AEMC

REVIEW

Australian Energy Market Commission

FINAL REPORT

2017 Residential Electricity Price Trends

18 December 2017

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About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

Box 1 Note on this year's report

The purpose of this 2017 residential electricity price trends report is to provide governments and consumers with an understanding of:

- the cost components of the electricity supply chain that contribute to the overall price paid by residential consumers
- the expected trends in each of the cost components and overall prices over the period from 2016/17 to 2019/20.

The prices presented in this report are specific to the 'representative consumer' and do not reflect the pricing outcomes for all residential consumers. The representative consumer is different for each jurisdiction and is determined using a representative annual consumption level either calculated from benchmark values published by the Australian Energy Regulator (AER) or provided to the Australian Energy Market Commission (AEMC) by state and territory governments.

This report does not provide, and should not be regarded as providing, forecasts of future prices, including those which are set by jurisdictional regulators or governments. The prices and trends in the report are based on information provided by jurisdictional governments, information in the public domain and modelling undertaken for the AEMC up to 8 November 2017.

It is important to note that the results are limited by the data used and the underlying assumptions made in determining costs, prices and trends. Information on prices in future years may differ from estimated outcomes as they are sensitive to uncertainties and changes in the factors that drive prices across the electricity supply chain. These include changes in:

- representative energy consumption by consumers across states and territories
- network costs following the finalisation of revenue determinations which remain the subject of ongoing regulatory or legal processes
- government policies, such as those related to jurisdictional environmental policy schemes
- jurisdictions reviewing their approaches to retail price deregulation or the setting of regulated prices.

Executive summary

This is the eighth annual residential electricity price trends report prepared by the Australian Energy Market Commission (AEMC) at the request of the Council of Australian Governments' (COAG) Energy Council. A copy of the terms of reference are available on the AEMC website.

The 2017 residential electricity price trends report (2017 report) identifies the current changes in the energy supply chain components that are driving costs and affecting the trends in residential electricity prices and bills for each state and territory of Australia from 2016/17 to 2019/20 (the reporting period). The four electricity supply chain components are:

- **network costs:** comprised of transmission and distribution costs, which account for around 40 to 55 per cent of the price
- **wholesale market costs:** which account for around 30 to 40 per cent of the price in most jurisdictions
- **environmental policy costs:** which directly account for around 5 to 15 per cent of the price
- **residual component**: which account for around 5 to 15 per cent of the price in most jurisdictions.

This report examines the different drivers of movements in each of the network, wholesale and environmental policy cost components. The residual component is derived by subtracting network, wholesale and environmental policy costs from the market or standing offer price. The residual component represents costs incurred by retailers, retail profit or loss and errors in the estimated value of all other supply chain cost components. It does not reflect nor is it meant to represent retail margins (either gross or net). The exception is Western Australia where the cost stack includes a retail cost component, which is equivalent to the regulated retail cost.

In most previous price tends reports the change in network costs has been the main driver of the change in estimated residential prices and bills. The 2016 report was different as it estimated that the change in residential prices and bills would be primarily driven by an increase in wholesale costs, following the retirements of the Northern (546 MW) and Hazelwood (1,600 MW) coal-fired power stations.

The 2017 report shows that the trends in residential electricity prices are primarily driven by wholesale electricity purchase costs in all jurisdictions. In the National Electricity Market (NEM), wholesale cost are expected to increase from 2016-17 to 2017-18 due to the retirements of Northern (546 MW), Hazelwood (1,600 MW) and Smithfield (171 MW) synchronous power stations and high gas prices and decrease in 2018-19 and 2019-20 due to new generation (approximately 4,100 MW across the NEM, of which 3,900 MW is renewable) and the return to service of Swanbank E (385 MW in

Queensland). The regulated network component continues to be uncertain in a number of jurisdictions due to ongoing legal and regulatory processes.

In Western Australia and the Northern Territory, estimated residential electricity prices and bills increase over the reporting period, primarily due to increasing wholesale costs.

The price trends identified in this report are not a forecast of actual prices, but rather a guide as to what may influence prices based on current expectations, assumptions and legislation. Actual price movements will be influenced by how retailers compete in the retail market, the outcomes of network regulatory processes and changes in legislation. The way these trends affect an individual consumer will depend on how that consumer uses electricity. This is particularly relevant as the consumption profiles of consumers become increasingly diverse within and across jurisdictions.

The NEM - a market in transition

The NEM is moving from predominantly large-scale synchronous generation to greater amounts of smaller, distributed and intermittent non-synchronous generation. Older coal-fired generators are retiring and more large-scale renewable generators have connected. This changing generation mix impacts the price and availability of electricity. This evolution has implications for future market design and regulatory frameworks, the dynamics of supply and demand and electricity price levels - both wholesale and retail.

The availability of electricity relates to the differing nature of the generators that are retiring and the new generation that is entering. The retiring generators generally provide stable levels of electricity into the market. In contrast, new generation, such as wind and solar, have limited control over the amount of electricity exported into the system as they are dependent on weather conditions. However, over time this new renewable generation may be developed in such a way as to also have the ability to provide relatively stable levels of generation - for example, the incorporation of battery storage with a wind farm.

Reviews of the energy sector and government energy policies and plans

A number of reviews of the energy sector have recently or continue to be carried out to examine and address issues that have arisen as a result of this transition currently underway. Significant work is being undertaken by governments, the COAG Energy Council, the Energy Security Board (ESB), the AEMC, Australian Energy Market Operator (AEMO) and the Australian Energy Regulator (AER) related to the transition, including developing a roadmap to implement recommendations from the Independent Review into the Future Security of the NEM (the Finkel Review).

In the mid- to long-term, outcomes of the work being undertaken, including changes in government policy, will impact on market dynamics including investment decisions, the supply and demand balance and the role of consumers in the market of the future. This will then flow through to price levels - either exerting upwards or downwards pressure on the various electricity supply chain cost components, depending on

circumstances and design of the mechanisms implemented. Due to the uncertain, unknown or long-term nature of any policies or mechanisms arising from those reviews, they have not been included in the modelling for this report at this time.

Effect of Large-Scale Renewable Energy Target (LRET)

The LRET has direct costs that are part of the environmental component, and additional effects on the wholesale electricity market. It is important to recognise its impact and how these impacts intersect with the other policies being considered and implemented in the market. This is particularly the case given the significant role that wholesale prices are currently playing in the market.

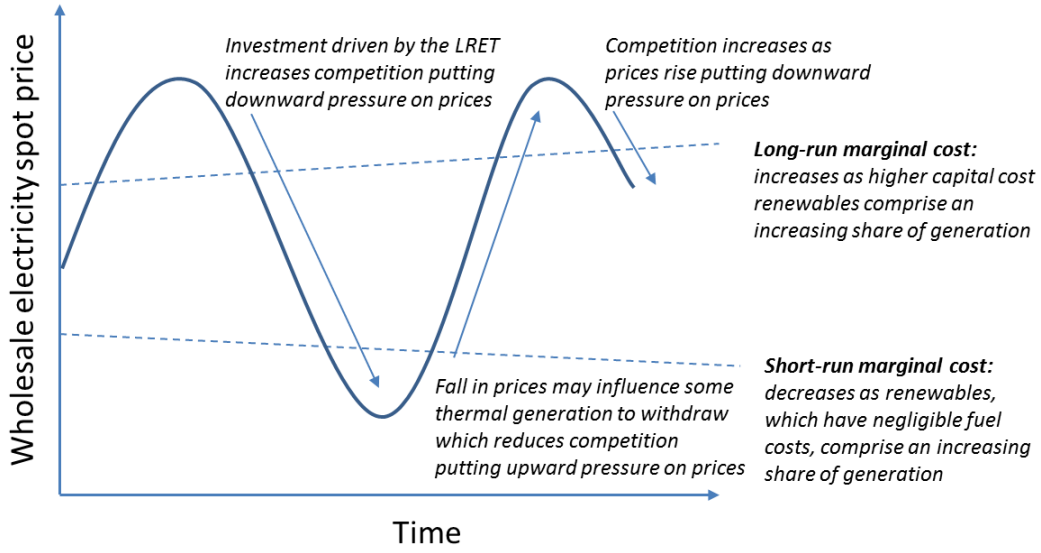
One element of the changing generation mix relates to the incentives created under the LRET and its current design. The design of the LRET creates an incentive for increased supply to enter the market, even where demand is flat or falling. This incentive is created through the revenue these generators receive from the scheme and outside the wholesale spot market. At the same time, these generators do not have the same incentives to provide hedging contracts to the market, compared to traditional generators. This is due to the revenue they receive under the scheme, but also because of the intermittent nature of the generation. Therefore, these generators in the short-term will exert downward pressure on wholesale prices. This will impact the medium to long-term financial viability of existing generators, such as coal-fired generators, and at the same time place upwards pressure on the price of hedging contracts due to the reduced supply.

Figure 1 shows the effect of the LRET on wholesale price dynamics over time. This involves:

- the entry of wind and solar generators, which have lower operating costs compared to coal and gas-fired generators and therefore reduce wholesale prices in the short-term
- over time, low wholesale costs mean some gas- and coal-fired generators may not recover their operating and maintenance costs, resulting in exit from the market
- to the extent the LRET contributes to generation exit, it will tighten the supply and demand balance, leading to higher wholesale prices.

This cycle has contributed to the recent high wholesale prices in the NEM. The LRET is also expected to contribute to the trend in wholesale costs over the reporting period, as shown in Figure 1.

Figure 1 **Effect of LRET on medium term wholesale electricity price dynamics**



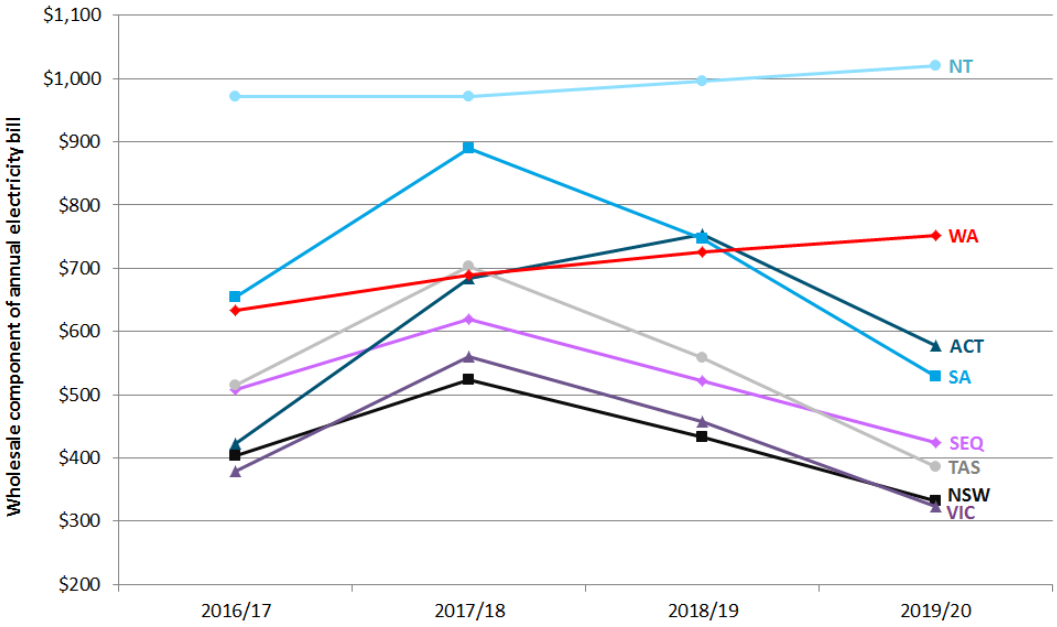
Source: Adapted from Grattan Institute

Key drivers of trends in residential electricity prices and bills

Wholesale costs primarily driving the overall trends in prices and bills

Figure 2 below shows the trends in wholesale cost component across jurisdictions over the period 2016/17 to 2019/20. The change in wholesale costs is the primary driver of the change in retail electricity prices and bills in all jurisdictions.

Figure 2 **Trends in wholesale component of representative residential annual electricity bill across jurisdictions**



Source: Frontier Economics and AEMC

In the NEM, wholesale costs are generally increasing from 2016/17 to 2017/18 and decreasing in 2018/19 and 2019/20. The increase from 2016/17 to 2017/18 is due to increasing gas prices or reduced supply from the following synchronous generators:

- the retirement of Northern coal power station (546 MW) in May 2016 and the Hazelwood coal power station (1,600 MW) in March 2017, which were large base load generators with low operating costs. The Smithfield gas power station (171 MW) is also expected to close in 2017/18
- Pelican Point gas-fired power station (239 MW) was mothballed in 2016/17 and was returned to service in 2017/18 although the increased gas prices increase its operating costs
- the withdrawal of the Tamar Valley gas power station (208 MW) in 2016/17.

The decrease in wholesale costs in the NEM in 2018/19 and 2019/20 is due to:

- approximately 4,100 MW of new committed and expected (modelled) generation entering the NEM in 2018/19 and 2019/20, the majority of which is renewable generation (3,900 MW).
- the return to service of the Swanbank E gas power station (385 MW) in early 2018
- reduced short-run costs for South Australian gas plants in 2019/20 due to the pass through of certificate revenue related to the Energy Security Target.

Of the 5,300 MW of new generation that is committed or expected (modelled) to enter the NEM over the period 2016/17 to 2019/20, the majority (4,900 MW) is renewable generation. In 2019/20, this 4,900 MW of new renewable generation is expected to represent around 10 per cent of generation capacity and 8 per cent of energy output in the NEM.

As outlined above, the LRET scheme design exerts downwards pressure on wholesale prices in the short-term (reporting period). In the medium-term it is expected to impact the financial viability of existing synchronous base load generators, placing upwards pressure on wholesale costs and increase price volatility.

In Western Australia, estimated residential electricity prices and bills increase over the reporting period, primarily due to increasing wholesale prices. This is due to higher gas prices and a switch in the generation mix from gas to coal, which results in higher capital costs but lower fuel costs.

In the Northern Territory, estimated residential electricity prices and annual bills increase over the reporting period, primarily due to increasing wholesale prices. The increase in wholesale costs up to 2018/19 reflects contractual arrangements for generation entered into for the period 2015-18. The increase in costs from 2018/19 to 2019/20 reflects an expected increase due to inflation.

Uncertain network cost trends remain in some jurisdictions

As per the 2016 report, the trend in the regulated network component remains uncertain in a number of jurisdictions due to ongoing legal and regulatory processes. Given the uncertainty around the potential outcomes of these legal and regulatory proceedings, the 2017 report has not speculated on the potential range of network cost outcomes over the reporting period. This is consistent with the approach applied in the 2016 report.

Environmental policy costs

Prior to 2017, a number of environmental policies had been introduced by Commonwealth and jurisdictional governments. In 2017, a number of new environmental schemes were introduced and one system security scheme was introduced in South Australia. Over the period 2016/17 to 2019/20, the direct costs associated with these policies are increasing in most jurisdictions. Aside from the direct costs, environmental schemes can also have additional effects on customer's bills through the impact they have on the wholesale electricity market.

In 2016/17, the direct costs of environmental policies are approximately 3 to 6 per cent of a typical residential electricity price, however they are higher in south east Queensland due to the Solar Bonus Scheme and in the ACT due to feed-in-tariff scheme costs. In 2017/18, environmental costs decrease in south east Queensland as the Queensland Government has moved charges associated with the Solar Bonus Scheme from distribution network prices to the Queensland Government budget.

Residential electricity prices and bills for the 'representative' consumer in each jurisdiction

The residential electricity prices and bills in this report are based on the representative consumer in each jurisdiction. Representative consumption levels, which have a major impact on price and bill outcomes, have changed in most jurisdictions.

In the 2016 report, representative consumption levels in most jurisdictions were developed based on data from the AER's 2014 Electricity Bill Benchmarks. In this 2017 report, representative consumption levels in most jurisdictions were developed based on data from the AER's 2017 Electricity Bill Benchmarks. This has led to a significant change in some representative consumption levels – for example, in New South Wales, the annual consumption level has decreased markedly as the representative consumer is now a dual-fuel customer.

Price levels in this report should not be directly compared between jurisdictions. This is due to two important things that have a direct impact on the prices in this report:

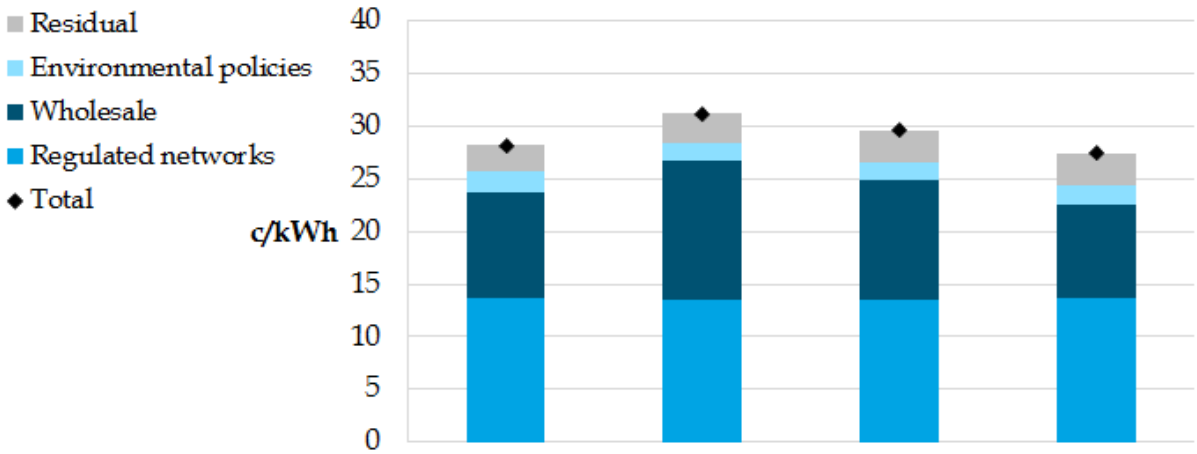
- the prices are specific to the representative consumer, which is different in each jurisdiction, and do not reflect the pricing outcomes for all residential consumers
- consumption levels are specific to the representative consumer, which are different for each jurisdiction as they depend on numerous factors including

weather, availability of gas and penetration of air-conditioning. Therefore, there can be significant variation in consumption levels between jurisdictions.

Trend in national summary residential electricity prices and bills

Residential electricity prices for each jurisdiction are weighted to determine nationally indicative price, bill and cost components. Due to this averaging process, the national trends are only indicative and may not reflect the actual costs faced by consumers in Australia. Figure 3 below shows the expected movements in the supply chain components nationally.

Figure 3 Trends in National summary supply chain components



	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Residual	**2.52**	**$116**	**2.87**	**$132**	**2.95**	**$135**	**3.03**	**$139**
Environmental policies	**2.01**	**$92**	**1.62**	**$74**	**1.78**	**$82**	**1.93**	**$89**
LRET	0.65	$30	0.76	$35	0.89	$41	1.03	$47
SRES	0.36	$17	0.32	$15	0.34	$15	0.32	$15
FIT Schemes	0.85	$39	0.37	$17	0.37	$17	0.39	$18
Other state schemes	0.15	$7	0.16	$7	0.19	$9	0.20	$9
Wholesale	**10.01**	**$460**	**13.23**	**$608**	**11.28**	**$518**	**8.81**	**$405**
Regulated networks	**13.63**	**$627**	**13.47**	**$619**	**13.57**	**$623**	**13.67**	**$628**
Transmission	2.48	$114	2.36	$108	2.36	$108	2.39	$110
Distribution	11.15	$512	11.11	$511	11.21	$515	11.28	$518
Total	**28.16**	**$1,294**	**31.19**	**$1,433**	**29.58**	**$1,359**	**27.45**	**$1,261**

On a national basis, residential electricity prices and bills are expected to increase from 2016/17 to 2017/18 and decrease in 2018/19 and 2019/20. This trend is primarily driven by wholesale costs, which follow this trend in south east Queensland, New South Wales, Victoria, South Australia and Tasmania, as shown in Figure 2. As this trend applies across most of the NEM, and a large proportion of Australian residential customers are in the NEM, it has a large effect on the national summary trend.

The national weighted average consumption level is 4,596 kWh per year. At this consumption level, the national average annual bill in 2016/17 is $1,294 exclusive of good and services tax (GST). It is noted that all prices and bills in this report are

exclusive of GST. However it is recognised that customers are required to pay GST, such that the retail electricity prices paid by representative customers would be 10 per cent higher than those presented in this report. Therefore, the annual bill for the national average representative consumer in 2016/17 is $1,424 inclusive of GST.

Table 1 provides a summary of key data and results from this report.

Table 1 Summary of key data by jurisdiction

	National weighted average	SE QLD	NSW	ACT	VIC	SA	TAS	WA	NT
% customers on offer type	-	52% on market offer	77% on market offer	77% on standing offer	90% on market offer	87% on market offer	Most on standing offers.	N/A (regulated)	N/A (regulated)
Representative consumption (kWh p.a)	-	5,240	4,215	7,151	3,865	5,000	7,908	5,198	6,613
Cost component proportion of retail electricity price in 2016/17									
Network	48.4%	47.2%	52.7%	41.1%	45.1%	41.8%	53.7%	48.7%	53.0%
Wholesale	35.5%	35.8%	34.5%	30.0%	34.2%	40.6%	28.1%	40.1%	57.1%
Environmental policy	7.1%	14.2%	6.0%	11.8%	5.9%	8.8%	5.6%	3.3%	3.6%
Changes in retail electricity prices over the reporting period									
Actual change from 2016/17 to 2017/18	↑ 10.8%	↑ 3.4%	↑ 10.2%	↑ 20.3%	↑ 15.9%	↑ 17.0%	↑ 2.0%	↑ 10.9%	↑ 0.5%
Estimated change from 2017/18 to 2018/19	↓ 5.2%	↓ 7.0%	↓ 5.8%	↑ 8.0%	↓ 6.6%	↓ 6.9%	↓ 5.2%	↑ 7.0%	↑ 2.5%
Estimated change from 2018/19 to 2019/20	↓ 7.2%	↓ 7.2%	↓ 7.3%	↓ 4.1%	↓ 9.7%	↓ 7.8%	↓ 7.9%	↑ 5.6%	↑ 2.5%

Note: Victoria increase is based on an estimated price for 2017/18. In Victoria retail prices generally change in January of each year.

Contents

1 Introduction

1.1 Purpose of the report

The Australian Energy Market Commission (the AEMC or Commission) prepares the price trends report at the request of the Council of Australian Governments' Energy Council (COAG Energy Council). Now in its eighth year, this report provides information to stakeholders on trends in the components of the electricity supply chain that impact residential electricity prices for each state and territory of Australia. The report covers the period from 2016/17 to 2019/20 (the reporting period).

The analysis of possible future price trends is based on assumptions and modelling of future costs. Therefore the information contained in this report should not be considered forecasts of either regulated prices set by jurisdictional regulators, government-set prices, or of prices offered by retailers in the competitive market.

1.2 COAG Energy Council terms of reference

In accordance with the terms of reference set by the COAG Energy Council,[1] this report describes and analyses:

- the trends in residential retail electricity prices for each year from 2017/18 to 2019/20, using 2016/17 as the base year
- the breakdown of the supply chain components that contribute to residential retail electricity prices.

The analysis is presented separately for each state and territory, as well as in aggregate to create a national summary. The results are based on representative residential consumption levels for each state and territory.[2]

Where available both standing offer[3] and market offer[4] price trends are reported. Prices are expressed in cents per kilowatt (c/kWh) and as an annual bill amount for the representative consumer. Prices in c/kWh and annual bills are sensitive to the consumption level of the representative consumer, which differs between

1 A copy of the terms of reference can be found on the project page for the 2017 Residential Electricity Price Trends Report on the AEMC website.

2 Consumption levels were either calculated from benchmark values published by the AER, or provided directly by state and territory governments. Consumption levels reflect the annual electricity consumption of a representative consumer for each jurisdiction.

3 Standing offer contracts are basic electricity contracts with terms and conditions regulated by law. For further information refer to Appendix A.

4 Market offer contracts are electricity contracts determined by retailers in the competitive market. They must contain a regulated set of minimum terms and conditions. For further information refer to Appendix A.

jurisdictions.[5] All prices are in nominal terms and are exclusive of Goods and Services Tax (GST).

1.3 Supply chain components

In this report, the supply chain cost components have been grouped into the following segments:

- **regulated network sector:** the regulated network sector includes transmission network service providers (TNSPs) and distribution network service providers (DNSPs) who provide the necessary infrastructure to enable the power system to operate as a connected system. Networks provide the secure integration of the power system and link power stations to the end users who consume electricity. Regulated network costs are costs associated with building and operating the network, including a return on capital and metering costs. These costs are regulated by the Australian Energy Regulator (AER) in the National Electricity Market (NEM) and the Northern Territory, and the Economic Regulation Authority (ERA) in Western Australia.

- **wholesale electricity market sector:** these costs include retailer's contracting costs, purchases from the spot market, ancillary services, market fees and energy losses from transmission and distribution networks.

- **environmental policies:** these costs are related to policies introduced by Commonwealth or state and territory governments. There are a number of environmental policies that directly affect the electricity markets and whose costs are directly recoverable from consumers through their electricity bill. These include the Renewable Energy Target (RET),[6] various state and territory feed-in-tariff (FiT) schemes and energy efficiency schemes. Some of these policies may have additional effects on the wholesale electricity market.

- **system security policy:** these costs relate to the one system security policy, the Energy Security Target, that was introduced by the South Australian government and only applies in South Australia. Therefore, in South Australia this supply chain component is referred to as environmental and system security policies. This policy may have additional effect on the wholesale electricity market.

- **residual component:** this component captures all of the costs that arise from retailing electricity and marketing to consumers, the return to owners of the retailer for investing in the business, as well as any errors in the estimation of any of the costs associated with the other components. It should be noted for the

5 For more information, refer to Appendix A.

6 The RET is comprised of the Large-scale Renewable Energy Target (LRET) and the Small-scale renewable energy scheme (SRES)

purpose of this Price Trends reports, this residual amount does not necessarily reflect a retail margin.[7].

1.4 Structure of the report

This report is structured as follows:

- chapter 2 provides a discussion of changes in the electricity market since the publication of the 2016 Residential Electricity Price Trends report
- chapter 3 outlines the economic regulation of electricity network businesses, and network price trends, including a discussion of the uncertainty in network price trends in some jurisdictions
- chapter 4 provides a summary of the factors and developments that are likely to influence movements in wholesale electricity costs
- chapter 5 provides a discussion and summary of the various environmental and system security policies enacted by Commonwealth and state and territory governments which may have direct impact on the prices paid by residential electricity consumers over the reporting period
- chapter 6 outlines how the residual component is derived. In this report, the residual component applies in all jurisdictions except Western Australia.

Appendices:

- appendix A provides the methodology used for this 2017 Residential Electricity Price Trends report
- appendix B to J provide detailed jurisdictional results for each state and territory and a national summary.

7 For a discussion on retail pricing and margins in the NEM see the AEMC, *2017 Retail Energy Competition Review report*, 25 July 2017, available on the AEMC's website: http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Retail-Energy-Competition-Review

2 Changes in the energy landscape

Box 2.1 Key findings

- The National Electricity Market (NEM) is undergoing a period of transition moving from predominantly large-scale synchronous generation to greater amounts of smaller, distributed and intermittent non-synchronous generation. This evolution has implications for the future market design and regulatory frameworks, the dynamics of supply and demand and electricity price levels - both wholesale and retail.
- Significant work is being undertaken by governments, the COAG Energy Council, the Energy Security Board (ESB), the AEMC, AEMO and the AER related to this transition, including developing a roadmap to implement recommendations from the Independent Review into the Future Security of the NEM (the Finkel review).
- In the mid- to long-term, outcomes of the work being undertaken, will impact on market dynamics including investment decisions, the supply and demand balance and the role of consumers in the market of the future. This will then flow-through to price levels - either exerting upwards or downwards pressure depending on circumstances and design of the mechanisms implemented.
- In this report, the impact of uncertain, unknown or long-term (past 2020) policies or mechanisms have not been included in the modelling for this report given the difficulty in assessing impacts given the limited information or specifics on these policies or mechanisms at this point in time. However, where the policy or mechanism design is fairly certain, the modelling has included the impact on residential electricity price trends.
- For the reporting period in this year's report, the key findings are:
  - wholesale electricity purchase costs are the primary driver of the tends in residential electricity prices with wholesale electricity costs increasing from 2016/17 to 2017/18 and decreasing from 2017/18 to 2019/20
  - the regulated network component continues to be uncertain due to ongoing legal and regulatory processes.
- The increase in wholesale prices is driven by the closure of the Northern (546 MW), Hazelwood (1,600 MW) and Smithfield (171 MW) synchronous generators and high gas prices. The decrease in wholesale prices that starts in 2018/19 is driven by new generation (approximately 4,100 MW across the NEM, of which 3,900 MW is renewable) and the return of the Swanbank E (385 MW) generator.

- The large-scale renewable energy target (LRET) (introduced in 2001 and changed to its current design and target in 2009) has contributed to changes in wholesale market dynamics. The effect of the LRET is to incentivise new renewable generation which have low operating costs and reduce wholesale prices in the short-term. Over time, low wholesale costs mean some coal generators may not recover their operating and maintenance costs. To the extent the LRET contributes to generation exit, it will tighten the supply and demand balance, leading to higher wholesale prices. This has contributed to the recent high wholesale prices in the NEM.

- Representative consumer levels, which have a major impact on price and bill outcomes, have changed in most jurisdictions. Of particular note, the consumption level in New South Wales has decreased significantly as the representative consumer is now a duel fuel customer.

This chapter provides an overview of:

- the significant work being undertaken in the energy market focusing on the potential impacts these have on market fundamentals including market design and regulatory frameworks, supply and demand dynamics and price levels - wholesale and retail

- the key trends in representative residential electricity prices and bills and the main drivers of these trends.

2.1 The NEM - a market in transition

The NEM is moving from predominantly large-scale synchronous generation to greater amount of smaller, distributed and intermittent non-synchronous generation. Older coal-fired generators are retiring and more large-scale renewable generators have connected. This changing generation mix impacts the price and availability of electricity.

The availability of electricity relates to the differing nature of the generators that are retiring and the new generation that is entering. The retiring generators generally provide stable levels of electricity into the market. In contrast, new generation, such as wind and solar, have limited control over the amount of electricity exported into the system as they are dependent on weather conditions. However, over time this new renewable generation may be developed in such a way as to also have the ability to provide relatively stable levels of generation - for example, the incorporation of battery storage with a wind farm.

A number of reviews of the energy sector have recently or continue to be carried out to examine and address issues that have arisen as a result of this transition currently underway. These reviews and other work being completed will impact on market design and regulatory frameworks, supply and demand dynamics and price levels. Where the results of these work programs are outside the reporting period, unknown or uncertain they have not been included in the modelling of residential electricity

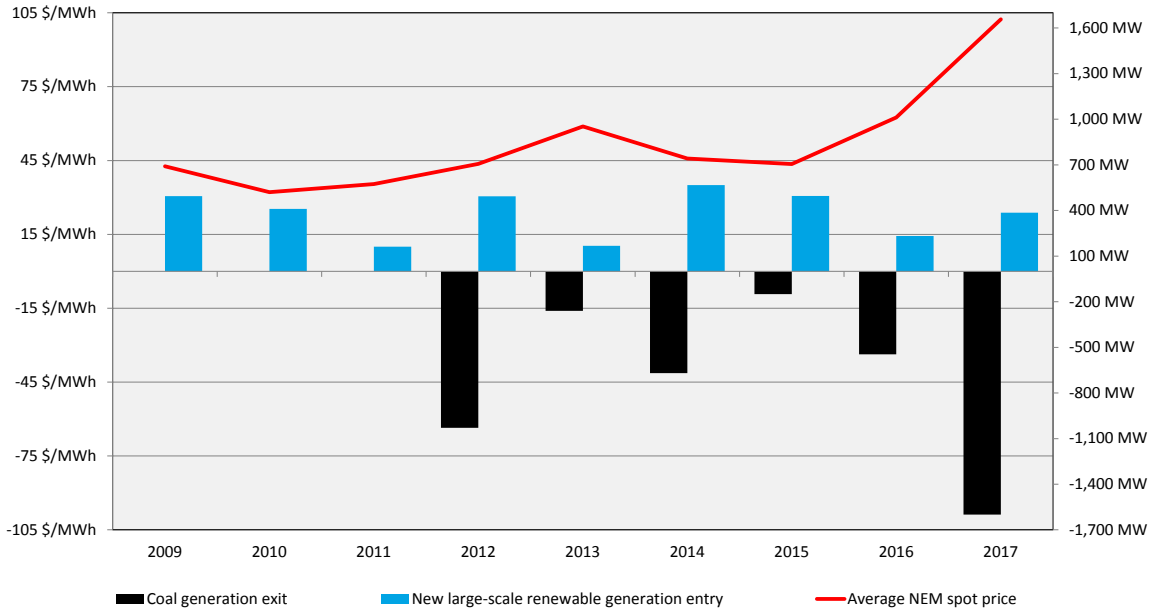
price trends. However, it is important to note the impact they may have in the short-, mid- and long-term depending on the mechanisms (including the design) implemented.

Although the direct and additional impacts of the large-scale renewable energy target (LRET) are discussed and modelled later in this report. Nevertheless, it is important to recognise its impact and how these impacts intersect with the other policies being considered and implemented in the market. This is particularly the case given the significant role that wholesale prices are currently playing in the market.

One element of the changing generation mix relates to the incentives created under the LRET and its current design. The LRET creates an incentive for increased supply to enter the market, even where demand is flat or falling. This incentive is created through the revenue these generators receive from the scheme and outside the wholesale spot market. At the same time, these generators do not have the same incentive to provide hedging contracts to the market supplied by the traditional generators. This is due to the revenue they receive under the scheme, but also because of the intermittent nature of the generation. Therefore, these generators in the short-term will exert downward pressure on wholesale prices. This will impact the financial viability of existing generators, such as coal-fired generators, and at the same time place upward pressure on the price of hedging contracts due to the reduced supply. For more information on the LRET and its impact on the wholesale market refer to Chapter 3.

Figure 2.1 shows how the average spot price in the NEM has been impacted by generation entry and exit. In particular, it provides an indication of the cycle of spot prices – a decrease in prices when new generation enters the market and an increase in prices when existing coal-fired generation exits the market – that has occurred in the NEM. This cycle is most pronounced over the last few years up to and including the current year; however, it can be also be seen to a lesser extent over previous periods. Although generation entry and exit is one factor driving the cycle of spot prices, there may be other factors that also contribute to the level and length of these cycles.

Figure 2.1 Entry of renewable generation, exit of coal generation and wholesale spot prices in the NEM from 2009 to 2017



2.1.1 Independent review into the future security of the National Electricity Market

The COAG Energy Council engaged the Commonwealth Chief Scientist, Dr Alan Finkel, to carry out an independent review of the NEM.[8] This review was triggered by the state wide blackout in South Australia that occurred in September 2016.

The key focus of this review was how to deliver affordable, secure and reliable, low emissions energy to consumers. The final report was published in June 2017 and provides a blueprint for the future of the market. To address these issues, the Finkel review examined the following three pillars:[9]

- **orderly transition** - integrating emissions reduction and energy policy; requiring existing large generators to provide three years' notice of closure; requirements on new generators to provide services to maintain power system security
- **system planning** - a system-wide grid plan to inform network investment decisions and ensure security is preserved in each region, including a list of potential priority projects to enable the development of renewable energy zones
- **stronger governance** - the development of a new Energy Security Board (ESB) to drive implementation of the blueprint and deliver an annual health check on the state of the electricity system.

8 COAG Energy Council, *Blueprint for Energy Security in the National Electricity Market - Independent Review Terms of Reference*, 7 October 2016.

9 Australian Government - Chief Scientist, *Media release - Blueprint for a world-class electricity system*, 9 June 2017. http://www.chiefscientist.gov.au/wp-content/uploads/Chief-Scientist-Media-Release-Blueprint-for-a-world-class-electricity-system-2.pdf

The final report contained 50 recommendations. To date, 49 of 50 recommendations have been endorsed by government, including the establishment of the ESB. The recommendation related to the adoption of the Clean Energy Target has not been endorsed. However, the COAG Energy Council at its 25 November 2017 meeting directed the ESB to undertake further design work on the National Energy Guarantee. The National Energy Guarantee is a mechanism aimed at integrating energy and emissions policy to deliver a reliable low emissions system at the lowest overall cost.

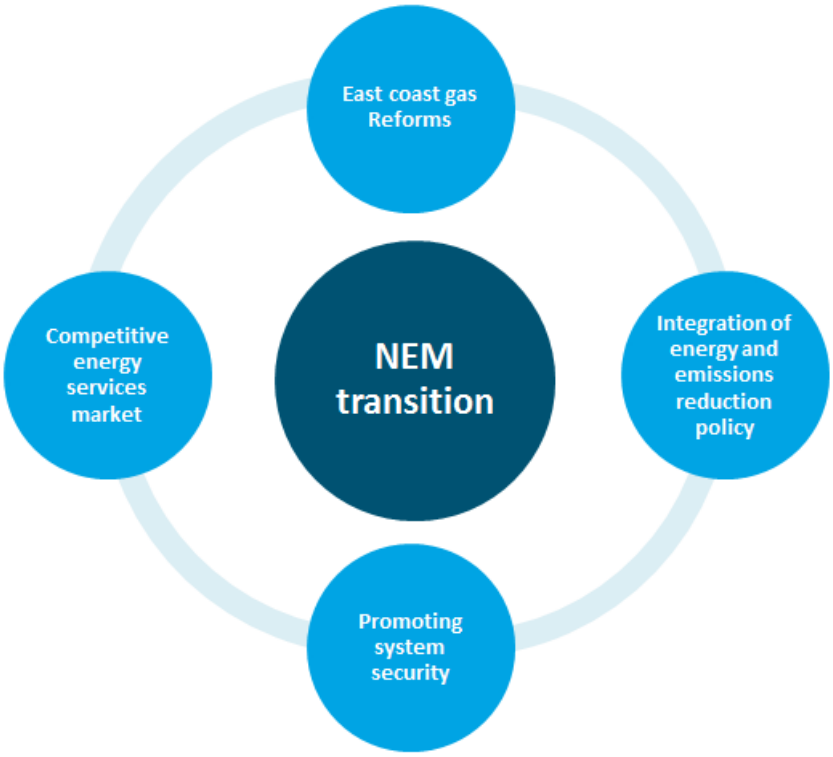
Since the publication of the final report some stakeholders have questioned whether the measures outlined in the recommendations will put downward pressure on prices, especially new initiatives related to security and reliability.[10] However, until the full details of how the recommendations will be implemented, including the detailed design of any new mechanisms, it is uncertain what impact they might have on prices – upward or downward. In the absence of information or detail about the design, the Commission has not included it in the modelling for this report.

2.1.2 AEMC market transformation work to support the NEM in transition

The work program of the AEMC focuses on four interconnected areas as shown in Figure 2.2. Much of the work undertaken in these areas goes directly to the blueprint set out in the Finkel review. In addition, the COAG Energy Council, the ESB, AEMO, the AER and the AEMC are co-ordinating efforts and work programs to implement the endorsed recommendations.

10 See for example: PIAC, *Finkel review: mixed news for consumers*, media release, 9 June 2017. https://www.piac.asn.au/2017/06/09/finkel-review-mixed- news-for-consumers/

Figure 2.2 AEMC's market transformation work to support the NEM in transition



The AEMC's work program will have impacts on future market design and the regulatory frameworks, the supply and demand dynamics or price levels – wholesale and retail. The impact of price levels will depend on the design of the mechanisms and the interaction between these mechanisms, the wholesale spot market, the contract market and participant behaviour. The four areas include:

- **system security and reliability** – this work program examines issues with providing mechanisms and tools to ensure the system continues to operate in a safe and reliable manner given the widespread deployment of non-synchronous generating technologies, such as wind farms and solar. Any policy or mechanisms implemented in this area is likely to impact on price levels. In addition it will likely impact on the supply and demand dynamics as a result of the mechanisms implemented to ensure adequate supply is available when and where it is needed throughout the day.

- **integrating energy and emissions reduction policy** - this work program examines how the often different objectives of energy and emissions reduction policy can be developed to balance desired outcomes and costs. A certain and integrated emissions reduction policy should remove uncertainty in the market and promote efficient investment. Further, although such policies may have direct costs to consumer, these costs should promote an efficient mix of generation to meet demand and the required level of emissions reductions.

- **redesigning the east coast gas market** - the AEMC recently completed reviews of both the east coast gas market and the Victorian Declared Wholesale Gas Market.

These reviews were completed in furtherance of the COAG Energy Council's vision to promote a more liquid and transparent gas market, including an efficient gas price. The operation of the domestic gas market, including the gas price, has a direct impact on wholesale electricity prices. Where gas prices increase, upward pressure is exerted on spot prices as the cost of operating a gas-fired generator increases. The degree of this impact depends on the frequency by which these gas generators are the marginal generator – the price setter in the wholesale spot market.

- **competitive energy services** - this work program examines how the market may change in the future in relation to distributed resources and other competitive services, among other things. Competition should exert downward pressure on price levels as consumers are provided options in relation to their service providers and how they will interact and participate in the market.

2.1.3 Other key reviews of the energy sector

A number of other key reviews of the energy sector were conducted in 2017:

- **ACCC Retail Electricity Price Inquiry** - the preliminary findings include that: there is an energy affordability problem; increased vertical integration is likely contributing to higher wholesale spot prices; and increases in electricity prices since 2007/08 was primarily driven by higher network costs.[11] The ACCC report made a number of preliminary recommendations, including consideration of what can be done to mitigate the burden of historical network investment decisions on future electricity prices.[12] The ACCC's final report is due in June 2018

- **AEMO September 2017 Electricity Statement of Opportunities (ESOO)** - AEMO regularly updates and publishes an ESOO, which compares electricity supply with demand forecasts, to identify potential expected unserved energy (USE) in excess of the reliability standard.[13] The findings of the September 2017 ESOO included that changing dynamics in the power system are resulting in a tight supply-demand balance in the NEM and the responsiveness of the power system is at risk from climatic events (i.e. extended period of high temperatures). Over the 10-year outlook period from 2017-18 to 2026-27 across the NEM, the reliability standard is forecast to be breached only in South Australia and Victoria in 2017-18 and only in the high demand scenario.[14] The changing dynamics in

11 ACCC, *Electricity supply and price inquiry*, viewed 12 October 2017, pp5-7. https://www.accc.gov.au/regulated-infrastructure/energy/electricity-supply-prices-inquiry/preliminary-report

12 Ibid, p62.

13 AEMO, *Electricity Statement of Opportunities for the National Electricity Marke*t, September 2017.

14 The High Demand scenario assumes that demand growth is in the upper range of expectations. For more information refer to AEMO, *Electricity Statement of Opportunities for the National Electricity Marke*t, September 2017, pp17-18

the supply-demand balance can affect wholesale electricity prices in the short and longer term.

- **Independent Review into the Electricity and Gas Retail Markets in Victoria** - in November 2016 the Victorian Government commissioned an independent review of its energy markets. The final report provided 11 recommendations, including that standing offers be abolished and retailers be required to provide a Basic Service Offer with the maximum price to be regulated.[15] Such changes, if implemented, have the potential to affect the competitive dynamics in the retail sector and future electricity prices in Victoria.

2.1.4 New Commonwealth government energy policies and plans

Prior to 2017, a number of state, territory and Commonwealth governments had previously introduced their own energy policies and plans. These include the LRET, state and territory-based feed-in-tariff schemes and energy efficiency schemes. In 2017, a number of state and territory governments introduced new energy policies and plans. These existing and new schemes are discussed in chapters 3 and 5 and the relevant jurisdictional appendix. They have been included in the modelling for this report where the design and implementation of the policy is relatively certain.[16]

In 2017, the Commonwealth government also implemented and proposed the following:

- **Abolition of Limited Merits Review** - the Commonwealth Government passed a bill to abolish the limited merits review on 16 October 2017.[17] Removal of limited merits review will affect the AER's network revenue determinations. These form the basis of the network cost component, which is around 40 to 45 per cent of the representative consumer's annual bill. For more information on limited merits review and network costs refer to Chapter 4.

- **Electricity rule change request - Notification of end of fixed benefit period** - the Commonwealth Government submitted a rule change request to the AEMC under the National Energy Retail Law.[18] It seeks to increase customer awareness of changes in retail market contracts by requiring retailers to give customers notice of the end of fixed benefit periods under those contracts.[19] The rule

15 Independent review panel, *Independent Review into the Electricity and Gas Retail Markets in Victoria*, August 2017, p xi.

16 Where a state energy policy or plan will affect electricity prices and has been included in the modelling for this report, it is outlined in section 3.3.5.

17 Parliament of Australia, *Competition and Consumer Amendment (Abolition of Limited Merits Review) Bill 2017*, 16 October 2017. Bill as passed available at: https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r5929

18 Australian Government rule change proposal to the AEMC, *Ensuring customer awareness of changes in retail market contracts customer notification at the end of benefits periods*, 22 August 2017.

19 A fixed benefit period is where a customer receives a benefit or benefits which expire prior to the end of the market contract.

change, made on 7 November 2017,[20] provides consumers with additional tools and information to more readily be able to find the best offer to meet their needs. Over time, this rule change may bring the representative consumer outcomes in Residential Electricity Price Trends report, where it is based on the lowest market offer, more in line with the experience of the average consumer.

- **Proposals to improve wholesale supply** - the following proposals to increase electricity generation capacity and storage and the availability of gas may place downwards pressure on electricity prices in the short-term and longer-term:

  - a proposal to increase the generation capacity of the Snowy Hydro scheme, by adding 2,000 MW through a pumped hydro (energy storage) project.[21] It is assumed that this proposal, known as Snowy 2.0, will not be operational within the reporting period

  - a proposal[22] to expand the Tasmanian hydro scheme by 2,500 MW of storage capacity and examine the expansion of the Tarraleah and Gordon power stations.[23] It has been assumed that new Tasmanian pumped hydro generation will not be operational within the reporting period.

  - the Australian Domestic Gas Security Mechanism (ADGSM) was announced on 20 June 2017. The objective of the ADGSM is to ensure there is sufficient supply of natural gas to meet the forecast needs of Australian consumers. It does this by requiring, if necessary, LNG projects which are drawing gas from the domestic market to limit exports or find offsetting sources of new gas.[24]

These new energy policies, plans and rule changes have the potential to affect market design and regulatory frameworks, supply and demand dynamics and price levels – both wholesale and retail in the mid- to long-term. However, they have not been incorporated into the modelling for this report as they have not yet been finalised, occur outside the reporting period or remain relatively uncertain.

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20 AEMC, *Final rule – Notification of end of fixed benefit period*, 7 November 2017. http://www.aemc.gov.au/Rule-Changes/Notification-of-end-of-fixed-benefit-period#

21 A feasibility study is due to be completed by the end of 2017. See: Prime Minister of Australia, *The Honourable Malcolm Turnbull, Snowy Hydro 2.0 Powering Ahead*, media release, 28 August 2017.

22 This proposal is from both the Commonwealth and Tasmanian governments.

23 Prime Minister of Australia, *The Honourable Malcolm Turnbull, New Tasmanian Pumped Hydro*, Media release, 20 April 2017.

24 Australian Government, Department of Industry, Innovation and Science, *The Australian Domestic Gas Security Mechanism*, viewed 13 October 2017. https://industry.gov.au/resource/UpstreamPetroleum/AustralianLiquefiedNaturalGas/Pages/Australian-Domestic-Gas-Security-Mechanism.aspx

2.2 Key drivers and trends in residential electricity prices and bills

2.2.1 Key trends in electricity prices and bills

This section provides the key trends in representative residential electricity prices and annual bills for all jurisdictions. This is based on the consumption level of the representative consumer in each jurisdiction.[25]

In the 2016 report, for all jurisdictions aside from South Australia and Western Australia,[26] the representative consumption levels were based on the AER's 2014 Electricity Bill Benchmarks for residential customers.[27] In this 2017 report, for all jurisdictions aside from South Australia, Western Australia and Northern Territory, the representative consumption levels were based on the AER's 2017 Electricity Bill Benchmarks for residential customers.

Table 2.1 Annual Consumption levels of the representative consumer in each jurisdiction used for 2015, 2016 and 2017 Residential Electricity Price Trends reports

Jurisdiction	Annual consumption (kWh)	
	2017	**2015 and 2016**
Queensland	**5,240**	5,173
New South Wales	**4,215**	5,936
Australian Capital Territory	**7,151**	7,312
Victoria	**3,865**	4,026
Tasmania	**7,908**	8,550
Northern Territory	**6,613**	6,790
South Australia	**5,000**	5,000
Western Australia	**5,198**	5,198

25 For more information on the representative consumer, refer to Appendix A.

26 Representative consumption levels were provided by the South Australian and Western Australian governments.

27 AER, *Electricity bill benchmarks for residential customers 2014*, effective 17 December 2014. See https://www.aer.gov.au/retail-markets/retail-guidelines-reviews/electricity-bill-benchmarks-for-residential-customers-2014

Price levels between jurisdictions in this report should not be directly compared. This is due to two important things that have a direct impact on the prices presented in this report:

1. the prices are specific to the representative consumer, which is different in each jurisdiction, and do not reflect the pricing outcomes for all residential consumers. The representative consumer is defined in each jurisdiction by electricity consumption characteristics of a typical consumer, based either on benchmark data published by the AER or information provided by state and territory governments

2. consumption levels are different for each jurisdiction and are impacted by numerous factors including weather, availability and use of gas and penetration of air-conditioning. Therefore, there can be significant variation in consumption levels between jurisdictions. In those jurisdictions where the representative consumer is a dual fuel consumer, the total annual energy costs paid by the consumer would be higher than represented here as it would include both electricity and gas costs.[28]

Figures 2.3 and 2.4 show that estimated electricity prices and bills are generally increasing from 2016/17 to 2017/18, and decreasing from 2017/18 to 2019/20, in most NEM jurisdictions. In Western Australia and Northern Territory, estimated prices and annual bills are increasing over the reporting period from 2016/17 to 2019/20. In the period 2016/17 and 2017/18 these figures present information based on actual results, except in Victoria where 2017/18 is estimated. For the period from 2018/18 to 2019/20 these figures indicate the expected trends that are expected to occur.

By examining Table 2.1 and Figures 2.3 and 2.4, the impact of consumption on the price and bills can be seen, and highlights why price levels and consumer bills across jurisdictions cannot be compared. For example, the Tasmanian representative consumer consumes more than double that of the representative consumer in Victoria (who is a duel fuel customer). However, as shown in Figure 2.3 the c/kWh for Tasmania is lower than in Victoria but the annual bill, as expected, is higher given the difference in consumption. Therefore, any comparison or ranking between jurisdictions would provide an inaccurate picture. Rather, these price levels provide information on trends in each individual jurisdiction.

28 This applies in Victoria and New South Wales, where the representative consumer is a duel fuel consumer. This report only estimates trends in residential retail electricity price and bills and does not estimate residential retail gas prices and bills.

Figure 2.3 **Trends in representative residential electricity prices across jurisdictions**

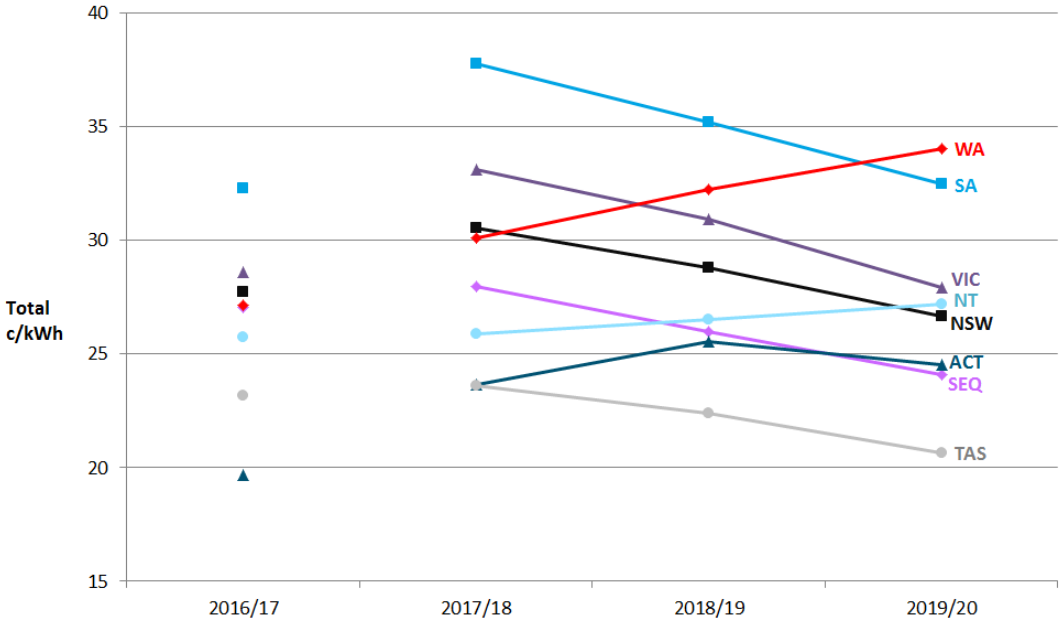
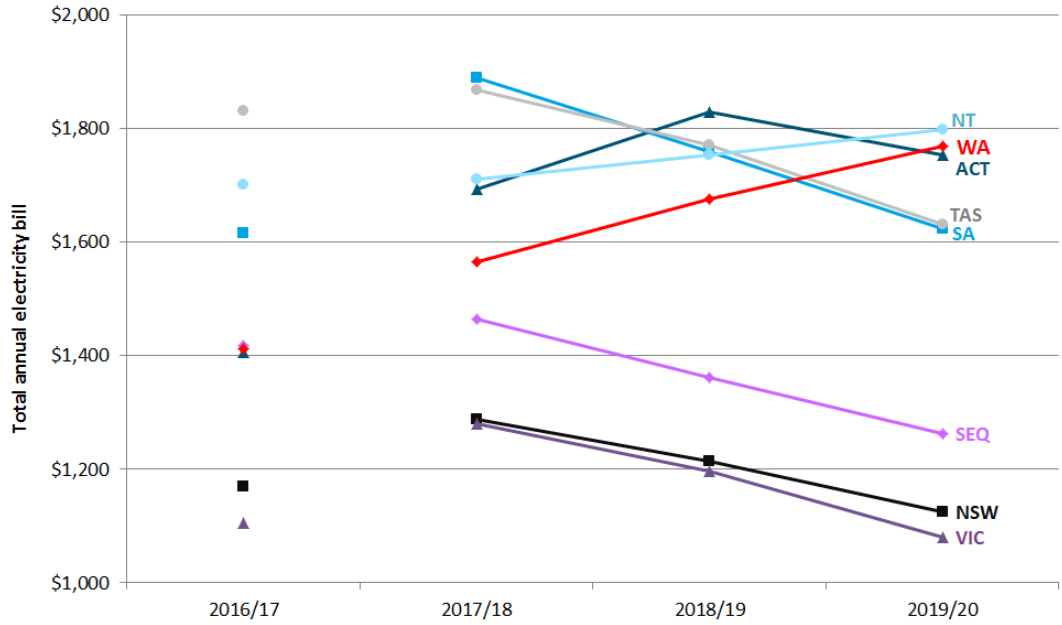


Figure 2.4 **Trends in representative residential electricity bills across jurisdictions**



2.2.2 Key drivers of trends in electricity prices and bills

Wholesale costs primarily driving the overall trends in price and bills

In the NEM, estimated residential electricity prices and annual bills are generally:

- increasing from 2016/17 to 2017/18 primarily due an increase in wholesale costs, resulting from the retirements of Northern (546 MW), Hazelwood (1,600 MW) and Smithfield (171 MW) power stations and increasing gas prices

- decreasing in 2018/19 and 2019/20 primarily due to decreasing wholesale costs, resulting from around 4,100 MW of new generation (across the NEM) and the return of Swanbank E (385 MW) power station.

In Western Australia, estimated residential electricity prices and annual bills increase over the reporting period, primarily due to increasing wholesale prices. This is due to higher gas prices and a switch in the generation mix from gas to coal.

In the Northern Territory, estimated residential electricity prices and annual bills increase over the reporting period, primarily due to increasing wholesale prices. The increase in wholesale costs up to 2018/19 reflects contractual arrangements for generation entered into for the period 2015-18. The increase in costs from 2018/19 to 2019/20 reflects an assumed increase due to inflation.

Uncertain network cost trends remain in some jurisdictions

As per the 2016 report, the trend in the regulated network component remains uncertain in a number of jurisdictions due to ongoing legal and regulatory processes. Given the uncertainty around the potential outcomes of these legal and regulatory proceedings, the 2017 report has not speculated on the potential range of regulated network price outcomes over the reporting period. This is consistent with the approach applied in the 2016 report. For more detail refer to Chapter 4.

Effect of interconnectors on the wholesale electricity market

In the 2016 report,[29] interconnectors were expected to have a large effect on the trend in wholesale electricity prices. The retirement of Hazelwood was expected to significantly affect flows of electricity between regions. For example, Victoria moving from being a net exporter to New South Wales to a net importer from New South Wales. A result of this was that interconnectors frequently became subject to binding constraints, leading to wholesale electricity purchase cost differentials being modelled between regions. This 2017 report found that interconnector flows were subject to binding constraints less frequently than expected in the 2016 report. Therefore, it has a minimal effect on wholesale prices. For more detail on interconnector constraints, refer to Chapter 3.

29 AEMC, *2016 Residential Electricity Price Trends*, Sydney, December 2016, pp24-27.

3 Wholesale electricity cost trends and drivers

Box 3.1 Key findings

- Wholesale market outcomes are increasingly interconnected with environmental policy, the wholesale gas market and system security. Reforms in these areas will affect wholesale electricity prices.
- Wholesale electricity costs comprise approximately 30-40 per cent of a typical residential electricity bill for a consumer in the NEM, and 40-45 per cent in Western Australia's SWIS.
- In the NEM, demand remains flat over 2016/17 to 2019/20, and the underlying estimated trend in wholesale costs:
  - increase from 2016/17 to 2017/18 in all regions due to the retirements of Northern (546 MW), Hazelwood (1,600 MW) and Smithfield (171 MW) power stations and increasing gas prices
  - decrease in 2018/19 and 2019/20 in all regions due to a combination of 4,100 MW of new generation, the return to service of the Swanbank E power station, and reduced short-run costs for South Australia gas plants due to the Energy Security Target (EST) in 2019/20.
- Of the 5,300 MW of new generation that is committed or expected (modelled) to enter the NEM over the reporting period, the majority (4,900 MW) is renewable generation. In 2019/20, this 4,900 MW of new renewable generation is expected to represent around 10 per cent of generation capacity and 8 per cent of energy output in the NEM.
- In the SWIS, the trend in wholesale costs is estimated to increase across the reporting period. This is due to higher gas prices and a switch in the generation mix from gas to coal, which results in higher capital costs but lower fuel costs.
- Wholesale costs continue to be affected by increased levels of intermittent generation across the NEM, incentivised by the large-scale renewable energy target (LRET). Aside from the direct costs, the LRET scheme design has additional effects on wholesale electricity costs:
  - wind and solar investment suppresses wholesale electricity prices in the short term. In the medium term, lower wholesale electricity prices can contribute to earlier retirement for large-scale synchronous generators, decreasing competition and increasing wholesale prices
  - increasing intermittent renewable generation can increase wholesale price volatility
  - electricity contract market costs can increase as renewable generators may have less incentives to provide contracts.

This chapter outlines:

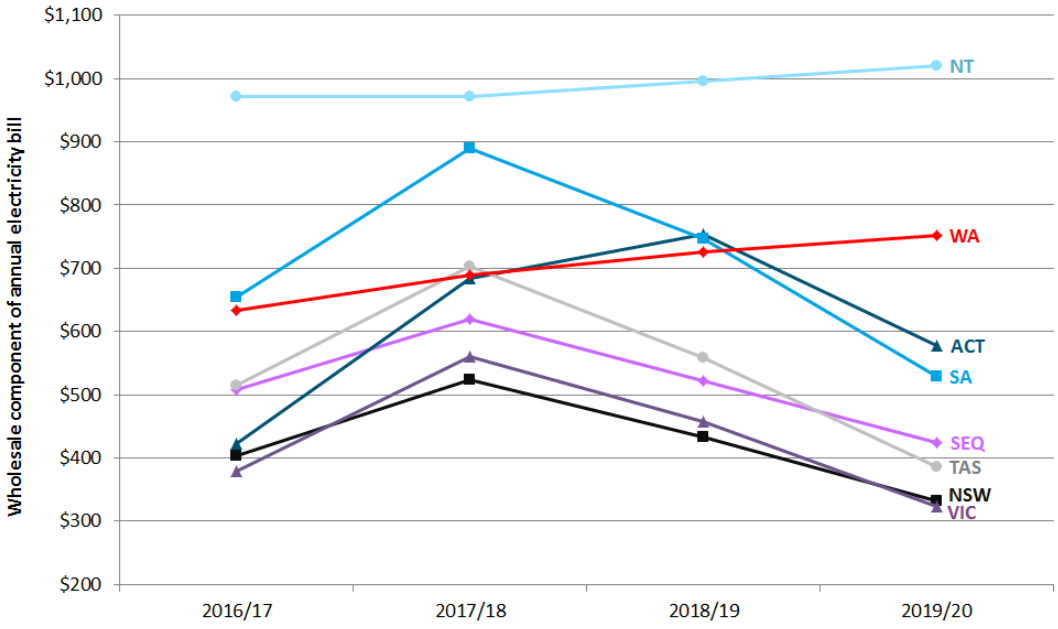
- the trend in wholesale electricity costs,
- the interaction between the LRET and the wholesale electricity market, and
- the effect of other factors on the wholesale electricity market.

For information on the methodology for estimating wholesale electricity costs refer to Appendix A of this report and Frontier Economics' report that was prepared for the AEMC.[30]

3.1 Trends in wholesale electricity costs

Figure 3.1 shows the trend in the wholesale component of the annual representative residential electricity bill across jurisdictions. In 2016/17, wholesale costs accounted for approximately 30 to 40 per cent of the annual bill for representative consumers in the NEM, and 45 per cent in Western Australia's SWIS.

Figure 3.1 Wholesale component of annual electricity bill for a representative consumer in each jurisdiction



NEM

Over the 2016/17 to 2019/20 period electricity demand is forecast to remain flat, so changes in wholesale cost are due to changes in the supply of electricity. The trend in NEM wholesale prices from 2016/17 to 2017/18 is increasing and is driven by:

- the retirement of Northern coal power station (546 MW) in South Australia in May 2016 and the Hazelwood coal power station (1,600 MW) in Victoria in

30 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

March 2017, which were large base load generators with low operating costs. The Smithfield gas power station (171 MW) is also expected to close in 2017/18.

- the mothballing of one unit of Pelican Point gas power station (239 MW) in 2016/17 that was returned to service in 2017/18
- the withdrawal of the Tamar Valley gas power station (208 MW) in 2016/17. However, this power station can be operational in the market again with less than three months notice[31]
- gas prices, which are expected to increase from 2016/17 to 2017/18.

The trend in wholesale costs in 2018/19 and 2019/20 is downwards and is driven by:

- approximately 4,100 MW of new committed and expected (modelled) generation entering the NEM in 2018/19 and 2019/20.
- the return to service of the Swanbank E gas power station (385 MW) in early 2018[32]
- reduced short-run costs for South Australian gas plants in 2019/20 due to the pass through of certificate revenue related to the EST.

Although gas input costs are expected to remain high from 2017/18 to 2019/20, the above supply-side drivers are expected to more than offset the effect of these higher gas costs in 2018/19 and 2019/20.

The downwards trend in wholesale costs in 2018/19 and 2019/20 is largely driven by new renewable generation, incentivised through the LRET. While this suppresses wholesale prices in the short-term, in the medium-term lower wholesale prices can contribute to earlier retirement of large-scale synchronous generators, decreasing competition and increasing wholesale prices. The effect of the LRET on the wholesale electricity market is discussed further in section 3.2.

It is also noted that the expected decrease in wholesale costs in 2018/19 and 2019/20 may not necessarily translate into lower retail electricity prices for consumers in the NEM. In some jurisdictions, increases in network or environmental costs result in an increase in the overall retail electricity price.

31 AEMO, *Generation Information_TAS_05062017*, viewed 20 October 2017. Available at: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information.

32 The Queensland Cabinet and Ministerial Directory, *Joint Statement – Swanbank E Power station fires up again*, 4 June 2017. http://statements.qld.gov.au/Statement/2017/6/4/swanbank-e-power-station-fires-up-again

Summary of wholesale cost drivers in the NEM

Table 3.1 provides a summary of wholesale cost drivers in the NEM.[33] More detail on the effects of these drivers on trends in wholesale electricity prices over the reporting period are outlined in sections 3.2 and 3.3 below.

Table 3.1 Summary of wholesale cost drivers in the NEM

Wholesale cost driver	For wholesale costs to increase, this driver needs to change as follows (if all else constant)
Demand	
Forecast electricity demand	Increase
Supply	
Generator exit (retirements and mothballing)	Generator retirement or mothballing occurs
Gas fuel prices	Increase
Coal fuel prices	Increase

South West Interconnected System (SWIS)

In Western Australia, the trend in wholesale electricity costs is estimated to increase across the reporting period. This is due to:

- from 2016/17 to 2017/18:
  - increasing gas prices, as shown in Figure 3.9
  - the increase in gas prices leading to a switch in the generation mix from gas only in 2016/17 to gas plus coal in 2017/18, as shown in Figure 3.7. This results in higher capital costs, lower fuel costs and an overall increase in total costs for the SWIS, as discussed in section 3.3.1.
- from 2017/18 to 2019/20:
  - there is a further increase in total costs as the load shape is expected to become peakier, which leads to more investment in peaking capacity and therefore increases the capital costs of serving the residential load.

3.2 The LRET and wholesale electricity costs

As outlined in chapter 2, wholesale market outcomes are increasingly interconnected with environmental and system security policies.

Under the LRET, retailers are obliged to acquire large-scale generation certificates (LGCs) created by renewable generators. The costs of LGCs are passed through to both small and large consumers. These environmental policy costs related to the LRET (the direct costs) are outlined in further detail in Chapter 5 of this report. The LRET though, through its scheme design, also has additional effects on wholesale electricity costs. These costs may be over and above any direct costs associated with the scheme.

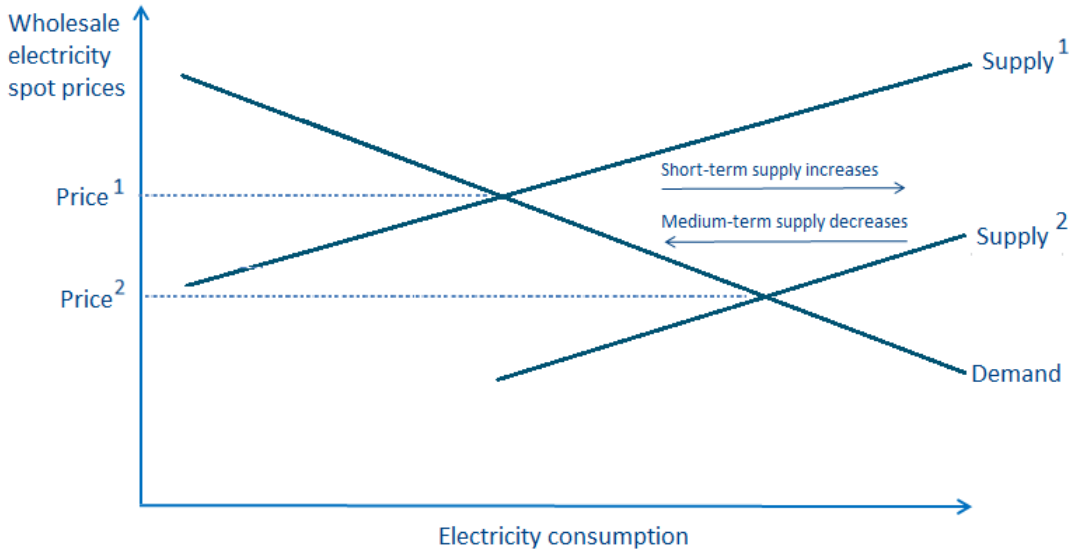
For information on the methodology for estimating LRET costs, refer to Frontier Economics' report.[34]

3.2.1 The LRET and wholesale electricity prices

The LRET scheme design results in new investment in renewable generation – solar and wind. To date this has been largely intermittent wind generation. It is expected to that both wind and solar will be the dominant technologies entering over the next couple of years.

Figure 3.2 shows the type of effect the LRET has on wholesale electricity price dynamics in the short and medium term.

Figure 3.2 Effect of LRET on short and medium-term electricity prices



In the short-term, as wind and solar generators have lower operating costs compared with gas- and coal-fired generators, they are likely to submit lower offer prices and be dispatched by AEMO early in the merit order. This can put downward pressure on wholesale electricity costs, as Figure 3.2 shows the supply curve shifts down. The resulting excess supply, leads to a wholesale price decrease, shown in the diagram by a decrease in price from Price¹ to Price².

33 In addition to the cost drivers in Table 3.1, generator entry (new or return to service) results in a decrease in wholesale costs, all else constant.

34 Available on the AEMC's website: Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

Over time, low wholesale costs mean some generators may not recover their operating and maintenance costs. In the medium-term, this may result in exit from the market,[35] noting that there is a lag between intermittent generation investment occurring and retirement decisions being implemented. To the extent the LRET contributes to generation exit, it will tighten the supply and demand balance. Figure 3.2 illustrates that the supply curve will shift up, creating excess demand at $Price^2$. In this example, there is an increase in price from $Price^2$ to $Price^1$.

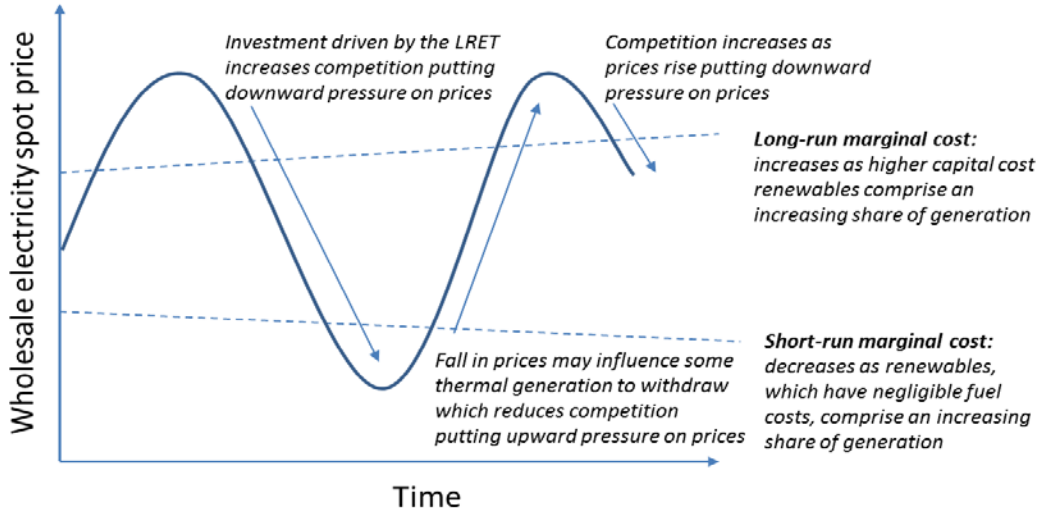
The effect of the LRET on wholesale price dynamics over time is shown in Figure 3.3 below and involves:

- price decreases from generator investment and price increases from subsequent withdrawal of generators
- prices cycling up and down over time, with higher peaks and lower troughs. Long-run marginal cost (LRMC) increases over time as new renewable generation has higher capital costs than the existing capital stock of generation across the electrical system. Short-run marginal cost (SRMC) decreases over time as renewable generation has lower operating costs than the existing stock of generation
- greater variability results from the intermittent nature of renewable generation, which comprises an increasing share of generation. It can also increase contract premiums as intermittent renewable generators are not in a position to offer firm contracts, which reduces the supply of contracts.

The impact the LRET has in increasing price volatility is discussed further in section 3.2.2.

35 It is noted the retirement of coal and gas generators is not caused solely due to the LRET. A range of other factors may also influence decisions to retire, including the age of the plant and expenditure needed to meet safety requirements.

Figure 3.3 Effect of LRET on medium term wholesale electricity price dynamics



Source: Adapted from Grattan Institute[36]

3.2.2 The LRET and price volatility

Uncertainty is normal and inevitable in the wholesale electricity market. Innate risks in the power system - such as transmission or power station outages and unforseen changes in demand - are reflected in movements in spot prices, particularly when these are unforseen. Being exposed to sudden and volatile price movements is therefore an inherent aspect of participating in the wholesale spot market.

Increasing intermittency of generation can lead to more volatile wholesale electricity spot prices. Price volatility in the wholesale electricity spot market can occur as the market responds to unexpectedly high or low demand or supply. Weather related events and generator or interconnector outages can contribute to volatility. For example, high wholesale price events have in the past corresponded to times when wind generation or rooftop solar PV production is low and there is an outage in a generator or interconnectors are constrained.

The level of volatility is also affected by the extent of contracts in the market. This is discussed in section 3.2.3 below.

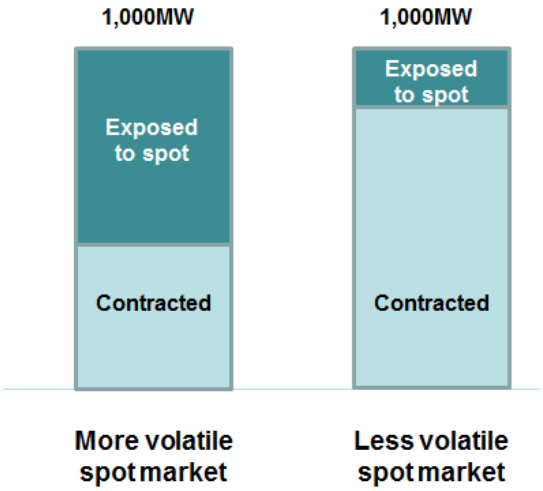
3.2.3 The LRET the wholesale electricity contract market

Increased volatility in spot prices increases the overall level of risk retailers must manage. Retailers can manage the risk of volatile electricity spot prices by purchasing contracts (such as swaps, forwards, caps and options) and by owning generators.

36 Grattan Institute, *Keeping the Lights On: Lessons from South Australia's Power Shock*, 2016, Figure 12, p21.

More contracting in a market lowers risk for both retailers and generators. This can lead to lower wholesale spot market prices. Generators enter into contracts to recover their costs and a rate of return. Therefore they no longer need to recover all of these costs from the electricity spot market. Contracted generators, when generating to contracted levels, are to some extent indifferent to spot prices and therefore bid so that output matches contracted volumes. The effect of higher volatility on retail prices is also reduced with higher levels of contracting as retailers are less exposed to spot prices. More contracting can therefore lead to lower risk exposure, a less volatile market and wholesale price levels. Figure 3.4 shows the indicative reduction in risk and volatility from contracting over a given level of capacity.

Figure 3.4 Effect of hedge contracting on spot market volatility



Where there is greater price volatility in the spot market, the costs of contracts may increase. Higher contract prices provide an incentive for increased investment in generating assets. When built, this should lead to electricity prices stabilising as there is increased supply to meet demand.

The LRET scheme design contributes to spot price volatility by reducing the incentives to enter into firm hedging contracts, as generators receive a separate source of revenues from LGCs. As wind and solar generators are able to seek recovery of their fixed costs from outside of the wholesale electricity market they do not provide firm hedging contracts. The design of the LRET scheme means revenue certainty is obtained from LGCs as well as from wholesale electricity spot prices. As traditional generators who offered the firm hedging contracts retire, under the LRET, there will be fewer generators to supply firm hedging contracts. This results in upward pressure on wholesale electricity contract prices. The South Australian forward contract market has been affected by the lack of firm hedging contracts.[37]

The LRET scheme design incentivises investment in intermittent renewable generation that do not sell firm hedge contracts. As the output of intermittent generation depends on wind and solar conditions which vary over time and cannot be controlled, these

37 For more information refer to AEMC, *2017 Retail Energy Competition Review*, 25 July 2017, p61.

generators are not in a position to defend firm hedge contracts. The intermittent nature of this generation is not reflected in wholesale spot prices, as these prices do not reflect the value of firm capacity (i.e. dispatchable capacity).

Further, given that fewer generators may provide contracts, the risk faced by retailers from volatile spot prices may increase due to the inability to hedge their position. This will over the longer term also potentially affect the level of retail competition.

3.3 Effects of other key factors on wholesale electricity costs

This section outlines other key factors affecting wholesale electricity costs. These include generator entry and exit, forecast electricity demand, fuel costs, the role of interconnectors and jurisdictional policies.

3.3.1 Change in generation mix

Recent and planned generator retirements

Generator retirements can place upwards pressure on wholesale prices by:

- tightening the supply-demand balance
- reducing competition in the wholesale electricity spot market
- increasing electricity spot price volatility where the proportion of intermittent generation increase
- reducing the availability of contracts, where retirements are non-intermittent generators.

Figure 3.5 shows the recent generator retirements that have occurred and the planned generator retirements that are expected to occur in the NEM over the reporting period:

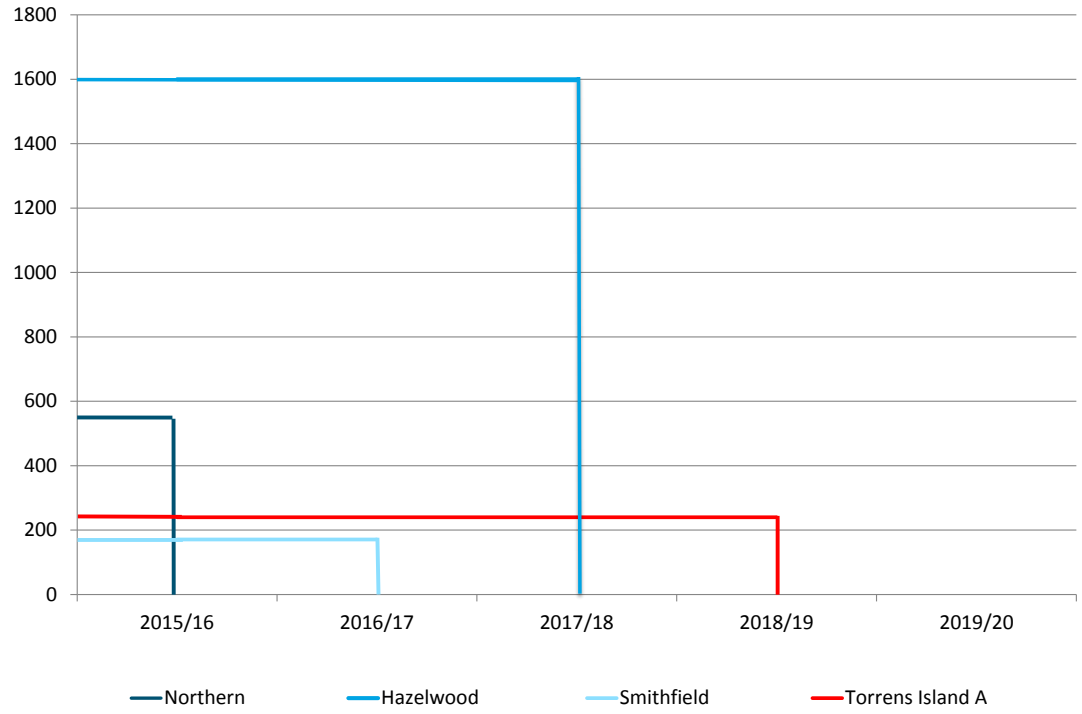
- the Northern coal power station (546 MW) in South Australia was closed in May 2016[38]
- the Hazelwood coal power station (1,600 MW) in Victoria closed in March 2017
- the Smithfield gas-fired power station (171 MW) in New South Wales is expected to close in 2017/18[39]

38 The co-located Playford B power station (240 MW) was also permanently closed at the same time, though this had previously been mothballed. See Alinta Energy, *Flinders Operations*, website viewed 15 August 2017: flinderspower.com.au

39 AEMO, *Generation Information - NSW*, 19 May 2017. Available at: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information.

- two units of Torrens Island gas-fired power station (240 MW in total) in South Australia are expected to close in 2019/20.[40] However a new 210 MW gas-fired power station is planned to be built alongside the Torrens Island facility and commence operation in early 2019.

Figure 3.5 Recent and planned generator retirements in the NEM



Source: AEMO Generation Information, June 2017

Generator mothballing and return to service

Mothballing is where there is the withdrawal of a generation facility such that it is not available to supply electricity, but the generator is kept in working order. This means if a decision is made to return it to service, it could be made available to supply electricity. The following decisions to either mothball or return generators to service is expected to affect wholesale costs over the reporting period:

- one unit of Pelican Point (239 MW) in South Australia was mothballed in 2016/17 and returned to service in 2017/18[41]
- Swanbank E (385 MW) in Queensland was mothballed and is expected to return to service in early 2018[42]

40 AGL, *AGL announces development of $295m power station in SA*, media release, 6 June 2017, https://www.agl.com.au/about-agl/media-centre/asx-and-media-releases/2017/june/agl-announces-development-of-$295m-power-station-in-sa

41 AEMO, *Generation_Information_SA_050617*, 5 June 2017. Available at: https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information.

- the withdrawal of the Tamar Valley gas power station (208 MW) in 2016/17. However, this power station can be operational in the market again with less than three months notice[43]

For more information on generator retirements, mothballing and returning to service refer to the Frontier Economics' report.[44]

New generation investment

Figure 3.6 shows the new committed[45] and modelled (expected) generation to be installed in the NEM over the reporting period. More than 5,300 MW of new generation is expected to be installed across the NEM over the period from 2016/17 to 2019/20. This is comprised of:

- **renewable generation:** around 4,200 MW of committed and 750 MW of expected (modelled) generation in the period 2017/18 to 2019/20. In 2019/20, this 4,900 MW of new renewable generation is expected to represent around 10 per cent of generation capacity (MW) and 8 per cent of energy output (MWh) in the NEM.
- **non-renewable generation:** around 400 MW of committed generation.

The 4,100 MW of new committed and expected (modelled) generation that is commencing operation in 2018/19 and 2019/20 is a key driver of the decrease in wholesale costs in these years.

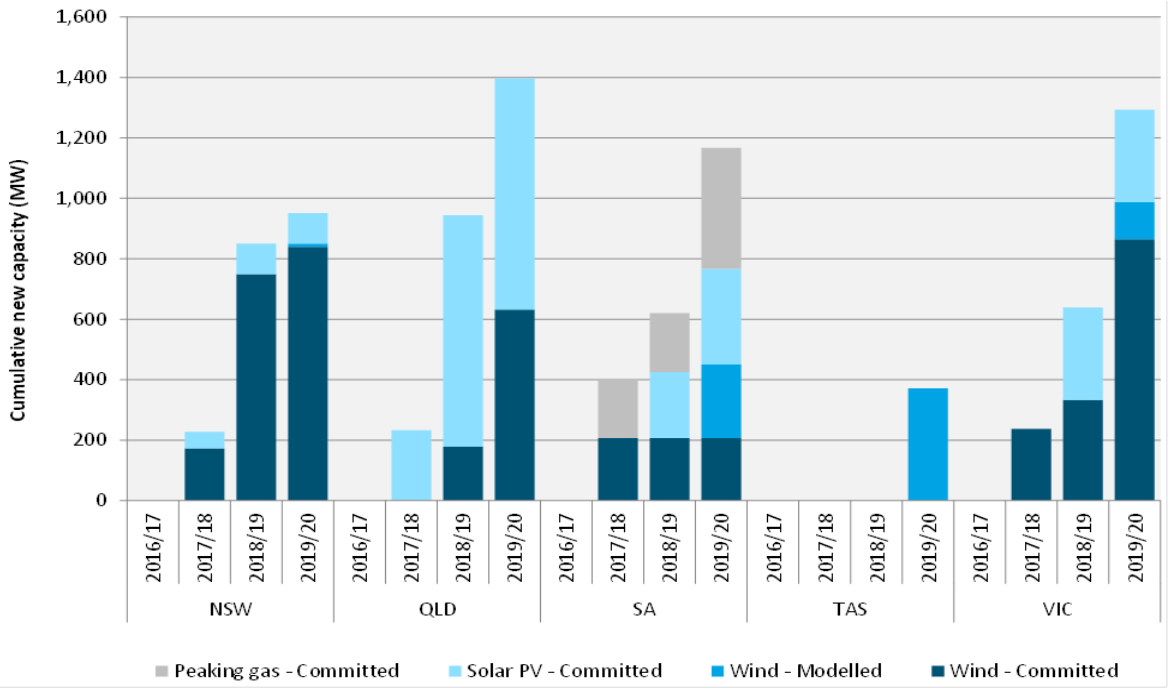
42 Stanwell, *Swanbank E power station to return to service*, 7 June 2017. http://www.stanwell.com/news/press-releases/swanbank-e-power-station-return-service/

43 AEMO, *Generation Information_TAS_05062017*, viewed 20 October 2017.

44 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, section 3.6.

45 Frontier Economics determines new committed generation primarily based on information published by AEMO. It may also account for other information, such as commencement of construction or if a project has achieved financial closure.

Figure 3.6 Committed and modelled new generation in the NEM from 2017/18 to 2019/20



Source: AEMO 2017 Electricity Forecasting Insights (EFI) and Frontier Economics[46]

Change in generation mix in the SWIS

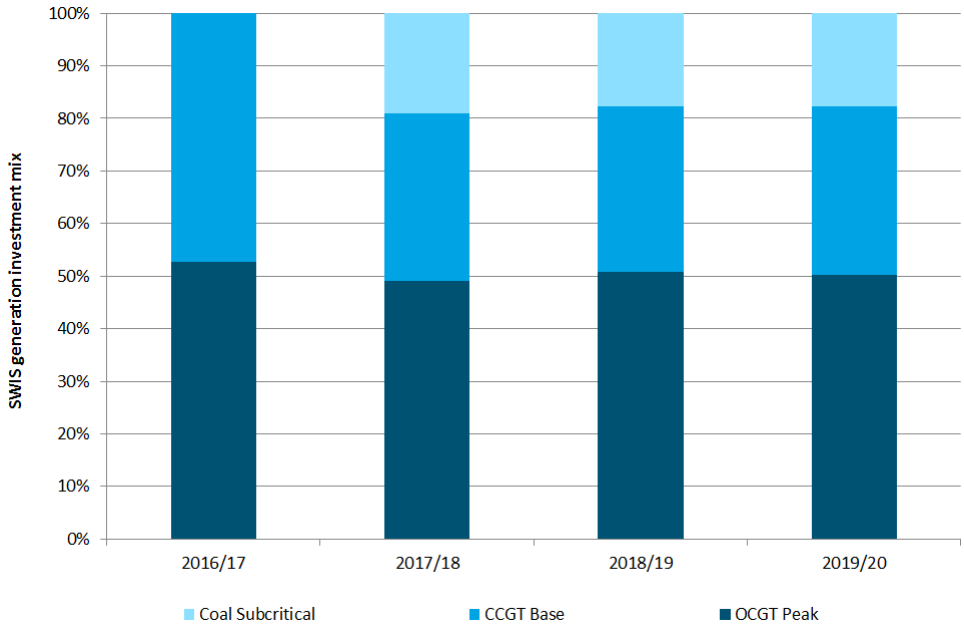
In the SWIS, wholesale costs are estimated based on modelling the stand-alone Long Run Marginal Costs (LRMC) for the electricity system, which is driven by the fixed and variable costs of generation technologies and the peakiness of residential load shapes.[47] This approach assumes that the generation mix can be completely rebuilt each year. The resulting assumed change in generation mix over the reporting period, as shown in Figure 3.7, are as follows:

- from 2016/17 to 2017/18, the increase in gas prices leads to a switch in the generation mix from gas only to gas plus coal. Overall however, this still results in an increase in total costs
- from 2017/18 to 2019/20, there is a further increase in total costs of the standalone LRMC as the load shape becomes peakier, which leads to more investment in peaking capacity and therefore increases the capital costs of serving the residential load.

46 In addition, 144 MW of new renewable (solar and wind) generation entered in 2016/17. In accordance with Frontier Economics' modelling approach, this 144 MW is included in the first year of the modeling period (2016/17), alongside all other existing scheduled generators in the NEM. Figure 3.6 shows new generation entering the NEM from 2017/18 to 2019/20.

47 For information on the modelling approach refer to Appendix A and Frontier Economics, *2017 Residential Electricity Price Trends Report,* November *2017.*

Figure 3.7 Changes in SWIS generation investment mix for the Base case over the reporting period



Source: Frontier Economics

3.3.2 Forecast electricity demand

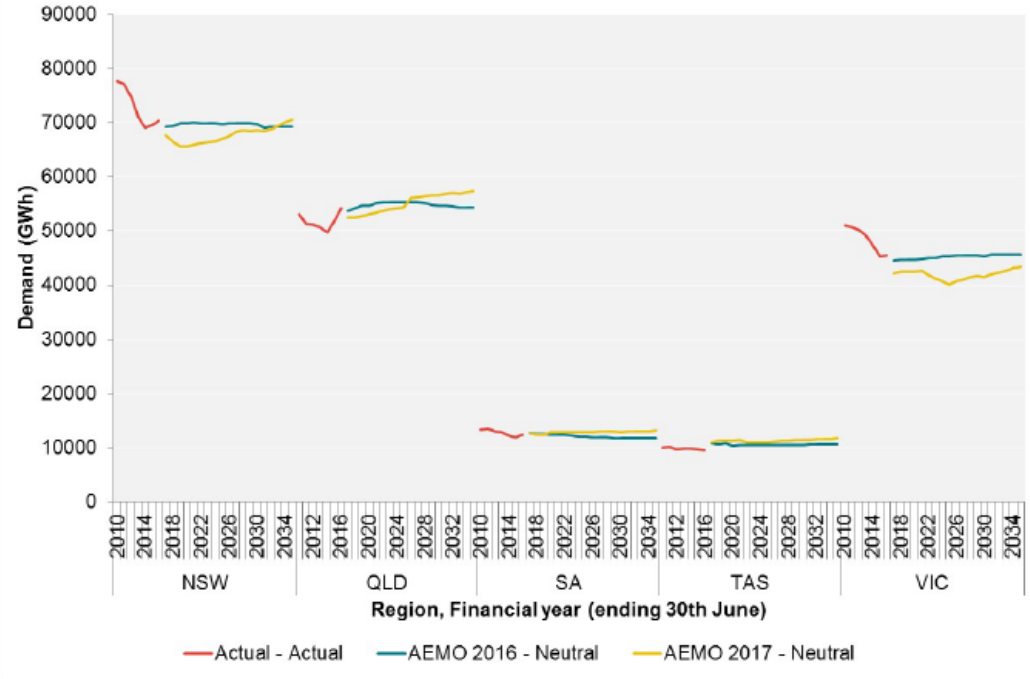
Increasing demand for electricity will in the absence of any supply change, place upward pressure on wholesale electricity costs. In general, electricity demand in the NEM though is expected to be relatively flat over the reporting period. Figure 3.8 shows that electricity demand is forecast to fall in New South Wales and South Australia, remain flat in Queensland and Victoria and rise slightly in Tasmania.[48]

Compared to the 2016 report,[49] forecast electricity demand for the 2017 report is expected to be lower in New South Wales, Queensland and Victoria and higher in South Australia and Tasmania.

48 Based on the Neutral demand forecast scenario in AEMO, *Electricity Forecasting Insights*, For the National Electricity Market, June 2017. https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/EFI/2017-Electricity-Forecasting-Insights.pdf

49 The base case scenario in the AEMC's *2016 Residential Electricity Price Trends review* was based on the neutral demand forecast in AEMO's *2016 National Electricity Forecast Report (NEFR)*.

Figure 3.8 Electricity demand forecast in the NEM over the reporting period



Source: Frontier Economics, based on AEMO 2016 NEFR and AEMO 2017 EFI

3.3.3 Fuel costs

The costs of gas-fired and coal-fired generators are sensitive to the access to and cost of gas and coal fuel sources. For example, large increases in these fuel costs will flow through into higher costs of generating electricity, and ultimately higher wholesale electricity costs.

Gas prices

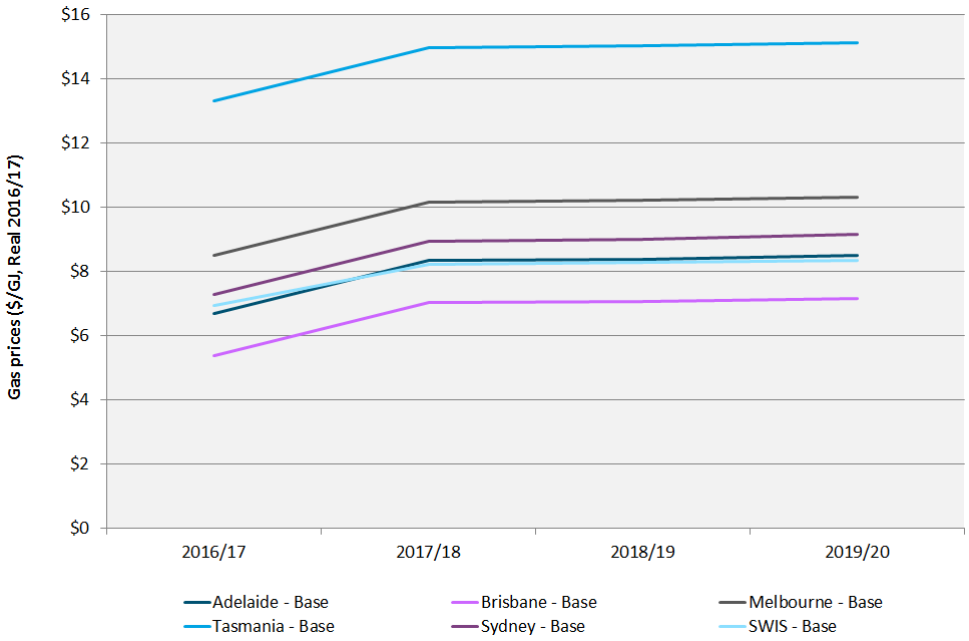
The increase in demand for gas from the east coast, driven by liquefied natural gas (LNG) exports from Queensland, has increased gas prices. Higher gas fuel costs result in higher input costs for gas-fired generators. This results in higher wholesale electricity market costs as gas-fired generators often set the dispatch price in the wholesale electricity spot market. This also impacts on investment decisions - not only in relation to gas-fired generators but also other generator types.

Figure 3.9 shows that gas prices are expected to increase in 2017/18 and remain high throughout the reporting period, placing upwards pressure on wholesale electricity costs.[50] High forecast gas prices reflect the tight supply-demand balance in the

50 The differences in gas prices at different points in eastern Australia reflect differences in transport costs.

wholesale gas market and the assumption that the LNG net-back price[51] reflects the opportunity cost of supplying gas to the domestic market.[52]

Figure 3.9 Forecast gas prices over the reporting period



Source: Frontier Economics

Coal prices

Figure 3.10 shows that coal prices are expected to be high in 2016/17 due to high export prices for Australian thermal coal, and decrease from 2017/18 to the end of the reporting period. This will place downwards pressure on wholesale electricity costs.

Coal prices are expected to decrease for coal mines that are export exposed, due to the forecast reduction in Australian export coal prices by the World Bank.[53] The forecast decrease in coal prices by the World Bank is also reflected in forward prices for Newcastle coal and other public forecasts of international coal prices.

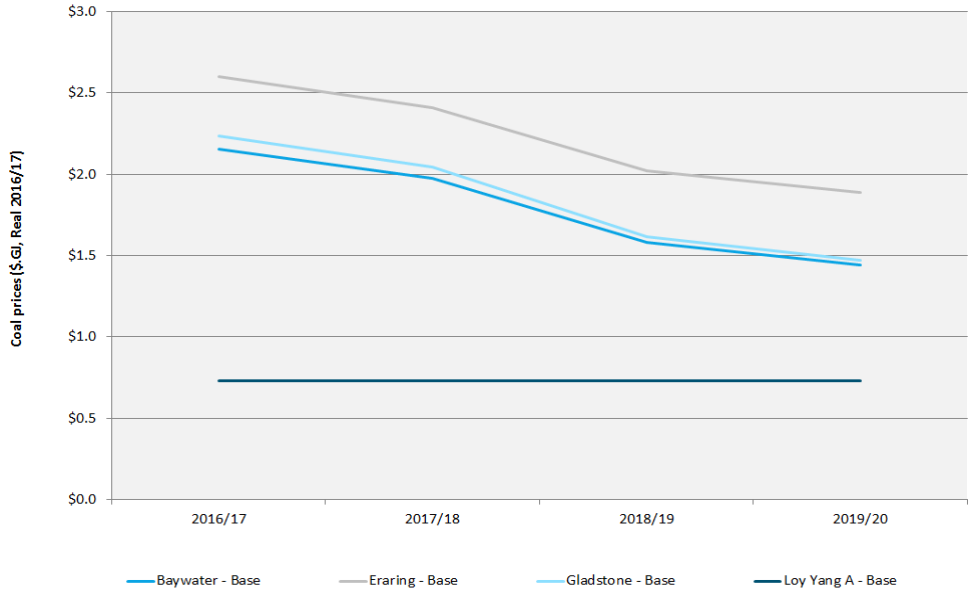
It is noted that some coal-fired generators may be finding it difficult to access long-term contracts for coal supply from coal mines which have an export option. To some extent, this may be due to uncertainty over the long-term future of coal generation in Australia, resulting in coal mines seeking export contracts rather than supplying coal domestically.

51 The net-back price is the price of liquefied natural gas sold internationally, minus the cost of liquefaction and transport.

52 It is noted that there are uncertainties in this forecast, as detailed in: Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, section 3.5.2.

53 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, section 3.5.2.

Figure 3.10 Forecast coal prices over the reporting period



Source: Frontier Economics

3.3.4 The effect of interconnectors on the wholesale electricity market

Transmission networks that transport electricity between regions are referred to as interconnectors.[54] Interconnectors allow electricity in lower priced regions to flow to higher prices regions, which reduces the overall cost of meeting demand in the NEM. Interconnectors allow retailers to access cheaper sources of generation. They also contribute to reliability of supply across the NEM as regions can draw upon a wider pool of reserves. Interconnectors are often viewed as a substitute for building additional generation, however they do not increase the supply of firm hedging contracts.

In the 2016 report,[55] interconnectors were expected to have a large effect on the trend in wholesale electricity prices. The retirement of Hazelwood was expected to significantly affect flows of electricity between regions. For example, Victoria moving from being a net exporter to New South Wales to a net importer from New South Wales. A of this was that interconnectors frequently became subject to binding constraints, leading to wholesale electricity purchase cost differentials being modelled between regions. This 2017 report found that interconnector flows were subject to binding constraints less frequently than expected in the 2016 report. Therefore, it has a minimal effect on wholesale prices.

3.3.5 Effect of the LRET and new government policies and plans on the wholesale electricity market

A number of state governments recently introduced their own energy policies aimed at increasing renewable generation, providing system security or putting downwards

54 There are currently six interconnectors in the NEM.

55 AEMC, *2016 Residential Electricity Price Trends*, Sydney, December 2016, pp24-27.

pressure on wholesale spot prices. Some of the policies are funded by government, and to the extent these policies impose a direct cost to consumers they are included in the environmental and system security cost component dealt with in Chapter 5. These policies, like the LRET, have the potential to additionally affect supply-demand dynamics and wholesale electricity costs.

Table 3.2 provides a summary of the direct costs and additional effects of the LRET and government energy policies and plans on wholesale, environmental and system security cost components. More detail on the Commonwealth Government energy policies and plans is provided in section 2.1.4 and more detail on the new state government energy policies and plan is outlined below.

Table 3.2 Assumed effects of government energy policies and plans on wholesale, environmental and system security costs in the NEM

Government energy policy or plan	Assumed effect on electricity cost components	
	Direct effect on environmental and system security costs	**Additional effects on wholesale costs in period 2016/17 to 2019/20**
Commonwealth government		
LRET	Yes (upwards pressure)	Yes (upwards or downwards pressure, depending on the supply/demand balance. See section 3.2)
Proposals to increase wholesale supply (expansion of Snowy Hydro and Tasmanian Hydro schemes and ADGSM)	No (not incorporated into modelling as either still to be finalised, occur outside the reporting period or effect remains relatively uncertain).	
South Australian government		
Energy Security Target (EST)	Yes (upwards pressure)	Yes (downwards pressure)
Government contracted load	No (government funded)	No (outside reporting period)
Emergency backup generator	No (government funded)	No
Utility scale battery storage	No (government funded)	No
Victorian government		
Victorian renewable energy target (VRET)	No (outside reporting period)	No (outside reporting period)
Victorian energy storage initiative	No (government funded)	Yes (slight downwards pressure)
Queensland government		
Renewable generation reverse auction	No (outside reporting period)	No (outside reporting period)
Direction to Stanwell on bid pricing	No	No[56]
Affordable energy plan	No (plan details still to be finalised)	No (plan details still to be finalised)
Tasmania		
Price cap for 2017/18	No (government funded)	Yes (direct effect through cap on wholesale prices).

56 This government direction has not been in place for a sufficient period of time to model the pricing effects for this report.

South Australia

The South Australian government has proposed a number of new energy policies and plans, including the Energy Security Target (EST),[57] a new generator to supply government contracted load, an emergency backup generator and a utility scale backup generator. Of these policies, it was assumed that only the EST would affect the estimate of wholesale costs,[58] as this scheme is designed to support synchronous generation in South Australia by providing a subsidy to gas generators and other synchronous power sources.[59] The direct costs of this scheme would likely be passed through by retailers to end consumers and are therefore included in the environmental and system security cost component (refer to Chapter 5).

It was assumed that the following South Australian government policies would not affect the estimate of wholesale costs:

- *Government contracted load* - the South Australian government will build the 150 MW Port Augusta solar farm to supply government contracted load. As this plant is expected to be completed in November 2020, it does not affect wholesale costs as it is expected to commence operation outside of the reporting period.[60]

- *Emergency backup generator* - the South Australian government will build a government owned emergency gas generator. It is assumed that this generation will only be used during times of emergency and will bid in at the market price cap, so will only be dispatched if there is a shortfall of energy.[61]

- *Utility scale battery storage* - in July 2017 it was announced that Tesla would build a 100 MW / 129 MWh grid level battery.[62] Currently it is unknown whether the battery will be used primarily for providing ancillary services or whether it will also supply energy to the wholesale market. For this report it was assumed that the battery will not regularly supply energy and hence it was not included in the modelling of wholesale electricity costs.

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57 The EST is expected to commence in January 2018. Government of South Australia, *Start date of Energy Security Target revised*, 10 June 2017. https://www.premier.sa.gov.au/index.php/tom-koutsantonis-news-releases/7625-start-date-of-energy-security-target-revised

58 For more information refer to: Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, pp19-20.

59 Department of the Premier and Cabinet, *Energy Security Target Stakeholder Consultation*, p2. http://www.dpc.sa.gov.au/__data/assets/pdf_file/0014/18113/Energy-Security-Target-Stakeholder-Consultation.pdf

60 Government of South Australia, *Port Augusta Solar Thermal to boost competition and create jobs*, 14 August 2017.

61 SA Government, *Our Energy Plan - New Gas Power Plant*, media release, website viewed 18 August 2017. http://ourenergyplan.sa.gov.au/gas-power-plant.html

62 South Australia Government, *Our Energy Plan – Battery Storage and Renewable Technology Fund*, http://ourenergyplan.sa.gov.au/battery.html

Victoria

Our wholesale modelling incorporated the following Victorian government policies:

- *VRET* - the aim of this scheme is for Victoria to generate 25% of its electricity from renewable generation in 2020 and 40% in 2025. The first generation under the VRET is expected to commence operation before the last quarter of the 2020 calendar year.[63] This occurs outside the reporting period and therefore does not affect estimates of wholesale costs in this 2017 report. The direct costs of this scheme are included in the environmental cost component (refer to Chapter 5).

- *Victorian energy storage initiative* - the Victorian government announced that it will fund a grid level battery which will be operational by January 2018.[64] Our modelling assumed that the battery would be 40 MW / 100 MWh and supply energy to the wholesale market.

Queensland

The Queensland government announced its Powering Queensland Plan which included:

- *Renewable generation reverse auction* - a plan to undertake a reverse auction for up to 400 MW of renewable energy, including up to 100 MW of energy storage. It was assumed that the new renewable projects would not be installed in the reporting period[65] and therefore do not affect the estimate of wholesale costs.

- *Direction to Stanwell on bid pricing* - in June 2017 the Queensland government announced that it would direct Stanwell Corporation to undertake strategies to place downward pressure on wholesale prices.[66]

On 22 October 2017, the Queensland Government announced the *Affordable Energy Plan*. This plan features a range of proposed initiatives, to apply from 1 January 2018, aimed at making electricity more affordable for residential and business customers.[67]As details of the plan are still to be finalised, the plan has not been incorporated into the estimate of electricity prices in this report.

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63 Victorian Government, *Victorian Renewable Energy Auction Scheme Fact Sheet*, p2, viewed 25 October 2017.https://www.energy.vic.gov.au/__data/assets/pdf_file/0014/80510/VRET-fact-sheet-Auction.pdf

64 Department of Environment, Land, Water and Planning, *Energy Storage Initiative: Application Guidelines*, Melbourne, 2016, viewed 3 November 2017.

65 Based on the timetable outlined in Queensland Renewable Energy Expert Panel, *Credible Pathways to a 50% renewable energy target for Queensland*, Final Report, 30 November 2016.

66 Queensland Government, Department of Energy and Water Supply, *Powering Queensland Plan: an integrated energy strategy for the state.* Website viewed 20 August 2017. https://www.dews.qld.gov.au/electricity/powering-queensland-plan

67 Queensland Government, Department of Energy and Water Supply, *Affordable Energy Plan: making electricity more affordable*, viewed 2 November 2017. https://www.dews.qld.gov.au/electricity/affordable-energy-plan

Tasmania

Wholesale costs in Tasmania are based on the Tasmanian Government's price cap for 2017-18.[68]

3.3.6 Uncertainty associated with estimated wholesale electricity costs

The wholesale electricity costs presented in this report reflect Frontier Economics' base case scenario, which represents the most likely combination of inputs for the reporting period. However, where any of these inputs differ from those modelled, prices may be higher or lower than estimated. For example, the decrease in wholesale prices may be less or not occur if there are delays in the expected timing of committed new generation entering the NEM. Alternatively, the decrease in wholesale prices may be greater than estimated if a larger amount of new generation enters the market than was modelled.

For more information, refer to Frontier Economics' report.[69]

68 This caps the wholesale price at $83.79 per MWh in 2017/18. http://www.premier.tas.gov.au/budget_2017/budget_releases/keeping_downward_pressure_on_power_prices

69 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, pp45-46.

4 Regulated network cost trends and drivers

Box 4.1 Key points

- Network tariffs are the prices that electricity distribution network business' charge retailers for the use of the electricity network by each retailer's customers. These tariffs include transmission costs which are passed through to distribution businesses.
- Network charges in 2016/17 represented approximately 45 to 55 per cent of a typical residential electricity bill for a consumer in the NEM, of which transmission costs represented 5 to 12 per cent and distribution costs represented 30 to 45 per cent.
- The trend in the regulated network component is uncertain in some jurisdictions due to ongoing legal and regulatory proceedings:
  - in NSW and the ACT, following the Federal Court decision in May 2017, the AER is required to remake its 2014-19 distribution revenue determinations. The AER's remade final determinations will need to align with the final rules of the NSW and ACT distribution network service providers (DNSPs) revenue smoothing rule changes
  - in South Australia, due to the potential outcomes of a judicial review, and any subsequent decisions or processes, in relation to the AER's final distribution revenue determination.
  - in Western Australia, due to ongoing processes related to Western Power's 2017-22 Access Arrangement.
- Given the uncertainty around the potential outcomes of legal and regulatory proceedings, this report has not speculated on the potential range of regulated network price outcomes over the reporting period. Instead, the regulated network component for each jurisdiction has been estimated using assumptions based on the latest and clearest available information.
- Over the reporting period, the regulated network component of a representative consumer's annual electricity bill is expected to slightly increase in South Australia, remain stable in south east Queensland, New South Wales, Victoria and Western Australia and slightly decrease in the ACT, Tasmania and the Northern Territory.

This chapter outlines:

- trends in network prices by jurisdictions
- why network regulation is required and its purpose

- institutions involved in determining electricity network revenues
- how services are economically regulated, and
- uncertain network price trends in some jurisdictions.

The approach for estimating transmission and distribution network components in each jurisdiction over the reporting period is outlined in the methodology section (Appendix A).

4.1 Trends in network prices by jurisdictions

Network charges in 2016/17 represented approximately 40 to 55 per cent of a typical residential electricity bill for a consumer in the NEM, of which transmission costs represented 5 to 12 per cent and distribution costs represented 30 to 45 per cent.

Figure 4.1 and Figure 4.2 below show that the regulated network component of representative electricity prices and annual bills over the reporting period is expected to increase in South Australia, decrease in the ACT, Tasmania and the Northern Territory, and remain stable in south east Queensland, New South Wales, Victoria and Western Australia. Note though that there is uncertainty around the trend in the regulated network component in several jurisdictions for various reasons, including:

- the potential outcomes of a judicial review of the AER's final determination
- the need for the AER to make or remake final determinations. In relation to NSW and the ACT, the AER is required to make decisions on revenue smoothing in accordance with the participant derogation revenue smoothing rule changes[70]
- the potential outcome of Western Power's 2017-22 Access Arrangement
- uncertainty around subsequent appeals and other processes.

This report has not speculated on the potential range of regulated network price outcomes over the reporting period. Instead, the regulated network component for each jurisdiction has been estimated using simplifying assumptions based on the latest and clearest available information. This information includes network businesses' initial regulatory proposals, the AER's draft and final revenue determinations and enforceable undertakings.

The drivers for the trends in the network cost component are specific to each jurisdiction. Refer to the jurisdictional appendices for information on current and

70 See AEMC, *Participant derogation - ACT and NSW DNSP Revenue smoothing rule changes*, http://www.aemc.gov.au/Rule-Changes/Participant-derogation-ACT-DNSP-Revenue-Smoothing http://www.aemc.gov.au/Rule-Changes/Participant-derogation-NSW-DNSPs-Revenue-Smoothing

upcoming network revenue determinations, the basis for network costs in each year of the reporting period and ongoing appeals and decisions.

The difference in consumption levels between jurisdictions drives differences in the network component of electricity prices and bills between jurisdictions, as shown in Figure 4.1 and Figure 4.2. This is particularly relevant as the consumption profiles of consumers are diverse across jurisdictions.

Figure 4.1 Network component of electricity prices for a representative consumer by jurisdiction

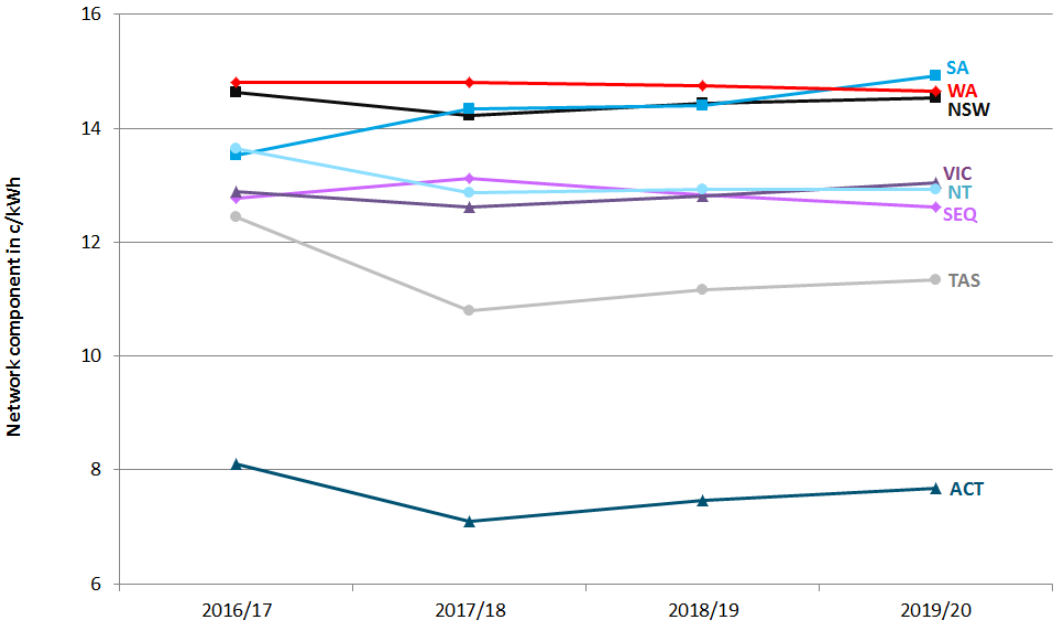
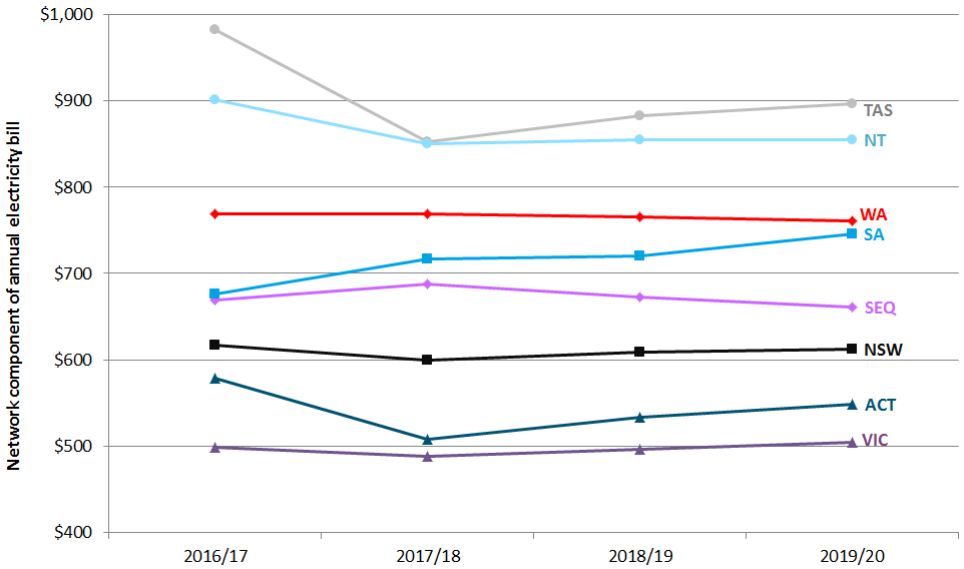


Figure 4.2 Network component of annual electricity bill for representative consumer by jurisdiction



4.2 Why network regulation is required and its purpose

The regulated network sector enables the power system to operate as a connected system and links power stations to the end users who consume electricity.[71] Generally, transmission lines connect electricity generators to major load centres and the distribution network delivers energy at lower voltages to residential and other consumers.

Electricity networks are capital intensive and incur declining average costs as output increases. Network services in a particular geographic area are, therefore, most efficiently provided by one supplier. This is what is known as a natural monopoly market structure. As there is no competition, Network Service Providers (NSPs) are regulated to encourage efficient investment and maintenance of reliability of the electricity network. This prevents consumers from being overcharged for its use. NSP's in the NEM are regulated under a framework based on incentives, which is discussed further in section 4.4.1.

The regulatory framework also provides requirements for NSPs to meet numerous regulatory standards relating to the safety, reliability and security of electricity supply to consumers. It also includes obligations for NSP's to provide access for generators to connect to the electricity network.[72]

In July 2017, the AEMC released the first edition of the annual Electricity networks economic regulatory frameworks review report.[73] This report reviewed the operation of the economic regulatory framework and how it has evolved against the backdrop of change in the past decade.

4.3 Institutions involved in determining electricity network revenues

The functions of institutions involved in the process of determining electricity network revenues are set out below:

- **NSPs** - submit proposals for network expenditure for each five year regulatory control period to the Australian Energy Regulator (AER) or the Economic Regulatory Authority (ERA)
- **the AER** - role includes determining the regulated revenues for all electricity network service providers in the NEM and Northern Territory.[74]

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71 The regulated network sector is operated by NSPs, including both Transmission Network Service Providers (TNSPs) and DNSPs

72 It is noted that large-scale generators pay for direct connection costs to the transmission network.

73 AEMC, *Electricity network economic regulatory frameworks review*, 18 July 2017. http://www.aemc.gov.au/Markets-Reviews-Advice/Electricity-Network-Economic-Regulatory-Framework

74 In the Northern Territory, the Utilities Commission determined regulated network revenues up until and including the current 2014-19 regulatory control period. Starting from the 2019-24 regulatory control period, regulated revenue determinations will be performed by the AER.

- **the Economic Regulatory Authority** - independent economic regulator that is responsible for determining access arrangements in Western Australia. The access arrangement covers prices, services, policies and terms and conditions for access to the Western Power network for a five year regulatory period.[75]

- **Federal Court of Australia** - the AER's decisions may be subject to judicial review by the Federal Court of Australia.[76] The grounds for judicial review relate to the legality of the administrative decision (e.g. an error of law), not the merits of the decision.

A limited merits review was introduced into both the NEL and National Gas Law (NGL) in 2008. The limited merits review allowed parties affected by prescribed decisions to have the decisions reviewed by the Australian Competition Tribunal where it could establish that there were grounds for this to occur. Affected parties had to demonstrate an error of fact, incorrect exercise of discretion, or unreasonableness by the AER in part of the determination, and that correcting that decision would result in a decision that overall is materially preferable in terms of the long-term interests of consumers. On 10 August 2017, the Commonwealth government introduced a new bill into the House of Representatives to abolish the limited merits review.[77] The bill passed the House on 5 September 2017, passed the Senate on 16 October 2017 and received Royal Assent on 30 October 2017.[78]

4.4 How services are economically regulated in the NEM

This section addresses the question of how to regulate NSP services in three parts:

1. The principles underlying network regulation in the NEM

2. The building block approach to calculating revenue allowances for NSPs, and

3. The pricing framework for DNSPs.

4.4.1 Principles

The key feature of network regulation in the NEM is that it is based on incentives. The AER locks in the total revenue requirement for each NSP at the start of each regulatory

75 Western Power, *Access Arrangements*, viewed 6 September 2017, https://westernpower.com.au/about/regulation/access-arrangements/

76 The AER's determinations are subject to judicial review under the Administrative Decisions (Judicial Review) Act 1977 (Cth).

77 Australian Competition Law, *Competition and Consumer Amendment (Abolition of Limited Merits Review) Bill 2017*, viewed 13 October 2017, https://www.australiancompetitionlaw.org/legislation/2017meritsreview-aer.html

78 Australian Competition Law, *Australian Competition Law | AER Merits review bill*, Australian Competition Law, Canberra, 2017, viewed 7 November 2017, https://www.australiancompetitionlaw.org/legislation/2017meritsreview-aer.html.

period. It is based on the AER's estimate of the efficient costs that a NSP would incur to meet its reliability standard and other regulatory obligations.

If a NSP spends less than the estimated efficient operating costs, it will retain savings for the remainder of the regulatory control period. These lower actual revealed costs may then lower the estimated efficient costs for the subsequent regulatory control period (all else being equal). This would result in lower approved operating expenditure that is included in network charges that retailers may pass through to customers. A similar incentive also exists in relation to the NSP's capital expenditure.

Importantly, under this approach, the AER does not approve funding for the NSP's specific projects or programs. Rather, once total revenue is set, it is for the NSP to decide which projects or programs are required to deliver services to consumers while meeting its regulatory obligations. For example, the framework provides NSPs with discretion to provide services by using any combination of:

- network or non-network options
- operating or capital expenditure based approaches
- a wide variety of technologies, and
- procuring inputs from third parties or investing in assets directly.

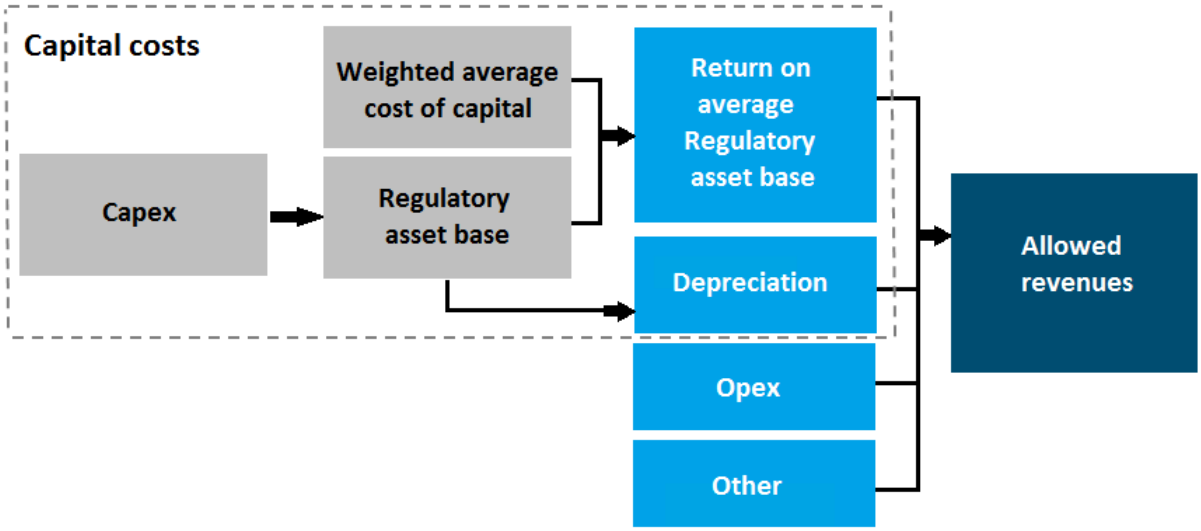
4.4.2 Building blocks

This section describes the following key components that are used to calculate NSPs' allowed revenues:

- capital costs - capital expenditure (capex), regulatory asset base, weighted average cost of capital (return on capital) and depreciation,
- operating expenditure (opex), and
- other components - including the Service Target Performance Incentive Scheme (STPIS), demand management incentive scheme and innovation allowance.

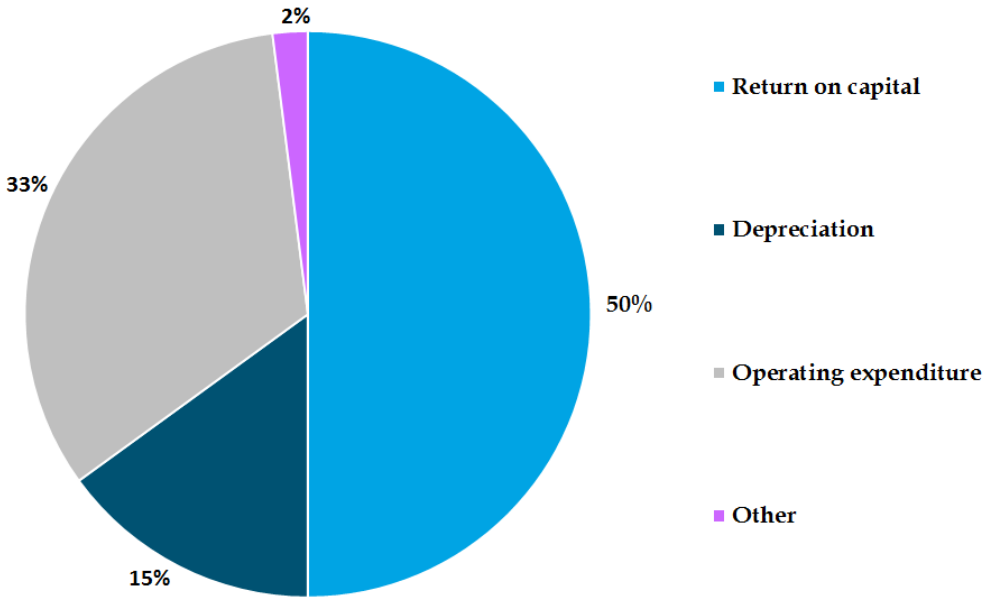
These components form part of the building block framework, shown in Figure 4.3 below, that is used to calculate network business' allowed revenues.

Figure 4.3 Components of the building block model



The breakdown of NSPs' allowed revenue into these building block components differs for each business. Figure 4.4 provides a typical example. The largest component is typically the return on and return of (depreciation) capital, which may account for up to two-thirds of revenue. The return on capital is determined by the size of a NSPs' regulatory asset base (including forecast capital expenditure) and its weighted average cost of capital (the rate of return necessary to cover a commercial return on equity and efficient debt costs). Operating expenditure typically accounts for a further 30 per cent of revenue requirements

Figure 4.4 Example of typical breakdown of building block components



Capital expenditure

Capital expenditure is spent on buying and installing assets like poles, wires and other equipment that allows the network to convey energy to customers. It varies from year to year because capital assets are generally costly to build but last for a number of years. To smooth out prices arising from the lumpy capital expenditure, the costs are recovered from customers over the life of the assets, instead of at the time of investments.

The regulatory framework accounts for the difference between when a network business incurs capital expenditure and when it recovers these costs from consumers. It does this by allowing businesses to earn both a return on capital (rate of return multiplied by the regulatory asset base) and a return of capital (depreciation). Both of these are recovered over the life of the assets.

The AER approves an estimate of total capital expenditure for each network business at the start of the regulatory control period. By locking in the allowance of efficient capital expenditure at the start of the regulatory control period, businesses face an incentive to undertake capital expenditure efficiently. This is because they keep savings on the financing costs of capital until the end of the regulatory control period if they spend less than their allowance. At the end of each regulatory period only the value of capital expenditure that was actually incurred by the business is added to the regulatory asset base for the next regulatory control period. Any savings are therefore passed on to consumers through lower allowed network revenues (and, therefore, lower network charges) in future regulatory control periods.

The AER determines the total capital expenditure for the regulatory period based on the capital expenditure objectives and criteria set out in the NER. These objectives and criteria require the AER to determine the efficient costs a prudent network business would need to:

- meet or manage estimated demand for standard control services
- comply with regulatory requirements (including jurisdictional reliability standards) associated with providing standard control services
- maintain safety of the distribution system through the supply of standard control services.

The AER is also required to, and has developed, an incentive scheme for capital expenditure under the NER, known as the capital expenditure sharing scheme (CESS). The CESS is not designed to replace the core feature of the economic regulatory framework of locking in total efficient capital expenditure up front. Rather, the CESS is complementary to this framework. The AER highlights three purposes of the CESS:

- balance incentives to spend on capital and operating expenditure,
- equalise the incentive for efficient capital expenditure in each year of a regulatory period, and

- share efficiency gains and losses between NSPs and consumers.

Regulatory asset base

The regulatory asset base is based on a network business' historical capital expenditure in assets that are used to provide network services. The AER determines the opening value of the Regulatory Asset Base (RAB) for an NSP for each year of a regulatory control period.

In general terms, the regulatory asset base in a given year of the regulatory control period is based on:

- the value of the regulatory asset base at the end of the previous regulatory control period,
- depreciation within the regulatory period, and
- forecast capital expenditure within the regulatory period.

Return on capital

The value of the NSPs' regulatory asset base is multiplied by the allowed rate of return to determine the return on capital.

The allowed rate of return, or the weighted average cost of capital, is the estimate of the cost of funds a NSP requires to attract investment in the network. An appropriate estimate of the rate of return, which compensates businesses for the risk they face, is essential to promote efficient investment by NSPs. If the rate of return is set too low, NSPs may not be able to attract sufficient funds to be able to make required investments to maintain reliability and security. Alternatively, if the rate of return is set too high, NSPs may face an incentive to spend more than necessary and consumers will pay inefficiently high prices.

The rate of return also influences the incentives NSPs face to spend on operating expenditure relative to capital expenditure. Capital expenditure earns a rate of return over time, whereas operating expenditure is recovered within the period of the expenditure. If NSPs expect that the rate of return will be higher than their actual cost of capital (the cost of borrowing and shareholders' required return), they will be incentivised to undertake capital expenditure rather than operating expenditure.

Similar to the overall economic regulatory framework, the rate of return operates on an incentive basis. That is, the AER sets the rate of return at the start of the regulatory control period based on its estimate of the efficient financing costs of a benchmark efficient entity with a similar degree of risk as the NSP. This provides NSPs with an incentive to obtain financing at the lowest available cost because their returns are based on the estimated rate regardless of their actual financing cost during the period. Information on risk allocation principles that relate to the allowed rate of return is outlined in Box 4.2 below.

Box 4.2 Risk allocation principles

Under the incentive-based framework, the AER must set an allowed rate of return that reflects the efficient financing costs of a benchmark efficient entity. This benchmark entity must be subject to a similar degree of risk in providing regulated services as the NSP. The purpose of this approach is to maintain incentives for investment because investors can reasonably expect to recover efficient costs.

How each risk is allocated between NSPs and consumers is a key factor in the AER's determination of an appropriate allowed rate of return. The approach taken to risk allocation is based on the principle that risks and accountability for investment decisions should rest with those parties best placed to manage those risks - generally the NSP that is making the business decisions. At the same time, measures that limit the risk imposed on NSPs to tolerable levels are likely to provide substantial benefits by liming the allowed rate of return and resulting network tariffs.

Key factors affecting risk allocation

How demand risk is allocated between consumers and NSPs is important for the allowed rate of return. There are two common approaches:

- revenue cap - the AER sets the allowed revenue a network business can recover over the regulatory control period, and
- price cap - the AER sets the average price level that a network business can charge over the regulatory control period.

Tariffs are based on forecasts of future demand, consumption and customer numbers under both approaches. Under the revenue cap approach, average prices are adjusted each year for errors in forecasts that result in revenue recovery above or below the allowed revenue. Put simply, network businesses under a revenue cap are guaranteed to recover the allowed revenue over the regulatory period. Under a price cap approach, prices are not adjusted for errors in forecasts which results in revenue recovery above or below the allowed revenue.

Systematic variations (if any) in the allocation of risk under both approaches are reflected in the allowed rate of return by the AER.[79] The AER determines which approach is most appropriate for the NSP in order to maximise benefits for end-users. Recent decisions have resulted in the AER moving to a revenue cap approach for network revenue determinations.

79 Note that investors can generally diversify away non-systematic, or business-specific risk. Therefore investors do not require financial compensation for business-specific risk. Financial compensation for equity holders is only required for bearing systematic risk. Sources of systematic risk include changes in real GDP, inflation, prices and real long term interest rates. See AER, *Better regulation - Equity Beta Issues Paper*, October 2013, p8 for further discussion.

Depreciation (return of capital)

Depreciation is the allowance provided so that capital investors recover their investment over the economic life of the asset (return of capital). The regulatory depreciation allowance is the net total of depreciation less the indexation of the RAB.

Operating expenditure

Operating expenditure is the non-capital cost of running the electricity network and maintaining the assets. Operating expenditure is generally recurrent and predictable from year to year.

Similar to capital expenditure, the regulatory arrangements for operating expenditure operate on an incentive basis. The AER locks in an overall estimate of operating expenditure for each NSP at the start at the regulatory period. This creates an incentive for NSPs to undertake operating expenditure efficiently. This is because NSPs retain savings for the remainder of the regulatory period if they spend less than the operating expenditure allowance. Customers benefit from these savings as the AER uses the information about costs incurred by the NSP to set lower operating cost allowances for the next regulatory period.

The AER determines the estimated operating costs for the regulatory control period based on the efficient costs a prudent network business would incur. The NER provide the AER with discretion to use a range of methods and information to determine the efficient operating expenditure.

The NER require the AER to create an incentive scheme, known as the efficiency benefit sharing scheme (EBSS), for operating expenditure. Similar to the CESS, the objective of this is not to alter the incentive for efficient operating expenditure, as this is already embodied in the regulatory framework. Rather, the EBSS is complementary to this framework.

The AER highlights three purposes for the EBSS:

- provide a balanced incentive to reduce operating and capital expenditure,
- incentivise continuous efficiency improvements in operating expenditure throughout the regulatory period, and
- allow NSPs and consumers to share in efficiency gains.

Other components

The rules also provide for the AER to develop a STPIS that provides rewards or penalties for network businesses based on how their reliability levels compare with historical performance. For example, if a network business' reliability performance worsens over time, it will be penalised by being allowed lower overall revenue. The amount of the reward or penalty is based on estimates of the value that consumers place on reliability.

The AEMC published the Demand management incentive scheme final rule determination in November 2015. The final rule put in place a framework to require the AER to develop incentive schemes to encourage more efficient demand management expenditure decisions by DNSPs. There are two mechanisms under the new frameworks:

- Demand management incentive scheme - the objective of the incentive scheme is to provide DNSPs with an incentive to undertake efficient expenditure on relevant non-network options relating to demand management. The scheme will reward DNSPs for implementing non-network options that deliver net cost savings to retail consumers

- Demand management innovation allowance - the objective of the innovation allowance is to provide DNSPs with funding for research and development in demand management projects that have the potential to reduce long-term network costs. The allowance will be used to fund innovative projects that have the potential to deliver ongoing reductions in demand or peak demand.

The AER is currently consulting on the development of the demand management incentive scheme and innovation allowance. On 28 August 2017, the AER published draft versions of its new demand management incentive scheme and innovation allowance mechanism.[80]

4.4.3 Pricing

After total revenue is determined within each NSPs' revenue determination, tariffs need to be developed to charge customers to allow NSPs to recover that revenue. Small customers (i.e. residential customers) are exposed to network charges indirectly, as network costs are passed through to retailers, who may pass some or all of the network costs through to customers in retail electricity prices.

There are two key components within the regulatory framework regarding network tariffs:

1. the control mechanism

2. rules regarding how each tariff is set - commonly known as the pricing principles.

These two components are described below.

Control mechanism

There are two common approaches to the control mechanism:

- revenue cap - the AER sets the allowed revenue a network business can recover over the regulatory control period.

80 Australian Energy Regulator, *Explanatory statement: Draft demand management innovation allowance mechanism*, Australian Energy Regulator, Melbourne, 2017.

- weighted average price cap - the AER sets the average price level that a network business can charge over the regulatory control period.

More information on these two approaches and the control mechanism affects risk allocation is provided above in Box 4.2.

Under the NER, the AER determines which approach is most appropriate for DNSPs. In doing so the AER must have regard to a number of factors, including the need for efficient pricing structures, administrative costs and consistency with control mechanisms for other DNSPs. Currently, all of the DNSPs other than ActewAGL are regulated under revenue caps.[81]

Pricing principles

Substantial changes were made to the NER in the distribution network pricing arrangements rule change in 2014 regarding the pricing principles. A new pricing objective for distribution businesses was introduced requiring prices to reflect the efficient costs of providing network services to each customer.

To achieve this objective, the new rule requires distribution businesses to comply with four pricing principles:

- each network tariff must be based on the long run marginal cost of providing the service. If consumers choose to take actions that will reduce future network costs, such as by reducing peak demand, then they will reduce future network costs. Network businesses will have flexibility about how they measure long run marginal cost

- the revenue to be recovered from each network tariff must recover the network business' total efficient costs of providing services in a way that minimises distortions to price signals that encourage efficient use of the network by consumers[82]

- tariffs are to be developed in line with a new consumer impact principle that requires network businesses to consider the impact on consumers of changes in network prices and develop price structures that are able to be understood by consumers. Consumers are more likely to be able to respond to the price signals that network prices are designed to send if they can relate their usage decisions to network price structures and sudden price changes are avoided. Network businesses can gradually phase-in new price structures

- network tariffs must comply with any jurisdictional pricing obligations imposed by state or territory governments. But if network businesses need to depart from the above principles to meet jurisdictional pricing obligations, they must do so transparently and only to the minimum extent necessary.

81 Unlike for DNSPs, the NER dictate that the control mechanism for TNSPs is a revenue cap.

82 It should be noted that consumers only observe network tariffs to the extent that these are reflected in retail tariffs.

The final rule and determination also clarify how the pricing objective and principles work together. Network businesses must comply with the principles in a way that contributes to the objective. If there is conflict between the principles, the final rule specifies the order of priority of the principles and the extent of businesses' ability to depart from the one of the principles to resolve that conflict.

4.5 How services are economically regulated in Western Australia

In the SWIS, Western Power's electricity network is regulated by the Economic Regulation Authority (ERA) . The regulation of Western Power includes, but is not limited to:

- **Access arrangements** - determining electricity network revenues for five year regulatory periods. In doing so, the ERA is to determine if Western Power:
  - complies with the requirements of the Access Code, and
  - meets the Access Code objective of promoting economically efficient investment in, and operation and use of, electricity networks and services of networks in Western Australia, in order to promote competition in electricity retail and wholesale markets.[83]
- **Annual price lists for network charges** - Western Power's access arrangement requires it to submit to the ERA a proposed price list and supporting information for the next pricing year. The ERA assesses the proposed price list to ensure it complies with the price control and pricing methods in Western Power's access arrangement.[84]
- **Service standards** - as part of the access arrangement, Western Power is required to include service standard benchmarks for each of its reference services. The ERA monitors and, at least once a year, must publish Western Power's actual service standard performance against its benchmarks.[85]

4.6 Uncertain network price trends in some jurisdictions

When the network pricing components are finalised following the completion of judicial reviews, remade AER final determinations and any subsequent processes, the trend in the regulated network component in relevant jurisdictions may increase or

83 Economic Regulation Authority, *Electricity Network Access Code 2004 - Guidelines for Access Arrangement Information*, 6 December 2010, p1.

84 Economic Regulation Authority, *Annual Price Lists for Network Charge*, viewed 12 September 2017, https://www.erawa.com.au/electricity/electricity-access/western-power-network/annual-price-lists-for-network-charges

85 Economic Regulation Authority, *Service Standards*, viewed 12 September 2017, https://www.erawa.com.au/electricity/electricity-access/western-power-network/service-standards

decrease compared to the information available for this report. This may affect the regulated network component during the reporting period for this report.[86]

For information on the basis for network costs in each jurisdiction across the reporting period, and ongoing appeals and decisions, refer to the jurisdictional appendices.

Table 4.1 below outlines the change in each network pricing component (increase or decrease) that leads to an increase in network revenues, which therefore may result in an increase in network prices. For example, an increase in return on debt, all other things being equal would increase the weighted average cost of capital, which would result in an increase in network revenues and network prices.

Table 4.1 Effect of change in network component on building blocks and network revenues

Network component	Effect on which building block component?	For network revenues to increase, this network component needs to change as follows:
Operating expenditure	Operating expenditure	Increase
Capital expenditure	Return on average RAB	Increase
	Depreciation	Increase
Return on debt	Weighted average cost of capital	Increase
Return on equity	Weighted average cost of capital	Increase
Gamma	Tax allowance	Decrease
Inflation	Return on average RAB	Decrease

86 That is, in some jurisdictions the relevant reviews, determinations and any subsequent processes may not be completed in time to be incorporated into 2018/19 or 2019/20 annual prices.

5 Environmental and system security policy costs

Box 5.1 Key findings

- A number of environmental and system security schemes have been introduced by Commonwealth and jurisdictional governments that affect residential electricity prices. These include the renewable energy target (RET), feed-in-tariff (FiT) schemes, energy efficiency schemes and a system security scheme in South Australia.
- Environmental and system security costs in 2016/17 represented approximately 3 to 14 per cent per cent of a typical residential electricity bill across all jurisdictions. In most jurisdictions these direct costs are approximately 3 to 6 per cent of a typical residential electricity bill, however they are higher in south east Queensland and the ACT due to environmental schemes in those jurisdictions.
- Over the reporting period, the trend in environmental and system security policy costs is increasing in New South Wales, ACT, Victoria, South Australia, Tasmania, Western Australia and the Northern Territory and is decreasing in south east Queensland.

Environmental and system security schemes have been introduced by Commonwealth and jurisdictional governments with various objectives, including:

- encouraging investment in renewable or gas generation
- making energy efficiency more accessible and affordable
- supporting system strength (South Australian Government only).

Throughout this report, these schemes are grouped together as environmental and system security policies.

This chapter provides an overview of environmental and system security policies, and the trends in these costs over the reporting period.[87] Additional information on these policies and costs is provided in the jurisdictional Appendices.

Some environmental and system security costs have additional effects on the wholesale electricity market. These effects are outlined in chapter 3.

5.1 Trends in environmental and system security policy costs

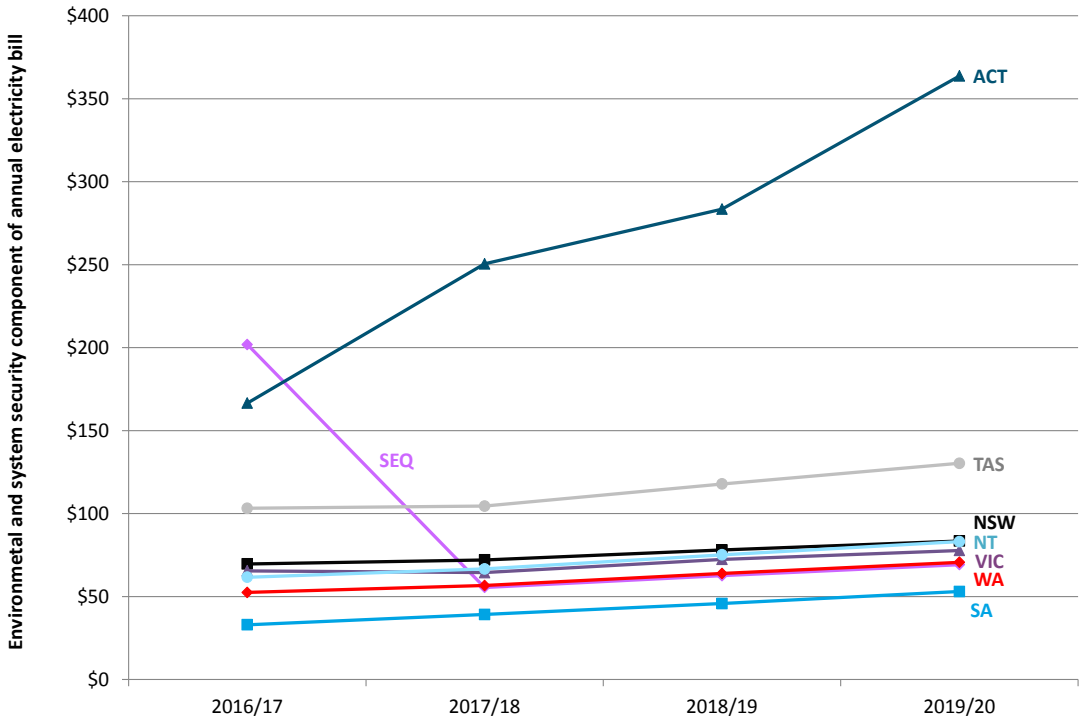
Environmental and system security policy costs in 2016/17 represented approximately 3 to 14 per cent of a typical residential electricity bill across all jurisdictions. In most jurisdictions these direct costs are approximately 3 to 6 per cent of a typical residential

87 Information on policy costs was provided by the jurisdictional governments.

electricity bill. However, they are higher in south east Queensland, due to the Solar Bonus Scheme, and the ACT due to the solar feed-in-tariff(FiT) scheme. Aside from the direct costs, environmental schemes in particular, can also have additional effects on customers' bills through the impact they have on the wholesale electricity market.

Figure 5.1 shows the trends in environmental and system security policy costs across jurisdictions over the reporting period.

Figure 5.1 Environmental and system security component of annual electricity bill for representative consumer in each jurisdiction



It is important to note that these schemes are often bespoke to a state or territory. Over the reporting period, the trends in environmental and system security policy costs prices are driven by:

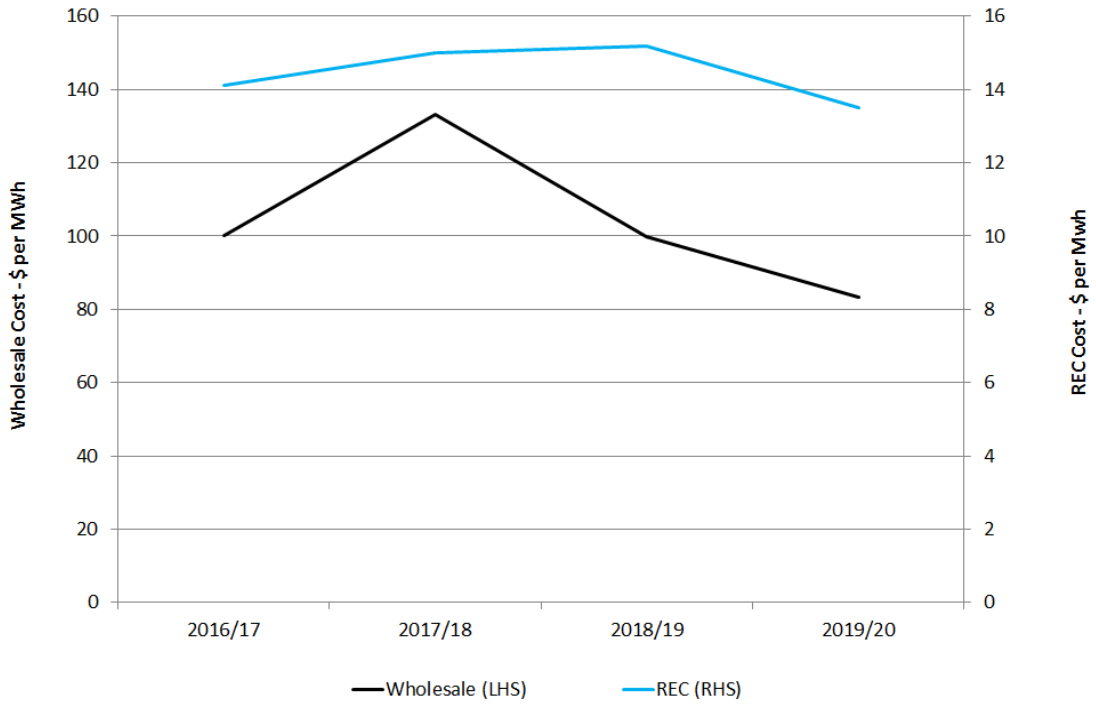
- *Large-scale renewable energy target (LRET)* costs increasing in all jurisdictions
- *Small-scale renewable energy scheme (SRES)* costs decreasing in all jurisdictions
- *South east Queensland Solar Bonus Scheme* - the Queensland Government has removed charges for this scheme from distribution network prices and included them in the Queensland Government budget from 2017/18 to 2019/20. For more information, refer to Appendix B.

- *ACT solar feed-in-tariffs (FiT) scheme* - costs increase across the period due to the expected increase in FiT payments for large-scale generators.[88] This is based on a reverse auction process, as explained in Appendix D.

The effect of these schemes on wholesale market structure may have a greater impact on customer bills than the direct effects estimated in this section.

Figure 5.2 below shows the estimated Renewable Energy Certificate (RECs) costs[89] and estimated national average wholesale costs over the reporting period. This shows that REC and wholesale costs are estimated to decrease in 2019/20, which is related to the large volume of new renewable generation entering the NEM in 2019/20.

Figure 5.2 Estimated REC and national average wholesale costs over the reporting period



5.2 Renewable energy target

The renewable energy target (RET)[90] applies on a national basis, and consists of the LRET and SRES.

88 ACT Government, *How do the ACT's renewable energy reverse auctions work?* Viewed 8 September 2017. https://www.environment.act.gov.au/energy/cleaner-energy/how-do-the-acts-renewable-energy-reverse-auctions-work

89 In Figure 5.2, RECs are the sum of LGC and STC costs.

90 The RET is based on a legislated annual target of 33,000 GWh of generation from renewables by 2020.

LRET and SRES costs are estimated for the AEMC by Frontier Economics. For information on the methodology for estimating these costs, refer to the Frontier Economics report.[91]

5.2.1 Large scale renewable energy target

The LRET supports the installation of large-scale renewable generators, such as wind and solar farms. Under the LRET, eligible renewable energy generators are able to create Large-scale generation certificates (LGCs) based on the amount of electricity they produce. In most circumstances, electricity retailers are then required to purchase these certificates and surrender them to the Clean Energy Regulator (CER). Costs incurred in purchasing certificates are assumed to be passed on to consumers through retail prices.[92]

For information on the additional effects that the LRET has on wholesale electricity costs, refer to Chapter 3.

5.2.2 Small scale renewable energy scheme

The SRES supports the installation of small-scale renewables, such as household solar and solar hot water systems. Under the SRES, eligible renewable energy generators are able to create small-scale technology certificates (STCs) based on the amount of electricity they produce. In most circumstances, electricity retailers are then required to purchase these certificates and surrender them to the CER.[93] Costs incurred in purchasing certificates are assumed to be passed on to consumers through retail prices.[94]

5.3 Victorian renewable energy target

The aim of the VRET is for Victoria to generate 25% of its electricity from renewable generation in 2020 and 40% in 2025. The first generation under the VRET is expected to commence operation before the last quarter of the 2020 calendar year.[95] This occurs

91 Available on the AEMC's website: Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

92 Although it is assumed for this report that retailers pass-through the cost of LGCs to its customers, a retailer may decide not to pass-through these costs or only pass-through a portion.

93 For further information, please see: Clean Energy Regulator 2017, Canberra, Certificate surrender, viewed 20 June 2017, http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Renewable-Energy-Target-liable-entities/Certificate-surrender.

94 Although it is assumed for this report that retailers pass-through the cost of STCs to its customers, a retailer may decide not to pass-through these costs or only pass-through a portion.

95 Victorian Government, *Victorian Renewable Energy Auction Scheme Fact Sheet*, viewed 25 October 2017. https://www.energy.vic.gov.au/__data/assets/pdf_file/0014/80510/VRET-fact-sheet-Auction.pdf

outside the reporting period and therefore does not affect estimates of wholesale costs in this 2017 report.

5.4 Feed in tariff schemes

FiT's can be defined as either net or gross electricity generation. A gross FiT is where a consumer receives a payment for all electricity generated by the renewable generator, whereas a net FiT is where the consumer is only paid for the excess electricity that is exported to the grid. FiTs can either be mandated through government schemes or offered voluntarily by retailers. A number of mandatory government schemes have now been phased out and replaced with voluntary retailer FiT payments.

This report only covers government FiT schemes which were mandatory during the reporting period and are therefore a direct environmental cost. These are outlined below:

- Queensland's Solar Bonus Scheme (SBS)[96]
- NSW Solar Bonus Scheme[97]
- ACT small, medium and large-scale FiT schemes[98]
- Victoria's FiT schemes[99]
- South Australia's Solar Feed-in scheme.[100]

For information on the nature and costs associated with these solar FiT schemes, refer to the relevant jurisdictional appendix.

96 Direct environmental costs for this scheme are only included in 2016-17. No environmental costs relate to this scheme for 2017/18 to 2019/20, as the Queensland Government has moved funding of the SBS from DNSP charges to the Queensland government budget.

97 This government scheme was closed on 31 December 2016. From 1 January 2017, customers on this scheme no longer receive subsidised payments, however can receive unsubsidised payments if their retailer voluntarily offers a FiT. NSW Planning & Environment, *The Solar Bonus Scheme is closed,* website viewed 21 August 2017.

98 The small and medium-scale FiT schemes are closed for new entrants, however consumers on the scheme continue to receive FiT payments for 20 years from after their system was connected to the distribution network. ACT Government, *2015-16 Annual Feed-in-tariff Report*, December 2016, p5.

99 Victorian Government, *Current feed-in-tariff*, website viewed 21 August 2017. https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/current-feed-in-tariff

100 In addition, South Australia also has a voluntary Retailer Feed-in-tariff (R-FiT) scheme. From 1 January 2017, ESCoSA determined that it would not set a minimum amount for R-FiT. ESCoSA, *Solar feed-in-tariff scheme*, website viewed 21 August 2017. http://www.escosa.sa.gov.au/consumers/energy/solar-feed-in-tariff-scheme

5.5 Energy efficiency schemes

The following jurisdictional schemes are designed to assist consumers in reducing their energy consumption through energy efficiency measures:

- New South Wales Energy Savings Scheme (ESS)
- ACT Energy Efficiency Improvement Scheme (EEIS)
- Victorian Energy Upgrades (VEU)[101]
- South Australia Retailer Energy Efficiency Scheme (REES)
- Tasmanian Energy Efficiency Loan (TEEL).[102]

The cost of these schemes either have a direct impact on residential prices or is government funded. For information on the nature and costs associated with these energy efficiency schemes, refer to the jurisdictional appendices.

5.6 System security scheme

The only jurisdictional system security policy is the Energy Security Target in South Australia. This scheme is designed to support electricity generation from eligible generators (gas-fired generation and other synchronous power sources) in South Australia by providing a subsidy.[103] Existing and new gas generators and other synchronous power sources in South Australia will be able to create one certificate for each MWh of electricity generated. The certificate will then be purchased by retailers, who are assumed to pass through the cost to consumers.[104]

For information on the effects of the EST on the wholesale electricity market, refer to section 3.3.5 and Frontier Economics' report.[105]

101 Victorian Energy Upgrades is the new name for the previous Victorian Energy Efficiency Target (VEET) scheme

102 The TEEL scheme is government funded.

103 South Australian Government, *Energy Security Target*, viewed 22 September 2017. ourenergyplan.sa.gov.au/energy-security-target.html.

104 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017, p19. Note: However, as this scheme has not been in operation historically, there is no evidence or historic treatment of these costs to determine if they are likely to be passed-through by retailers to consumers or whether the retailer will incur part or all of the costs themselves.

105 Ibid, pp19-21.

6 Residual component

The residual component is derived for the 2016/17 and 2017/18 base year by subtracting:

- wholesale costs
- environmental and system security policy costs, and
- regulated network costs

from the representative standing offer price or market offer price in each jurisdiction.[106] The exception is in Western Australia where the cost stack includes a retail cost component, which is equivalent to the regulated retail cost.[107] The details regarding how the residual component is calculated are contained within the respective jurisdictional appendices.

The residual component is comprised of:

- cost incurred by retailers to operate their business
- retail profit or loss
- errors in the estimated value of all of the other supply chain cost components.

Therefore, it is important to note that the residual component in this report does not reflect nor is it meant to represent retail margins (either gross or net). The purpose of this Residential Electricity Price Trends report is to provide an indication of trends in retail bills and the drivers of those trends. This report does not forecast the actual costs that will be paid by retail customers of any of the supply chain components.

Although this report does not examine retail costs or margins, the Commission did consider these issues as part of AEMC's 2017 Retail Energy Competition Review.[108] The Retail Energy Competition Review assesses the effectiveness of competition in retail energy markets. Further, it looks at the current state and possible future development of retail competition across the NEM. Therefore this review, rather than the Residential Electricity Price Trends Report, should be referenced in relation to specific costs related to the retailing of electricity.

106 The residual component is assumed to increase at an annual inflation rate of 2.5 per cent for future years in the reporting period.

107 Retail costs are also regulated in Tasmania, ACT and the Northern Territory. In these jurisdictions, the residual component is based on the standing offer price minus wholesale costs, environmental policy costs and network costs, as opposed to being based on the regulated retail cost.

108 See: AEMC, *2017 Retail Energy Competition Review*, Final Report, 30 June 2017, Sydney, chapter 10 and Appendix D.

A Methodology

Box A.1 Summary of methodology used for 2017 Residential Electricity Price Trends report

The methodology followed for the 2017 report includes:

- estimating trends in residential electricity prices over the period 2016/17 to 2019/20 (the reporting period) based on estimates of household electricity consumption, representative retail prices and electricity supply chain components
- estimating electricity prices for a representative set of residential consumers. The representative consumer in each jurisdiction is defined by their electricity consumption characteristics including:
  - total annual electricity consumption and how this consumption is split across the quarters of the year
  - use of off-peak tariffs
  - gas use
  - number of people in the household
- developing representative retail prices for each year of the reporting period using the following:
  - for 2016/17 and 2017/18, generally-available market and standing offers were collected for each electricity retailer in each distribution network area
  - the collected offers were expressed in terms of a c/kWh value based on the representative consumption level
  - for the remaining years of the reporting period, prices were estimates. For Victoria, prices were also estimated for 2017/18
- electricity supply chain components have been grouped into the following segments:
  - regulated network costs
  - wholesale electricity costs
  - environmental and system security policy costs
  - residual component.

This appendix outlines the approach to estimating trends in residential electricity prices for the reporting period. It covers the types of data collected and how it has been used in this analysis. This chapter sets out the methodology for the estimation of:

- household electricity consumption
- representative retail prices
- electricity supply chain cost components.

Retail electricity offers were collected and the price that would be paid by representative consumers, if they were to be on these offers, was calculated. These actual retail prices were available for the first two years (2016/17 and 2017/18) of the reporting period, in most jurisdictions. Then the trends in supply chain cost components were developed and used to inform the retail prices and annual bills that would be paid by the representative consumer in future years.

A.1 Household electricity consumption

Electricity prices have been estimated for a representative set of residential consumers. These representative consumers are defined by their electricity consumption characteristics.

The two key characteristics of the representative consumer are:

- their total annual electricity consumption measures in kWh
- how this consumption is divided throughout the year, on a quarterly basis.

For all jurisdictions aside from South Australia, Western Australia and the Northern Territory, both the annual consumption value and the quarterly breakdown are based on benchmark values published by the AER.

In the 2016 report, representative consumption levels in most jurisdictions were developed based on data from the AER's 2014 Electricity Bill Benchmarks.[109] In this 2017 report, representative consumption levels in most jurisdictions were developed based on data from the AER's 2017 Electricity Bill Benchmarks.

The AER benchmark values are based on a survey of around 8,000 households where participants are asked about their homes and the way in which they use electricity. The survey produced consumption values for different types of households. The households are defined by the presence of a pool, the presence of a mains gas connection, the presence of either split system or reverse system air conditioner and the number of occupants.

109 AER, *Electricity bill benchmarks for residential customers 2014*, December 2014. https://www.aer.gov.au/retail-markets/retail-guidelines-reviews/electricity-bill-benchmarks-for-residential-customers-2014

A.1.1 Total annual electricity consumption

By analysing the survey results, the most common type of household in each jurisdiction was determined. The consumption value and quarterly profile associated with these households have been used as the representative consumer in each jurisdiction.

There are no benchmark values for Western Australia as it was not included in the household survey published by the AER. A consumption value provided by the Western Australian government has been used. The South Australian government requested the same consumption level be used that is used by several South Australian organisations that report on electricity prices. The Northern Territory government provided a typical consumption value based on 2016-17 retailer information for the Northern Territory.

The annual consumption of the representative consumers are set out in Table A.1. The same consumption levels have been used for the whole reporting period.

Table A.1 Most common household types and consumption levels

Jurisdiction	Most common household types	General Consumption (kWh) Controlled load consumption (kWh)	Total annual consumption (kWh)
Derived by the AEMC from AER benchmark values			
Queensland	2 person household; no mains gas; no pool; air conditioning, off-peak hot water and on a market offer	4,434 806	5,240
New South Wales	2 person household; no pool; mains gas and on a market offer	4,215	4,215
Australian Capital Territory	2 person household; no mains gas; no pool, electricity water heating and on the regulated standing offer	7,151	7,151
Victoria	2 person household; mains gas; no pool and on a market offer	3,865	3,865
Tasmania	2 person household; no mains gas; no pool, electric water heating and on the regulated standing offer	3,559 4,349[110]	7,908

110 In Tasmania, 3,559 kWh relates to Tariff 31 (Light and power) and 4,349 kWh relates to Tariff 41 (Heating and hot water).

Jurisdiction	Most common household types	General Consumption (kWh)	Total annual consumption (kWh)
		Controlled load consumption (kWh)	
Provided by jurisdictional governments			
Northern Territory	2 person household; no mains gas; no pool; air conditioning and on the government set price	6,613	6,613
South Australia	On a market offer	5,000	5,000
Western Australia	4 person household (2 adults and 2 children) and on the government set price	5,198	5,198

In Queensland the most common household type does not have a mains gas connection. Therefore, it is assumed that the representative consumer in Queensland has an off-peak hot water system. As a result, part of their consumption has been allocated to an off-peak tariff (also referred to as a controlled load tariff). In Queensland 15 per cent of total annual consumption, is allocated to the off-peak tariff.[111]

For Tasmania, total annual consumption (7,908 kWh) is allocated between Light and Power Tariff 31 (3,559 kWh) and Heating and Hot Water Tariff 41 (4,349 kWh), consistent with the most common Tasmanian tariff combination and allocation.[112]

A range of factors lead to differences in the representative consumption levels between jurisdictions, such as climate, population density, economic conditions and the availability of mains gas. The relative prevalence of residential solar PV systems may also affect the results.

A.1.2 Consumption by quarter

The other important component of the consumption of the representative consumer is their quarterly consumption profile. This is relevant for retail offers where the first block of energy is charged at a different price to subsequent blocks. When this is the

111 This percentage allocation was determined by reference to the Energex data (see: https://www.energex.com.au/about-us/our-commitment/to-our-customers/connecting-with-you/data-to-share) and Regulatory Information notice responses which are published by the AER.

112 Office of the Tasmanian Economic Regulator, *Comparison of Australian Standing Offer Energy Prices as at 1 February 2017*. http://www.economicregulator.tas.gov.au/Documents/Standing%20Offer%20Prices%20February%202017.PDF

case, the way in which consumption is divided throughout the year may affect the overall c/kWh value that a household will pay.[113]

For the applicable jurisdictions, the quarterly profiles are set out in Table A.2

Table A.2 Quarterly profiles of the representative consumers' annual consumption profile

Jurisdiction	Summer	Autumn	Winter	Spring
Queensland	27%	25%	25%	23%
New South Wales	27%	23%	29%	21%
Australian Capital Territory	19%	23%	33%	26%
Victoria	23%	24%	29%	24%
South Australia	26%	22%	27%	25%
Northern Territory	25%	25%	25%	25%
Tasmania	18%	23%	33%	26%

Source: AER 2017 Electricity Bill Benchmarking data

The quarterly profiles are based on AER Bill Benchmarking data. The AER provided regression equations describing the contribution of electricity consumption by different explanatory variables such as by the presence of a pool, the presence of a mains gas connection, the presence of either split system or reverse system air conditioner and the number of occupants. The data source has also been used for the South Australian quarterly profile, which is applied to the South Australian government supplied annual consumption level. No quarterly profile is required for the Northern Territory or Western Australia as the most common regulated tariffs in these jurisdictions charge all consumption at the same rate.

High and low quarterly electricity consumption households were also calculated. The process for calculating overall consumption and quarterly load profiles is similar to calculating the consumption of the representative consumer. High electricity consumption numbers are typically derived by adjusting the representative consumer by increasing the number of occupants in the household. Low electricity consumption numbers are typically derived by adjusting the representative consumer by decreasing the number of occupants in the household.

113 For example, an offer could feature different c/kWh for the first 1,000 kWh per quarter, the next 1,000 kWh per quarter, and any consumption in excess of 2,000 kWh per quarter.

A.2 Representative retail prices

This report provides representative retail prices for each jurisdiction for each year of the reporting period. Developing representative prices involves the following steps:

- for 2016/17, standing and market offers were collected from Energy Made Easy on 30 March 2017 for Queensland, New South Wales, Australian Capital Territory and South Australia
- for 2017/18, standing and market offers were collected from Energy Made Easy on 25 July 2017 for Queensland, New South Wales, Australian Capital Territory and South Australia
- for Victoria, standing and market offers for 2016/17 were collected from Victorian Energy Compare on 15 March 2017 and for 2017/18 they were estimated using the methodology in Table A.3.
- for Tasmania, standing offers from 2016/17 and 2017/18 were taken from Aurora Energy
- for Northern Territory, standing offers from 2016/17 to 2017/18 were provided by the Northern Territory Government
- for Western Australia, standing offers from 2016/17 and 2017/18 were taken from Synergy and Horizon Power
- the collected offers were expressed in terms of a c/kWh value based on the representative consumption level
- prices for the base year (2016/17) and current year (2017/18) were calculated using available retail offers, then prices were estimated for future years. For Victoria, the current year (2017/18) prices were also estimated. The reason for a different approach being applied in Victoria is that retailers release new electricity prices at the start of the year (calendar year basis), compared to other jurisdictions where new electricity prices are released in the middle of the year (financial year basis).

All standing and market offers are single rate offers. This rate does not have peak or off peak periods.

A.2.1 Standing and market offers

Generally, retail offers are classified as being either standing or market offers. The difference between the two types of offers is the contractual terms and conditions:

- **standing offers** are basic electricity contracts with terms and conditions that are regulated by law; retailers cannot alter them.[114] In some, but not all jurisdictions, the standing offer is also regulated

- **market offers** are electricity contracts determined by retailers in the competitive market. These contracts must contain a minimum set of terms and conditions, such as consumer protection obligations.

Outside of the minimum requirements, retailers have greater flexibility in how they design their market offers in response to consumer preferences and retail market conditions. The terms and conditions of market offers generally vary from standing offers, and could include incentives, different billing periods and additional fees and charges.

In jurisdictions where residential prices are regulated, standing offers are set by either jurisdictional regulators or governments.[115] In other jurisdictions, retail prices have been deregulated and standing offers are set by electricity retailers.

Available standing and market offers were collected from each electricity retailer in each distribution network area for each jurisdiction. Offers need to be a single energy price, including block or seasonal block structures to be included in the analysis. The representative prices calculated do not include time-varying offers, such as time-of-use or variable pricing.

Offers were sourced from price comparator websites, governments, independent regulators and retailers' websites. Table A.3 outlines the source of standing and market offers and other information used to estimate prices for each jurisdiction over the reporting period.

114 In jurisdictions that have adopted the National Energy Customer Framework (NECF), the applicable terms and conditions are set out in the National Energy Retail Rules (NERR). This currently applies to the Australian Capital Territory (ACT), Tasmania, South Australia, New South Wales and Queensland.

115 This is currently the case in regional Queensland (however, not in south east Queensland where prices were deregulated as of 1 July 2016), Western Australia, Tasmania, the Northern Territory and the ACT.

Table A.3 Source of offers and government-set prices used to estimate prices by jurisdiction over the reporting period

<table>
<tr><th>Jurisdiction</th><th>2016/17</th><th>2017/18</th><th>2017/18</th><th>2018/19</th></tr>
<tr><td>South east Queensland*</td><td rowspan="4">Prices were collected from the AER's Energy Made Easy website on 30 March 2017 as follows:

• market offers for south east Queensland, New South Wales, the ACT and South Australia

• non-regulated standing offers for south east Queensland, New South Wales and South Australia

• regulated standing offers for the ACT</td><td rowspan="4">Prices were collected from the AER's Energy Made Easy website on 25 July 2017 as follows:

• market offers for south east Queensland, New South Wales, the ACT and South Australia

• non-regulated standing offers for south east Queensland, New South Wales and South Australia

• regulated standing offers for the ACT</td><td colspan="2" rowspan="4">Escalated based on the sum of estimated environmental and system security policy costs, regulated network costs, wholesale electricity costs and residual component from current year 2017/18</td></tr>
<tr><td>New South Wales*</td></tr>
<tr><td>Australian Capital Territory</td></tr>
<tr><td>South Australia</td></tr>
<tr><td>Tasmania</td><td colspan="2">The regulated standing offers were used for 2016/17 and 2017/18, as determined by the Tasmanian Economic Regulator</td></tr>
<tr><td>Victoria</td><td>Prices were collected from the Victorian Government's Victorian Energy Compare website, as follows:

• For 2016, collected all published non-regulated standing and market offers available at 15 March 2017</td><td colspan="3">Escalated based on the sum of estimated environmental policy costs, regulated network costs, wholesale electricity costs and the residual component from base year 2016/17.</td></tr>
</table>

Jurisdiction	2016/17	2017/18	2017/18	2018/19
Western Australia	Government set prices for 2016/17 and 2017/18 were used.		The movement in prices in 2018/19 and 2019/20 is based on the trend announced in the 2017/18 state budget.[116]	
Northern Territory	Residential tariffs for 2016-17 were based on an average of the prices set by the Northern Territory Government for the 2016 and 2017 calendar years.	The Northern Territory Government moved to updating prices on a financial year basis for 2017-18.	It is assumed that residential tariffs for 2018-19 and 2019-20 will increase at an inflation rate of 2.5 per cent.	

* In the case of south east Queensland, where the representative consumer has some consumption on an off-peak tariff, the retail offers that were applicable to this type of consumer were used.

116 Western Australia State Budget 2017-18, *2017-18 Budget Papers*. Available at: https://www.ourstatebudget.wa.gov.au/Budget-Papers/

A.2.2 Cent per kilowatt hour value

The terms of reference requires retail prices to be reported as a c/kWh value. Actual retail offers typically feature a fixed daily charge and variable energy charge. Further, retail offers typically feature discounts tied to timely payments or the use of a specific payment option (direct debit or online payments).

The process to convert each retail offer into a c/kWh value is described below.

Box A.2 Process of calculating a c/kWh value

Residential electricity prices generally include the following:

- **fixed charge:** applies on a daily basis and is independent of the amount of electricity consumed
- **variable charge:** applies to each block of electricity consumed. It is variable in the sense that it will vary depending on how much electricity is consumed. This component is also referred to as 'usage charge' or 'energy charge'.

Some retail offers have only one price for all electricity consumed. Other offers are structures so the first block of electricity is charged at a different price to subsequent blocks.

For each individual offer, retail prices are converted to c/kWh as follows:

- multiply the variable charge by the amount of electricity, in kWh, that is consumed by the representative consumer in each block of the tariff in each quarter of the year
- multiply the fixed daily charge by the number of days in the quarter
- sum the fixed and variable results from each quarter to obtain an annual total cost
- divide the annual total cost by the consumption in the four quarters to obtain a c/kWh value.

Where a retail offer has a fixed charge that is greater than zero, the c/kWh value will be lower for a high electricity consumption household, compared to a low consumption household. This is due to the fixed daily charge being spread across a larger volume of consumption.

A c/kWh value was calculated for all of the retail offers collected. It has been assumed that all discounts are awarded and that no penalties are incurred. Monetary values have not been assigned to non-monetary incentives (such as frequent flyer points).

Where there was only one relevant retail offer in a jurisdiction (eg the government regulated price), the corresponding c/kWh value is used for that jurisdiction. Where there are multiple retailers, it is necessary to calculate jurisdictional averages.

Jurisdictional averages

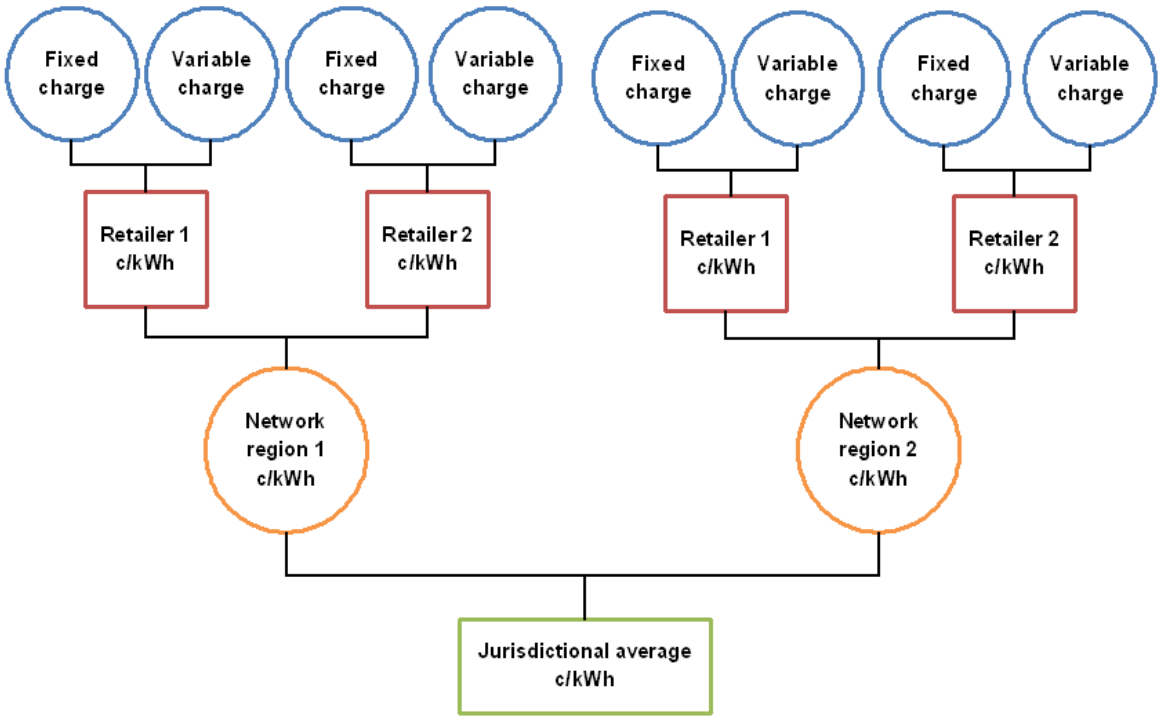
To determine the jurisdictional average:

- an average c/kWh value was calculated for each region based on the cheapest c/kWh offer for each retailer
- this is then weighted by the corresponding market share of each retailer based on customer numbers but excludes commercial and industrial customers.

For New South Wales and Victoria, where there are multiple network regions, the network region rates were averaged and weighted by proportion of consumers in each network in order to obtain a jurisdictional average. For Queensland, all reporting refers to the Energex network covering south east Queensland.

This process is illustrated in Figure A.1 below:

Figure A.1 Process of calculating a jurisdictional average price



Actual and future prices

The retail price in 2016/17 and 2017/18, where available, are calculated using actual offers available to residential consumers. In all other instances, retail prices are projections based on expected trends in underlying costs or other assumptions.

Market offers in the period from 2018/19 to 2019/20 are based on movements in the underlying cost stack components. Future prices are calculated as the aggregate, for a specific year, of the estimated wholesale electricity cost, regulated network cost, environmental and system security policy costs and the inflation adjusted residual component from 2016/17. The residual is the amount that is left over when the estimated costs (wholesale electricity costs, regulated network costs, environmental and system security policy costs) for 2016/17 are subtracted from the 2016/17 representative market offer.

The same methodology applies for future standing offers when there is no retail price determination or standing offers are set by retailers.

A different approach applies to Western Australia, the Northern Territory and Tasmania. In those jurisdictions, residential electricity prices are set by the respective governments and do not necessarily reflect costs, nor follow expected cost trends. In Western Australia, future prices reflect a trend set in the Western Australia government's 2017/18 budget paper. Northern Territory prices are assumed to increase in line with inflation during the modelling period. In Tasmania, a government direction has been given setting the wholesale spot price for 2017/18. In addition, residential retail prices are not permitted to increase by more than 2 per cent per year starting in 2017/18; however, where the increase is less than or equal to 2 per cent no adjustment has been made.

Importantly, the future prices in this report do not seek to pre-empt the decisions of governments or jurisdictional regulators.

A.3 Electricity supply chain cost components

Electricity supply chain cost components are reported separately in the jurisdictional sections and inform the analysis of future trends in the representative standing and market offers. All costs are reported in a c/kWh value, in accordance with the terms of reference from the COAG Energy Council.

The supply chain cost components have been grouped into the following segments:

- **regulated network costs:** the regulated network sector includes transmission network service providers (TNSPs) and distribution network service providers (DNSPs) who provide the necessary infrastructure to enable the power system to operate as a connected system. Networks link power stations to the end users who consume electricity. Regulated network costs are costs associated with building and operating the network, including a return on capital and metering costs. These costs are regulated by the Australian Energy Regulator (AER) in the National Electricity Market (NEM) and the Economic Regulation Authority (ERA) in Western Australia

- **wholesale electricity costs:** these costs include purchases from the spot market and financial contracts, ancillary services, market fees and energy losses from transmission and distribution networks

- **environmental policy costs:** these costs are related to policies introduced by Commonwealth or state and territory governments. There are a number of environmental policies that directly affect the electricity markets and whose costs are directly recoverable from consumers through their electricity bill. These include the Renewable Energy Target (RET),[117] various state and territory feed-in-tariff schemes and energy efficiency schemes

- **system security policy costs:** these costs relate to the one system security policy, the Energy Security Target, that was introduced by the South Australian government and only applies in South Australia

- **residual component:** this component captures all of the costs that arise from retailing electricity and marketing to consumers, the return to owners of the retailer for investing in the business, as well as any errors in the estimation of any of the costs associated with the other components. It should be noted for the purpose of this Residential Electricity Price Trends report, this residual amount does not reflect a retail margin.[118]

The approach to estimating the supply chain costs for the mainland NEM jurisdictions is set out in the following section. The methodologies used for the other jurisdictions - Tasmania, Western Australia and Northern Territory - are covered in the jurisdictional appendices.

Box A.3 The National Electricity Market

The NEM is the interconnected power system that covers Queensland, New South Wales, ACT, Victoria, Tasmania and South Australia.

The NEM is an energy-only market where all electricity is traded through a central clearing mechanism. There are five market regions, corresponding to one region for each NEM jurisdiction, with the exception of the ACT which is included in the New South Wales region. For each region, a price is calculated for each five-minute dispatch interval, based on generator bidding and electricity demand.

In 2016/17, there was 43,213 MW of total installed generation capacity[119] and 196.5 terrawatt-hours (TWh) of electricity supplied[120] to approximately 9,868,563

117 The RET is comprised of the Large-scale Renewable Energy Target (LRET) and the Small-scale renewable energy scheme (SRES)

118 For a discussion on retail pricing and margins in the NEM see the AEMC report on retail competition. See: http://www.aemc.gov.au/getattachment/006ad951-7c42-4058-9724-51fe114cabb6/Final-Report.aspx

119 For the supporting data, see: AER, *Generation capacity and peak demand*, https://www.aer.gov.au/wholesale-markets/wholesale-statistics/generation-capacity-and-peak-demand

consumers (of which 9.79 million were residential and small business consumers).

In 2016/17, the average regional prices ranged from $70/MWh in Victoria to $123/MWh in South Australia.[121] In any five-minute interval, prices can be set between the market price cap (which was $14,000/MWh in 2016/17 and is $14,200/MWh in 2017/18) and the market price floor (negative $1,000/MWh). To manage potential price volatility, market participants can hedge risk via secondary contract markets or by vertically integrating retail and generation activities.

There are three governance institutions in the NEM:

- **the Australian Energy Market Commission:** is the institution responsible for making changes to the National Electricity Rules (NER) and the National Energy Retail Rules (NERR) and providing market development advice to the COAG Energy Council
- **the Australian Energy Regulator:** is responsible for the economic regulation of electricity transmission and distribution networks. The AER has compliance and enforcement responsibilities under the NER and NERR
- **the Australian Energy Market Operator:** operates the power system and is responsible for long-term planning including forecasting demand and supply scenarios and network development.

On 8 August 2017 the Energy Security Board (ESB) was established. The ESB is providing whole-of-system oversight for energy security and reliability and coordinating the implementation of recommendations coming from the *Independent Review into the Future Security of the National Electricity Market*.

All of the governance institutions are guided by the National Electricity Objective (NEO) as set out in the National Electricity Law (NEL). The NEO is:

> "to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to - price, quality, safety, reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system."

120 AER, *Electricity supply to regions of the National Electricity Market*. https://www.aer.gov.au/wholesale-markets/wholesale-statistics/electricity-supply-to-regions-of-the-national-electricity-market

121 AER, *Electricity supply to regions of the National Electricity Market*. https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-spot-prices

A.3.1 Regulated networks

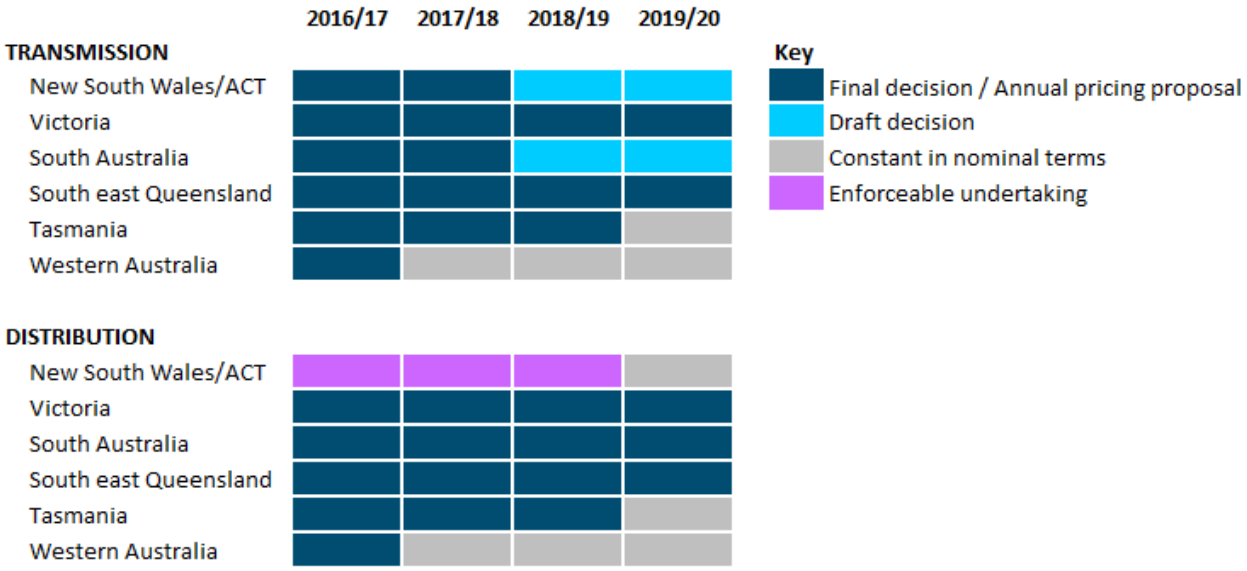
As outlined in chapter 4, transmission and distribution networks in the NEM and the Northern Territory are regulated by the AER. In Western Australia network service providers are regulated by the Economic Regulation Authority of Western Australia (ERA). The AER and ERA makes determinations that set out the revenue that network businesses are allowed to recover during the regulatory period. There is then some flexibility in how network businesses structure their prices in any particular year to recover the allowed revenue. Currently, network businesses typically publish their prices shortly before they come into effect. Published prices are used for the years in which they are available (2016/17 and 2017/18).

In 2018/19 and 2019/20, there is uncertainty around the trend in the regulated network component in several jurisdictions for various reasons including:

- the potential outcomes of judicial reviews of the AER's final determinations
- the need for the AER to make or remake the final determination
- uncertainty around subsequent appeals and other processes (see relevant jurisdictional appendices).

This report has not speculated on the potential range of regulated network price outcomes over the reporting period. Instead the regulated network component for each jurisdiction was estimated using simplifying assumptions based on the latest and clearest information. The assumptions used to estimate the regulated network component in each jurisdiction is outlined below and shown in Figure A.2.

Figure A.2 Summary of approaches for estimating network costs[122]



In 2018/19 and 2019/20, where a determination has been made by the AER, network costs are escalated by the trend indicated in this determination.[123] This trend may differ from actual cost outcomes depending on how network businesses structure their prices, and if there are any cost pass-through events.[124]

Where the current network regulatory control period ends before the final year of the reporting period in this report (2019/20), regulatory proposals or other published information from the network businesses are used, where possible. The cost trend indicated by regulatory proposals (or equivalent) is the best available information in the absence of an AER determination or ERA access arrangement. However, it is acknowledged that the AER and ERA's final decisions, and thereby the actual price outcomes for consumers, may differ from a network business' regulatory proposal (or equivalent).

In 2018/19 and 2019/20, where there is no regulatory proposal, AER determination or ERA access arrangement, or the AER final determination is subject to judicial review, the regulated network component has been estimated using the approaches outcomes in Figure A.2 and as outlined in the relevant jurisdictional appendices.

The regulated network costs were separately determined for each distribution area. In jurisdictions with multiple distribution regions, these values were then weighted by the shares of total residential consumers in each distribution region, to provide a

122 NSW and ACT distribution costs in 2018/19 are estimated based on the growth rate in the NSW and ACT DNSP's enforceable undertakings for 2017/18.

123 Where possible, separate trends have been applied to Standard Control Services and Alternative Control Services (metering). The trend used to escalate Standard Control Services is normalised by total residential consumption.

124 Cost pass-through events allow a network business to recover additional revenue associated with allowable costs that were unforeseen at the beginning of the regulatory period.

state-wide, representative transmission and distribution cost estimate for each year in c/kWh.

A.3.2 Wholesale electricity costs

The wholesale electricity cost estimates are based on modelling undertaken by Frontier Economics.[125] These costs have been used in calculating non-regulated standing offers and market offers. In jurisdictions that have regulated standing offers, wholesale energy costs from published price determinations have been used. In future years, these prices have been escalated by the trend in Frontier's modelled wholesale energy costs.

The wholesale energy costs include modelled spot prices, hedging costs, market fees and ancillary service costs.

Modelling of the wholesale spot prices in the NEM involves forecasting supply and demand conditions in the market and strategic bidding behaviour of market participants. Importantly, the prices are correlated to assumed residential load shapes to properly capture the risks faced by retailers. In the SWIS, the stand-alone long-run marginal cost approach is used and reflects the costs that a retailer would face if it were to build and operate a theoretical least-cost generation system to service its retail business.[126]

In the modelling base case, the following key assumptions are made:

- electricity demand for the NEM is consistent with the neutral scenario from AEMO's 2017 Electricity Forecasting Insights published June 2017
- electricity demand for the SWIS is not relevant as a stand-alone long run marginal approach is used
- the Large-scale Renewable Energy Target is the legislated target of 33,000 GWh of renewable energy per year by 2020
- fuel prices are based on Frontier's modelling and analysis of the Australian gas and coal markets. The forecasts are specific to each power station and therefore account for factors, including coal mine ownership, exposure to international commodity prices and the operational regimes of gas-fired generators
- announced retirements are included in the modelling. Additional retirements of existing generation plant result from the modelling where demand and supply conditions mean that it is least cost for a particular plant to close.

125 Frontier's approach is explained in their wholesale modelling report which is available for the 2017 Price Trends project page on the AEMC website.

126 The stand-alone LRMC approach is discussed in more detail in section 2.2.1 of Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

Retailer's hedging costs for NEM jurisdictions will depend on the specific hedging strategy adopted by a retailer. This depends on the retailer's expectations of future price volatility and its appetite for risk. Frontier's model is used to determine optimal conservative hedging outcomes for residential load shapes. It does this by considering:

- the load shape
- spot price forecast in each jurisdiction
- contract price forecast in each jurisdiction.

The optimal conservative hedging outcome can be different in different regions. Frontier has assumed that contract prices represent a five per cent premium on spot prices for all retailers.[127] In practice, there is no single percentage or absolute contract premium value that applies to all retailers in all market at all times. Expectations around both the level and volatility of spot and contract prices evolve over time and differ by region.

Both the market fees and ancillary service costs were estimated by Frontier Economics. Market fees are charges to market participants in order to recover the cost of operating the market. Ancillary services are those services used by the market operator to manage key technical characteristics of the power system.

In the NEM, market fees are based on the operational expenditures of AEMO. In the SWIS, market fees include the costs of AEMO as well as the costs associated with System Management and the Economic Regulation Authority.

For the NEM, Frontier uses AEMO's estimated market fees for the years they were available and escalated the value in the final available year by inflation for the remaining years where necessary. The same approach is used in the SWIS.

Ancillary services costs for the NEM jurisdictions and the SWIS are based on the average of four years historical costs for each region. The exception to this is in South Australia where the year 2016/17 has been excluded due to extraordinary circumstances that have resulted in a significant cost increase in ancillary service costs. It is expected that these circumstances are being addressed so that these high costs are not expected to continue into the future. Therefore, in South Australia ancillary service costs are based on average prices from 2013/14 to 2015/16.

Estimated transmission and distribution loss factors for residential customers are applied to wholesale electricity costs. The factors used are provided by Frontier, except for Tasmania where these factors are accounted for in Tasmania Energy Regulator's (TER) retail pricing determination and the Northern Territory where wholesale energy costs are provided by the Northern Territory Government.

127 This contract premium value was established based on initial analysis of spot and contract market price data over 2006/07 as part of Frontier Economics' advice to the Independent Pricing and Regulatory Tribunal's 2007 retail price determination.

A.3.3 Environmental costs

A number of schemes have been introduced by the Commonwealth and state governments to achieve greenhouse gas emission reductions, or other objectives such as to encourage investment, support employment and encourage energy efficiency. In addition, in South Australia polices have been implemented for system security reasons. Throughout this report, these schemes are grouped together as environmental policies except in South Australia where they are referred to as environmental and system security policy costs.

Environmental scheme costs are included for the duration that the schemes have been legislated. If schemes are legislated to end during the reporting period and it is unknown whether or not the schemes will continue, then the costs are not quantified for the unknown years.

For the one system security policy, the Energy Security Target (EST), costs are included from the proposed start date of 1 January 2020. Where the details of the cost impacts from the scheme have not been fully developed or legislated, then the costs are not quantified during the reporting period.

It should be noted that environmental and system security policy costs only include the direct costs of these policy costs. It does not include any costs that may be associated with additional effects on wholesale prices.

Renewable Energy Target

The RET applies on a national basis, and consists of two components: the LRET and the small-scale renewable energy scheme (SRES). The costs of both of these schemes have been estimated by Frontier Economics.

LRET cost trends are based on the legislated 33,000 GWh target by 2020, assumptions about the percentage of renewable energy that will be required, and the resource costs of obtaining large-scale generation certificates (LGC). Similarly, SRES costs are based on a renewable energy percentage and expectations about future small-scale technology certificates (STC) prices. The Minister for Environment and Energy sets the renewable energy percentages for both the LRET and SRES schemes.[128]

The LGC cost trend was based on modelling by Frontier Economics of on the basis of the LRMC of meeting the LRET.

LGC and STC costs are assumed to be the same across all jurisdictions as both schemes involve certificates that can be traded on a national basis. Therefore, all liable entities,

128 Clean Energy Regulator, Canberra, *Renewable power percentage*, Canberra, viewed 21 June 2017 http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/the-renewable-power-percentage

in theory, have access to the same certificate price.[129] LGC costs for the reporting period are set out in the jurisdictional appendices.

A different approach was taken for Tasmania as follows:

- the total RET costs were taken from Aurora Energy's standing offer determinations for 2015 and 2016[130]
- proportion of LRET and SRES costs were then derived from RET costs using Frontier Economics' estimates
- the LRET and SRES costs were then escalated using the respective trends established by Frontier Economics for 2018/19 and 2019/20.

Other costs and benefits of the RET through its influence on the supply/demand balance in the NEM, wholesale price volatility and network costs are not estimated in this report.

Other environmental schemes

Other jurisdictional environmental schemes mostly involve incentives for energy efficiency and feed-in-tariffs (FiT) for solar PV systems. Solar PV feed-in-tariffs can be defined in terms of either net or gross electricity generation. A gross feed-in-tariff means that the consumer receives a payment for all electricity generated by the solar PV system, whereas under a net feed-in-tariff the consumer is only paid for the electricity generated that is in excess of the household's electricity needs and is exported to the grid.[131]

Originally all solar PV feed-in-tariff schemes involved payments that were in excess of the value of the electricity to the retailer. Access to all of these schemes are now closed for new applicants, with existing participants receiving feed-in-tariff payments until the schemes come to an end. Feed-in-tariffs that are current available are either set by retailers, or determined by governments or regulators with consideration to the value of the exported electricity. When the feed-in-tariff payments are set at the value of the exported electricity then the payments should have a neutral effect on electricity prices. The solar PV feed-in-tariff schemes that are reported on are those that involve a payment in excess of the electricity value as these can directly affect electricity prices (depending on how the costs are recovered).

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129 In some cases certificate costs are determined through bilateral contracts. These costs are not publically available and are not considered in this analysis.

130 See: http://www.energyregulator.tas.gov.au/domino/otter.nsf/LookupFiles/15_1652%20Final%20Pricing%20Proposal.PDF/$file/15_1652%20Final%20Pricing%20Proposal.PDF and https://www.auroraenergy.com.au/Aurora/media/pdf/my_home/Aurora-Energy-2016-Standing-Offer-Price-Strategy.pdf and

131 Details on the current and closed FiT tariff schemes can be found on the websites of jurisdictional governments and electricity retailers.

System security scheme in South Australia

The only jurisdictional system security policy is the Energy Security Target in South Australia. This scheme is designed to support electricity generation in South Australia from gas-fired generators and other synchronous power sources by providing a subsidy. Existing and new gas generators and other synchronous power sources will be able to create one certificate for each MWh of electricity generated. The certificate will then be purchased by retailers, who are assumed to pass through the cost to consumers.

Jurisdictional schemes costs were calculated using distribution network businesses' annual pricing proposals or information provided by jurisdictional governments as shown in Table A.4 below.

Table A.4 Sources used to calculate jurisdictional environmental and system security scheme costs

Jurisdiction	Scheme	2016/17	2017/18	2018/19	2019/20
Queensland	Solar Bonus Scheme	Charges for 2016/17 were estimated from revenue and data obtained from Energex and Energex's 2016/17 pricing proposal	Costs associated with the Solar Bonus Scheme are no longer collected through network charges as the scheme is government funded as of 1 July 2017.		
New South Wales	Climate Change Fund	Jurisdiction scheme charges from Ausgrid, Endeavour Energy and Essential Energy's annual pricing proposals for 2016/17 and 2017/18		Kept constant in nominal terms	
	Energy Savings Scheme	Provided by New South Wales government			
Australian Capital Territory	FiT Schemes	Provided by ACT government		Provided by ACT government	
	Energy Efficiency Improvement Scheme				
South Australia	Solar FiT	Jurisdictional scheme charges from SA Power Networks' annual pricing proposal for 2016/17 and 2017/18		Based on reported indicative tariff from SA Power Networks. The trend takes into account the 16 c/kWh part of the scheme which ended on 30 September 2016.	
	Retailer Energy Efficiency Scheme	Provided by SA Government	Kept in constant nominal terms		
	Energy Security Target	Not applicable	Modelled by Frontier starting January 2020. The price of the scheme is capped at $50 per certificate and it is assumed that the SA gas generators and other synchronous power sources will pass through the entire cost		

Jurisdiction	Scheme	2016/17	2017/18	2018/19	2019/20
			saving from the EST certificates in their bids.		
Victoria	FiT Schemes	2016/17 jurisdictional scheme charges estimated based on average jurisdictional scheme charges from 2016 and 2017 Victorian distributions network businesses' pricing proposals.	Jurisdictional charges estimated based on average of 2017 and 2018. 2017 charges based on 2017 Victorian distribution network businesses' pricing proposals. 2018 charges based on trend in estimated annual costs provided by Victorian government.	Estimated annual costs based on trend provided by the Victorian government.	
	Victorian Energy Upgrades	Provided by Victorian government			

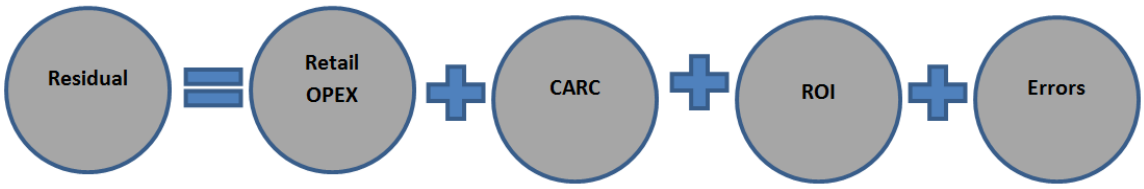
A.3.4 Residual component

The residual component is not directly observable and has been derived as the residual when all of the other cost components are subtracted from the representative market offer in 2016/17 (this is shown in Figure A.3). By using this residual method, this component also includes any errors, positive or negative, in the estimates of the other supply chain cost components. For example, if the wholesale contracting premium is greater than five per cent, then this method of calculation would overestimate the size of the residual component.

Figure A.3 Graphical representation of residual method

In aggregate, the residual component consists of the retailer operating costs (opex), customer acquisition and retention costs (CARC), return for investing in the business, and any errors in the other supply chain cost components, as shown in the figure A.4 below.

Figure A.4 Graphical representation of residual component



As the retail component is derived in aggregate, it is not possible to report on the individual sub-components shown in Figure A.4. Importantly, this means that the reported residual component is not equivalent to the profit earned by retailers. Further, the residual component is only estimated for a single point in time.

Retail markets are dynamic and retailers will respond to changes in costs and competitive dynamics over time. For all NEM jurisdictions, a residual component was derived for 2016/17. This residual component was escalated by an inflation rate of 2.5 per cent for the remaining years of the reporting period.

B South East Queensland

Box B.1 Key points

- 52 per cent of small customers in Queensland are on a market offer.[132]
- The analysis of residential electricity prices and cost components applies to a representative consumer in south east Queensland. A representative consumer is assumed to consume 5,240 kWh per year.
- In 2016/17, the residential electricity market offer price in south east Queensland was approximately $1,417. This is made up of a:
  - 35.8 per cent wholesale market component
  - 47.2 per cent regulated network component
  - 14.2 per cent environmental policy component
  - 2.7 per cent residual component.
- In 2016/17, a representative consumer on a standing offer using 5,240 kWh each year:
  - had an annual bill of $1,630 exclusive of GST
  - may have saved around 13 per cent or $212 by switching from a representative standing offer to the representative market offer.
- Residential electricity market offer prices for the representative consumer in south east Queensland increased by 3.4 per cent from 2016/17 to 2017/18.
- Residential electricity market offer prices for the representative consumer in south east Queensland are expected to decrease by an annual average of 7.1 per cent from 2017/18 to 2019/20. This is based on a:
  - decrease of 7.0 per cent in 2018/19
  - decrease of 7.2 per cent in 2019/20.
- The expected decreases in residential market offer electricity prices in 2018/19 and 2019/20 are largely attributable to decreases in the wholesale component of electricity prices in those years.

132 Small customers includes both residential and small business customers. This data also refers to the whole of Queensland.

B.1 The representative consumer in south east Queensland

The analysis of residential prices and cost components applies to a representative residential consumer in south east Queensland[133] consuming 5,240 kWh of electricity per year, of which 806 kWh is attributed to the controlled-load tariff.[134]

In south east Queensland, the most common type of residential electricity consumer (the representative consumer) is a two-person household with no pool, no mains gas connection, with air conditioning and off-peak hot water, on a "controlled load" tariff. A detailed explanation of the pricing methodology is set out in Appendix A.

B.2 Trends in residential electricity prices and bills

B.2.1 Trends in electricity prices and annual bills for the representative consumer

Residential market offer electricity prices in south east Queensland for the representative consumer:

- increased by 3.4 per cent from 2016/17 to 2017/18
- are expected to decrease by 7.0 per cent in 2018/19
- are expected to decrease by 7.2 per cent in 2019/20.

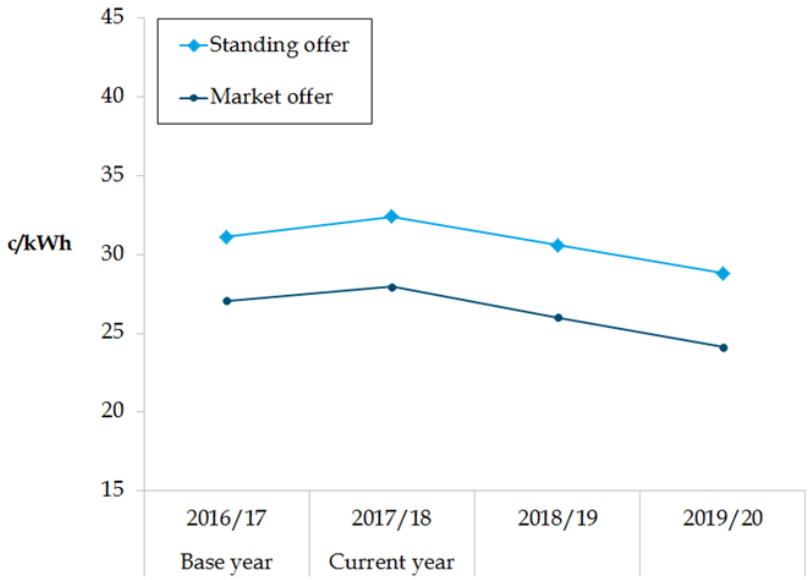
This is equivalent to an annual average decrease of 7.1 per cent from 2017/18 to 2019/20.

Figure B.1 shows the expected movements in standing offer and market offer prices.

133 This analysis does not include regional Queensland. In regional Queensland, standing offer prices remain regulated, reflecting the Queensland Government's Uniform Tariff Policy, which sets prices on par with lower-cost electricity prices in south east Queensland. See: Queensland Competition Authority, *Regulated Retail Electricity Prices for Regional Queensland in 2017-18,* Media release, 16 June 2017, http://www.qca.org.au/Media-Centre/Media-Releases/Media-Releases/2017/Jun/Regulated-Retail-Electricity-Prices-for-Regional-Q

134 Energex customer connection data was used to establish that the most typical south east Queensland consumer is on Tariff 33 and the controlled load attributed is sourced from this tariff class.

Figure B.1 Trend in south east Queensland standing offer and market offer prices



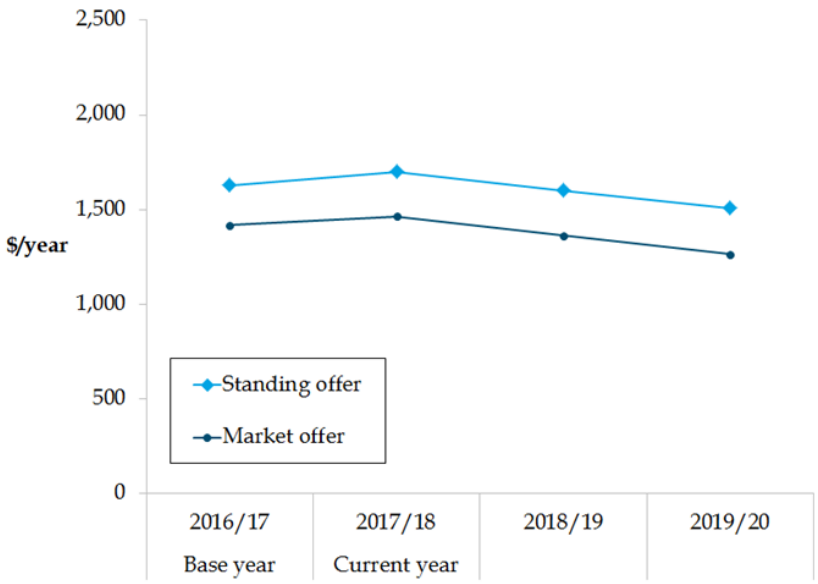
In south east Queensland, consumers can select from standing offers and market offers, neither of which are regulated.[135] The majority of residential consumers in south east Queensland are on a market offer.[136] As shown in Figure B.2 in 2016/17, a representative consumer on a standing offer had an annual bill of $1,630 exclusive of GST. This consumer may have saved around 13 per cent or $212 by switching from the representative standing offer to the representative market offer of $1,417.[137]

135 For more information on the differences between standing and market offers, see Appendix A.

136 Queensland Competition Authority, *Electricity Prices - Residential Tariff*, viewed 4 July 2017, http://www.qca.org.au/Electricity/Electricity-Prices-2014-15/Electricity-prices-2014-15/Electricity-Prices-Residential-Tariff.

137 This indicative saving is based on a representative consumer on a representative standing offer switching to the representative market offer, as defined in Appendix A of this report. Actual savings will depend on individual circumstances.

Figure B.2 **Trend in south east Queensland market offer and standing offer prices, annual bill**



B.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

Table B.1 demonstrates how different consumption profiles and choice of retail offer can affect electricity prices and annual bills. As for the representative consumer, prices and bills for small and large households are based on a weighted average of the lowest available offer from all retailers.

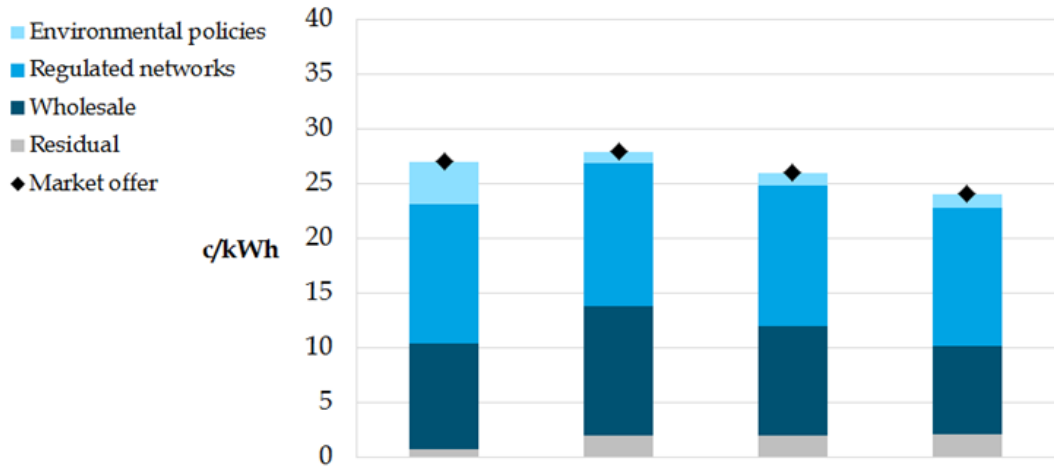
Table B.1 Effect of different household consumption levels on electricity price and annual bills in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household Two person household with controlled load (3,502 kWh)	34.10	$1,201
Representative consumer Two person household with controlled load (5,240 kWh)	27.96	$1,465
Large household Four person household with controlled load and a pool (8,952 kWh)	24.84	$2,223

B.3 Trends in electricity supply chain components

Figure B.3 shows the expected movements in the supply chain cost components for south east Queensland, which are the wholesale markets, regulated networks, environmental policy costs and the residual component.

Figure B.3 Trends in south east Queensland supply chain components

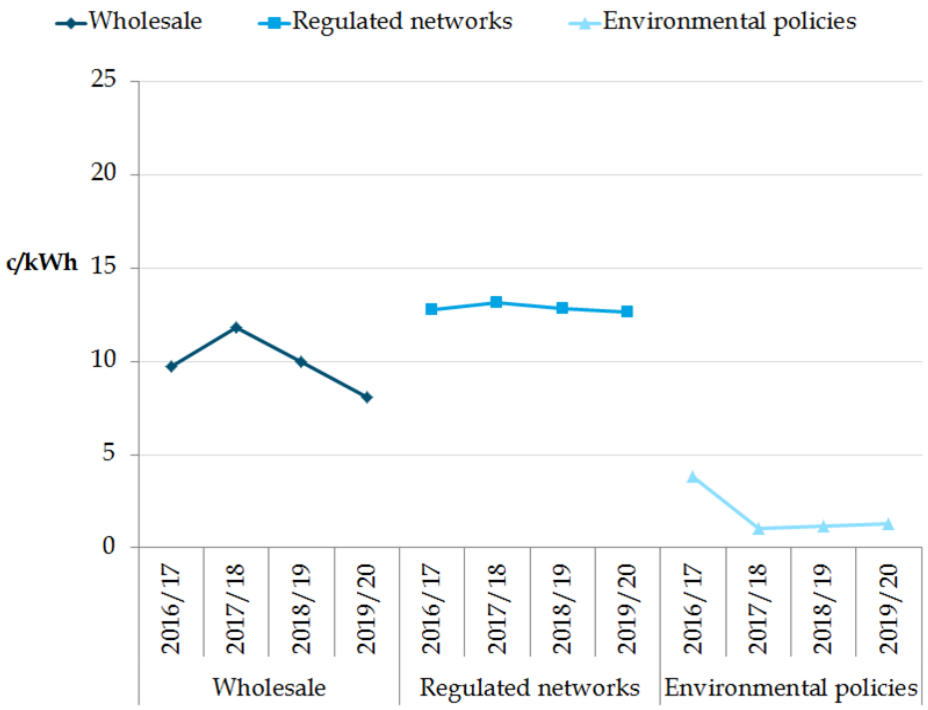


	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**3.85**	**$202**	**1.06**	**$56**	**1.19**	**$63**	**1.32**	**$69**
LRET - LGC cost	0.64	$34	0.74	$39	0.87	$45	1.00	$53
SRES - STC cost	0.36	$19	0.32	$17	0.33	$17	0.32	$17
Solar Bonus Scheme	2.85	$150	0.00	$0	0.00	$0	0.00	$0
Regulated networks	**12.78**	**$670**	**13.12**	**$688**	**12.84**	**$673**	**12.62**	**$662**
Transmission	2.70	$142	1.85	$97	1.87	$98	1.90	$99
Distribution	10.08	$528	11.28	$591	10.96	$574	10.73	$562
Wholesale	**9.70**	**$508**	**11.81**	**$619**	**9.95**	**$521**	**8.10**	**$425**
Residual	0.72	$38	1.97	$103	2.02	$106	2.07	$108
Market offer	**27.05**	**$1,417**	**27.96**	**$1,465**	**26.00**	**$1,362**	**24.12**	**$1,264**

Figure B.4 shows the expected trends in supply chain components in south east Queensland over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 17.2 per cent in the wholesale market component
- an average annual decrease of 1.9 per cent in the regulated networks component
- an average annual increase of 11.7 per cent in environmental policy component.

Figure B.4 Trends in south east Queensland supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

B.3.1 Wholesale market costs

In south east Queensland, wholesale market costs comprised approximately 35.8 per cent of the representative market offer in 2016/17, and are expected to comprise an increasing and then decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs are expected to:

- increase by 21.8 per cent in 2017/18
- decrease by 15.7 per cent in 2018/19
- decrease by 18.6 per cent in 2019/20.

This is equivalent to an average annual decrease of 17.2 per cent from 2017/18 to 2019/20.

The drivers of the expected trend in wholesale electricity costs in south east Queensland over the reporting period are detailed in chapter 3 of this report.

B.3.2 Regulated network costs

In south east Queensland, transmission network services are provided by Powerlink and distribution network services are provided by Energex.

Transmission

In 2016/17, the transmission network component comprised 10.0 per cent of the representative market offer and are expected to comprise a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- decrease by 31.6 per cent in 2017/18
- increase by 1.5 per cent in 2018/19
- increase by 1.2 per cent in 2019/20.

This is equivalent to an average annual increase of 1.4 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 37.3 per cent of the representative market offer and are expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period.

Distribution costs are expected to:

- increase by 11.9 per cent in 2017/18
- decrease by 2.8 per cent in 2018/19
- decrease by 2.1 per cent in 2019/20.

This is equivalent to an average annual decrease of 2.5 per cent from 2017/18 to 2019/20.

Basis for estimated network costs in south east Queensland

The expected trend in transmission and distribution network costs in south east Queensland is based on the network cost information in Table A.2 below.

Table B.2 Basis for network costs in south east Queensland

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends
DNSP Energex	1 July 2015 – 30 June 2020	Draft: 30 April 2015. Final: 29 Oct 2015.	2016/17 and 2017/18 based on Energex' annual pricing proposals. 2018/19 and 2019/20 estimated based on revenue growth rate in the AER's 2015-20 final determination.
TNSP Powerlink	1 July 2017 – 30 June 2022	Draft: 29 Sep 2016 Final: 28 April 2017	2016/17 and 2017/18 based on transmission use of system charges in Energex' approved annual pricing proposals. 2018/19 and 2019/20 estimated based on revenue growth rate in the AER's 2017–22 final determination for Powerlink.

B.3.3 Environmental policy costs

The environmental policy costs that are relevant in south east Queensland during the reporting period are the Commonwealth Government's Renewable Energy Target (RET) and the Queensland Government's Solar Bonus Scheme (SBS).[138]

In 2016/17, environmental schemes comprised 14.2 per cent of the representative market offer and are expected to comprise a decreasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components contribute the following proportion of the representative market offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.4 per cent
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.3 per cent
- SBS costs made up 10.5 per cent.

Renewable Energy Target

The Renewable Energy Target (RET) applies on a national basis and consists of the LRET and SRES.[139] The drivers of direct costs associated with the LRET and SRES are

138 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics. The costs associated with the SBS are recovered through increases in distribution network prices.

139 For more information refer to chapter 5.

detailed in the Frontier Economics report.[140] Additional effects of the LRET on the wholesale electricity market are discussed in chapter 3 of this report.

LGC costs are expected to:

- increase by 15.7 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 11.5 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

Queensland Solar Bonus Scheme

The SBS was introduced on 1 July 2008 to provide an incentive for electricity customers to install solar energy systems. Households who installed small solar PV systems of up to 5kW rated capacity were eligible for a payment for all electricity exported to the grid.

Under the SBS, a payment of 44 c/kWh applies for customers who lodged a connection application with their distribution network service provider before 10 July 2012 and installed the system before 30 June 2013. As long as participants continue to meet eligibility criteria they will receive this payment until the scheme ends in 2028.[141]

For administrative reasons, there was previously a two year lag between when SBS costs were incurred by network businesses and when they were recovered from consumers. With the start of the new regulatory period in 2015/16, it is possible for costs to be passed-through to consumers in the same year that they are incurred.

140 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

141 Participants will lose eligibility for the 44 c/kWh feed-in-tariff if they sell or lease their house, increase their solar inverter to a larger capacity. See: Department of Energy and Water Supply, *Solar Bonus Scheme 44c feed-in-tariff - Department of Energy and Water Supply*, Queensland Government, Brisbane, 2017, viewed 13 July 2017, https://www.dews.qld.gov.au/electricity/solar/installing/benefits/solar-bonus-scheme.

Therefore in 2016/17, the SBS costs include both the current year costs as well as the costs from the previous two years.[142]

SBS costs are only included in 2016/17 and not in the subsequent years of the reporting period. This is due to the Queensland Government's direction on 31 May 2017 for Energy Queensland to remove charges for the SBS from distribution network prices.[143] These costs will be included in the Queensland Government budget from 2017–18 to 2019–20.[144].

Separate from the SBS, since July 2014 customers in south east Queensland have been eligible for voluntary feed-in-tariffs offered by retailers.[145] Any payment made by a retailer through these voluntary arrangements are not part of the SBS and are not included as part of the environmental policy component costs.

B.4 Developments that could affect residential electricity prices in south east Queensland

This section identifies future developments that have been announced and which could affect the future trend in residential retail prices in south east Queensland.

Affordable Energy Plan

On 22 October 2017, the Queensland Government announced the Affordable Energy Plan. This plan features a range of proposed initiatives, to apply from 1 January 2018, aimed at making electricity more affordable for residential and business customers.[146] As details of the plan are still to be finalised, the plan has not been incorporated into the estimate of electricity prices in this report.

142 Australian Energy Regulator, *Final decision, Energex determination 2015-16 to 2019-20: Overview*, October 2015, pp. 11–12.

143 QCA, *Fact sheet - 2017-18 regulated electricity prices for regional Queensland - June final determination*, QCA, Brisbane, 2017, viewed 4 September 2017, http://www.qca.org.au/getattachment/4a01f410-9737-47de-b591-9ec4b829230b/Transitional-Fact-Sheet-2017-18-final-determinat.aspx

144 Queensland Government, *Paluszczuk Government intervenes to continue electricity price stability*, 31 May 2017, Media release, Brisbane, viewed 4 September 2017, http://statements.qld.gov.au/Statement/2017/5/31/palaszczuk-government-intervenes-to-continue-electricity-price-stability

145 Queensland Government, Department of Energy and Water Supply, *Market feed-in-tariffs in SEQ - Department of Energy and Water Supply* viewed 13 July 2017. https://www.dews.qld.gov.au/electricity/solar/installing/benefits/market

146 Queensland Government, Department of Energy and Water Supply, *Affordable Energy Plan: making electricity more affordable*, viewed 2 November 2017. https://www.dews.qld.gov.au/electricity/affordable-energy-plan

Solar Future Program

The Queensland Government has announced a number of initiatives to promote solar generation in Queensland, including a target for one million rooftops or 3,000MW of solar photovoltaics (PV) in Queensland by 2020.[147]

Renewable energy study

The Queensland Government established an independent expert panel in early 2016 to investigate the development of a renewable energy economy in Queensland.[148] The Panel released its final report in November 2016 to the Queensland Government.[149]

In June 2017, in response to the recommendations in the Panel's final report, the Queensland Government:[150]

- accepted in-principle the Panel's approach to include Queensland's pro-rata share of the LRET in Queensland's 50 per cent renewable energy target
- accepted the Panel's recommendation to undertake a reverse auction for up to 400 MW of renewable capacity, to commence in the second half of 2017. To support long-term security (i.e. storage and dispatchable generation) this will include a 100 MW energy storage component. It is expected that the new generation relating to this auction will not commence operation until after the middle of 2020 and is therefore outside the reporting period.

147 Department of Energy and Water Supply 2017, *A solar future: powering Queensland's renewable energy industries, Department of Energy and Water Supply*, Brisbane, viewed 4 July 2017, https://www.dews.qld.gov.au/electricity/solar/solar-future

148 Department of Energy and Water Supply, *Renewable Energy Expert Panel*, Department of Energy and Water Supply, Brisbane, 2017, viewed 4 September 2017, https://www.dews.qld.gov.au/electricity/solar/solar-future/expert-panel.

149 Queensland Renewable Energy Expert Panel, *Credible pathways to a 50% renewable energy target for Queensland: Final Report, 30 November 2016*, Queensland Renewable Energy Expert Panel, Brisbane, 2016.

150 Department of Energy and Water Supply, *Queensland Government response to the Renewable Energy Expert Panel inquiry into credible pathways to a 50 per cent renewable energy target in Queensland by 2030*, Department of Energy and Water Supply, Brisbane, 2017, viewed 4 September 2017, https://www.dews.qld.gov.au/__data/assets/pdf_file/0003/1253811/qg-responce-renewable-energy-inquiry.pdf.

C New South Wales

Box C.1 Key points

- 77 per cent of New South Wales small customers are on a market offer.[151]
- The analysis of residential electricity prices and cost components applies to a representative consumer in New South Wales. A representative consumer is assumed to consume 4,215 kWh per year.
- In 2016/17, the residential electricity market offer price in New South Wales was approximately $1,169. This is made up of a:
  - 34.5 per cent wholesale market component
  - 52.7 per cent regulated network component
  - 6.0 per cent environmental policy component
  - 6.8 per cent residual component.
- In 2016/17, a representative consumer on a standing offer using 4,215 kWh each year:
  - had an annual bill of $1,380 exclusive of GST
  - may have saved around 15 per cent or $210 by switching from a representative standing offer to the representative market offer.
- Residential electricity market offer prices for the representative consumer in New South Wales increased by 10.2 per cent from 2016/17 to 2017/18.
- Residential electricity market offer prices for the representative consumer in New South Wales are expected to decrease by an annual average of 6.6 per cent from 2017/18 to 2019/20. This is based on an expected:
  - decrease by 5.8 per cent in 2018/19
  - decrease by 7.3 per cent in 2019/20.
- The expected decreases in residential market offer electricity prices in 2018/19 and 2019/20 are largely attributable to decreases in the wholesale component of electricity prices in those years.

151 Small customers includes both residential and small business customers.

C.1 The representative consumer in New South Wales

The analysis of residential prices and cost components applies to a representative residential consumer in New South Wales consuming 4,215 kWh of electricity per year.

In New South Wales, the most common type of residential electricity consumer (the representative consumer) is a two-person household with no pool, no off-peak "controlled load" tariff, but with a mains gas connection. A detailed explanation of the pricing methodology is set out in Appendix A.

C.2 Trends in residential electricity prices and bills

C.2.1 Trends in electricity prices and annual bills for the representative consumer

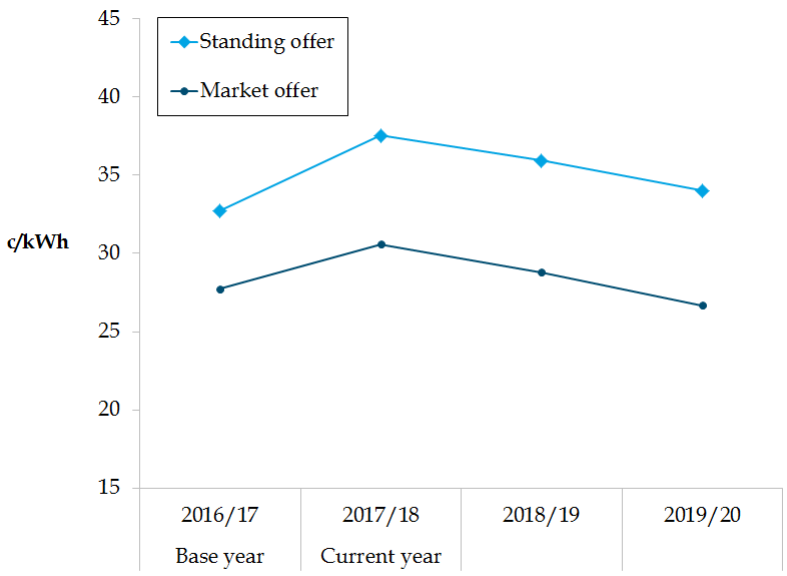
Residential market offer electricity prices in New South Wales for the representative consumer:

- increased by 10.2 per cent from 2016/17 to 2017/18
- are expected to decrease by 5.8 per cent in 2018/19
- are expected to decrease by 7.3 per cent in 2019/20.

This is equivalent to an annual average decrease of 6.6 per cent from 2017/18 to 2019/20.

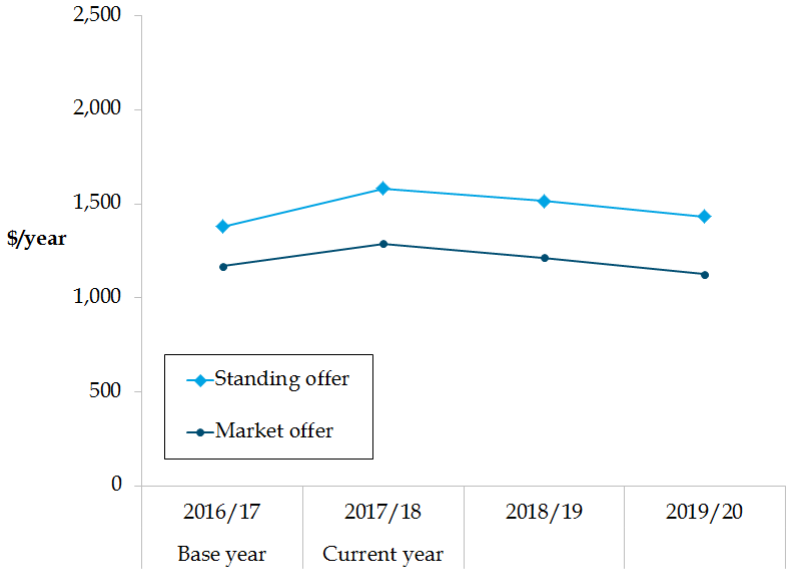
Figure C.1 shows the expected movements in standing offer and market offer prices.

Figure C.1 Trend in New South Wales standing offer and market offer prices



In New South Wales, consumers can select from standing offers and market offers, neither of which are regulated.[152] The majority of New South Wales residential consumers are on a market offer. As shown in Figure C.2 in 2016/17, a representative consumer on a standing offer had an annual bill of $1,380 exclusive of GST. This consumer may have saved around 15 per cent or $210 by switching from the representative standing offer to the representative market offer of $1,169.[153]

Figure C.2 Trend in New South Wales market offer and standing offer, annual bill



C.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

Table C.1 demonstrates how different consumption profiles and choice of retail offer can affect electricity prices and annual bills. As for the representative consumer, prices and bills for small and large households are based on a weighted average of the lowest available offer from all retailers.

152 For more information on the differences between standing and market offers, see Appendix A.

153 This indicative saving is based on a representative consumer on a representative standing offer switching to the representative market offer, as defined in Appendix A of this report. Actual savings will depend on individual circumstances.

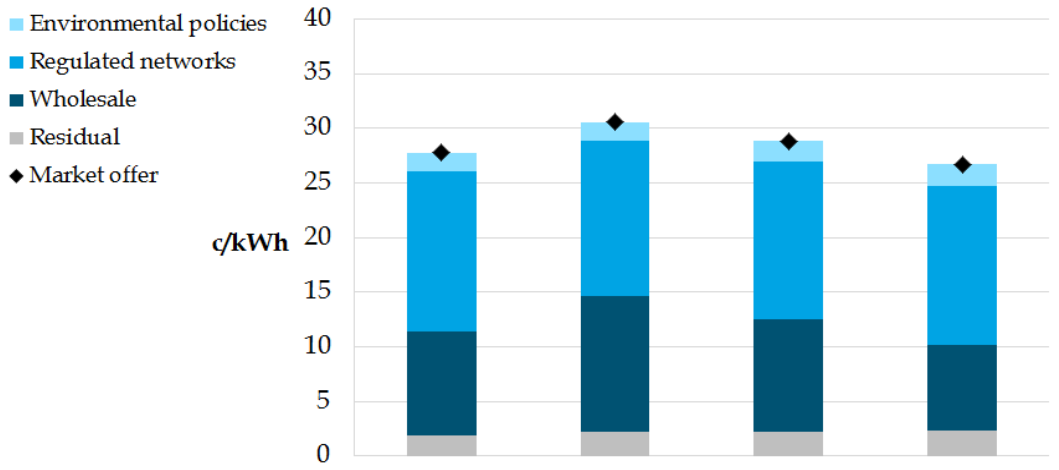
Table C.1 Effect of different household consumption levels on electricity price and annual bills in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household with a mains gas connection (2,387 kWh)	36.80	$878
Representative consumer Two person household with a mains gas connection (4,215 kWh)	30.57	$1,289
Large household Four person household with a mains gas connection (5,813 kWh)	28.31	$1,646

C.3 Trends in electricity supply chain components

Figure C.3 shows the expected movements in the supply chain cost components for New South Wales.

Figure C.3 Trends in New South Wales supply chain components

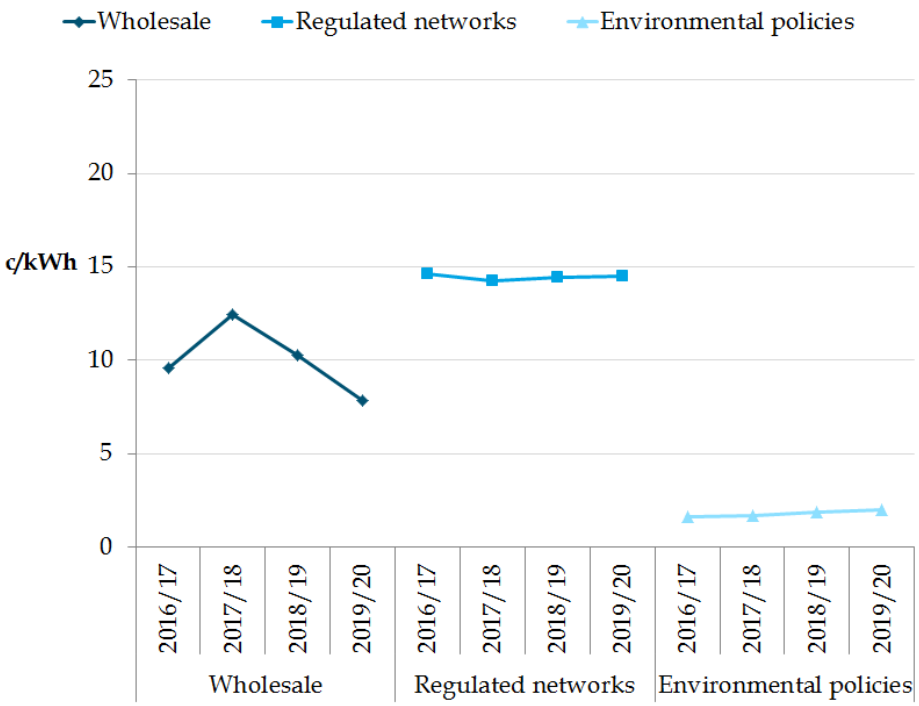


	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**1.65**	**$70**	**1.71**	**$72**	**1.85**	**$78**	**1.98**	**$83**
LRET - LGC cost	0.64	$27	0.76	$32	0.89	$37	1.03	$43
SRES - STC cost	0.36	$15	0.32	$14	0.33	$14	0.32	$14
Climate Change Fund	0.48	$20	0.41	$17	0.40	$17	0.39	$16
Energy saving scheme	0.17	$7	0.21	$9	0.23	$10	0.25	$10
Regulated networks	**14.63**	**$617**	**14.23**	**$600**	**14.44**	**$608**	**14.53**	**$612**
Transmission	3.20	$135	3.03	$128	3.10	$131	3.19	$135
Distribution	11.43	$482	11.19	$472	11.34	$478	11.33	$478
Wholesale	**9.57**	**$403**	**12.44**	**$524**	**10.26**	**$433**	**7.87**	**$332**
Residual	1.89	$80	2.19	$92	2.25	$95	2.31	$97
Market offer	**27.74**	**$1,169**	**30.57**	**$1,289**	**28.80**	**$1,214**	**26.69**	**$1,125**

Figure C.4 shows the expected trends in supply chain components in New South Wales over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 20.5 per cent in the wholesale market component
- an average annual increase of 1.0 per cent in the regulated networks component
- an average annual increase of 7.6 per cent in environmental policy component.

Figure C.4 Trends in New South Wales supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

C.3.1 Wholesale market costs

In New South Wales, wholesale market costs comprised approximately 34.5 per cent of the representative market offer in 2016/17, and are expected to represent an increasing and then decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs are expected to:

- increase by 30.0 per cent in 2017/18
- decrease by 17.5 per cent in 2018/19
- decrease by 23.3 per cent in 2019/20.

This is equivalent to an average annual decrease of 20.5 per cent from 2017/18 to 2019/20.

The drivers of the expected trend in wholesale electricity costs in New South Wales over the reporting period are detailed in chapter 3 of this report.

C.3.2 Regulated network costs

In New South Wales, transmission network services are provided by TransGrid and distribution network services are provided by Ausgrid, Endeavour Energy and Essential Energy.

Transmission

In 2016/17, the transmission network component comprised 11.5 per cent of the representative market offer and is expected to represent an increasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- decrease by 5.3 per cent in 2017/18
- increase by 2.1 per cent in 2018/19
- increase by 3.0 per cent in 2019/20.

This is equivalent to an average annual increase of 2.6 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 41.2 per cent of the representative market offer and is expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period.

Distribution costs are expected to:

- decrease by 2.0 per cent in 2017/18
- increase by 1.3 per cent in 2018/19
- remain unchanged in 2019/20.

This is equivalent to an average annual increase of 0.6 per cent from 2017/18 2019/20.

Basis for estimated network costs in New South Wales

The expected trend in transmission and distribution network costs in New South Wales is based on the network cost information in Table C.2 below. Table C.2 also details ongoing processes relating to New South Wales distribution network revenue determinations.

Table C.2 Basis for network costs in price trends and ongoing processes in New South Wales

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends and ongoing processes
DNSPs Ausgrid, Endeavour Energy, Essential Energy	1 July 2014 - 30 June 2019	Draft: 27 Nov 2014 Final: 30 April 2015	2016/17 and 2017/18 based on enforceable undertakings. 2018/19 estimated based on escalation rate in 2017/18 enforceable undertakings for each DNSP. All New South Wales distribution businesses applied for merits review of their final determinations. As a result of the subsequent Federal Court orders of 4 July 2017, the AER is required to remake these final determinations.[154]
	1 July 2019 - 30 June 2024		As the 2019-24 determination has not yet been made, 2019/20 revenues are kept constant in nominal terms with 2018/19.
TNSP TransGrid	1 July 2014 - 30 June 2018	Draft: 27 Nov 2014 Final: 30 April 2015	2016/17 and 2017/18 based on transmission use of system charges in NSW DNSP's approved annual pricing proposals.
	1 July 2018 - 30 June 2023	Draft: 27 September 2017	2018/19 and 2019/20 estimated based on revenue growth rate in TransGrid draft decision for 2018-23.

C.3.3 Environmental policy costs

The environmental policy costs that were relevant in New South Wales during the reporting period are the Commonwealth Government's Renewable Energy Target (RET), the Climate Change Fund (CCF) and the Energy Savings Scheme (ESS).[155]

In 2016/17, environmental schemes comprised 6.0 per cent of the representative market offer and are expected to represent an increasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components represent the following proportion of the representative market offer in 2016/17:

154 https://www.aer.gov.au/news-release/federal-court-judgement-on-aer-electricity-and-gas-price-decisions-disappointing-outcome-for-nsw-and-act-consumers

155 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics. The costs associated with the CCF and ESS are recovered through increases in distribution network prices.

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.3 per cent
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.3 per cent
- Climate Change Fund (CCF) costs made up 1.7 per cent
- Energy Savings Scheme (ESS) costs made up 0.6 per cent.

Renewable Energy Target

The Renewable Energy Target (RET) applies on a national basis and consists of the LRET and SRES.[156] The drivers of direct costs associated with the LRET and SRES are detailed in the Frontier Economics report.[157] Additional effects of the LRET on the wholesale electricity market are discussed in chapter 3 of this report.

LGC costs are expected to:

- increase by 17.6 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 10.0 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

Climate Change Fund

The CCF was established by the New South Wales Government to support energy and water savings initiatives.[158] It is mostly funded from the NSW electricity distribution

156 For more information refer to chapter 5.

157 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

158 For more information, see NSW Office of Environment and Heritage, *Climate Change Fund*, viewed, 5 September 2017. http://www.environment.nsw.gov.au/grants/ccfund.htm

network service providers, which pass on the costs to consumers through distribution network prices.[159]

The Solar Bonus Scheme was the largest component of the CCF.[160] It provided feed-in-tariffs to support residential solar PV systems through two separate tariffs: a 60 c/kWh tariff[161] and a 20 c/kWh tariff.[162] Both of these tariffs closed on 31 December 2016.[163]

CCF costs are expected to:

- decrease by 12.9 per cent in 2017/18
- decrease by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 3.5 per cent from 2017/18 to 2019/20.

New South Wales Energy Savings Scheme

The ESS is a New South Wales Government program to assist households and businesses reduce their energy consumption. This is a certificate trading scheme where retailers are required to fund energy efficiency through the purchase of certificates.[164]

ESS costs are expected to:

- increase by 23.0 per cent in 2017/18
- increase by 8.9 per cent in 2018/19
- increase by 5.6 per cent in 2019/20.

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159 NSW Office of Environment and Heritage, *Climate Change Fund Annual Report 2015-16*, September 2016, p5.

160 Ibid, p2.

161 To be eligible for the 60 cent tariff, a consumer must have entered a binding agreement to purchase or lease a complying generator on or before 27 October 2010, lodge an application to connect that generator to the network on or before 18 November 2010, and for the generator to have been connected on or before 30 June 2012.

162 To receive the tariff, the consumer must have connected to the network by meter installation on or before 30 June 2011, or the network must have received an "application to connect" on or before 28 April 2011 and the consumer must have connected the solar panels to the network by meter installation on or before 30 June 2012.

163 NSW Government, Planning and Environment, *The Solar Bonus Scheme is closed.*, viewed 5 September 2017. http://www.resourcesandenergy.nsw.gov.au/energy-consumers/solar/solar-bonus-scheme/the-solar-bonus-scheme-is-closed

164 For more information, see IPART, *Energy Savings Scheme* http://www.ess.nsw.gov.au/How_the_scheme_works

This is equivalent to an average annual increase of 7.2 per cent from 2017/18 to 2019/20.

C.4 Developments that could affect residential electricity prices in New South Wales

This section identifies future developments that have been announced and which could affect the future trend in residential retail prices in New South Wales.

New Energy Security Taskforce

An Energy Security taskforce will engage with all relevant stakeholders and the broader community in examining how New South Wales manages energy security and resilience, including readiness, planning, preparation and response capability to extreme events.[165] A draft report was published 5 May 2017.[166]

Strategic plans

In November 2016, the NSW Government launched two draft strategic plans:

- one sets out priority investment areas and potential actions under the CCF over the next five years. This plan aims to help New South Wales make the transition to a net zero emissions future and adapt to a changing climate. The details of the plan and use of the fund are currently being developed and will be released at the end of 2017[167]

- a draft plan to Save NSW Energy and Money was also launched; this plan aims to address energy efficiency and reduce energy bills for consumers through a number of potential initiatives. This plan is meant to complement the ESS.[168]

165 Office of the NSW Chief Scientist & Engineer, *NSW Energy Security Taskforce - NSW Chief Scientist & Engineer*, Office of the NSW Chief Scientist & Engineer, Sydney, n.d., viewed 27 July 2017, http://www.chiefscientist.nsw.gov.au/reports/nsw-energy-security-taskforce.

166 NSW Chief Scientist & Engineer, *Initial Report from the Energy Security Taskforce*, NSW Chief Scientist & Engineer, Sydney, 2017, viewed 27 July 2017, http://www.chiefscientist.nsw.gov.au/__data/assets/pdf_file/0016/105280/170505-Initial-Energy-Security-Taskforce-Report_FINAL-SIGNED.pdf.

167 Office of Environment & Heritage, *Climate Change Fund: Draft Strategic Plan 2017-2022*, Office of Environment & Heritage, Sydney, p. 3, viewed 28 July 2017, http://www.environment.nsw.gov.au/resources/climatechange/EnvironmentalfuturefundingpackageDraft-climate-change-fund-strategic-plan-20160438.pdf

168 Office of Environment & Heritage, *A Draft Plan to save NSW Energy and Money: A plan to meet the NSW Government's energy savings target and save money for NSW households and businesses*, Office of Environment & Heritage, Sydney, 2016, viewed 28 July 2017, http://www.environment.nsw.gov.au/resources/climatechange/EnvironmentalfuturefundingpackageA-draft-plan-to-save-energy-money-160642.pdf, pp. 3.

D Australian Capital Territory

Box D.1 Key points

- 77 per cent of ACT small customers are on a standing offer.[169]
- The analysis of residential electricity prices and cost components applies to a representative consumer in the ACT. A representative consumer is assumed to consume 7,151 kWh per year.
- In 2016/17, the residential electricity standing offer price in the ACT was approximately $1,407. This is made up of a:
  - 30.0 per cent wholesale market component
  - 41.1 per cent regulated network component
  - 11.8 per cent environmental policy component
  - 17.0 per cent residual component.
- In 2016/17, a representative consumer on a market offer using 7,151 kWh each year:
  - had an annual bill of $1,291 exclusive of GST
  - may have saved around 8.0 per cent or $116 by switching from a representative standing offer to the representative market offer.
- Residential electricity standing offer prices for the representative consumer in the ACT increased by 20.3 per cent from 2016/17 to 2017/18.
- Residential electricity standing offer prices for the representative consumer in the ACT are expected to increase by an annual average of 1.8 per cent from 2017/18 to 2019/20. This is based on an expected:
  - increase by 8.0 per cent in 2018/19
  - decrease by 4.1 per cent in 2019/20.
- The expected decrease in residential standing offer electricity prices in 2019/20 is largely attributable to a decrease in the wholesale component of electricity prices.

169 Small customers includes both residential and small business customers.

D.1 The representative consumer in the ACT

The analysis of residential prices and cost components applies to a representative residential consumer in the ACT consuming 7,151 kWh.

In the ACT, the most common type of residential electricity consumer (the representative consumer) is a two-person household, with no mains gas, no pool and on the regulated standing offer. A detailed explanation of the pricing methodology is set out in Appendix A.

D.2 Trends in residential electricity prices and bills

D.2.1 Trends in electricity prices and annual bills for the representative consumer

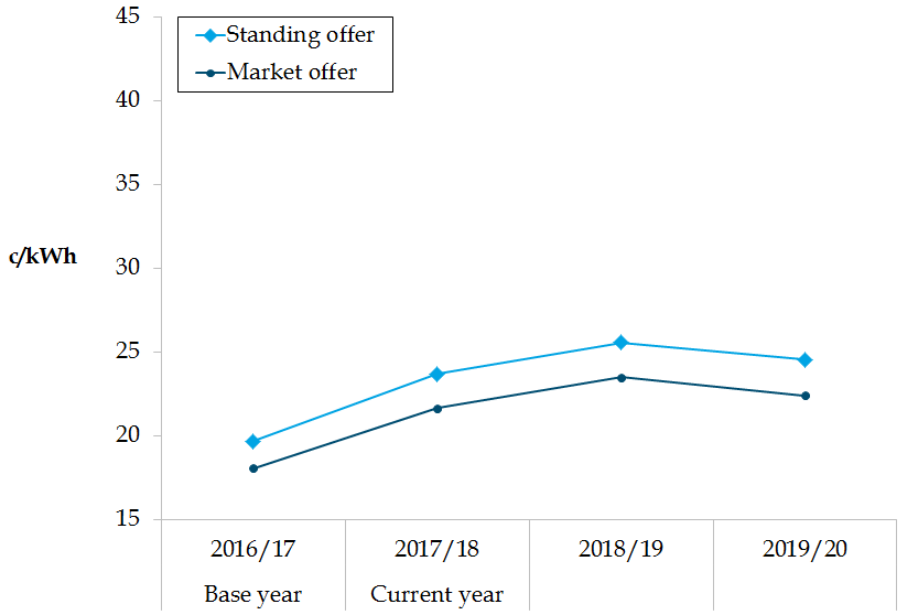
Residential standing offer electricity prices in the ACT for the representative consumer:

- increased by 20.3 per cent from 2016/17 to 2017/18
- are expected to increase by 8.0 per cent in 2018/19
- are expected to decrease by 4.1 per cent in 2019/20.

This is equivalent to an annual average increase of 1.8 per cent from 2017/18 to 2019/20.

Figure D.1 shows the expected movements in standing offer and market offer prices.

Figure D.1 Trend in ACT standing offer and market offer prices



In the ACT, consumers can select from standing offers and market offers,[170] with standing offers regulated by the Independent Commission and Regulatory Commission to a maximum allowable price change to a basket of regulated tariffs available in the ACT.[171] 77 per cent of ACT residential consumers are on a standing offer. As shown in Figure D.2 in 2016/17, a representative consumer on a standing offer had an annual bill of 1,407 exclusive of GST. This consumer may have saved around 8 per cent or $116 by switching from the representative standing offer to the representative market offer of $1,291.[172]

Figure D.2 Trend in the ACT market offer and standing offer annual bill

D.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household; however, different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

Table D.1 demonstrates how different consumption profiles and choice of retail offer can affect electricity prices and annual bills. As for the representative consumer, prices

170 For more information on the differences between standing and market offers, see Appendix A.

171 See: Independent Competition and Regulatory Commission, *Standing offer prices for the supply of electricity to small customers from 1 July 2017*, June 2017. http://www.icrc.act.gov.au/wp-content/uploads/2017/03/Report-6-of-2017-June-2017-1.pdf.

172 This indicative saving is based on a representative consumer on a representative standing offer switching to the representative market offer, as defined in Appendix A of this report. Actual savings will depend on individual circumstances.

and bills for small and large households are based on a weighted average of the lowest available offer from all retailers.

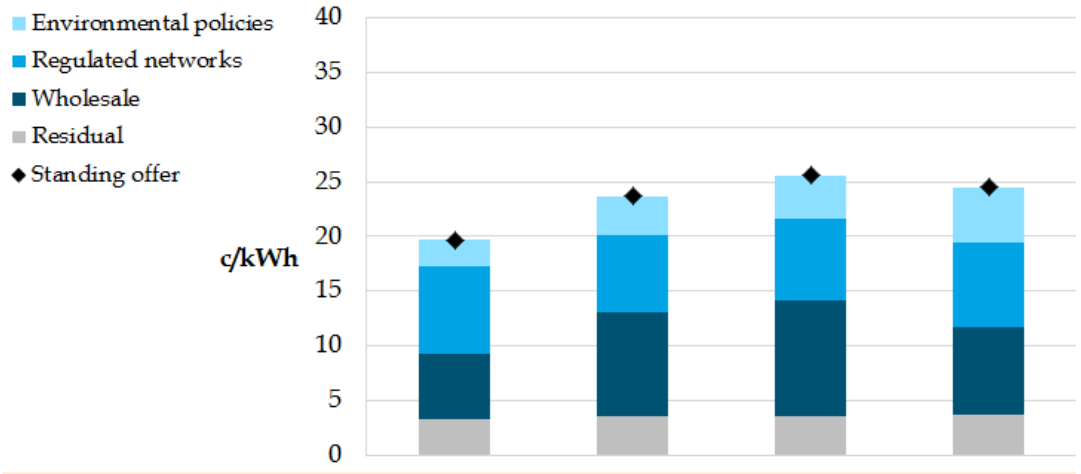
Table D.1 Effect of different household consumption levels on electricity price and annual bill in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household with electric water heating (4,638 kWh)	26.40	$1,224
Representative consumer Two person household with electric water heating (7,151 kWh)	23.68	$1,693
Large household Four person household with electric water heating and a pool (10,442 kWh)	22.02	$2,299

D.3 Trends in electricity supply chain components

Figure D.3 shows the expected movements in the supply chain cost components for the ACT.

Figure D.3 Trends in the ACT supply chain components



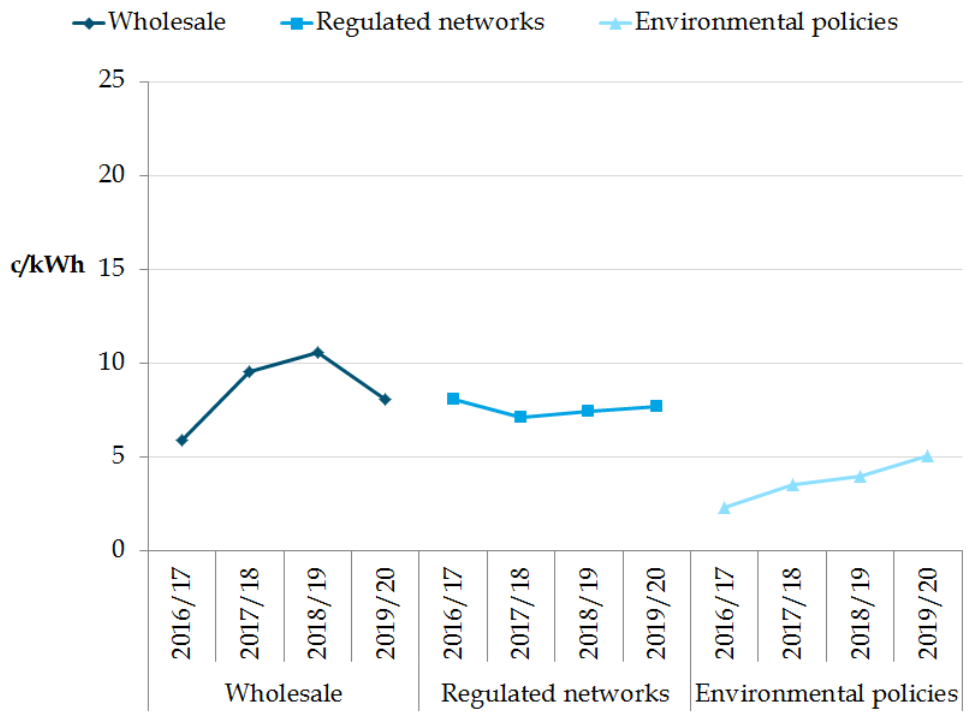
	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**2.33**	**$167**	**3.50**	**$251**	**3.96**	**$283**	**5.09**	**$364**
LRET - LGC cost	0.64	$46	0.78	$55	0.91	$65	1.05	$75
SRES - STC cost	0.36	$26	0.33	$24	0.34	$24	0.33	$24
FIT schemes	0.84	$60	1.98	$142	2.30	$164	3.29	$235
EEIS	0.49	$35	0.42	$30	0.42	$30	0.42	$30
Regulated networks	**8.10**	**$579**	**7.10**	**$508**	**7.46**	**$533**	**7.67**	**$549**
Transmission	2.38	$171	1.06	$76	1.13	$81	1.20	$86
Distribution	5.71	$408	6.04	$432	6.32	$452	6.47	$463
Wholesale	**5.90**	**$422**	**9.55**	**$683**	**10.54**	**$754**	**8.08**	**$578**
Residual	3.35	$240	3.52	$252	3.61	$258	3.70	$265
Standing offer	**19.68**	**$1,407**	**23.68**	**$1,693**	**25.57**	**$1,829**	**24.54**	**$1,755**

*The residual component is derived for 2016/17 and 2017/18 by subtracting wholesale, environmental and network costs from the standing offer price. The residual cost is assumed to increase at an inflation rate of 2.5 per cent for future years in the reporting period. As the residual component is derived specifically for the representative consumer using the methodology in this report, it may differ from the regulated retail cost in the ACT.

Figure D.4 shows the expected trends in supply chain components in the ACT over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 8.1 per cent in the wholesale market component
- an average annual increase of 4.0 per cent in the regulated networks component
- an average annual increase of 20.5 per cent in the environmental policy component.

Figure D.4 Trends in the ACT supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

D.3.1 Wholesale market costs

In the ACT, wholesale market costs comprised approximately 30.0 per cent of the representative market offer in 2016/17, and are expected to represent a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs are expected to:

- increase by 62.0 per cent in 2017/18
- increase by 10.3 per cent in 2018/19
- decrease by 23.4 per cent in 2019/20.

This is equivalent to an average annual decrease of 8.1 per cent from 2017/18 to 2019/20.

The ICRC uses a two-year rolling average approach in determining wholesale costs in the ACT. These costs are then used in determining the regulated retail rate. As a result of this approach it was necessary for the purposes of this price trends report to estimate wholesale costs more in line with the approach used by the ICRC to more accurately reflect the impact of the various cost drivers on the retail costs in the ACT. Therefore, the following approach has been used in this report for estimating wholesale electricity costs:

- 2016/17 – the wholesale cost uses the average of estimates of 2016/17 wholesale electricity costs (WEC) from the 2015 Residential Electricity Price Trends report and the 2016/17 estimates in the 2016 Residential Electricity Price Trends report

- 2017/18 – the wholesale cost uses the average estimate of 2017/18 WEC from the 2016 Residential Electricity Price Trends report and 2017/18 estimates from the 2017 Residential Electricity Price Trends

- 2018/19 and 2019/20 – uses estimates from 2017 Residential Electricity Price Trends report. The standing offers from 2016/17 to 2017/18 have increased by around 20 per cent. This is approximately in line with the average percentage change of 18.95 per cent set by the ICRC.[173]

The drivers of the expected trend in wholesale electricity costs in the ACT over the reporting period are detailed in chapter 3 of this report.

D.3.2 Regulated network costs

In the ACT, transmission network services are provided by TransGrid and distribution network services are provided by ActewAGL.

Transmission

In 2016/17, the transmission network component comprised 12.1 per cent of the representative standing offer and is expected to represent a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- decrease by 55.4 per cent in 2017/18

- increase by 6.4 per cent in 2018/19

- increase by 6.1 per cent in 2019/20.

This is equivalent to an average annual increase of 6.2 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 29.0 per cent of the representative standing offer and is expected to represent an decreasing proportion of a residential electricity consumer's bill over the reporting period.

Distribution costs are expected to:

- increase by 5.7 per cent in 2017/18

173 ICRC, *Standing offer prices for the supply of electricity to small customers from 1 July 2017*, June 2017, piii.

- increase by 4.8 per cent in 2018/19
- increase by 2.3 per cent in 2019/20.

This is equivalent to an average annual increase of 3.6 per cent from 2017/18 to 2019/20.

Basis for estimated network costs in the ACT

The expected trend in transmission and distribution network costs in the ACT is based on the network cost information in Table D.2 below.

Table D.2 Basis for network costs and ongoing processes in the ACT

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends and ongoing processes
ActewAGL	1 July 2014 – 30 June 2019	Draft: 27 November 2014 Final: 30 April 2015	2016/17 and 2017/18 based on ActewAGL's enforceable undertakings. 2018/19 estimated based on escalation rate in 2017/18 enforceable undertaking for ActewAGL. ActewAGL applied for merits review of their final determinations. As a result of the subsequent Federal Court orders of 4 July 2017, the AER is required to remake ActewAGL's final determination.[174]
	1 July 2019 - 30 June 2024		As the 2019-24 determination has not yet been made, 2019/20 revenues are kept constant in nominal terms with 2018/19.
TransGrid	1 July 2014 – 30 June 2018	Draft: 27 November 2014 Final: 30 April 2015	2016/17 and 2017/18 based on transmission use of system charges in ActewAGL's approved annual pricing proposals.
	1 July 2018 – 30 June 2023	Draft: 28 September 2017	2018/19 and 2019/20 estimated based on revenue growth rate in TransGrid draft decision for 2018–23.

D.3.3 Environmental policy costs

The policy costs that are relevant in the ACT during the reporting period are the Commonwealth Government's Renewable Energy Target (RET), the ACT

174 https://www.aer.gov.au/news-release/federal-court-judgement-on-aer-electricity-and-gas-price-decisions-disappointing-outcome-for-nsw-and-act-consumers.

Government's feed-in-tariffs (FiT) and the Energy Efficiency Improvement Scheme (EEIS).[175]

In 2016/17, environmental schemes comprised 11.8 per cent of the representative standing offer and are expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components represent the following proportion of the representative standing offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 3.3 per cent.
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.8 per cent.
- Feed-in-tariff (FiT) costs made up 4.3 per cent.
- Energy Efficiency Improvement Scheme (EEIS) costs made up 2.5 per cent.

Renewable Energy Target

The Renewable Energy Target (RET) applies on a national basis and consists of the LRET and SRES.[176] The drivers of direct costs associated with the LRET and SRES are detailed in the Frontier Economics report.[177] Additional effects of the LRET on the wholesale electricity market are discussed in chapter 3 of this report.

LGC costs are expected to:

- increase by 21.2 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 7.2 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

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175 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics. The costs associated with the FiT are recovered through increases in distribution network prices and the EEIS is recovered partly through retail prices.

176 For more information refer to chapter 5.

177 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

Feed-in-tariff schemes

There are a number of FiT schemes which were introduced to encourage the installation of renewable energy systems. These schemes, which are now closed to new entrants, include the following:

- the *micro (Household) FiT scheme* was designed to subsidise renewable generation for small-scale solar generators of 30 kW or less. From 1 March 2009 to 30 June 2010, registered systems of up to 10 kW received a 50.05 c/kWh rate, while systems between 10 kW and 30 kW received a 40.04 c/ kWh FiT rate. From 1 July 2010 to 31 May 2011, the FiT was 45.7 c/kWh for all systems up to 30 kW. There is no longer a regulated FiT available for new residential consumers, although consumers receiving the FiT will continue to do so for 20 years after the system was connected to the distribution network.

- the *Medium Feed-in-tariff scheme* was designed for generators between 30 kW and 200 kW. The scheme opened for applications on 7 March 2011 and originally offered a 34.27 c/kWh rate. In July 2011 the scheme was modified so that it would be open to generators that would have qualified for the micro FiT scheme. After re-opening, the rate was reduced to 30.1 c/kWh for all systems up to 200kW; the scheme closed on 14 July 2011.

- the *Large-scale solar Feed-in-tariff scheme* involved reverse auctions for the right to receive a large-scale FiT for generators that have installed capacity of greater than 200 kW. The winning proposals receive a payment from the distribution network business equal to the difference between spot price income from the NEM and the auction FiT price. When the spot price income exceeds the auction FiT price, the generators pay the difference back to the distribution network business.

FiT costs are expected to:

- increase by 135.7 per cent in 2017/18

- increase by 16.2 per cent in 2018/19

- increase by 43.0 per cent in 2019/20.

This is equivalent to an average annual increase of 28.9 per cent from 2017/18 to 2019/20.

Energy Efficiency Improvement Scheme

The EEIS requires retailers in the ACT to meet energy savings targets by undertaking energy savings measures in ACT households or small to medium businesses. Retailers pass a portion of their compliance costs to ACT electricity consumers. The ICRC

determines the allowable costs that retailers can pass through to consumers. The scheme commenced on 1 January 2013 and is legislated to run until 2020.[178]

EEIS costs are expected to:

- decrease by 15.6 per cent in 2017/18
- remain unchanged in 2018/19
- remain unchanged in 2019/20.

Therefore, there is no change from 2017/18 to 2019/20.

178 ACT Government, Environment, Planning and Sustainable Development Directorate - Environment, Canberra, *Energy Efficiency Improvement Scheme*, viewed 6 September 2017, https://www.environment.act.gov.au/energy/smarter-use-of-energy/energy_efficiency_improvement_scheme_eeis

E Victoria

Box E.1 Key points

- 90 per cent of Victorian residential customers are on a market offer.
- The analysis of residential electricity prices and cost components applies to a representative consumer in Victoria. A representative consumer is assumed to consume 3,865 kWh per year.
- In 2016/17, the residential electricity market offer price in Victoria was approximately $1,105. This is made up of a:
  - 34.2 per cent wholesale market component
  - 45.1 per cent regulated network component
  - 5.9 per cent environmental policy component
  - 14.8 per cent residual component.
- In 2016/17, a representative consumer on a standing offer using 3,865 kWh each year:
  - had an annual bill of $1,435 exclusive of GST
  - may have saved around 23 per cent or $330 by switching from a representative standing offer to the representative market offer.
- Residential electricity market offer prices for the representative consumer in Victoria are estimated to increase by 15.9 per cent from 2016/17 to 2017/18.
- Residential electricity market offer prices for the representative consumer in Victoria are expected to decrease by an annual average of 8.2 per cent from 2017/18 to 2019/20. This is based on an expected:
  - decrease by 6.6 per cent in 2018/19
  - decrease by 9.7 per cent in 2019/20.

E.1 The representative consumer in Victoria

The analysis of residential prices and cost components applies to a representative residential consumer in Victoria consuming 3,865 kWh of electricity per year.

In Victoria, the most common type of residential electricity consumer (the representative consumer) is a two-person household with no pool, mains gas

connection and no off-peak hot water. A detailed explanation of the pricing methodology is set out in Appendix A.

E.2 Trends in residential electricity prices and bills

E.2.1 Trends in electricity prices and annual bills for the representative consumer

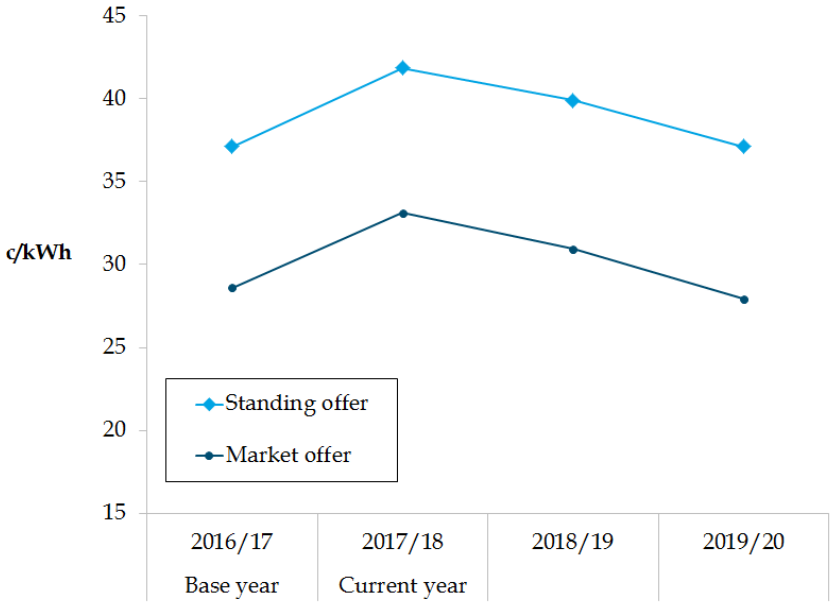
Residential market offer electricity prices in Victoria for the representative consumer:

- are expected to increase by 15.9 per cent from 2016/17 to 2017/18
- are expected to decrease by 6.6 per cent in 2018/19
- are expected to decrease by 9.7 per cent in 2019/20.

This is equivalent to an annual average decrease of 8.2 per cent from 2017/18 to 2019/20.

Figure E.1 shows the expected movements in standing offer and market offer prices.

Figure E.1 Trend in Victorian standing offer and market offer prices

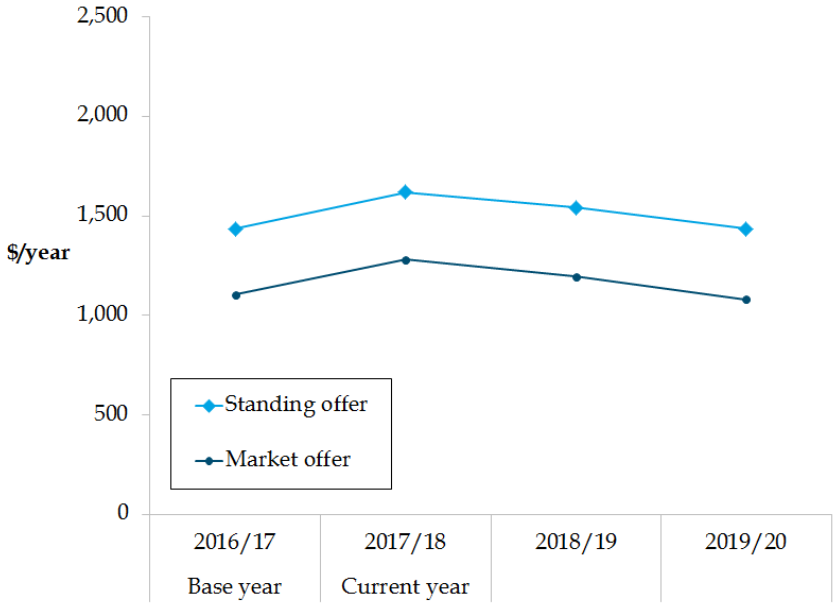


In Victoria, consumers can select from standing offers and market offers, neither of which are regulated.[179] The majority of Victorian residential consumers are on a market offer. As shown in Figure E.2 in 2016/17, a representative consumer on a standing offer had an annual bill of $1,435 exclusive of GST. This consumer may have

179 For more information on the differences between standing and market offers, see Appendix A

saved around 23 per cent or $330 by switching from the representative standing offer to the representative market offer of $1,105.[180]

Figure E.2 Trend in Victorian standing offer and market offer annual bill



Across jurisdictions, the residential electricity price is based on actual prices in 2016/17 and 2017/18 and an estimated price in 2018/19 and 2019/20. The exception is in Victoria, where the price in 2017/18 is also estimated. A different approach is applied in Victoria for 2017/18 as retailers release new annual electricity prices at the start of the year (calendar year basis), compared to other jurisdictions where new residential electricity prices are released in the middle of the year (financial year basis). This means that the new Victorian annual electricity prices for 2018 were not released at the time of writing this report, which is based on available information up to 8 November 2017. For more information on the methodology used to derive Victorian electricity prices, refer to Appendix A.

E.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

Table E.1 demonstrates how different consumption profiles and choice of retail offer can affect electricity prices and annual bills. As for the representative consumer, prices

180 This indicative saving is based on a representative consumer on a representative standing offer switching to the representative market offer, as defined in Appendix A of this report. Actual savings will depend on individual circumstances.

and bills for small and large households are based on a weighted average of the lowest available offer from all retailers.

Table E.1 Effect of different household consumption levels on electricity price and annual bill in 2017/18, excluding GST

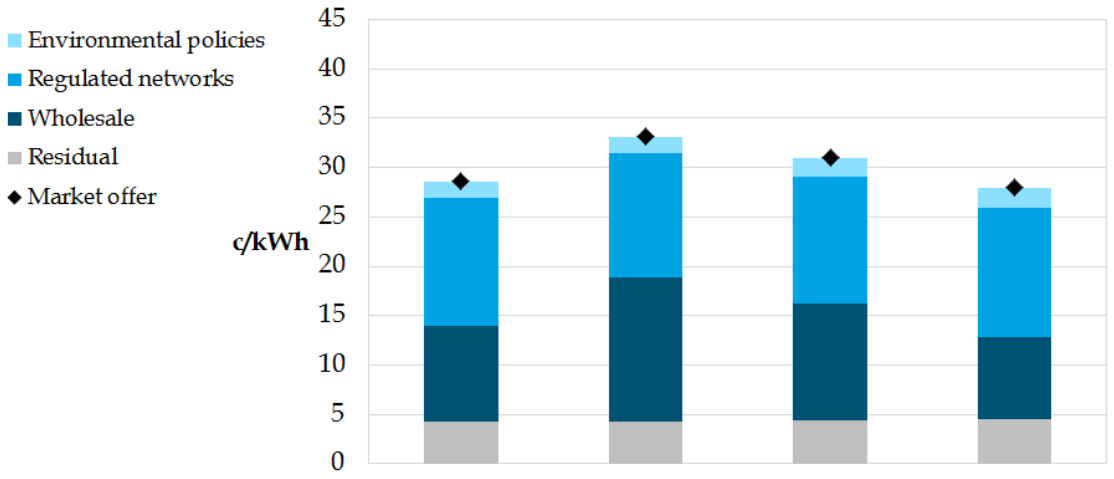
Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household with mains gas (2,760 kWh)	37.03	$1,022
Representative consumer Two person household with mains gas (3,865 kWh)	33.13	$1,281
Large household Three person household with mains gas (4,651 kWh)	31.57	$1,229

E.3 Trends in electricity supply chain components

Figure E.3 shows the expected movements in the supply chain cost components for Victoria.[181]

181 In Victoria, the residual component in 2016/17 and 2017/18 is based on the actual market offer minus wholesale, network and environmental costs. In 2018/19 and 2019/20, the residual component is escalated by 2.5 per cent per annum from the 2016/17 residual component.

Figure E.3 Trends in Victorian supply chain components

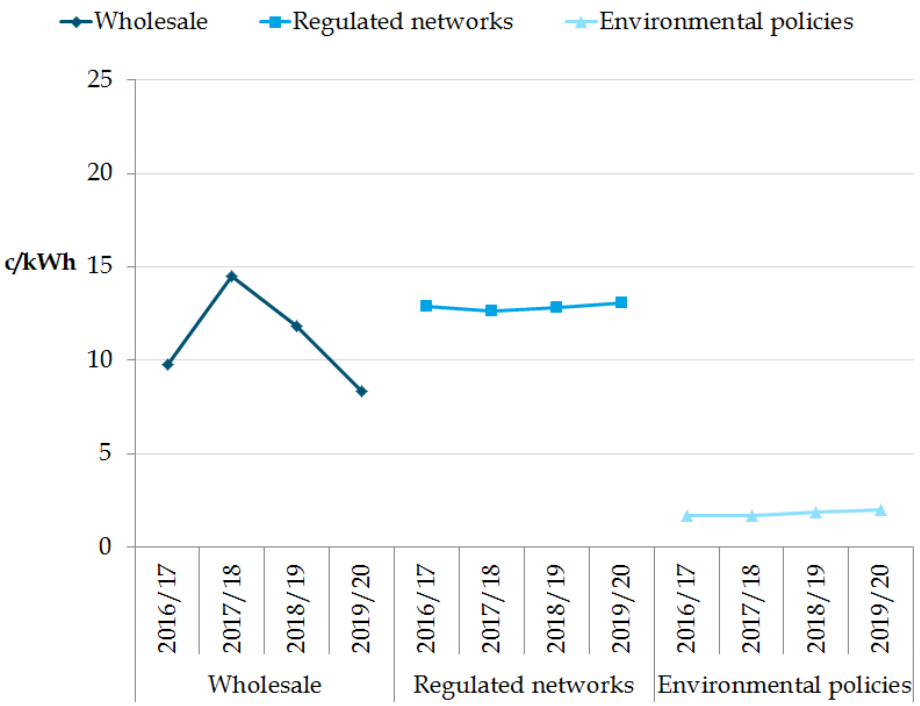


	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**1.69**	**$65**	**1.67**	**$64**	**1.87**	**$72**	**2.01**	**$78**
LRET - LGC cost	0.64	$25	0.75	$29	0.88	$34	1.02	$39
SRES - STC cost	0.35	$14	0.32	$12	0.33	$13	0.32	$12
FiT Schemes	0.50	$19	0.38	$15	0.38	$15	0.38	$15
Victorian Energy Upgrades	0.21	$8	0.22	$8	0.29	$11	0.30	$11
Regulated networks	**12.89**	**$498**	**12.63**	**$488**	**12.82**	**$495**	**13.04**	**$504**
Transmission	1.78	$69	2.04	$79	2.05	$79	2.03	$78
Distribution	11.11	$429	10.58	$409	10.77	$416	11.02	$426
Wholesale	**9.79**	**$379**	**14.51**	**$561**	**11.82**	**$457**	**8.34**	**$322**
Residual	4.22	$163	4.33	$167	4.44	$171	4.55	$176
Market offer	**28.60**	**$1,105**	**33.13**	**$1,281**	**30.95**	**$1,196**	**27.95**	**$1,080**

Figure E.4 shows the expected trends in supply chain components in Victoria over the reporting period. In summary, the expected trends over the two years from 2017/18 to 2019/20 are:

- an average annual decrease of 24.2 per cent in the wholesale market component
- an average annual increase of 1.6 per cent in the regulated networks component
- an average annual increase of 9.9 per cent in the environmental policy component.

Figure E.4 Trends in Victorian supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

E.3.1 Wholesale market costs

In Victoria, wholesale market costs comprised approximately 34.2 per cent of the representative market offer in 2016/17, and are expected to account for an increasing and then decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs are expected to:

- increase by 48.2 per cent in 2017/18
- decrease by 18.5 per cent in 2018/19
- decrease by 29.4 per cent in 2019/20.

This is equivalent to an average annual decrease of 24.2 per cent from 2017/18 to 2019/20.

The drivers of the expected trend in wholesale electricity costs in Victoria over the reporting period are detailed in chapter 3 of this report.

E.3.2 Regulated network costs

In Victoria, transmission network services are provided by AusNet Services and distribution network services are provided by AusNet Services, CitiPower, Powercor, Jemena and United Energy.

Transmission

In 2016/17, the transmission network component comprised 6.2 per cent of the representative market offer and is expected to represent an increasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- increase by 14.5 per cent in 2017/18
- increase by 0.2 per cent in 2018/19
- decrease by 1.0 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.4 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 38.8 per cent of the representative market offer and is expected to represent an increasing proportion of a residential electricity consumer's bill over the reporting period.

Distribution costs are expected to:

- decrease by 4.7 per cent in 2017/18
- increase by 1.8 per cent in 2018/19
- increase by 2.3 per cent in 2019/20.

This is equivalent to an average annual increase of 2.0 per cent from 2017/18 to 2019/20.

Basis for estimated network costs in Victoria

The expected trend in transmission and distribution network costs in Victoria is based on the network cost information in Table E.2 below.

Table E.2 Basis for network costs in Victoria

NSP	Regulatory period	Draft and final decision dates	Basis for network costs
DNSP AusNet Services, CitiPower, Powercor, Jemena, United Energy	1 January 2016 – 31 December 2020	Draft: 29 Oct 2015 Final: 26 May 2016	2016/17 based on average of approved Victorian DNSP's annual pricing proposals for 2016 (actual) and 2017 (actual). 2017/18 based on average of approved Victorian DNSP's annual pricing proposals for 2017 (actual) and 2018 (actual). 2018/19 and 2019/20 estimated based on revenue growth rates in the AER's 2016–20 final determination for each DNSP. All five Victorian distribution businesses applied for merits reviews of the AER's final determinations. The Tribunal hearings commenced in November 2016. In October 2017 the Australian Competition Tribunal confirmed the AER's revenue decisions made in May 2016.[182]
TNSP AusNet services	1 April 2017 – 31 March 2022	Draft: 20 July 2016 Final: 28 April 2017	2016/17 based on transmission use of system charges in Victorian DNSPs' approved annual pricing proposals, averaged across 2016 (actual) and 2017 (actual). 2017/18 based on transmission use of system charges in Victorian DNSPs' approved annual pricing proposals, averaged across 2017 (actual) and 2018 (actual). 2018/19 and 2019/20 estimated based on revenue growth rate in the AER's 2017-22 final determination for AusNet Services.

E.3.3 Environmental policy costs

The environmental policy costs that are relevant in Victoria during the reporting period are for the Commonwealth Government's Renewable Energy Target (RET), the various Victorian feed-in-tariff (FiT) schemes and the Victorian Energy Upgrades (VEU) scheme.[183]

182 Australian Energy Regulator, *Tribunal confirms AER approach to setting Victorian electricity and ACT gas network prices*, media release, 31 October 2017.

183 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics. The costs associated with the FiT are recovered through increases in distribution network prices or at the discretion of the retailer (see Chapter 5 for more information) and the VEU is recovered through retail prices.

In 2016/17, environmental schemes represented 5.9 per cent of the representative market offer and are expected to account for an increasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components represent the following proportion of the representative market offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.2 per cent.
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.2 per cent.
- FiT costs made up 1.7 per cent.
- The VEU program makes up 0.7 per cent.

Renewable Energy Target

The Renewable Energy Target (RET) applies on a national basis and consists of the LRET and SRES.[184] The drivers of direct costs associated with the LRET and SRES are detailed in the Frontier Economics report.[185] Additional effects of the LRET on the wholesale electricity market are discussed in chapter 3 of this report.

LGC costs are expected to:

- increase by 18.3 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 9.5 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

184 For more information refer to chapter 5.

185 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

Feed-in-tariffs

A number of FiT schemes have been introduced in Victoria in recent years. These include the premium schemes (now closed to new entrants) and an ongoing retailer funded scheme. Consumers who took part in the premium schemes remain eligible to claim the relevant tariff until the schemes conclude. The now closed schemes included:

- a 60 c/kWh premium feed-in-tariff (PFIT), with payments continuing until 2024[186]
- a 25 c/kWh transitional feed-in-tariff (TFIT), which closed to new customers on 31 December 2012 and payments continued until 31 December 2016[187]
- a standard feed-in-tariff (SFIT), paying a "one-for-one tariff", being equivalent to the retail price of electricity as bought by residential consumers from their retailers, with payments until December 2016.[188]

Currently, eligible Victorian residential customers can access a retailer funded FiT scheme that provides a minimum FiT of 11.3 c/kWh, as set by the Essential Services Commission.[189] The current Victorian FiT scheme commenced on 1 January 2013. Customers on the TFIT and SFIT schemes, which expired on 31 December 2016, are also eligible for the new minimum FiT of 11.3 c/kWh from 1 July 2017.[190]

A key difference between the PFIT/TFIT schemes and the retailer funded scheme is the way in which the costs of the schemes are recovered from consumers:

- the costs of the PFIT and TFIT are recovered from residential consumers through distribution network prices. These costs are included in the environmental component.
- the SFiT and minimum FiT are costs faced by the retailer and individual retailers will determine whether and/or how the costs of these schemes are to be recovered from consumers. This means that these costs are effectively part of the residual component.

186 Victorian Government, *Premium feed-in-tariff,* viewed 6 September 2017, https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/premium-feed-in-tariff

187 Victorian Government, *Standard feed-ion tariff and transitional feed-in-tariff*, viewed 6 September 2017. https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/standard-feed-in-tariff-and-transitional-feed-in-tariff

188 Ibid.

189 In 2016-17, the minimum FiT was 5 c/kWh.

190 Victorian Government, *Current feed-in-tariff*, viewed 6 September 2017. https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/current-feed-in-tariff

FiT costs are expected to:

- decrease by 23.9 per cent in 2017/18
- remain unchanged in 2018/19
- remain unchanged in 2019/20.

Victorian Energy Upgrades

VEU program is a Victorian government program that is designed to help reduce greenhouse gas emissions and electricity bills by giving households and businesses access to discounted energy-efficient products and services.[191]

VEU costs are expected to:

- increase by 4.6 per cent in 2017/18
- increase by 32.1 per cent in 2018/19
- increase by 4.0 per cent in 2019/20.

This is equivalent to an average annual increase of 17.2 per cent from 2017/18 to 2019/20.

Victorian Renewable Energy Target (VRET)

The aim of the VRET is for Victoria to generate 25 per cent of its electricity from renewable generation in 2020 and 40 per cent in 2025. The Victorian Government has established the Victorian Renewable Energy Auction Scheme (VREAS) to support achievement of the VRET. The first auction of the VREAS will award commercial contracts in support of up to 650 MW of renewable generation that is expected to commence operation before the last quarter of the 2020 calendar year.[192] This does not affect estimates of wholesale purchase costs as it occurs outside the reporting period.

E.4 Developments that could affect residential electricity prices in Victoria

This section identifies future developments that have been announced and which could affect the future trend in residential retail prices in Victoria.

Independent review of Victoria's electricity network safety framework

On 19 January 2017 the Minister for Energy, Environment and Climate Change announced an independent review of Victoria's electricity network safety framework.

191 Victorian Government, *Victorian Energy Upgrades - About the program*, viewed 6 September 2017. https://www.energy.vic.gov.au/energy-efficiency/victorian-energy-upgrades/about-the-program

192 Victorian Government, *Victorian Renewable Energy Auction Scheme*, viewed 6 September 2017. https://www.energy.vic.gov.au/renewable-energy/victorian-renewable-energy-auction-scheme

The review will have regard to the relationship between the safety regime and the economic regulatory regime with the aim of balancing safety objectives and economic impacts, including the cost impact on consumers.[193]

Review of electricity and gas retail markets in Victoria

In November 2016, the Victorian Government announced an independent bi-partisan review of Victoria's electricity and gas retail markets, to examine the operation of these markets and provide options to improve outcomes for consumers.[194] In August 2017, the final report with recommendations to the Minister for Energy, Environment and Climate Change was published. The Victorian Government has not yet responded to the recommendations in the report.[195]

193 Department of Environment, Land, Water and Planning, *Electricity network framework review*, Department of Environment, Land, Water and Planning, Melbourne, 2017, viewed 27 July 2017, https://www.energy.vic.gov.au/electricity/electricity-network-framework-review.

194 Department of Environment, Land, Water and Planning, *Policy and strategy*, Department of Environment, Land, Water and Planning, Melbourne, 2017, viewed 27 July 2017, https://www.energy.vic.gov.au/about-energy/policy-and-strategy.

195 The State Government of Victoria, *Independent Review of the Electricity & Gas Markets in Victoria*, The State Government of Victoria , Melbourne, 2017, viewed 4 September 2017, https://engage.vic.gov.au/application/files/7415/0267/4425/Retail_Energy_Review_-_Final_Report.pdf

F South Australia

Box F.1 Key points

- 87 per cent South Australian small customers are on a market offer.[196]
- The analysis of residential electricity prices and cost components applies to a representative consumer in South Australia. A representative consumer is assumed to consume 5,000 kWh per year.
- In 2016/17, the residential electricity market offer price in South Australia was approximately $1,615. This is made up of a:
  - 40.6 per cent wholesale market component
  - 41.8 per cent regulated network component
  - 8.8 per cent environmental and system security policy component
  - 8.8 per cent residual component.
- In 2016/17, a representative consumer on a standing offer using 5,000 kWh each year:
  - had an annual bill of $1,895 exclusive of GST
  - may have saved around 15 per cent or $280 by switching from a representative standing offer to the representative market offer.
- Residential electricity market offer prices for the representative consumer in South Australia increased by 17 per cent from 2016/17 to 2017/18.
- Residential electricity market offer prices for the representative consumer in South Australia are expected to decrease by an annual average of 7.3 per cent from 2017/18 to 2019/20. This is based on an expected:
  - decrease of 6.9 per cent in 2018/19
  - decrease of 7.8 per cent in 2019/20.
- The expected decreases in residential market offer electricity prices in 2018/19 and 2019/20 are largely attributable to decreases in the wholesale component of electricity prices in those years.

196 Small customers includes both residential and small business customers.

F.1 The representative consumer in South Australia

The analysis of residential prices and cost components applies to a representative residential consumer in South Australia consuming 5,000 kWh of electricity per year.[197]

A detailed explanation of the pricing methodology is set out in Appendix A.

F.2 Trends in residential electricity prices and bills

F.2.1 Trends in electricity prices and annual bills for the representative consumer

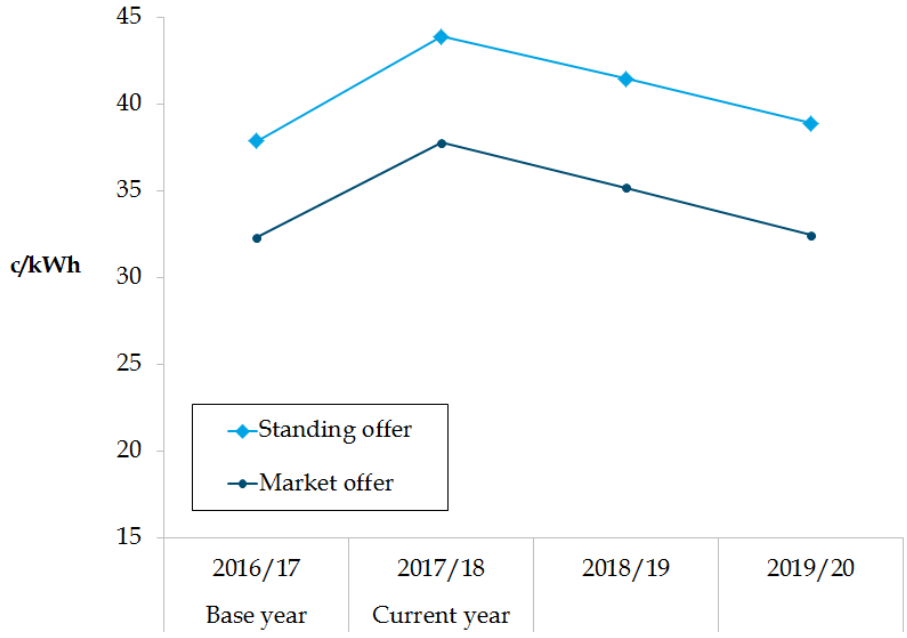
Residential market offer electricity prices in South Australia for the representative consumer:

- increased by 17.0 per cent from 2016/17 to 2017/18
- are expected to decrease by 6.9 per cent in 2018/19
- are expected to decrease by 7.8 per cent in 2019/20.

This is equivalent to an annual average decrease of 7.3 per cent from 2017/18 to 2019/20.

Figure F.1 shows the expected movements in standing offer and market offer prices.

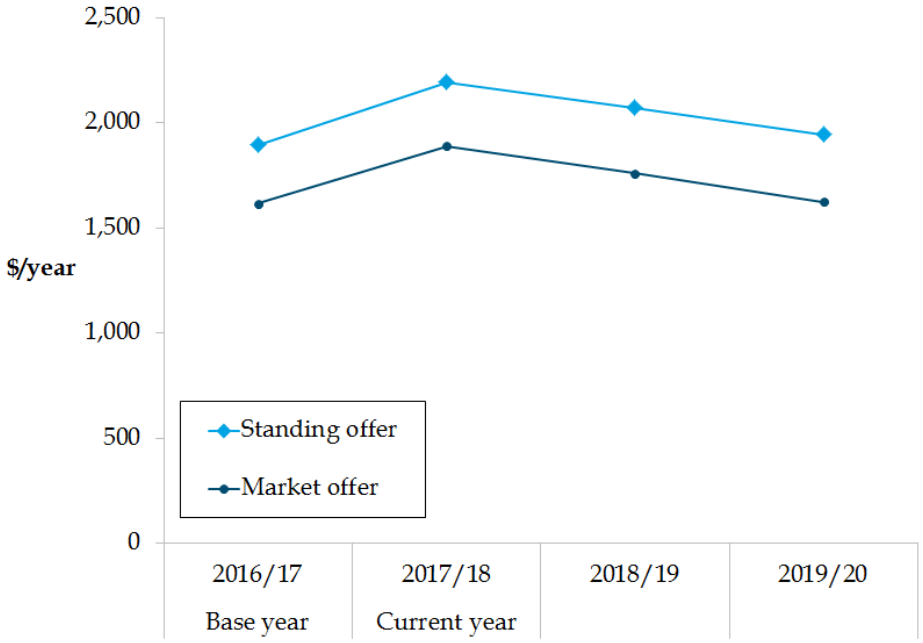
Figure F.1 Trend in South Australia standing offer and market offer



197 As provided by the SA Government.

In South Australia, consumers can select from standing offers and market offers, neither of which are regulated.[198] The majority of South Australian consumers are on a market offer.[199] As shown in Figure F.2 in 2016/17, a representative consumer on a standing offer had an annual bill of $1,895 exclusive of GST. This consumer may have saved around 15 per cent or $280 by switching from the representative standing offer to the representative market offer of $1,615.[200]

Figure F.2 Trend in South Australia market offer and standing offer prices, annual bill



F.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

The electricity consumption profiles of consumers are diverse and depend on many factors including the number of people in the household and technology choices.

198 For more information on the differences between standing and market offers, see Appendix A.

199 AER, *South Australia - small customer contract types | Australian Energy Regulator*, AER, Melbourne, 2017, viewed 25 August 2017, https://www.aer.gov.au/retail-markets/retail-statistics/south-australia-small-customer-contract-types.

200 This indicative saving is based on a representative consumer on a representative standing offer switching to the representative market offer, as defined in Appendix A of this report. Actual savings will depend on individual circumstances.

Table F.1 demonstrates how different consumption profiles and choice of retail offer can affect electricity prices and annual bills. As for the representative consumer, prices and bills for small and large households are based on a weighted average of the lowest available offer from all retailers.

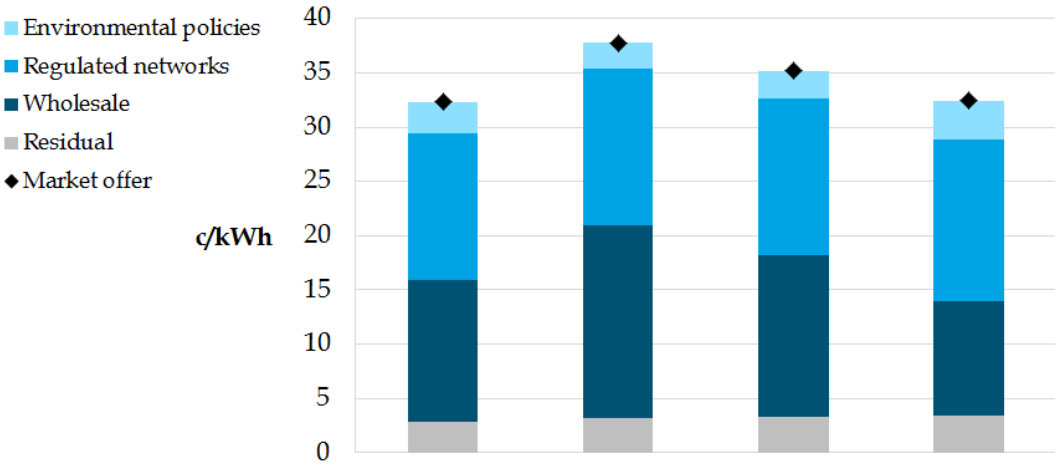
Table F.1 Effect of different household consumption levels on electricity price and annual bill in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household (4,995 kWh)	37.79	$1,888
Representative consumer Two person household (5,000 kWh)	37.79	$1,889
Large household Three person household (8,900 kWh)	35.72	$3,179

F.3 Trends in electricity supply chain components

Figure F.3 shows the expected movements in the supply chain cost components for South Australia.

Figure F.3 Trends in South Australia supply chain components



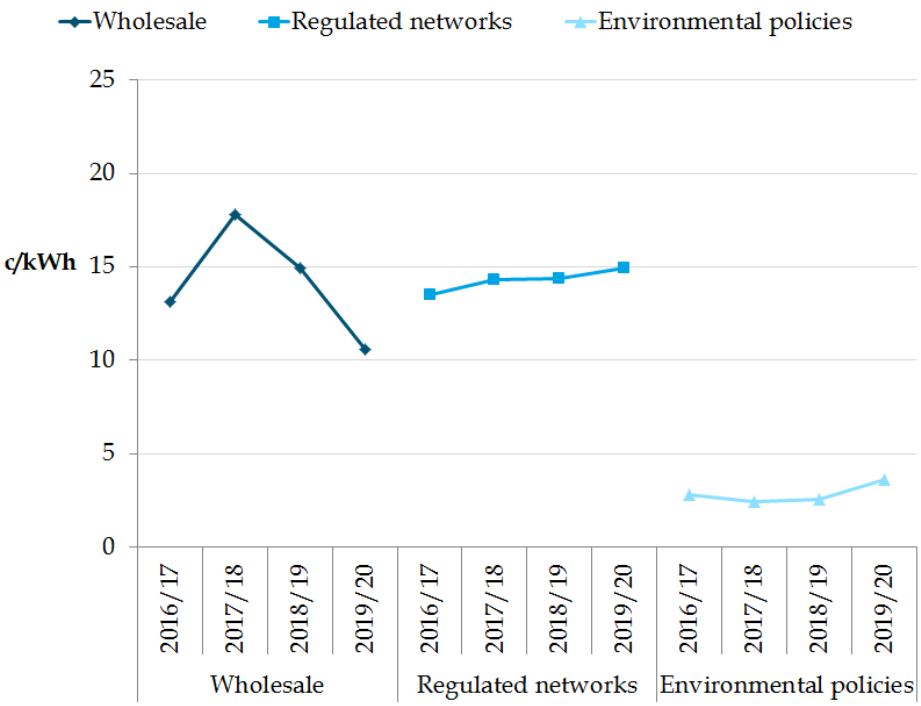
	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**2.83**	**$141**	**2.43**	**$122**	**2.58**	**$129**	**3.61**	**$180**
LRET - LGC cost	0.66	$33	0.78	$39	0.92	$46	1.06	$53
SRES - STC cost	0.37	$18	0.33	$17	0.35	$17	0.33	$17
Solar FiT	1.55	$78	1.06	$53	1.06	$53	1.06	$53
REES	0.25	$13	0.25	$13	0.25	$13	0.25	$13
Energy Security Target	0.00	$0	0.00	$0	0.00	$0	0.90	$45
Regulated networks	**13.52**	**$676**	**14.34**	**$717**	**14.40**	**$720**	**14.92**	**$746**
Transmission	2.80	$140	2.89	$145	2.51	$126	2.59	$129
Distribution	10.72	$536	11.45	$573	11.88	$594	12.33	$617
Wholesale	**13.10**	**$655**	**17.80**	**$890**	**14.94**	**$747**	**10.57**	**$529**
Residual	2.86	$143	3.21	$160	3.29	$164	3.37	$168
Market offer	**32.31**	**$1,615**	**37.79**	**$1,889**	**35.20**	**$1,760**	**32.47**	**$1,623**

Note: In South Australia Environmental policies also include system security policy costs.

Figure F.4 shows the expected trends in supply chain components in South Australia over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 22.9 per cent in the wholesale market component
- an average annual increase of 2.0 per cent in the regulated networks component
- an average annual increase of 21.8 per cent in environmental and system security policy component.

Figure F.4 Trends in South Australia supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

F.3.1 Wholesale market costs

In South Australia, wholesale market costs comprised approximately 40.6 per cent of the representative market offer in 2016/17, and are expected to comprise an increasing and then decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs are expected to:

- increase by 35.9 per cent in 2017/18
- decrease by 16.1 per cent in 2018/19
- decrease by 29.2 per cent in 2019/20.

This is equivalent to an average annual decrease of 22.9 per cent from 2017/18 to 2019/20.

The drivers of the expected trend in wholesale electricity costs in South Australia over the reporting period are detailed in chapter 3 of this report.

F.3.2 Regulated network costs

In South Australia, transmission network services are provided by ElectraNet and distribution network services are provided by SA Power Networks.

Transmission

In 2016/17, the transmission network component comprised 8.7 per cent of the representative market offer and is expected to comprise a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- increase by 3.2 per cent in 2017/18
- decrease by 13.1 per cent in 2018/19
- increase by 3.0 per cent in 2019/20.

This is equivalent to an average annual decrease of 5.4 per cent from 2018/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 33.2 per cent of the representative market offer and is expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period.

Distribution costs are expected to:

- increase by 6.8 per cent in 2017/18
- increase by 3.8 per cent in 2018/19
- increase by 3.8 per cent in 2019/20.

This is equivalent to an average annual increase of 3.8 per cent from 2017/18 to 2019/20.

Basis for estimated network costs in South Australia

The expected trend in transmission and distribution network costs in South Australia is based on the network cost information in Table F.2 below. Table F.2 also details the ongoing judicial review relating to the South Australia distribution revenue determination.

Table F.2 Basis for network costs and ongoing judicial review in South Australia

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends and ongoing judicial review
DNSP SA Power Networks	1 July 2015 – 30 June 2020	Draft: 30 April 2015 Final: 31 Oct 2015	2016/17 and 2017/18 based on SA Power Networks' approved annual pricing proposals. 2018/19 and 2019/20 estimated based on revenue growth rate in the AER's 2015–20 final determination for SA Power Networks. SA Power Networks applied to the Australian Competition Tribunal for merits review and the Federal Court for judicial review of the AER's final determination. The Federal Court dismissed SA Power Networks' application for judicial review of the AER's final determination.[201] In the merits review, the Tribunal dismissed all of SA Power Networks' grounds for review and upheld the AER's final determination.[202] In November 2016, SAPN lodged an application for judicial review in the Federal Court of Australia in respect of the Australian Competition Tribunal's decision.[203] The matter was heard in May 2017 and judgement is reserved at the time of writing this report.
TNSP ElectraNet	1 July 2013 – 30 June 2018	Draft: 30 Nov 2012 Final: 30 April 2013	2016/17 and 2017/18 based on transmission use of system charges in SA Power Network's approved annual pricing proposals.
	1 July 2018 – 30 June 2023	Draft: 26 October 2017	2018/19 and 2019/20 estimated based on revenue growth rate in ElectraNet's 2018–23 draft decision.

201 Australian Energy Regulator, *Federal Court dismisses SA Power Networks' application to review the AER's pricing decision*, media release, 23 December 2015.

202 Australian Competition Tribunal, *Application by SA Power Networks [2016] AComp T 11*, ACT 11 of 2015, 28 October 2016.

203 The Advertiser, *SA Power Networks goes to Federal Court in new bid to raise electricity prices*, 28 November 2016.

F.3.3 Environmental and system security policy costs

The policy costs that were relevant in South Australia during the reporting period are environmental and system security schemes, namely the Commonwealth Government's Renewable Energy Target (RET), South Australia's solar feed-in-tariff (FiT) schemes, the Retailer Energy Efficiency Scheme (REES) and the Energy Security Target (EST).[204]

In 2016/17, environmental schemes comprised 8.8 per cent of the representative market offer and are expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components contributed the following proportion of the representative market offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.0 per cent
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.1 per cent
- FiT costs made up 4.8 per cent
- REES costs made up 0.8 per cent

Renewable Energy Target

The Renewable Energy Target (RET) applies on a national basis and consists of the LRET and SRES.[205]

The drivers of direct costs associated with the LRET and SRES are detailed in the Frontier Economics report.[206]Additional effects of the LRET on the wholesale electricity market are discussed in chapter 3 of this report.

LGC costs are expected to:

- increase by 18.8 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

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204 The costs associated with the RET, REES and EST are recovered through increases in retail prices and are estimated by Frontier Economics. The FiT schemes comprise of two tariffs; one is recovered through network charges, and the other through retail prices.

205 For more information refer to chapter 5.

206 Frontier Economics, *2017 Residential Electricity Price Trends Report*, November 2017.

STC costs are expected to:

- decrease by 9.1 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

Feed-in-tariff schemes

Costs associated with the following South Australia FiTs are included over the reporting period:

- **Retailer feed-in-tariff (R-FiT)** – this scheme set a minimum amount that was paid to customers for supplying renewable energy into the distribution network. The R-FiT applied until 31 December 2016. From 1 January 2017, the Essential Services Commission of South Australia (ESCoSA) ceased setting a minimum price for the R-FiT. Instead, each retailer now determines the R-FiT amount, which is monitored by ESCoSA. The amount and mechanism for recovery of costs associated with the R-FiT are determined by the individual retailer. As a result, the costs of the R-FiT in 2016-17 are effectively part of the residual component for the purposes of this report.[207]
- **Solar feed-in scheme** – this scheme is now closed to new entrants. However consumers who took part are still eligible to claim the FiT, which is recovered through distribution network charges. The applicable tariffs over the reporting period are:[208]
  - a 44 c/ kWh tariff for electricity exported to the grid, which continues until 30 June 2028,[209] and
  - a 16 c/kWh tariff for electricity exported to the grid, which continued until 30 September 2016.[210]

207 ESCoSA, *Solar feed-in-tariff scheme*, website viewed 5 September 2017, http://www.escosa.sa.gov.au/consumers/energy/solar-feed-in-tariff-scheme

208 The actual tariff received depends on the eligibility criteria and the date on which the connection of a solar PV to the grid was approved.

209 SA Government, *Solar rebates and payments*, viewed 5 September 2017. http://www.sa.gov.au/topics/energy-and-environment/energy-bills/solar-rebates-and-payments

210 Ibid.

FiT costs are expected to:

- decrease by 31.4 per cent in 2017/18
- remain unchanged in 2018/19
- remain unchanged in 2019/20.

Retailer Energy Efficiency Scheme (REES)

The REES is a South Australian Government energy efficiency scheme that provides incentives for South Australian households and businesses to save energy. The REES requires large energy retailers to assist households and businesses by offering energy audits and undertaking energy efficiency activities. The scheme involves setting targets that retailers must meet in terms of the number of energy saving activities they undertake.[211]

REES costs are expected to remain unchanged over the reporting period.

Energy Security Target

The Energy Security Target (EST) is a system security scheme that has been introduced by the South Australian Government and will commence on 1 January 2020.[212] For further information on the EST, refer to section 5.6 of this report. For information on the effects of the EST on the wholesale electricity market, refer to section 3.3.5 of this report and Frontier Economics' report.

EST costs are expected to be incurred for the first time in the second half 2019/20.

F.4 Developments that could affect residential electricity prices in South Australia

This section identifies future developments that have been announced and which could affect the future trend in residential retail prices in South Australia.

Review of the Retail Energy Efficiency Scheme code

ESCoSA has commenced a review of the REES Code to align with the South Australian Department of State Development's review of REES annual targets and activity minimum specifications. The review of the REES Code aims to identify improvements in ESCoSA's administration of REES. On 11 May 2017, ESCoSA released an Issues

211 ESCoSA, *ESCoSA - REES overview*, ESCoSA, viewed 5 September 2017, http://www.escosa.sa.gov.au/industry/rees/overview.

212 SA Government, *Energy Security Target*, viewed 22 September 2017. ourenergyplan.sa.gov.au/energy-security-target.html

Paper.[213] As the REES is recovered through retail charges, changes to retailer obligations under the REES could potentially impact residential electricity prices.

Licensing arrangements for generators in South Australia

In August 2017, ESCoSA increased its technical licensing conditions for electricity generators in South Australia's power system. These apply immediately to new electricity generators connected to the NEM, regardless of generation type.[214] ESCoSA is working with licensed SA generators to apply the new conditions to existing licensees, including with the need and cost of any upgrades to be compliant with the new standards.[215] This may have a possible impact on wholesale electricity costs as the changes may impact on generator costs.

213 ESCoSA, *REES code review 2017*, viewed 30 October 2017, http://www.escosa.sa.gov.au/projects-and-publications/projects/rees/rees-code-review-2017

214 ESCoSA, *Stronger rules to apply to new electricity generators*, media release, Adelaide, 17 August 2017.

215 ESCoSA, *Inquiry into the licensing arrangements for generators in South Australia: Final decision*, ESCoSA, Adelaide, 2017, p. 4.

G Tasmania

Box G.1 Key points

- Most residential customers in Tasmania are on a standing offer.
- Residential electricity prices in Tasmania are set by the determinations of the Tasmanian Economic Regulator (TER) in 2015/16 and 2016/17. Prices in 2017/18 and 2018/19 will be set by TER based on projected cost movements. This report estimates the movements in supply chain cost components for 2017/18 and 2018/19 and the resulting residential electricity prices.
- The analysis of residential electricity prices and cost components applies to a representative consumer in Tasmania. A representative consumer is assumed to consume 7,908 kWh per year.
- In 2016/17, the residential electricity standing offer price in Tasmania was approximately $1,831. This is made up of a:
  - 28.1 per cent wholesale market component
  - 53.7 per cent regulated network component
  - 5.6 per cent environmental policy component
  - 12.5 per cent residual component.
- Residential electricity standing offer prices for the representative consumer in Tasmania are expected to decrease by an annual average of 6.5 per cent from 2017/18 to 2019/20. This is based on an expected:
  - decrease by 5.2 per cent in 2018/19
  - decrease by 7.9 per cent in 2019/20.
- The expected decreases in residential standing offer electricity prices in 2018/19 and 2019/20 are largely attributable to decreases in the wholesale component of electricity prices in those years.

G.1 The representative consumer in Tasmania

The analysis of residential prices and cost components applies to a representative residential consumer in Tasmania consuming 7,908 kWh of electricity per year, of which 4,349 kWh is attributed to tariff 41 (heating and hot water).[216] In Tasmania, the

216 Aurora Energy 2017, *Standard electricity rates and charges*, Aurora Energy, Hobart, viewed 5 September 2017,

most common type of residential electricity consumer (the representative consumer) is a two-person household with no pool and no mains gas connection, but with electric water heating. A detailed explanation of the pricing methodology is set out in Appendix A.

G.2 Trends in residential electricity prices and bills

G.2.1 Trends in electricity prices and annual bills for the representative consumer

Residential standing offer electricity prices in Tasmania for the representative consumer:

- increase by 2.0 per cent from 2016/17 to 2017/18
- are expected to decrease by 5.2 per cent in 2018/19
- are expected to decrease by 7.9 per cent in 2019/20.

This is equivalent to an annual average decrease of 6.5 per cent from 2017/18 to 2019/20.

As shown in Figure G.1 in 2016/17, a representative consumer on a standing offer had an annual bill of $1,831 exclusive of GST.

Figure G.1 Trend in Tasmania standing offer prices

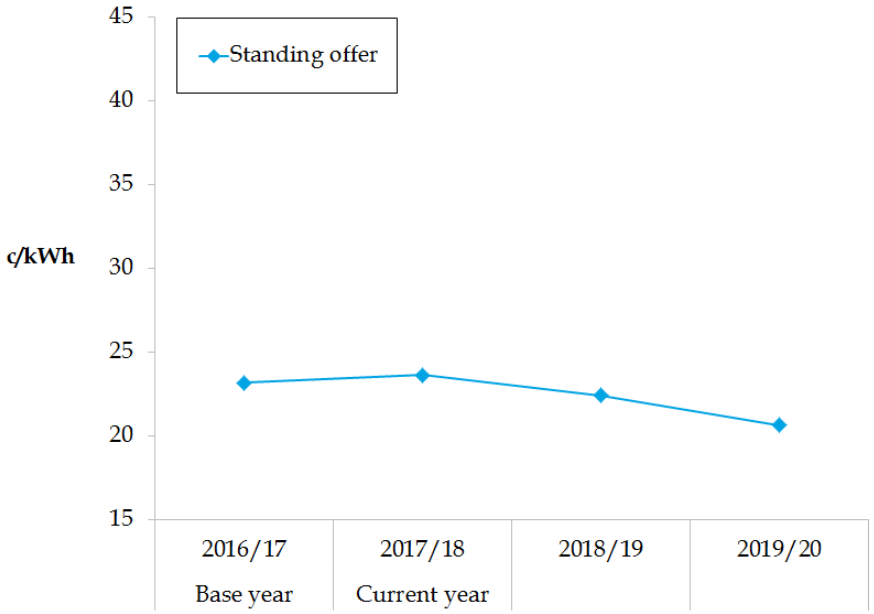


Figure G.2 shows the expected movements in standing offer prices.

https://www.auroraenergy.com.au/your-home/electricity/rates-and-charges/standard-electricity-rates-and-charges.

Figure G.2 Trend in Tasmania standing offer prices, annual bill

G.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

The electricity consumption profiles of consumers are diverse and depend on many factors including the number of people in the household and technology choices. Table G.1 demonstrates how different consumption profiles can affect prices and annual bills.

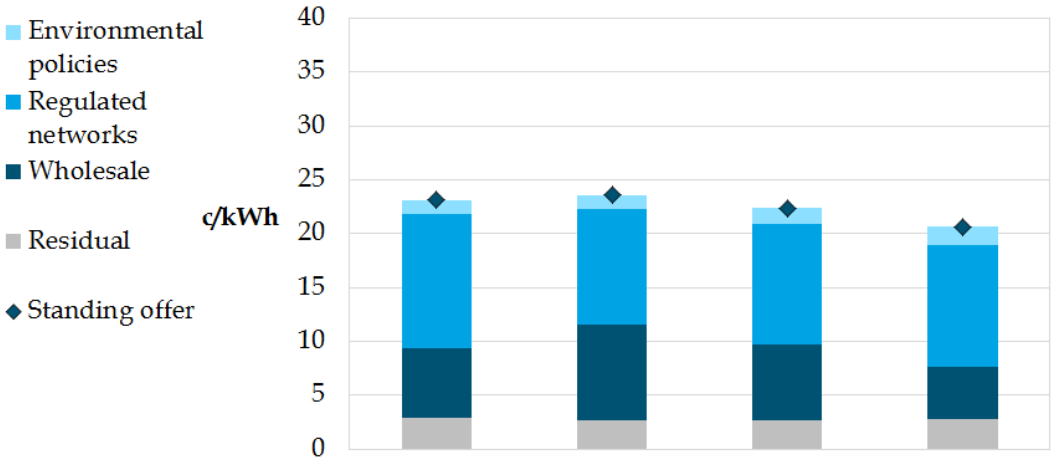
Table G.1 Effect of different consumption levels on electricity price and annual bill in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household with electric water heating (6,038 kWh)	24.59	$1,485
Representative consumer Two person household with electric water heating (7,908 kWh)	23.62	$1,868
Large household Four person household with electric heating (9,089 kWh)	22.55	$2,050

G.3 Trends in electricity supply chain components

Figure G.3 shows the expected movements in the supply chain components for Tasmania, which are the wholesale market, regulated network, environmental policy and the residual component.

Figure G.3 Trends in Tasmanian supply chain components



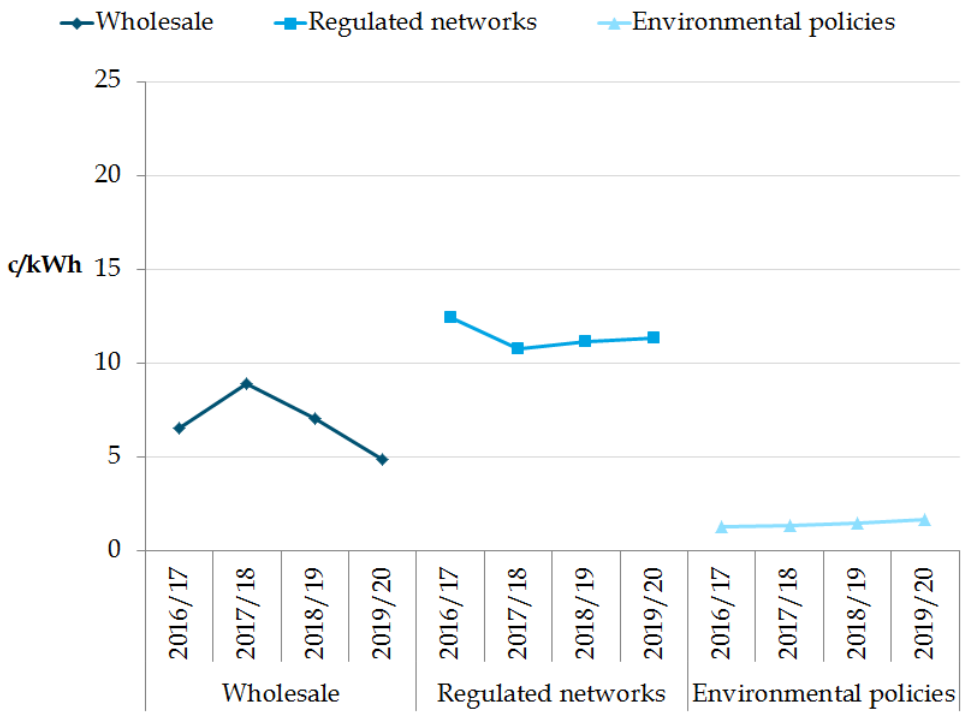
	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**1.31**	**$103**	**1.32**	**$104**	**1.49**	**$118**	**1.65**	**$130**
LRET - LGC cost	0.84	$66	0.93	$73	1.08	$86	1.25	$99
SRES - STC cost	0.47	$37	0.40	$31	0.41	$32	0.39	$31
Regulated networks	**12.44**	**$983**	**10.79**	**$853**	**11.16**	**$883**	**11.34**	**$896**
Transmission	2.82	$223	2.76	$218	2.81	$223	2.86	$226
Distribution	9.61	$760	8.03	$635	8.35	$660	8.48	$670
Wholesale	**6.51**	**$515**	**8.88**	**$702**	**7.05**	**$558**	**4.89**	**$387**
Residual	2.90	$229	2.63	$208	2.69	$213	2.76	$218
Standing offer	**23.15**	**$1,831**	**23.62**	**$1,868**	**22.40**	**$1,771**	**20.64**	**$1,632**

*The residual component is derived for 2016/17 and 2017/18 by subtracting wholesale, environmental and network costs from the standing offer price. The residual cost is assumed to increase at an inflation rate of 2.5 per cent for future years in the reporting period. The residual component is derived specifically for the representative consumer using the methodology in this report and is not equivalent to the regulated retail margin set by TER in Tasmania.

Figure G.4 shows the expected trends in supply change components in Tasmania over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 25.8 per cent in the wholesale market component
- an average annual increase of 2.5 per cent in the regulated network component
- an average annual increase of 11.7 per cent in environmental policy component.

Figure G.4 Trends in Tasmanian supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component is explained in Appendix A.

G.3.1 Wholesale market costs

In Tasmania, wholesale market costs comprised approximately 28.1 per cent of the representative standing offer in 2016/17, and are expected to comprise an increasing and then decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale market costs for 2016/17 are sourced from the TER's retail pricing determination.

For 2017/18, wholesale market costs are based on the Wholesale Electricity Price Order which sets the wholesale electricity price at $83.79/MWh.[217]

For 2018/19 and 2019/20, wholesale costs are estimated by the expected trend in Victorian wholesale electricity prices, as modelled by Frontier economics for this report. Frontier economics uses a modelling approach that is broadly consistent with that of the TER. The TER uses a market-based approach that has market cost of contracts in Victoria as an input, adjusted for losses on the Victoria to Tasmania interconnector (Basslink).

217 Electricity Supply Industry Act 1995, Wholesale Electricity Price Order. http://www.economicregulator.tas.gov.au/Documents/WEP-Order-for-2017-18-Standing-Offer-prices.PDF

The Victorian wholesale electricity trend is used as a proxy for the Tasmanian trend as, after accounting for transport costs, prices in these markets are similar when there are no interconnector constraints. Further, spot market and contract market information is more readily available for Victoria, providing the basis for better estimates of wholesale electricity costs.

Wholesale market costs are expected to:

- increase by 36.4 per cent in 2017/18
- decrease by 20.6 per cent in 2018/19
- decrease by 30.7 per cent in 2019/20.

This is equivalent to an average annual decrease of 25.8 per cent from 2017/18 to 2019/20.

Refer to Chapter 3 for information on the trend and drivers of the decrease in wholesale market costs over the reporting period in Victoria.

G.3.2 Regulated network costs

Transmission and distribution network services in Tasmania are provided by TasNetworks.

Transmission

In 2016/17, the transmission network component comprised 12.2 per cent of the representative standing offer and is expected to make up an increasing proportion of a residential electricity consumer's bill over the reporting period.

Transmission costs are expected to:

- decrease by 2.3 per cent in 2017/18
- increase by 2.0 per cent in 2018/19
- increase by 1.6 per cent in 2019/20.

This is equivalent to an average annual increase of 1.8 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 41.5 per cent of the representative standing offer and is expected to make up a decreasing and then increasing proportion of a residential electricity's consumer's bill over the reporting period.

Distribution costs are expected to:

- decrease by 16.5 per cent in 2017/18
- increase by 4.0 per cent in 2018/19
- increase by 1.5 per cent in 2019/20.

This is equivalent to an average annual increase of 2.7 per cent from 2017/18 to 2019/20.

Basis for network costs in Tasmania

The expected trend in transmission and distribution network costs in Tasmania is based on the network cost information in Table G.2 below.

Table G.2 Basis for network costs in price trends

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends
TasNetworks (distribution)	1 July 2017 - 30 June 2019	Draft: 29 Sept 2016 Final: 28 April 2017	2016/17 and 2017/18 based on approved pricing proposal for TasNetworks. 2018/19 estimated based on revenue growth rate in AER 2017-19 final determination for TasNetworks.
	1 July 2019 - 30 June 2024		As the 2019-24 determination has not yet been made, 2019/20 revenues are kept constant in nominal terms with 2018/19.
TasNetworks (transmission)	1 July 2014 – 30 June 2019	Draft: 27 Nov 2014 Final: 30 March 2017	2016/17 and 2017/18 based on transmission use of system charges in TasNetworks (distribution) approved annual pricing proposals. 2018/19 estimated based on revenue growth rate in AER's 2014-19 final determination for TasNetworks (transmission).
	1 July 2019 - 30 June 2024	Proposal due January 2018	2019/20 kept constant in nominal terms (no change) from 2018/19.

G.3.3 Environmental policy costs

The environmental policy costs relevant in Tasmania during the reporting period relate to the Commonwealth Government's Renewable Energy Target (RET).

In 2016/17, environmental schemes comprised 5.6 per cent of the representative standing offer and are expected to make up an increasing proportion of a residential electricity consumer's bill over the reporting period. The components of the RET contribute the following proportion of the representative standing offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the LRET made up 3.6 per cent
- Small-scale Technology Certificate (STC) costs under the SRES made up 2.0 per cent.

Renewable Energy Target

LGC costs are expected to:

- increase by 10.6 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 15.4 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

Aurora Energy offers a number of feed-in-tariffs for small-scale renewable energy generators. However, the costs of these schemes have not been estimated as they do not directly affect residential prices.

Tasmanian Energy Efficiency Loan scheme

The Tasmanian Energy Efficiency Loan (TEEL) scheme is a joint initiative of the Tasmanian Government and Aurora Energy to assist Tasmanian households and small businesses with the purchase of energy efficient products.[218] There is no direct environmental cost associated with the TEEL scheme as it is funded by the Tasmanian government.

218 Tasmanian Government, *Tasmanian Energy Efficiency Loan Scheme*, viewed 6 September 2017, https://www.auroraenergy.com.au/teels

H Western Australia

Box H.1 Key points

- Residential electricity prices in Western Australia are set by the Western Australian Government, which subsidises electricity prices such that the prices paid by consumers are less than the cost of supply.
- In 2016/17, the residential electricity supply cost in the South-West Interconnected System (SWIS) for the representative consumer was approximately $1,580. This is made up of a:
  - 40.1 per cent wholesale market component
  - 48.7 per cent regulated network component
  - 3.3 per cent environmental policy component
  - 7.9 per cent retail component.
- In 2016/17, a representative consumer using 5,198 kWh each year had an annual bill of $1,412 exclusive of GST.
- Residential electricity prices for the representative consumer in the SWIS increased by 10.9 per cent from 2016/17 to 2017/18. Residential electricity prices paid by consumers do not follow price trends or necessarily reflect the underlying cost of supplying electricity, because residential electricity prices are set by the Western Australian Government.
- Residential electricity prices for the representative consumer in the SWIS are expected to increase by an annual average of 6.3 per cent from 2017/18 to 2019/20. This is based on an expected:
  - increase by 7.0 per cent in 2018/19
  - increase by 5.6 per cent in 2019/20.
- The expected increases in residential electricity supply costs in 2018/19 and 2019/20 are largely attributable to increases in the wholesale component of residential electricity supply cost in those years. Expected increases in residential electricity prices are attributable to these changes in supply costs as well as a reduction in the subsidy provided each year.

H.1 The representative consumer in Western Australia

The analysis of residential prices and cost components applies to a representative residential consumer in Western Australia consuming 5,198 kWh of electricity per year.[219]

In Western Australia, the most common type of residential electricity consumer (the representative consumer) is a four-person household. A detailed explanation of the pricing methodology is set out in Appendix A.

H.2 Trends in residential electricity prices and bills

H.2.1 Trends in electricity prices and annual bills for the representative consumer

Residential electricity prices in Western Australia for the representative consumer:

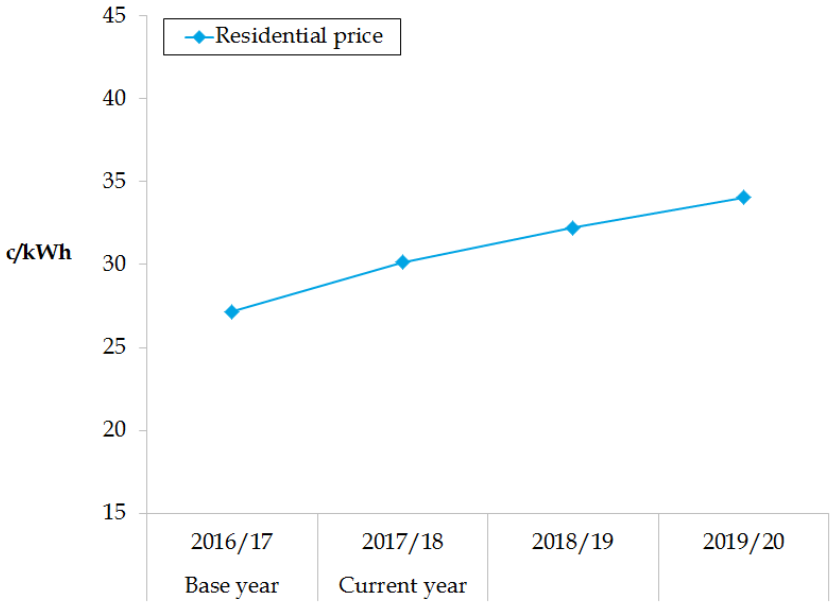
- increased by 10.9 per cent from 2016/17 to 2017/18
- are expected to increase by 7.0 per cent in 2018/19
- are expected to increase by 5.6 per cent in 2019/20.

This is equivalent to an annual average increase of 6.3 per cent from 2017/18 to 2019/20.

Figure H.1 shows the expected movements in representative residential electricity prices in Western Australia.

219 Government of Western Australia, *2017-18 Budget: Budget Paper No. 3*, Government of Western Australia, Perth, 2017.

Figure H.1 Trends in Western Australian representative residential retail prices



In Western Australia, retail prices are set by the Western Australian government. These retail prices are based on prices published by the Western Australian Government (for 2016/17 and 2017/18) and by the trend announced in the 2017/18 State Budget (for 2018/19 and 2019/20). As shown in Figure H.2 in 2016/17, a representative consumer had an annual bill of $1,412 exclusive of GST.

Figure H.2 Trend in Western Australia annual bill

H.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

Table H.1 demonstrates how different consumption profiles can affect prices and annual bills. Lower consumption levels result in lower annual household bills but a higher per unit average price, as the fixed component of the retail electricity price is spread over a smaller volume of electricity. The opposite effect applies to higher consumption levels, whereby annual household bills are higher but there is a lower per unit average price, as the fixed component of the retail electricity price is spread over a larger volume of electricity.

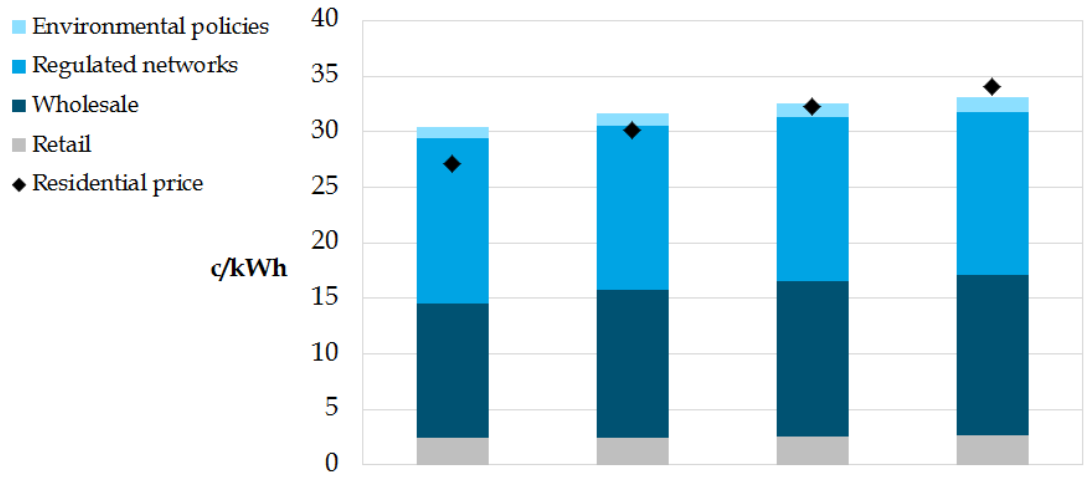
Table H.1 Effect of different household consumption levels on electricity price and annual bill in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household 2,500 kWh consumption	36.66	$917
Representative consumer Four-person household (5,198 kWh)	30.13	$1,566
Large household 9,500 kWh consumption	27.38	$2,601

H.3 Trends in electricity supply chain components

Figure H.3 shows the expected movements in the supply chain cost components for Western Australia. For Western Australia, the residual component is referred to as the retail component.

Figure H.3 Trends in Western Australian supply chain components

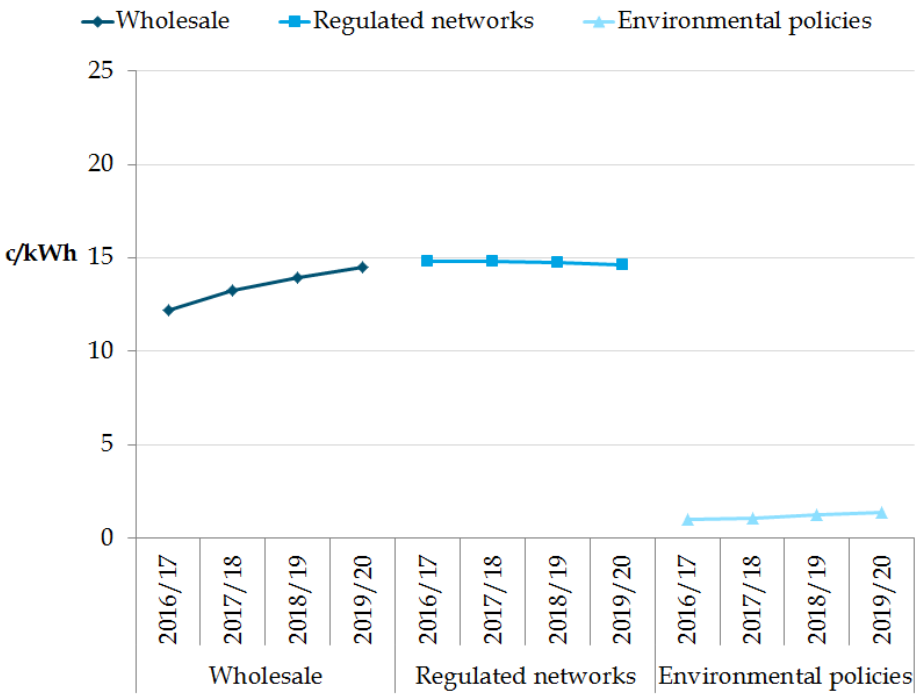


	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**1.01**	**$52**	**1.09**	**$57**	**1.23**	**$64**	**1.36**	**$71**
LRET - LGC cost	0.65	$34	0.76	$40	0.89	$46	1.03	$54
SRES - STC cost	0.36	$19	0.33	$17	0.34	$18	0.33	$17
Regulated networks	**14.80**	**$769**	**14.80**	**$769**	**14.74**	**$766**	**14.65**	**$761**
Transmission	1.50	$78	1.50	$78	1.49	$77	1.48	$77
Distribution	13.31	$692	13.31	$692	13.25	$689	13.17	$684
Wholesale	**12.19**	**$633**	**13.25**	**$689**	**13.97**	**$726**	**14.48**	**$752**
Retail	2.40	$125	2.50	$130	2.58	$134	2.67	$139
Estimated total supply cost	**30.40**	**$1,580**	**31.64**	**$1,645**	**32.52**	**$1,690**	**33.15**	**$1,723**
Residential price	**27.17**	**$1,412**	**30.13**	**$1,566**	**32.23**	**$1,676**	**34.04**	**$1,769**

Figure H.4 shows the expected trends in supply chain components in Western Australia over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual increase of 4.5 per cent in the wholesale market component
- an average annual decrease of 0.5 per cent in the regulated networks component
- an average annual increase of 11.7 per cent in environmental policy component
- an average annual increase of 3.3 per cent in the retail component.

Figure H.4 Trend in Western Australia prices, annual bill



The residential electricity prices paid by consumers do not necessarily reflect underlying costs, nor follow cost trends, as prices are set by the Western Australian Government. The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

H.3.1 Wholesale market costs

In Western Australia, wholesale market costs comprised approximately 40.1 per cent of the cost of supply in 2016/17, and are expected to comprise an increasing proportion of the cost of supply over the reporting period.

Wholesale market costs are expected to:

- increase by 8.7 per cent in 2017/18
- increase by 5.5 per cent in 2018/19
- increase by 3.6 per cent in 2019/20.

This is equivalent to an average annual increase of 4.5 per cent from 2017/18 to 2019/20.

The wholesale electricity cost estimates are based on modelling of the stand-alone Long Run Marginal Cost (LRMC) undertaken by Frontier Economics. LRMC modelling was used due to the expectation that market modelling would underestimate Synergy's actual wholesale electricity costs. Synergy's costs are determined by contractual

arrangements, including those relating to the Reserve Capacity Mechanism (RCM), rather than the spot market price.[220]

The drivers of the expected trend in wholesale electricity costs in Western Australia over the reporting period are detailed in chapter 3 of this report.

Box H.2 The Wholesale Electricity Market (WA)

The Wholesale Electricity Market (WEM) (WA) operates in the South Western Interconnected System (SWIS). The WEM has two components, an energy market (for the buying and selling of electricity) and a capacity market.

Most energy in the WEM is traded outside the market via bilateral contracts between market participants. These bilateral contract positions can be modified through trading on the daily Short Term Energy Market and a Balancing Market.

Activity in the capacity market is driven by the Reserve Capacity Mechanism (RCM). Retailers are required to contract two years in advance for a set amount of generation capacity to meet peak demand in the SWIS.

The key governance bodies in the WEM are the Australian Energy Market Operator, which maintains the Market Rules; Western Power, the network owner and operator; Synergy, which both retails and generates electricity; and the Economic Regulation Authority which is responsible for economic regulation of Western Power's transmission and distribution network and market monitoring. The transmission and distribution networks and the retailer are owned by the Western Australia government.

H.3.2 Regulated network costs

The expected trend in transmission and distribution network costs in Western Australia for 2017/18 have been set at a level equal to the 2016/17 financial year, while the terms of the access arrangement for Western Power's networks are being determined by the ERA. We have assumed that the total revenue that Western Power is allowed to recover remains fixed and that customer numbers continue to grow modestly to 2019/20. This results in a slight decline in transmission and distribution prices from 2017/18 to 2019/20.

Transmission

In 2016/17, the transmission network component comprised 4.9 per cent of the cost of supply and is expected to comprise a decreasing proportion of the cost of supply over the reporting period.

220 The objective of the RCM is to secure sufficient capacity (generation and demand side management) to meet the peak load of the SWIS. The capacity requirement is set two years in advance by the Australian Energy Market Operator.

Transmission costs are expected to:

- remain unchanged in 2017/18
- decrease by 0.5 per cent in 2018/19
- decrease by 0.7 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.6 per cent from 2017/18 to 2019/20.

Distribution

In 2016/17, the distribution network component comprised 43.8 per cent of the cost of supply and is expected to comprise a decreasing proportion of the cost of supply over the reporting period.

Distribution costs are expected to:

- remain unchanged in 2017/18
- decrease by 0.4 per cent in 2018/19
- decrease by 0.6 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.5 per cent from 2017/18 to 2019/20.

Basis for estimated network costs in Western Australia

The expected trend in transmission and distribution network costs in Western Australia is based on the network cost information in Table H.2 below.

Table H.2 Basis for network costs in price trends in Western Australia

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in price trends
Western Power (transmission and distribution)	1 July 2012 to 30 June 2017	Draft: 29 March 2012 Final: 29 Nov 2012	2016/17 based on 2016/17 Price List approved under Western Power's Access Arrangement.
	1 July 2017 to 30 June 2022	The 2017-22 Access Arrangement was not finalised as at the time of writing (8 November 2017).	As there is currently no access arrangement for the 2017/18 financial year onwards, 2017/18 is kept constant in nominal terms (no change) with 2016/17. Assume no change for 2018/19 and 2019/20.

H.3.3 Environmental policy costs

The environmental policy costs that are relevant in Western Australia during the reporting period relate to the Commonwealth Government's Renewable Energy Target (RET).[221]

In 2016/17, environmental schemes comprised 3.3 per cent of the cost of supply and it is expected to account for increasing proportion of the cost of supply over the reporting period. The individual environmental scheme components contribute the following proportion of the cost of supply in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.1 per cent
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.2 per cent.

Renewable Energy Target

LGC costs are expected to:

- increase by 17.8 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

STC costs are expected to:

- decrease by 9.9 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

221 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics. The costs associated with the SBS are recovered through increases in distribution network prices.

H.3.4 Retail costs

In Western Australia, retail costs comprised approximately 7.9 per cent of the cost of supply in 2016/17, and are expected to account for a slightly increasing proportion of the cost of supply over the reporting period.

Retail costs are expected to:

- increase by 4.0 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- increase by 3.2 per cent in 2019/20.

This is equivalent to an average annual increase of 3.3 per cent from 2017/18 to 2019/20.

For the retail component, estimates from the Western Australian Public Utilities Office have been used for Synergy's efficient retailer operating costs and retail margin. The approach to estimating the retail cost in Western Australia is different to how the residual component is derived for other jurisdictions.[222]

H.4 Developments that could affect residential electricity prices in Western Australia

This section identifies future developments that have been announced and which could affect the future trend of residential retail prices in Western Australia.

On 23 August 2017, the WA Minister for Energy announced several electricity sector reform initiatives.[223] The Public Utilities Office is currently developing a detailed work program to progress these reform initiatives.

The proposed reforms include:

- **Improving access to Western Power's electricity network -** implementing a constrained network access model for Western Power's electricity network in the SWIS.

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222 In other jurisdictions, the 'residual component' is derived by subtracting the wholesale, environmental policy and network cost components from the representative standing offer price or market offer price in each jurisdiction. Broadly there are two reasons for using a different method for Western Australia. As prices are set by the government rather than an independent regulator, it is unclear what assumptions have been made in regard to the retail component. Also, because the government-set price is less than the cost of supply, calculation of the retail component via the residual method used in other jurisdictions would not provide any indication of the retail costs and would therefore underestimate the total cost of supply.

223 Government of Western Australia, Department of Treasury, *Electricity Sector Reform Initiatives*, viewed 30 October 2017. http://www.treasury.wa.gov.au/Public-Utilities-Office/Industry-reform/Electricity-Sector-Reform-Initiatives/

- **Improved operation of the Wholesale Electricity Market -** changes to the network access regulation model for the Western Power network may require consequential changes to the Wholesale Electricity Market, including a new generator dispatch tool to be designed and implemented by AEMO.

- **Reserve capacity pricing -** the Public Utilities Office is to develop advice on a new model for capacity pricing. This work is to examine the suitability of implementing an auction to determine capacity pricing, as well as other appropriate pricing arrangements.

I Northern Territory

Box I.1 Key points

- Residential electricity prices in the Northern Territory are set by the Northern Territory Government, which subsidises electricity prices such that the prices paid by consumers are less than the cost of supply.
- In 2016/17, a representative consumer using 6,613 kWh each year had an annual bill of $1,702 exclusive of GST. This is made up of (excluding residual/retail component):
  - 57.1 per cent wholesale electricity component
  - 53.0 per cent regulated network component
  - 3.6 per cent environmental policy component. (It is noted that the components of the representative consumer's bill in the Northern Territory add up to more than 100 per cent due to the residual being negative, representing the amount that is subsidised.)
- Residential electricity prices for the representative consumer in the Northern Territory increased by 0.5 per cent from 2016/17 to 2017/18.
- Residential electricity regulated standing offer prices for the representative consumer in the Northern Territory are expected to increase by an annual average of 2.5 per cent from 2017/18 to 2019/20. This is based on an expected:
  - increase by 2.5 per cent in 2018/19
  - increase by 2.5 per cent in 2019/20.

I.1 The representative consumer in the Northern Territory

The analysis of residential prices and cost components applies to a representative residential consumer in the Northern Territory consuming 6,613 kWh of electricity per year.

In the Northern Territory, the most common type of residential electricity consumer (the representative consumer) is a two-person household with no pool, no mains gas connection and with air conditioning. A detailed explanation of the pricing methodology is set out in Appendix A.

I.2 Trends in residential electricity prices and bills

I.2.1 Trends in electricity prices and annual bills for the representative consumer

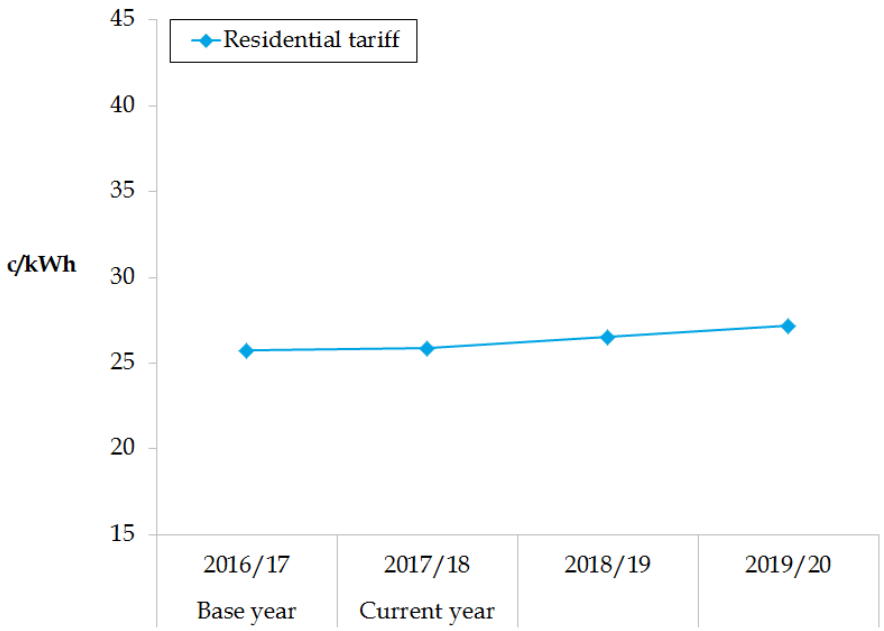
Residential electricity prices in the Northern Territory for the representative consumer:

- increase by 0.5 per cent from 2016/17 to 2017/18
- are expected to increase by 2.5 per cent in 2018/19
- are expected to increase by 2.5 per cent in 2019/20.

This is equivalent to an annual average increase of 2.5 per cent from 2017/18 to 2019/20 based on assumed inflation.

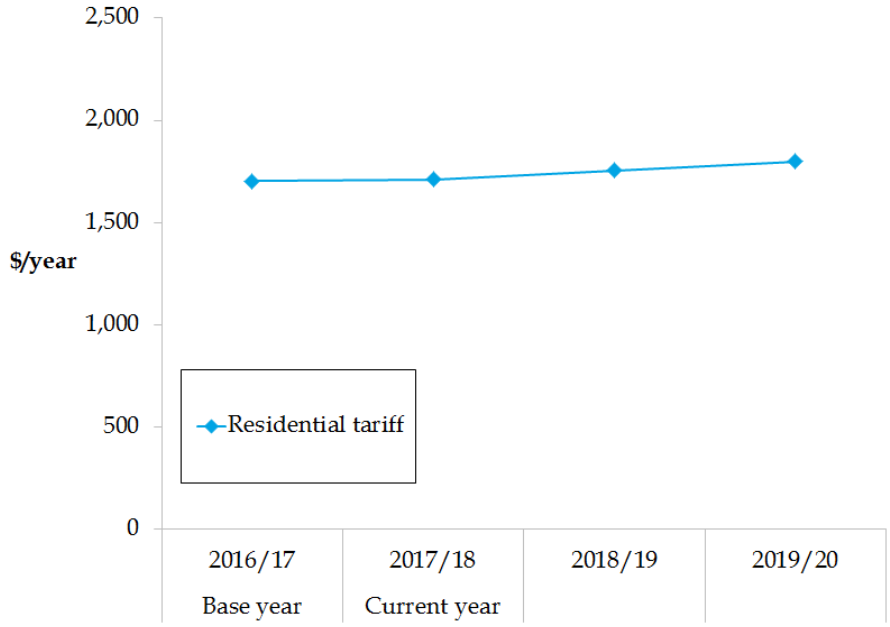
Figure I.1 shows the expected movements in electricity prices.

Figure I.1 Trend in Northern Territory government set residential tariff



Maximum residential electricity prices are set annually by the Northern Territory Government rather than by market competition or an independent regulator. As a result, the retail cost paid by consumers is less than the total cost of supply.

Figure I.2 Trend in Northern Territory annual bill



I.2.2 Effect of different household consumption levels on electricity prices and annual bills in 2017/18

Electricity price trends and drivers are analysed based on the outcomes for a representative consumer. This approach is based on the consumption profile of a common type of household, however different consumption profiles will result in different price levels. Therefore the actual prices paid by individual consumers will vary.

The electricity consumption profiles of consumers are diverse and depend on many factors including the number of people in the household and technology choices. Table I.1 demonstrates how different consumption profiles can affect prices and annual bills.

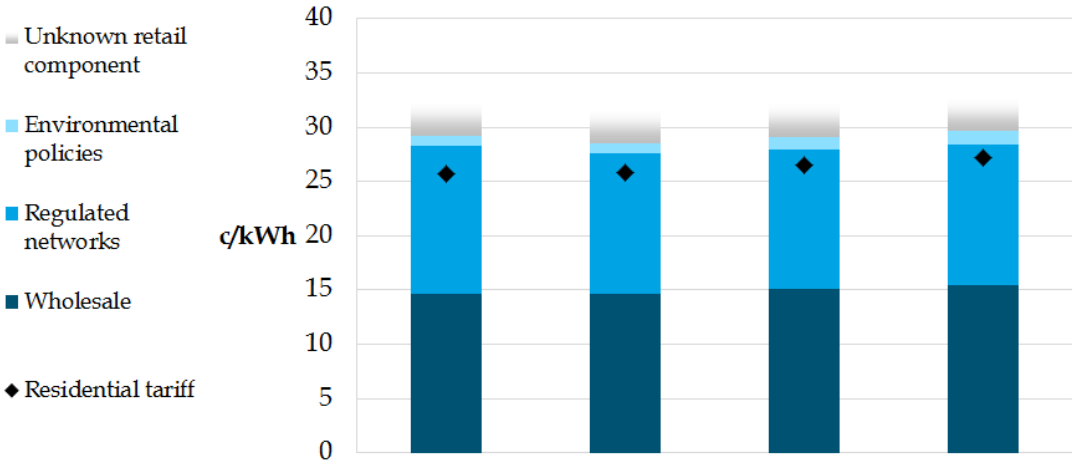
Table I.1 Effect of different household consumption levels on electricity price and annual bill in 2017/18, excluding GST

Annual consumption level	2017/18 price (c/kWh)	2017/18 annual bill
Small household One person household with split system air conditioning (2,500 kWh)	30.02	$750
Representative consumer Two person household with split system air conditioning (6,613 kWh)	25.88	$1,711
Large household Three person household with split system air conditioning (9,500 kWh)	25.10	$2,384

I.3 Trends in electricity supply chain components

Figure I.3 shows the expected movements in the supply chain cost components for the Northern Territory. While the AEMC is able to estimate wholesale electricity costs, regulated network costs and environmental policy costs, it is not possible to estimate the residual component in the Northern Territory. Therefore, the full cost of supply cannot be determined for the Northern Territory. However, as the residential tariff is set by the government the trend in residential electricity prices can be determined.

Figure I.3 Trends in Northern Territory supply chain components



	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Environmental policies	**0.93**	**$62**	**1.01**	**$67**	**1.14**	**$75**	**1.26**	**$83**
LRET - LGC cost	0.60	$40	0.71	$47	0.82	$55	0.96	$63
SRES - STC cost	0.33	$22	0.30	$20	0.31	$21	0.30	$20
Regulated networks	**13.64**	**$902**	**12.87**	**$851**	**12.94**	**$855**	**12.94**	**$855**
Wholesale	**14.69**	**$971**	**14.69**	**$971**	**15.06**	**$996**	**15.43**	**$1,021**
Residual	**-3.51**	**-$232**	**-2.69**	**-$178**	**-2.61**	**-$172**	**-2.44**	**-$161**
Residential tariff**	**25.74**	**$1,702**	**25.88**	**$1,711**	**26.52**	**$1,754**	**27.19**	**$1,798**

Note: The "residual" is the difference between the residential tariff and the aggregate of the supply chain costs. It is a contribution to the retail component. As a result the cost stack shown in the table underestimates total costs. In the case where the residual is negative, the aggregate of the supply chain costs, excluding the retail component, is higher than the residential price.

Note: The unknown retail component includes a range of different costs, including the retailer operating costs, consumer acquisition and retention, and return on investment for investing capital in the business. The quantum of the retail component is not known and this is illustrated by the faded element at the top of the cost stack in the graph.

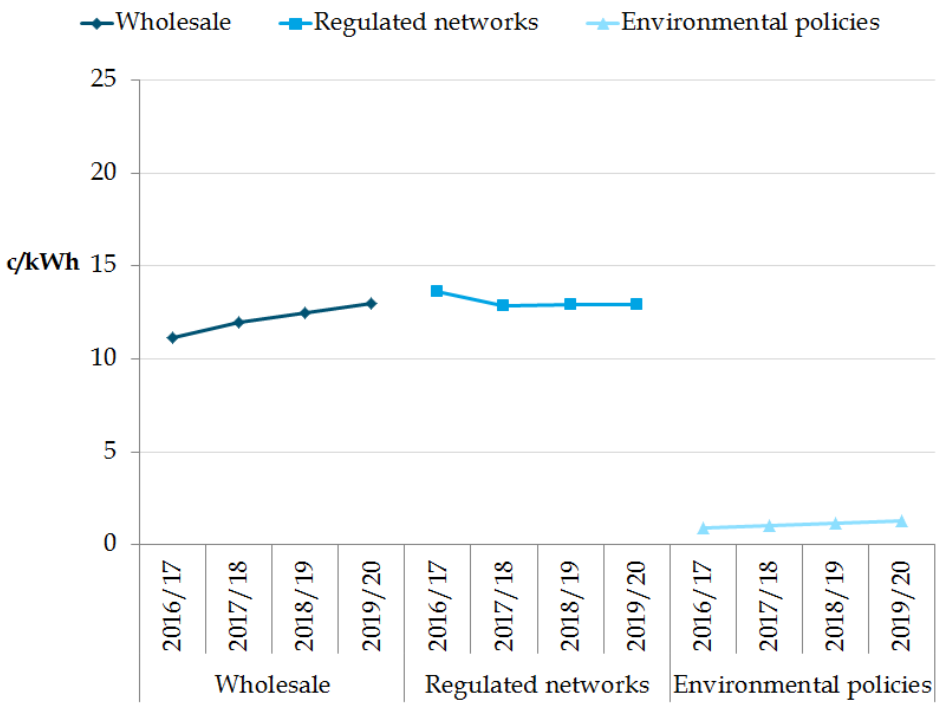
**Residential tariffs are set by the Northern Territory Government. Residential Tariffs for 2016-17 were based on an average of the prices set for the 2016 and 2017 calendar years. The Northern Territory Government moved to updating prices on a financial year basis for 2017-18.[224] It is assumed that residential tariffs for 2018-19 and 2019-20 will increase at an inflation rate of 2.5 per cent.

224 See: Noticve of Issue of Electricity Pricing Order, dated 6 June 2017, https://nt.gov.au/__data /assets /pdf_file/0004/434380/g26.pdf

Figure I.4 shows the expected trends in supply chain components in the Northern Territory over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual increase of 2.5 per cent in the wholesale market component
- an average annual increase of 0.3 per cent in the regulated networks component
- an average annual increase of 11.7 per cent in environmental policy component.

Figure I.4 Trends in Northern Territory supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

I.3.1 Wholesale electricity costs

Wholesale electricity costs for the reporting period were provided to the AEMC by the Northern Territory Government.

In the Northern Territory, wholesale electricity costs comprised approximately 57.1 per cent of the representative market offer in 2016/17, and are expected to account for a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Wholesale electricity costs are expected to:

- remain unchanged in 2017/18
- increase by 2.5 per cent in 2018/19
- increase by 2.5 per cent in 2019/20.

This is equivalent to an average annual increase of 2.5 per cent from 2017/18 to 2019/20.

The trend in wholesale electricity costs up to 2018/19 reflects contractual arrangements for generation entered into for the period 2015-18. The increase in costs in 2018/19 and 2019/20 is based on assumed inflation.

I.3.2 Regulated network costs

In the Northern Territory, transmission and distribution network services in the Northern Territory are provided by the government-owned Power and Water Corporation. There is also no distinction between transmission and distribution prices when network prices are recovered from consumers.

In 2016/17, the network component comprised 53.0 per cent of the representative offer and is expected to comprise a decreasing proportion of a residential electricity consumer's bill over the reporting period.

Network costs are expected to:

- decrease by 5.6 per cent in 2017/18
- increase by 0.5 per cent in 2018/19[225]
- remain unchanged in 2019/20.

This is equivalent to an average annual increase of 0.3 per cent from 2017/18 to 2019/20.

The expected trend in network costs in the Northern Territory is influenced by changes in changes in the Ministerial Direction regarding network pricing.

Basis for network costs in price trends

Table I.2 below shows the timetable for network revenue determinations, the basis for network costs used in price trends and ongoing appeals and decisions in the Northern Territory.

225 Based on growth in smoothed revenue between 2017/18 and 2018/19 in Power and Water Electricity Network Service Provider's pre tax revenue model (PTRM) for the 2014-19 regulatory period.

Table I.2 Basis for network costs in price trends for the Northern Territory

NSP	Regulatory period	Draft and final decision dates	Basis for network costs in this report
Power and Water Corporation (transmission and distribution)	1 July 2014 – 30 June 2019	Draft: December 2013 Final: 24 April 2014	2016/17 and 2017/18 based on Ministerial Direction. 2018/19 based on growth rate from the Utilities Commission 2014–19 final determination for Power and Water Corporation. 2019/20 kept constant in nominal terms (no change) from 2018/19.

I.3.3 Environmental policy costs

The environmental policy costs relevant in the Northern Territory during the reporting period relate to the Commonwealth Government's Renewable Energy Target (RET).[226]

In 2016/17, environmental schemes comprised 3.6 per cent of the representative market offer and are expected to comprise an increasing proportion of a residential electricity consumer's bill over the reporting period. The individual environmental scheme components contribute the following proportion of the representative market offer in 2016/17:

- Large-scale Generation Certificate (LGC) costs under the Large-scale Renewable Energy Target (LRET) made up 2.3 per cent
- Small-scale Technology Certificate (STC) costs under the Small-scale Renewable Energy Scheme (SRES) made up 1.3 per cent.

Renewable Energy Target

LGC costs are expected to:

- increase by 18.0 per cent in 2017/18
- increase by 16.8 per cent in 2018/19
- increase by 15.9 per cent in 2019/20.

This is equivalent to an average annual increase of 16.3 per cent from 2017/18 to 2019/20.

226 The costs associated with the RET are recovered through increases in retail prices and are estimated by Frontier Economics.

STC costs are expected to:

- decrease by 9.7 per cent in 2017/18
- increase by 3.4 per cent in 2018/19
- decrease by 3.5 per cent in 2019/20.

This is equivalent to an average annual decrease of 0.1 per cent from 2017/18 to 2019/20.

I.4 Developments that could affect residential electricity prices in the Northern Territory

This section identifies future developments that have been announced and which could affect the future trend in residential retail prices in the Northern Territory.

Network Regulation

On 1 July 2015, the Northern Territory Government transferred network access and price regulation from the Northern Territory Utilities Commission to the AER.[227] The AER will initially regulate according to the Northern Territory regulatory framework for the duration of the 2014–19 network determination. The National Electricity Law and the National Electricity Rules have been adopted and will apply for the subsequent regulatory period commencing 1 July 2019.

Northern Territory Electricity Market

The Northern Territory Government has commenced the development and implementation of competitive trading of electricity in the Northern Territory Electricity Market (NTEM).[228]

In May 2015, an interim wholesale electricity market, 'I-NTEM' commenced.[229]

The I-NTEM provides a framework to facilitate wholesale electricity arrangements between generators and retailers in the electricity market. The initiative is supported

227 Utilities Commission, *Transfer of network price regulation to the AER*, media release, Darwin, 1 July 2015, viewed 29 August 2017, http://www.utilicom.nt.gov.au/Newsroom/Lists/Posts/Post.aspx?ID=200.

228 Department of Treasury and Finance, *Strategy for Northern Territory Utilities*, Department of Treasury and Finance, Darwin, 2016, p. 6.

229 Utilities Commission, *Power System Review 2013-14,*, Utilities Commission, Darwin, 2015, p. 11.

by the creation of a Market Operator in addition to the existing System Controller.[230] The Government has commenced work on the transition from I-NTEM to NTEM.[231]

Retail competition

The Northern Territory Government undertook a review of options for retail price regulation for electricity consumers and the following measures have been implemented:[232]

- Retail price regulation has ceased for consumers in Darwin-Katherine, Alice Springs and Tennant Creek markets, using between 750 MWh and 2 GWh per annum. These consumers are now able to contract with any electricity retailers.

- For consumers up to 750 MWh per year, the uniform tariff subsidy was made contestable and now available to all licenced electricity retailers. This commenced on 1 January 2016.

The introduction of some competition for electricity retailers should provide consumers with more choice of offers. The extent to which this development will affect prices will become clearer over time.

230 Power and Water Corporation, *What is the I-NETM?*, Power and Water Corporation, Darwin, viewed 29 August 2017, http://www.powerwater.com.au/networks_and_infrastructure/market_operator.

231 Department of Treasury and Finance, *Strategy for Northern Territory Utilities*, Department of Treasury and Finance, Darwin, 2016, p. 7.

232 Department of Treasury and Finance, *Strategy for Northern Territory Utilities*, Department of Treasury and Finance, Darwin, 2016, p. 8.

J National summary

Box J.1 Key points

- In 2016/17, the national residential electricity weighted average price was approximately $1,294. This is made up of a:
  - 35.5 per cent wholesale market component
  - 48.4 per cent regulated network component
  - 7.1 per cent environmental security policy component
  - 8.9 per cent residual component.
- In 2016/17, the national weighed average consumption was 4,596 kWh per year.
- National weighted average residential electricity prices increased by 10.8 per cent from 2016/17 to 2017/18.
- National weighted average residential electricity prices are expected to decrease by an annual average of 6.2 per cent from 2017/18 to 2019/20. This is based on an expected:
  - decrease by 5.2 per cent in 2018/19
  - decrease by 7.2 per cent in 2019/20.
- The expected decreases in weighted average residential electricity prices in 2018/19 and 2019/20 are largely attributable to decreases in the wholesale market component of electricity prices in those years.

A national level summary where the jurisdictional estimates are weighted to determine nationally indicative prices and cost components are required in this report under the terms of reference provided to the AEMC by the COAG Energy Council.

As the national numbers are an average of jurisdictional results that are, in some cases, already averages of several different network regions, they do not reflect the actual costs faced by consumers in Australia. Due to this averaging process, the trends are only indicative.

In order to calculate the national weighted average consumption level and national weighted average prices, the representative consumption level and the estimate of price used for each jurisdiction has been weighted by the number of residential connections in each jurisdiction. As such, the trends in the national summary most closely reflect the cost trends in the most populous jurisdictions. This also means that the national summary is more representative of trends in the National Electricity

Market that covers the eastern states. This methodology is described further in section J.3 below.

On a national basis, residential electricity prices are expected to increase from 2016/17 to 2017/18 and decrease in 2018/19 and 2019/20.

The national weighted average consumption level is 4,596 kWh per year. At this consumption level, the national average annual bill in 2016/17 is $1,294 exclusive of GST.

J.1 Trends in residential electricity prices and bills

J.1.1 Trends in electricity prices and annual bills

Residential electricity prices nationally:

- increased by 10.8 per cent from 2016/17 to 2017/18
- are expected to decrease by 5.2 per cent in 2018/19
- are expected to decrease by 7.2 per cent in 2019/20.

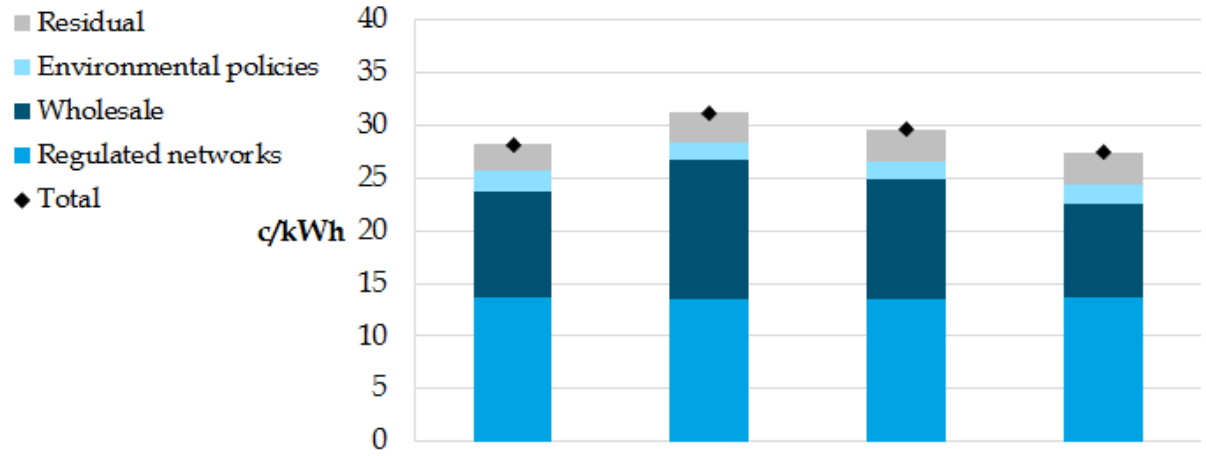
This is equivalent to an annual average decrease of 6.2 per cent from 2017/18 to 2019/20.

The expected increase in national residential electricity prices in 2017/18 is mostly due to higher costs associated with the wholesale market component. This trend reverses with decreases in 2018/19 and 2019/20 due to lower wholesale market costs.

J.2 Trends in electricity supply chain components

Figure J.1 shows the expected movements in the supply chain cost components nationally.

Figure J.1 National summary of supply chain cost components



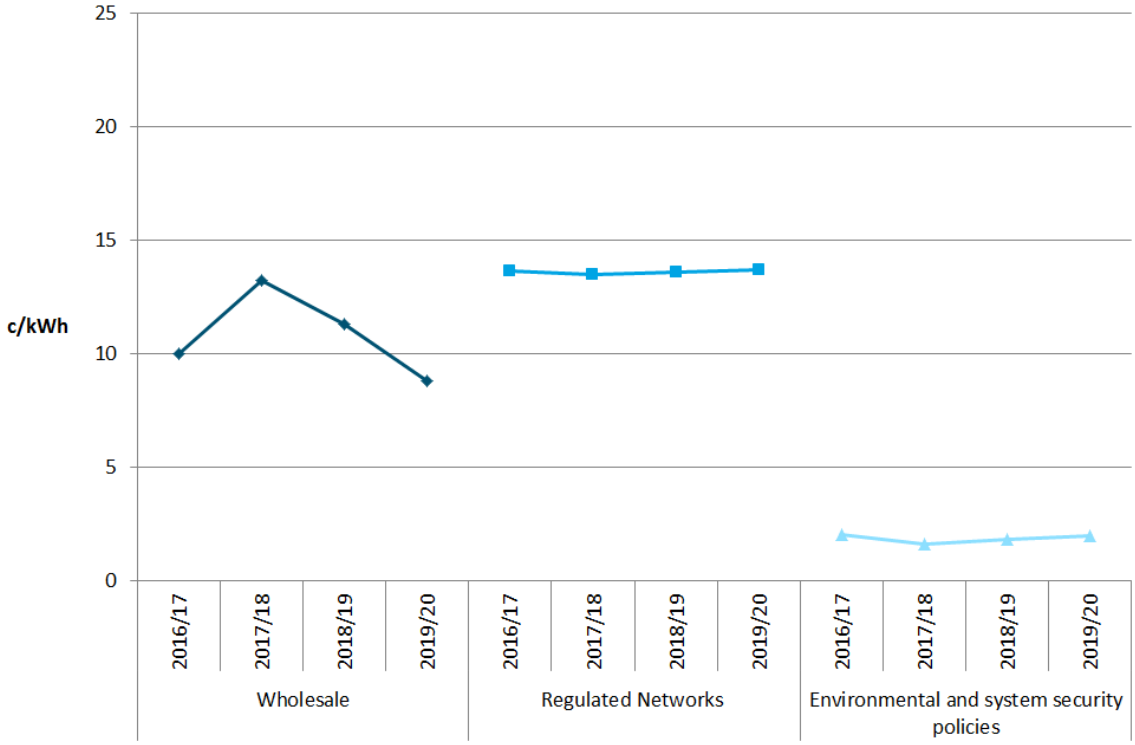
	2016/17 Base Year		2017/18 Current Year		2018/19		2019/20	
	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr	c/kWh	$/yr
Residual	**2.52**	**$116**	**2.87**	**$132**	**2.95**	**$135**	**3.03**	**$139**
Environmental policies	**2.01**	**$92**	**1.62**	**$74**	**1.78**	**$82**	**1.93**	**$89**
LRET	0.65	$30	0.76	$35	0.89	$41	1.03	$47
SRES	0.36	$17	0.32	$15	0.34	$15	0.32	$15
FIT Schemes	0.85	$39	0.37	$17	0.37	$17	0.39	$18
Other state schemes	0.15	$7	0.16	$7	0.19	$9	0.20	$9
Wholesale	**10.01**	**$460**	**13.23**	**$608**	**11.28**	**$518**	**8.81**	**$405**
Regulated networks	**13.63**	**$627**	**13.47**	**$619**	**13.57**	**$623**	**13.67**	**$628**
Transmission	2.48	$114	2.36	$108	2.36	$108	2.39	$110
Distribution	11.15	$512	11.11	$511	11.21	$515	11.28	$518
Total	**28.16**	**$1,294**	**31.19**	**$1,433**	**29.58**	**$1,359**	**27.45**	**$1,261**

*Across jurisdictions, residential electricity prices are based on actual prices in 2016/17 and 2017/18 and estimated prices in 2018/19 and 2019/20. The exception is in Victoria, where the price in 2017/18 is also estimated.

Figure J.2 shows the expected trends in national supply chain components over the reporting period. In summary, the expected trends from 2017/18 to 2019/20 are:

- an average annual decrease of 18.4 per cent in the wholesale market component
- an average annual increase of 0.8 per cent in the regulated networks component
- an average annual increase of 9.3 per cent in environmental and system security policy component.

Figure J.2 Trends in national supply chain components



The types of costs included in each supply chain cost component, and the methodology for estimating each cost component, is explained in Appendix A.

J.2.1 Wholesale market costs

Overall, wholesale market costs are expected to:

- increase by 32.2 per cent in 2017/18
- decrease by 14.8 per cent in 2018/19
- decrease by 21.8 per cent in 2019/20.

Wholesale electricity cost trends and drivers are discussed in detail in Chapter 3, as well as in the jurisdictional appendices (Appendix B to Appendix I).

J.2.2 Regulated network costs

The regulated network component of a representative consumer's annual electricity bill is estimated to increase over the reporting period.

Given the uncertainty around the potential outcomes of the various processes related to revenue determinations in NSW, ACT, South Australia and Western Australia, this report has not speculated on the potential range of regulated network price outcomes over the reporting period. Instead, the regulated network component for each

jurisdiction has been estimated using assumptions based on the latest and clearest available information.

Trends in regulated network costs are discussed in detail in Chapter 4.

Please refer to the jurisdictional appendices (Appendix B to Appendix I) for details on the relevant transmission and distribution network service providers for each jurisdiction.

J.2.3 Environmental and system security policy costs

"Environmental policies" in this report refer to a number of schemes that have been introduced by the Commonwealth and jurisdictional governments that affect residential electricity prices. The environmental policies that were considered during the reporting period are the Commonwealth Government's Renewable Energy Target (RET), feed-in-tariff (FiT) schemes and additional jurisdictional government schemes.

One “system security policy” has been included, which is the Energy Security Target (EST) in South Australia.

On a national basis, environmental and system security policy costs are increasing over the reporting period. This is due to increasing costs associated with the LRET and jurisdictional FiT schemes.

Trends in environmental and system security policies are discussed in the jurisdictional appendices (Appendix B to Appendix J) and Chapter 5.

J.3 Note on the methodology used

The national summary is an average of the jurisdictional estimates, where these estimates have been weighted by the number of residential connections in each jurisdiction. The national weighted average consumption level and national weighted average prices have been calculated by:

- taking the consumption level of the representative consumer in each jurisdiction and the average price paid by the representative consumer, as set out in Appendices B to I
- weighting by the number of residential connections in each jurisdiction.

The national average annual bill is the product of the weighted average consumption level and the weighted average price.

The AEMC calculates the electricity consumption of the representative set of residential consumers as follows:

- calculated annual consumption values for jurisdictions using benchmark values published by the AER based on a survey, with the exception of South Australia,

Western Australia and Northern Territory where the respective government provides the consumption level

- accounted for "controlled load" tariffs, where particular appliances (typically electric hot water systems and pool pumps) are charged at a lower rate as they are used outside of the peak periods. In Queensland the majority of residential consumers have part of their consumption on an off-peak tariff

- accounted for other region specific tariff structures. In Tasmania the majority of residential consumers have part of their consumption on a heating and hot water tariff which is charged at a lower rate.

Different methodologies have been used to estimate jurisdictional costs and prices. Where there are market offers available in a jurisdiction, representative market offers were used. In other jurisdictions, the regulated standing offer or government set tariffs were used.[233]

The methodology used for estimating market offers and standing offers for each jurisdiction is described in Appendix A.

233 The national representative price consists of market offer prices in New South Wales, Victoria, South Australia and Queensland; representative standing offer prices in the ACT and Tasmania; and the government determined tariffs in Western Australia and the Northern Territory.