Forecasting for COVID-19 impacts

Revised proposal for the Customer Advisory Panel

October 2020

Our revised proposal approach at a glance

- Preparation of our revised proposal has required careful consideration the impact COVID-19 has had on our original proposal and how our original assumptions may have changed.

- We engaged external forecasters to get a sense of the possible scenarios of impacts but more importantly, sought stakeholder input through a wider stakeholder forum in September and a separate session with the CAP

- Our stakeholders and the CAP wanted us to take a conservative approach to forecasting for the future minimize any financial impact on our communities that are already going through hardship. They would also like us, to the extent possible, to take into account structural shifts in energy usage

Ensuring our forecasts are conservative

We have chosen **in almost all cases to adopt the draft determination forecasts:**

- the AER's forecasts are **conservative by nature**. They reflect an **independent view of the impacts of COVID-19** and result in a **significant reduction in our forecasts** compared to our original proposal

- We will propose alternative forecasts for:

  - labour escalation as per the AER's suggestion. We have averaged the draft determination forecast with the updated forecast from BIS Oxford. This has resulted in a higher labour forecast compared to the draft determination

  - large connection activity using a bottom-up build of forecasts, in line with the Victorian Government's forecasts for major projects.

- We believe workplace changes will, in many cases, be permanent as we move to 'COVID normal', especially in Victoria. This will result in lower productivity. However, in the interests of maintaining affordability for our customers, **we have continued to apply a 0.5% p.a. forecast productivity adjustment to our forecasts**.

We are, however, concerned the AER may change its forecasts for the final determination without further consultation, which adds to uncertainty of the forecasts.

Capturing the structural change in energy usage

- We provide further details of how we are preparing for the 2020/21 summer

- We propose to reallocate some revenue recovery away from small business to residential customers, to assist small business recover faster from the pandemic

Stakeholder feedback and expectations, AER draft decision

Stakeholder expectations in July 2020

Feedback through submissions to the AER's issues paper

In July 2020, the COVID-19 pandemic was still relatively new in Australia and much was unknown about its impacts. The following are the areas or patterns most stakeholders expected to see from the pandemic with the information available at the time:

- While there may be uncertainties remaining about the impact of the crisis over the timeframe of the reset process, the importance of establishing forecasts that reflect the potential for a substantial economic downturn and slower population and load growth in Victoria are crucial

- Forecasts should be verified against independent data

- Small connections are likely to slow while large connections, particularly those driven by Government spending will be less impacted by COVID-19. The rate of uptake of solar may slow as many customers face financial uncertainty and reduce spending on nonessential items

- Consumption of energy and demand for network capacity will vary by sector, and will drive changes in usage and demand, with growth in residential demand offset by a decline in commercial activity

- AEMO forecasts for Victoria can be demonstrated to have been conservative which raises doubt regarding the distributors' forecast for peak demand, and associated augmentation expenditure

- The accuracy of forecasts for total energy will impact tariffs charged to consumers. All distributors except AusNet Services are forecasting an increase in total energy, reversing the current trend of stable or falling loads.

- 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.

- Expected pressure on wages is unlikely to occur at levels predicted before this crisis. Expect distributors to revise their forecasts to reflect the softening labour market

- Wholesale market changes including the compliance date for the application of new rules will likely be delayed and change the timing of some expenditure, e.g. 5-minute settlement

- There may be financial impacts from delayed payments from retailers, as per the AER statement of expectations, reduced revenue due to a higher number of customers unable to pay their bills and some sharing of these increased under recoveries with retailers

- There will be greater difficulty in engaging with "end use" customers and changing methodologies for consumer and stakeholder engagement

- There may be deferred or reduced license fees to be paid by network businesses

- There will be a greater need for more frequent review of all key aspects of business operation, including changing circumstances for opex step changes including those related to opex cost trend factors

- There are also changed global economic circumstances with implications for network business rate of return and depreciation rates.

Stakeholder expectations in September 2020

Feedback from COVID-19 stakeholder workshop held on 9 September 2020

Forecast integrity and granularity	Changing consumers trends and potential innovations	Government changes and policy risks	Potential Changes to productivity and revenue
• There was some confusion that the proposal **focussed too heavily on macro-trends rather than micro-trends**. Many saw the forecasts to be high-level and did not take into account the impact of the pandemic on a more granular level. This included giving forecasts that were industry-based, age-based, geography-based and included elasticities in age groups and elasticities in energy. • **There was no consideration of customers moving to regional centres** from Melbourne and the impact that this would have on demand forecasts for the three networks. *"Where is it based from? Is it triangulated with data from real-estate agents and appliance manufacturers and retailers?"* Workshop Stakeholder	• Some stakeholders mentioned that the forecasts did not factor in potential **increases in gas and hydrogen use in the future.** • **This also included potential innovations in solar enablement** such as a greater rollout of community battery and other changes to the grid. • **Disruptions to solar uptake / not enough information was** seen to be accounted for, within forecasts. This included reduction to solar uptake in growth belts. *"Solar has mainly been in the growth belt. Are we taking into consideration mortgage deferrals in these areas?"* Workshop Stakeholder *"The proposal was rear-vision focussed. It's not anticipating potential future impacts of COVID."* Workshop Stakeholder	• Many thought that the **forecasts should have taken greater consideration of potential infrastructure policy** that could be implementation as a result of the pandemic. If Victoria chose to invest in infrastructure programs, it could increase project delivery. • Stakeholders wanted to understand the **extent potential changes in State and/ or Federal Government** would have on infrastructure and renewable project spend. Some were conscious that Labor may lose power at the next Victorian State Election and this was expected to be taken into account within the forecasts. *"What if there's a change in government? Where's the contingency there?"* Workshop Stakeholder	• Some stakeholders thought that the forecast did not factor in the changes in productivity on major projects and the delays in manufacturing and shipping that have been experienced. This was seen important as they relate to changes in the cost of equipment. *"How has COVID impacted the cost of business on their operations? Half-crews, low productivity."* Workshop Stakeholder

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Customer Advisory Panel expectations in October 2020

Forecasting for COVID-19

- The CAP agreed that there was a higher level of uncertainty for forecasting the next regulatory period. There was support for adopting a conservative approach with a potential for an earlier review by the AER. The CAP noted that this suggestion was not because it is the "most likely" scenario but rather it could perhaps maximise benefits for consumers

- It was noted that trigger points/thresholds and metrics could be outlined in the revised proposal to add certainty to this model if adopted. Some detail re what degree of change in key metrics would lead to a contingent change in revenue requirement and the magnitude of customer impact via prices would be a useful level of transparency

- There was a suggestion that we should build in implications to each of the forecasted scenarios from the baseline to give stakeholders an understanding of the impacts of the uncertainty that can happen i.e. what does it mean if the 'actuals' are higher or lower than the forecasts?

- There was also a suggestion that there should be more granularity for each network, i.e. there is probably more certainty with Powercor than CitiPower so that should be reflected in the forecasts

- There should be more consideration of what the parameters look like moving forward in terms of side constraints, glide paths and reallocations, and how do you mitigate those shocks going forward. This is particularly important for ensuring glide paths that minimise impacts to consumers

- It was highlighted that while there is uncertainty now, it is becoming more certain that the negative effects on the community are going to be around for a long period and we should be taking that into consideration

- There should also be more consideration of intrastate migration, shifts in demographics, likely downsizing by households, a shift to regional areas and similar

- An estimate of the impact of the embedded networks ban (on number of connections) would also be useful.

Changing usage profiles

- It is still unclear what our new normal is going to look like. The experience of companies having their workforce work from home is very mixed. It's unlikely things will return to pre-pandemic levels soon but it's also unclear where we will land

- There is likely to be a permanent shift to more residential usage through a combination of: an ongoing level of working from home (more than pre-COVID but less than currently) after things return to normal(ish), plus the likelihood of higher levels of unemployment and underemployment for an extended period, plus the impact of some early retirements or people leaving the labour market permanently.

- This may be offset by some increase in local manufacturing (particularly small and medium scale) ongoing, as the risks of relying on offshore products became evident with the reduction in international travel and shipping; and if new enterprises that started up during the lockdown stick around

- Despite the recession it is possible solar installs will remain strong even for people with reduced income, as access to credit (especially no or low interest) and state rebates makes PV a good investment with immediate returns. With the current Solar Homes rebate a right-sized system could save a lot of households on bills a similar amount to the cost of finance on a monthly basis

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AER draft decision

The AER substituted all our forecasts with alternatives that take into account the impact of COVID-19. Some substituted factors resulted in a significant decline in forecast expenditure:

- For labour price growth, the AER used a forecast prepared by Deloitte Access Economics rather than the standard approach of averaging two forecasts as this is the only forecast available which factors in the impacts of COVID-19. For the final decision the AER indicated they will consider updating the rate of change forecast using our standard approach provided the necessary forecasts are available

- AER's forecast rate of change over the next five years is on average 0.5% p.a. for CitiPower, 0.6% p.a for Powercor and 0.5% p.a for United Energy. This is lower than CitiPower's proposed 2.4%, Powercor's proposed 2.9% and United Energy's proposed 1.9%. This is primarily driven by lower output and price growth forecasts, which in large part reflect the impacts of COVID-19 on forecast customer numbers and wage price growth

- The AER applied the updated customer number growth to the connections forecast, including small and large connections, resulting in 11% reductions in connections for CitiPower, 27% for Powercor, and 23% for United Energy

- The AER applied AEMO's 2019 demand forecasts which result in 0% growth over 2021-2026 demand for each network, resulting in a deferral of a number of augmentation projects (overall Powercor's augmentation was reduced by 40%, CitiPower's by 25% and United Energy's by 40%).

Learning from stakeholder feedback and the AER draft decision

- We need to update all our inputs for the 2021-2026 regulatory period as COVID-19 will have an impact, whether in the short term or the long term

- We should be relying on independently verified data for our forecasts, as well as the most recent data possible

- We need to demonstrate we are using conservative forecasts, rather than planning for the 'most likely scenario' which will keep changing day to day

- We should consider implications of a possible pass-through event for a difference in growth factors after the crisis, or show what could possibly constitute one

- We should demonstrate how COVID-19 has impacted our operations and whether there is a change in our planned program of works

- We should, to the extent possible, demonstrate how we are taking the structural usage shift into account in our plans, and show what assumptions we are making regarding the longevity of the change

- We should consider price glide paths for different customers groups and reallocations between customers based on changing using patterns

Addressing CAP' feedback – Forecasting for COVID-19 impacts

What we heard	Our response
The CAP agreed that there was a higher level of uncertainty for forecasting the next regulatory period and there was support for adopting a conservative approach (i.e. low scenarios) with a potential for an earlier review by the AER. The CAP noted that this suggestion was not because it is the "most likely" scenario but rather it could perhaps maximise benefits for consumers.	Our revised proposal will be based on the draft determination forecasts except for large connection forecasts. These will be based on a bottom up build reflecting recent stimulus package announcements from the Federal and State Governments.
It was noted that trigger points/thresholds and metrics could be outlined in the proposal to add certainty to this model if adopted. Some detail re what degree of change in key metrics would lead to a contingent change in revenue requirement and the magnitude of customer impact via prices would be a useful level of transparency.	Please see details on slide 15. We believe it is important the incentive properties of the regulatory framework are maintained where possible. Having forecasts managed as a 'pass through' would in our view result in unnecessary price volatility for customers and move us closer to cost of service style regulation.
There was a suggestion that we should build in implications to each of the forecasted scenarios from the baseline to give stakeholders an understanding of the impacts of the uncertainty that can happen i.e. what does it mean if the 'actuals' are higher or lower than the forecasts?	**All else being held equal**, if the forecasts are higher than actuals, there is an energy efficiency sharing scheme (EBSS) benefit of which customers keep 70%. Conversely there is an EBSS penalty for which customers pay 70%. For example, CitiPower's forecast average customer number growth is 1% p.a.; if the actual growth is 0.25 p.p. lower (0.75% p.a.), the saving is $2m EBSS benefit. Alternatively, if the actual customer number growth is 0.25 p.p. higher (1.25% p.a.), the EBSS penalty is $2m. The same 0.25 p.p. variation is $5m for Powercor, and $3m for United Energy. However, in reality this calculation would be very difficult against actuals as there are many moving parts of operating expenditure that are dependent on each other, including potential changes in the cost per customer (e.g. due to COVID-19) or other changing costs such as changing obligations
There was also a suggestion that there should be more granularity for each network, i.e. there is probably more certainty with Powercor than CitiPower so that should be reflected in the forecasts	We agree there is likely to be different impacts across networks. For example the lifting of restrictions earlier in regional Victoria has limited damage to the regional economy sustaining growth in the Powercor network. However predicting these differences with any degree of accuracy at this point is impossible hence we have adopted the AER forecasts
There should be more consideration of what the parameters look like moving forward in terms of side constraints, glide paths and reallocations, and how do you mitigate those shocks going forward. This is particularly important for ensuring glide paths that minimise impacts to consumers	We propose to reallocate some revenue recovery away from small business to residential customers in our tariffs from January 2021 and not change the allocation going forward. We trust this will aid recovery of the small business sector.
It was highlighted that while there is uncertainty now, it is becoming more certain that the negative effects on the community are going to be around for a long period and we should be taking that into consideration	The AER forecasts are highly conservative compared to history. We are forecasting lower labour price forecasts than history, and higher productivity targets. This will lower costs to our customers compared to our original proposals
There should also be more consideration of intrastate migration, shifts in demographics, likely downsizing by households, a shift to regional areas and similar.	While there may be permanent changes in the demographics and between regions, we do not have enough information to make these judgements with any certainty
An estimate of the impact of the embedded networks ban (on number of connections) would also be useful.	There is no assumption of the ban in embedded networks in AER's draft customer number forecasts. If the embedded networks are banned, this would mean the forecast customer numbers are underestimated

Addressing CAP' feedback – Changing usage patterns

What we heard	Our response
It is still unclear what our new normal is going to look like. The experience of companies having their workforce work from home is very mixed. It is unlikely things will return to pre-pandemic levels soon but it's also unclear where we will land	As we approach the summer, it is becoming more evident that the 'work from home' direction will continue well into 2021. As time progresses, we will continue to monitor usage patterns and build a database that will help us improve our medium to long term scenario modelling, including if there is a permanent shift to more working from home
There is likely to be a permanent shift to more residential usage through a combination of: an ongoing level of working from home (more than pre-COVID but less than currently) after things return to normal(ish), plus the likelihood of higher levels of unemployment and underemployment for an extended period, plus the impact of some early retirements or people leaving the labour market permanently. This may be offset by some increase in local manufacturing (particularly small and medium scale) ongoing, as the risks of relying on offshore products became evident with the reduction in international travel and shipping; and if new enterprises that started up during the lockdown stick around	We will continue to monitor usage patterns using smart meters, which includes patterns of solar PV generation, self-use and exports. This will allow us to over time improve our visibility and understanding of the shift in behaviour and model for any permanent or temporary shifts in behaviour We are also proposing to reallocate some cost-recovery from small business to residential customers as a result of this shift in usage, which is now expected to last at least until a vaccine is found
Despite the recession it is possible solar installs will remain strong even for people with reduced income, as access to credit (especially no or low interest) and state rebates makes PV a good investment with immediate returns. With the current Solar Homes rebate a right-sized system could save a lot of households on bills a similar amount to the cost of finance on a monthly basis	Our Future Network program is designed to ensure that we enable solar for more customers than ever before, which will be even more important if there is a permanent shift to more residential use and therefore an increase in solar PV demand

Forecasting operating expenditure factors

Forecasting output growth - CitiPower

Original proposal for customer numbers

- Based on Centre of International Economics (CIE) forecasts
- 1.24% p.a. growth over 2021-2026
- Included assumption of ban in embedded networks from 2020
- Actual 2015/16-2019/20 growth: 1.0% p.a.

Original proposal for demand growth (network-level ratcheted)

- Based on CIE forecasts
- 2.37% p.a. growth over 2021-2026 (with a large transfer in 2021)

Original proposal for circuit length growth

- Based on 2015-2019 historical growth
- 1.49% p.a. growth over 2021-2026

Original proposal for energy

- Based on forecasts usage linked to customer number growth
- 0.7% p.a. growth over 2021-2026
- However, we did not put any weight on energy in our proposal

Total rate of output growth: 1.46% p.a.

Total operating expenditure from output growth: $25m

Reduction of $15m in forecast operating expenditure

Revised proposal for customer numbers

- Draft determination, based on HIA forecasts, May 2020
- 0.6% in 2021/22, with growth increasing to 1.22% in 2023/24 before dropping off again, averaging 1.0% over 2021-2026

Revised proposal for demand growth

- Draft determination, based on 2019 AEMO
- 0% p.a. growth over 2021-2026 (cannot be negative)

Revised proposal for circuit length

- Draft determination, updated for 2019 actual
- 1.41% p.a. growth over 2021-2026

Revised proposal for energy

- Draft determination, based on 2011-2019 historical data
- -0.23% p.a. growth over 2021-2026
- Added weight on energy as per draft determination

Total rate of output growth: 0.82% p.a.

Total operating expenditure from revised output growth forecast: $10m

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Forecasting output growth - Powercor

Original proposal for customer numbers

- Based on Centre of International Economics (CIE) forecasts
- 2.10% p.a. growth over 2021-2026
- Included assumption of ban in embedded networks from 2020
- Actual 2015/16-2019/20 growth: 2.20% p.a.

Original proposal for demand growth (network-level ratcheted)

- Based on CIE forecasts
- 1.98% p.a. growth over 2021-2026

Original proposal for circuit length growth

- Based on 2015-2019 historical growth
- 0.64% p.a. growth over 2021-2026

Original proposal for energy

- Based on forecasts usage linked to customer number growth
- 0.9% p.a. growth over 2021-2026
- However, we did not put any weight on energy in our proposal

Total rate of output growth: 1.87% p.a.

Total operating expenditure from output growth: $79m

Reduction of $42m in forecast operating expenditure

Revised proposal for customer numbers

- AER's draft decision, based on HIA forecasts, May 2020
- 0.9% in 2021/22, with growth increasing to 2.10% in 2023/24 before dropping off again, averaging 1.73% over 2021-2026

Revised proposal for demand growth

- AER's draft decision, based on 2019 AEMO
- 0% p.a. growth over 2021-2026 (cannot be negative)

Revised proposal for circuit length

- AER's draft decision, updated for 2019 actual
- 0.61% p.a. growth over 2021-2026

Revised proposal for energy

- AER's draft decision, based on 2011-2019 historical data
- 0.42% p.a. growth over 2021-2026
- Added weight on energy as per AER's draft decision

Total rate of output growth: 1.05% p.a.

Total operating expenditure from revised output growth forecast: $37m

Forecasting output growth – United Energy

Original proposal for customer numbers

- Based on Centre of International Economics (CIE) forecasts
- 1.37% p.a. growth over 2021-2026
- Included assumption of ban in embedded networks from 2020
- Actual 2015/16-2019/20 growth: 1.20% p.a.

Original proposal for demand growth (network-level ratcheted)

- Based on National Institute of Economic and industry Research (NIEIR) forecasts
- 0.58% p.a. growth over 2021-2026

Original proposal for circuit length growth

- Based on 2015-2019 historical growth
- 1.44% p.a. growth over 2021-2026

Original proposal for energy

- Based on forecasts usage linked to customer number growth
- 0.5% p.a. growth over 2021-2026
- However, we did not put any weight on energy in our proposal

Total rate of output growth: 1.25% p.a.

Total operating expenditure from output growth: $25m

Reduction of $9m in forecast operating expenditure

Revised proposal for customer numbers

- Draft determination, based on HIA forecasts, May 2020
- 0.7% in 2021/22, with growth increasing to 1.35% in 2023/24 before dropping off again, averaging 1.12% over 2021-2026

Revised proposal for demand growth

- Updated NIEIR forecasts, August 2020
- 0.3% p.a. growth over 2021-2026

Revised proposal for circuit length

- Draft determination, updated for 2019 actual
- 1.37% p.a. growth over 2021-2026

Revised proposal for energy

- Draft determination, based on 2011-2019 historical data
- -0.23% p.a. growth over 2021-2026
- Added weight on energy as per draft determination

Total rate of output growth: 0.87% p.a.

Total operating expenditure from revised output growth forecast: $16m

Can a cost pass-through apply?

Direct cost pass-throughs

The AER considers a cost variation to be material when the variation is more than **1% of annual revenue** :

- ~$13m for CitiPower over 2021-2026

- ~$30m for Powercor over 2021-2026

- ~$18m for United Energy over 2021-2026

For example, if we **forecast 0% customer number growth** over 2021-2026, the **actual growth** would have to be **unrealistically high** for CitiPower and United Energy, and **around the same as forecast for Powercor**, to reach the cost pass-through:

- ~1.9% p.a. for CitiPower over 2021-2026

- ~1.8% p.a. for Powercor over 2021-2026

- ~1.8% p.a. for United Energy

Alternatively, if use the AER's customer number forecast over 2021-2026, the actual growth would have to be negative over the period (or 0% for Powercor) for a negative pass-through to apply.

These numbers only apply when all other factors are held constant. It is unclear how the actual variation would be calculated in a world of shifting costs/pressures/drivers etc, and with the AER's annual changes to how much customers number growth contributes to operating expenditure growth.

It is unlikely there would be a realistic opportunity, even in this much uncertainty, for the direct cost pass-through to apply to a variation in customer number forecasts or other growth forecasts.

Forecasting price growth

Original proposal for Victorian electricity, gas, water and waste (EGWW) labour price forecast

- Based on BIS Oxford forecast
- 2.0% p.a. real labour price growth
- included superannuation guarantee levy uplift each year from 1 July 2021 (around 1.6% p.a. without the guarantee)

Original proposal for non-labour price forecast

- 0% p.a. growth over 2021-2026

Total operating expenditure from originally proposed price forecast:
CP: $22m; PAL: $65m; UE: $25m

Reduction of $83m in forecast operating expenditure

Actual Victorian EGWW labour price growth 2014/15 to 2019/20:

- 1.4% p.a. real labour price growth

By comparison, actual *Australian* EGWW labour price growth during 2015/16 to 2019/20:

- 0.8% p.a. real labour price growth

Revised proposal for Victorian EGWW labour price forecast

- Average of DAE and BIS Oxford forecasts
- 0.7% p.a. real labour price growth
- Both forecast include:
- the impacts of COVID-19 (the forecast rate is half the actual growth rate over the past five years)
- a reduction in wage growth from downward pressure of the superannuation guarantee levy increase (i.e. employees partially absorbing the increase through lower wage growth)
- superannuation guarantee levy increase.
- This forecasts is reasonably conservative forecast for this industry, as at least half of the business is under enterprise bargaining agreements (EBA) and the same staff have continued working throughout the pandemic as front-line workers
- The AER has acknowledged the averaging approach provides the most accurate forecasts and has asked distributors to provide an updated BIS Oxford forecast

Total operating expenditure from revised price forecast:

CP: $5m; PAL: $16m; UE: $8m

Forecasting augmentation and connections

Our forecasts for augmentation and connections are conservative

Augmentation

- We accept the AER's lower augmentation forecasts for each network, based on the acceptance of 2019 AEMO maximum demand forecast. Our augmentation proposal is $26m lower than our original proposal for CitiPower, $74m for Powercor and $34m for United Energy

- We have conducted a sensitivity analysis with the draft 2020 AEMO forecasts and results are very similar.

Residential and small business connections

- The AER has applied the same Housing Industry Association (HIA) forecasts for small connections (residential and small business) as for the average customer number growth. We accept this COVID-19 adjustment insofar as it only applies to residential and small business connections.

Large connections

- We recognise our Australian Construction Industry Forum (ACIF) forecasts from 2019 are no longer current, and an update has not been published since November 2019 due to the uncertainty regarding the COVID-19 pandemic.

- Given the uncertainty around COVID-19, we consider using **historical expenditure as the basis for forecasting large connections** is a conservative but appropriate approach for the 2021-2026 regulatory period as:

  - our connections expenditure has continued to exhibit strong activity during 2020 despite the lockdown

  - we are expecting a step-up in non-residential connections. This will be driven by:

    - completing the backlog of large embedded generator projects which have been stalled since September 2019 while the system stability issues in the north-west and western areas of the state are remedied, as well as new projects due to the Victorian Government's legislated renewable energy target of 40% of electricity generation by 2025 (VRET II)

    - new infrastructure projects driven by economic stimulus packages. The recent federal budget included infrastructure funding of $1.1 billion for Victoria. This includes new projects to upgrade the Shepparton, Warrnambool, and South Geelong to Waurn Ponds rail lines as well as upgrading the Barwon Heads road, upgrade of Latham's road and suburban rail loop projects, upgrade to roads in the Cranbourne area, and apartment buildings and social housing developments in Dandenong.

- Our gross connections proposal is $28m lower expenditure than our original proposal for CitiPower, $85m for Powercor and $52m for United Energy

Analysing the structural change in usage patterns

We are using smart meter data to analyse usage patterns

We are developing a model based on AMI data to analyse changes in usage patterns for residential customers at two heavily residential zone substations, Laverton (LV) and Werribee (WBE).

We will use those results to predict changes in demand for those customers if there is still a "work from home if you can direction", which is seeming more and more likely at this stage.

We used the difference in the average hourly demand between April 2019 – June 2019 (pre-COVID) and April 2020 – June 2020 (COVID) for the analysis. It is evident this is mostly a colder period, however, that is all the comparison data we have at present.

These deltas were then applied to the baseline (customer segment and day of the week level). For example, if the baseline demand of a given customer segment was on a Monday then the Monday deltas were applied to baseline profile. These profiles were aggregated up and was used as a baseline for LV and WBE.

There are a number of limitations to this analysis including which we hope to improve over time:

- the deltas used to forecast summer demand for LV and WBE was based on an Autumn/Winter load – should the trend continue over summer, we will have summer data to analyse as well
- COVID-19 restrictions have not varied to those imposed during April to June 2020
- we have assumed no change in population growth
- there is unpredictability of industrial generation
- assumed summer temperature will remain the same
- solar irradiance was not factored into the forecast.

> We are forecasting 0% demand growth at network level, however there are some areas of growth that are likely to become more evident with more residential use

> We will be using our new modelling results to track and monitor usage at residential zone substations over the 2020/21 summer

> While we will not be changing our augmentation forecasts in the revised proposal, our long-term forecasting tool will be updated over time with the results of the modelling, capturing structural changes

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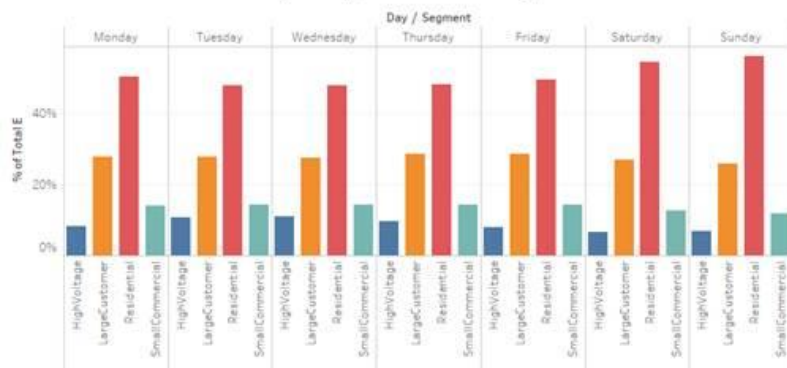# Customer segment data analysis - LV

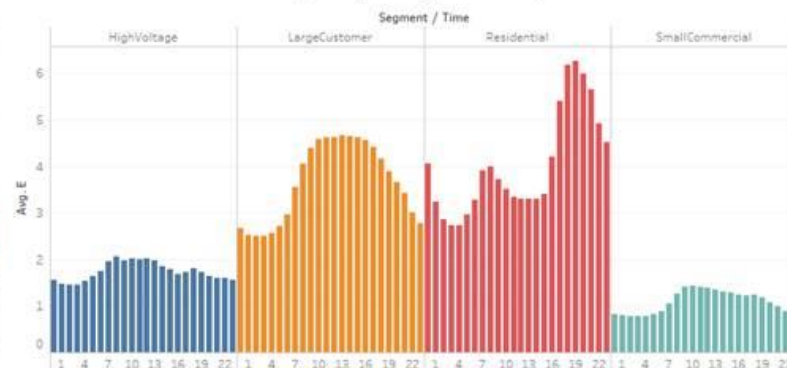Based on the meter data obtained from customers located in Laverton it shows,

- Residential peak usually occurred around 1800 hours;

- Large customers peaked around 0930 hours;

- Small commercial usually peaked at 1000 hours; and

- High voltage customers peaked at 0830 hours.
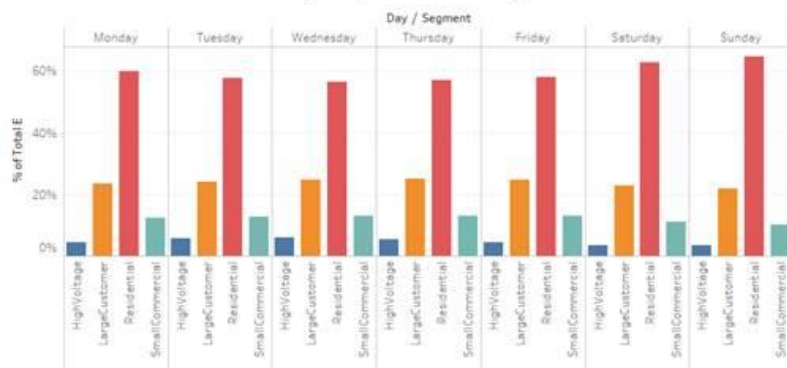
Customer segment data analysis - WBE

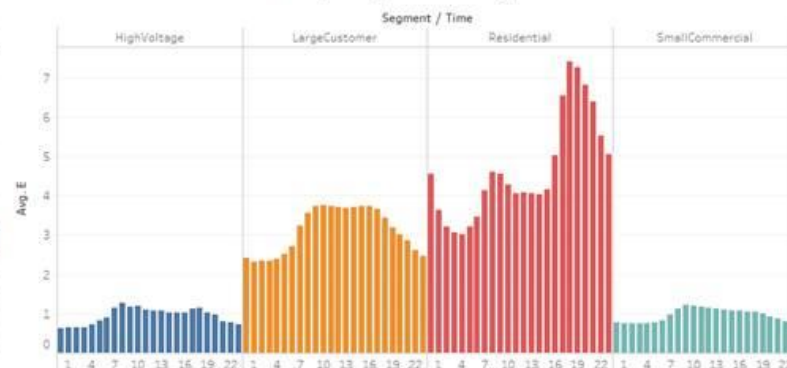Werribee (WBE) pre-COVID weekday profile

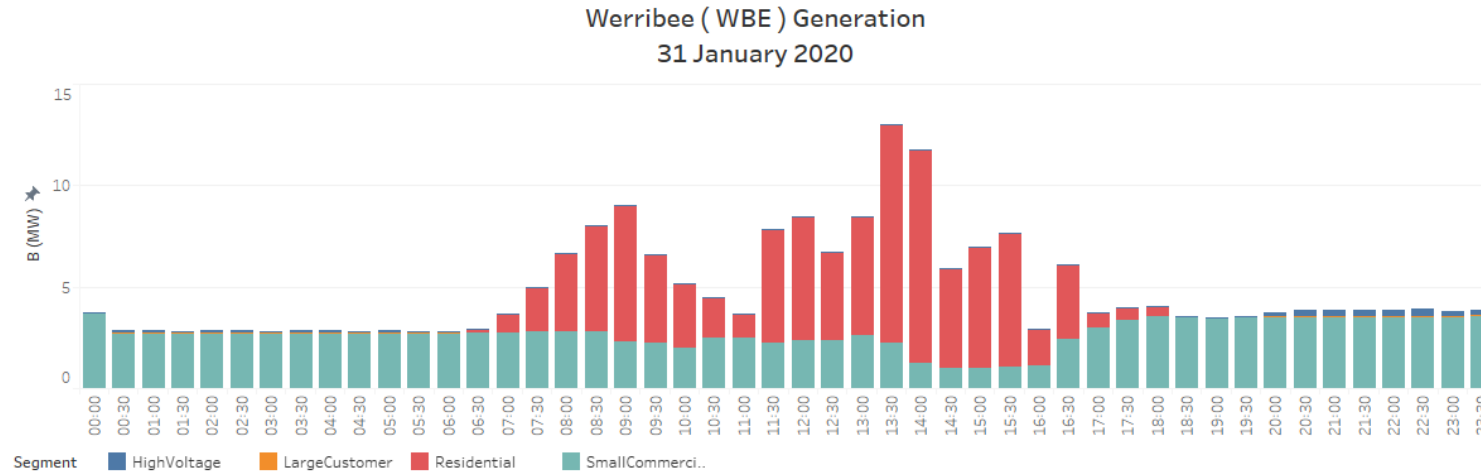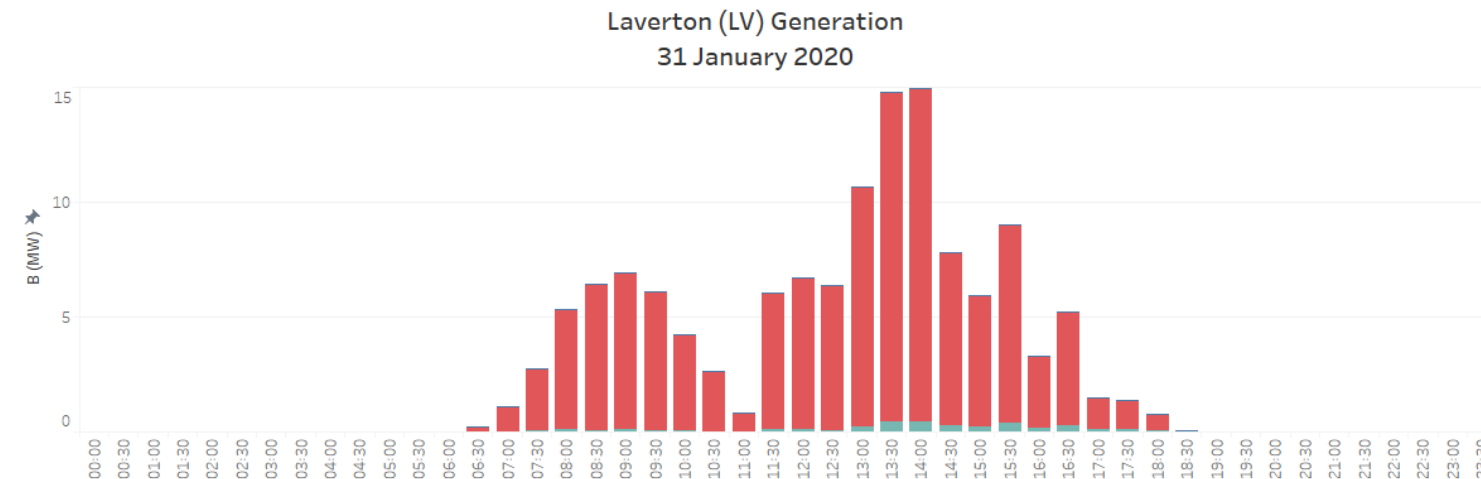Werribee (WBE) hourly pre-COVID profile

Werribee (WBE) COVID weekday profile

Werribee (WBE) COVID hourly profile

In Werribee, the trends were similar to Laverton where;

- Residential usually peaked around 1800-1830 hours;

- Large customers around 0930 hours;

- Small commercial peaks at 0930 hours; and

- High voltage customers peaks at either 0900 or 1630 hours.

Generation data analysis

Werribee (WBE) Generation
31 January 2020

Laverton (LV) Generation
31 January 2020

This graph shows the generation (B) load on January 31 by customer segment.

The higher proportion of generation is mainly from residential PVs particularly in Laverton.

In Werribee, there is consistent generation mainly after hours.
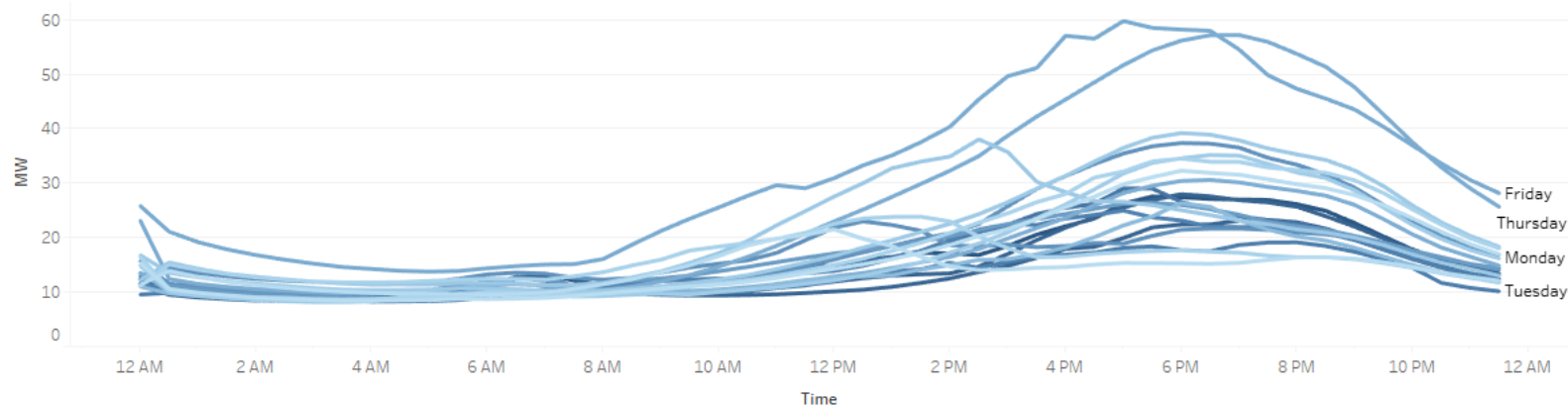
Air conditioning load

Weather station: Avalon
Maximum air temperature
1 January - 31 March 2020

Top 20 max
air temperature

DAY	
Monday	1
Tuesday	3
Wednesday	3
Thursday	5
Friday	3
Saturday	3
Sunday	2

In order to assess the impact of air conditioning we can observe the maximum air temperature recorded at Avalon and see how many days will be required in order to capture load profiles with air conditioning.
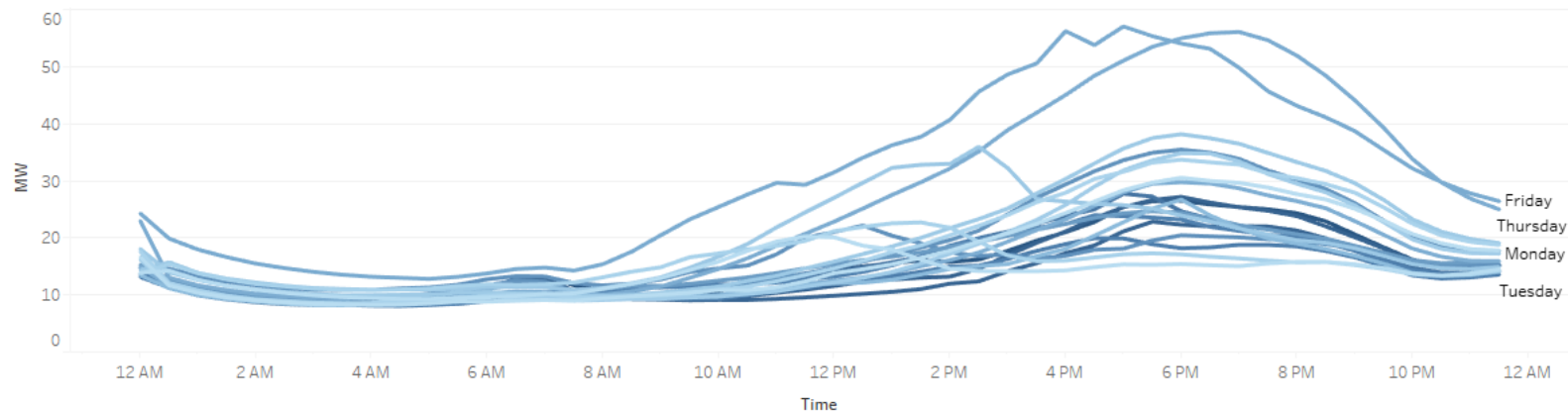
Based on time series graph, using the top 20 days (grey region) will cover all days of the week with a higher likelihood load air conditioning will be captured in the profiles.

Air conditioning load

LV Airconditioning Profile
top 10 highest temperatures recorded at Avalon

WBE Airconditioning Profile
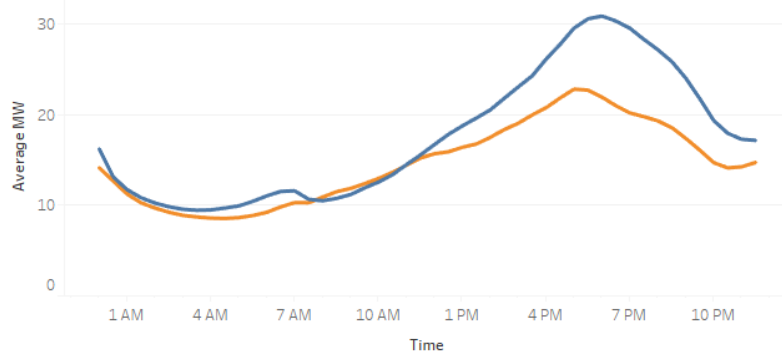top 10 highest temperatures recorded at Avalon

Based on the top 20 highest temperatures recorded at Avalon, it can be observed there were two particular days, 30th and the 31st of January 2020, where demand had significantly increased over the 2019 – 2020 summer.
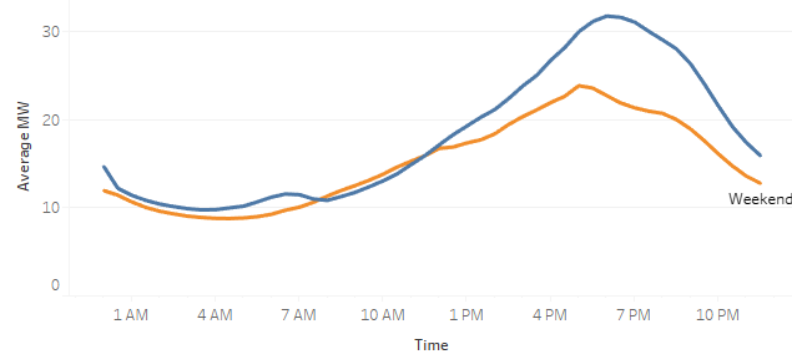
For these particular days, 40.1 and 43.4 degrees Celsius was reached respectively making these two days the two highest temperatures recorded at Avalon.

Air conditioning load

WBE Airconditioning Profile by weekend and weekday

LV Airconditioning Profile by weekend and weekday

WBE Airconditioning Profile by weekend and weekday

LV Airconditioning Profile by weekend and weekday

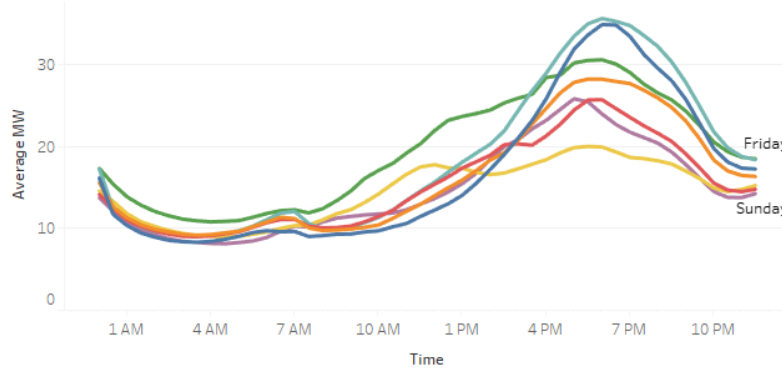Day Of Week — Monday — Tuesday — Wednesday — Thursday — Friday — Saturday — Sunday

Based on the top 20 temperatures observed at Avalon, a comparison was made to see if there was any change between the days of the week.
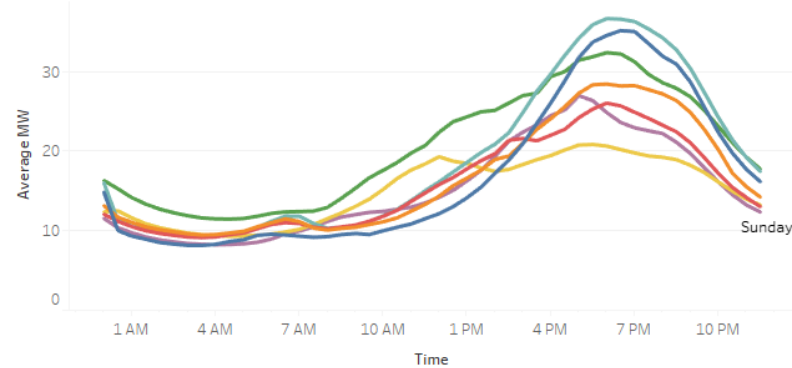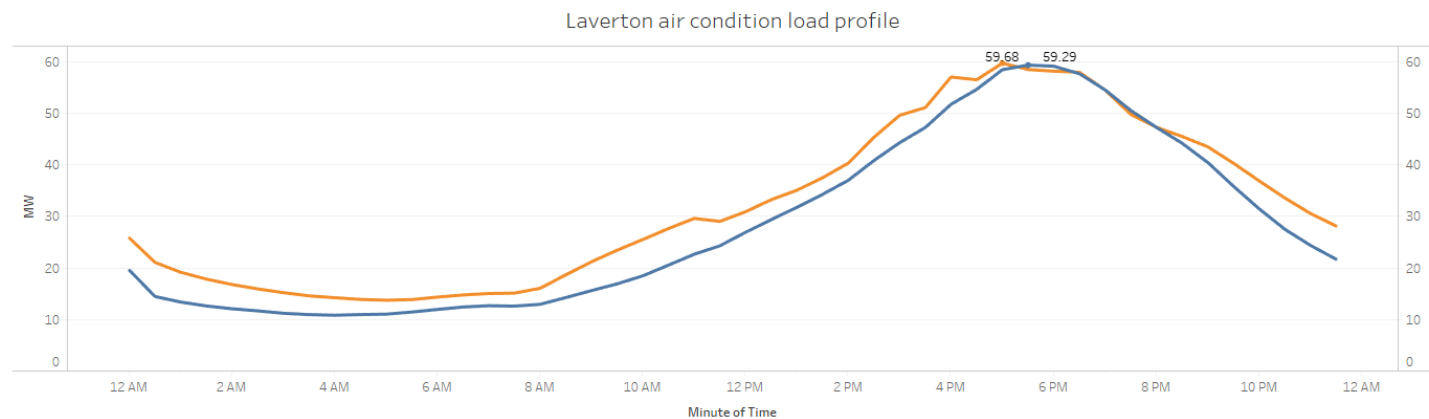
The average weekend profiles for LV and WBE are generally flatter in comparison to the weekday profiles.

With Monday and Thursdays observed to be more peakier compared to the other days of the week.

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Air conditioning load data analysis

Werribee air condition load profile

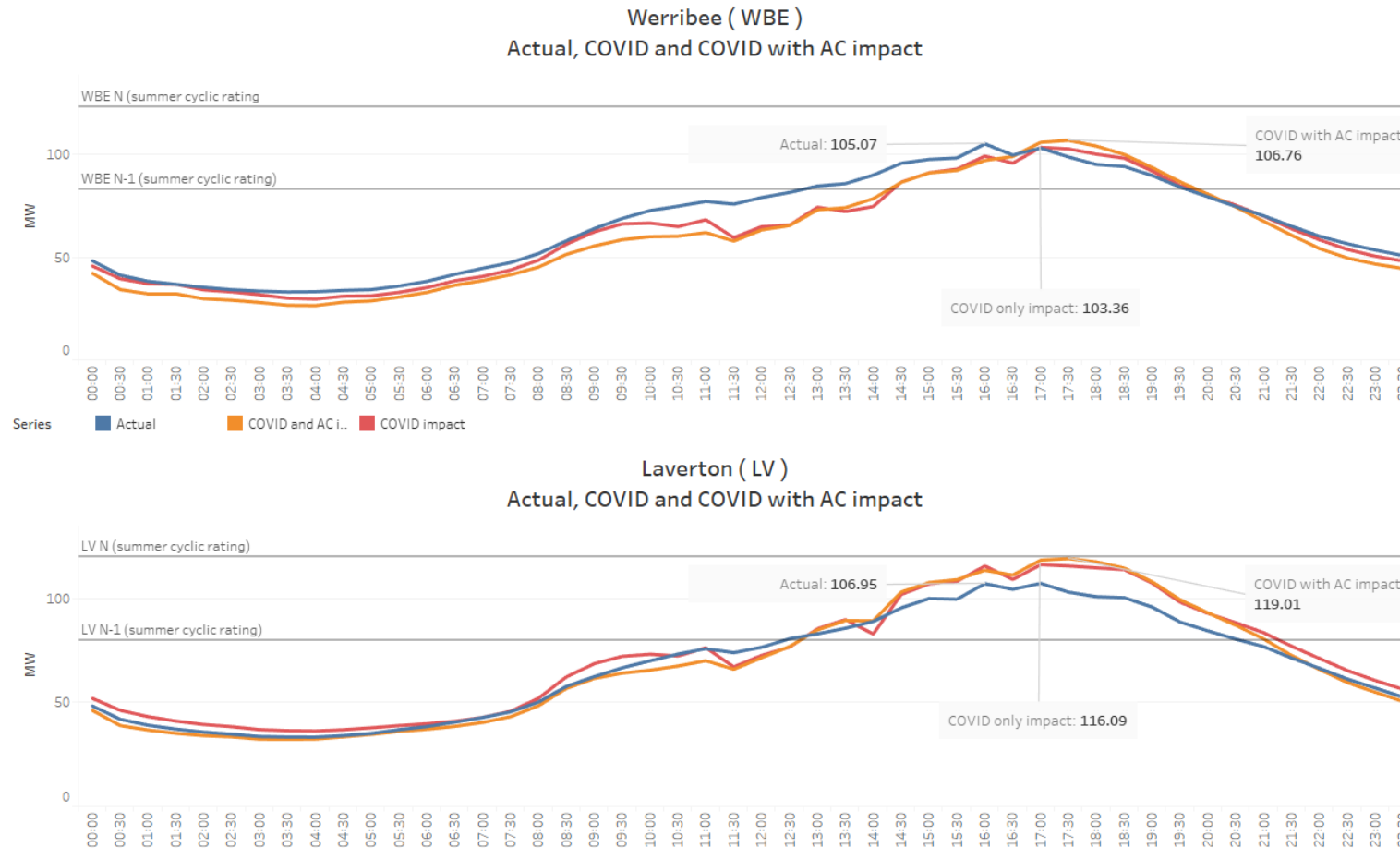Laverton air condition load profile

The time series compares air conditioning load on January 31 and the dates where the customer reached their maximum demand over the top 20 recorded maximum air temperature.

Using the load profile of the day the customer's reach their maximum demand, assumes they would most likely be home using air conditioning. Whereas, customer's may not be home on January 31 as it falls on a Friday. Increasing our date range increases the likelihood obtaining the load profile when air conditioning was used.

Based on this approach, demand increases in Werribee but not so much in Laverton.

Results

Werribee (WBE)
Actual, COVID and COVID with AC impact

Actual: 105.07
COVID with AC impact: 106.76
COVID only impact: 103.36

Series: Actual — COVID and AC i.. — COVID impact

Laverton (LV)
Actual, COVID and COVID with AC impact

Actual: 106.95
COVID with AC impact: 119.01
COVID only impact: 116.09

The forecast maximum demand growth is higher for LV than for WBE due to a higher residential load in LV.

In WBE, there is a higher penetration of commercial / industrial PV in leading to a decrease in MD, whereas in LV where there is no commercial / industrial PV has sees to an increase.

We will be using our new modelling results to track and monitor usage at residential zone substations over the 2020/21 summer