ESIG Down Under 2020 Plenary Session 3B

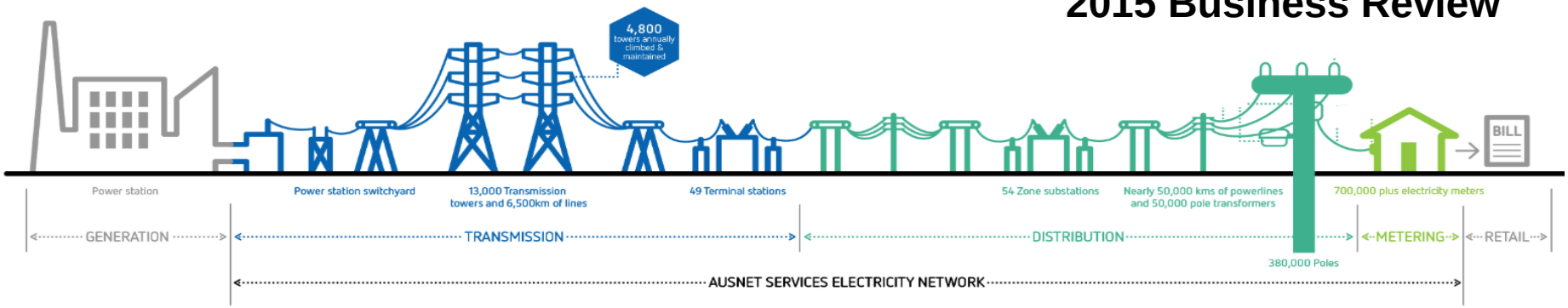
Transformation of the energy value chain

Parallels between distribution and transmission – perspective of a joint asset owner

Jacqui Bridge - formerly Transmission Planning & Development Manager, AusNet Services
- now General Manager - Asset Strategy and Planning, Powerlink Queensland

Evolution of energy eco-system

2015 Business Review



2020 Annual report

Electricity Transmission

Our transmission network transports electricity from where it is generated, through terminal stations and high-voltage transmission powerlines across the state, to Victoria's five lower-voltage distribution networks.

Electricity Distribution

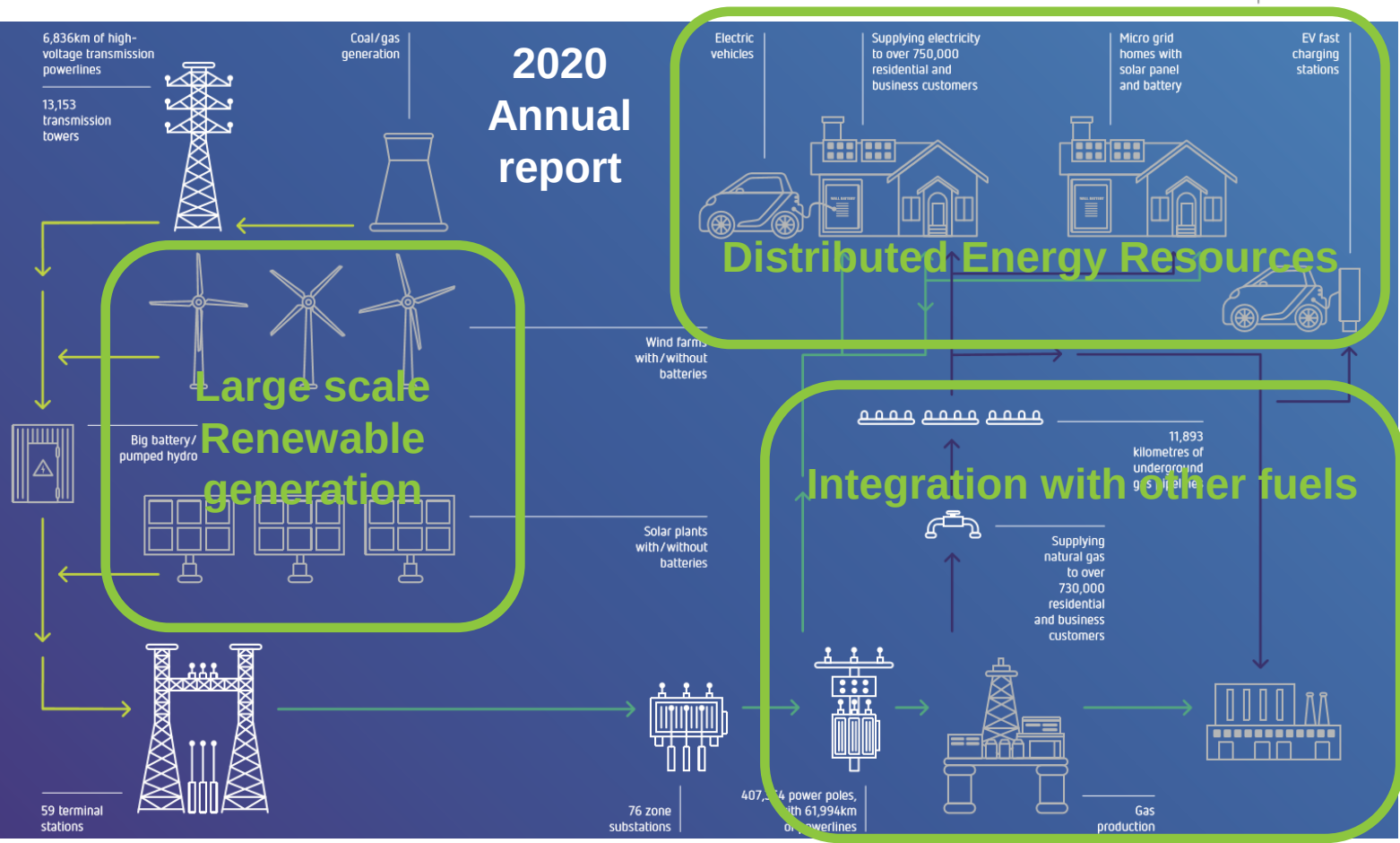
Our electricity distribution network feeds lower-voltage electricity to customers across all of eastern and north-eastern Victoria and in Melbourne's north and east.

Gas Distribution

Our gas distribution network supplies natural gas to residential and business customers in western Melbourne, central and western Victoria, through our network of underground gas pipelines.

Mondo

Mondo provides services and technology for essential infrastructure in the energy, water and transport sectors, including transmission connections, grid-scale storage, smart energy management systems, mini grids, and community energy hubs.



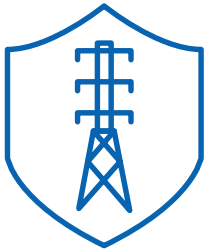
The energy value chain is evolving
Value is shifting downstream

	Centralised generation	Transmission	Distribution	Metering / data	Retail	Behind-the- meter	
						Storage Energy mgmt	*Demand response Home automation*
							
Value shift	↓	—	—	↑	↓	↑	↑ ↑
Key drivers	• Falling demand • Peak capacity security challenges • Growth in higher priority renewables and distribution • New entrants grabbing market share	• Plug and play • Increasingly complex and volatile energy flows • Emerging role of the complex system operator (TSO/DSO) • Evolving 'electron platform' provider		• Growth in smart tools to optimise demand patterns • New data-driven services • New entrants emerging from tech and data players	• High churn • Price-based competition • Expanding into energy services • New competitors • Innovation core value driver • Affordability challenges • Trust with customers?	• More power to consumer • Maturing Distributed generation (DG), storage and Electric Vehicle (EV) technologies	• 'Make my life easy' • Demand for usage insights and control solutions • Home automation and IoT • New players emerging • Who will 'own the home'? • SME sector looking for solution now

Value is broadly shifting to behind-the-meter services and offerings

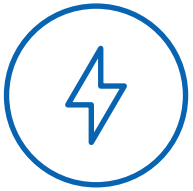
Evolving value chain introduces new demands and challenges for both T & D networks

Key Issues impacting grid performance, operational stability and renewable connections



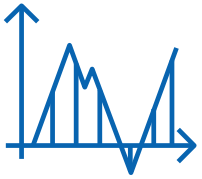
System strength:

the ability of the power system to maintain a stable voltage waveform – necessary for safe and secure operation of the power system.



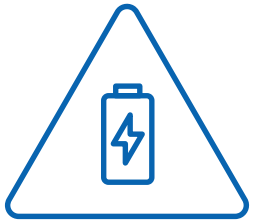
Thermal limitations:

the physical capacity of the network to transport the volume of energy generated in a particular region to the load centres.



Voltage management:

maintaining voltage within the technical limits in electrically weak regions where generators seek to connect, or, post a power system disturbance due to the sheer volume of generation seeking to connect.



Contingency management:

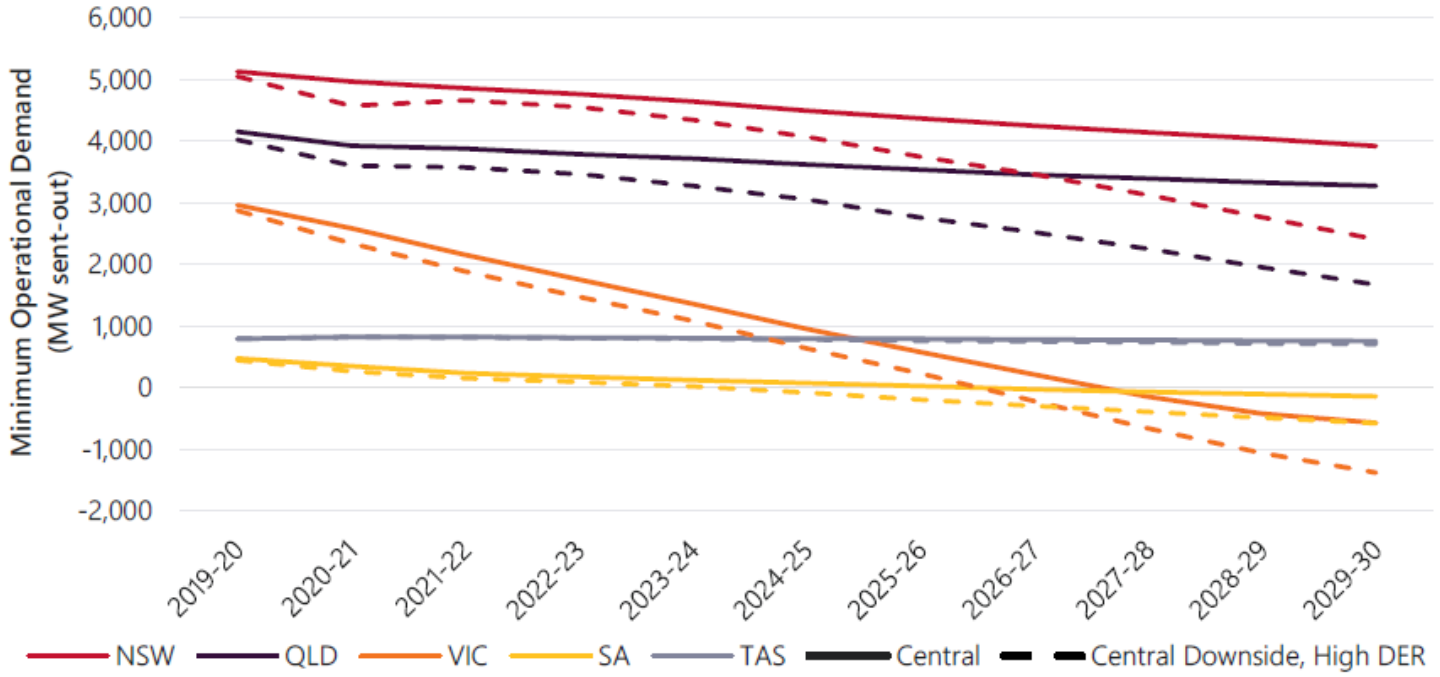
the ability for the power system to be managed operationally during a planned outage or following a disturbance which may result in the loss of a transmission line, or large generator.

Minimum demand (AEMO 2020 ESOO)

Forecast minimum operational (grid) demand is declining rapidly, in all NEM regions, due to increasing contributions of distributed photovoltaic (PV) generation to meet consumer demand in the daytime:

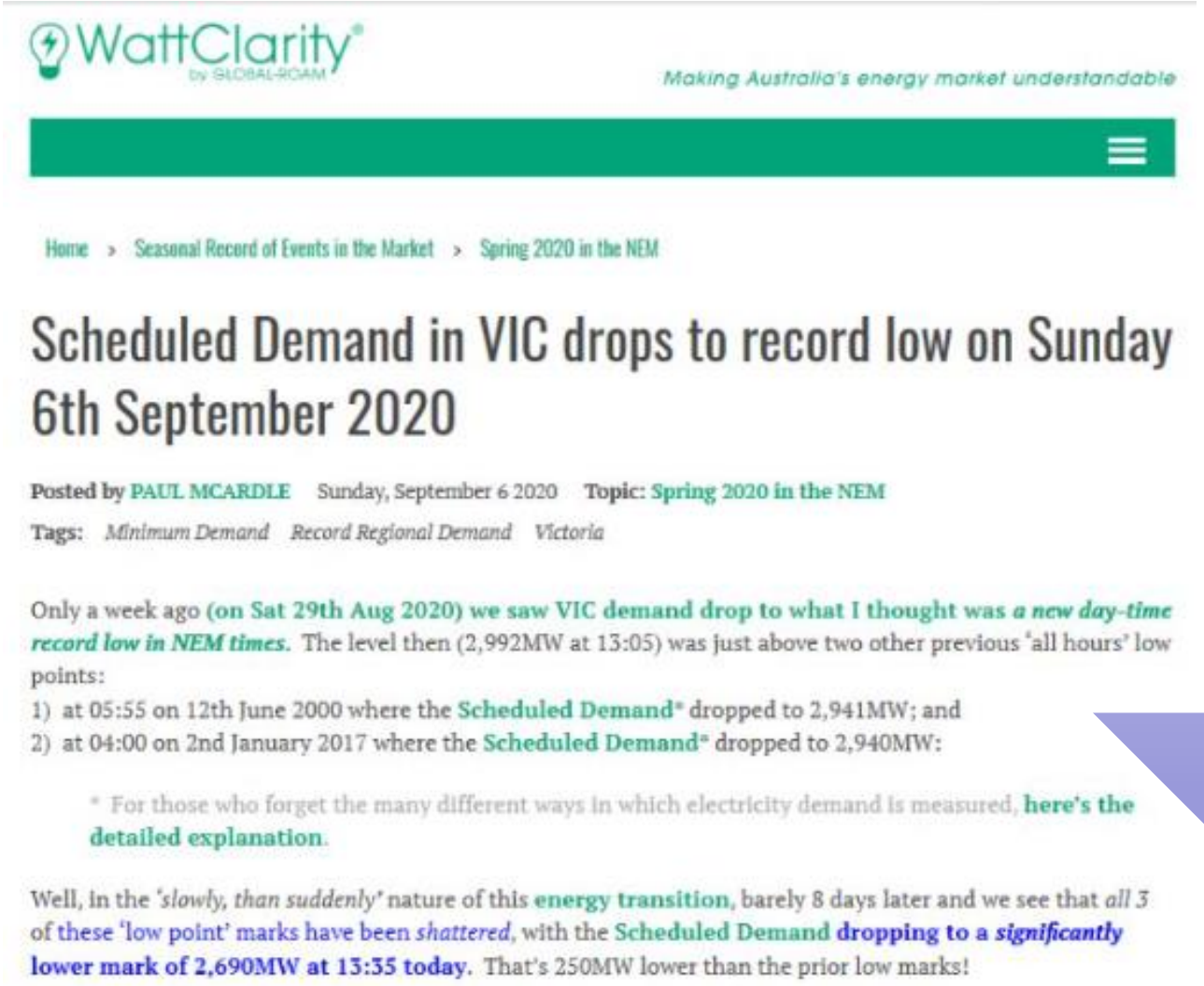
- By 2025, all regions are expected to experience minimum operational demand in the daytime, not overnight. Expected reductions are most evident in Victoria and South Australia, and continue across the full 10-year forecasting horizon.
- Declining minimum demand could lead to issues with managing voltage, system strength, and inertia. It is creating near-term operational and planning challenges for sustaining a reliable and secure power system that must be addressed.

Figure 3 Forecast minimum operational demand (full lines = Central scenario, dashed lines = Central Downside, High DER sensitivity)



Source: AEMO 2020 Electricity Statement of Opportunities https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2020/2020-electricity-statement-of-opportunities.pdf?la=en

Actual minimum demand in Victoria



WattClarity
by GLOBAL-ROAM

Making Australia's energy market understandable

Home › Seasonal Record of Events in the Market › Spring 2020 in the NEM

Scheduled Demand in VIC drops to record low on Sunday 6th September 2020

Posted by PAUL MCARDLE Sunday, September 6 2020 **Topic:** Spring 2020 in the NEM

Tags: *Minimum Demand* *Record Regional Demand* *Victoria*

Only a week ago **(on Sat 29th Aug 2020) we saw VIC demand drop to what I thought was *a new day-time record low in NEM times*.** The level then (2,992MW at 13:05) was just above two other previous 'all hours' low points:

1) at 05:55 on 12th June 2000 where the **Scheduled Demand*** dropped to 2,941MW; and
2) at 04:00 on 2nd January 2017 where the **Scheduled Demand*** dropped to 2,940MW:

* For those who forget the many different ways in which electricity demand is measured, **here's the detailed explanation**.

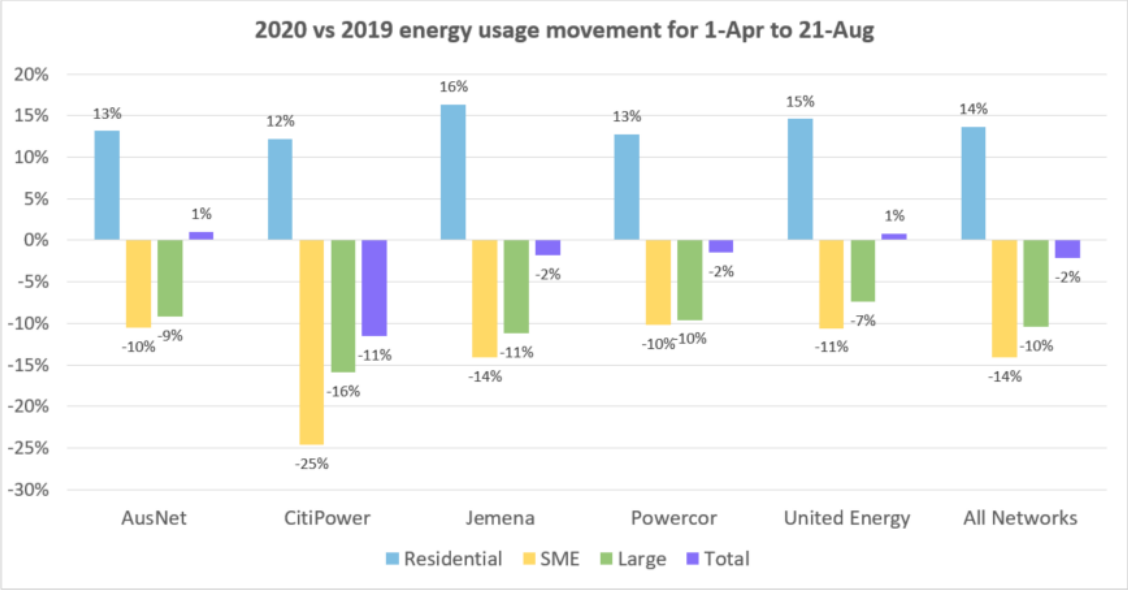
Well, in the *'slowly, than suddenly'* nature of this **energy transition**, barely 8 days later and we see that *all 3* of these 'low point' marks have been *shattered*, with the **Scheduled Demand dropping to a *significantly* lower mark of 2,690MW at 13:35 today.** That's 250MW lower than the prior low marks!

Milestones:

YEAR	Min. demand
2000	2,941 MW
2017	2,940 MW
2020 Aug	2,992 MW
2020 Sept	2,690 MW

COVID19 insights & challenges

Victorian energy consumption (April, May, June)

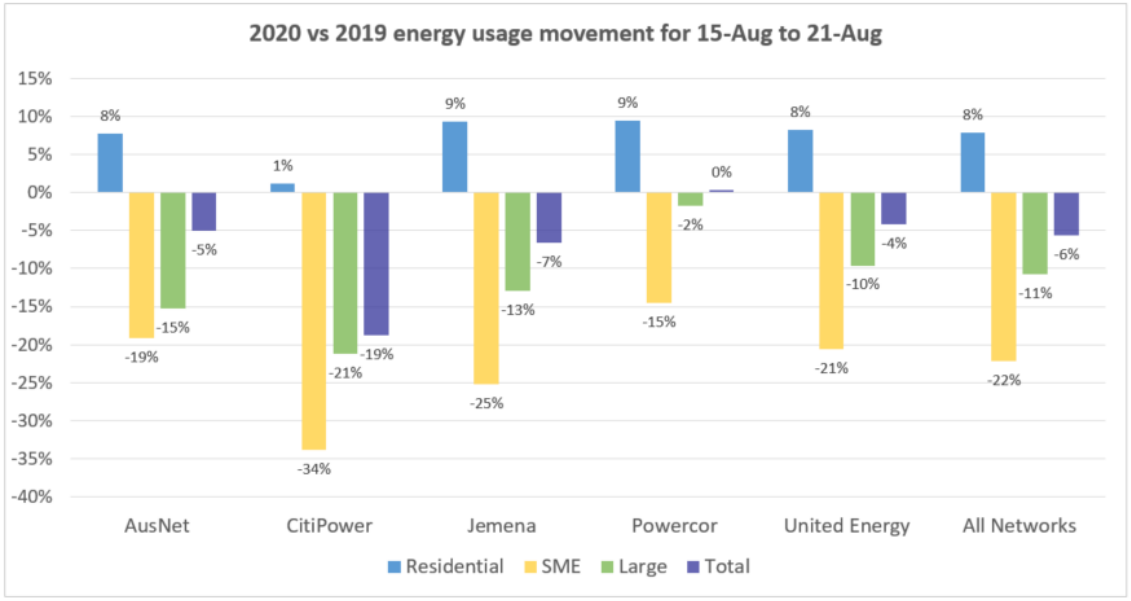


2020 vs 2019 energy usage movement for 1-Apr to 21-Aug

	Residential	SME	Large	Total
AusNet	13%	-10%	-9%	1%
CitiPower	12%	-25%	-16%	-11%
Jemena	16%	-14%	-11%	-2%
Powercor	13%	-10%	-10%	-2%
United Energy	15%	-11%	-7%	1%
All Networks	14%	-14%	-10%	-2%

Since 1 April:

- VIC consumption down 2%
- AusNet DNSP area up 1%



2020 vs 2019 energy usage movement for 15-Aug to 21-Aug

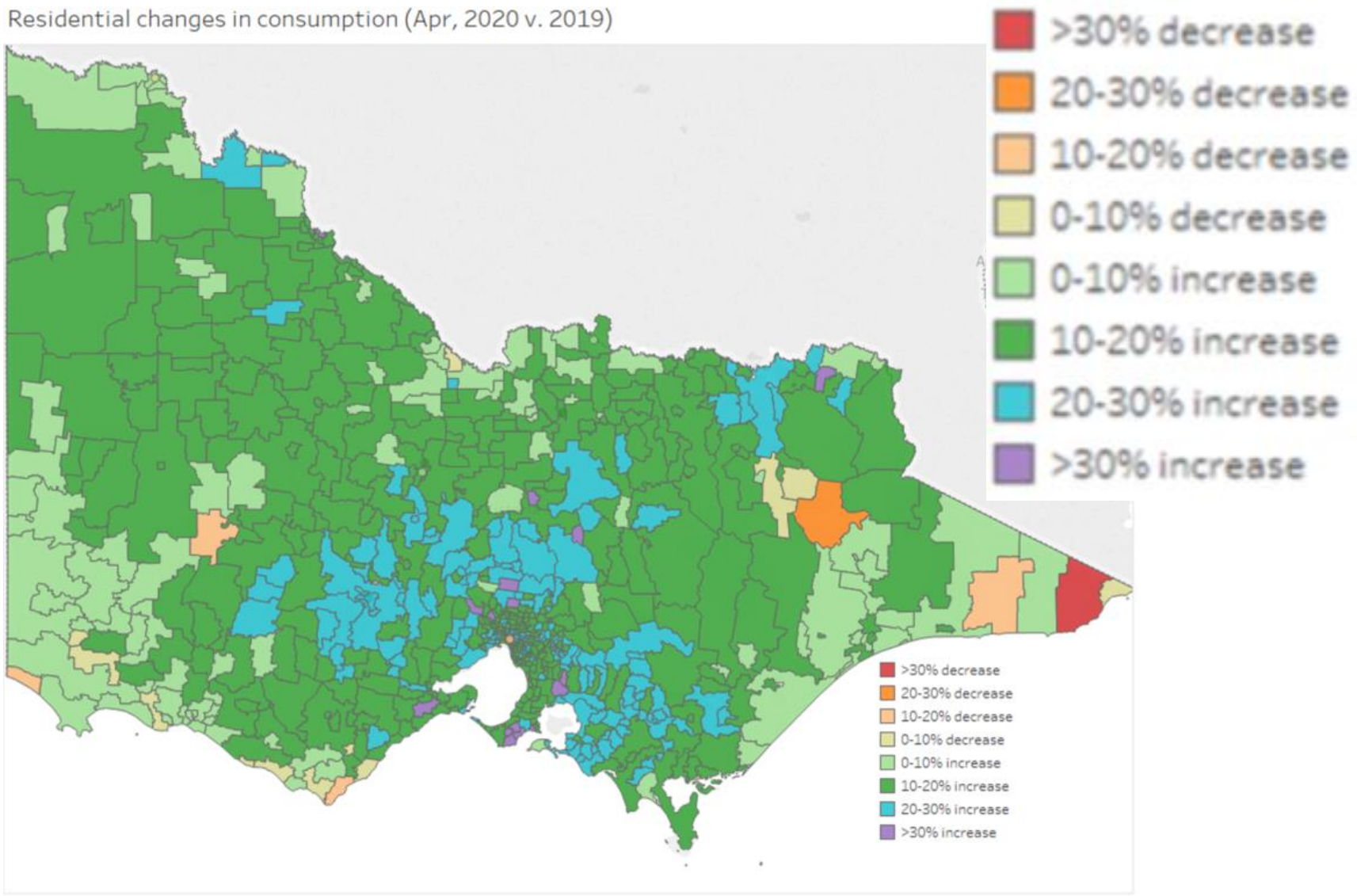
	Residential	SME	Large	Total
AusNet	8%	-19%	-15%	-5%
CitiPower	1%	-34%	-21%	-19%
Jemena	9%	-25%	-13%	-7%
Powercor	9%	-15%	-2%	0%
United Energy	8%	-21%	-10%	-4%
All Networks	8%	-22%	-11%	-6%

	2019	2020	Difference
Average temperature (°C)	12.3	12.2	-0.1

Last week (15 Aug – 21 Aug):

- VIC consumption down 6%
- AusNet DNSP area down 5%

COVID impact
Changes in Victorian electricity consumption April 2019 vs. 2020



Electricity Consumption changes 2020 vs. 2019