Attachment 1.3

Energy and Customer Number Forecast Report (2022)

Revised proposed access arrangement information

15 November 2022

Access Arrangement (AA) for the period
1 July 2023 to 30 June 2027

EDM 61938988

Energy & Customer Numbers Forecast

2022

2 November 2022

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Energy & Customer Numbers Forecast

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1. Purpose

This report contains the Energy & Customer Numbers Forecast results and analysis as of FY22 for Finance and Metering and Regulation and Investment Assurance for budgeting and the tariff determination processes. It is an update of the document Energy & Customer Numbers Forecast Report published in 2021 and includes new actuals and forecasts that extend to 2027, as well as providing additional commentary.

This report might also be given to external stakeholders such as the Economic Regulation Authority as part of access arrangement deliberations.

Note that this report is just one of several demand forecast reports. For information about how the forecasts are produced, please refer to the Methodology Report: Connections, energy, demand and reactive power forecasts [EDM# 55474718].

2. Introduction

This report provides the forecast of active connections and associated energy sales in aggregate and by tariff for up to five years ahead. In addition, analysis of the key trend and inflection points is provided with enough context to fully understand the likely persistence of trend drivers as well as evidence of any accelerator or decelerator impacts.

In this year's report, small-scale rooftop solar photovoltaic electricity generation systems (i.e. solar PV) is identified as a key trend driver. Throughout this report, solar PV is often referred to as a Distributed Energy Resource (DER).

Box 1: What is DER?

- Distributed Energy Resources (DER) is the name given to renewable energy units or systems that are commonly located at houses or businesses to provide them with power. Another name for DER is "behind the meter" because the electricity is generated or managed 'behind' the electricity meter in the home or business.
- Common examples of DER include rooftop solar PV units, battery storage, thermal energy storage, electric vehicles and chargers, smart meters, and home energy management technologies.

Source: Australian Energy Renewable Resources, Distributed energy resources; accessed 4 March 2021

Another trend driver identified in this report is the growth of new premises that require connection to the electricity network (i.e. new NMIs).

Box 2: National Meter Identifier (NMI)

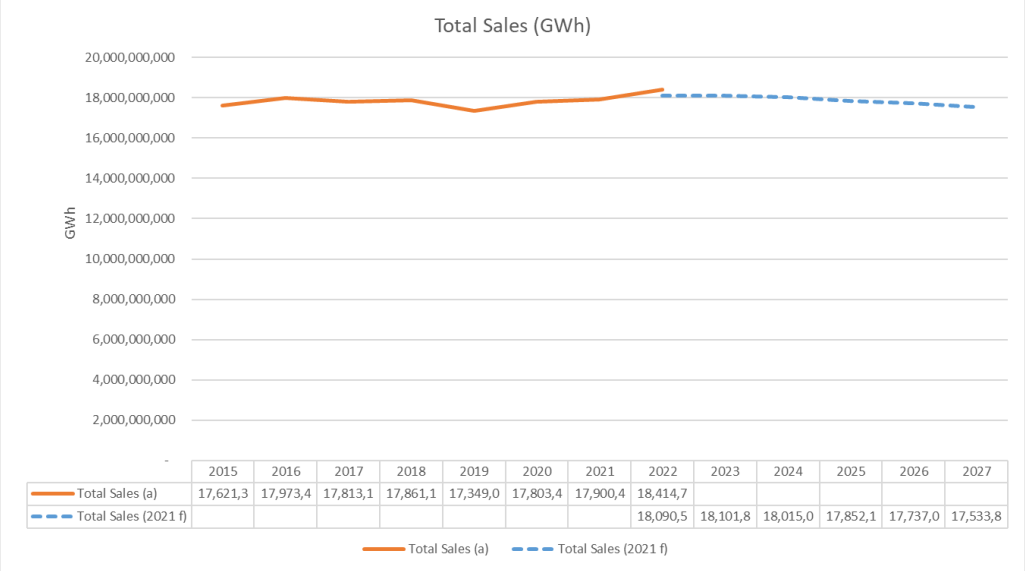
Every connection to the national electricity network is given its own NMI. That includes all types of metered and unmetered electricity connections, like homes, businesses and streetlights.

The report also considers the prospects for electric vehicle adoption. Adoption levels are still very low with less than 4,000 registered pure electric vehicles in Western Australia (Source: Department of Transport). At this stage, the impact of electric vehicles appears to be slight and likely to remain slight over the forecast period up to 2027 (although in CSIRO's most recent EV projections in September 2022, there are forecasts for approximately 200,000 electric vehicles in 2027. See section 5.1.4).

3. Key trends

This section provides an overview of the key trends in customer numbers (i.e. number of active NMIs) and electricity export sales.[1] Figure 3-1 presents the recent history of Total Sales and the forecast. A slight downward trend is observable over the forecast period.

Figure 3-1: Total Sales forecast (GWh)



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Total Sales (a)	17,621,3	17,973,4	17,813,1	17,861,1	17,349,0	17,803,4	17,900,4	18,414,7					
Total Sales (2021 f)								18,090,5	18,101,8	18,015,0	17,852,1	17,737,0	17,533,8

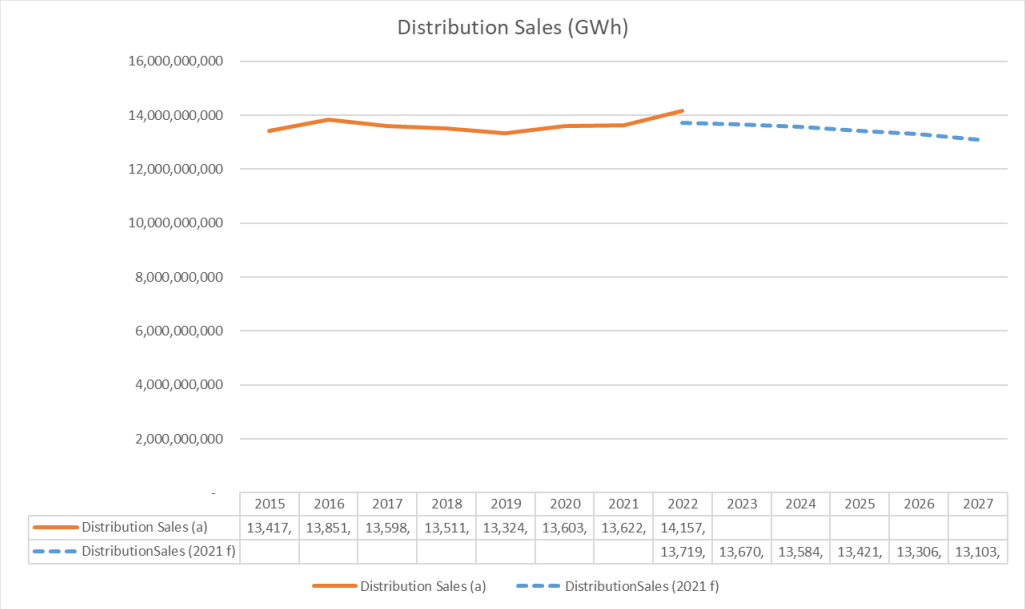
Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

(1) Total Sales is defined as the sum of Distribution, Transmission Export Sales, Streetlights and Unmetered Supplies.

[1] Note that there are many definitions of what a customer is within Western Power. Active NMI is a proxy that is most relevant to this report in terms of representing a sensible measurement point for the transfer of electrical power to and from customer sites.

Figure 3-2: Distribution Sales forecast (GWh)



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Distribution Sales (a)	13,417,	13,851,	13,598,	13,511,	13,324,	13,603,	13,622,	14,157,					
DistributionSales (2021 f)								13,719,	13,670,	13,584,	13,421,	13,306,	13,103,

Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

Chart shows electrical power exported from the South West Interconnected System at the Distribution Network level. That is, it excludes the Transmission Connected Customer power.

The NMI count history by tariff since 2015 is presented in Table 3.1 and the forecasts are shown in Table 3.2. (next page). Export sales by tariff are presented in Table 3.3 and Table 3.4.

Table 3.1: Historical customer count (NMI) by tariff

Tariff	2015	2016	2017	2018	2019	2020	2021	2022
RT1	560,509	574,565	583,288	588,017	590,080	590,796	595,249	496,861
RT2	55,916	55,827	55,363	55,165	54,292	53,738	54,609	43,684
RT3	4,133	4,113	4,191	4,308	4,434	4,444	4,421	3,864
RT4	3,261	3,220	3,236	3,239	3,245	3,244	3,239	2,978
RT5	281	283	290	298	301	305	307	300
RT6	3,302	3,371	3,450	3,527	3,575	3,605	3,629	3,559
RT7	273	278	283	284	288	287	291	292
RT7Z	18	18	20	20	19	19	19	19
RT8	55	55	55	56	53	53	53	53
RT13	220,590	228,486	234,437	239,342	242,621	243,252	243,084	197,127
RT14	1,831	1,846	1,867	1,862	1,855	1,853	1,849	1,313
RT15	8,682	8,684	8,733	8,790	8,810	8,805	8,788	7,947
RT16	620	635	646	661	662	661	659	627
RT17	156,473	158,069	159,191	159,965	163,279	173,885	181,024	180,275
RT18	19,627	19,988	20,251	20,506	20,771	21,680	22,606	34,506
RT19	173	177	182	182	184	184	183	250
RT20	5,856	5,941	6,026	6,112	6,188	6,214	6,215	6,379
RT21	34,621	35,335	35,734	36,981	38,588	39,167	39,905	198,739
RT22	152	157	159	169	174	185	184	318
RT34	-	-	-	-	-	-	-	-
RT35	-	-	-	-	-	-	-	-
RT36	-	-	-	-	-	-	-	-
RT37	-	-	-	-	-	-	-	-
RT40	-	-	-	-	-	-	-	-
RT41	-	-	-	-	-	-	-	-
Other	72	45	28	23	16	-	-	-
RT9	230,278	261,730	265,118	270,511	272,281	275,373	282,313	278,067
RT10	15,720	15,863	17,457	19,399	19,048	19,293	19,250	18,698
Distribution Total	**1,076,445**	**1,101,093**	**1,117,430**	**1,129,507**	**1,139,435**	**1,152,377**	**1,166,314**	**1,179,091**
TRT1	41	41	40	40	40	40	42	44
Total	**1,076,486**	**1,101,134**	**1,117,470**	**1,129,547**	**1,139,475**	**1,152,417**	**1,166,356**	**1,179,135**

Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

(1) Historical NMI count reported as at June each year
(2) Other refers to active NMIs that are not yet allocated to a tariff

Table 3.2: Customer count (NMI) forecast by tariff

Tariff	2023	2024	2025	2026	2027
RT1	364,284	287,519	196,753	106,484	22,494
RT2	41,030	33,907	25,486	17,110	9,317
RT3	4,032	4,032	4,032	4,032	4,032
RT4	3,056	3,056	3,056	3,056	3,056
RT5	329	341	354	367	380
RT6	3,650	3,662	3,675	3,688	3,701
RT7	313	325	338	351	364
RT7Z	19	19	19	19	19
RT8	74	86	99	112	125
RT13	180,870	144,862	102,286	59,944	20,547
RT14	1,400	1,400	1,400	1,400	1,400
RT15	8,241	8,241	8,241	8,241	8,241
RT16	627	627	627	627	627
RT17	196,408	196,408	196,408	196,408	196,408
RT18	42,247	42,247	42,247	42,247	42,247
RT19	249	249	249	249	249
RT20	6,338	6,338	6,338	6,338	6,338
RT21	339,819	327,817	313,625	299,510	286,378
RT22	291	291	291	291	291
RT34	-	10,910	23,781	36,590	48,527
RT35	-	118,527	257,468	396,154	526,289
RT36	-	1,853	3,961	6,084	8,109
RT37	-	15,504	33,433	51,434	68,547
RT40	-	10	20	30	42
RT41	-	2	4	6	8
Other	-	-	-	-	-
RT9	288,636	293,180	297,685	302,467	307,357
RT10	19,460	19,811	20,162	20,513	20,864
Distribution Total	**1,193,278**	**1,208,234**	**1,224,190**	**1,240,773**	**1,257,737**
TRT1	42	42	42	42	42
Total	**1,193,320**	**1,208,276**	**1,224,232**	**1,240,815**	**1,257,779**

Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

(3) Distribution Generators (RT11) have not been included in this forecast
(4) For counts, RT9 (Streetlights) and RT10 (Unmetered supply) have been excluded from the subtotals, as these are not NMIs or connection points

Table 3.3: Historical Export sales by tariff (GWh)

Tariff	2015	2016	2017	2018	2019	2020	2021	2022
RT1	2,691 GWh	2,824 GWh	2,788 GWh	2,696 GWh	2,681 GWh	2,804 GWh	2,862 GWh	2,431 GWh
RT2	591 GWh	574 GWh	538 GWh	516 GWh	489 GWh	476 GWh	482 GWh	406 GWh
RT3	29 GWh	29 GWh	28 GWh	27 GWh	27 GWh	28 GWh	28 GWh	25 GWh
RT4	289 GWh	284 GWh	270 GWh	265 GWh	256 GWh	255 GWh	255 GWh	235 GWh
RT5	552 GWh	575 GWh	574 GWh	610 GWh	627 GWh	647 GWh	639 GWh	628 GWh
RT6	1,656 GWh	1,710 GWh	1,706 GWh	1,739 GWh	1,744 GWh	1,767 GWh	1,769 GWh	1,751 GWh
RT7	2,615 GWh	2,701 GWh	2,680 GWh	2,757 GWh	2,765 GWh	2,827 GWh	2,802 GWh	2,956 GWh
RT7Z	467 GWh	474 GWh	482 GWh	497 GWh	456 GWh	461 GWh	451 GWh	467 GWh
RT8	192 GWh	191 GWh	179 GWh	180 GWh	166 GWh	161 GWh	155 GWh	154 GWh
RT13	1,231 GWh	1,311 GWh	1,280 GWh	1,218 GWh	1,180 GWh	1,226 GWh	1,224 GWh	1,016 GWh
RT14	36 GWh	35 GWh	31 GWh	28 GWh	25 GWh	25 GWh	26 GWh	19 GWh
RT15	52 GWh	54 GWh	51 GWh	48 GWh	47 GWh	48 GWh	48 GWh	47 GWh
RT16	99 GWh	99 GWh	96 GWh	94 GWh	89 GWh	88 GWh	88 GWh	88 GWh
RT17	889 GWh	941 GWh	913 GWh	878 GWh	863 GWh	905 GWh	919 GWh	967 GWh
RT18	671 GWh	665 GWh	634 GWh	621 GWh	593 GWh	577 GWh	583 GWh	717 GWh
RT19	11 GWh	12 GWh	12 GWh	12 GWh	12 GWh	12 GWh	12 GWh	22 GWh
RT20	969 GWh	979 GWh	943 GWh	933 GWh	912 GWh	890 GWh	870 GWh	959 GWh
RT21	205 GWh	219 GWh	213 GWh	204 GWh	200 GWh	213 GWh	218 GWh	1,079 GWh
RT22	11 GWh	11 GWh	11 GWh	10 GWh	9 GWh	8 GWh	8 GWh	17 GWh
RT34	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT35	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT36	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT37	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT40	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT41	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
Other	3 GWh	2 GWh	1 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT9	124 GWh	129 GWh	129 GWh	130 GWh	131 GWh	135 GWh	132 GWh	132 GWh
RT10	32 GWh	33 GWh	41 GWh	48 GWh	49 GWh	51 GWh	49 GWh	43 GWh
Distribution Total	**13,418 GWh**	**13,851 GWh**	**13,598 GWh**	**13,512 GWh**	**13,324 GWh**	**13,604 GWh**	**13,622 GWh**	**14,158 GWh**
TRT1	4,204 GWh	4,122 GWh	4,215 GWh	4,349 GWh	4,025 GWh	4,200 GWh	4,278 GWh	4,257 GWh
Total	**17,621 GWh**	**17,973 GWh**	**17,813 GWh**	**17,861 GWh**	**17,349 GWh**	**17,803 GWh**	**17,900 GWh**	**18,415 GWh**

Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

(5) Historical NMI count reported as at June each year

(6) Other refers to active NMIs that are not yet allocated to a tariff

Table 3.4: Forecast Export sales by tariff (GWh)

Tariff	2023	2024	2025	2026	2027
RT1	2,160 GWh	1,754 GWh	1,239 GWh	696 GWh	140 GWh
RT2	406 GWh	323 GWh	230 GWh	145 GWh	73 GWh
RT3	30 GWh	31 GWh	32 GWh	33 GWh	34 GWh
RT4	105 GWh	101 GWh	96 GWh	90 GWh	83 GWh
RT5	664 GWh	670 GWh	675 GWh	682 GWh	688 GWh
RT6	1,724 GWh	1,694 GWh	1,664 GWh	1,641 GWh	1,614 GWh
RT7	2,876 GWh	2,882 GWh	2,885 GWh	2,897 GWh	2,903 GWh
RT7Z	462 GWh	462 GWh	461 GWh	462 GWh	462 GWh
RT8	210 GWh	239 GWh	269 GWh	299 GWh	328 GWh
RT13	1,161 GWh	961 GWh	705 GWh	432 GWh	148 GWh
RT14	48 GWh	46 GWh	44 GWh	41 GWh	38 GWh
RT15	29 GWh	30 GWh	32 GWh	33 GWh	35 GWh
RT16	22 GWh	21 GWh	20 GWh	19 GWh	17 GWh
RT17	708 GWh	730 GWh	758 GWh	796 GWh	828 GWh
RT18	1,455 GWh	1,399 GWh	1,327 GWh	1,247 GWh	1,149 GWh
RT19	2 GWh	2 GWh	2 GWh	1 GWh	1 GWh
RT20	218 GWh	210 GWh	199 GWh	187 GWh	172 GWh
RT21	1,214 GWh	1,210 GWh	1,204 GWh	1,210 GWh	1,206 GWh
RT22	10 GWh	10 GWh	9 GWh	9 GWh	8 GWh
RT34	0 GWh	76 GWh	157 GWh	227 GWh	277 GWh
RT35	0 GWh	431 GWh	975 GWh	1,583 GWh	2,199 GWh
RT36	0 GWh	61 GWh	124 GWh	180 GWh	221 GWh
RT37	0 GWh	56 GWh	127 GWh	206 GWh	286 GWh
RT40	0 GWh	0 GWh	0 GWh	0 GWh	1 GWh
RT41	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
Other	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT9	137 GWh	138 GWh	140 GWh	142 GWh	144 GWh
RT10	46 GWh	47 GWh	48 GWh	49 GWh	49 GWh
Distribution Total	**13,686 GWh**	**13,585 GWh**	**13,422 GWh**	**13,306 GWh**	**13,103 GWh**
TRT1	4,431 GWh	4,430 GWh	4,431 GWh	4,431 GWh	4,431 GWh
Total	**18,117 GWh**	**18,015 GWh**	**17,852 GWh**	**17,737 GWh**	**17,534 GWh**

Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Notes:

(7) Distribution Generators (RT11) have not been included in this forecast

(8) For counts, RT9 (Streetlights) and RT10 (Unmetered supply) have been excluded from the subtotals, as these are not NMIs or connection points

4. Analysis

This section presents contextual information and insight relating to the observed trends presented in the previous section. Continued adoption of DER by residential and commercial customers has been identified as the key driver.

4.1 Deceleration of connection growth (2022-2027)

There was an historic average of 19k new residential NMIs per year for 2008-2020. However, from 2017-2022 this average has dropped to 13k new residential NMIs per year and the outlook for the forecast period of 2022-2027 is an average of 14k new residential NMIs per year.

Compared against FY2020 (14,246), dwelling approvals in Western Australia for FY2020-21 (26,704) and FY2021-22 (20,106) increased by 87% and 41% respectively (source: ABS). This is likely due to record low interest rates in FY2020-21 and FY2021-22. This hasn't yet been reflected in NMI connections as high demand for construction and supply chain delays have caused delays in completion of these dwellings and connections to the network.

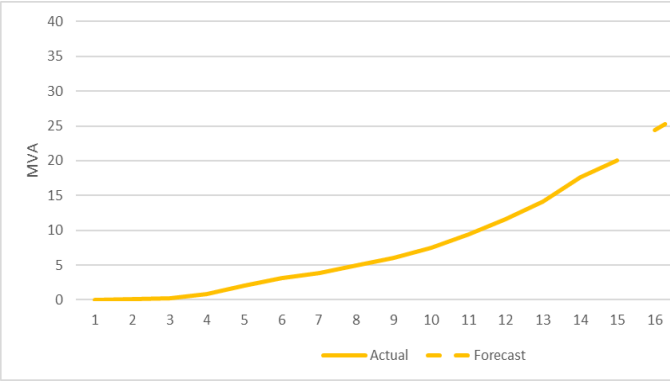
- Positive factors for continued housing growth are low interest rates, enhanced population growth (reflecting low rental vacancy rates). This will change moving forward as interest rates have begun to increase with the RBA increasing the cash rate by 2.5% since May 2022.
- One dampening factor for continued housing growth is high property valuation relative to average wages, prompting lenders to tighten lending standards – particularly in the investor market. Increasing interest rates from May 2022 are again likely to dampen housing growth.
- Likely to see the rental vacancy rate lead construction growth.

4.2 DER adoption trends

The persistent downward drift is largely due to continuing growth in Distributed Energy Resources (DER - primarily solar photovoltaic electricity generation systems).

DER is a direct competitor to grid-delivered electrical power services. As indicated in Figure 4-11 and Figure 4-22, for each 1 kVA of additional solar PV capacity installed, Western Power's annual exported sales decrease by approximately 10 kWh.

Figure 4-1: Solar PV installed capacity



Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

Figure 4-2: Installed DER capacity & export sales

FY	Distribution Sales (GWh)	PV capacity (MVA)
2017	13,598GWh	7,429
2018	13,512 GWh	9,371
2019	13,324 GWh	11,624
2020	13,604 GWh	14,163
2021	13,622 GWh	17,660
2022	14,158 GWh	20,091
2023	13,670 GWh	24,352
2024	13,585 GWh	27,561
2025	13,421 GWh	30,897
2026	13,306 GWh	34,369
2027	13,103 GWh	37,990

Causal factors driving household DER adoption

- A recent econometric study reported that key factors influencing DER adoption are net wealth, source of income, number of employed persons, age of DER adopter, duration of home ownership, size of roof space, housing density, number of household inhabitants, number of credit cards.
- Factors that increase the likelihood of DER adoption are: net wealth up to $3.1M; part or full privately funded retirement income; 60 years of age; homeownership of less than 20 years; only one or two employed persons in the household; multiple credit cards; and participating in a green energy scheme.
- Factors that decrease the likelihood of DER adoption are: mortgage outstanding; renting rather than owning; living in a high density area; and living in a non-familial household with more than two employed persons; and living in a cool climate.
- Factors that positively influence the intention to adopt DER are: solar hot water system installation; struggling to pay household bills; a mortgage; more than two income earners. Negative influences are: apartment living; house tenure longer than 25 years.

Source: (Best, Burke, & Nishitateno, 2019)

Reasons for Record Rooftop Solar adoption in 2020

- Across Australia almost 3GW of solar capacity was installed by homeowners and small businesses in 2020, up 43% from 2019. COVID-19 proved to be a large driver behind this increase.
- With people spending less time commuting due to an increase in working from home and flexible working, many homeowners spent time and money working on home improvements, some of which included solar panels. COVID-19 restrictions also meant people couldn't leave their houses as much, resulting in even more time to work on their house as well as a bigger budget for such home improvements due to the money saved from not getting out and about as much.
- The increase in people working from home also led to larger energy consumption in the home. With most people working during the day, when solar panels are most effective, it makes solar panels a very attractive option to combat this increase in energy consumption.
- Another major factor in the strong uptake of solar installation is the cost of installation. This cost has been falling for the last decade, and 2020 was no exception with residential prices dropping 13.2% despite a decrease in the federal rebate available. With the savings due to solar panels covering the cost of installation in 2 to 4 years for most homeowners, it is again a very attractive option.

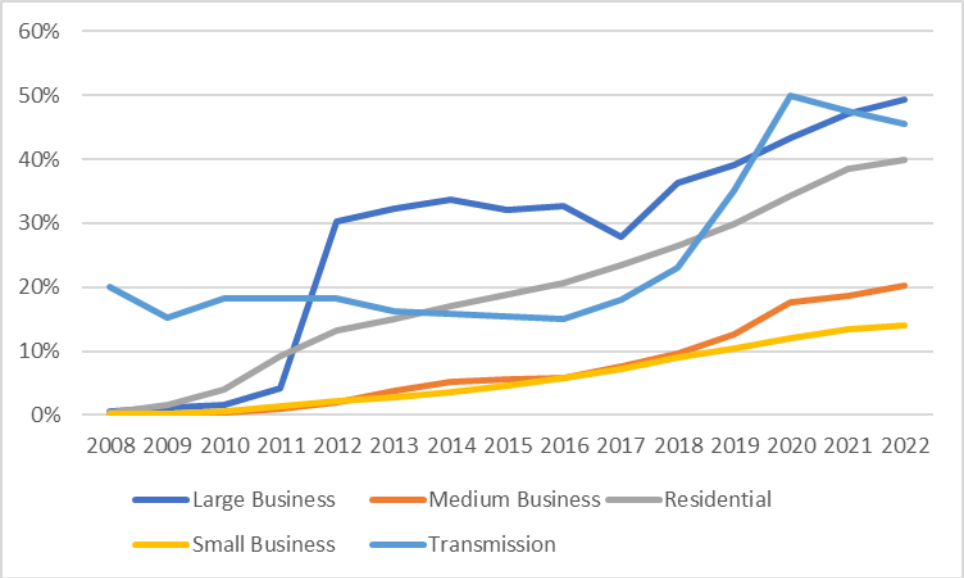
Source: (Sykes, 2021)

- In 2022, there has been a downturn in average residential PV installations. The average from January until July was 2,900 per month, falling from an average of 4,000 installations across the calendar years 2020-2021.

Figure 4-33 (next page) shows that DER adoption is growing across residential, transmission, large, medium and small business customer groups. In all groups, growth has continued, but may be slowing. Across all customer types, except for small businesses, the total adoption rate has exceeded 20% of active NMIs. Residential uptake of DER has slowed and currently sits at 40% of all customers, possibly due to ongoing supply chain constraints (Source: The Guardian[2]).

[2] https://www.theguardian.com/environment/2022/may/24/supply-chain-delays-and-steel-costs-are-part-of-perfect-storm-stalling-renewable-energy-growth

Figure 4-3: DER adoption by customer type as a proportion of segmented total customer numbers



4.3 COVID-19 Impact

The COVID-19 pandemic had several impacts as a result of emergency control measures to reduce the rate and extent of viral spread and the subsequent stimulus measures to reinvigorate economic activity.

Parts of the commercial customer base were impacted, such as:

- Hospitals (mainly elective surgery)
- Hotels, public bars, cinemas, restaurants.
- Tourist operators including airlines
- Temporary delay of construction activity.

There was also higher than normal consumption across the residential customer base.

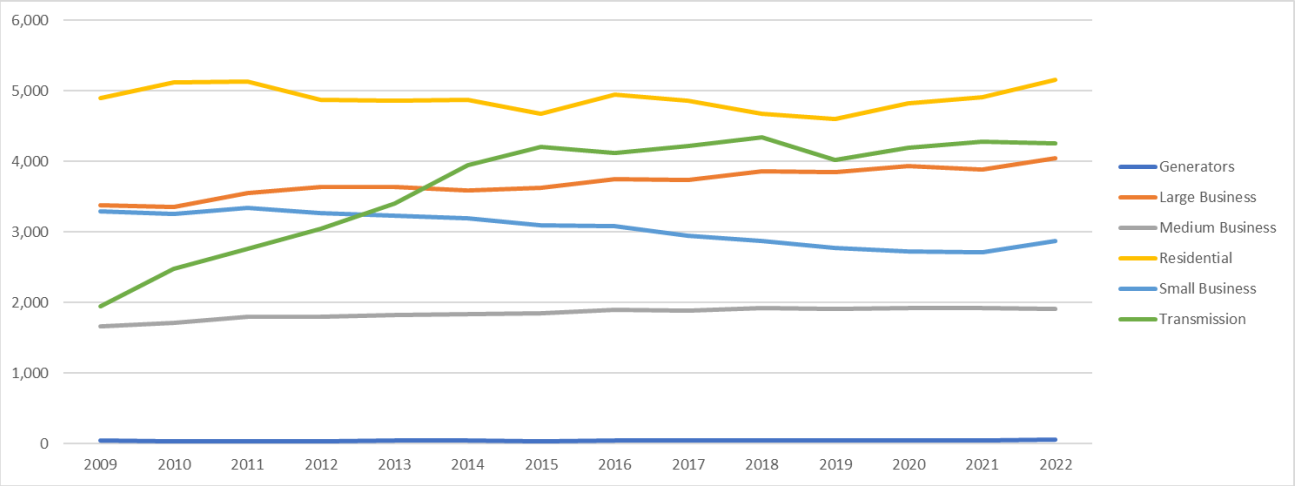
Despite disruption to normal economic activity, Western Australia registered growth of 1.1% for Gross State Product during FY2019-20[3], and grew by 2.6% in FY2020-21[4].

Overall, distribution electricity sales fared better than expected during the COVID-19 lockdown. The sharp increase from residential offset the decrease from small business in FY2019-20, which began to increase again in FY2020-21 and FY2021-22. Medium Business held at a similar level to previous years, Large Business trended higher, with transmission remaining stable.

[3] Western Australian economy resilient in the face of COVID-19, Wednesday, 2 September 2020; https://www.mediastatements.wa.gov.au/Pages/McGowan/2020/09/Western-Australian-economy-resilient-in-the-face-of-COVID-19.aspx

[4] https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release

Figure 4-4: Historic consumption by customer group



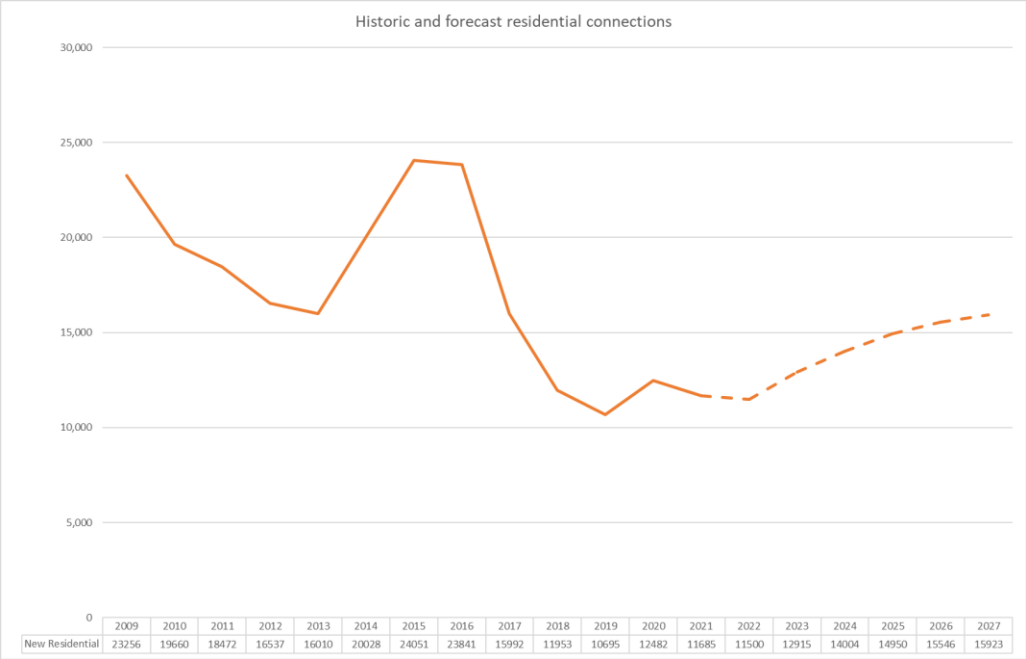
4.4 Forward-looking information

This section presents information about factors that are likely to influence trends in NMI count and export sales over the next two to five years.

4.4.1 Intelligence from WA Tomorrow

The WA Tomorrow population forecast indicates an average of 14.3k new residential NMI connections per year for 2022-2027, which is shown in

Figure 4-5: Residential connections forecast based on WA Tomorrow

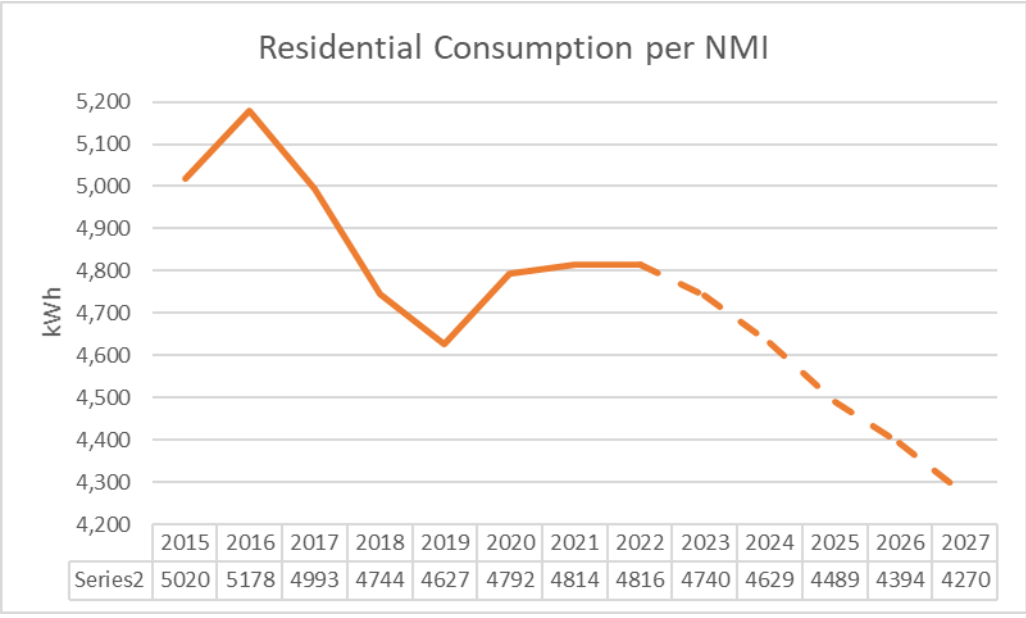


Source: Energy and Customer Numbers Forecast 2021.xlsx [EDM# 61726036]

4.4.2 Average Residential Consumption

Despite forecast annual average growth of 1.4% between FY2022-23 and FY2026-27 for residential NMIs, average residential consumption is expected to continue the recent downward trend, mainly due to the uptake of solar PV. By 2027, average annual residential consumption is forecast to trend down towards 4,000 kWh. Electric vehicle recharge demand could offset this downward trend to some degree, depending on the rate of adoption. See Figure 4-6.

Figure 4-6: Residential Consumption per NMI



5. Risk to forecast

This section presents information about the likely cause of material forecast error.

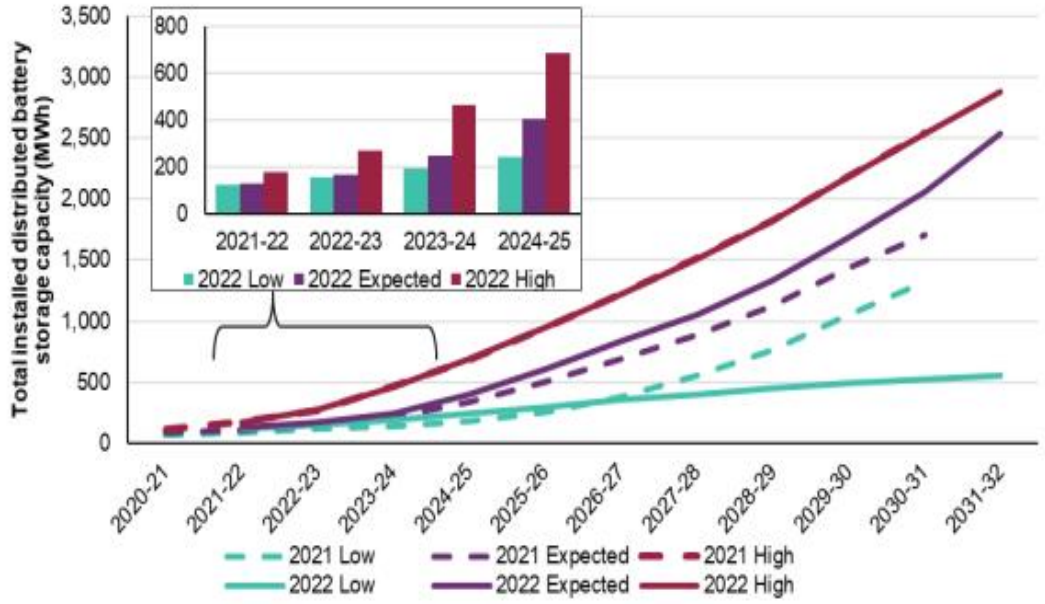
5.1.1 DER Adoption

DER adoption rates continue to increase across customer types. Commercial customer adoption rates appear to be slowing. Across all customer types, except small business, the total adoption rate has exceeded 20% of active NMIs. According to the current trend, residential DER adoption growth will slow and currently sits at 40%.

5.1.2 Battery Adoption

Although battery adoption is not an explicit driver in this forecast, it can significantly influence energy consumption. According to CSIRO's expected trajectory forecast published in AEMO's 2022 ESOO, there should be 1,058 MWh of storage capacity by FY2027-28, with 10% efficiency losses this becomes 952 MWh. A 40% utilisation of these batteries equates to 139GWh reduction in energy consumption per annum. Should there be a high uptake of battery storage as per CSIRO's modelling, there would be 1,510 MWh (1,359 GWh less efficiency losses) of storage capacity in FY2027-28. With 40% battery utilisation this equates to 198 GWh less energy consumed due to battery capacity.

Figure 5-1: Battery capacity on the SWIS (Source: 2022 AEMO ESOO)



A. Cumulative installed capacity forecasts account for degradation of battery performance over time. Data includes degradation of distributed battery storage capacity.
B. Inset plot only displays 2022 WEM ESOO forecasts.
Source: CSIRO and GEM.

5.1.3 New customer numbers

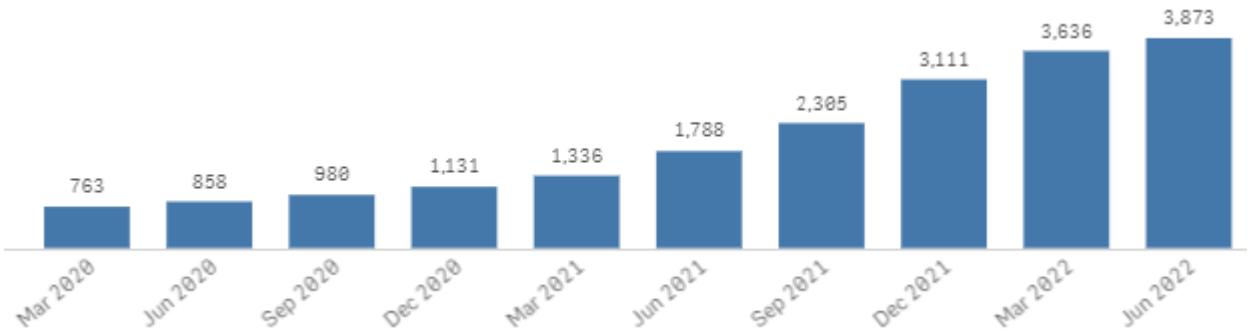
The number of new connections is of course a fundamental driver of all forecasts. There is always a risk that these numbers won't be as high as what is forecast (or potentially that they could be higher). Notable factors which could influence new customer numbers are economic including house prices, interest rates and national and international migration.

5.1.4 Electric vehicle adoption

Electric vehicle (EV) adoption has the potential to cause a large increase in electricity demand from the grid. The forecasts presented in this report exclude EV adoption as an explicit driver, however, should EV adoption follow CSIRO modelling (See Figure 5-3), the increase in energy consumption could be significant. With approximately 200,000 vehicles in the step change (expected scenario in 2023), 394 GWh would be consumed per annum.

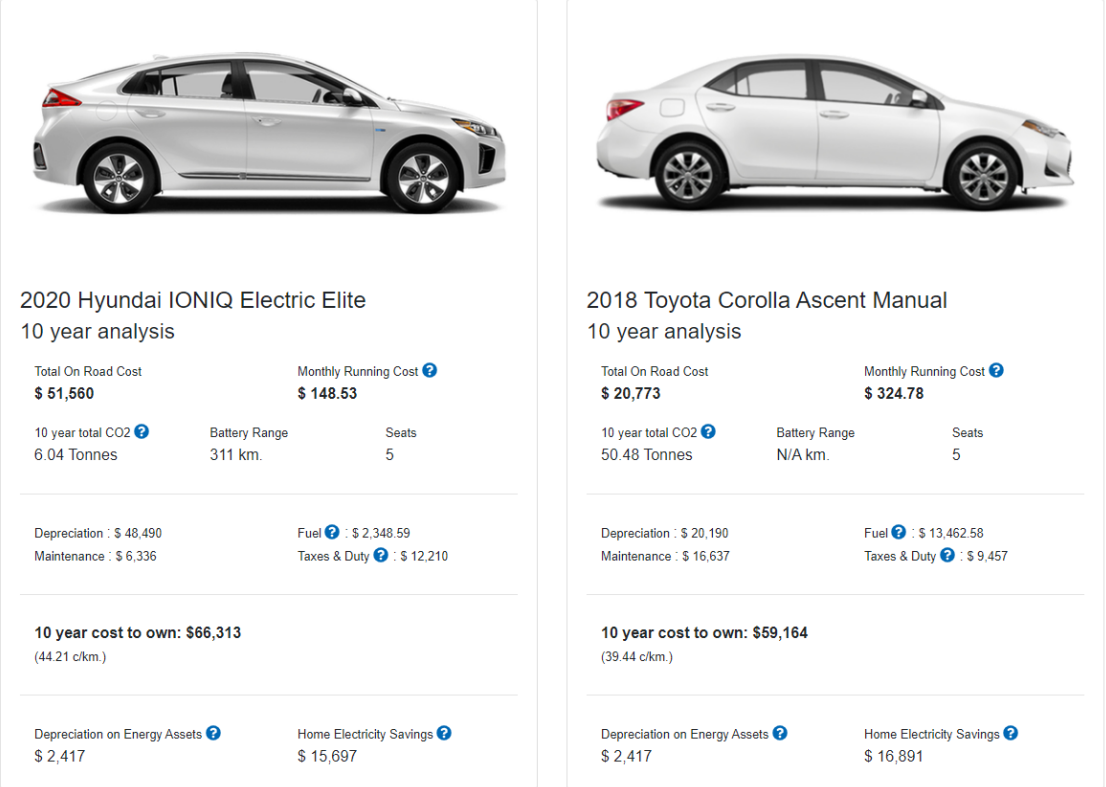
Figure 5-2: EV Registrations in WA show that as of June 2022 there were still only 3,873 electric vehicles (excluding plug-in hybrids) registered in WA.

Figure 5-2: EV Registrations in WA (excludes plug-in hybrids)



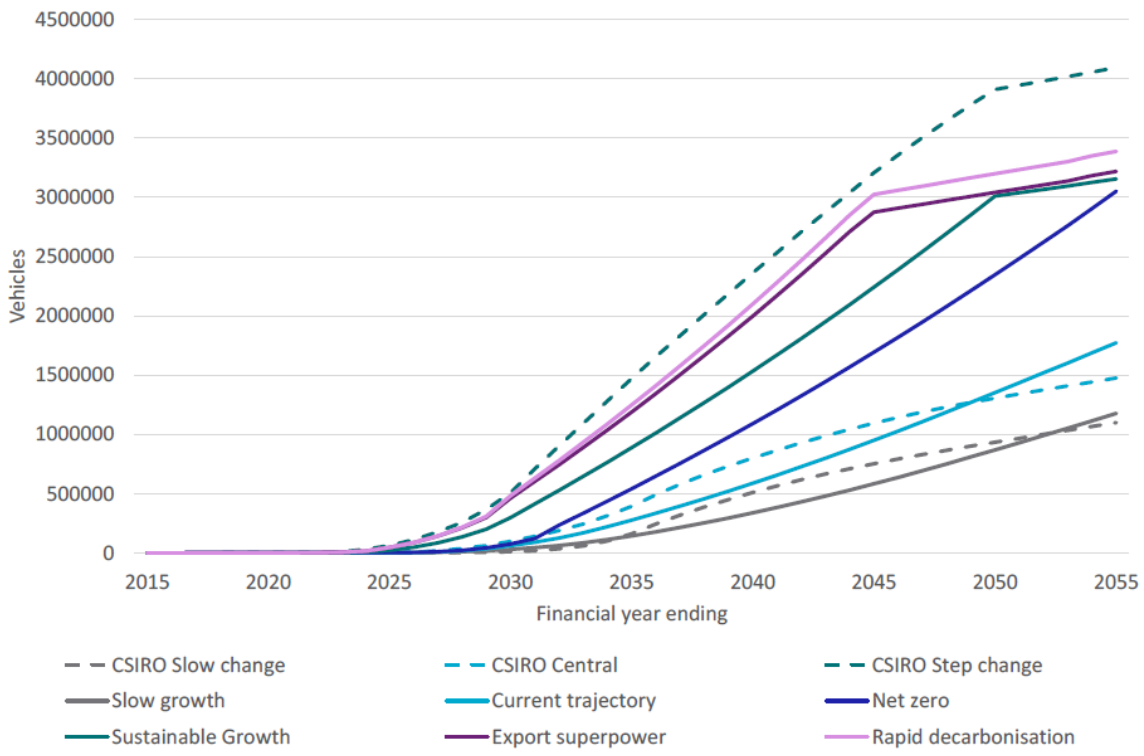
Additionally, the cost of owning an electric vehicle is still higher than that of a petrol or diesel car. Figure 5-3: EV vs Petrol Car Cost of Ownership Comparison shows that the 10 year cost of owning a Hyundai IONIQ is approximately $7,000 more than Toyota Corolla in WA (Total cost of ownership calculator, n.d.). This assumes driving 15,000 km a year, and a 7kW home solar system.

Figure 5-3: EV vs Petrol Car Cost of Ownership Comparison



Despite not being included in current the forecasts, the difference in cost of ownership is narrowing and it is important to be aware of some of the possible scenarios which could happen and cause significant deviation in electricity demand from the reference case. For example, Mitsubishi is promoting their Dendo Drive House concept which launched in Japan in 2019 (40 Year in Australia, 2020) and is currently undergoing a feasibility study in Australia (technology explained: https://www.youtube.com/watch?v=KhRSV0-5VP4). This technology would involve houses being equipped with solar panels and enabled with reverse charging capability where both home batteries and EVs could be used to store electricity during the day and then power homes at night for example. The idea of using an EV as a home battery creates a synergy between EV ownership and solar PV which could increase demand for EVs.

Figure 5-4: Number of EVs in SWIS (Source: CSIRO electric vehicle projections, May 2021 update)



The above projections are taken from May 2021 update from CSIRO. The new projections for EV are in flight and they are yet to be fully verified and assessed at this stage. It is important to note that additional industry and business decisions are required regarding the charging options and behaviours to determine impacts at right level for network forecasts.

One phenomenon to be aware of in relation to EVs is that a top down approach to forecasting is not always appropriate as highlighted in a case study of Ausgrid's Waverley and Wyong zone substations (Evenergi). Spatially allocating global electricity loads based on EV registration data is not satisfactory as EVs are somewhat unique amongst major electricity consumers in that they frequently move locations and consume electricity at different locations. The geographic distribution of these vehicles is also time dependent. If mass EV adoption does take place, it will be important to also consider the timing of the contribution from EVs to network peak demand, as whether such vehicles are charging or not is also time dependent.

6. References

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