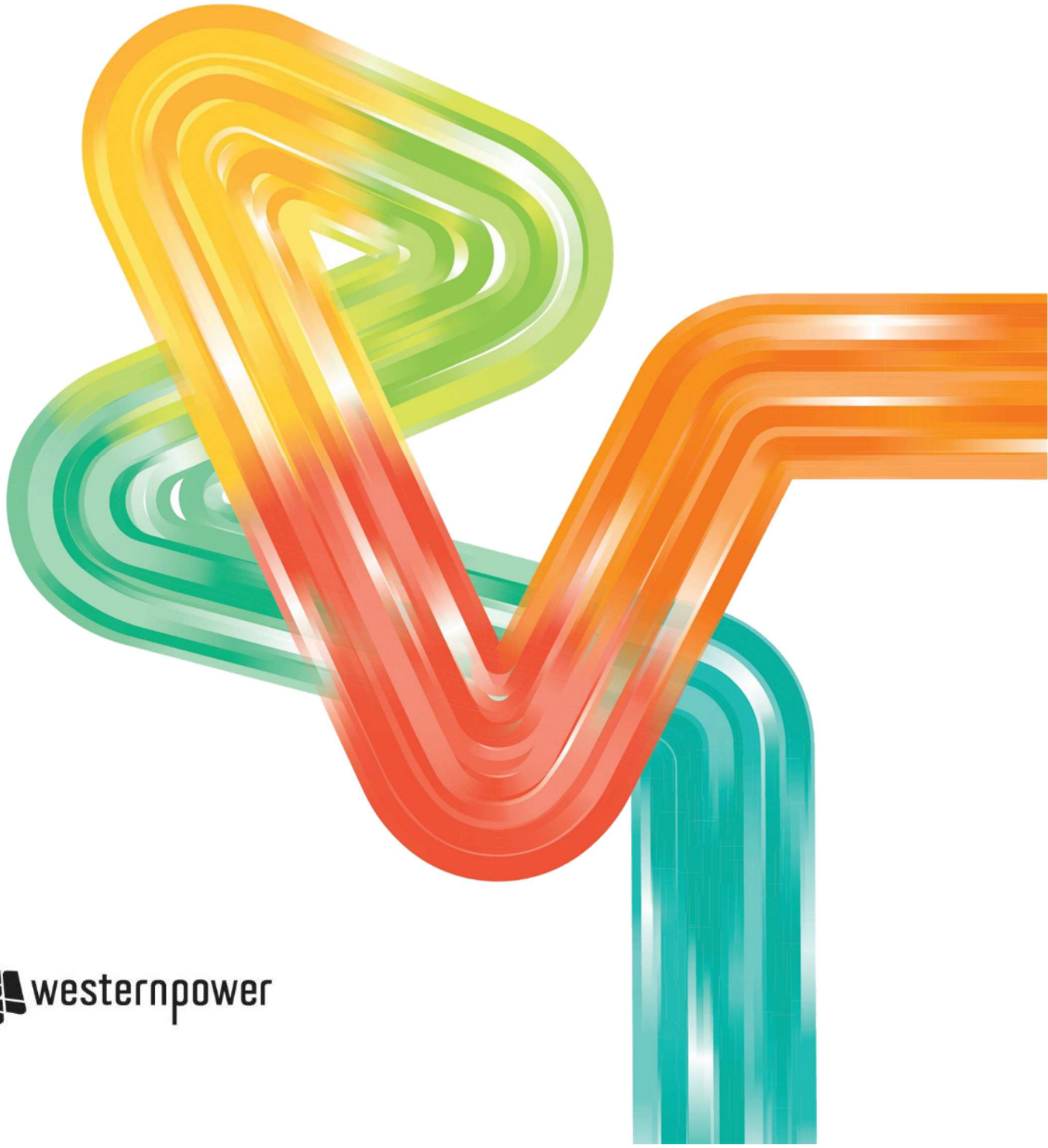
Attachment 7.5

Energy and Customer Number Forecast Report (2020)

Access Arrangement Information

1 February 2022



westernpower

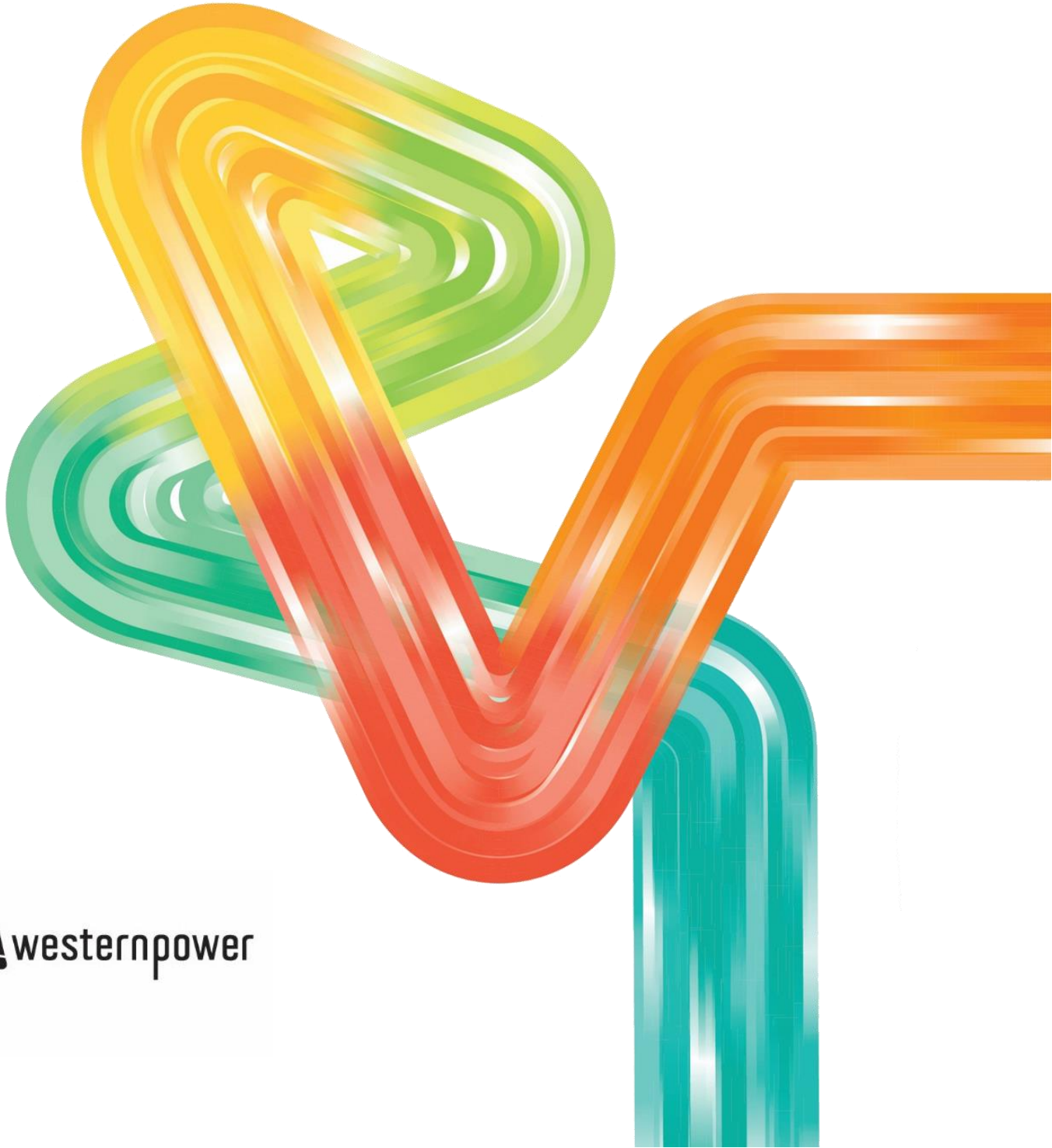
Energy & Customer Numbers Forecast

2020

Commercial-in-confidence

Protected

10 March 2021



westernpower

An appropriate citation for this paper is:

Energy & Customer Numbers Forecast

Western Power

363 Wellington Street
Perth WA 6000
GPO Box L921 Perth WA 6842

T: 13 10 87 | Fax: 08 9225 2660
TTY 1800 13 13 51 | TIS 13 14 50

Electricity Networks Corporation
ABN 18 540 492 861

enquiry@westernpower.com.au
westernpower.com.au

Enquiries about this report should be directed to:

Grant Coble-Neal

Principal Analyst
Telephone: 9326 4161
Email: grant.cobleneal@westernpower.com.au

Contents

List of tables

List of figures

1. Purpose

This report contains the Energy & Customer Numbers Forecast results and analysis for Finance and Metering and Regulation and Investment Assurance for budgeting and the tariff determination processes.

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)

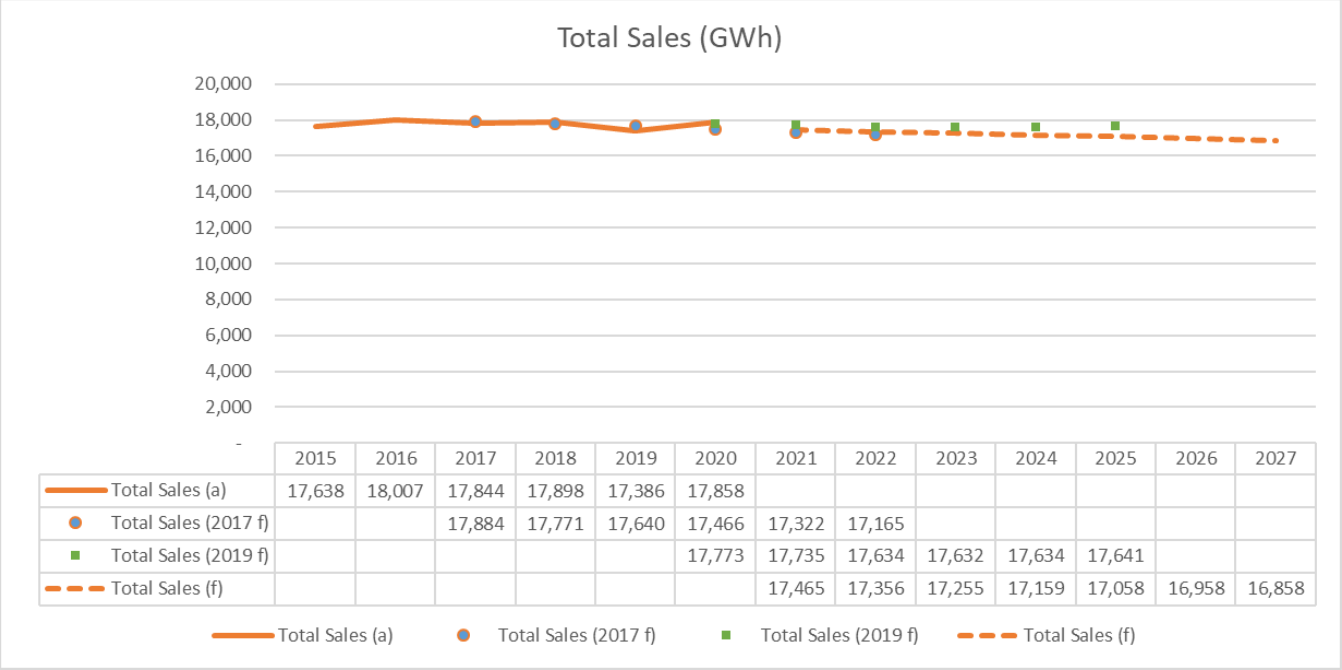
Every connection to the national electricity network is given its own NMI. That includes all types of metered and unmetered electricity connections, like homes, businesses, farms and streetlights.

The report also considers the prospects for electric vehicle adoption. Adoption levels are still very low with less than 1,000 registered electric vehicles operating with the Network License Area. At this stage, the impact of electric vehicles appears to be slight and likely to remain slight over the forecast period up to 2025.

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 in both the history and is more pronounced 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)	17,638	18,007	17,844	17,898	17,386	17,858							
Total Sales (2017 f)			17,884	17,771	17,640	17,466	17,322	17,165					
Total Sales (2019 f)						17,773	17,735	17,634	17,632	17,634	17,641		
Total Sales (f)							17,465	17,356	17,255	17,159	17,058	16,958	16,858

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

Notes:

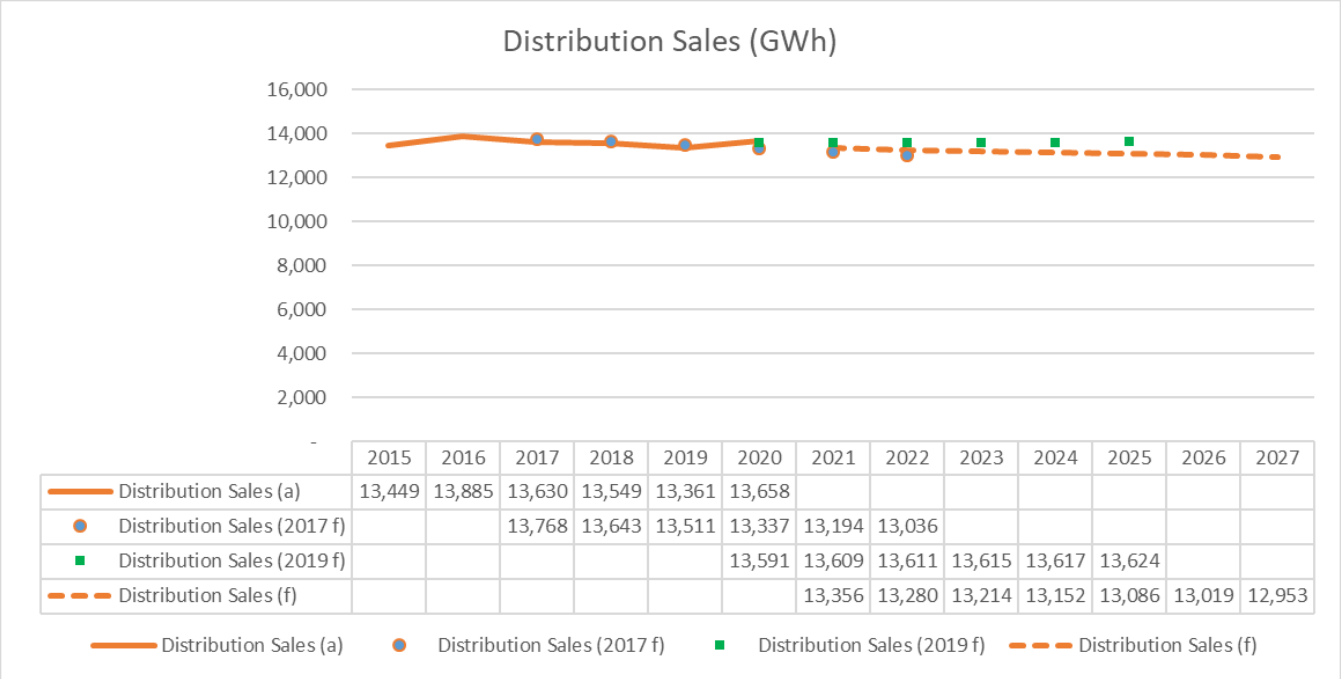
(1) Total Sales is defined as the sum of Distribution, Transmission Export Sales, Streetlights and Unmetered Supplies.

For reference and comparison purposes, the prior forecasts completed in 2017 and 2019 have demonstrated to be accurate.[2] Consequently, the 2020 update represents a slight revision.

[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.

[2] Note a 2018 forecast report is not available.

Figure 3-2: Distribution Sales forecast (GWh)



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Distribution Sales (a)	13,449	13,885	13,630	13,549	13,361	13,658							
Distribution Sales (2017 f)			13,768	13,643	13,511	13,337	13,194	13,036					
Distribution Sales (2019 f)						13,591	13,609	13,611	13,615	13,617	13,624		
Distribution Sales (f)							13,356	13,280	13,214	13,152	13,086	13,019	12,953

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

Notes:

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

The results confirm the 2017 Reference Forecast trend, which indicated a downward drift in Distribution Sales. 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
RT1	680,624	696,100	705,623	711,707	716,888	725,972
RT2	69,351	69,473	69,123	69,055	68,360	68,796
RT3	4,773	4,758	4,843	4,970	5,120	5,155
RT4	3,984	3,953	3,973	3,987	3,993	4,015
RT5	283	286	293	300	303	308
RT6	3,403	3,471	3,544	3,614	3,650	3,667
RT7	266	270	275	276	280	278
RT7Z	18	18	20	20	19	19
RT8	56	56	56	57	54	54
RT11	25	24	23	23	25	25
RT13	278,366	286,456	292,379	297,732	302,625	316,420
RT14	2,097	2,126	2,155	2,153	2,145	2,144
RT15	10,126	10,132	10,184	10,245	10,266	10,264
RT16	701	716	730	747	749	747
RT17	15,565	16,376	17,198	17,437	17,644	18,306
RT18	5,205	5,338	5,481	5,619	5,723	5,852
RT19	138	142	147	147	149	150
RT20	6,010	6,098	6,190	6,284	6,362	6,390
RT21	1	1	1	1	1	1
RT22	25	28	30	31	34	38
Other	88	57	40	37	30	14
RT9	237,378	262,967	267,553	270,622	273,508	275,857
RT10	14,074	15,909	16,904	19,881	19,457	19,273
Distribution Total	**1,332,557**	**1,384,755**	**1,406,765**	**1,424,945**	**1,437,385**	**1,463,745**
TRT1	41	41	40	40	40	40
Total	**1,332,598**	**1,384,796**	**1,406,805**	**1,424,985**	**1,437,425**	**1,463,785**

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

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	2021	2022	2023	2024	2025
RT1	497,598	300,141	191,901	84,024	-
RT2	69,193	69,250	69,306	69,362	69,417
RT3	5,251	5,324	5,402	5,483	5,564
RT4	4,031	4,034	4,037	4,041	4,044
RT5	306	306	306	306	306
RT6	3,658	3,766	3,877	3,988	4,099
RT7	277	277	277	277	277
RT7Z	19	19	19	19	19
RT8	54	55	57	59	60
RT11	-	-	-	-	-
RT13	320,745	325,761	331,168	336,734	342,301
RT14	2,151	2,153	2,154	2,156	2,158
RT15	10,459	10,623	10,800	10,983	11,165
RT16	749	750	751	751	752
RT17	260,459	469,286	589,776	710,267	806,905
RT18	5,870	5,875	5,879	5,884	5,889
RT19	151	151	152	152	153
RT20	6,413	6,418	6,423	6,428	6,433
RT21	1	1	1	1	1
RT22	38	38	38	38	38
Other	15	15	15	15	15
RT9	280,203	285,718	291,661	297,781	303,901
RT10	19,278	19,278	19,278	19,278	19,278
Distribution Total	**1,486,918**	**1,509,239**	**1,533,280**	**1,558,027**	**1,582,774**
TRT1	40	40	40	40	40
Total	**1,486,958**	**1,509,279**	**1,533,320**	**1,558,067**	**1,582,814**

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

Notes:

(3) Historical NMI count reported as at June each year
(4) Other refers to active NMIs that are not yet allocated to a tariff
(5) All RT1 NMIs are assumed to have been reclassified to RT17 by 2025
(6) Generators (RT11) have not been included in this forecast

Table 3.3: Historical Export sales by tariff (GWh)

Tariff	2015	2016	2017	2018	2019	2020
RT1	3,346 GWh	3,518 GWh	3,464 GWh	3,347 GWh	3,329 GWh	3,502 GWh
RT2	739 GWh	722 GWh	679 GWh	652 GWh	619 GWh	611 GWh
RT3	34 GWh	34 GWh	32 GWh	31 GWh	31 GWh	32 GWh
RT4	362 GWh	356 GWh	338 GWh	331 GWh	320 GWh	318 GWh
RT5	579 GWh	608 GWh	613 GWh	642 GWh	670 GWh	687 GWh
RT6	1,728 GWh	1,783 GWh	1,773 GWh	1,807 GWh	1,809 GWh	1,818 GWh
RT7	2,587 GWh	2,667 GWh	2,641 GWh	2,724 GWh	2,722 GWh	2,786 GWh
RT7Z	467 GWh	474 GWh	482 GWh	497 GWh	456 GWh	461 GWh
RT8	198 GWh	196 GWh	184 GWh	187 GWh	173 GWh	167 GWh
RT11	3 GWh	2 GWh	2 GWh	6 GWh	7 GWh	5 GWh
RT13	1,583 GWh	1,686 GWh	1,639 GWh	1,558 GWh	1,506 GWh	1,566 GWh
RT14	41 GWh	39 GWh	35 GWh	31 GWh	29 GWh	28 GWh
RT15	61 GWh	63 GWh	59 GWh	56 GWh	55 GWh	57 GWh
RT16	114 GWh	114 GWh	111 GWh	108 GWh	104 GWh	103 GWh
RT17	99 GWh	106 GWh	106 GWh	105 GWh	105 GWh	109 GWh
RT18	433 GWh	427 GWh	409 GWh	404 GWh	387 GWh	386 GWh
RT19	9 GWh	10 GWh	10 GWh	10 GWh	10 GWh	10 GWh
RT20	906 GWh	916 GWh	881 GWh	871 GWh	848 GWh	824 GWh
RT21	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT22	2 GWh	2 GWh	2 GWh	1 GWh	1 GWh	1 GWh
Other	3 GWh	2 GWh	1 GWh	1 GWh	0 GWh	0 GWh
RT9	124 GWh	129 GWh	129 GWh	130 GWh	131 GWh	135 GWh
RT10	32 GWh	33 GWh	39 GWh	49 GWh	49 GWh	51 GWh
Distribution Total	**13,449 GWh**	**13,885 GWh**	**13,630 GWh**	**13,549 GWh**	**13,361 GWh**	**13,658 GWh**
TRT1	4,189 GWh	4,122 GWh	4,215 GWh	4,349 GWh	4,025 GWh	4,200 GWh
Total	**17,638 GWh**	**18,007 GWh**	**17,844 GWh**	**17,898 GWh**	**17,386 GWh**	**17,858 GWh**

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

Notes:

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

Table 3.4: Forecast Export sales by tariff (GWh)

Tariff	2021	2022	2023	2024	2025
RT1	2,328 GWh	1,361 GWh	850 GWh	364 GWh	0 GWh
RT2	572 GWh	555 GWh	537 GWh	519 GWh	501 GWh
RT3	32 GWh	31 GWh	31 GWh	30 GWh	30 GWh
RT4	309 GWh	300 GWh	290 GWh	280 GWh	271 GWh
RT5	677 GWh	683 GWh	684 GWh	686 GWh	687 GWh
RT6	1,773 GWh	1,807 GWh	1,835 GWh	1,862 GWh	1,887 GWh
RT7	2,692 GWh	2,713 GWh	2,719 GWh	2,724 GWh	2,729 GWh
RT7Z	447 GWh	451 GWh	452 GWh	452 GWh	453 GWh
RT8	162 GWh	165 GWh	168 GWh	170 GWh	173 GWh
RT11	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT13	1,554 GWh	1,531 GWh	1,521 GWh	1,514 GWh	1,505 GWh
RT14	27 GWh	26 GWh	25 GWh	24 GWh	23 GWh
RT15	56 GWh	55 GWh	54 GWh	54 GWh	54 GWh
RT16	101 GWh	98 GWh	95 GWh	92 GWh	89 GWh
RT17	1,245 GWh	2,154 GWh	2,638 GWh	3,101 GWh	3,440 GWh
RT18	386 GWh	375 GWh	363 GWh	350 GWh	338 GWh
RT19	10 GWh	10 GWh	9 GWh	9 GWh	9 GWh
RT20	800 GWh	776 GWh	750 GWh	725 GWh	700 GWh
RT21	0 GWh	0 GWh	0 GWh	0 GWh	0 GWh
RT22	1 GWh	1 GWh	1 GWh	1 GWh	1 GWh
Other	1 GWh	1 GWh	1 GWh	1 GWh	1 GWh
RT9	134 GWh	138 GWh	140 GWh	143 GWh	146 GWh
RT10	50 GWh	50 GWh	50 GWh	50 GWh	50 GWh
Distribution Total	**13,356 GWh**	**13,280 GWh**	**13,214 GWh**	**13,152 GWh**	**13,086 GWh**
TRT1	4,109 GWh	4,077 GWh	4,042 GWh	4,007 GWh	3,972 GWh
Total	**17,465 GWh**	**17,356 GWh**	**17,255 GWh**	**17,159 GWh**	**17,058 GWh**

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

Notes:

(9) Historical NMI count reported as at June each year
(10) Other refers to active NMIs that are not yet allocated to a tariff
(11) All RT1 NMIs are assumed to have been reclassified to RT17 by 2025
(12) Generators (RT11) have not been included in this forecast

4. Analysis

This section presents contextual information and insight relating to the observed trends presented in the previous section. The main trend determining factors are:

- Cyclical downturn in housing construction.
- Continued and accelerating adoption of DER across commercial and residential customers.

A brief analysis of the COVID-19 impact is also presented.

4.1 Deceleration of connection growth (2015-2019)

There is an historic average of 19k new residential NMIs per year for 2008-2020.

- From 2015 to 2019, there was a substantial slowdown in new residential NMIs with a rebound in 2020.
- In 2020, new dwelling purchase by owner occupier (+2.2%) due to strong demand for house construction driven by the combined value of $45,000 of housing grants available from the Federal and Western Australian governments (source: ABS).

There is an average of 12k new residential NMIs per year forecast for 2021-2025.

- This implies that at least part of the 2020 rebound in houses completed is likely to be transitory and may reflect a 'bring forward' of first home buyer demand induced by government new housing incentives.

A key factor in the number of new residential NMIs going forward is likely to be whether Transitory or persistent housing construction rebound.

- Positive factors for continued housing growth are low interest rates, enhanced population growth (reflecting low rental vacancy rates).
- 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.
- 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 monthly exported sales decrease by approximately 30 kWh. In other words, without DER Western Power's annual export sales would be approximately 5% higher.[3]

[3] Note that total export sales lost is growing by approximately 0.3% per year.

Figure 4-1: Solar PV installed capacity

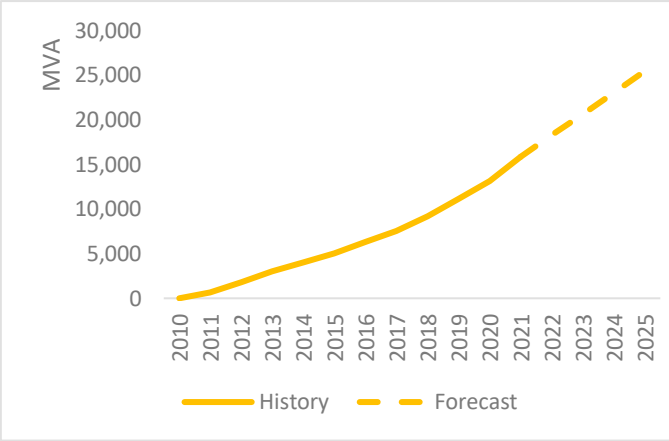
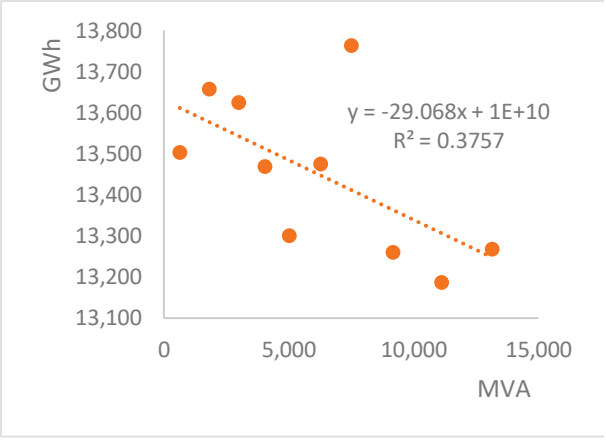


Figure 4-2: Installed DER capacity & export sales



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

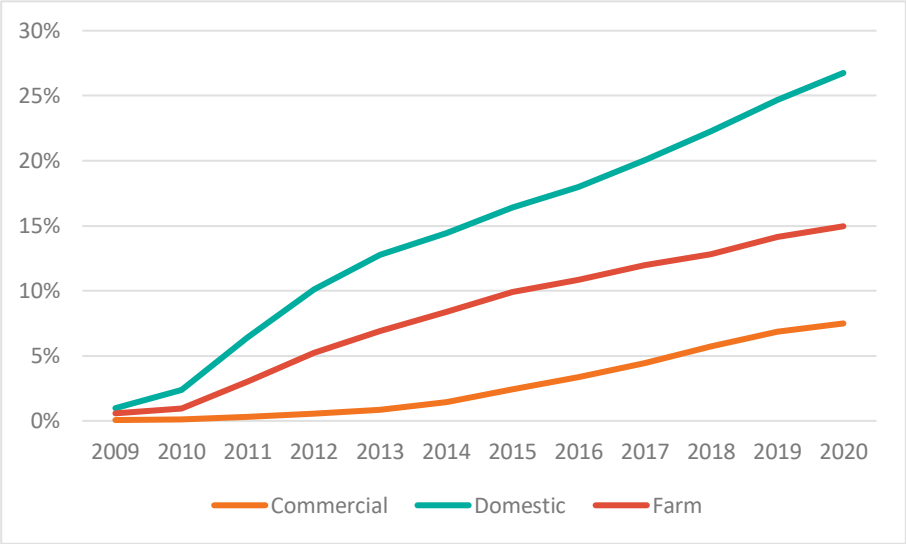
- Across Australia almost 3GW of solar capacity was installed by homeowners and small businesses in 2020, up 43% from 2019. COVID-19 proved to be a large driver behind this increase.
- With people spending less time commuting due to an increase in working from home and flexible working, many homeowners spent time and money working on home improvements, some of which included solar panels. COVID-19 restrictions also meant people couldn't leave there house 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)

Figure 4-33 (next page) shows that DER adoption is growing across Commercial, Farms and Residential customer groups. In all three groups, growth has continued, but may be slowing within the Commercial group. Across the three customer types, the total adoption rate has exceeded 25% of active NMIs. According to the current trend, Residential DER adoption could stabilise at a long-term steady state of 35%.[4]

[4] This assumes price and wealth effects remain the same.

Figure 4-3: DER adoption by customer type as a proportion to total customer numbers in each group



4.3 Impact of COVID-19

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. The key milestones and dates of the emergency control measures were:[5]

- State of Emergency declared, 13 March 2020
- Stage 1 Restrictions, 21 March 2020
- Stage 2 Restrictions, 29 March 2020
- Stage 3 Restrictions, 18 April 2020 (including schooling from home permitted)
- Resumption of elective surgery, 26 April 2020
- Phase 1 Easing, 28 April 2020
- Resumption of compulsory school attendance, 30 April 2020
- Phase 2 Easing, 16 May 2020
- Phase 3 Easing, 5 June 2020

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.

At the time of writing, the vaccination program was scheduled to begin in February 2021.

[5] https://ww2.health.wa.gov.au/-/media/Corp/Documents/Reports-and-publications/COVID19-in-Western-Australia/COVID19-in-WA-Bulleltin-1-Impact-on-Lifestyle.pdf

Despite disruption to normal economic activity, Western Australia registered growth of 1.1% for Gross State Product during FY2019-20.[6] During the first half of FY 2020-21, the State Government of Western Australia announced a $5.5 billion economic stimulus plan.[7] Key elements of the plan included:

- The $0.5 billion Building Bonus program, which provided grants of $20k per homebuilding construction project.
- Road and rail infrastructure construction projects
- A boost to vocational training programs.

The Building Bonus program will have the most direct impact on connection growth as well as Distribution Sales volumes.

The most likely impacts of the Building Bonus would be:

- Possible 'bring forward' home building demand in FY 2021-22 at the expense of housing construction in later years.
- Reversal of some of the home building project cancellations that occurred during the imposition of the COVID-19 emergency control measures.

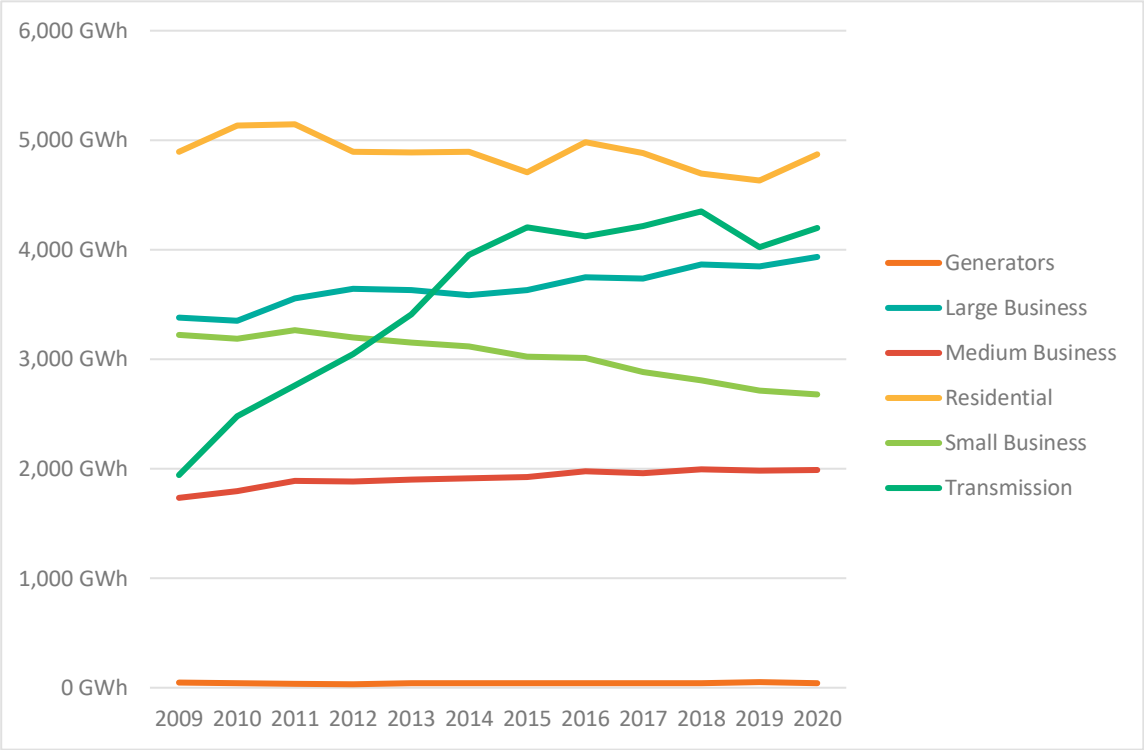
The effect would be a transitory acceleration of new connection growth in FY 2020-21 and a corresponding deceleration in FY 2021-22.

Overall, distribution electricity sales fared better than expected during the COVID-19 lockdown. The sharp increase from residential offset the decrease from small business. Medium Business held at a similar level to previous years, while large business and transmission also trended higher. All things considered electricity sales were much better than expected.

6 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

7 WA Recovery, 16 December 2020; https://www.wa.gov.au/government/wa-recovery

Figure 4-4: Historic consumption by customer group



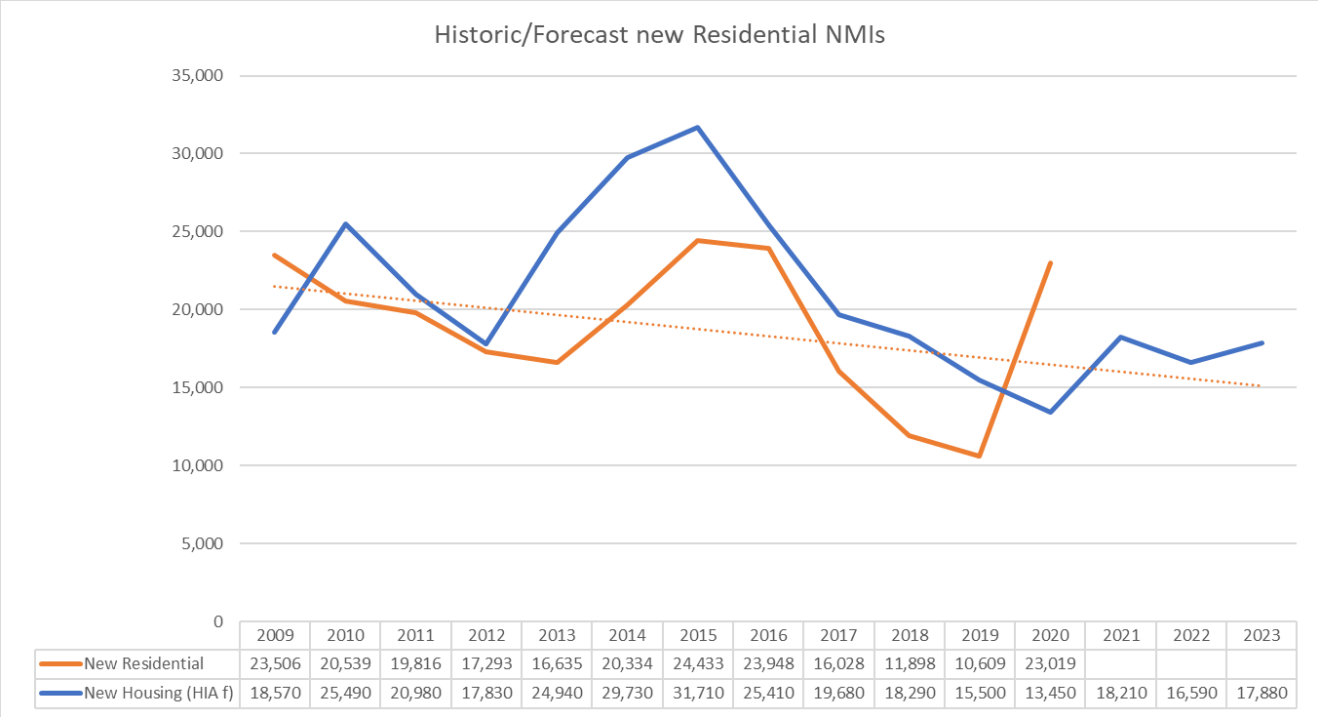
4.4 Forward-looking information

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 the Housing Institute of Australia

The Housing Institute of Australia (HIA) new home construction forecast indicates an average of 17.6k new homes per year for 2021-2023, which as shown in Figure 4-55 reflects the average of past new residential connections.

Figure 4-5: Comparison of new residential connections and HIA forecast



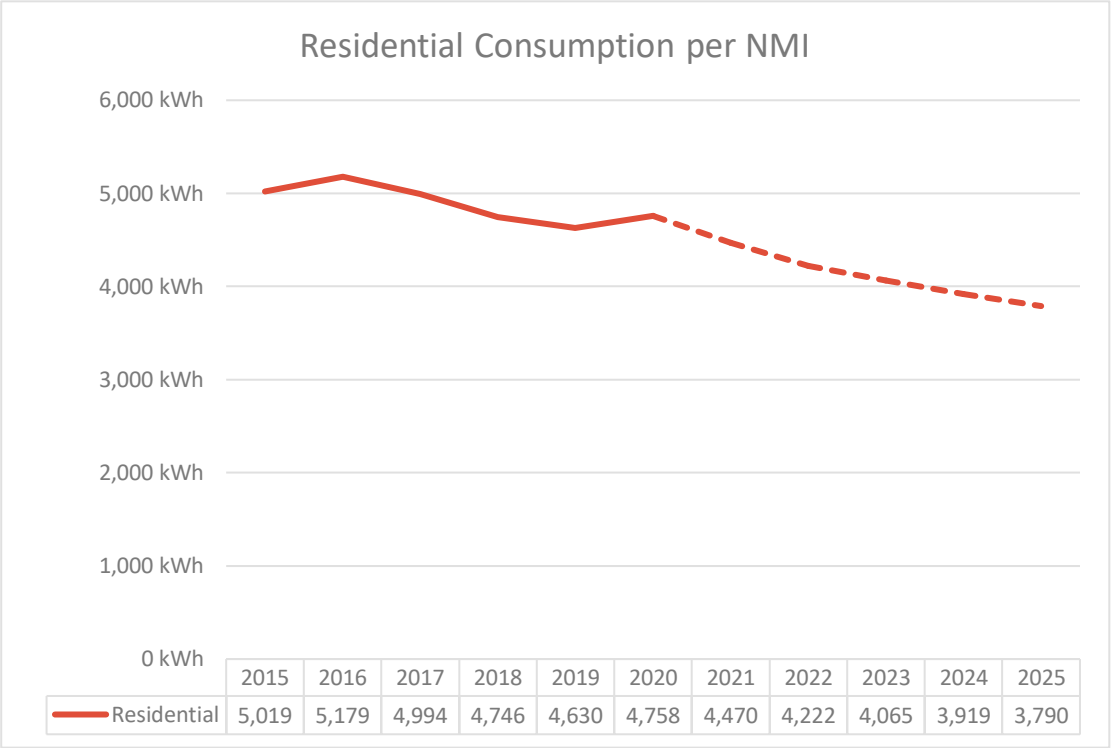
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
New Residential	23,506	20,539	19,816	17,293	16,635	20,334	24,433	23,948	16,028	11,898	10,609	23,019			
New Housing (HIA f)	18,570	25,490	20,980	17,830	24,940	29,730	31,710	25,410	19,680	18,290	15,500	13,450	18,210	16,590	17,880

Source: Energy and Customer Numbers Forecast 2020.xlsx [EDM# 55409628]

4.4.2 Average Residential Consumption

Despite forecast annual average growth of 1.9% for residential NMIs, average residential consumption is expected to continue the recent downward trend, mainly due to the uptake of solar PV. By 2024, average annual demand for homes is forecast to cross below 4,000 kWh. Electric vehicle recharge demand would offset this downward trend to some degree, depending on the rate of adoption. See Figure 4-6.

Figure 4-6: Residential Consumption per NMI



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	5,019	5,179	4,994	4,746	4,630	4,758	4,470	4,222	4,065	3,919	3,790

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 the three customer types, the total adoption rate has exceeded 25% of active NMIs. According to the current trend, the residential DER adoption could stabilise at a long-term steady state of 35%.

5.1.2 COVID-19 outbreak

At the time of writing there has been just a single case of community transmission of COVID-19 in WA in the last 11 months, and life has returned to relative normality. That being said, a single case of community transmission in February 2021 caused a 5-day snap lockdown of Perth and the Southwest, followed by 9 days of further restrictions. While things are currently under control in WA and Australia, relative to the rest of the world, things can change quickly, and the virus's unpredictable nature means it could have sudden impacts on electricity consumption without warning. Although the increase in residential electricity consumption during the 2020 lockdown largely balanced the decrease in small commercial consumption, there is no guarantee that this would be the case if any future outbreaks occurred, and deviation from the reference case in either direction would be possible.

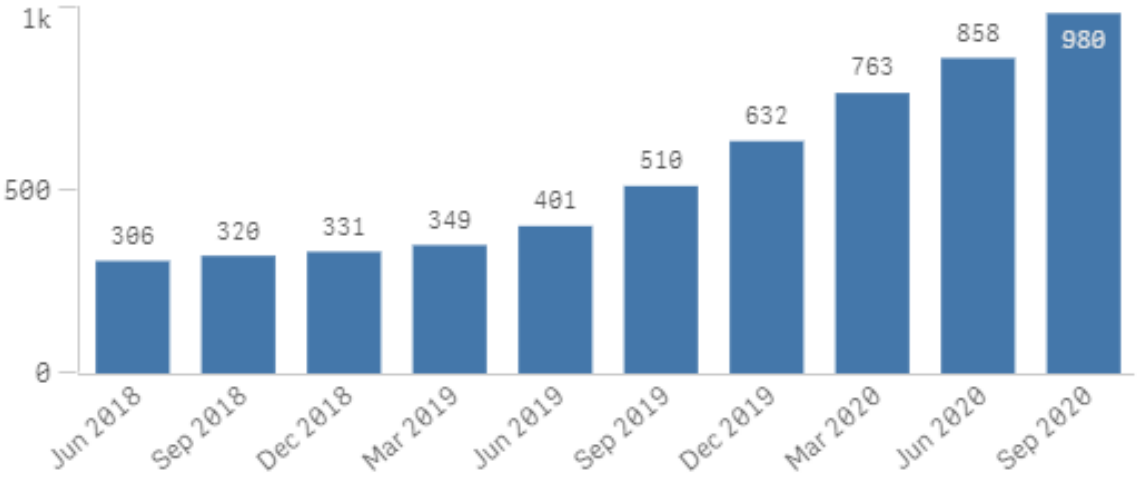
5.1.3 New customer numbers

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). This risk is exacerbated by the ongoing COVID-19 pandemic, internationally in particular. Currently, very few people are being allowed into Australia and there is a lot of uncertainty surrounding when this is likely to change. Naturally, this has had and continues to have a large negative impact on immigration which historically has been very strong. This in turn, could have an impact on new customer numbers/connections. Other factors which could influence new customer numbers are economic ones including house prices and interest rates.

5.1.4 Electric vehicle adoption

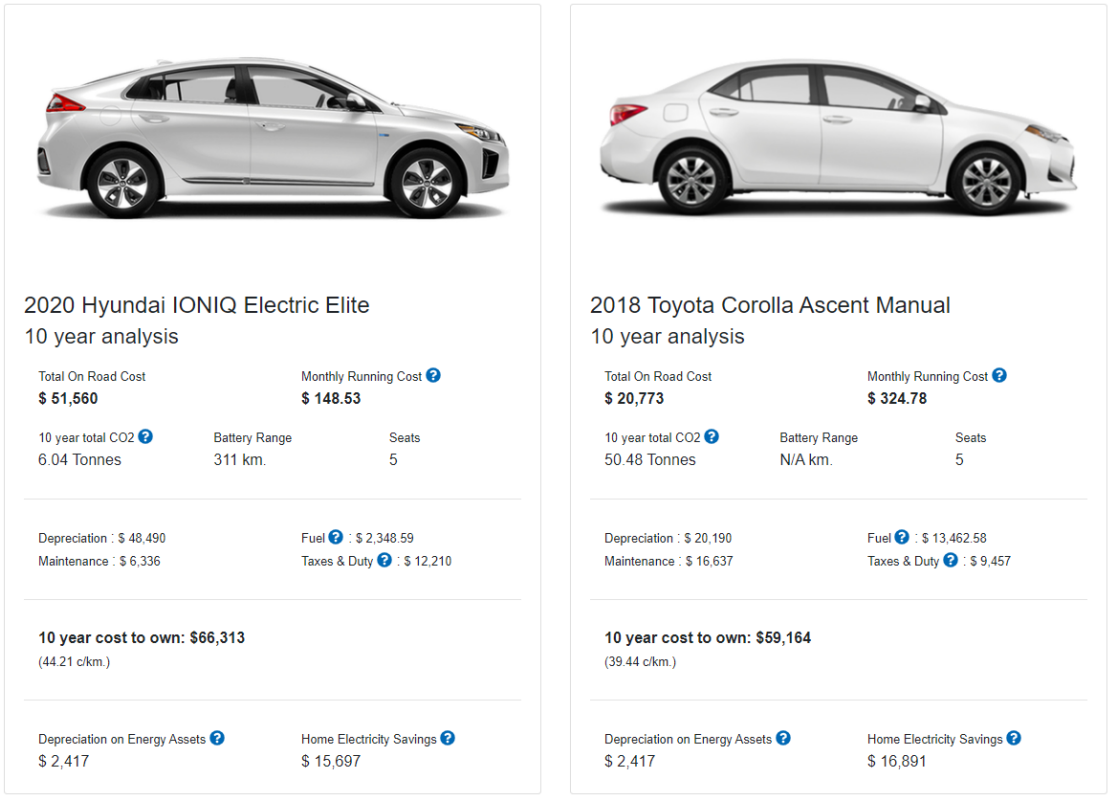
Electric vehicle (EV) adoption has the potential to cause a large increase in electricity demand from the grid. The forecasts presented in this report exclude EV adoption from the reference case and current alternative case. While it might be appropriate to consider another alternative case forecast which considers EV uptake, mass adoption has not yet started to occur, and the current level of EV ownership does not have a material impact on the grid. For this reason, it is not appropriate to include EV adoption in the reference case. Figure 5-1: EV Registrations in WA shows that as of September 2020 there were still only 980 electric vehicles (excluding plug-in hybrids) registered in WA.

Figure 5-1: 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 5-2: 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 5-2: 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.

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

(n.d.). Retrieved from NREL: https://www.nrel.gov/

Best, R., Burke, P. J., & Nishitateno, S. (2019). *Understanding the determinants of rooftop solar installation: evidence from household surveys in Australia.* Centre for Climate & Energy Policy. Canberra: Australian National University. Retrieved February 19, 2021, from https://ccep.crawford.anu.edu.au/sites/default/files/publication/ccep_crawford_anu_edu_au/2019-04/1902_0.pdf

Driscoll, W. (2020, September 8). Retrieved from PV Magazine: https://www.pv-magazine.com/2020/09/08/nrels-pv-cost-projections-plummet-in-new-forecast/

Sykes, J. (2021, March 1). *What is driving record rooftop solar volumes in Australia?* Retrieved from One Step Off The Grid: https://onestepoffthegrid.com.au/what-is-driving-record-rooftop-solar-volumes-in-australia/