. ESV also made recommendations for Powercor in relation to implementation of its asset management strategy and strategic analysis of data.

As a result, all three companies have incorporated a step up in maintenance costs and pole replacement: Powercor is proposing ~250% increase in pole replacement, Citipower 400% increase and United Energy 15% increase.

Fire start risk reduction - pole replacement and REFCL

We recognise the difficulty that Powercor faces in addressing community concerns about bushfire risks. The ESV's involvement has indicated ways it believes Powercor can change its criteria to increase the number of poles replaced, thereby further reducing risks of fire starts.

We note that Citipower, Powercor and United Energy have included statements in their proposals that their existing pole management practices have led to very low levels of pole failure.

We have not seen whether the businesses have considered the billion dollar REFCL program and the significant reduction in risk of fire starts that it is believed to account for in each network's risk assessments for poles.

We would welcome further clarity on whether the two programs should be linked and considered as working together to reduce risk, with a view to ultimately reducing the cost to customers.

We are concerned that Powercor's customers are being asked to fund $480 per customer for pole replacement and REFCL this period. This is a significant impost on customers in addition to normal network operational costs over the period, and one we think that Powercor should be working to reduce.

We do not understand why the increase at United Energy is so modest in comparison to its sister organisations. We note that United Energy has applied its risk based pole replacement program to High Bush Fire Areas (HBFA). It is not clear what risks have increased for Citipower that would prompt such a significant increase in pole replacement as there are no HBFAs in Citipower's network. A better explanation of this part of the methodology would be helpful.

We support … an increase in pole replacement if there is evidence that the asset management system has been lacking and that residual strength of poles over time had not been considered in the replacement criteria. However, given the level of expenditure and the low levels of pole failure to date, we ask that the AER review the modelling to assure itself that the parameters have been correctly applied.

We are concerned… by the suggestion that ESV has found gaps in Powercor's asset management system that suggest a lack of strategic oversight and strategic analysis of data.

We support a review of Powercor's Reliability Centred Maintenance (RCM) methodology for other asset classes to ensure similar gaps are not present that may also lead to customers being asked to fund a step up in replacement of other asset classes in future.

It is in customers' interests that replacement expenditure does not follow a boom-bust cycle. A sustainable level of replacement helps keep prices stable and RAB growth relatively flat.

AusNet

AusNet's pole replacement forecast is stable at $202.1m which represents a 1% reduction on comparable spend in the current period. We note that AusNet has flagged an ESV review of its pole replacement methodology which could lead to changes to the program.

We are unclear as to whether the historic program includes poles replaced under the special Powerline Replacement Program. Any comparisons between periods should take account of the impacts of this program and compare like with like.

We trust the ESV will take account of failure rates and affordability concerns when performing this review.

Jemena

Jemena has forecast a steady pole replacement program and unchanged replacement criteria. We would be surprised if changes are required to Jemena's replacement program given its pole failures in recent years have been very, very low - 2 failures in 2017 and 1 failure in 2018.

Repex - Environment

EPA requirements

Changes to the EPA in Victoria were planned to apply from 1 July 2020. The policy is designed to move from a reactive framework of managing pollution to a proactive framework of managing risk.

The amended Act applies a General Environmental Duty to all individuals and companies in Victoria:

> *"A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable."*

The EPA has indicated it will work with industry to develop a Compliance Code to identify the best ways to identify, assess and manage risks. This will help utilities understand the actions that would be considered 'reasonably practicable' in the circumstances.

Citipower, Powercor, & United Energy

Citipower and Powercor have undertaken a desk-top assessment of the likely impact of the EPA changes. Oil containment, land contamination and noise pollution were identified as being the most significant drivers of new expenditure.

We consider that… expenditure on oil containment is reasonable and note that bunding and water treatment facilities are included in all new facilities.

Citipower, Powercor & United Energy are proposing to achieve compliance with the EPA Amendments over time by targeting worst affected sites in the 2021-26 period. We support this approach.

The businesses have included estimates of remediation costs in their proposals. We have raised concerns that the estimates represent an overly conservative approach to compliance in both volume of affected sites and the cost of remediation.

We consider … the estimates for noise abatement in the proposals to be high and reflect a very conservative approach to compliance. Powercor confirmed that there have been no noise-related complaints to date that have led to noise abatement expenditure. We reject the estimates put forward by Citipower $58.9m, Powercor $30.5m and United Energy $66.71m, particularly as there is little or no evidence that equipment noise is a problem for customers in these franchise areas.

A test case in Melbourne's CBD (Citipower's franchise) will help clarify the impact of the EPA Amendments on substation equipment operating within urban areas and the level of expenditure required to achieve compliance with noise pollution standards, if any.

Updated forecasts

On 18 May 2020, Citipower, Powercor and United Energy updated their forecasts to remove the capex and opex associated with the new amendments in response to advice the application of the amendments would be delayed.

Jemena

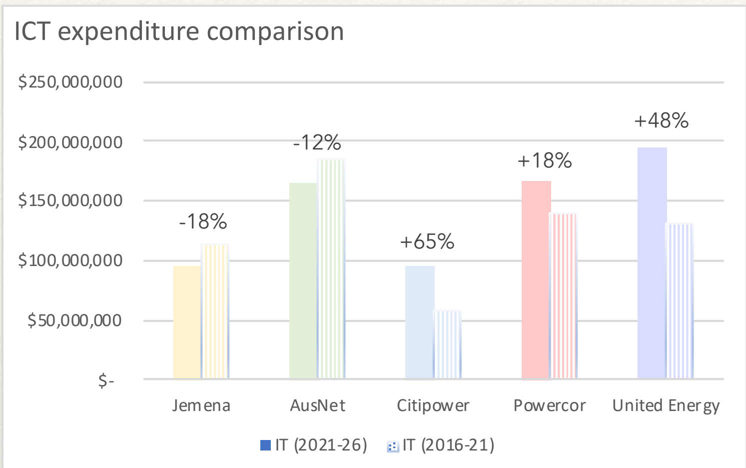
Jemena is subject to the EPA Amendments but has not sought a step up in capital expenditure. Jemena has sought $4.5m in opex to review its environmental risks, upgrade its environmental management plans and reporting mechanisms so as to proactively demonstrate compliance with the new obligations. Jemena has provided a detailed breakdown of costs and the approach appears reasonable. However, we would like Jemena to engage with the EPA to confirm compliance requirements, and review its cost estimates in light of the deferral in the date of the regulation's application. More time may allow costs to be smoothed over time and more costs be borne as part of normal business costs - a similar approach to AusNet.

AusNet

AusNet Services considers that compliance with the EPA amendments will cost $1m. AusNet was encouraged by the Customer Forum to absorb these costs as part of absorbing a suite of non-material cost increases. AusNet is relying on its existing asset management systems and a modest upgrade to its compliance framework to demonstrate compliance.

We recommend …. the AER test the veracity of Jemena's compliance expenditure, and whether the differences between forecast costs of compliance relate to different levels of conservatism in compliance. We recommend compliance costs be addressed via the pass through mechanism if required.

IT - Citipower, Powercor



ICT investment is a growing area of investment for distribution businesses. Most IT investments are justified with clear statement of needs, risk and analysis of options. However, benefits are not always clear, particularly where the benefit is improved customer service. If customers are being asked to pay for the investment, it is reasonable that the customer benefit is clear, tangible and measurable. Where benefits are hard to quantify it is reasonable that the business takes part of the risk of the investment. This may include self-funding the investment until benefits are revealed.

We note the AER's guidance on assessment of IT projects which states that any IT investment designed to reduce opex should be accompanied by a negative step change in opex. It should not simply contribute to the 0.5% productivity requirement.

We have not seen any negative step changes in opex or reliability outcomes based on IT investments.

Citipower

Citipower will spend $96.1m on ICT in the 2021-26 period which represents more than 10% of Citipower's total capex program at a cost of $280/customer. It is 65% higher than its IT program in 2016-21 period.

We have reviewed much of the material presented and note the underlying strategy to invest in a smarter network was supported by customers. However, we are concerned that customers, whilst benefiting from these investments, may not be able to afford the costs in this regulatory period. The timing of these investments should be reviewed carefully and 'must have' capability balanced with 'nice to have' capabilities on the basis of affordability.

Much of the explanation of the IT investment program is consistent across Citipower, Powercor and United Energy as they have joint ownership and leverage common systems. The synergies achieved by three networks operating in the same jurisdiction is significant and should result in comparatively lower IT costs to their customers.

We have a couple of other concerns:

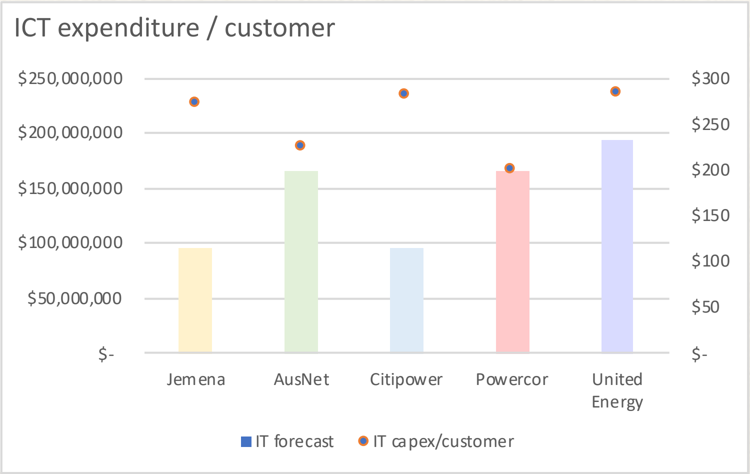
- Citipower intends to continue to migrate systems to Cloud-based systems. However, there is no mention of how moving to cloud offsets existing IT costs. We look forward to a more detailed explanation of why costs are increasing and how Citipower has offset the costs via tradeoffs.
- The intelligent engineering program is designed to improve GIS data, which will improve customer and worker safety when working on and around the network. It will also reduce costs of designing works by allowing more automation. We would like to see how Citipower has incorporated these lower cost outcomes in its forecast. It is not clear that these savings have been taken into account.
- The customer enablement program allows dynamic control of solar export and is argued to support a more equitable impact on customers wanting to export. We are not yet convinced that this program is a 'must have' in this regulatory period, particularly given the uncertainty around economic slow down and take-up of PV.
- We are not convinced that the change in the allocation of costs between Citipower and Powercor for IT systems costs is appropriate. Allocating costs on the basis of end beneficiaries (customers) or users (employees) seems reasonable. We suspect the allocation of costs on a 50:50 basis is driven by the effect of reducing pressure on Powercor's opex and benchmark efficiency which has been under pressure in recent years.

Powercor

Powercor has a $166m ICT program that is the cheapest program/customer of all the Victorian networks. It is 18% higher than its IT program in 2016-21 period.

The same concerns raised for Citipower are relevant to Powercor because the projects are the same.

IT - United Energy, Jemena, AusNet



United Energy

United Energy's ICT expenditure represents 16% of its total capex expenditure and is the largest program amongst the Victorian networks. United Energy spent $131m in the 2016-21 period. It's forecast for 2021-26 represents a 48% increase on its previous ICT program.

It is unclear from the proposals why the costs are much higher at United Energy for the same outcome. We note that the program is driven by a large number of refreshes to critical systems. We also understand that there is some 'catch-up' for United Energy to achieve the level of IT capability available at Citipower and Powercor.

United Energy has a significant underspend in the 2016-21 period for which it will receive CESS rewards. It is difficult for customers to reconcile large CESS benefits with large amounts of capital being sought again.

Furthermore, we expect to see how the productivity savings from future investment have been taken into account as lower forecast costs. We are concerned that customers will pay to improve efficiency through investment in new capabilities, and pay again via efficiency rewards when networks outperform their allowances.

AusNet

AusNet Services has forecast a $165m program of IT investment that includes significant upgrades to core network systems, streamlined data sharing and improved communication within the company. It is 12% less than its IT spend last period.

We note that the Customer Forum has reviewed parts of the program and as a result AusNet has agreed to absorb some costs (part of IT Cloud migration).

We also note AusNet's intent to capture the efficiency savings from multiple IT projects by applying a 1% productivity allowance to its opex (ie. double the AER's rate of 0.5%).

The Workforce Collaboration program ($8.6m) as well as the Information Management program ($13.8m) appear to be projects that other networks have self-funded in the past to improve efficiency. We consider the decision to include these projects in the IT program (i.e. not self-fund them) is a less risky approach for AusNet given the size of the opex program and the transformation program that continues at AusNet. However, we agree with the AER that it is unreasonable for customers to fund internal company improvements and also pay for rewards. We leave it to AER to determine whether AusNet's productivity rate of 1% is sufficient to ameliorate the risks of double dipping.

AusNet's $10.4m Outage Management investment is described as having benefits for planned outages. We suspect that it will also have benefits for unplanned outages and therefore would like to see how these benefits have been incorporated into STPIS targets.

Jemena

Jemena proposes a $91m program for the 2021-26 period which is 18% lower than the last period. Jemena has provided reasonable explanations for why it has chosen a baseline of IT expenditure to assess future recurrent spending. It shows recurrent spending is flat. The major non-recurrent components of the program are Future Grid ($15.7m), 5-minute settlement ($10.5), SAP migration ($5.6m) which are common to other networks. We rely on the AER to assess whether the costing of these projects is reasonable.

IT costs / customer is high for Jemena, but it is a relatively small network and is disadvantages by simple / customer comparisons. We note that spending is down on previous periods which provides us with some comfort about the estimate.

Non-system

Non-system program consist of corporate programs related to corporate office leases, vehicles, property including depot upgrades, and other costs that are not related to the network.

United Energy is the only business to forecast a higher non-system capex in 2021-26 than in the previous period. All the other businesses have forecast smaller programs.

Businesses have provided high level explanations for programs and high level costs. We therefore must rely on AER's detailed review of program costs.

AusNet

AusNet's program of $42.1m is largely consistent with spending in the current period when compared like with like.

We are concerned that the increase in vehicle leases occurs in the last year of the period, and if delayed would fall outside the period leading to substantial CESS benefits. We look to the AER to confirm that timing of lease expenditure is necessary and appropriate and unlikely to be gamed.

We support the innovation allowance (capex) of $6.4m and acknowledge the Customer Forum's work to ensure that programs are clearly articulated and are directly related to customer benefits.

Jemena

Jemena's non-system program ($18.2) reflects investment decisions made in the current period to delay the replacement of some vehicles as well as the large investments in property made during the 2011-15 period.

Consequently, spending on vehicles is high early in the period. We appreciate the detail Jemena has provided about standard lives for vehicles and consider its investment proposals to be reasonable. We note property investment is negligible this period.

Citipower

Citipower proposes a $20.7m program which is marginally higher than its non-system expenditure in the current period. The majority of expenditure ($15.4m) relates to property security. We note that Citipower and its sister organisation Powercor have proposed a staged program and will target the highest risk sites during this period. We appreciate this balancing of network need and affordability .

We sought clarification of why building upgrades were required for existing (not new) buildings. We were told that compliance requirements are triggered for a whole site when changes to part of a site reach a certain threshold. We understand the AER has also sought justification of this issue for Citipower, Powercor and United Energy. We rely on their investigation as to whether this expenditure is justified.

Powercor

Powercor's non-system program of $227.5m is 7% lower than last period. The majority of expenditure is on depot refurbishment, property security upgrade and fleet.

Powercor propose to replace or refurbish five depots during the 2021-26 period. The business cases provide the logic behind the investment but little detail on costing. We assume the AER will dig further into the costings to justify $114m.

We could find no information other than what was included in the proposal to justify $95m for fleet. We seek further information before we can comment.

United Energy

United Energy's program of $85.6m is significantly higher than the non-system expenditure program in the 2021-26 period. The upgrade of three depots at Burwood, Keyborough and Mornington contribute $68.9m. As is the case with Citipower and Powercor above, we are satisfied with the logic set out in the business cases provided, but are unable to comment on the cost of the program as there are no detailed costs included. We rely on the AER to determine the reasonableness of the costs.

The remaining cost of $16.7m relates to fleet and tools and equipment. We can find no supporting detail to justify these programs.

Opex - the base

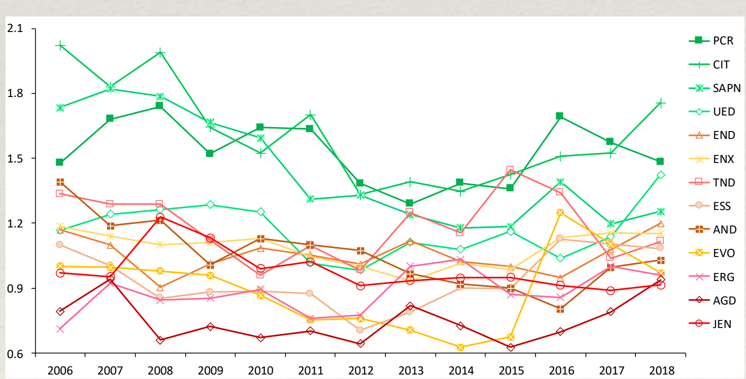
The AER uses the base-step-trend method to determine opex for distributors. An assessment of each of the three elements is required to determine the efficiency of the forecast costs.

Assessing the base

The AER's MPFP analysis for opex shows Citipower, Powercor and United Energy remain three of the top four performers. AusNet is ranked 9th and Jemena is ranked 13th out of 13.

All of the Victorian businesses are multi-utility businesses that share corporate costs across multiple businesses. This should result in relative efficiency of these businesses compared to others. It is therefore surprising to see Jemena and AusNet perform relatively poorly in the analysis.

DNSP opex multilateral partial factor productivity indexes, 2006–18



Source: Economic Insights, AER analysis.

p 16 AER Benchmarking report, Nov 2019

In recognition of declining opex efficiency relative to peers, AusNet and Jemena have undertaken transformation programs to reduce their base year opex. Are the cost reductions sufficient to represent an efficient starting point?

AusNet's transformation program has improved its relative opex efficiency since 2015 and has reduced opex by approximately $60m per annum to 2019. This is an impressive correction which can be seen in the steep incline in the chart (left) from 2016 onwards.

Given AusNet's relative performance to peers, we consider there is further efficiency to be achieved. We note AusNet's intention to absorb $21m of new costs as negotiated with the Customer Forum. As such, our concerns about the relative efficiency of the starting point is somewhat ameliorated.

We recommend AusNet use 2019 as the base year as it reflects the most recent full year of audited opex data and will have the full benefits of the transformation program contained therein. This is consistent with the base year used by Citipower, Powercor and United Energy.

We do not object to AusNet's base opex as a starting point for its opex forecast for the 2021-26 period but suspect that further efficiency will be achieved in the period. The AER will need to decide whether the productivity escalator is sufficient transfer of these savings to customers.

Jemena has used a base year of CY2018, consistent with the AER's recent decision for Jemena's gas business, as this year contains no additional costs associated with Jemena's transformation program and is at the lowest level within the 2016-2019 period. We support this approach.

We are concerned that Jemena's starting point is relatively less efficient than its peers based on the AER's analysis. However, we note that Jemena's transformation program is forecast to deliver a $9m reduction in opex per annum. We note that Jemena's base year opex is well below the AER's allowance for the current period and that Jemena forecasts its opex per customer to be constant over the 2021-26 period.

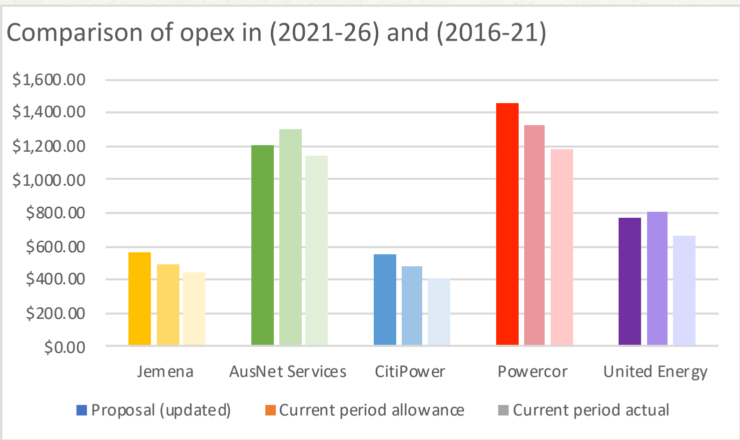
We do not object to Jemena's base year opex as a starting point for forecasting opex for the 2021-26 period.

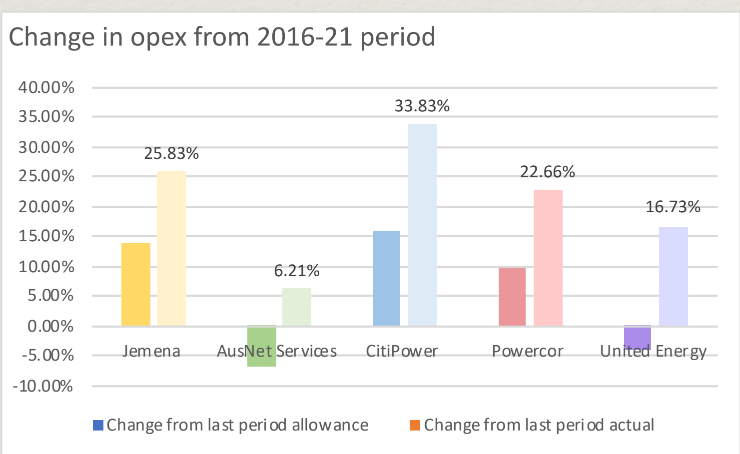
Citipower, Powercor and United Energy are shown to be the most efficient of the Victorian businesses according to the AER's methodology. In this light, it is hard to argue that their starting opex is anything other than efficient.

We acknowledge the improving performance for both Citipower and United Energy. United Energy's performance has improved considerably in recent years in response to decreased costs following the change in ownership and sharing of corporate costs with Citipower and Powercor. However, we note that Powercor appears to be on a downward trajectory in efficiency terms. This is of some concern as Powercor is the largest of the three businesses with more customers affected. We will look carefully at future costs to ensure that Powercor's efficiency remains at a high level.

We consider Citipower, Powercor and United Energy's base year opex to represent efficient starting points for their opex forecasts for the 2021-26 period.

Opex


Comparison of opex in (2021-26) and (2016-21)


Change in opex from 2016-21 period

Forecast opex is rising substantially

All networks propose an increase in opex for the 2021-26 period compared to what they have spent during the last period.

While some increase is to be expected, the size of the increases is surprising, particularly in the context of customer concerns about energy affordability.

Jemena, Citipower and Powercor have proposed opex increases above 20% compared to actual spend in the current period.

AusNet and United Energy have proposed allowances that are above their current spend, but below the allowance granted by the AER in 2016 (both have claimed significant EBSS benefits this period).

Step changes and re-categorisation of costs from capex to opex, and from metering (alternative control service) to opex (standard control service) are driving the significant step up in opex.

We consider the changes to opex require review for all networks (including AusNet).

Re-categorisation of costs

All networks propose to recategorise some costs prior to the start of this regulatory period. In some cases this results from changes to accounting standards (vehicle leases, AusNet) or regulatory decisions (wasted truck visits). Other changes have been at the behest of the networks who believe a re-categorisation of costs is more in keeping with the activity (minor repairs, Citipower, Powercor, United Energy), or more in keeping with the long-term interests of customers (capitalised overheads, Jemena). The increase in costs to opex is generally offset with a decrease to capex (or vice versa).

We are concerned about the impact of these changes on affordability, particularly for those networks already facing opex cost pressures of +20%.

We are also concerned that several of these changes were not the subject of consultation with customers. However, to the extent that the costs have historically been accepted by AER, the question is one of how to balance the impact on today's customers versus tomorrow's customers rather than an increase in costs overall.

Re-categorisation of costs in 2021-26 period

	Jemena	AusNet	Citipower	Powercor	United Energy
Change in capitalisation (capex to opex)	$60m				
Change in lease capitalisation (opex to capex)		-$34.5m			
GSL		$33m			
ESV Levy		$11.5m			
Recategorisation of costs			$26.8m	$33.5m	$32m

Opex - step changes (1)

The step change methodology is designed to cater for new costs imposed on businesses that are not reflected in the base year.

The AER states that a step change in cost must be related to a change in regulatory obligation and that obligation must be binding. Further, when assessing the step change, it will look to whether a business has chosen the most efficient option, has taken steps to minimise the cost of compliance, and if compliance can be met by existing allowances.

Step changes sought by Victorian businesses

There are $233 million worth of step changes being sought by the five businesses in the 2021-26 period. The bulk of these costs are being claimed by Citipower, Powercor and United Energy - businesses assessed by the AER as the most efficient businesses in the NEM.

The step changes contribute an increase in costs of between 1.4% for AusNet, and 9.2% for United Energy. For customers, the cost impact ranges from $23 (over 5 years) for AusNet's customers, to $120 (over 5 years) for Jemena's customers.

There are no negative step changes being identified to offset the positive step changes (increases) in costs.

Step changes	Jemena	AusNet	Citipower	Powercor	United Energy
5-minute settlement costs		$3,600,000	$1,900,000	$4,900,000	$3,900,000
Cyber security	$2,900,000	$4,700,000	$14,400,000	$14,500,000	$45,900,000
SAP upgrade					
Insurance	$28,800,000			$5,000,000	$2,200,000
REFCL*	$1,300,000	$6,000,000		$8,400,000	
Environmental Protection Act*	$4,200,000		$0	$0	$0
ESV levy			$1,500,000	$4,000,000	$2,500,000
New High Bushfire Areas*				$0	
Yarra Trams pole relocation			$14,400,000		
Transitional hedging costs	$900,000				
Change to financial year	$500,000		$1,800,000	$1,800,000	$1,800,000
DM projects					$8,600,000
EDO fuse replacement				$11,200,000	
IT cloud migration		$2,600,000	$2,300,000	$5,900,000	$4,700,000
Solar enablement / Future Grid	$3,800,000		$1,300,000	$6,200,000	$4,200,000
Total step changes	**$42,400,000**	**$16,900,000**	**$37,600,000**	**$61,900,000**	**$73,800,000**
Total opex	$576,600,000	$1,222,000,000	$569,000,000	$1,537,000,00(	$798,000,000
Step change as % of opex	**7.4%**	**1.4%**	**6.6%**	**4.0%**	**9.2%**
Cost per customer over 5 years	$120	$23	$110	$74	$108

* Citipower, Powercor and United Energy updated their forecasts for Environmental Protection Act compliance, and Powercor's estimates for REFCL testing and New High Bushfire Areas on 18 May 2020.

Opex - step changes (2)

The interaction between step changes and efficiency benefits

We are concerned that the step changes being sought may act to reset operating costs and establish a higher level of cost from which further EBSS benefits can be extracted.

In the 2016 reset, all businesses requested step changes in costs, and all were able to outperform the AER's allowance (except Citipower) which has led to $178.4m being claimed as EBSS rewards in the 2021-26 period.

According to the AER's methodology, the base year is revealed as an efficient cost because businesses have an incentive to reduce costs as far as possible to achieve efficiency benefits under the EBSS.

However, the step change mechanism does not operate symmetrically in practice. It is extremely rare for a business to put forward a negative step change. In practice, the methodology operates to increase the base opex from which businesses are incentivised to reduce costs. To the extent that a business over-forecasts the step change compliance costs, EBSS benefits are easily derived. Negative step changes are not identified upfront but tend to be revealed as efficiencies during the period.

It is important that the AER assesses the veracity of each step change to ensure that networks do not use step changes to generate more 'low hanging fruit', and that customers pay no more than required, no earlier than is necessary.

Forecasting compliance costs

Several networks explained that many of the step changes were extensions of existing regulations and were already being complied with which allowed actual compliance costs to be a guide for future costs. We accept this to be a reasonable starting point.

However, we ask the AER to test forecast costs for efficiencies of scale and scope. Fixed costs of compliance are unlikely to change, but the variable portion of compliance costs may decline as scope and scale increase.

The date on which several new obligations will apply is likely to change due to COVID-19 including 5-minute settlement and the EPA amendments. It is important that networks adjust their forecasts accordingly.

Comparability of costs

All businesses in Victoria have been subject to a change to the regulatory period from calendar year basis to a financial year basis. Despite the common requirement, the costs claimed by the businesses vary considerably.

AusNet has decided to absorb the costs at the request of The Customer Forum to absorb non-material costs. Jemena is seeking $500k to cover costs of additional audit of accounts, and Citipower, Powercor and United Energy who share corporate back office functions seek $1.8m each - a total of $5.4m to comply. We suggest the AER interrogate these costs as they appear much higher than identified by AusNet or Jemena.

Compliance costs vary with legal interpretation and risk appetite

Regulations imposed on businesses can be very specific, but increasingly, regulators are moving away from specifying inputs and prefer to specify outcomes leaving businesses to decide how best to achieve compliance. Regulators are also changing the onus of responsibility. Businesses are responsible for ensuring events do not happen, rather than being required to rectify things when they do. This means that compliance costs are a function of legal interpretation and risk appetite.

Example: Changes to EPA

Compliance with regulations is linked to legal interpretation and risk appetite. The EPA amendments were scheduled to apply from 1 July 2020 and impose a 'General Environmental Duty' on all individuals and businesses in Victoria, who must take steps that are 'reasonably practicable' to mange environmental risks. (We understand that the start date will be delayed).

We suggest the AER review the interpretations of compliance being taken by each business to ensure that customers are funding a similar level of compliance and risk management across Victoria.

Opex - step changes (3)

Customers may end up paying rewards for poor decisions

Example: Cyber security

All five companies are subject to compliance with new Federal Government cyber security standards for energy utilities. However, the costs range from $2.9m for Jemena to $45.9m for United Energy.

United Energy is forecast to receive $72.4m in EBSS benefits for opex efficiency improvements during the last period. However, customers could argue that reducing costs has not been prudent and that the under-spent expenditure in recent years should have been used to improve the cyber security of the business in line with obligations that are known to be forthcoming. By resetting the base line opex for United Energy, customers are being asked to pay rewards for levels of opex that are below the sustainable level, and being asked to pay to correct these decisions in the upcoming period.

Other companies who have a more robust cyber security system in place are disadvantaged as they did not receive EBSS benefits for reducing their expenditure to unsustainable levels nor make what turn out to be poor IT choices in hindsight.

The AER must take care to ensure the step change mechanism does not undermine prudent expenditure in the pursuit of efficiency rewards.

Commercial negotiations

A business's own commercial contracts may trigger legal obligations. However, it is not clear that a commercial contract would trigger a regulatory obligation and therefore meet the criteria for a step change.

In the case of Yarra Trams, we seek confirmation that commercial terms fall within the step change definition. Secondly, we seek assurance that the costs are valid and the contractual arrangements are in the interests of customers. Finally, the AER should satisfy itself that contractual arrangements have not been designed to avoid application of the shared asset guideline.

Different mechanisms to recover the same costs

Example - Bush Fire Insurance

All businesses are seeking to cater for forecast insurance cost increases. The step up in costs varies markedly across the five businesses, as does the mechanism each business proposes to use - opex step change (large / small), or pass through.

Jemena has sought a very large step change to cover expected increases in insurance premiums (worth 4.8% of total opex). In contrast, AusNet has agreed with the Customer Forum to absorb the recent increase in insurance costs, but has requested several new insurance related pass through events to capture events where it cannot obtain adequate coverage for the costs included in the proposal.

Powercor and United Energy have requested step changes for insurance that appear modest in comparison to Jemena which may be explained by a better starting point.

Example - ESV levy

All businesses are required to pay a levy to fund Energy Safe Victoria. The levy is based on customer numbers and thus varies by business.

Citipower, Powercor and United Energy have sought a step change in opex to cover the expected increase in the levy based on their forecast of customers over the period.

In contrast, AusNet has suggested a revenue adjustment be made within the control mechanism to recover the required amount of revenue each year based on actual customer numbers (i.e. this mechanism simply passes through the cost and does not require a forecast).

Jemena has included a specific forecast for the ESV levy (outside the base-step-trend methodology) based on ESV advice for levy payments to FY21. Jemena has held this forecast constant in real terms throughout the period. Currently the ESV levy is added to Jemena's total opex, but Jemena is also open to it being incorporated in the control mechanism as is currently the case.

Step changes must consider tradeoffs

Business should only make a decision to move IT systems to the cloud where the benefits of doing so are outweighed by the costs. Jemena has determined it will receive sufficient savings in avoided costs of software updates and other investment that it can fund the change within existing allowances. We seek evidence that all businesses have explicitly considered how cloud migration costs can be offset.

Opex - Trend

All businesses forecast wage pressure within the sector, but materials costs were forecast to be flat. Following the COVID-19 crisis, wage pressures are likely to soften in the early part of the period.

The AER in its decision for SAPN used Deloitte Access Economics (rather than an average of Deloitte and BIS) purporting that Deloitte more accurately forecast wholesale price increases nationally. In contrast, AusNet and Citipower, Powercor and United Energy all argue that BIS Oxford Economics is more accurate when looking at Victoria only. BIS argues that wage pressure in Victoria is likely to be higher than the National and All State Industries Average.

The analysis provided shows that there is no clear winner in terms of forecast accuracy. While we believe that Victoria's labour market is broader than the state of Victoria, and that a national wage forecast may be appropriate, we consider it prudent, particularly in the current economic circumstances, to use two forecasters rather rely on one.

Superannuation guarantee increase scheduled for 1 July 2021 to 9.5% and annually up to 12% by 2025/26 is not included in the official forecasts of labour costs. Citipower, Powercor and United Energy have added the super guarantee into their estimates of labour cost escalation.

We seek evidence… that the increase in the super guarantee will lead to an increase in total wages rather than a redistribution of salaries between super and taxable salary. To the extent that employees rather than employers bear the burden of the change to super, the adjustments to escalators are likely to be too high.

Weights of labour / materials input costs

Citipower, Powercor and United Energy argue the AER should use audited accounts to establish the weights of labour and materials rather than the AER's benchmarking model outputs. We note that businesses that have a higher labour input will receive higher revenues from relatively stronger labour cost growth.

We are concerned… that practices of cost allocation are not consistent across networks and that both the audited accounts and the benchmarking model reflect these differences (i.e. do not account for the differences). We consider that more work is required in this area.

Output growth

We are concerned… that COVID-19 will cause a slow-down in economic growth and connections, particularly in the early half of the period, and that the output growth measures underlying forecasts such as customer numbers, circuit length and matched demand are likely to be too high.

Productivity

All companies have applied the AER's productivity index to opex. We note that AusNet has agreed to absorb $21m of costs which it argues is equivalent to a further 0.5% productivity measure applied (total of 1%). In contrast, Citipower, Powercor and United Energy argue their position on the opex efficiency frontier together with having the productivity measure applied means they are unable to absorb any new costs. Collectively they have identified $173m worth of step changes ($866.5m over 5 years) in extra opex that customers will pay.

Real cost escalation	Labour	Materials	Output	Productivity	Labour / materials	Labour rate forecasts
Jemena	1.05%	0.0%	1.28%	0.5%	59.7% : 40.3%	Average of DEA and BIS
Citipower	1.99%	0.0%	1.5%	0.5%	70% : 30%	BIS Oxford
Powercor	1.99%	0.0%	1.9%	0.5%	77% : 23%	BIS Oxford
United Energy	1.99%	0.0%	1.9%	0.5%	77% : 23%	BIS Oxford
AusNet	0.58%	0.0%	1.39%	0.5%	59.7% : 40.3%	Average of DEA and BIS

Depreciation

Depreciation is the allowance provided so that capital investors recover their investment over the economic life of the asset. It is an important building block within the revenue formula.

All networks other than Jemena have sought an acceleration of depreciation for one or more asset class.

The following charts from the AER's Issues Paper shows that AusNet and United Energy have the largest variation in depreciation between periods.

AusNet

AusNet has sought to accelerate depreciation of some SCADA and Network control units which increases forecast revenues by $160m. This is a surprising decision at a time when affordability is a priority for customers.

An increase in depreciation means that the residual asset base value is lower. We note that AusNet is the only network whose RAB is declining over the period. However, the decision to accelerate depreciation adds to this decline and effectively means customers today are being asked to pay more than future customers.

In discussions, AusNet mentioned that its decision to increase deprecation was to assist cash flow which was under pressure due to the very low WACC. We find this a surprising admission and one that requires review by AER. We find it difficult to reconcile this decision with AusNet's purported customer focus.

Drivers of revenue change (SCS and metering services)

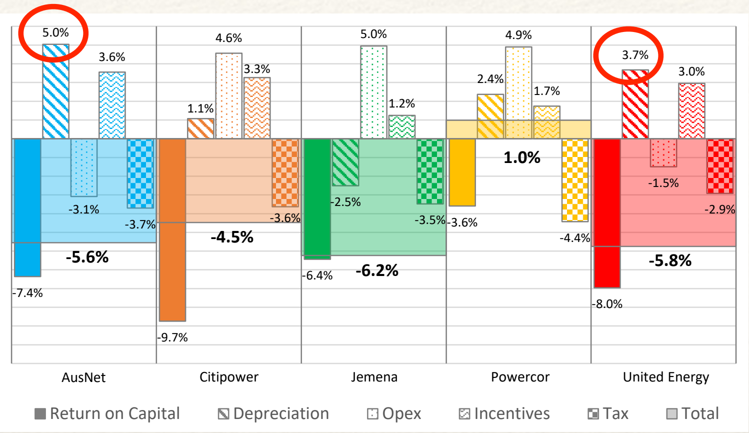


Chart reproduced from AER Issues paper, April 2020 p27

We also note that AusNet seeks to depreciate SCADA/ Network control assets over 10 years (5.6 years remaining). At Powercor and Citipower, the equivalent asset class has a remaining life of 13 years. We would like to understand what is driving this variance.

United Energy

United Energy has the largest proportion of revenue coming from depreciation compared to peers. We would like to understand what drives this outcome. Customers should not be required to pay a dollar more in revenue than is necessary to operate the network and the business.

Depreciation as a proportion of opening RAB

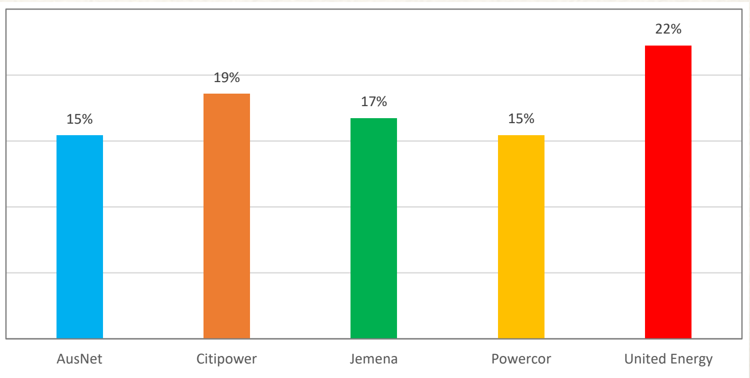


Chart reproduced from AER Issues paper, April 2020 p33

Solar enablement

Citipower, Powercor and United Energy all refer to increase in depreciation as a result of replacement of distribution transformers that cannot be tapped to provide for localised solar export. Has this hidden cost been taken into account in the costing of options?

Changes in assets lives

Significant changes to asset lives should be viewed with caution. Changing lives from 40-50 year assets to 10 year assets has a significant impact on revenue (see AusNet). Further, we would like to see how networks proposing such changes have considered smoothing the revenue impact over two periods.

We look forward to the AER's detailed scrutiny of depreciation.

Incentives

There are several incentive mechanisms that the Victorian distributors have taken advantage of during the 2016-21 period.

EBSS

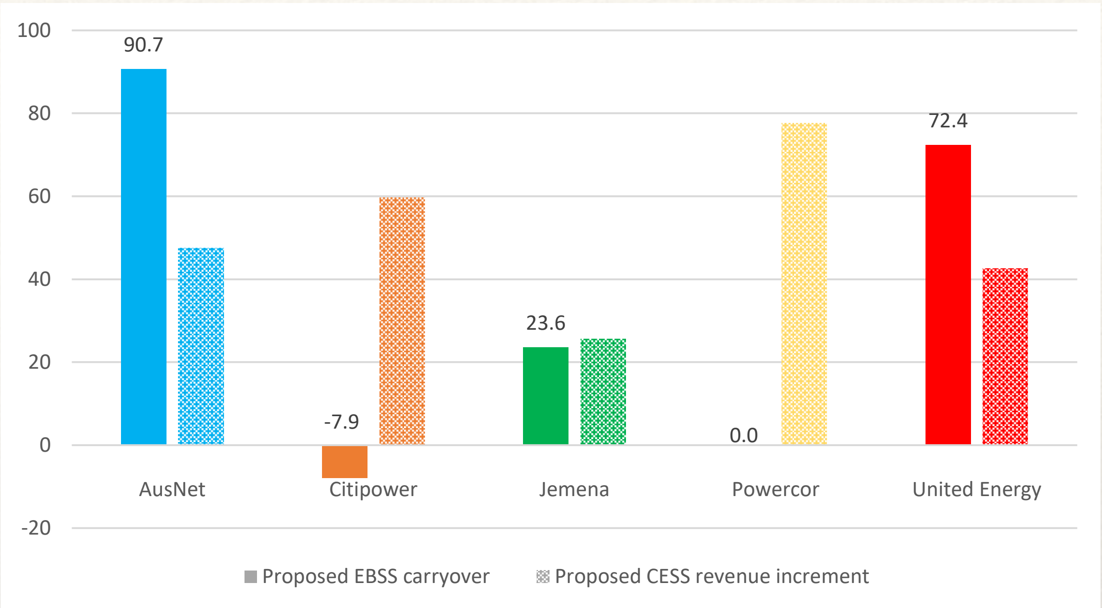
The Efficiency Benefit Sharing Scheme (EBSS) rewards businesses for ongoing reductions in opex, and penalises businesses that increase opex from year to year. The scheme is designed to pass 70% of efficiency benefits to customers and 30% to the businesses.

For the 2016-21 period, $178.4m will be paid to businesses as efficiency rewards which infers that customers will receive $416m worth of benefits over the long term.

The amount of extra revenue being paid to businesses shows the significant efforts being made to spend less than the allowance, or may also indicate that the AER's allowance was too generous in 2016.

Those networks that are performing relatively poorly in the AER's benchmarking analysis are set to receive the largest EBSS rewards in recognition of their efforts to reduce spending. Networks closest to the frontier are receiving almost no EBSS reward. The outlier is United Energy which is claiming $72.4m in EBSS rewards. The savings made in its costs are due predominantly to its change in ownership and the fact that it can leverage corporate costs shared with Citipower and Powercor. This no doubt compensates for the absence of EBSS rewards applicable to those networks.

Proposed EBSS and CESS carryovers, AER Issues Paper, p37



CESS

The CESS rewards businesses that reduce capital expenditure below their capex allowance and penalises businesses for any overspend. All five networks are expecting significant rewards under the CESS scheme for spending below the AER's allowance in 2016-21 - a total of $246m in CESS benefits has been claimed as rewards.

It is unclear whether these rewards are the result of systemic over-forecasting by businesses in 2016, under-delivery of required capex by businesses, a change in underlying drivers (i.e. change to growth compared to forecast), or clever deferral of capex by businesses whilst managing risks.

We are concerned …. when businesses under-deliver their replacement program, claim CESS rewards and then seek higher replacement capex in the following period. Businesses must be able to show how they managed risks in the interim. Otherwise customers will have borne the risks during the period and businesses received the benefit.

Ultimately, customers should know whether the CESS is rewarding efficient behaviour, happenstance, poor forecasting or an inability to drive project approvals through the internal bureaucracy. We consider the AER should look carefully at the CESS design to ensure it only rewards efficient behaviour. We suspect it does not.

Incentives (2)

All Victorian businesses seek application of the following incentive schemes:

STPIS

All businesses will apply the STPIS in the 2021-26 period. Reliability targets have been updated to reflect recent performance. We note the very good reliability outcomes experienced by Victorian customers in general which we assume can, at least in part, be attributed to the roll out of smart meters.

The networks have incorporated momentary outages in their parameters as required by the AER's methodology. The GSL component of the STPIS scheme does not apply in Victoria as a separate jurisdictional scheme is in place.

DMIS & DMIA

The Demand Management Incentive Scheme (DMIS) and Demand Management Investment Allowance (DMIA) are standard schemes within the regulatory framework designed to encourage networks to pursue DM and counteract the natural bias that networks have to pursue network solutions over DM solutions.

United Energy and AusNet lead the Victorian Networks in trials and successful application of innovative DM. The DM schemes need more support than ever at a time when capital is so cheap and growth capex so low. We hope that despite these economic circumstances, United Energy's positive experience with DM encourages others to pursue DM more vigorously in future.

GSL scheme

We are somewhat troubled by the networks' practice of estimating the cost of GSL payments as a cost line item. The STPIS works to ensure that reliability is not compromised in the pursuit of efficient investment and operations. The GSL scheme provides justification for the lack of reliability for some customers (who anecdotally rely on GSL payments).

We consider that customers should only be required to fund reliability payments for other customers if the costs of improving reliability to standard levels is prohibitive. Networks should self-fund payments where the failure to deliver services is within their control such as missed appointments, delays in connections, street lights not repaired within standard number of days.

F-factor scheme

The F-factor scheme applies in Victoria and incentivises networks to reduce the risk of fire starts from network assets. The F-factor scheme, together with other bush fire risk reduction initiatives such as REFCL has been very effective in reducing fire starts with all networks reporting declining rates of fire starts over the past 5 years. We have no objection to this scheme continuing for the 2021-26 period, but will be interested to understand whether the scheme is required once all REFCLs have been installed.

Innovation

AusNet services is the only business who has sought a specific allowance for Innovation. However, all networks have noted the importance of innovation and committed to pursuing innovation, predominantly through smart grid investments.

AusNet's proposed innovation program has been reviewed by the Customer Forum. As a result of this review, AusNet removed projects that did not have a clear link to customers. The Customer Forum supports AusNet's Innovation allowance of $7.5m ($1.2m relates to trials and is considered opex).

AusNet has shown a history of Innovation investment which we applaud. We note that AusNet intends to apply governance arrangements to the program similar to that put in place by Ausgrid which was approved by the AER. We would like to see AusNet share the results of its innovation program with other distributors to ensure that customers across Victoria and in other jurisdictions can benefit from its research.

In light of the AER's previous support for similar programs, and the support given by the Customer Forum for AusNet's program, we do not oppose AusNet's Innovation allowance.

Customer Service Incentive Scheme (CSIS)

All five Victorian distributors have considered the Customer Service Incentive Scheme (CSIS) but there is little consistency between the approaches taken. The different approaches shed light on the internal cultures of each network business:

AusNet has proposed a CSIS which has been supported by the Customer Forum as a mechanism to drive internal behaviour and improve outcomes for customers. AusNet was strongly of the view that an incentive mechanism with real dollars attached would make the customer service improvements impossible for AusNet's Executive to ignore.

Citipower, Powercor and United Energy state their intention to submit a CSIS in their Revised Proposals following further customer engagement. The proposed scheme is currently being designed.

These three companies have strong philosophical support for incentive regulation and have a history of outperforming incentive targets wherever they are set. However, it is disappointing that a Customer scheme was not designed earlier if the intention is to use it. The delay could be interpreted several ways.

In contrast, **Jemena** has withdrawn its proposal for a CSIS in support of its customers who gave a clear message that they expect good customer service as 'standard' and do not support providing additional incentives/revenues to networks to deliver what they consider should already be in the price.

We have two concerns… with the CSIS scheme as proposed:

1. **The standard service should be *good* service**.
   We have a similar view to Jemena's customers. There is a standard level of ***good*** service that should be included in the base price for distribution network services. Businesses should not be provided with additional rewards for delivering services that meet this standard.

2. **Targets should reflect the future state**.
   All distributors are planning significant investment in technology that will improve customer service in the 2021-26 period including:

   - allowing better access to customer data,
   - single portals for information,
   - tracking of connection requests,
   - automatic approval for solar connection,
   - Dynamic control of solar exports, etc.

   We consider it is inappropriate to base targets on historical performance at a time when a step change in service improvement is expected.

AER's Draft CSIS

The AER has done a good job in examining the issues associated with design of a new scheme.

We support … a flexible scheme whereby networks can propose parameters that are most meaningful to their customers.

We support … the proposal that customers must endorse the design of the CSIS proposed by a network. We hope that in consultation with customers, networks use professionals to help design the scheme to will measure what is purported to be measured.

We support … the AER's plan not to proscribe how networks obtain customer support but leave open the prospect for innovation in designing engagement activities and the scheme.

We are concerned … that targets reflect the change in baseline performance that has been used to justify inclusion of IT investment and programs to improve process in the regulatory proposal. Targets should be stretch targets so that rewards are not paid for the standard levels of performance - to do so would cause customers to pay twice for service improvements. A dead band where no reward or penalty is paid could be a useful way to address an expected step change in performance resulting from forecast technology investment.

Further issues for consideration

We offer some further issues for consideration:

- **Sufficiency and consistency of data.** Where a single network is proposing a scheme it is less important that definitions of parameters are consistent. However, it would be useful for the AER to start with a view to achieving consistency for similar parameters from the outset in order to increase the number of service parameters that could potentially used in future benchmarks. Our concerns about baseline data used to set targets is also relevant here.
- **Target poorest performance.** Issues of process improvement are easier to fix for all customers than issues such as complaints which are specific to an individual customer and inherently subjective. Targets should be set to improve poorest performance rather than set to encourage marginal improvements for the bulk of customers.
- **A paper trial** could be used to iron out data issues or to set a new baseline following a step change in performance.

Pass through

The pass through mechanism is an important mechanism to cater for uncertainty, particularly where costs of an event are large and uncertain, and inclusion of an expected value for the event in the forecasts would have a significant impact on revenue and may not occur.

The Rules set out the requirements for a pass through event and proscribe a set of standard pass-through events. Networks are able to propose additional events if they meet the criteria.

All networks put forward the accepted list of pass through events which includes the following:

- Insurer credit event - consistent with recent decisions
- Insurance coverage event - variation in approach
- Natural disaster event - consistent with recent decisions
- A terrorism event - updated to include cyber terrorism
- Retailer insolvency event - consistent with Rules definition

The businesses propose some minor amendments to the wording of several of these events. We have no objection to the proposed amendments.

New pass through events have been proposed by businesses as follows:

Major cyber event	CP, PC, UE
Act of aggression	CP, PC, UE
Electric vehicle event	CP, PC, UE, AusNet
Insurance premium event	JEN, AusNet
Insurance cap event	JEN,

Insurance cap event / Insurance coverage event

Insurance is the biggest issue for networks in managing the uncertainty of future costs in the 2021-26 period.

We are sympathetic to the difficulties that networks face in obtaining insurance of appropriate coverage and note the possibility that a portfolio of policies may be required. We accept that gaps in policy coverage have the potential, theoretically, to occur. However, we would hope that if the AER accepted this change, it would be able to ensure that businesses would be incentivised to ensure there are no insurance gaps (to the extent possible), and that any gaps are the result of the lack of available cover rather than a lack of care a business has taken to identify insurance gaps.

Insurance premium event

Jemena has also put forward an insurance premium event in addition to a substantial step change for expected insurance cost increases.

Given the fact that much of the detail with regard to insurance coverage and cost is subject to confidentiality, we only make high level comments.

We have already noted our surprise at the materiality of the insurance step change proposed by Jemena and strongly recommend the AER review it with a view to reducing the costs to customers whilst allowing Jemena to achieve a prudent level of cover. Making use of a pass-through event may help relieve costs to customers during the regulatory period and balance the risk to Jemena in the absence of an event.

AusNet also proposes a pass-through event for the inability to obtain insurance coverage at all, or at a reasonable price.

Establishing 'reasonable coverage' and a 'reasonable price' is difficult given confidentiality claims and the complexity of the issue. We therefore rely on the AER's investigation of the issue, particularly why Citipower, Powercor and United Energy do not seek a similar event. We also welcome the AER's review of why the insurance step change for Powercor and United Energy is also much smaller than Jemena.

Pass through (2)

Electric vehicles

All networks except Jemena have proposed an electric vehicle pass through event. We are reticent to support this event for the following reasons.

We can see that AEMO's forecast of the impact that fast-neutral-slow take-up rates has on the share of operational demand and that a fast take-up rate could increase network demand substantially in the future periods.

That said, we note that the forecast shows a fast take-up rate will be responsible for 2% of operational demand at best at the end of the period.* Government policies have the potential to drive the take-up rate higher and the network impact sooner, but we think this is unlikely in the current economic circumstances.

The Victorian networks have put forward substantial investment programs to digitise their networks. We would hope that this investment would be used to help mitigate the impact of EV uptake on the network.

We would like to see work undertaken to design electric vehicles tariffs that encourage charging at times that will mitigate the impact on demand growth. A pass through mechanism for electric vehicle uptake could act as a disincentive to progress tariff strategy in this area.

We acknowledge the relatively high utilisation rates that the Victorian networks have and the relatively small augmentation programs being put forward due to flat forecast demand. However, we think that there is sufficient capital being requested by the networks in this period to allow networks to reprioritise expenditure as required.

Cyber event

We note that the AER in its draft determination for SAPN refused a 'major cyber event' as a nominated pass through event. We support the AER's view that businesses are primarily responsible to maintain security of critical systems and as such are best placed to address this risk.

We note that Victorian businesses have all put forward significant investment to enhance their cyber security and meet the regulatory standards required for critical infrastructure. We also agree with the AER that it is the responsibilities of businesses to ensure that are appropriately insured for such events.

However, we note the following issues:

- Citipower states it is unable to obtain insurance for non-physical losses as a result of cyber crime and that coverage.
- A major cyber event may be similarly outside the control of a DNSP as a terrorism event, and a natural disaster.
- Citipower has included criteria for the event that would require the AER to assess whether or not insurance was available and obtained, and whether actions were taken to mitigate the event from occurring, and actions to mitigate the impact of the event.

We think Citipower, Powercor and United Energy have proposed sufficient safe guards that allow the AER to exclude events where the network has not acted prudently. As a result we do not oppose the nominated pass through for a cyber event.

Act of aggression

We note the extent to which Citipower, Powercor and United Energy have gone to establish a definition for a pass through touted previously by Essential Energy as an 'act of war'. While we consider a war or 'act of aggression' to be a conceivable possibility, we do not consider that such an event would occur without the actions of Government to make special provisions for its impacts, both physical and financial. COVID-19 has had a significant economic impact and we have seen Governments act quickly to mitigate the implications for the economy. We would expect an act of aggression that met the definitions put forward would more than meet a threshold at which Governments would act.

We do not consider that its inclusion as a nominated pass through event is required.

*AEMO modelling cited in Powercor's Tariff Structure Statement, p13.

Metering

We are pleased to note that the cost of metering for customers in all networks is falling significantly in the 2021-26 period. Lower revenues are required by networks as little capex is forecast other than minor replacement for faulty meters and new meters for new connections. WACC has fallen significantly since 2015 and has reduced returns compared to last period.

Benefits to customers

We are pleased to see that networks are making efforts to explain the benefits of smart meters to customers. AusNet, who has been challenged by the Customer Forum to explain the benefits, has dedicated considerable space in its proposal to this issue. Despite the disappointing history on cost reflective prices for residential customers in Victoria, the explanations provided by AusNet and other businesses provides comfort that AMI has delivered benefits to customers via lower business costs.

We are pleased by the decision taken by AusNet and agreed by all Victorian networks to remove the disconnection / reconnection charges faced by customers moving premises. We look forward to see what other customer charges can be removed entirely. We are also pleased by the improvements in communication to customers during this process.

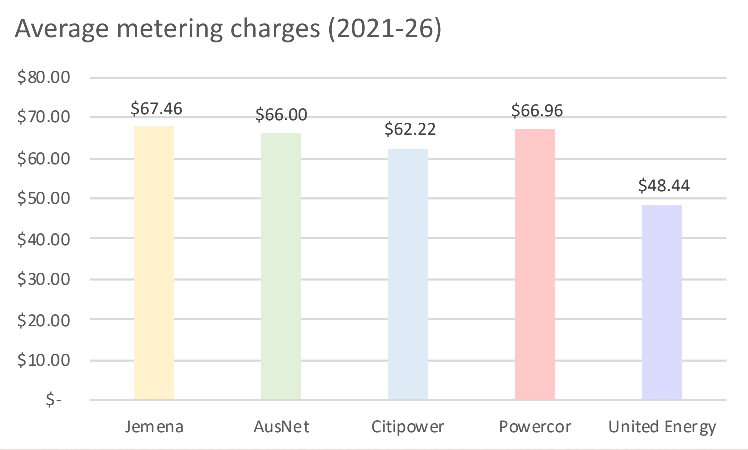
All businesses have taken the opportunity to reallocate part of the cost of metering systems to the distribution network business on the basis that advanced meters (AMI) provides useful data for network analysis including power quality information that helps identify faulty equipment as well as faster outage location detection for faster response and recovery of supply.

The longer term

We are slightly concerned about the absence of planning for metering replacement in future. When questioned, all networks responded saying that wide spread replacement of meters would not be required for another 10 years (circa 2030). We are satisfied that a 10 year timeframe provides sufficient time to develop a replacement strategy that ensures replacement of the meter fleet is smoothed over several regulatory periods and does not lead to a significant step change in costs.

AusNet

AusNet explicitly refers to the costs of upgrading its meter fleet from 3G to 4G in its metering revenue proposal. The other networks who face the same issue only refer to the 3G upgrade in their costs for distribution business. Given that all networks have allocated meter costs to the DNSP, it is important that all networks attribute the telecommunication upgrade in a manner consistent with their cost allocation methodologies. This will ensure that metering costs between networks remain more comparable.



United Energy

United Energy is unusual in its metering cost outcomes. It is unclear why United is able to provide the same service for considerably less cost than its peers. We note the allocation of metering data cost between the DNSP and the metering business is the same as Citipower and Powercor (88%:12%). We would welcome more information on this matter to understand whether other companies can also provide services for this lower price.

Tariffs

Network pricing for retailers

The 2021 Tariff Proposals represent a lost opportunity to move more quickly on tariff reform.

In its draft determination for South Australia Power Networks (SAPN), the AER states:

> "The purpose of network tariff reform is to improve the cost reflectivity of the price signals that distributors charge retailers for the cost of providing electricity network capacity for their end customers."*

The AER accepts the fact that retailers do not necessarily pass on pricing signals and may repackage tariffs on the basis of customer preferences.

With the knowledge that retailers will repackage price signals if necessary, it is surprising that distributors have not moved faster to reform tariffs.

We acknowledge the efforts networks went to in order to collaborate and engage with customers. We note the top 5 objectives of simplicity, economic efficiency, adaptability, affordability and equity that have been adopted.

We note that networks found in consultation that customers, although accepting that network pricing was directed at retailers, did expect an inevitable impact on them, and were particularly concerned about the impact of tariff reform on vulnerable customers.

A rare opportunity for reform has been missed

A declining revenue scenario is a rare opportunity to undertake broad based tariff reform with very few 'losers'.

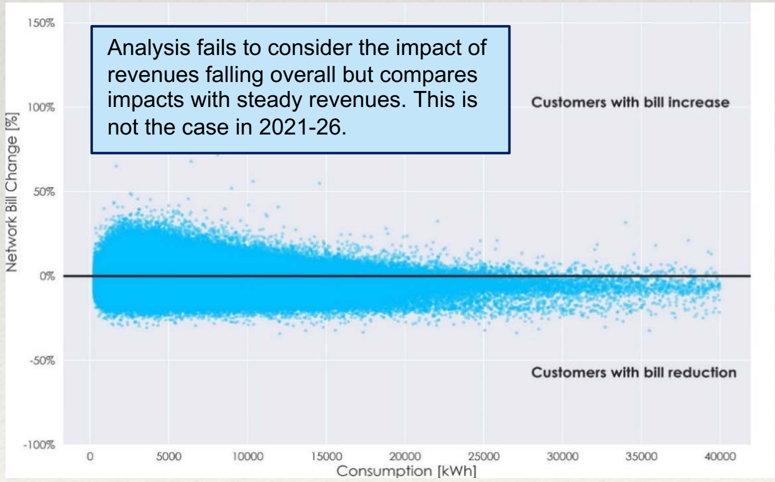
Regrettably, the Victorian tariff proposals lack ambition. Tariff reform has been relegated to 'the slow track' on the basis of protecting vulnerable customers. The reform such as it is, focuses on new connections, customers upgrading connections or installing solar, batteries or a charger for an electric vehicle. Existing residential customers are ignored unless they 'opt in' to more cost reflective tariffs.

Powercor states that a conservative approach will allow it to 'ready' customers for TOU. It is unclear why customers, who have already had AMI meters for 10 years need further time.

This is a missed opportunity. ACIL Allen confirmed that the majority of vulnerable customers would be better off under a TOU tariff in a steady revenue environment. We would like to see the analysis conducted in the declining revenue environment we currently face.

Another reason given not to make use of this opportunity is that any change in demand in response to price signals would have an inconsequential impact on costs during this period. It is unclear whether the businesses have considered the potential tariff impact on the planned DER program. Further, it is unclear whether demand will continue to be low in future periods. The tariff strategy shows a lacks of strategic vision for the longer term and lacks a clear transition path.

Figure 22 Victorian bill impacts of a move of all single-rate customers to our new ToU tariff (%), Powercor TSS, p42.



* AER Draft Determination for SAPN, Overview p39.

Tariffs (2)

Is every day a peak day?

The application of peak time to weekends and public holidays throughout the year for residential tariffs represents the inevitable compromise when five businesses that have peaks at different times of the year/week/day negotiate for a single outcome.

We understand the desire for simplicity but we reject the idea that customers are confused by different tariffs applying to weekends or public holidays. Customers face different fares for public transport on weekends, different priced movies at different times of day, and different store opening hours on weekends and public holidays. Consistency across every day of the week is more *unusual* than different pricing for weekends.

We are also concerned that peaks generally occur in the summer months Dec-March and are largely driven by air-conditioning load in residential areas. We therefore wonder why the proposed TOU tariff has peak periods that occur during two thirds of the year when only 22% of peaks occur. A flat tariff with a seasonal peak would only need to apply to week days in summer (ie 23% of days in the year) to capture 70-80% of peaks. In contrast, the current peak period applies every day.

We would encourage networks to revisit this decision to ensure customers across Victoria are not paying more than they need to, particularly on weekends (which account for 29% of the year) and in shoulder and winter periods (which account for two thirds of the year).

Transition plan to more cost reflective tariffs

Demand tariffs are widely seen as most cost reflective, but also as difficult to explain to customers. A flat tariff with a seasonal peak is more like a demand tariff than a ToU tariff that applies throughout the year. It is important that networks consider the end-point for tariff reform so ensure that the transition path they plot is supportive of the end goal. This is particularly important when considering how to best educate customers about the cost of demand on the network.

Is AMI delivering benefits to customers?

Victoria was the first jurisdiction to mandate the roll-out of AMI. More than a decade later, most of the benefits have flowed to Victorian businesses rather than to the customers that paid for the meters. The majority of customers including business customers still face simple pricing structures and limited access to data (albeit this is set to change this period with businesses investing in customer access to data portals).

We note that businesses are using AMI data to better target expenditure and that customers are beneficiaries of this in the long term. However, we encourage Victorian networks to push for more cost reflective pricing options for customers and thereby deliver one of the main benefits of AMI to customers.

Electric vehicles

AEMO's forecasts suggests that EVs consumption share of operational demand in Victoria will be about 13% by 2040 under a neutral scenario and 15% under a faster uptake scenario.

All businesses have used a pass-through event to cater for uncertainty of uptake and uncertainty of network impact. We consider this is to be a reasonable approach for this period given the uncertainty around take-up, particularly in the current economic circumstances where an economic downturn could see spending on electric vehicles deferred as customers consolidate their financial positions and defer discretionary spending.

We encourage networks to design specific tariffs for electric vehicle owners and support the idea that electric vehicle chargers be connected to a separate circuit as per traditional controlled load. Given the potential for future uptake, and the potential that 'convenience charging' in the 'after work' time slot it would seem sensible for networks to have some control over vehicle charging to ensure that charging loads can be staggered rather than all turned on at the same time using a digital timer.

Attachment 2

‘Prices-to-Devices’ Tariffs: Developing a more cost reflective EV Tariff for Victoria

Energy Consumers Australia

Friday 5 June 2020

ENERGEIA

Executive Summary 1/2

- Victorian Distribution Network Service Providers(DNSPs) have proposed implementing a new, common ToU tariff for new customers, customers changing their electrical installation, including the installation of solar PV and Level 2 electric vehicle charging. The rate has been designed to avoid negatively impacting vulnerable customers and to be easy for customers to understand. The prices will be in place for the next 5 years, which is a crucial time in terms of solar PV, behind the meter storage and EV adoption.
- Grid load has traditionally been considered relatively inelastic in electricity markets, due to the lack of cost-effective substitutes or storage. Rooftop solar PV, vehicle electrification, behind the meter storage and smart appliances are rapidly altering the potential for load flexibility. However, the pace of this technology depends on the existence of efficient price signals, without them, consumers will under invest in lower cost technology in favour of higher cost grid services.
- Energeia was engaged by Energy Consumers Australia (ECA) to develop Rules compliant rate designs for Victorian consumers that to identify the potential impacts it could have on the long-term interests of Victorian consumers. The tariffs were assumed to be voluntary, and technology or expert agent facilitated, enabling greater freedom to design efficient and effective rates compared to a mandatory tariff that all consumers may be subjected to.
- Energeia's in-depth analysis of network and generation peak demand, including spatial peak demand, found that adjusting for 1 in 10 year weather, and underlying trends in demand, resulted in peak period definitions that were 98-99% different to current periods in Victoria with a 98-99% reduction in the duration of the peak period overall.
- Energeia's analysis of DNSP Regulatory Information Notice (RIN) data and DNSP Long Run Marginal Cost (LRMC) calculations found that current LRMC estimates include 2-20%[1] of DNSP approved total expenditure (totex), despite the Rules definition of LRMC being defined to be the period over which all costs are variable[2]. Energeia's RIN based estimate of DNSP LRMC, which includes 50% of repex, found them to be 2-5 times higher.

Note: 1: In the cases of AusNet and Jemena. 2. As defined in Chapter 10 of the NER

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Executive Summary 2/2

- Bringing together our findings of a 98-99% shortened peak period definitions and significantly increased LRMC, Energeia then assessed their impacts on first order customer bills, second order customer behavior, and third order long-term system costs and customer bills – compared to current flat/inclining block rates and proposed ToU rates. Our key findings included:
  - Customers without solar PV or EVs would be no worse off on average
  - Customers with electric vehicles could save $86 more per year on average per EV if they modified that load to avoid the peak period, compared to the DNSP ToU
- Although out of scope for this project, Energeia identified:
  - Consumer costs could be further reduced if low-voltage costs could be unbundled from the over all network tariff. This is a necessary first step to enabling peer-to-peer trading solutions, which would enable consumers on the same LV circuit to manage the over and under utilization of their solar, storage and electric vehicle assets
  - Peer-to-peer trading could enable local optimisation of lowest cost electricity supply, and reduce consumer's exposure to the full build up of distribution network, transmission network and wholesale market costs in the unbundled bill.

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Project Context, Background and Objectives

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Project Background and Objectives

2021-26 Determination

- The Victorian DNSPs are putting forward a new ToU tariff that would only apply to customers with new or replacement meters on an opt-out basis. In combination with a relatively unambitious tariff assignment position for the new tariff, the proposed structure provides minimal incentive to shift consumption away from the peak, particularly for those with intelligent devices.
- While EV adoption may be limited in the 2021-26 regulatory period, it is important to set norms in advance of mass market take up or acceleration, so as to incentivise new demand management business models and to condition the correct consumer behaviour and avoid potential issues later.

Developing a more cost reflective EV Tariff for Victoria

- In view of the above context, we understand that the ECA's objective for this work is for Energeia to review existing EV/tech neutral tariffs offered by other networks/retailers and develop best practice, incentive-driven, NER compliant and voluntary tariffs, which will drive the right technology-enabled responses for consumers (i.e. "prices-to-devices") .
- The project will develop cost reflective pricing (both structure and rates) for EV-drivers in Victoria. These tariffs can act as a benchmark for the approach that ECA believes the Victorian and other Australian DNSPs should consider in the development of their regulatory proposal.
- This project will both be an exercise in designing tariffs according to best practices (i.e. how cost reflective prices should be developed), and at the same time, a demonstration of the benefits to customers of strongly reflective prices (in this case, EV customer adoption of the price).

Scope and Approach

Energeia's Approach

Stage > Task			Objective	Sub-Tasks
	0	Project Management and Governance	Management to agreed parameters	Weekly risk and issues management; weekly plan and controls update
Network Tariff Optimisation	1.1	Update Model Inputs	Develop a cost-reflective network tariff for EV customers	Update in-house models for the five Victorian DNSPs
	1.2	Develop Optimal Network Tariff Structure		Estimate the peak period and LRMC, and develop an efficient tariff structure that minimises cross subsidies
	1.3	Estimate Retail Overlay		Mark-up the developed network prices based on historic retailer behaviours
	1.4	Validate Outcomes		Present our findings and conclusions to ECA
Customer Bill Impact Assessment	2.1	Assess 1st Order (Immediate) Impacts	Assess the consumer benefits for EV drivers (and the effect on non-EV drivers)	Analyse the bill impacts and distributional effects
	2.2	Estimate 2nd Order Impacts (EV return on investment for consumers)		Estimate the impact on EV uptake attractiveness and outcomes
	2.3	Model 3rd Order Impacts (Long Term Outcomes)		Examine longer-term impacts on network costs, investment and revenue recovery
	2.4	Validate Outcomes		Present our findings and conclusions to ECA

- Energeia has split our workplan into two stages
  - ***Network Tariff Optimisation*** – this step will deliver a highly cost reflective EV tariff for the Victorian DNSPs, on the basis of an optimised peak period, LRMC and structure
  - ***Consumer Bill Impact Assessment*** – we will then take our optimised network tariffs and assess their primary (immediate consumer bill savings), secondary (DER incentives and cross-subsidies) and tertiary (long term) order impacts

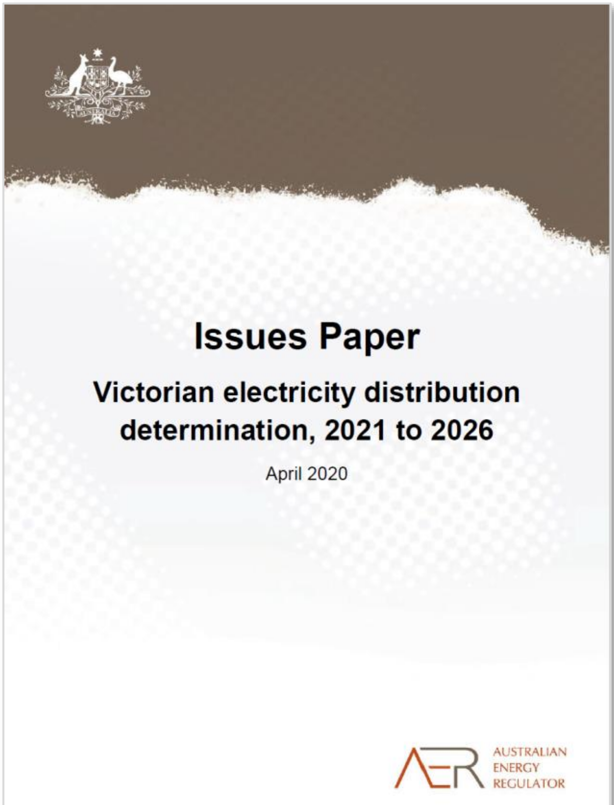
Source: Energeia; Note: 3rd Order impacts (Step 2.3) are to be updated in future editions of this work

Background

Victorian Electricity Determination Process

AER Issues Paper – Tuesday 7 April 2020

AER Issues Paper – 7 April


Issues Paper

Victorian electricity distribution determination, 2021 to 2026

April 2020

"The five Victorian distributors have proposed a largely common tariff strategy across their Tariff Structure Statements (TSS). For residential and small business customers, the distributors propose to focus tariff reform on those customers who install DER such as rooftop solar, a home battery or an electric vehicle."

"In addition, tariff reform is proposed for retailers of customers with new connections and customers who upgrade from single phase to three phase power. […] A default time-of-use tariff will be charged to retailers for residential customers, with a peak charging window set as 3pm to 9pm and off-peak rates at all other times [i.e. both weekends and weekdays]"

"The Victorian distributors' proposed tariff assignment policies are to charge retailers a cost reflective network tariff by default for customers who install DER, are a new connection or upgrade to three phase power […]. Apart from AusNet Services, the distributors have proposed that retailers can opt-out of tariff reform and avoid facing a cost reflective network tariff. AusNet Services has proposed that for solar PV customers, the retailer can choose between a time-of-use or demand tariff, but cannot opt-out of tariff reform [altogether]."

"Tariff assignment policy will be a focus of our review. We plan to review whether the proposals provide a sufficient financial incentive for retailers to innovate and reform their offers to meet the needs and preferences of a diverse set of customers and to meet the challenges of the energy system transition at lowest cost to customers overall."

Source: AER (2020), 'Issues Paper Victorian electricity distribution determination, 2021 to 2026', pg. 18-20

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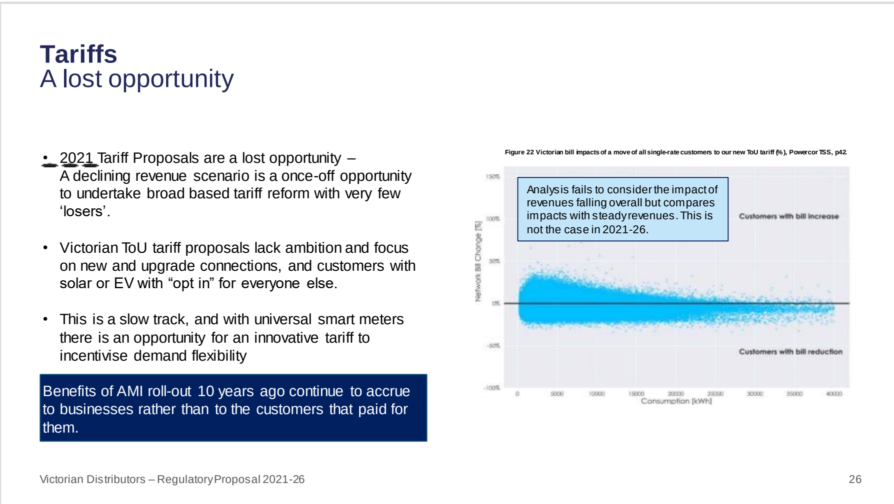
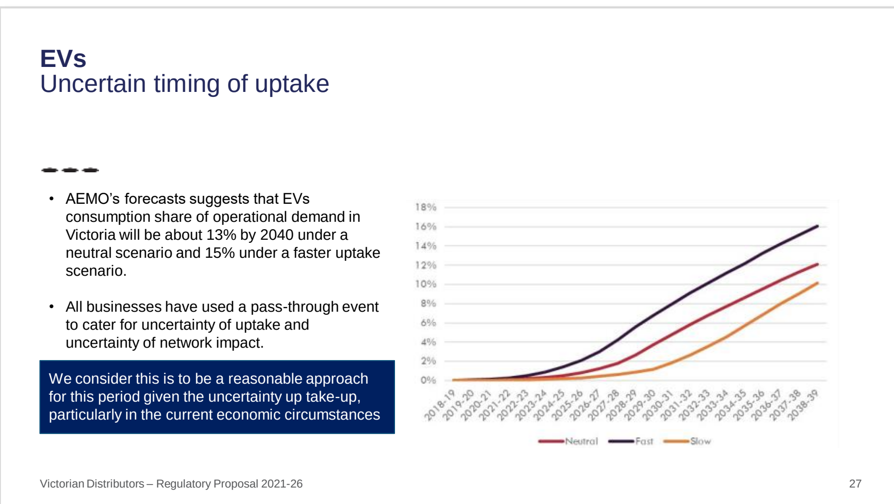
AER Public Forum – Wednesday 22 April 2019



Source: Victorian Electricity Determination Public Forums, Response by Energy Consumers Australia, April 2020



Source: Victorian Electricity Determination Public Forums, Response by Energy Consumers Australia, April 2020

- Due to the COVID-19, the public forum was facilitated by remotely by the AER
- The ECA submission highlighted two network tariff issues impacting on this study:
  - Firstly, the lack of ambition of the Victorian ToU design, given the revenue decline in Victoria and the roll out of AMI across the state
  - Secondly, the uncertainty of the timing of EV uptake impacting on forecast consumption
- This study will help make the case for more ambitious cost reflective tariffs (in both design and in assignment) for EVs by demonstrating how an optimised tariff design can deliver net benefits to EV drivers and non-EV drivers alike
  - Electricity bill and petrol savings
  - Avoided cross-subsidies
  - Removal of barriers to efficient EV adoption
  - Strong incentives for managing EV charging

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Background

Best Practice Electric Vehicle Tariff Design

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International EV Tariffs are typically ToU

Summary of International Best Practice EV Tariffs

Region	Jurisdiction	Utility	Residential Tariff Type			EV Incentives - Tariff and Non-Tariff[1]		
			Default	Alternative	EV Charging	Energy Rate ($/kWh)[2]	Controlled Load[3]	Structural Changes[4]
US	California	PG&E	IBT	Seasonal ToU	Seasonal ToU	✗	✗	✓
		LADWP	Seasonal IBT	Seasonal ToU	Seasonal ToU	✓	✗	✗
		SDG&E	Seasonal IBT	Seasonal ToU	Seasonal ToU	✓	✗	✗
		SCE	IBT	Seasonal ToU	Seasonal ToU	✓	✗	✗
	Hawaii	HECO	IBT	ToU	ToU	✗	✗	✓
	New York	Con Ed	Seasonal IBT	Seasonal ToU	Seasonal ToU	✓	✗	✗
	Minnesota	Xcel	Seasonal Flat	Seasonal ToU	Seasonal ToU	✗	✗	✗
	Texas	Austin Energy	IBT	Seasonal ToU	Seasonal ToU	✗	✗	✓
Europe	Norway	Hafslund Nett	Flat	Seasonal Flat	N/A	N/A	N/A	N/A
	Netherlands	essent	Flat	ToU	N/A	N/A	N/A	N/A
	UK	Octopus Energy	Flat	ToU	ToU	✓	✗	✓
	Germany	entega energie	Flat	N/A	N/A	N/A	N/A	N/A
Asia	Japan	TEPCO	IBT	ToU	N/A	N/A	N/A	N/A
	South Korea	KEPCO	Flat	N/A	Seasonal ToUD	✓	✗	✓
	China		Flat	N/A	N/A	N/A	N/A	N/A

Source: Energeia Research; Note: 1. EV Incentives are comparing the EV Charging tariffs to the Alternative tariff (if unavailable, then the Default tariff); 2. Whether there is a discount to the energy rates; 3. Whether the tariff includes direct load control; 4. Whether there are differences in the structure of the tariffs

IBT = Inclining-Block Tariff, ToU = Time-of-Use, ToUD = Time-of-Use Demand

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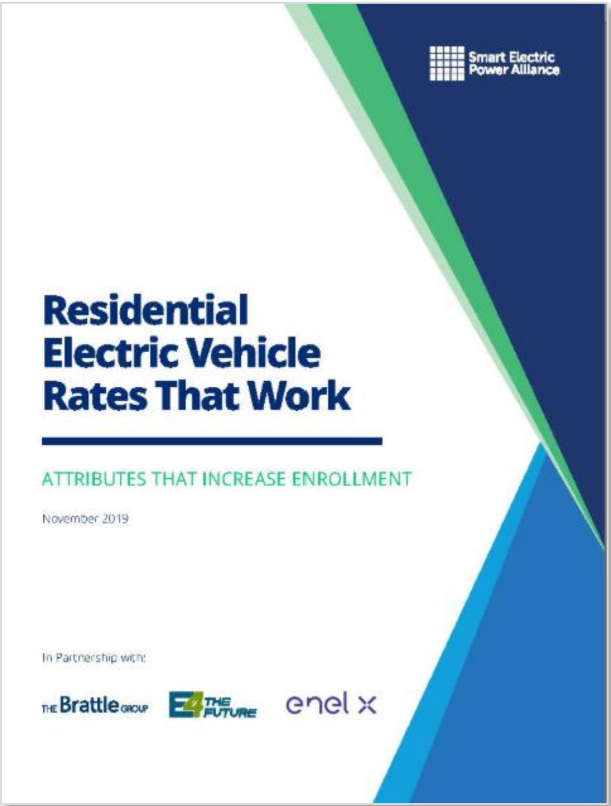
ToU EV rates are the most attractive to consumers

SEPA EV Rates Report



- The Brattle report complete for SEPA found that:
  - Customers on an EV-specific time-varying rate were more familiar with the rate rules and more likely to charge off-peak compared to their generic time-varying rate counterparts
  - Utility-driven initiatives had significantly higher average enrollment than mandated programs
  - Just offering a rate is not sufficient to attract customers; utilities that actively market residential EV rates had customer enrollment 1.4 times greater than those that were not marketed
  - 70% of the enrolled residential EV participants heard about their time-varying rate through least-cost marketing efforts
  - 72% of non-enrolled customers were willing and able to charge their EV during off-peak hours if the rate resulted in savings and was convenient to use

Source: SEPA (2019), 'Residential Electric Vehicle Rates That Work'

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Tariff Design Methodology and Inputs

Best Practice Tariff Design Methodology

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Tariff Design and Assessment Methodology

- Requirements
  - Rules compliant
  - Risk adjustment cost recovery
  - Economically sound (Ramsay, MC=MR, etc.)
- Design Parameters
  - Peak Period
  - LRMC
  - Residual Cost Recovery
  - Structure
- Design Assessment
  - Immediate bill impacts by segment
  - Economic incentives and cross-subsidies
  - Long-term bill impacts by segment

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Tariff Design Methodology and Inputs

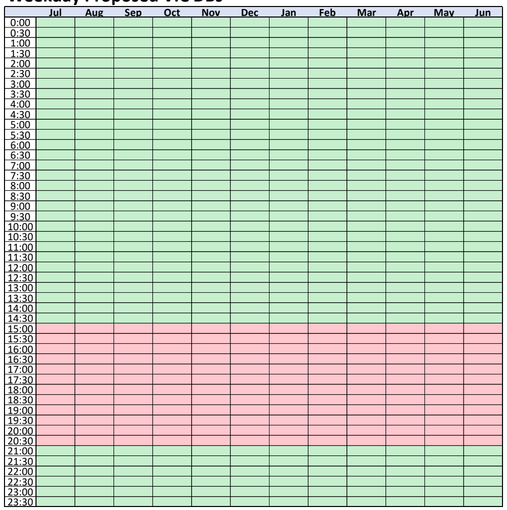
Peak Period Setting

Peak Period Setting

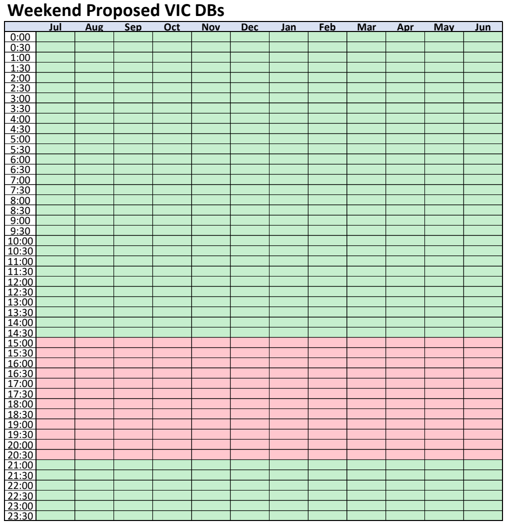
- Victorian ToU Periods
- Victorian DNSP Peak Analysis
  - Raw
  - P10
  - 3-Year Projected (P10)
  - 5-Year UED Deep Dive
- Victorian Regional Reference Price Analysis
- Recommended Network and Retail Peak Periods

Current Victorian Peak Periods

Weekday Proposed VIC DBs



Weekend Proposed VIC DBs



- Current VIC-wide periods (heat map, using WE/WD, etc. format)
- Proposal for the 2021-2026 period is to extend the peak by 30 mins to 9pm
- Energeia's analysis shows that United consumers (for example) are currently being charged the wrong price 98% of the time
- Further, by 2026, our analysis shows consumers will be being charged the wrong peak price 99% of the time

Source: Victorian DNSPs, https://www.aer.gov.au/system/files/AER%20-%20Issues%20paper%20-%20Victorian%20Electricity%20Determination%202021-26%20-%20April%202020_2.pdf

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DNSP Peak Periods (United) – Raw Peak

2018-19 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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11:00	5%	5%	2%	0%	5%	2%	69%	7%	2%	0%	5%	5%
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15:30	0%	0%	0%	0%	0%	29%	26%	5%	48%	0%	0%	2%
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17:30	0%	0%	0%	0%	0%	21%	57%	36%	57%	0%	0%	0%
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23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Energeia analysed zone substation data for each DNSP to identify:
  - Peak periods assuming >90% of annual peak
  - Impact of P10 weather normalisation
  - Impact of 5-year trending of P10 normalized load
- A 90% of peak period was selected as being the level of demand that could become the peak within 5 years
- P10 (1 in 10 year) weather was implemented as the industry standard for network and system planning
- Chart to the left shows UED's average peak load distribution using raw ZS load data
- The red box indicates the peak periods proposed by the Victorian DNSPs
- It can be seen that they are correct 8% of the time on weekdays, and 0% of the time on weekends

DNSP Peak Periods (United) – P10 Peak

2018-19 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	2%	2%	5%	5%	2%	2%	0%	2%	5%
8:00	2%	0%	0%	2%	2%	5%	10%	2%	2%	0%	2%	7%
8:30	5%	2%	2%	2%	2%	5%	14%	5%	2%	0%	2%	7%
9:00	5%	5%	2%	2%	2%	2%	24%	2%	2%	0%	2%	7%
9:30	5%	5%	2%	0%	2%	5%	36%	5%	2%	0%	7%	5%
10:00	5%	5%	2%	0%	5%	5%	48%	5%	5%	0%	5%	7%
10:30	5%	5%	2%	0%	2%	5%	60%	7%	2%	0%	5%	5%
11:00	5%	5%	2%	0%	5%	2%	69%	7%	2%	0%	5%	5%
11:30	5%	2%	2%	0%	0%	2%	62%	5%	2%	0%	5%	5%
12:00	2%	2%	2%	0%	2%	5%	55%	7%	2%	0%	2%	5%
12:30	2%	2%	0%	0%	2%	5%	67%	7%	2%	0%	2%	5%
13:00	2%	2%	0%	0%	2%	7%	62%	7%	5%	0%	0%	2%
13:30	2%	0%	0%	0%	0%	12%	31%	7%	5%	0%	2%	5%
14:00	2%	0%	2%	0%	0%	10%	31%	0%	5%	0%	0%	5%
14:30	2%	0%	0%	0%	0%	17%	19%	5%	7%	0%	0%	5%
15:00	0%	0%	0%	0%	0%	26%	19%	2%	21%	0%	0%	5%
15:30	0%	0%	0%	0%	0%	29%	26%	5%	48%	0%	0%	2%
16:00	0%	0%	0%	0%	0%	38%	33%	7%	64%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	33%	43%	12%	62%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	31%	57%	29%	57%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	21%	57%	36%	57%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	12%	60%	17%	50%	0%	0%	0%
18:30	2%	2%	0%	0%	0%	5%	57%	2%	29%	0%	2%	2%
19:00	2%	2%	0%	0%	0%	5%	40%	0%	10%	0%	2%	2%
19:30	2%	2%	0%	0%	0%	2%	31%	2%	2%	0%	2%	2%
20:00	2%	2%	0%	0%	0%	0%	24%	0%	0%	0%	2%	2%
20:30	2%	2%	0%	0%	0%	0%	7%	0%	0%	0%	2%	2%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	5%	5%	0%	21%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	7%	5%	0%	24%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	7%	14%	0%	52%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	7%	24%	0%	90%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	5%	26%	0%	98%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	2%	21%	0%	98%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	26%	0%	98%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	19%	0%	95%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	14%	0%	95%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	0%	88%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	33%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	7%	5%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	7%	12%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	7%	19%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	29%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	5%	26%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	21%	0%	0%	2%
18:30	2%	2%	0%	0%	0%	0%	0%	0%	7%	0%	0%	2%
19:00	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
19:30	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Chart to the left shows UED's average loads using raw and P10 load data
- The proposed periods are correct 6% of the time on weekdays, and 0% of the time on weekends for P10 normalised temperatures

DNSP Peak Periods (United) – 3-Year Trend (P10)

2018-19 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	2%	2%	5%	5%	2%	2%	0%	2%	5%
8:00	2%	0%	0%	2%	2%	5%	10%	2%	2%	0%	2%	7%
8:30	5%	2%	2%	2%	2%	5%	14%	5%	2%	0%	2%	7%
9:00	5%	5%	2%	2%	2%	2%	24%	2%	2%	0%	2%	7%
9:30	5%	5%	2%	0%	2%	5%	36%	5%	2%	0%	7%	5%
10:00	5%	5%	2%	0%	5%	5%	48%	5%	5%	0%	5%	7%
10:30	5%	5%	2%	0%	2%	5%	60%	7%	2%	0%	5%	5%
11:00	5%	5%	2%	0%	5%	2%	69%	7%	2%	0%	5%	5%
11:30	5%	2%	2%	0%	0%	2%	62%	5%	2%	0%	5%	5%
12:00	2%	2%	2%	0%	2%	5%	55%	7%	2%	0%	2%	5%
12:30	2%	2%	0%	0%	2%	5%	67%	7%	2%	0%	2%	5%
13:00	2%	2%	0%	0%	2%	7%	62%	7%	5%	0%	0%	2%
13:30	2%	0%	0%	0%	0%	12%	31%	7%	5%	0%	2%	5%
14:00	2%	0%	2%	0%	0%	10%	31%	0%	5%	0%	0%	5%
14:30	2%	0%	0%	0%	0%	17%	19%	5%	7%	0%	0%	5%
15:00	0%	0%	0%	0%	0%	26%	19%	2%	21%	0%	0%	5%
15:30	0%	0%	0%	0%	0%	29%	26%	5%	48%	0%	0%	2%
16:00	0%	0%	0%	0%	0%	38%	33%	7%	64%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	33%	43%	12%	62%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	31%	57%	29%	57%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	21%	57%	36%	57%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	12%	60%	17%	50%	0%	0%	0%
18:30	2%	2%	0%	0%	0%	5%	57%	2%	29%	0%	2%	2%
19:00	2%	2%	0%	0%	0%	5%	40%	0%	10%	0%	2%	2%
19:30	2%	2%	0%	0%	0%	2%	31%	2%	2%	0%	2%	2%
20:00	2%	2%	0%	0%	0%	0%	24%	0%	0%	0%	2%	2%
20:30	2%	2%	0%	0%	0%	0%	7%	0%	0%	0%	2%	2%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	5%	5%	0%	21%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	7%	5%	0%	24%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	7%	14%	0%	52%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	7%	24%	0%	90%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	5%	26%	0%	98%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	2%	21%	0%	98%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	26%	0%	98%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	19%	0%	95%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	14%	0%	95%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	0%	88%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	33%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	2%	0%	2%	2%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	2%	7%	7%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	10%	5%	10%	7%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	10%	2%	2%	2%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	12%	5%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	12%	26%	0%	10%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	10%	31%	0%	17%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	10%	52%	0%	19%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	12%	57%	0%	17%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	5%	57%	0%	24%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	36%	0%	19%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	31%	5%	10%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	10%	14%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	5%	12%	5%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	10%	2%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	7%	5%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	7%	12%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	7%	19%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	29%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	5%	26%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	21%	0%	0%	2%
18:30	2%	2%	0%	0%	0%	0%	0%	0%	7%	0%	0%	2%
19:00	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
19:30	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	2%	5%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	2%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	2%	0%	7%	7%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	2%	5%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	0%	5%	5%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Chart to the left shows UED's substation weighted average loads using raw, P10 and trended load data
- Trending of last 3 years of ZS data adjusted for P10 weather is used to identify the future peak
- Trending reveals the need to include Dec, Jan and potentially weekend days in the peak period
- Using the technically correct approach shows consumers should benefit from off-peak prices for 99% longer than proposed
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

Generation, Network (United) and Retail Peak Periods

United CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	2%	0%	2%	2%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	2%	7%	7%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	2%	5%	10%	7%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	10%	2%	2%	2%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	12%	5%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	12%	26%	0%	10%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	10%	31%	0%	17%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	10%	52%	0%	19%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	12%	57%	0%	17%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	5%	57%	0%	24%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	36%	0%	19%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	31%	5%	10%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	10%	14%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	5%	12%	5%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	10%	2%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Generation CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	48%	41%	45%	47%	31%	45%	54%	38%	59%	39%	46%	49%
0:30	41%	41%	43%	46%	31%	40%	50%	36%	55%	40%	44%	47%
1:00	40%	40%	41%	44%	36%	38%	49%	35%	53%	39%	41%	46%
1:30	39%	41%	40%	43%	30%	36%	50%	34%	48%	37%	41%	45%
2:00	37%	40%	39%	41%	30%	36%	47%	33%	46%	36%	40%	46%
2:30	39%	38%	40%	39%	30%	38%	46%	32%	46%	35%	38%	45%
3:00	35%	38%	39%	37%	29%	38%	46%	31%	46%	34%	38%	46%
3:30	35%	39%	38%	37%	30%	37%	49%	32%	47%	37%	36%	44%
4:00	35%	40%	39%	37%	30%	35%	54%	33%	48%	37%	36%	43%
4:30	37%	41%	39%	39%	38%	36%	56%	34%	48%	40%	38%	43%
5:00	38%	42%	40%	41%	39%	36%	60%	34%	48%	46%	44%	44%
5:30	39%	43%	41%	45%	39%	35%	65%	36%	49%	55%	39%	47%
6:00	42%	46%	44%	47%	37%	35%	71%	40%	49%	64%	44%	50%
6:30	47%	51%	48%	51%	39%	36%	79%	41%	52%	70%	47%	57%
7:00	53%	54%	52%	52%	41%	35%	83%	41%	53%	69%	47%	61%
7:30	55%	56%	56%	51%	38%	32%	88%	40%	52%	59%	52%	64%
8:00	57%	54%	55%	46%	38%	31%	92%	39%	53%	53%	54%	67%
8:30	55%	50%	51%	44%	39%	31%	91%	37%	59%	50%	56%	71%
9:00	54%	48%	46%	44%	38%	34%	92%	37%	61%	46%	54%	70%
9:30	52%	47%	45%	43%	39%	38%	90%	36%	67%	45%	53%	67%
10:00	48%	46%	42%	42%	42%	42%	88%	36%	72%	44%	52%	65%
10:30	46%	44%	39%	42%	45%	46%	86%	35%	45%	38%	53%	60%
11:00	46%	42%	37%	43%	38%	48%	83%	35%	47%	44%	54%	57%
11:30	44%	40%	36%	42%	39%	49%	81%	36%	49%	43%	52%	55%
12:00	43%	39%	36%	36%	40%	50%	85%	37%	51%	42%	54%	54%
12:30	41%	39%	34%	38%	42%	51%	86%	39%	54%	42%	53%	54%
13:00	41%	37%	31%	39%	42%	53%	85%	41%	59%	45%	54%	53%
13:30	40%	38%	31%	40%	42%	55%	82%	44%	62%	47%	50%	54%
14:00	40%	40%	30%	40%	43%	57%	81%	50%	65%	48%	50%	52%
14:30	39%	41%	31%	42%	44%	59%	82%	54%	67%	49%	50%	53%
15:00	40%	42%	32%	44%	44%	63%	84%	78%	72%	48%	48%	53%
15:30	41%	42%	33%	48%	46%	63%	84%	86%	74%	49%	47%	53%
16:00	48%	43%	33%	49%	45%	65%	86%	85%	79%	50%	50%	53%
16:30	52%	42%	35%	51%	47%	67%	87%	84%	78%	53%	55%	56%
17:00	55%	42%	37%	56%	49%	72%	89%	82%	78%	53%	53%	58%
17:30	54%	42%	40%	56%	49%	74%	95%	81%	77%	53%	50%	61%
18:00	58%	53%	42%	60%	49%	73%	98%	80%	77%	56%	52%	63%
18:30	60%	56%	44%	60%	47%	71%	98%	78%	77%	57%	60%	64%
19:00	60%	55%	46%	58%	44%	66%	94%	77%	74%	57%	61%	66%
19:30	58%	55%	46%	59%	44%	67%	94%	78%	71%	55%	61%	65%
20:00	58%	53%	47%	59%	43%	66%	98%	73%	71%	54%	60%	67%
20:30	55%	52%	52%	56%	41%	64%	100%	67%	67%	53%	60%	63%
21:00	54%	51%	51%	52%	38%	64%	95%	64%	66%	50%	58%	63%
21:30	53%	52%	49%	51%	39%	64%	90%	62%	64%	49%	56%	61%
22:00	50%	52%	49%	50%	37%	60%	86%	59%	60%	49%	54%	59%
22:30	48%	51%	46%	48%	36%	58%	76%	55%	55%	46%	50%	53%
23:00	45%	50%	44%	44%	33%	54%	72%	52%	52%	44%	47%	49%
23:30	45%	50%	43%	43%	33%	50%	69%	53%	49%	44%	44%	47%

Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	1	0	0	0	0	0	0
16:30	0	0	0	0	0	1	0	0	0	0	0	0
17:00	0	0	0	0	0	1	0	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

United CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	2%	5%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	2%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	2%	0%	7%	7%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	2%	5%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	0%	5%	5%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Generation CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	41%	52%	36%	51%	38%	68%	36%	36%	63%	36%	49%	50%
0:30	38%	45%	34%	50%	35%	62%	33%	35%	58%	34%	47%	50%
1:00	37%	43%	33%	46%	34%	59%	32%	35%	57%	36%	46%	49%
1:30	36%	36%	33%	46%	34%	55%	34%	42%	56%	36%	45%	50%
2:00	35%	33%	32%	44%	33%	51%	35%	40%	53%	36%	44%	50%
2:30	34%	32%	31%	42%	32%	49%	32%	38%	49%	38%	41%	48%
3:00	33%	32%	32%	40%	33%	45%	33%	37%	49%	37%	41%	45%
3:30	32%	30%	32%	39%	33%	42%	33%	37%	45%	38%	40%	45%
4:00	33%	32%	30%	40%	33%	41%	34%	35%	45%	37%	40%	45%
4:30	33%	32%	30%	37%	32%	41%	35%	34%	45%	37%	40%	45%
5:00	34%	31%	30%	38%	34%	40%	34%	33%	45%	38%	41%	44%
5:30	34%	32%	31%	39%	35%	38%	35%	32%	45%	32%	42%	44%
6:00	35%	32%	32%	40%	36%	37%	35%	32%	47%	34%	42%	44%
6:30	37%	36%	32%	42%	39%	36%	36%	34%	46%	34%	49%	45%
7:00	36%	38%	34%	42%	39%	35%	35%	35%	49%	34%	46%	46%
7:30	36%	38%	35%	40%	39%	34%	35%	34%	51%	37%	49%	48%
8:00	36%	40%	34%	37%	36%	35%	35%	38%	54%	37%	52%	49%
8:30	37%	39%	37%	37%	32%	38%	35%	38%	56%	37%	52%	53%
9:00	40%	42%	38%	36%	31%	39%	32%	38%	59%	36%	51%	54%
9:30	40%	42%	32%	36%	31%	41%	30%	41%	63%	37%	47%	57%
10:00	42%	53%	29%	35%	28%	40%	31%	44%	68%	41%	43%	57%
10:30	43%	52%	28%	31%	29%	41%	31%	45%	73%	40%	45%	56%
11:00	41%	49%	27%	33%	29%	40%	30%	47%	54%	39%	45%	55%
11:30	42%	46%	27%	34%	28%	40%	30%	50%	55%	39%	44%	56%
12:00	44%	49%	29%	34%	28%	42%	31%	53%	56%	36%	44%	55%
12:30	44%	49%	28%	37%	28%	39%	31%	55%	58%	34%	45%	55%
13:00	43%	48%	28%	45%	27%	42%	32%	59%	61%	33%	43%	54%
13:30	43%	48%	33%	48%	26%	45%	32%	65%	64%	33%	43%	55%
14:00	43%	47%	38%	47%	62%	50%	33%	66%	68%	34%	42%	56%
14:30	43%	44%	41%	45%	62%	52%	34%	83%	73%	34%	38%	54%
15:00	45%	47%	44%	44%	63%	55%	34%	62%	76%	34%	38%	55%
15:30	47%	48%	48%	43%	63%	58%	35%	63%	79%	33%	41%	55%
16:00	49%	48%	46%	45%	63%	59%	36%	67%	83%	34%	43%	55%
16:30	53%	54%	49%	47%	65%	59%	37%	69%	86%	39%	45%	56%
17:00	56%	54%	47%	49%	66%	59%	40%	71%	88%	40%	46%	57%
17:30	55%	57%	50%	48%	66%	60%	41%	74%	90%	42%	42%	60%
18:00	55%	42%	45%	48%	65%	62%	44%	76%	93%	44%	43%	66%
18:30	54%	44%	44%	48%	63%	62%	45%	79%	96%	46%	42%	70%
19:00	54%	43%	43%	47%	62%	61%	46%	81%	95%	46%	42%	72%
19:30	52%	41%	52%	47%	58%	59%	44%	79%	92%	45%	42%	74%
20:00	50%	39%	51%	44%	56%	56%	44%	74%	90%	44%	40%	73%
20:30	50%	39%	51%	44%	53%	55%	42%	78%	87%	43%	40%	70%
21:00	48%	38%	49%	43%	50%	52%	40%	76%	80%	42%	38%	69%
21:30	48%	37%	47%	42%	34%	47%	39%	72%	77%	44%	38%	64%
22:00	47%	37%	44%	42%	32%	43%	37%	68%	73%	43%	40%	62%
22:30	45%	34%	41%	42%	32%	40%	33%	64%	66%	40%	40%	58%
23:00	43%	33%	37%	41%	32%	39%	32%	56%	61%	37%	42%	57%
23:30	43%	39%	38%	40%	34%	41%	32%	54%	60%	36%	41%	54%

Retail CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	1	0	0	0
18:30	0	0	0	0	0	0	0	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

- Charts show the network, generation and combination (retail) period definitions
- The generation peak was based on VIC NEM demand data from AEMO
- The retail peak periods combine the network and generation peak periods
- *Energeia recommends the retail peak periods as the most cost reflective*

Source: Energeia

Tariff Design Methodology and Inputs

LRMC Determination

ENERGEIA

Determining Long-Run-Marginal-Cost (LRMC)

- Victorian DSNP LRMCs
- Victorian LRMC Methodologies
- Avoidable Costs
- Energeia's LRMC Analysis

ENERGEIA

Victorian Calculation Methods, Assumptions and Results

Victorian DNSP Low-Voltage LRMC's

Low Voltage Long Run Marginal Cost		
	Annual Pricing Proposals or Tariff Structure Statements ($ / kVA / year)	Reg Proposal Model ($ / kVA / year)
AusNet	$88.70 (2019)	$62.57 (2019)
CitiPower	$94.22 (2015)	$94.22 (2015)
Powercor	$96.64 (2015)	$96.64 (2015)
United Energy	$124.00 (2015)	N/A
Jemena	$60.03 (2019)	$80.67 (2019)

Source: DNSP LRMC Models and Annual Pricing Proposals

LRMC Calculation Methodologies and Key Assumptions

		AusNet	Jemena	CitiPower / Powercor	United
Demand	Main Forecast Method	P50 Non-Coincident at ZS level	Raw Non-Coincident at customer level	Raw Non-Coincident at ZS level	
Demand	Split by Voltage Level?	✗	✓	✗	
Capex	Repex	✗	✗	✗	
Capex	Augex	10%, Annualised by Project Cashflow Timing	90%, Annualised by Asset Life	✗[1]	
Capex	Connex	✗	65% SCS Connex	✗	
Capex	Opex %	1%	4.3%	0.5%	
LRMC	Diversity Factor	✗	✗	✓	
LRMC	Start Year	FY19	FY19	CY16	
LRMC	Time Horizon	10	10	10	

Source: DNSP LRMC Models and RINs, Energeia, Note: 1. Annualised by Project Cashflow Timing, but annualised costs not disclosed to enable back calculation of Augex

- Victorian DNSPs, like their peers, determine LRMC using key assumptions about which costs to include
- A fraction of total planned expenditure is generally deemed avoidable
- This results in LRMCs that are relatively low, with relatively high and unavoidable sunk costs
- Energeia therefore examined the case for including additional costs and the impact on estimated LRMC
- This issue is topical for a number of reasons, including the AER's decision to make repex subject to the RIT-D

ENERGEIA

SAPN Avoidable Repex for LRMC Case Study

SAPN Repex Exclusions for LRMC

Asset Replace/Refurbish	Sub-Trans	Zone S/Stn	HV Feeder	Dist T/F	LV Feeder	Not Aug
Lines						
Planned						
Cable Replacement - Planned			15%		10%	75%
Conductor Replacement - Planned			15%		10%	75%
Line Ancillary Equipment - Planned (incl LFIs, fences, gates, signs etc)						100%
Line Regulation - Planned (incl regulators, capacitors)						100%
Overhead Line Components - Planned (incl insulators, crossarms, taps, pole earths)						100%
Poles - Planned						100%
Recloser Refurbishment - Planned						100%
Recloser Replacement - Planned						100%
Services Replacement - Planned					15%	85%
Strategic Line Maintenance Spares						100%
Switchgear - Ground Level - Planned						100%
Switchgear - Overhead - Planned						100%
Transformers - Planned				25%		75%
Poles - Planned plating						100%
Recloser Maintenance - Planned						100%
Pole Replacement Projects						100%
CBD ducts & manholes						100%
Cables - CBD 11kV PILC cable replacements						100%
Services - Aluminium neutral screen service line replacements						100%
Unplanned						
Cable Replacement - Unplanned			15%		10%	75%
Line Ancillary Equipment - Unplanned (incl LFIs, fences, gates, signs etc)						100%
Line Regulation - Unplanned (incl regulators, capacitors)						100%
Overhead Line Components - Unplanned (incl insulators, Xarms, pole earths)						100%
Poles - Unplanned						100%
Recloser Replacement - Unplanned						100%
Services Replacement - Unplanned					15%	85%
Switchgear - Ground Level - Unplanned						100%
Switchgear - Overhead - Unplanned						100%
Transformers - Unplanned				25%		75%
Other						100%
Substations						
Auxillary DC Supplies excl AC - Battery Banks & Chargers						100%
Capacitor Banks - CAPACITY UPGRADE?						100%
Circuit Breakers Planned Replacement		10%				90%
Circuit Breakers Planned Refurb		25%				75%
Mobile Substations		25%				75%
Protection Relays (Replace 33kV/66kV Fuses, incl Fault Thrower)						100%
Substation Insurance Spares & Asset Mgt						100%
Substation Infrastructure - Civil (incl buildings, structures)						100%
Substation Transformer Repl.		25%				75%
TF Refurb (18665 & 18977)						100%
Planned Transformer Refurbishment - also done under 18665						100%
Surge Arrester						100%
Carryover (subs)						100%
AC Panels + auxilary supply						100%
Protection Asset Replacement						100%
Unplanned CB Replacement		25%				75%
Standby Power Station						100%
Unplanned Substation Asset Repl - PROTECTION						100%
Other (sub cables)						100%
Northfield 66kV GIS Switchboard replacement (1/3rd)		25%				75%
MOD3C Substation Upgrades (trf to 18665)						100%
Substation Standards Templates and CU Developments						100%
Relay Replace on Failure						100%
Cable replacement & Cable Termination Support upgrade (tfr to other)						100%
GIS Assessment and Refurbishment						100%
Transformer planned replacement due to condition						100%

Source: SAPN Reg Proposal 2021-26, Energeia

- The table to the left reports on SAPN's assumed level of avoidable repex in their LRMC analysis
- This results in around 5% of the total forecast repex spend being included in the LRMC calculation
- An alternative view of assets is that most high voltage feeders and zone substations could be removed if load was expected to be reduced for foreseeable future
- This would make repex, and potentially connex and cap cons also 100% variable, or at least some portion of it – a future vision or reference design is needed

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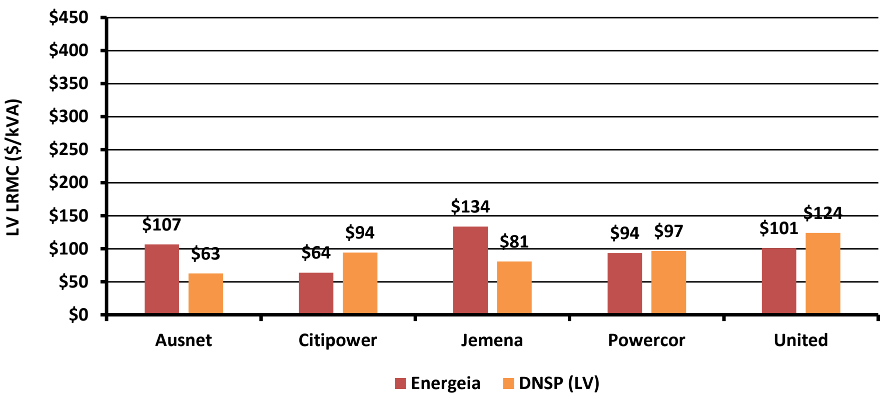
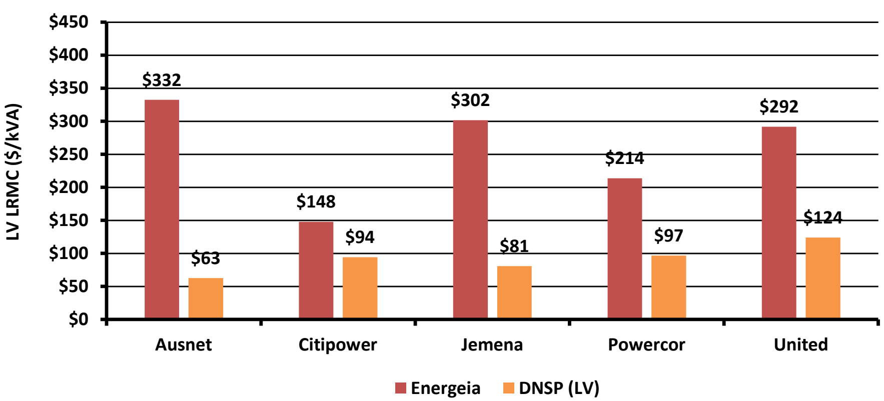
Energeia's Estimated LRMCs vs. Published

Energeia's Estimated LRMC with 12% Repex vs. Published



Source: Energeia, DNSP Tariff Structure Statements, Note: Connex excluded, avoidable Repex assumed to be 12%

Energeia's Estimated LRMC with 100% Repex vs. Published



Source: Energeia, DNSP Tariff Structure Statements, Note: Connex excluded, avoidable Repex assumed to be 100%

- Energeia developed a tool for calculating LRMC, which is similar in operation and input to DNSP tools
  - It also draws from RIN data
  - It can be parameterized to generate the same results with the same settings as the DNSPs
- The top left graphic shows our bottom-up estimates compared to the DNSP reported LRMCs
- The bottom left graphic shows our revised estimate if we include the bookend scenario, all repex, etc.
- The following slide shows some intermediate settings, which we are recommending to take forward

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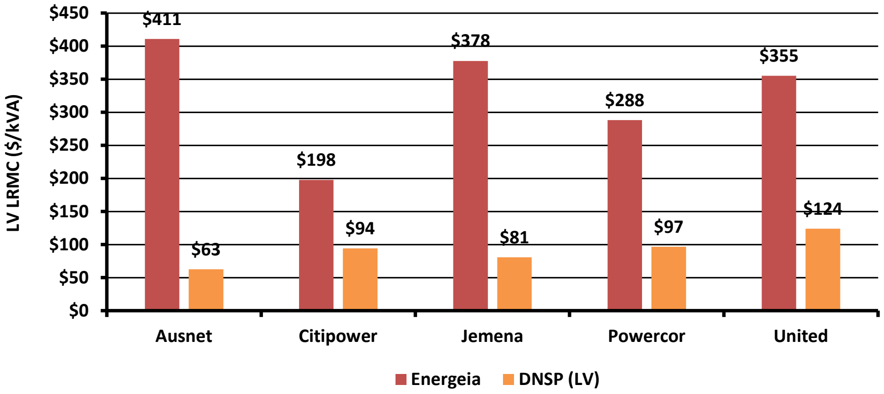
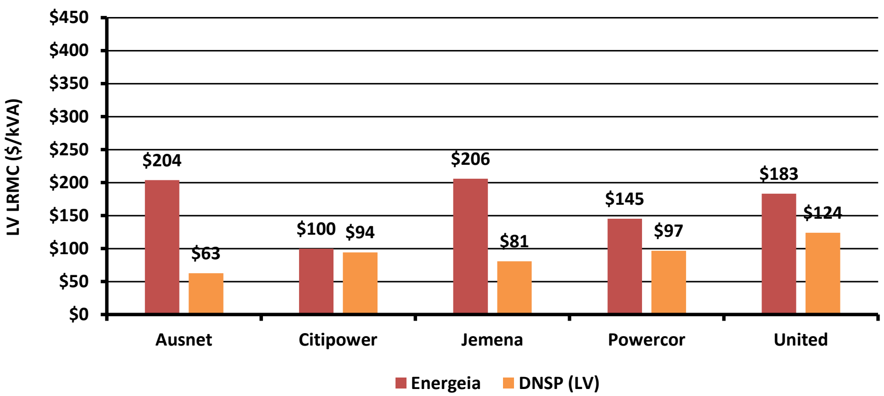
Energeia's Recommended LRMCs

Energeia's Estimated LRMC with 100% Repex + Connex



Source: Energeia, DNSP Tariff Structure Statements, Note: Connex included, avoidable, Repex assumed to be 100%

Energeia's Estimated LRMC with 50% Repex



Source: Energeia, DNSP Tariff Structure Statements, Note: Connex excluded, avoidable Repex assumed to be 50%

- The graphic to the top left assumes 100% repex and 100% cap cons and connex
  - This implies distributed energy being able to replace 100% of the high voltage and sub-transmission network
- The graphic on the bottom left assumes 50% repex is avoidable
  - *Energeia recommends taking the 50% repex assumption forward into the rate design step*
  - *This assumes that the absence of load could enable removal of assets*

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Pricing Design and impact Assessment

Structure, Periods and Prices

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Determining Tariff Structure and Residual Cost Allocation

- Peak pricing components
  - Distribution peak
  - Generation peak
- Residual cost components
  - Sliding scale fixed based on class outcomes not individual outcomes (non-distortionary)
  - Retail overhead considerations

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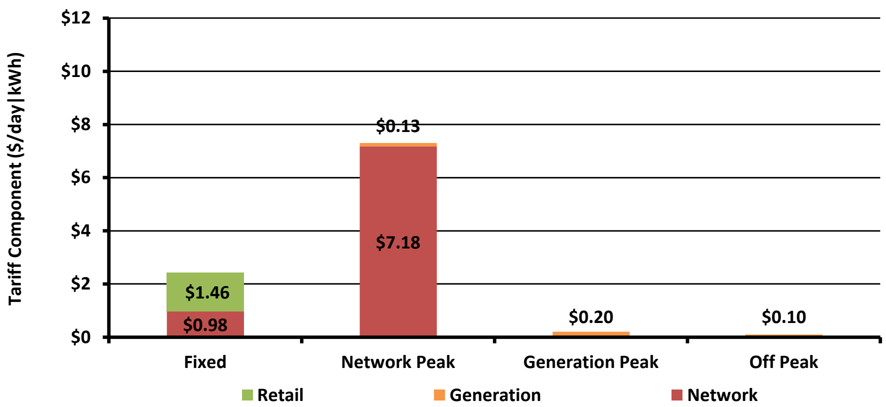
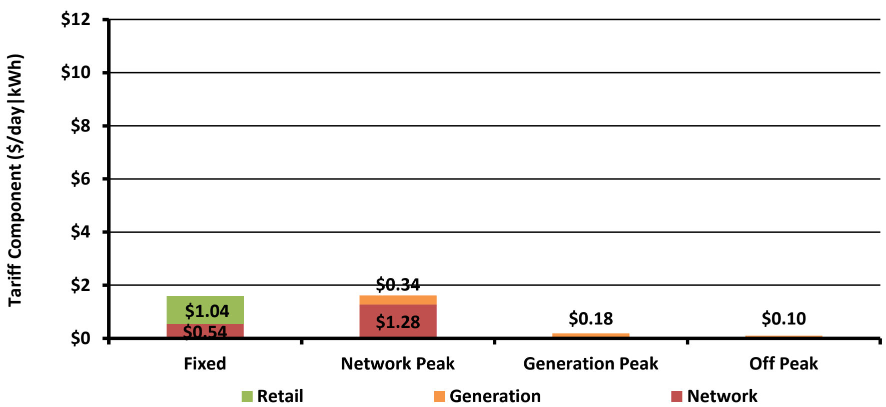
Tariff Rate Breakdown (1/2)

AusNet



Source: Energeia

CitiPower



Source: Energeia

- Daily fixed charges used to recover all residual costs
  - Retail margin treated as a residual cost
- Two peak periods defined to recover peak costs
  - Generation based on observed NEM demand data from the past 3 years
  - Pricing level mostly a function of hours
- *Remember, these are voluntary tariffs, and will only be adopted if consumers or their agents think better off*
  - *They are designed to enable more efficient grid usage, and that includes increasing the addressable benefits for demand response*

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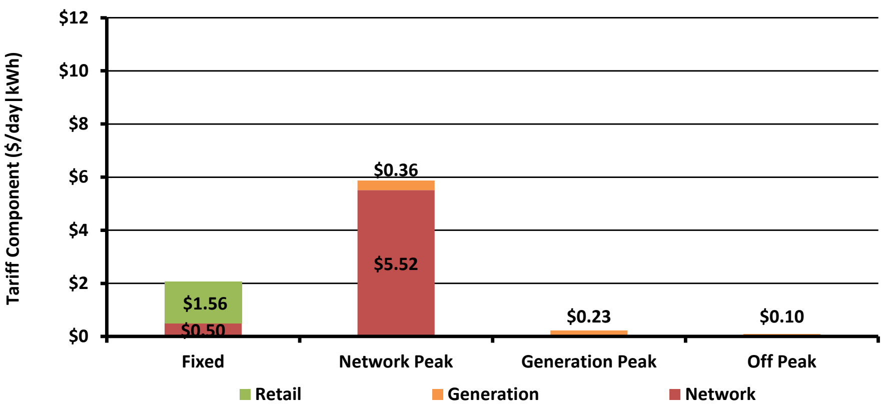
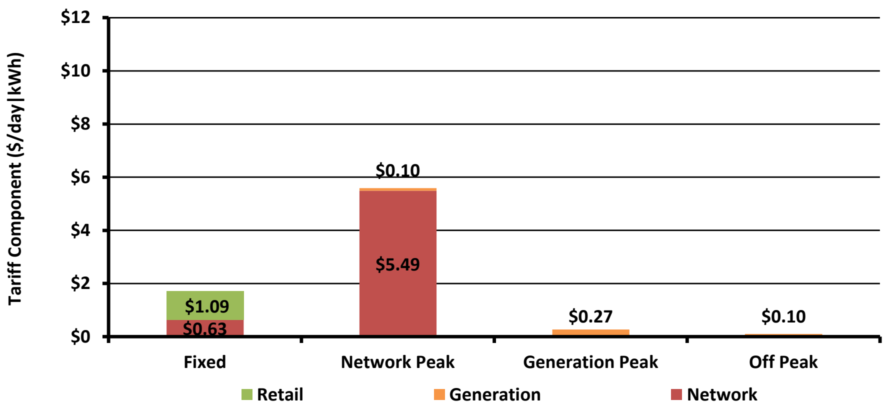
Tariff Rate Breakdown (2/2)

Jemena



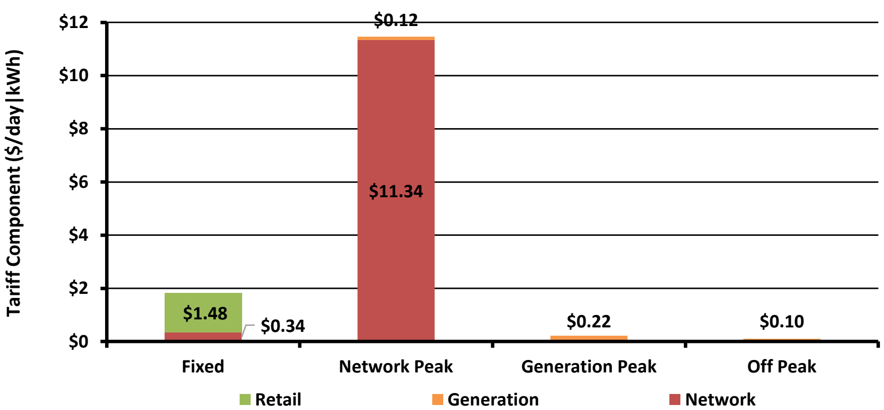
Source: Energeia

Powercor



Source: Energeia

United



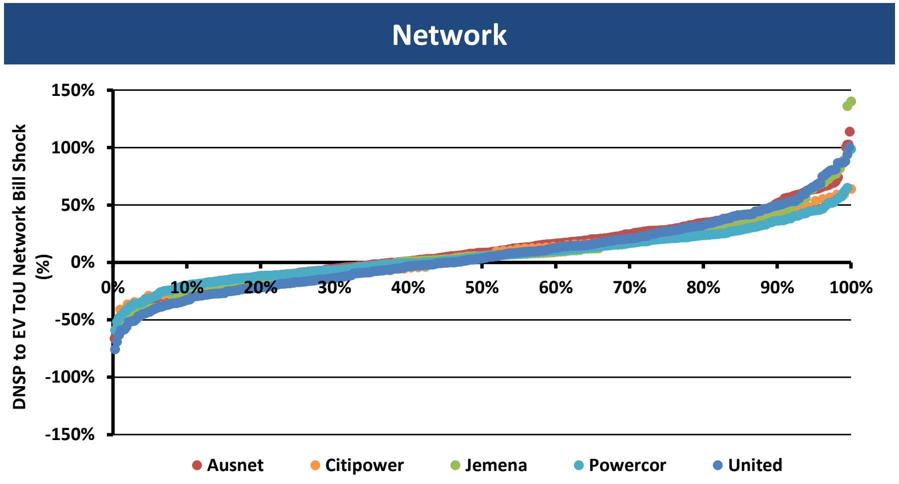
Source: Energeia

- JEN, PCR and ASN peak prices are in the $5-8/kWh range
- UED is $12/kWh and CitiPower is $1.5/kWh, mainly due to differences in the peak period
- Off-peak prices are $0.10/kWh for 98-99% of the time

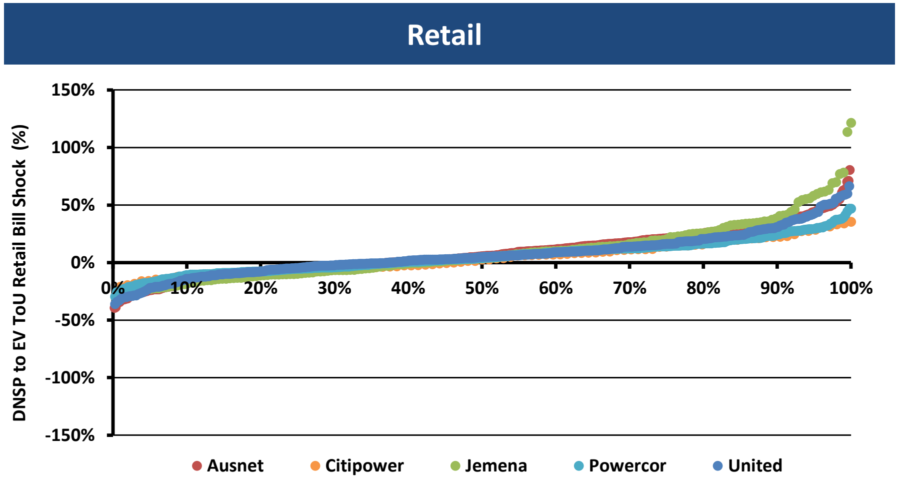
Pricing Design and impact Assessment

First Order: Initial Bill Impacts

Network and Retail Bill Impacts – Base Consumption



Source: Energeia



Source: Energeia

- Prices have been set to be revenue neutral at the network and retail level
- So switching from the DNSP ToU to the EV ToU rate should not result in any change in bills on average

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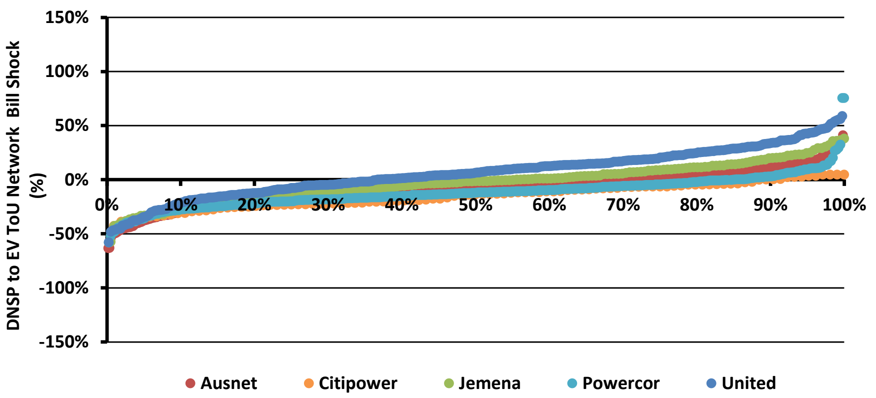
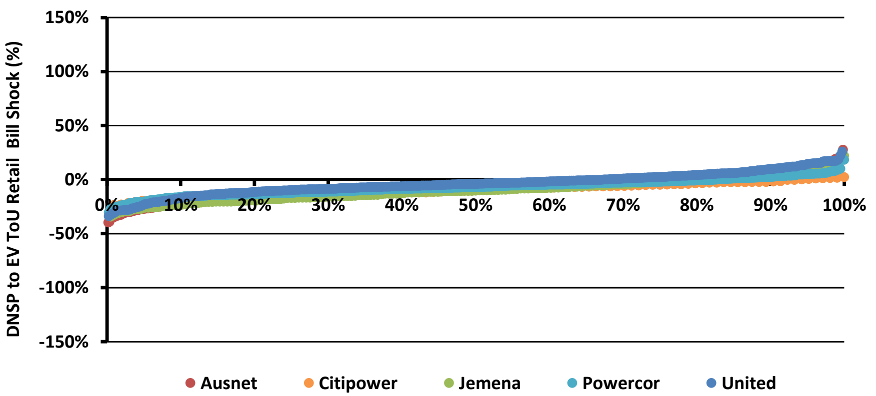
Network and Retail Bill Impacts – Base + EV Load

Network



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a.

Retail



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a.

- For consumers with an EV load that they are not managing, the change would result in a slightly lower retail bill on average for most DNSPs
- This reflects unwinding in the cross-subsidy being paid from drivers to consumers in the DNSP ToU rate

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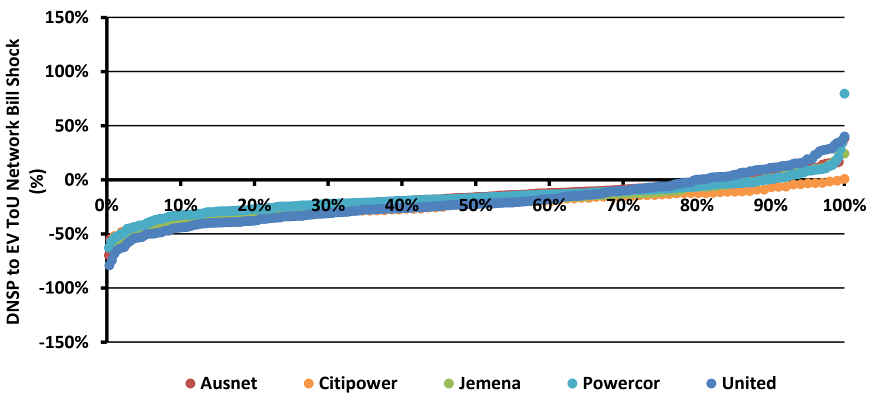
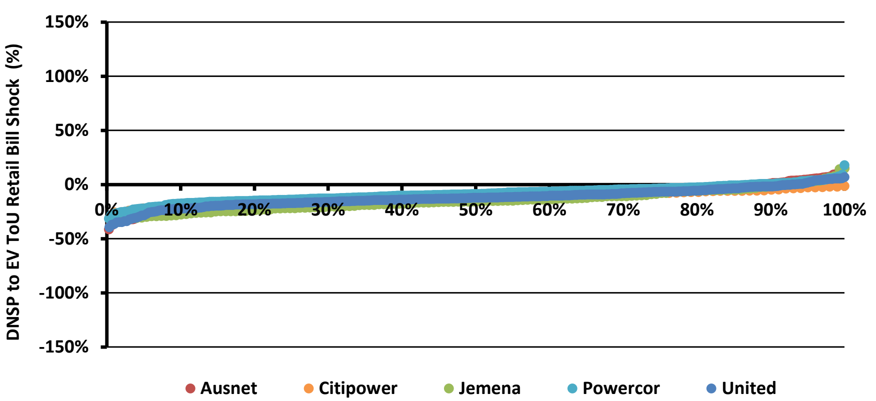
Network and Retail Bill Impacts – Base + EV DR Load

Network



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a.

Retail



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a.

- Almost all customers save on their bill optimising their charging to avoid the peak for the EV ToU tariff as opposed to the DNSP tariff
- Importantly, load control is only required for 1-2% of hours in a year on the EV ToU tariff, compared to 25% of hours on the DNSP tariff
- This analysis shows the significant benefit and incentive for EV drivers to volunteer for this rate

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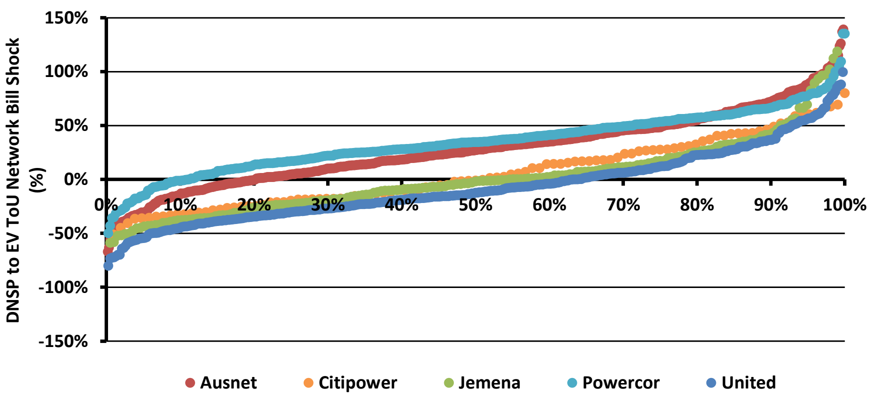
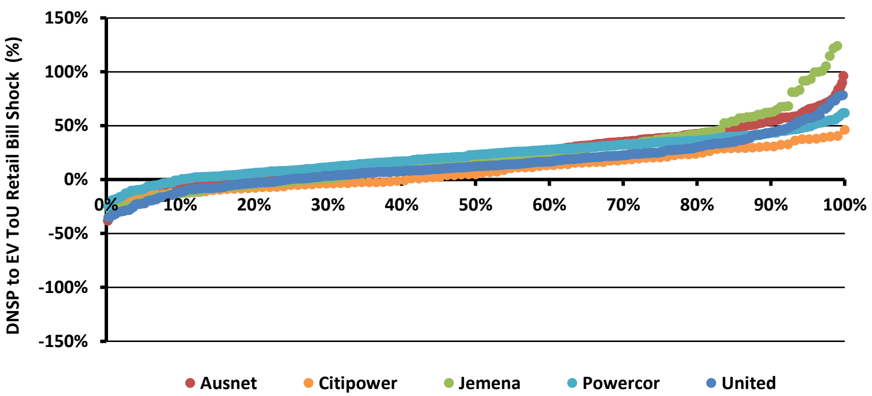
Network and Retail Bill Impacts – Base + PV Consumption

Network



Source: Energeia, Note: PV Capacity assumed to by 4 kW

Retail



Source: Energeia, Note: PV Capacity assumed to by 4 kW

- We also looked at the impact of the rate on rooftop solar PV bill impacts
- Our analysis shows that network and retail bills go up for customers with solar PV
  - This is expected given the EV ToU tariff is more cost reflective
  - The key question is whether the benefits for EVs outweigh the disbenefits related to PV

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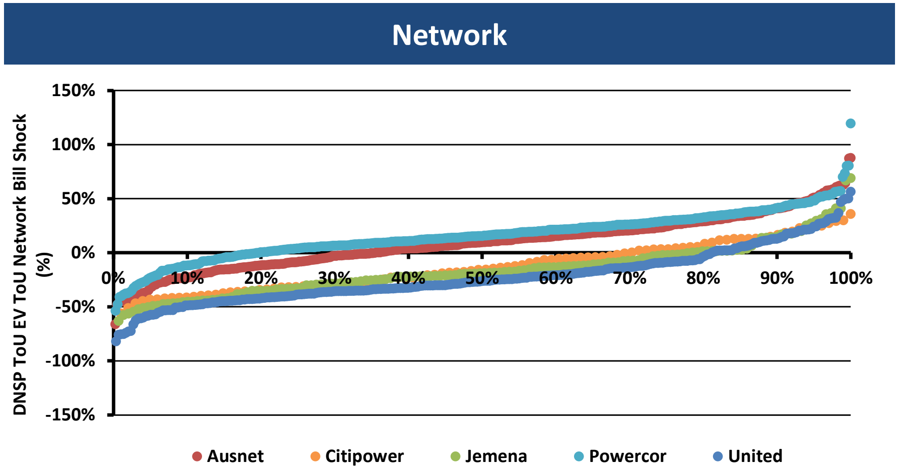
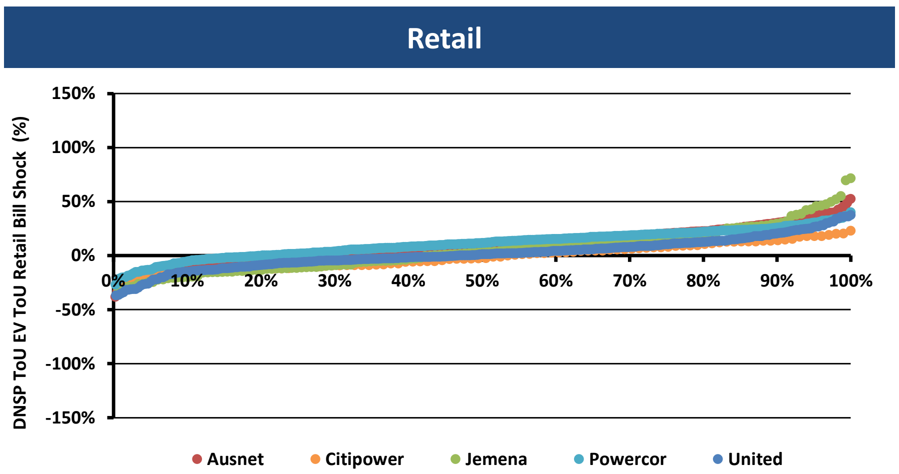
Network and Retail Bill Impacts – Base + PV + EV DR



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a., PV Capacity assumed to be 4 kW



Source: Energeia, Note: EV Consumption assumed to be 2,044 kWh/p.a., PV Capacity assumed to be 4 kW

- Energeia also looked at the case of combined EV charging and PV generation, which is likely to be increasingly common for VIC EV drivers
  - It's also important to bear in mind that there is likely to be 2 EVs at most premises over time
- The final outcome when combining optimised EV charging with 4 KW of solar is heavily dependant on the network's peak time
  - United, CitiPower and Jemena customers, with morning/afternoon peaks, saw reduced bills as PV generation reduces network peak
  - Customers on AusNet and Powercor, with evening peaks, see higher bills since PV generation impact peak less
- Across all networks, the average customer is better off optimising their EV charging on the EV ToU tariff as opposed to the DNSP ToU tariff
  - It is also important to bear in mind much reduced peak window that is easier to avoid

Pricing Design and impact Assessment

Second Order: Incentives and Cross-Subsidies

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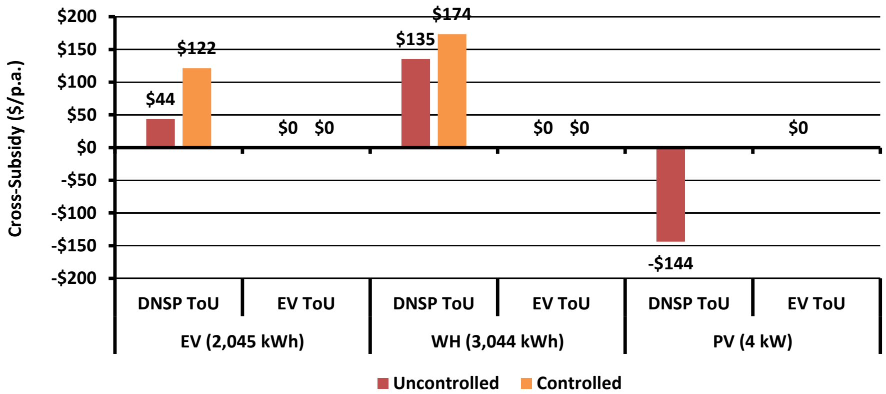
Cross-Subsidies by Load / Generation Type

Network-Average Cross Subsidy



Source: Energeia

- The EV ToU tariff eliminates cross-subsidies by correctly pricing load during the peak, based on calculated LRMC and peak periods
- Energeia's analysis found the DNSP ToU rates charge those with EV's and flexible water heating loads more than their cost of service
- Likewise, the analysis found current rates are cross-subsidising solar PV investments, but not by as much as many may have assumed
- While unwinding cross-subsidies is desirable from an equity and efficiency perspective, the main driver for moving to the EV ToU is the higher DR benefits

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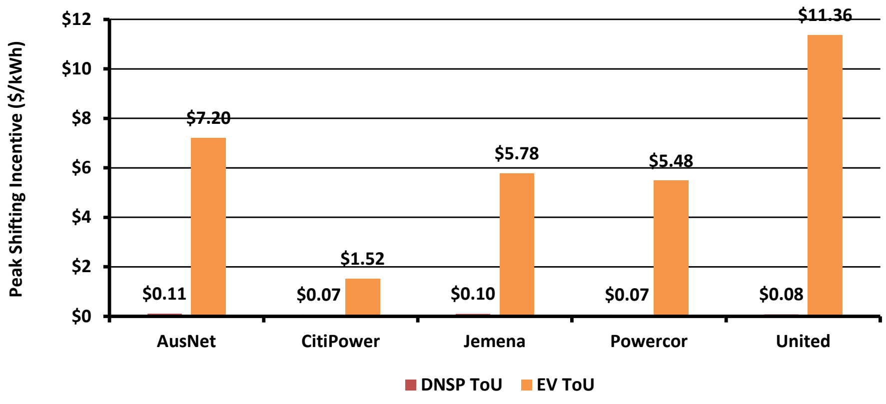
Peak Shifting Incentives

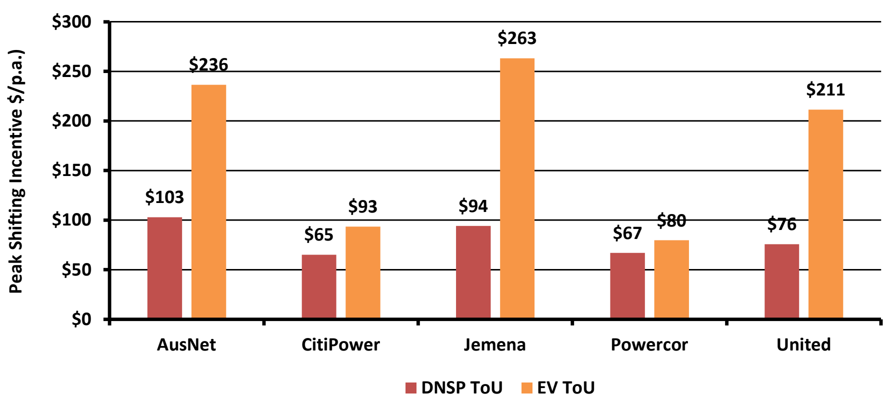
$/kWh Incentive



Source: Energeia

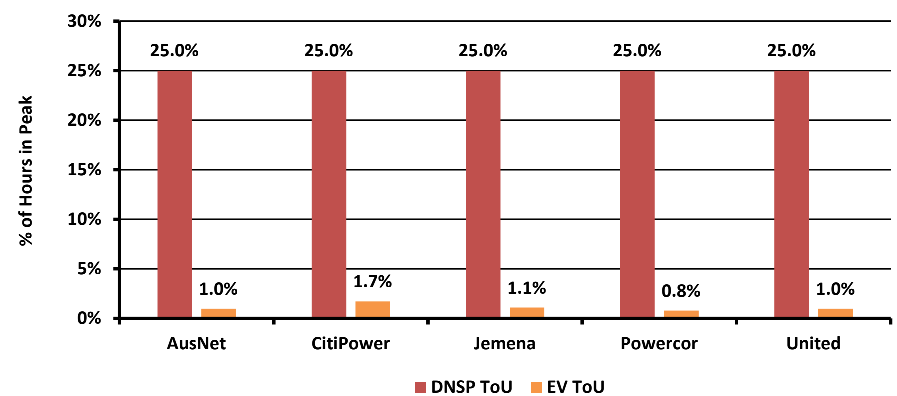
- $/kWh incentives for demand response based on combining LRMC costs and peak period hours
- Prices incentives are much higher per kWh and on a annual EV charging basis
- The approach is expected to significantly increase the 'addressable' value of demand response
    - EV DR expected to result in ~100% avoidance

Annual Incentive



Source: Energeia, Note: based on average EV charging load

% of Hours in Peak



Source: Energeia

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Recommendations and Next Steps

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Project – Key Recommendations

- In order to achieve the tariff reforms that this work has demonstrated to be in the long-term interests of consumers (those adopting new technology as well as those not adopting it), Energeia recommends that the ECA engage with DNSP, government, regulator, retailer and consumer stakeholders regarding:
    - Making more cost reflective tariff designs available on a voluntary basis
    - How peak periods are set, and the need for significant additional work to get this right
    - What costs are included in LRMC calculations, and agree a methodology for including up to 100% of repex, etc.
- Although not in scope for this project, Energeia also recommends that the ECA consider engaging with the above stakeholders to address the two other key barriers to more efficient consumer investment and consumption incentives and the long-term interests of consumers:
    - Unbundling of network services to unlock the benefits of more efficient DER investment and operation
    - Removing barriers to setting cost reflective prices for exporting energy and not just importing energy

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Thank You

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Appendix 1

DNSP Peak Period Analysis

DNSP Peak Periods (United)

2018-19 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	2%	2%	5%	5%	2%	2%	0%	2%	5%
8:00	2%	0%	0%	2%	2%	5%	10%	2%	2%	0%	2%	7%
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13:30	2%	0%	0%	0%	0%	12%	31%	7%	5%	0%	2%	5%
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14:30	2%	0%	0%	0%	0%	17%	19%	5%	7%	0%	0%	5%
15:00	0%	0%	0%	0%	0%	26%	19%	2%	21%	0%	0%	5%
15:30	0%	0%	0%	0%	0%	29%	26%	5%	48%	0%	0%	2%
16:00	0%	0%	0%	0%	0%	38%	33%	7%	64%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	33%	43%	12%	62%	0%	0%	0%
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22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	2%	0%	0%	24%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	5%	5%	0%	21%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	7%	5%	0%	24%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	7%	14%	0%	52%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	7%	24%	0%	90%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	5%	26%	0%	98%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	2%	21%	0%	98%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	26%	0%	98%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	19%	0%	95%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	14%	0%	95%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	0%	88%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	33%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	2%	0%	2%	2%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	2%	7%	7%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	10%	5%	10%	7%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	10%	2%	2%	2%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	12%	5%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	12%	26%	0%	10%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	10%	31%	0%	17%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	10%	52%	0%	19%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	12%	57%	0%	17%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	5%	57%	0%	24%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	36%	0%	19%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	31%	5%	10%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	10%	14%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	5%	12%	5%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	10%	2%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	7%	5%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	7%	12%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	7%	19%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	29%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	5%	26%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	21%	0%	0%	2%
18:30	2%	2%	0%	0%	0%	0%	0%	0%	7%	0%	0%	2%
19:00	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
19:30	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	2%	5%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	2%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	2%	0%	7%	7%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	2%	5%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	0%	5%	5%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Chart to the left shows UED's substation weighted average loads using raw, P10 and trended load data
- Trending of last 3 years of ZS data adjusted for P10 weather is used to identify the future peak
- Trending reveals the need to include Dec, Jan and potentially weekend days in the peak period
- Using the technically correct approach shows consumers should benefit from off-peak prices for 99% longer than proposed
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

DNSP Peak Periods (CitiPower)

2019 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	4%	0%	0%	0%	0%	7%	0%	0%	0%	0%	4%
9:00	0%	4%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%
9:30	0%	4%	0%	0%	0%	0%	37%	0%	0%	0%	0%	0%
10:00	0%	4%	0%	0%	0%	0%	56%	0%	0%	0%	0%	0%
10:30	0%	4%	0%	0%	0%	0%	63%	0%	0%	0%	0%	0%
11:00	0%	4%	0%	0%	0%	0%	67%	0%	0%	4%	0%	0%
11:30	0%	4%	4%	0%	7%	0%	85%	0%	0%	4%	0%	0%
12:00	0%	4%	4%	0%	7%	4%	85%	0%	0%	4%	4%	0%
12:30	4%	4%	4%	0%	4%	4%	78%	4%	0%	4%	0%	0%
13:00	4%	4%	4%	0%	11%	11%	78%	4%	0%	4%	0%	0%
13:30	4%	4%	7%	0%	11%	11%	81%	7%	0%	4%	0%	0%
14:00	0%	4%	7%	0%	19%	11%	81%	7%	0%	4%	0%	0%
14:30	4%	4%	11%	0%	19%	15%	70%	11%	0%	7%	0%	0%
15:00	0%	4%	11%	0%	4%	15%	52%	15%	0%	4%	0%	0%
15:30	0%	4%	11%	4%	0%	19%	44%	11%	0%	0%	0%	0%
16:00	0%	4%	11%	4%	0%	22%	56%	11%	0%	0%	0%	0%
16:30	0%	4%	11%	4%	0%	26%	63%	11%	0%	0%	0%	0%
17:00	0%	4%	4%	4%	0%	30%	67%	19%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	37%	59%	7%	0%	0%	0%	0%
18:00	0%	0%	0%	7%	7%	37%	41%	11%	0%	0%	11%	4%
18:30	4%	7%	0%	7%	7%	37%	33%	22%	11%	0%	11%	11%
19:00	7%	11%	4%	7%	7%	33%	33%	19%	11%	0%	11%	11%
19:30	7%	11%	4%	7%	7%	30%	26%	0%	7%	0%	11%	11%
20:00	7%	7%	4%	0%	4%	30%	26%	0%	4%	0%	11%	11%
20:30	4%	4%	0%	0%	0%	15%	26%	0%	0%	0%	7%	7%
21:00	4%	0%	0%	0%	0%	11%	19%	0%	0%	0%	4%	7%
21:30	0%	0%	0%	0%	0%	7%	15%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2019 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	11%	0%	0%	11%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	19%	0%	0%	11%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	11%	19%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	11%	26%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	7%	33%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	26%	52%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	11%	33%	59%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	22%	56%	67%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	33%	52%	59%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	15%	33%	52%	59%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	11%	59%	52%	59%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	26%	67%	56%	63%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	26%	67%	52%	56%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	41%	81%	52%	33%	0%	0%	4%	0%	0%
15:00	0%	0%	0%	33%	74%	63%	30%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	37%	0%	67%	22%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	56%	0%	74%	37%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	67%	0%	78%	44%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	70%	0%	93%	41%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	56%	0%	96%	41%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	26%	0%	85%	26%	7%	0%	0%	0%	0%
18:30	0%	0%	0%	19%	0%	63%	22%	7%	0%	0%	0%	0%
19:00	0%	0%	0%	15%	0%	63%	22%	7%	0%	0%	0%	0%
19:30	0%	0%	0%	15%	0%	59%	19%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	41%	15%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	41%	15%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	30%	7%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	4%	0%	0%	11%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	4%	0%	0%	0%	15%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	22%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	4%	0%	4%	26%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	48%	0%	0%	0%	0%	0%
10:30	0%	4%	0%	4%	0%	0%	56%	0%	0%	0%	0%	0%
11:00	0%	4%	0%	4%	0%	0%	56%	0%	0%	0%	0%	0%
11:30	0%	4%	0%	4%	4%	0%	70%	0%	0%	0%	0%	0%
12:00	0%	4%	4%	4%	4%	4%	70%	0%	0%	0%	0%	0%
12:30	0%	4%	4%	4%	0%	0%	70%	0%	0%	0%	0%	0%
13:00	4%	4%	4%	4%	7%	4%	67%	0%	0%	0%	0%	0%
13:30	11%	4%	4%	4%	0%	4%	70%	0%	0%	0%	0%	0%
14:00	4%	0%	4%	0%	7%	0%	70%	0%	0%	0%	0%	0%
14:30	7%	0%	4%	0%	19%	0%	56%	0%	0%	0%	0%	0%
15:00	7%	0%	0%	0%	15%	0%	52%	4%	0%	0%	0%	0%
15:30	7%	0%	4%	0%	0%	0%	44%	0%	0%	0%	0%	0%
16:00	7%	0%	4%	0%	0%	0%	48%	0%	0%	0%	0%	0%
16:30	4%	0%	4%	0%	0%	0%	52%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	15%	0%	0%	48%	0%	0%	0%	0%	0%
17:30	0%	0%	4%	15%	0%	0%	37%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	15%	0%	0%	30%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	11%	0%	0%	26%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	4%	19%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	4%	11%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2019 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	15%
16:30	0%	0%	0%	0%	0%	0%	0%	4%	4%	0%	0%	7%
17:00	0%	0%	0%	0%	0%	0%	0%	4%	4%	0%	0%	4%
17:30	0%	0%	0%	0%	0%	0%	0%	11%	4%	0%	0%	4%
18:00	7%	0%	4%	0%	0%	0%	0%	11%	4%	0%	0%	7%
18:30	7%	0%	11%	0%	0%	11%	0%	15%	0%	4%	0%	15%
19:00	7%	0%	11%	0%	0%	11%	0%	4%	0%	4%	0%	15%
19:30	7%	0%	7%	0%	0%	11%	0%	0%	0%	4%	0%	15%
20:00	4%	0%	7%	0%	0%	7%	0%	0%	0%	0%	0%	7%
20:30	0%	0%	7%	0%	0%	7%	0%	0%	0%	0%	0%	4%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%

2019 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	7%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
17:00	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	4%
17:30	0%	0%	0%	0%	0%	0%	0%	7%	4%	0%	0%	4%
18:00	0%	0%	0%	0%	0%	0%	0%	7%	4%	0%	0%	11%
18:30	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	15%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	7%
9:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	11%
10:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	15%
10:30	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	15%
11:00	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
17:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	19%
18:30	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	15%
19:00	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	7%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Analysis of CitiPower's zone substation peak periods shows P10 weather resulting in a large peak spread, however, the underlying trend moves to a Jan peak only
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

DNSP Peak Periods (Jemena)

2018-19 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	16%	4%	0%	0%	0%	0%
7:30	4%	0%	0%	0%	0%	0%	28%	4%	0%	0%	4%	8%
8:00	4%	4%	0%	0%	4%	0%	40%	4%	0%	0%	4%	8%
8:30	4%	4%	0%	0%	4%	0%	44%	4%	0%	0%	4%	4%
9:00	4%	8%	0%	0%	4%	0%	60%	4%	0%	0%	4%	4%
9:30	8%	8%	0%	0%	4%	0%	68%	4%	0%	0%	0%	4%
10:00	4%	8%	0%	0%	0%	4%	68%	4%	0%	0%	4%	4%
10:30	0%	4%	0%	0%	0%	8%	76%	4%	0%	0%	0%	0%
11:00	4%	4%	0%	0%	0%	8%	76%	4%	0%	0%	0%	0%
11:30	4%	0%	0%	0%	0%	4%	72%	4%	4%	0%	0%	4%
12:00	0%	0%	0%	0%	0%	4%	72%	8%	4%	0%	0%	4%
12:30	0%	4%	0%	0%	0%	4%	76%	12%	4%	0%	0%	0%
13:00	0%	4%	0%	0%	0%	12%	68%	8%	12%	0%	0%	0%
13:30	0%	4%	0%	0%	0%	4%	56%	16%	16%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	8%	44%	12%	24%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	28%	52%	16%	40%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	36%	56%	28%	52%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	48%	48%	24%	52%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	28%	48%	32%	64%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	32%	72%	44%	72%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	8%	72%	48%	72%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	8%	68%	56%	48%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	8%	68%	24%	32%	0%	8%	4%
18:30	0%	4%	0%	0%	0%	0%	64%	12%	8%	0%	8%	4%
19:00	4%	0%	0%	0%	0%	0%	64%	4%	4%	0%	8%	4%
19:30	0%	0%	0%	0%	0%	0%	56%	0%	4%	0%	4%	4%
20:00	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	24%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	4%	0%	0%	12%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	4%	0%	0%	20%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	4%	0%	44%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	4%	16%	0%	68%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	8%	20%	0%	76%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	4%	40%	0%	96%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	4%	28%	0%	92%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	4%	24%	0%	92%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	8%	0%	88%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	8%	0%	88%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	4%	0%	80%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	4%	0%	68%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	4%
7:30	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	4%	4%
8:00	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	4%
8:30	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	4%	4%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	4%	4%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	4%	8%	0%	0%	4%	0%	0%	0%
10:30	0%	0%	0%	0%	4%	4%	0%	0%	4%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	4%	0%	4%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	4%	4%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	4%	0%	4%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	4%	8%	4%	12%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	4%	16%	4%	8%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	4%	12%	0%	4%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	4%	8%	4%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	4%	8%	12%	12%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	8%	12%	28%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	24%	0%	44%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	32%	0%	56%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	44%	8%	52%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	32%	8%	48%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	24%	16%	32%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	20%	28%	24%	0%	0%	0%	4%
18:30	0%	0%	0%	0%	0%	8%	24%	16%	0%	0%	0%	8%
19:00	4%	8%	0%	0%	0%	4%	20%	8%	0%	0%	0%	8%
19:30	4%	0%	0%	0%	0%	4%	32%	4%	0%	0%	0%	4%
20:00	0%	4%	0%	0%	0%	4%	32%	0%	0%	0%	0%	4%
20:30	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	4%
21:00	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	16%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	4%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2018-19 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18:00	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
18:30	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
19:00	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
19:30	0%	4%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

- Analysis of Jemena's zone substation peak periods shows P10 and trend analysis significantly reducing the peak period
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

Source: Energeia

DNSP Peak Periods (Powercor)

2019 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	8%	8%	5%	3%	5%	3%	3%	0%	0%	3%	3%	5%
0:30	3%	3%	5%	8%	5%	8%	5%	3%	3%	3%	0%	3%
1:00	3%	0%	0%	3%	3%	5%	3%	0%	3%	3%	0%	3%
1:30	3%	0%	0%	3%	3%	5%	3%	0%	0%	0%	0%	3%
2:00	3%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
6:30	3%	0%	3%	0%	0%	8%	3%	0%	0%	3%	0%	3%
7:00	3%	0%	3%	0%	3%	3%	3%	0%	0%	3%	0%	3%
7:30	5%	3%	3%	5%	3%	5%	8%	3%	3%	0%	0%	5%
8:00	3%	3%	3%	3%	0%	5%	5%	3%	3%	3%	5%	5%
8:30	0%	5%	0%	3%	3%	5%	13%	3%	3%	5%	3%	5%
9:00	0%	0%	0%	3%	3%	3%	15%	3%	3%	0%	3%	5%
9:30	0%	0%	0%	3%	5%	5%	13%	3%	0%	0%	3%	5%
10:00	3%	0%	0%	0%	3%	8%	15%	3%	3%	3%	3%	3%
10:30	3%	3%	0%	0%	3%	5%	15%	3%	3%	3%	3%	3%
11:00	5%	3%	0%	3%	3%	5%	18%	3%	3%	3%	3%	3%
11:30	5%	0%	0%	3%	3%	8%	18%	3%	3%	5%	3%	5%
12:00	0%	0%	3%	3%	3%	8%	23%	3%	3%	3%	3%	3%
12:30	3%	0%	0%	3%	5%	3%	23%	3%	3%	5%	3%	3%
13:00	0%	0%	3%	0%	8%	8%	25%	3%	3%	3%	3%	3%
13:30	5%	0%	3%	3%	8%	5%	28%	3%	3%	3%	3%	3%
14:00	3%	0%	3%	3%	10%	5%	25%	3%	3%	3%	3%	3%
14:30	0%	0%	3%	3%	13%	10%	30%	3%	5%	3%	3%	3%
15:00	3%	0%	3%	0%	8%	13%	33%	3%	5%	5%	3%	0%
15:30	3%	0%	3%	3%	5%	13%	30%	3%	5%	3%	0%	0%
16:00	3%	0%	0%	3%	0%	15%	40%	5%	0%	5%	0%	0%
16:30	0%	3%	5%	0%	3%	20%	48%	8%	3%	5%	0%	0%
17:00	5%	5%	0%	3%	5%	25%	50%	10%	3%	10%	3%	0%
17:30	3%	5%	0%	3%	3%	38%	55%	8%	5%	10%	5%	5%
18:00	8%	8%	3%	3%	5%	45%	63%	13%	5%	10%	10%	5%
18:30	5%	5%	5%	3%	8%	45%	68%	10%	5%	13%	8%	5%
19:00	3%	5%	5%	0%	3%	53%	70%	5%	5%	18%	3%	5%
19:30	3%	5%	3%	0%	3%	53%	73%	5%	0%	13%	3%	5%
20:00	0%	0%	0%	0%	3%	45%	68%	3%	0%	8%	0%	5%
20:30	0%	0%	0%	0%	3%	40%	50%	0%	0%	5%	0%	0%
21:00	0%	0%	0%	0%	3%	20%	35%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	3%	13%	10%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	3%	3%	5%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	3%	3%	0%	0%	3%	0%	3%
23:30	13%	13%	10%	13%	8%	8%	13%	8%	8%	8%	13%	13%

2019 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
12:00	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	30%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	28%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%

P10 CAGR Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	8%	0%	5%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	3%	3%	5%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	3%	5%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	3%	15%	0%	0%	0%	0%	3%
12:00	0%	0%	0%	0%	0%	0%	18%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	3%	0%	13%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	3%	10%	0%	0%	3%	0%	0%
15:00	0%	0%	0%	0%	0%	3%	8%	0%	0%	5%	0%	0%
15:30	0%	0%	0%	0%	0%	5%	5%	0%	0%	8%	0%	0%
16:00	0%	0%	3%	0%	0%	5%	8%	0%	0%	8%	0%	0%
16:30	0%	0%	3%	0%	0%	3%	8%	0%	0%	8%	0%	0%
17:00	0%	0%	3%	0%	0%	3%	5%	0%	0%	8%	0%	0%
17:30	0%	0%	3%	0%	0%	0%	8%	0%	0%	15%	0%	0%
18:00	0%	0%	0%	0%	0%	5%	13%	3%	0%	13%	0%	3%
18:30	0%	0%	0%	0%	0%	8%	13%	0%	0%	13%	0%	3%
19:00	0%	0%	0%	0%	0%	10%	30%	0%	0%	10%	0%	3%
19:30	0%	0%	0%	0%	0%	8%	33%	0%	0%	10%	0%	0%
20:00	0%	0%	0%	0%	0%	8%	35%	0%	0%	10%	0%	0%
20:30	0%	0%	0%	0%	0%	8%	35%	0%	0%	10%	0%	0%
21:00	0%	0%	0%	0%	0%	8%	28%	0%	0%	5%	0%	0%
21:30	0%	0%	0%	0%	0%	5%	15%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	5%	8%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%

2019 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	3%	5%	5%	0%	0%	5%	3%	3%	0%	3%	0%	3%
0:30	0%	0%	0%	3%	0%	3%	3%	3%	3%	0%	0%	0%
1:00	0%	0%	0%	3%	0%	3%	3%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	3%	3%	3%	0%	0%	0%	0%
7:30	0%	3%	0%	3%	0%	3%	3%	0%	0%	0%	3%	0%
8:00	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	3%	5%	0%	0%	3%	0%	0%	0%	0%	0%	0%
9:00	0%	3%	3%	0%	0%	3%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	3%	0%	0%	3%	3%	0%	0%	0%	0%	0%
10:00	0%	0%	5%	0%	0%	3%	3%	0%	0%	0%	0%	0%
10:30	0%	0%	3%	0%	0%	5%	3%	0%	0%	0%	0%	0%
11:00	0%	3%	3%	0%	0%	5%	0%	0%	3%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	5%	3%	0%	3%	0%	0%	0%
12:00	0%	0%	0%	0%	3%	5%	3%	0%	3%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	5%	3%	0%	3%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%
14:00	0%	0%	3%	0%	3%	5%	0%	0%	3%	0%	0%	3%
14:30	0%	0%	3%	0%	3%	0%	0%	0%	3%	0%	0%	0%
15:00	0%	0%	0%	0%	3%	3%	0%	0%	3%	0%	0%	0%
15:30	0%	0%	0%	0%	3%	3%	0%	0%	3%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	3%	0%	0%	3%	0%	0%	0%
16:30	0%	0%	3%	0%	0%	3%	0%	0%	3%	0%	0%	3%
17:00	0%	0%	3%	0%	0%	3%	0%	3%	5%	0%	0%	5%
17:30	0%	0%	3%	0%	0%	5%	0%	5%	5%	3%	0%	0%
18:00	0%	0%	5%	0%	0%	10%	0%	5%	3%	3%	0%	3%
18:30	0%	0%	8%	0%	0%	13%	0%	5%	5%	0%	0%	3%
19:00	0%	0%	0%	0%	0%	13%	0%	3%	5%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	13%	0%	0%	3%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	5%	8%	8%	3%	0%	10%	3%	3%	8%	8%	0%	8%

2019 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	13%	0%	0%	13%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	28%	0%	0%	15%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	40%	0%	0%	13%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	80%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	93%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	95%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	98%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	98%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	93%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

P10 CAGR Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	5%	0%	0%	3%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	15%	0%	0%	5%	0%	0%	3%
17:00	0%	0%	3%	0%	0%	18%	0%	0%	3%	0%	0%	5%
17:30	0%	0%	3%	0%	0%	25%	0%	3%	3%	0%	0%	3%
18:00	0%	0%	3%	0%	0%	28%	0%	5%	3%	0%	0%	3%
18:30	0%	0%	5%	0%	0%	28%	0%	8%	5%	0%	0%	3%
19:00	0%	0%	0%	0%	0%	20%	0%	5%	3%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	13%	0%	3%	3%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	8%	0%	0%	3%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	5%	0%	0%	3%	0%	3%	3%	0%	0%	0%

- Analysis of Powercor's zone substation peak periods shows significant variation between raw, P10 and trend analysis
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

Source: Energeia

DNSP Peak Periods (AusNet)

2017 Raw Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	5%	0%	0%	0%	0%	3%	0%	0%
0:30	10%	5%	5%	3%	5%	3%	0%	0%	0%	8%	3%	3%
1:00	13%	5%	5%	3%	5%	3%	5%	0%	0%	8%	3%	3%
1:30	3%	0%	0%	0%	0%	0%	5%	3%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	5%	3%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	3%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	3%	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	3%	3%	0%	0%	3%	0%	0%	0%	0%	0%	3%
7:30	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	3%	0%
8:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	5%	0%
8:30	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
9:00	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
9:30	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	3%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%
11:30	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	8%	0%	0%	3%	0%	3%	0%	0%
13:00	0%	0%	0%	0%	8%	0%	0%	3%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	8%	0%	0%	13%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	10%	3%	0%	18%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	15%	8%	0%	20%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	23%	15%	0%	18%	0%	0%	3%	0%
15:30	0%	0%	0%	0%	23%	20%	3%	25%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	35%	8%	5%	23%	0%	0%	0%	0%
16:30	0%	0%	3%	0%	38%	23%	5%	25%	0%	0%	0%	0%
17:00	0%	0%	3%	0%	30%	25%	13%	23%	3%	0%	0%	0%
17:30	5%	3%	3%	0%	28%	25%	18%	33%	3%	3%	3%	3%
18:00	5%	5%	5%	0%	20%	20%	25%	30%	3%	3%	3%	3%
18:30	5%	5%	3%	0%	15%	13%	28%	28%	3%	3%	5%	3%
19:00	5%	5%	0%	0%	5%	8%	18%	25%	0%	3%	3%	5%
19:30	3%	3%	0%	0%	0%	0%	10%	20%	0%	3%	3%	5%
20:00	3%	3%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%
23:30	0%	3%	0%	0%	3%	0%	0%	0%	0%	3%	0%	0%

2017 P10 Weather Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	18%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	43%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	70%	0%	0%	0%	0%	3%	0%
15:30	0%	0%	0%	0%	0%	83%	0%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	85%	0%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	83%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	83%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	55%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	3%	0%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	3%	0%	3%	3%	0%	0%	0%	0%	0%	3%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	5%	3%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	8%	3%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	5%	5%	0%	3%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	3%	10%	3%	3%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	3%	10%	3%	0%	0%	0%	3%	0%
15:30	0%	0%	0%	0%	3%	15%	3%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	8%	18%	3%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	13%	18%	0%	0%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	15%	25%	0%	0%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	23%	0%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2017 Raw Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	5%	3%	3%	0%	3%	0%	0%	0%	0%	0%	0%	3%
0:30	10%	13%	8%	8%	3%	3%	0%	0%	0%	5%	0%	8%
1:00	10%	13%	5%	8%	3%	3%	3%	0%	0%	5%	0%	5%
1:30	5%	3%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	5%	3%	0%	0%	3%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
12:30	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	10%	3%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%
17:30	5%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%
18:00	5%	3%	0%	0%	0%	0%	13%	0%	0%	0%	0%	3%
18:30	3%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
19:30	3%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

2017 P10 Weather Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	10%	0%	3%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	8%	8%	0%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	5%	50%	3%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	3%	75%	5%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	85%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	85%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	83%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	3%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
0:30	8%	5%	0%	3%	0%	5%	0%	0%	0%	0%	0%	0%
1:00	8%	5%	0%	0%	0%	5%	0%	0%	0%	0%	0%	3%
1:30	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	3%	3%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	3%	5%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	3%	8%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	3%	3%	5%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	3%	8%	3%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	5%	13%	5%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	18%	8%	0%	0%	0%	0%
17:30	0%	0%	0%	3%	0%	3%	28%	0%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	48%	0%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

- Analysis of AusNet's zone substation peak periods shows P10 and trending leading to a much smaller peak window
- *Energeia recommends red boxed peak periods in the CAGR P10 tables*

Source: Energeia

Retail Peak Periods – Final

Ausnet Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	1	0	0	0	0	0	0
17:30	0	0	0	0	0	1	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Citipower Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	1	0	0	0	0	0
10:30	0	0	0	0	0	0	1	0	0	0	0	0
11:00	0	0	0	0	0	0	1	0	0	0	0	0
11:30	0	0	0	0	0	0	1	0	0	0	0	0
12:00	0	0	0	0	0	0	1	0	0	0	0	0
12:30	0	0	0	0	0	0	1	0	0	0	0	0
13:00	0	0	0	0	0	0	1	0	0	0	0	0
13:30	0	0	0	0	0	0	1	0	0	0	0	0
14:00	0	0	0	0	0	0	1	0	0	0	0	0
14:30	0	0	0	0	0	0	1	0	0	0	0	0
15:00	0	0	0	0	0	0	1	0	0	0	0	0
15:30	0	0	0	0	0	0	1	0	0	0	0	0
16:00	0	0	0	0	0	0	1	0	0	0	0	0
16:30	0	0	0	0	0	0	1	0	0	0	0	0
17:00	0	0	0	0	0	0	1	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Jemena Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	1	0	0	0	0
16:00	0	0	0	0	0	0	0	1	0	0	0	0
16:30	0	0	0	0	0	1	0	1	0	0	0	0
17:00	0	0	0	0	0	0	0	1	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Powercor Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

United Retail CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	1	0	0	0	0	0
8:30	0	0	0	0	0	0	1	0	0	0	0	0
9:00	0	0	0	0	0	0	1	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	1	0	0	0	0	0	0
16:30	0	0	0	0	0	1	0	0	0	0	0	0
17:00	0	0	0	0	0	1	0	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	0	0	0	0
18:30	0	0	0	0	0	0	1	0	0	0	0	0
19:00	0	0	0	0	0	0	1	0	0	0	0	0
19:30	0	0	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	1	0	0	0	0	0
20:30	0	0	0	0	0	0	1	0	0	0	0	0
21:00	0	0	0	0	0	0	1	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Ausnet Retail CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	1	0	0	0	0	0
18:00	0	0	0	0	0	0	1	0	1	0	0	0
18:30	0	0	0	0	0	0	1	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Citipower Retail CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	1	0	0	0
18:30	0	0	0	0	0	0	0	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Jemena Retail CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	1	0	0	0
18:30	0	0	0	0	0	0	0	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Powercor Retail CAGR P10 Weekend

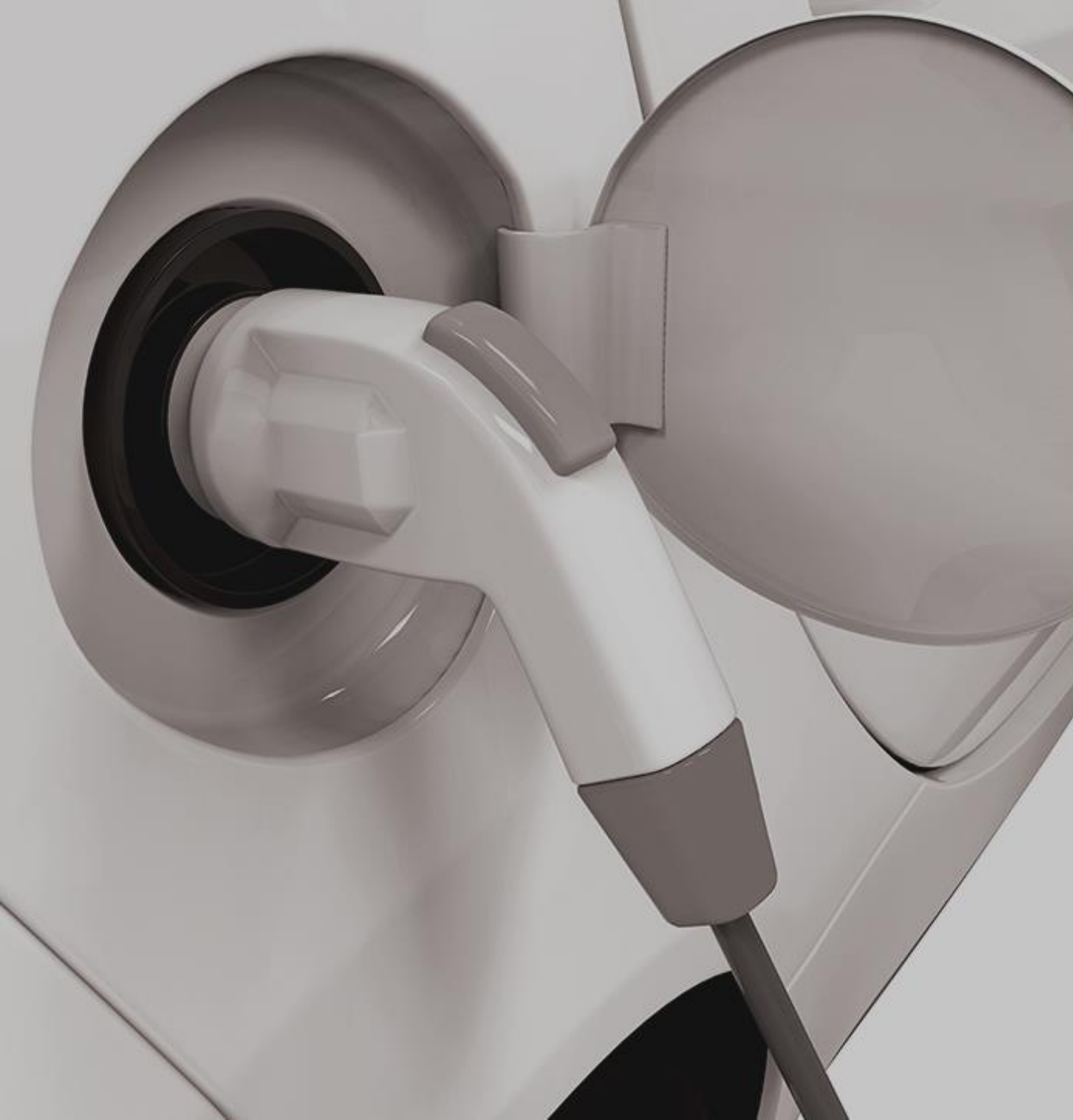
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	1	0	0	0
18:30	0	0	0	0	0	0	0	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

United Retail CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0	0	0	0	0	0	0	0	0	0	0	0
0:30	0	0	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	1	0	0	0
18:30	0	0	0	0	0	0	0	0	1	0	0	0
19:00	0	0	0	0	0	0	0	0	1	0	0	0
19:30	0	0	0	0	0	0	0	0	1	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0

Source: Energeia

ENERGEIA



Appendix 2

United Deep Dive

ENERGEIA

DNSP Peak Periods (United) – Deep Dive

United 3-Year CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	2%	0%	2%	2%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	2%	2%	7%	7%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	10%	5%	10%	7%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	10%	2%	2%	2%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	12%	5%	0%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	12%	26%	0%	10%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	10%	31%	0%	17%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	10%	52%	0%	19%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	12%	57%	0%	17%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	5%	57%	0%	24%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	36%	0%	19%	0%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	31%	5%	10%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	10%	10%	14%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	5%	12%	5%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	10%	2%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United 5-Year CAGR P10 Weekday

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%
9:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
10:00	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	2%
10:30	0%	0%	0%	0%	0%	0%	5%	0%	5%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	5%	2%	10%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	7%	2%	17%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	5%	0%	0%	2%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	12%	5%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	10%	12%	5%	5%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	12%	19%	7%	12%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	21%	24%	7%	17%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	24%	29%	12%	40%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	12%	33%	14%	57%	0%	0%	0%	0%
17:30	0%	0%	0%	0%	7%	36%	24%	29%	0%	0%	2%	0%
18:00	0%	0%	0%	0%	0%	36%	10%	17%	0%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	31%	14%	7%	0%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	19%	10%	2%	0%	0%	2%	0%
19:30	0%	0%	0%	0%	0%	12%	12%	0%	0%	0%	2%	0%
20:00	0%	0%	0%	0%	0%	7%	10%	0%	0%	0%	2%	0%
20:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United 3-Year CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	2%	5%	0%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	0%	7%	2%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	2%	0%	7%	7%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	2%	0%	2%	5%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	2%	0%	5%	5%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

United 5-Year CAGR P10 Weekend

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7:30	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:00	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8:30	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:00	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9:30	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:00	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10:30	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:00	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11:30	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13:30	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%
14:00	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%
14:30	0%	0%	0%	0%	0%	0%	7%	0%	10%	0%	0%	0%
15:00	0%	0%	0%	0%	0%	0%	7%	0%	19%	0%	0%	0%
15:30	0%	0%	0%	0%	0%	0%	12%	0%	19%	0%	0%	0%
16:00	0%	0%	0%	0%	0%	0%	19%	0%	24%	0%	0%	0%
16:30	0%	0%	0%	0%	0%	0%	36%	0%	26%	0%	0%	0%
17:00	0%	0%	0%	0%	0%	0%	45%	2%	33%	0%	0%	0%
17:30	0%	0%	0%	0%	0%	0%	38%	2%	33%	0%	0%	0%
18:00	0%	0%	0%	0%	0%	0%	0%	2%	24%	0%	0%	0%
18:30	0%	0%	0%	0%	0%	0%	0%	2%	12%	0%	0%	0%
19:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20:30	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%
21:00	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%
21:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:00	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23:30	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Energeia

- Energeia tested the effect of using 5-years of historical ZS load profile data compared to 3-years
- Results shows the peak period changing, so it is worth considering which is more appropriate
- The key is whether the 3-year or 5-year trend is more significant over the next 5 years

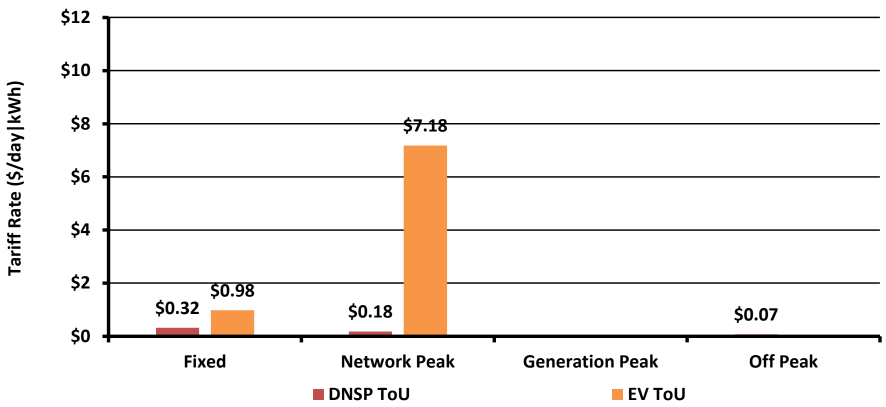
Appendix 3

DNSP ToU vs. EV ToU Rates

ENERGEIA

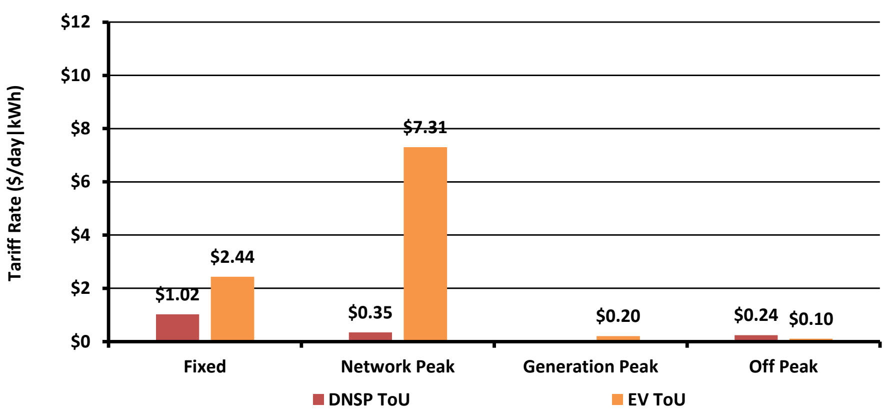
ToU Tariff Rates Comparison – AusNet

AusNet – Network



Source: Energeia

AusNet – Retail



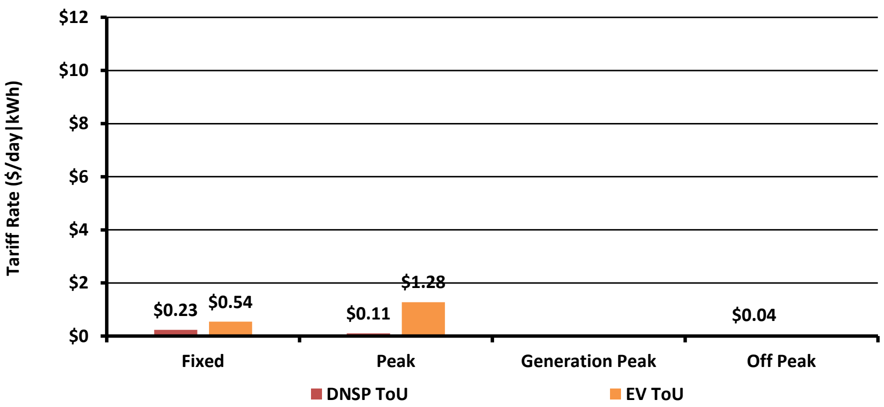
Source: Energeia

- The forthcoming slides will all show the following at the retail pricing level:
  - 2-5 fold increase in daily fixed charges
  - 50-60% decrease in off-peak kWh charges
  - 5-40 fold increase in peak price
- The fixed charged will be based on 3 consumption categories, enable a lower fixed charge for smaller customers
- Network pricing differentials are similar, however, it is worth noting that off-peak prices are zero

ENERGEIA

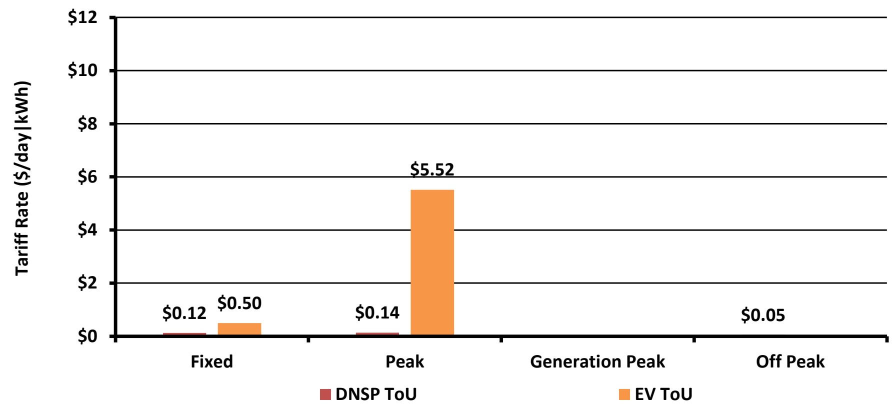
ToU Tariff Rates Comparison – CitiPower and Jemena

CitiPower – Network



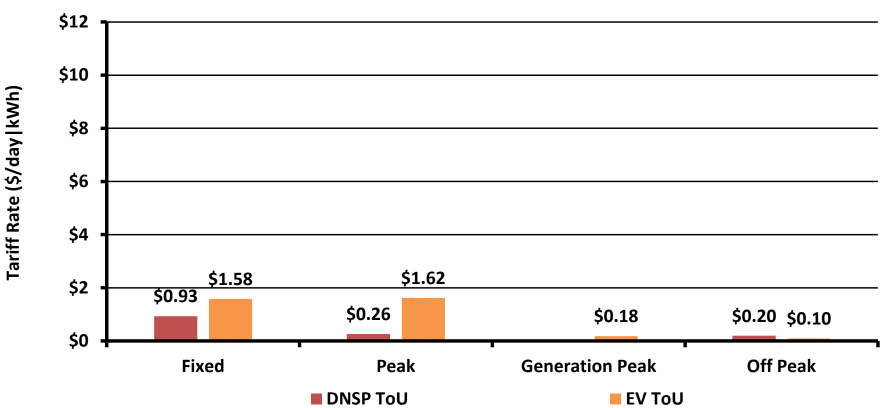
Source: Energeia

Jemena – Network



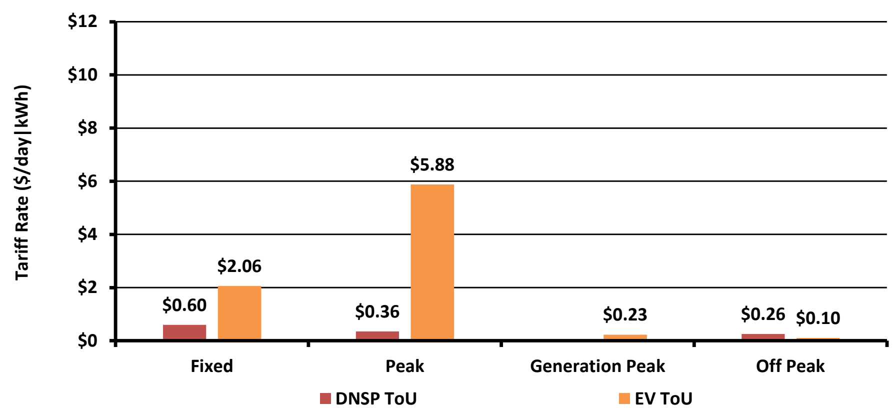
Source: Energeia

CitiPower – Retail



Source: Energeia

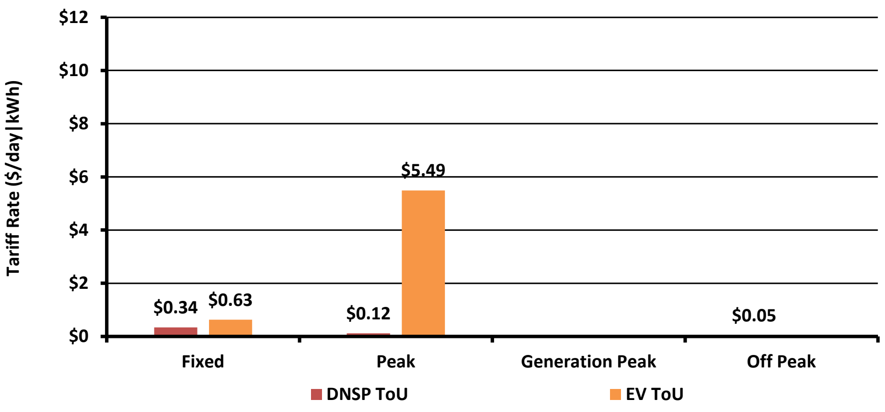
Jemena – Retail



Source: Energeia

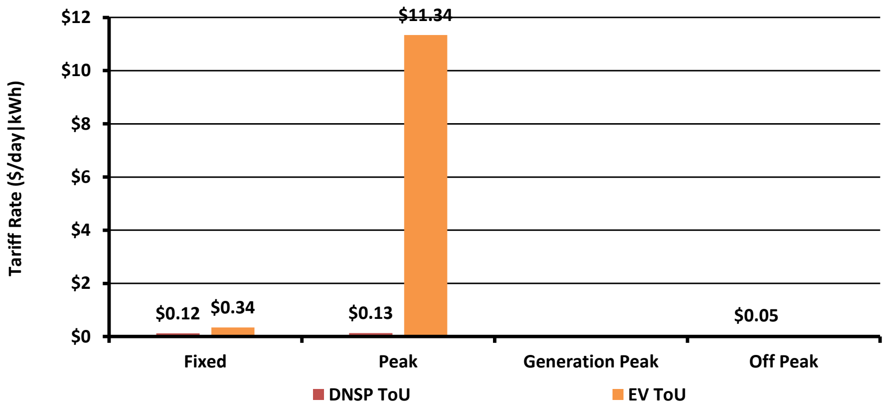
ToU Tariff Rates Comparison – Powercor & United

Powercor – Network



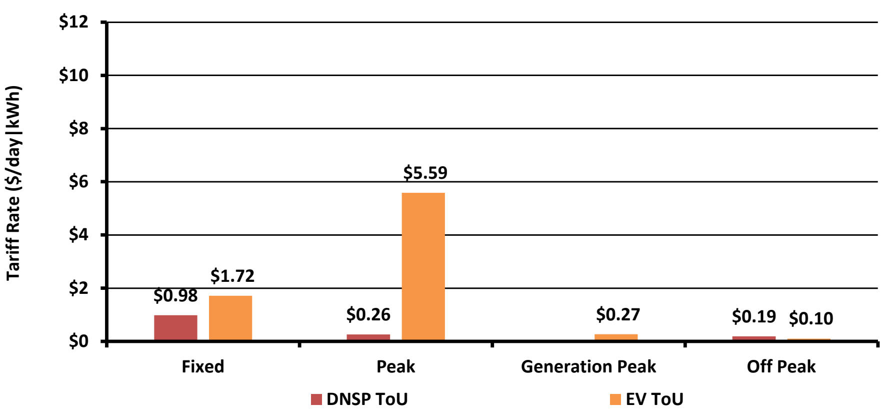
Source: Energeia

United – Network



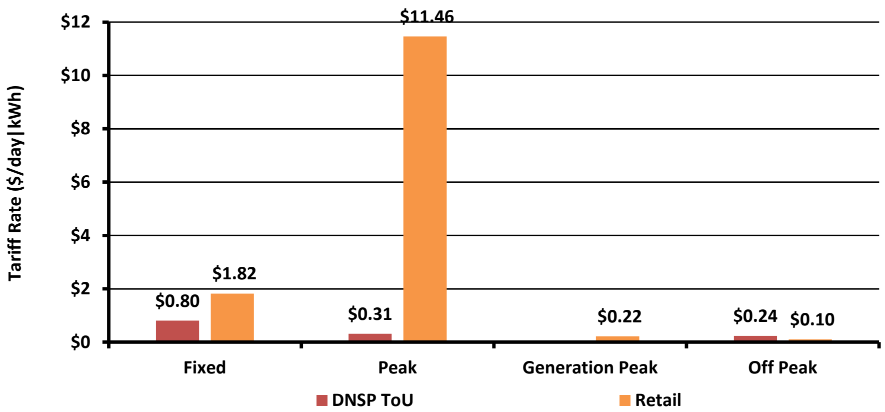
Source

Powercor – Retail

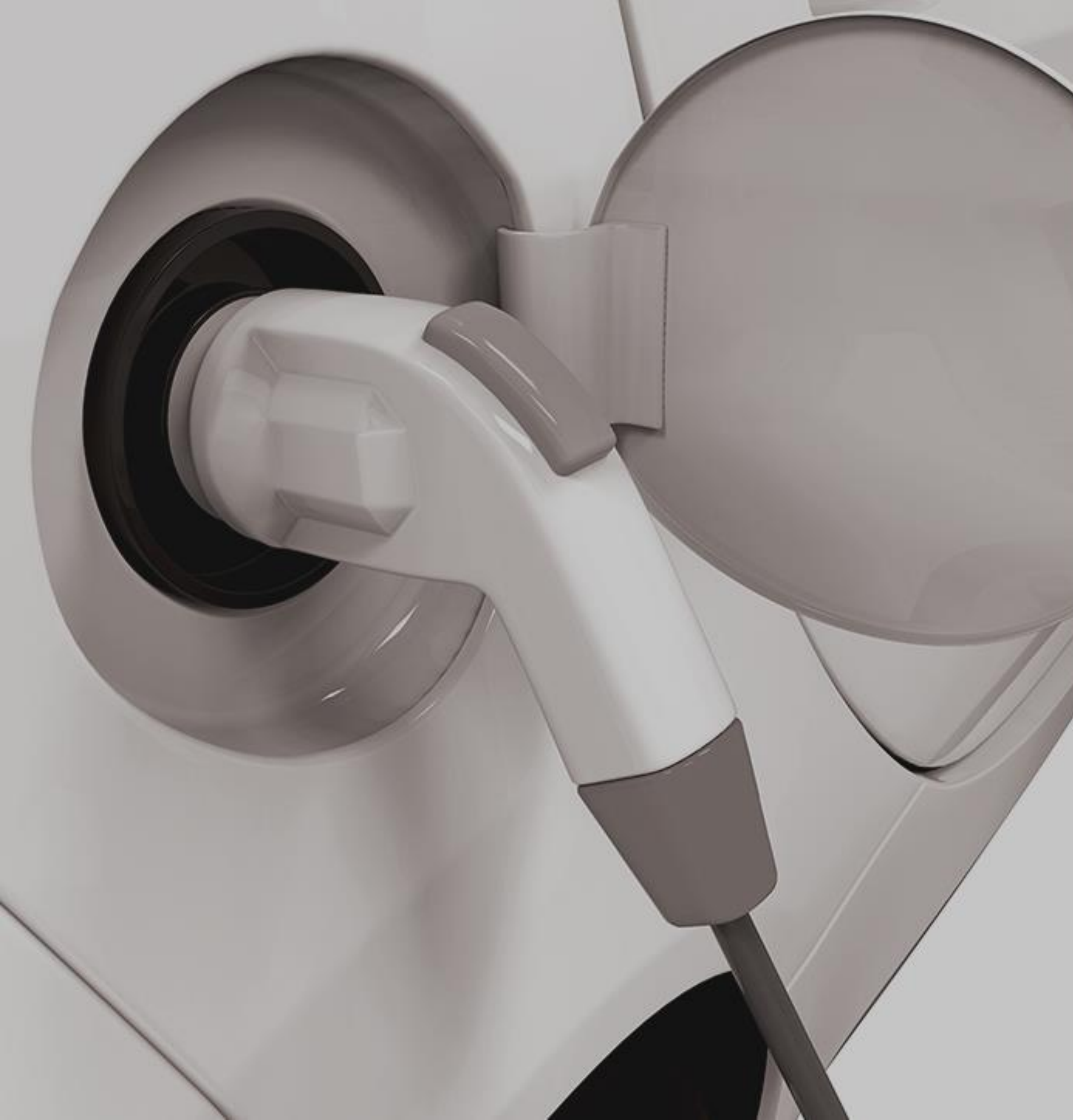


Source: Energeia

United – Retail



Source: Energeia



Appendix 4

DNSP ToU vs. EV ToU Network Cross-Subsidies

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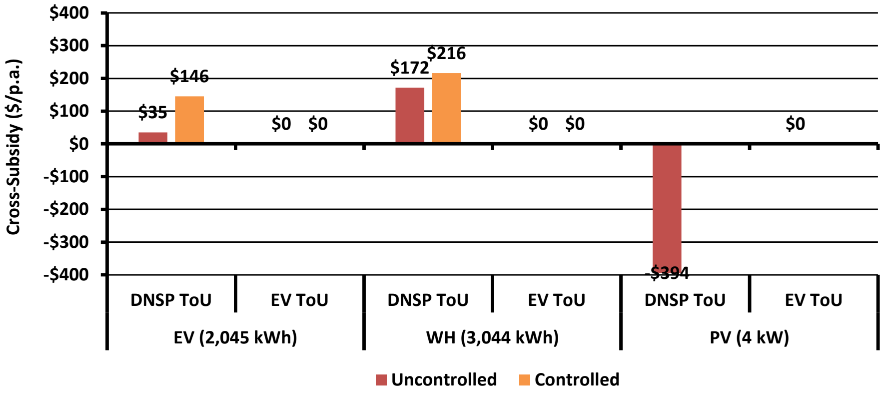
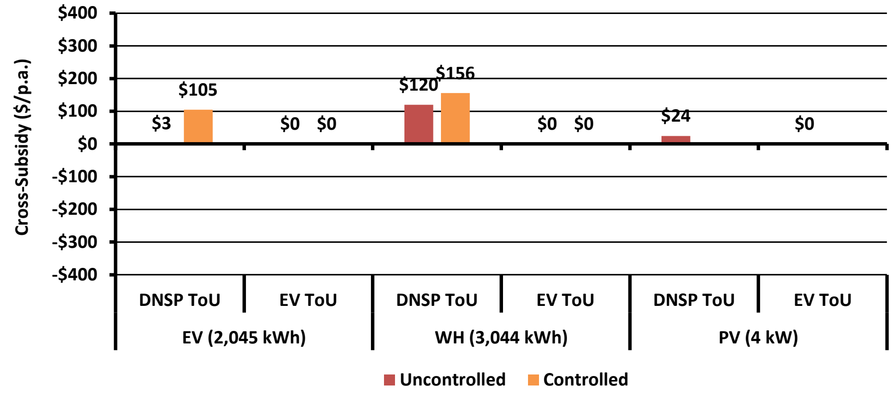
Cross-Subsidies – AusNet, CitiPower and Jemena

Ausnet



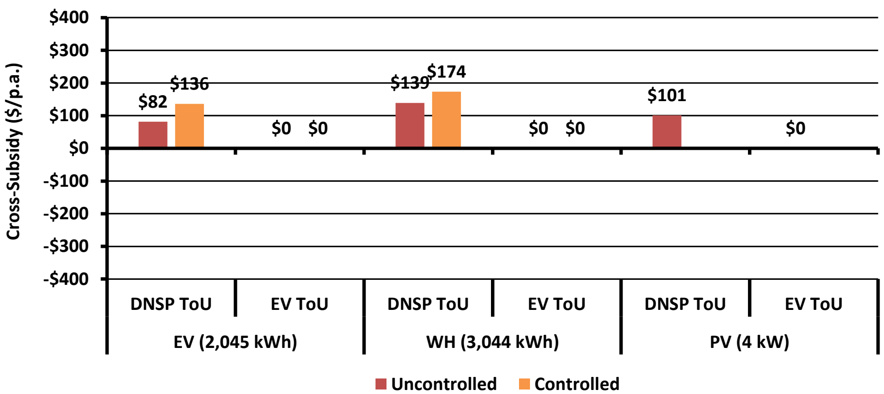
Source: Energeia

Jemena



Source: Energeia

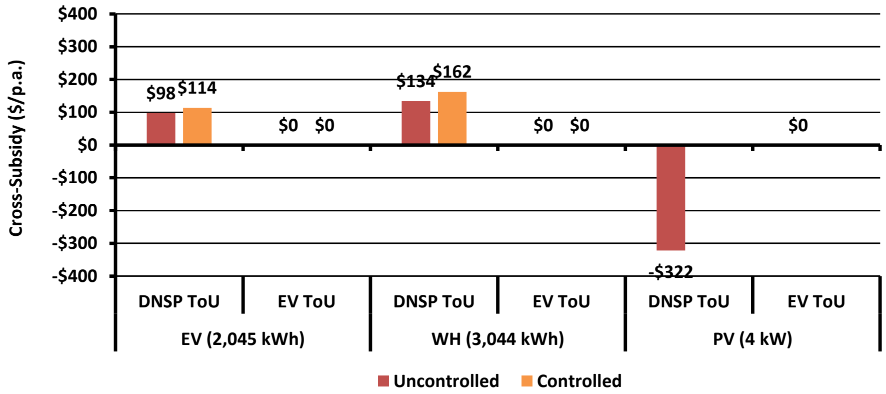
CitiPower



Source: Energeia

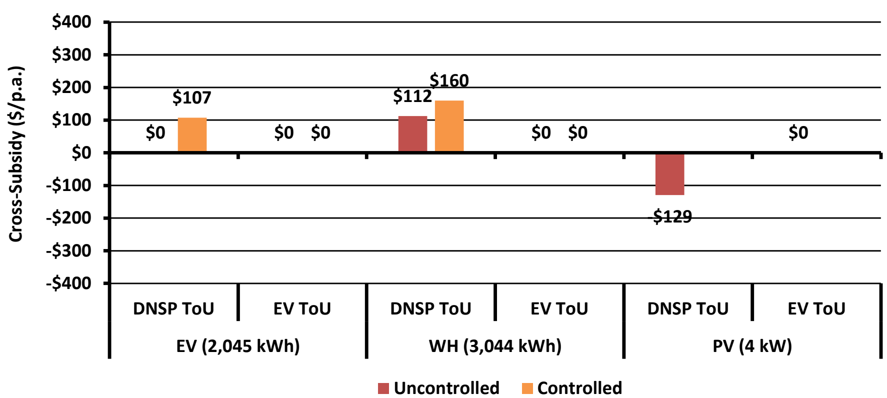
Cross-Subsidies – Powercor and United

Powercor



Source: Energeia

United



Source: Energeia

- Interestingly, cross subsidies vary considerably across DNSPs
- In the case of Jemena and CitiPower, consumers adopting these technologies are paying more than their estimated cost of service
- In the other networks, EVs and water heating loads are being overcharged, while PV is being undercharged

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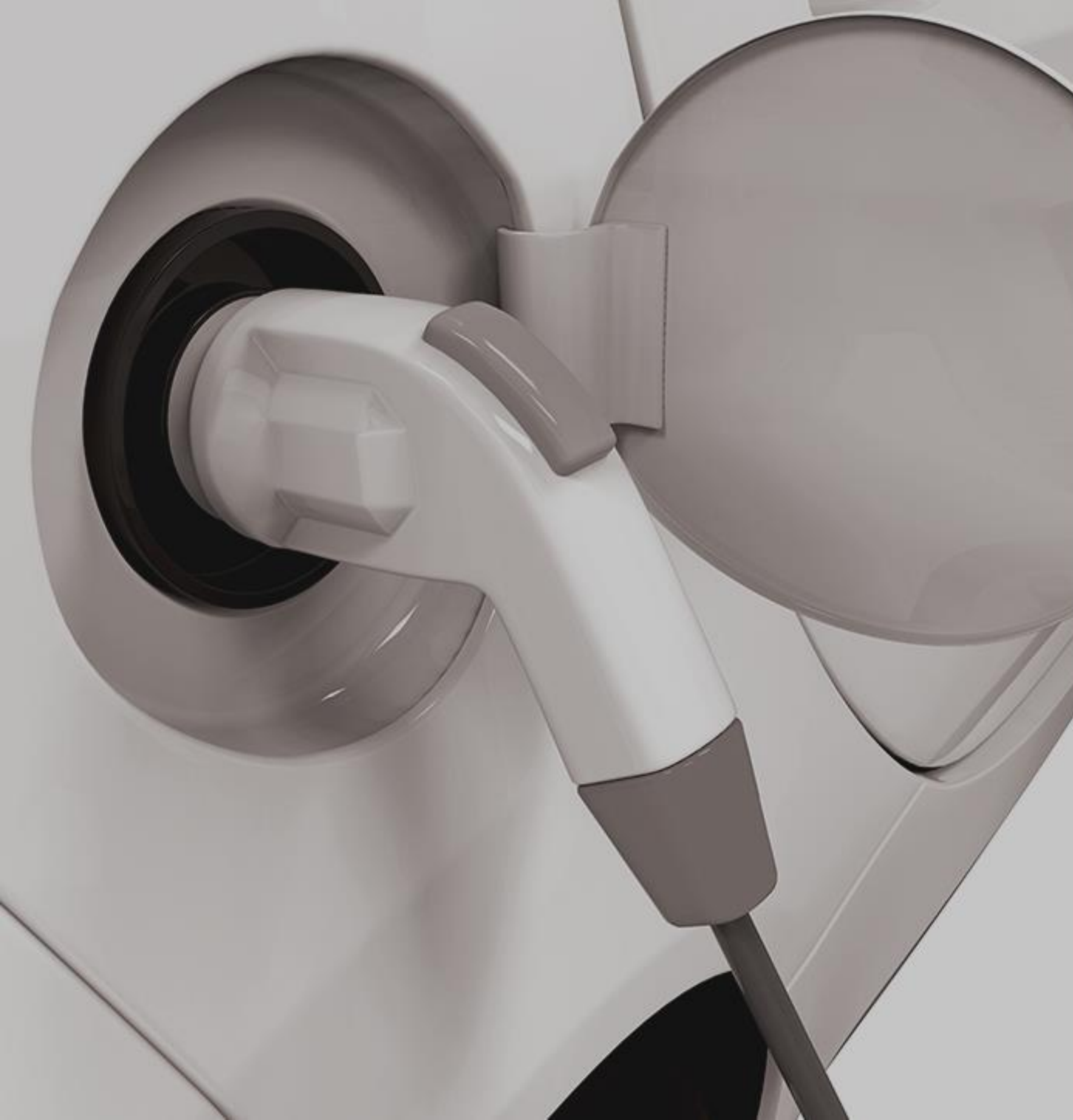

Appendix 5

Load Profile Assumptions

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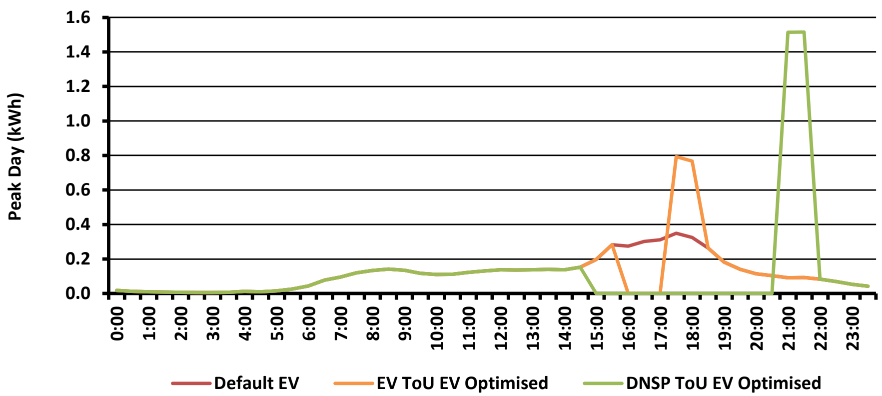
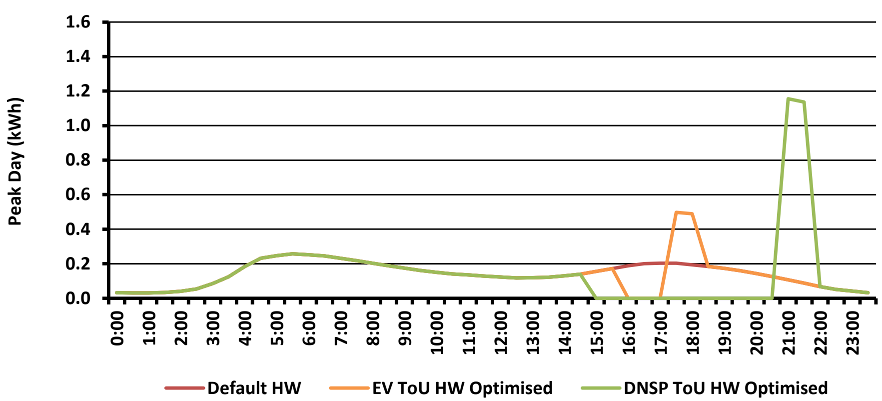
Peak Day Loads

Network Peak Day Optimal EV Charging (United)



Source: Energeia

Network Peak Day Optimal HW Usage (United)



Source: Energeia

- On a network peak day, the EV and HW sub-loads are optimised by shifting load out of the peak and towards the off-peak
- A large-spike can be observed after the peak time, where customers are immediately able to charge their vehicles at the lowest rate, see next slide
- This varies by the individual DNSPs calculated peak periods

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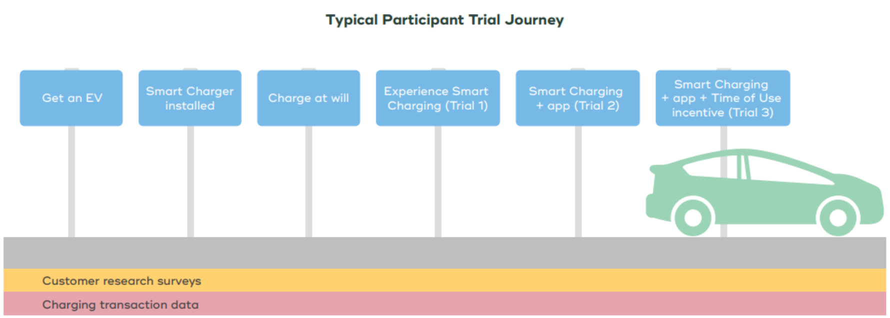
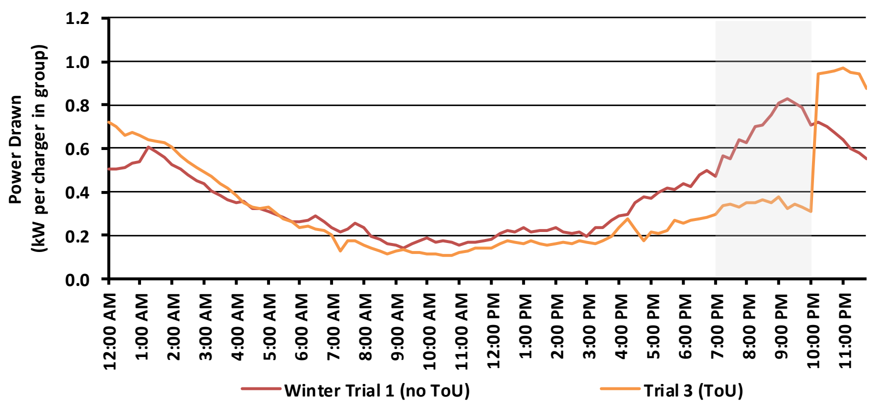
Charging Behaviour – UK Case Study

Electric Nation Pilot



Source: Electric Nation (2019)

Impact of ToU Incentives on Weekdays



Source: Electric Nation (2019). Note: Grey shaded area is the peak period.

- A recent UK pilot, Electric Nation, funded by Western Power Distribution trialed domestic EV charging between January 2017 and December 2018:
  - **Trial 1** – Customers charge their EV with the distribution network managing their charging
  - **Trial 2** – Customers could manage their EV charging with an app
  - **Trial 3** – Customers were then provided a ToU-like incentive to EV charging
- Customers were found to shift their charging to off-peak periods when on a ToU tariff, eliminating the need for networks to manage customer charging behaviour
- ToU incentives were highly effective in shifting demand away from evening peak periods, especially with an app that makes it simpler for customers to optimize their charging and minimize their cost
- Study found that sharp demand spikes during off-peak periods may need to be managed, either through demand management or through implementing smart charging technology

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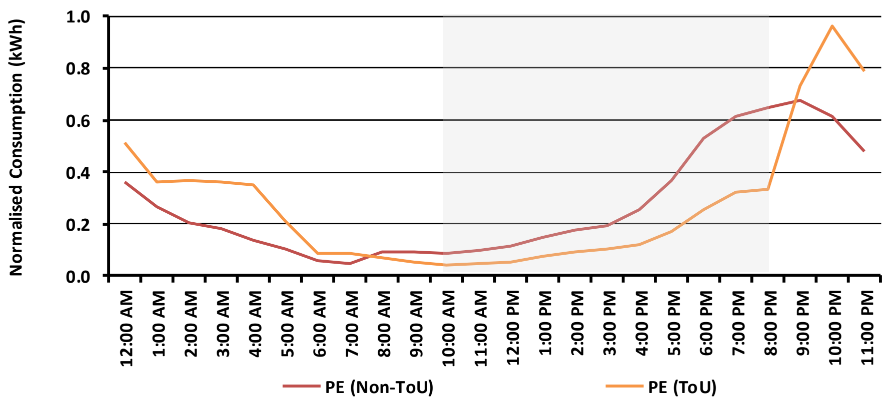
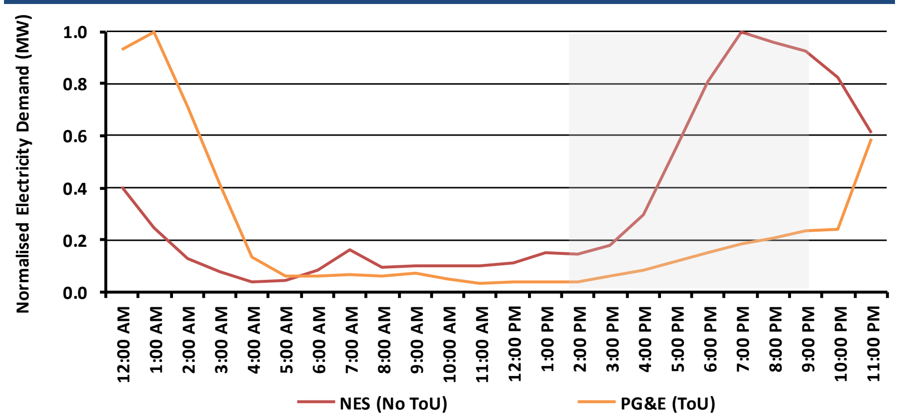
Charging Behaviour – US Case Studies

Summer Weekday Charging (NC and SC)



Source: US Department of Energy (2014). Note: Grey shaded area is the peak period.

Weekday Charging (TX and CA)



Source: National Research Council (2015) 'Overcoming Barriers to Deployment of Plug-in Electric Vehicles'. Note: Grey shaded area is the peak period for PG&E.

- Two US studies were found that specifically examined the impact of EV tariff design on customer charging patterns:
  - A 2014 study paid for by the US Department of Energy found customers on a ToU tariff shifted their charging outside of the peak period compared to those not on a ToU tariff
  - A 2015 study paid for by the US National Research Council found a similar result
- Both studies therefore confirmed that EV drivers shift charging patterns in response to price signals
- However, demand spikes immediately following the peak period are observable
- These findings are consistent with the Australian Federal Government funded, *Smart Grid, Smart City* project

CA = California; NC = North Carolina; NES = Nashville Electric Service; PE = Progress Energy; PG&E = Pacific Gas and Electric; SC = South Carolina; ToU = Time-of-Use; TX = Texas

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