DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

NSW Energy Savings Scheme – Draft Statutory Review Report

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Contents

List of tables

List of figures

Executive summary

This Draft Statutory Review Report assesses the operation of the NSW Energy Savings Scheme (ESS) for the period 2014–2018 to determine whether the:

- policy objectives of the scheme are being met
- policy objectives remain valid
- overall scheme design remains appropriate for securing those objectives.

The Minister for Energy and Environment is releasing this report to fulfil the requirement under section 175 of the *Electricity Supply Act 1995* to review the scheme every five years.

The main findings of the Draft Statutory Review Report are as follows.

Objective 1 – to create a financial incentive to reduce the consumption of electricity by encouraging energy saving activities

The ESS is meeting this objective. The scheme has encouraged the uptake of energy saving activities that otherwise would not have occurred. In the lighting market, incentives provided by the scheme have helped bring forward the decision to upgrade. Lighting upgrades supported by the scheme will save 19,200 gigawatt hours (GWh) over their lifetime. The incentives provided by the scheme have played a material role in catalysing transformation of the lighting retrofit market in New South Wales.

Accredited Certificate Providers (ACP) have created certificates for energy saving activities. Scheme participants are purchasing and surrendering certificates. Surveys of ACPs indicate revenue from the sale of energy savings certificates (ESCs) is greater than the administrative cost of creating them. ACPs use this revenue in various ways to encourage their customers to invest in energy efficiency upgrades.

This objective remains valid. New South Wales has substantial opportunities to save energy to 2050; however, market and behavioural barriers to their uptake will persist. By continuing to encourage energy saving activities, the scheme can continue to support energy affordability, reliability and sustainability in New South Wales.

Objective 2 (a) – to assist households and businesses to reduce electricity consumption and electricity costs

The ESS has been effective in assisting households reduce energy consumption and costs. Activities implemented between 2014 and 2018 have delivered an estimated $1.5 billion in energy bill savings over that period and will deliver a total of $3.9 billion over their lifetimes. These energy savings have also driven down bills for all customers in New South Wales. Between 2009 and 2018, the scheme saved NSW households $13.50 a year on average on their electricity bills.

This objective remains valid. Since 2009, energy costs have been growing faster than the consumer price index and energy prices are expected to remain relatively high. The ESS can continue to help reduce energy consumption and costs for businesses and households while supporting a growing economy.

Objective 2 (b) – to complement any national scheme for carbon pollution reduction by making the reduction of greenhouse gas emissions achievable at a lower cost

The ESS is meeting this objective. By providing an effective alternative pathway to the national Emissions Reduction Fund the scheme has helped unlock low-cost emissions

abatement from energy efficiency. As of 2018, energy saving activities delivered under the ESS have reduced the size of Australia's annual abatement task by 2.2 megatonnes of CO_2-e. These emissions savings help contribute to Australia's obligations under the Paris Agreement and New South Wales' aspirational objective of net zero emissions by 2050.

This objective remains valid. The national emissions abatement task to meet Australia's obligations under the Paris Agreement remains substantial and emissions from electricity and gas will remain significant to 2030. Energy saving activities encouraged by the scheme will help avoid emissions in the short term. In the long term, energy savings can reduce the amount, and therefore cost, of new renewable energy generation required to replace retiring generators.

Objective 2 (c) – to reduce the cost of, and the need for, additional energy generation, transmission and distribution infrastructure

The ESS has been effective in reducing the cost of, and the need for, additional energy infrastructure. By reducing overall energy consumption, the scheme has reduced the amount of generation capacity needed in New South Wales. In 2018, energy savings delivered by the ESS reduced the need for additional generation infrastructure equivalent to a 1050 MW solar farm, costing about $1.5 billion.

Energy savings delivered by the ESS have also reduced the energy infrastructure needed in New South Wales at peak times. The NSW Government estimates peak savings from the ESS in 2018 deferred investment in additional gas peaking plant of about 500 MW at a capital cost of about $510 million. Based on peak demand reductions achieved between 2014 and 2018, the NSW Government estimates the ESS has helped defer $213.1 million of network investment.

This objective remains valid. The electricity system is facing increasing pressure as existing power stations are getting older and retiring. The grid is also becoming congested and network infrastructure will need to be upgraded as the energy system transitions. Reducing total and peak demand during this period will help minimise supply disruptions. This will also help reduce the investment required to replace retiring generators and replace or augment network infrastructure.

Broad scheme design remains appropriate

The 2009 Better Regulation Statement before the scheme's establishment considered alternative ways of meeting government objectives. The ESS, as a market-based certificate scheme, was chosen because in comparison to the alternatives it delivered:

- higher economic benefits by reducing the cost of electricity supply
- higher financial benefits of reduced energy bills
- lower compliance, reporting and administration costs.

The five-yearly review in 2015 did not reconsider alternatives to the ESS. Rather, it considered options to terminate, extend and reform the scheme. This Statutory Review takes the same approach that the broad scheme design as a market-based certificate scheme remains appropriate.

As announced in November 2019, the NSW Government is extending and expanding the ESS under a new name, the Energy Security Safeguard. The new Energy Security Safeguard will include an energy efficiency scheme and a peak demand reduction scheme. The energy efficiency scheme will run until 2050, have a more ambitious energy savings target and provide incentives for an expanded set of activities.

The NSW Government is seeking feedback on these reforms in the Energy Security Target and Safeguard Consultation Paper.

1. Introduction

This Draft Statutory Review Report assesses the operation of the NSW Energy Savings Scheme (ESS) for the period 2014–2018 to determine whether the:

- policy objectives of the scheme are being met
- policy objectives remain valid
- overall scheme design remains appropriate for securing those objectives.

The ESS is established under Part 9 of the *Electricity Supply Act 1995* (the Act), which requires the Minister for Energy and Environment to review the operation of the scheme every five years. The purpose of the review is to determine whether the:

- policy objectives of the scheme remain valid
- terms of Part 9 of the Act remain appropriate for securing those objectives.

The first Statutory Review was completed in June 2015. The second Statutory Review is therefore due to be tabled in Parliament by 30 June 2020.

1.1 Statutory Review consultation question

The NSW Government invites submissions from all interested parties on the evidence presented in this Draft Statutory Review Report. To help us consider your submission please respond to the following question:

Is there any other evidence or matters that should be considered that would indicate whether the objectives of the Energy Savings Scheme are being met and remain valid?

Please set out your response against the scheme objectives as defined in the Act. These are:

1. The principal object of this Part is to create a financial incentive to reduce the consumption of energy by encouraging energy saving activities.
2. The other objects of this Part are:
   a. to assist households and businesses to reduce energy consumption and energy costs, and
   b. to complement any national scheme for carbon pollution reduction by making the reduction of greenhouse gas emissions achievable at a lower cost, and
   c. to reduce the cost of, and the need for, additional energy generation, transmission and distribution infrastructure.

1.2 Making a submission

To make your submission please visit the NSW Government Consultation website.

You can also email your submission. Identify your submission with the subject: 'Your Name – ESS Review 2020', and send it to:

Director, Climate Change and Energy Savings Policy
NSW Department of Planning, Industry and Environment
energysecurity@environment.nsw.gov.au

1.2.1 Closing date

The closing date for the survey and written submissions is **5pm on Wednesday, 20 May 2020**. Submissions received after this deadline may not be considered.

1.2.2 Publication of submissions

The NSW Government is committed to an open and transparent process, and all survey responses and submissions will be made publicly available. Written submissions should be provided as documents that can be published on the NSW Planning, Industry and Environment website.

If you wish your written submission to remain confidential, please clearly state this in your submission, and only your organisation's name will be published. We will remove personal details from submissions made by individuals.

Please be aware that even if you state that you do not wish certain information to be published, there may be legal circumstances that require the NSW Government to release that information (for example, under the requirements of the *Government Information (Public Access) Act 2009*).

2. Objective 1 – create a financial incentive to encourage energy savings

The principal object of Part 9 of the Act, otherwise referred to as Objective 1, is to create a financial incentive to reduce the consumption of energy by encouraging energy saving activities.

The ESS achieves this by supporting energy saving activities that go beyond business-as-usual, meaning that households and businesses choose a more energy efficient option than they would have otherwise.

2.1 The objective is being met

The ESS has created a financial incentive to encourage energy savings because:

- the scheme has encouraged energy saving activities which would otherwise not have occurred
- certificate providers have created certificates for energy saving activities
- scheme participants are purchasing and surrendering certificates
- certificates have provided a financial incentive for energy saving activities.

2.1.1 The ESS has encouraged energy saving activities which would otherwise not have occurred

Approximately 70% of the energy savings supported by the ESS have come from commercial and industrial lighting upgrades. Over their lifetimes, these projects will save New South Wales 19,200 GWh of electricity.[1]

An evaluation of NSW Government programs concluded that the ESS has had a significant impact on improving the energy efficiency of the NSW lighting market (Common Capital 2017). The scheme was found to have driven additional energy savings by bringing forward lighting retrofits by seven to 10 years on average.

By helping overcome market barriers such as split incentives and information asymmetry, the scheme was found to have materially influenced the structure and dynamics of the lighting market in New South Wales. It drove the emergence of a new lighting retrofit market segment and new business models, upgrading around 20% of NSW commercial lighting stock (Common Capital 2017).

As a result of this market transformation, energy savings from LED lighting retrofits are now becoming increasingly likely even without the scheme.

2.1.2 Accredited certificate providers have created certificates for both electricity and gas saving activities

Between 2014 and 2018, accredited certificate providers (ACPs) created almost 20.1 million certificates for eligible energy saving activities. This exceeds the cumulative target over the same period by 2.4 million certificates (IPART n.d.).

Gas saving activities were introduced to the ESS in 2016. The first certificates were registered in the 2017 compliance year, accounting for 1.5% of certificates created in that

[1] Energy savings from upgrades completed between 2009 and 2018, see Table 2.1 in IPART (2019).

year (IPART n.d.). The proportion of certificates created from gas increased to 4.6% in 2018 (IPART n.d.), indicating that the ESS is effective in supporting both electricity and gas saving activities.

2.1.3 Scheme participants are purchasing and surrendering certificates

Table 1 shows scheme participants have largely chosen to purchase certificates rather than pay penalties. Between 2014 and 2018, nearly 17.6 million certificates were surrendered. Penalties were only paid for the equivalent of about 18,000 certificates. Penalties paid represent roughly 0.1% of the overall obligation over the last five years of the scheme.

Table 1 Annual scheme participant compliance

Compliance year	Total scheme obligation	Certificates surrendered for scheme obligation	No. of scheme participants that paid penalties	Total penalties in certificates	% total scheme participant obligation
2014	2,698,830	2,700,190	0	0	0
2015	2,788,055	2,706,408	2	4,800	0.17%
2016	3,794,614	3,765,238	2	7,315	0.19%
2017	4,076,779	4,063,989	4	5,684	0.14%
2018	4,330,051	4,319,963	2	285	0.01%

Source: IPART (n.d.)

Scheme participants are not required to report the price they pay for the certificates they purchase and surrender; however, as is shown in Figure 1, the ESC spot market indicates that the cost of purchasing certificates remains below the penalty rate. Between 2014 and 2018 the spot price has fluctuated from around $10 to $28 per certificate, remaining below the tax-effective penalty rate of around $40.[2]

[2] Civil penalties are not tax deductible and if the scheme participants operate at a net profit, they would pay the penalty using their post-tax income. The base penalty rate is therefore grossed up by the corporate tax rate of 30% to represent the amount of income the scheme participants would need to earn to pay the penalty. For 2018, the tax-effective penalty is $28.56/(1 – 0.30) = $40.80.

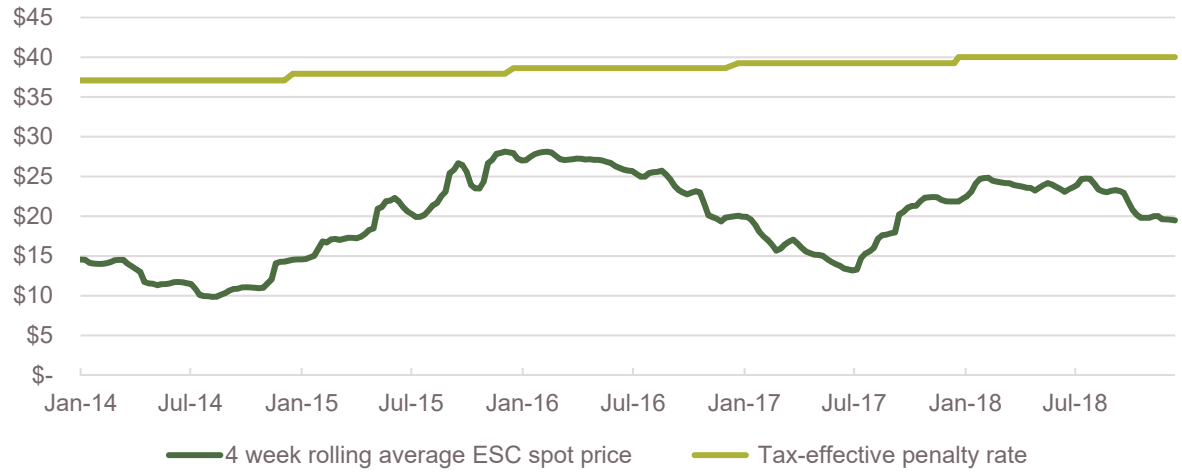

Figure 1 Tax-effective penalty rate and ESC spot price[3]

2.1.4 ESCs provide a financial incentive for energy efficiency

Surveys of scheme participants and ACPs indicate the price paid for certificates is generally above the administrative cost of creating them. From 2012 to 2017, the average cost for a certificate provider to create an ESC has fallen from $5.78 to $3.63 (Sapere Research Group 2017).[4] The average ESC spot price in 2017 was $17.75,[5] making about four-fifths of the remaining ESC price available as an incentive to encourage energy saving activities.

ACPs use the revenue from the sale of certificates incentive in various ways. Some may provide a direct discount on the equipment supplied to their customers. Many ACPs see the ESS incentive as essential for covering the cost associated with customer recruitment and the development of new business models and market segments. Overall, the incentive provided by the ESS plays an essential role in customer engagement and provides a reason to upgrade now rather than later (Common Capital 2017).

2.2 The objective remains valid

The objective to provide a financial incentive to encourage energy saving activities remains valid. Substantial unrealised energy efficiency opportunities remain in New South Wales but the barriers to their uptake persist.

2.2.1 The energy efficiency opportunity remains significant

There are substantial cost-effective opportunities to save energy; for example, energy efficiency improvements in lighting, hot water, heating and cooling, and appliances could by 2050 more than halve the average energy consumption of buildings. This would save about $14 billion in energy costs nationwide (Australian Sustainable Built Environment Council 2016, pp.60 & 68). Energy intensity of Australia's manufacturing sector could decrease by 40% by 2050 (ClimateWorks Australia 2014, p.20).

[3] ESC spot price sourced from TFS Green and averaged over preceding four weeks. The tax-effective penalty rate is the base penalty rate grossed up by the corporate tax rate of 30%.

[4] Average cost per ESC was weighted based on the method used to create the ESC (e.g. commercial lighting method), as a proportion of the total number of ESCs created.

[5] ESC spot prices sourced from TFS Green.

The energy efficiency improvements in buildings and industry to 2050 could help offset increases in electricity demand from business-as-usual growth as well as electrification of vehicles and production processes (CSIRO 2017, pp.63–64).

In New South Wales, preliminary analysis for the Department of Planning, Industry and Environment (the Department) indicates there are opportunities to save 15,600 GWh of electricity and 11 petajoules (PJ) of gas each year in the near term.[6]

The trends in Australia mirror the international energy efficiency opportunity. If all cost-effective energy efficiency technologies readily available today were implemented, the size of the global economy could double between now and 2040 with only a marginal increase in energy demand (International Energy Agency 2018, pp.13 & 83).

2.2.2 Market barriers to energy efficiency still exist

A range of market barriers prevent the uptake of the available energy efficiency opportunity, resulting in an 'energy efficiency gap'. These barriers are well documented and can be broadly grouped as:[7]

- split incentives
- bias for short-term priorities
- high transaction costs and liquidity constraints
- information asymmetries.

These barriers are systemic and the role of government in implementing a mix of policies to overcome them has long been recognised (Rosenow et al. 2016). Schemes such as the ESS have proven to be successful at overcoming market barriers and encouraging the take-up of energy efficiency activities that might otherwise go unrealised (International Energy Agency 2014).

While the ESS has been successful in transforming the lighting market (see Section 2.1.1), evaluation of previous NSW programs has found barriers persist in other energy efficiency markets in New South Wales (D-Sipher 2015). As a large-scale market-based scheme, the ESS can help transform these markets by providing certainty for service providers to develop business models that are scalable and sustainable.

The NSW Government will continue to provide complementary programs for key customer groups such as low-income households and small businesses to improve access to energy savings.

[6] Analysis undertaken by the Department using Jacobs (2019b). This excludes fuel switching between electricity and gas. If fuel switching is included, the size of the electricity saving opportunity increases to 20,100 GWh but gas consumption increases by 1 PJ.

[7] For a literature review of the barriers to energy efficiency upgrades, see Alam et al. (2018) and Gillingham & Palmer (2014).

Affordability

3. Objective 2A – Reduce energy consumption and costs for businesses and households

Objective 2 (a) of the Act is to assist households and businesses to reduce energy consumption and energy costs.

3.1 The objective is being met

The ESS has been effective in assisting households and businesses to reduce electricity consumption and costs, because the scheme has:

- delivered significant energy and bill savings for participating households and businesses
- placed downward pressure on electricity prices for all customers in New South Wales.

3.1.1 Participating households and businesses have benefitted from significant energy and bill savings

Activities implemented between 2014 and 2018 are estimated to have delivered $1.5 billion in energy bill savings over that period and will deliver a total of $3.9 billion over their lifetimes.[8] These bill savings are lowering the cost of living and doing business for participating households and businesses.

As an example, upgrades to lighting, and the heating, ventilating and air conditioning (HVAC) system in a medium-sized commercial building delivered estimated total cost savings of $293,000 per year and energy savings of 643 MWh annually (OEH 2017). On a smaller scale, residential consumers who change 20 halogen downlights to LED downlights can save up to $210 a year on energy costs.[9]

Figure 2 shows the proportion of certificates created by sector over the life of the scheme. In the 2014–18 review period, lighting upgrades was the dominant activity. Upgrades took place in a range of sectors, including retail and wholesale, manufacturing operations and other commercial buildings such as warehouses, hotels and offices.

[8] Estimated by the Department using annual energy savings from IPART's annual compliance and operation reports and forecast electricity prices from Jacobs (2019b) neutral scenario. Energy savings are weighted by the average distribution of ESCs amongst customer sectors using data from the ESS Registry.

[9] Analysis by the Department (DPIE 2019a).

Figure 2 Proportion of certificates created by sector 2014–2018[10]

Following the 2015 ESS review, a regional network factor was introduced to adjust for additional line losses in regional areas. Over the review period, about 17% of ESCs have been created in regional areas.[11] This is comparable to electricity usage in regional areas that is about 23% of the state's usage.[12]

3.1.2 Evidence shows that energy saving measures reduce energy consumption

Measurement and verification studies of the NSW Energy Saver Program (Urbis 2017) and the Gas Efficiency Improvement Program (Clear Horizon 2017) demonstrated the installation of energy saving measures results in actual energy and bill savings for households and businesses. This reiterates a similar finding from the 2012 evaluation of NSW Energy Efficiency Programs (ARTD Consultants 2012). The real energy savings benefits delivered by energy efficiency projects have also been demonstrated by the Australian Government[13] and by other jurisdictions.[14]

[10] Analysis by the Department of ESS Portal data.

[11] Analysis by the Department of ESS portal data. The regional network factor applies to electricity savings projects located within Essential Energy's service area.

[12] Total energy deliveries for Essential Energy as compared to total energy deliveries for Essential Energy, Ausgrid and Endeavour Energy, sourced from each distributor's Regulatory Information Notice (RIN) for 2017–18 (Australian Energy Regulator 2019b).

[13] See various business cases published by the Australian Department of Industry, Science, Energy and Resources.

[14] See, for example, Department of Industry, Innovation and Science (2016).

3.1.3 The ESS has placed downward pressure on electricity prices for all customers in New South Wales

By assisting some households and businesses to save energy, the ESS has also lowered overall electricity demand in New South Wales. This has placed downward pressure on both the wholesale electricity market and energy infrastructure costs, which are generally passed through to consumers.[15]

In its first decade, the ESS has reduced the wholesale electricity price by an average of $2.30 per MWh. This includes costs of $1.10 per MWh,[16] which are offset by savings of $3.40 per MWh.[17]

Figure 3 shows the annual benefits and costs of the scheme for residential customers. Since 2009, the scheme has saved NSW households $13.50 a year on average on their electricity bills.

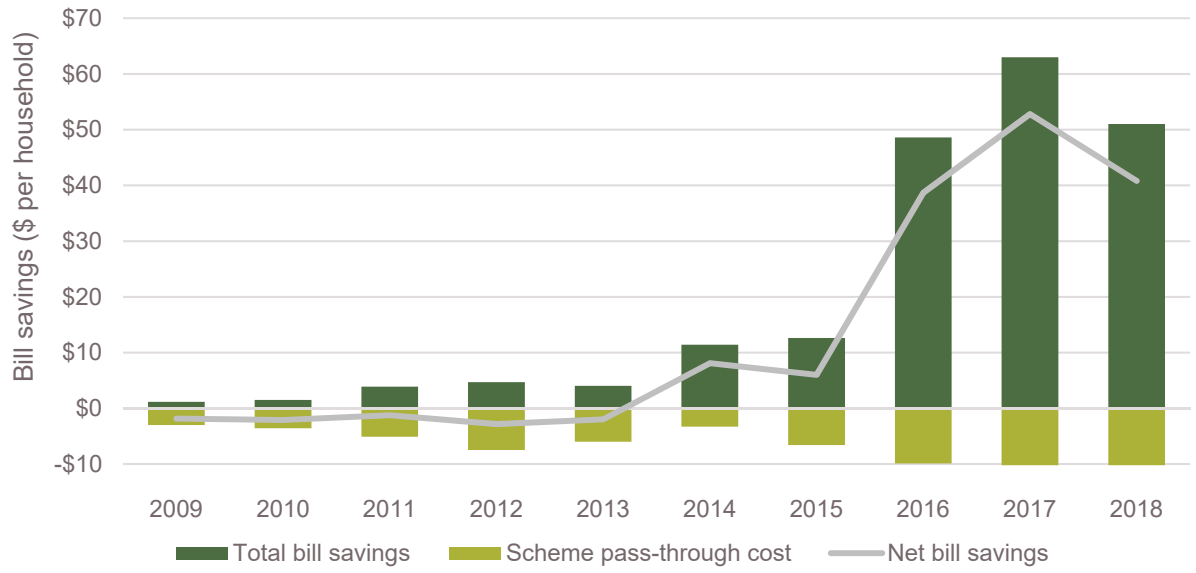

Figure 3 Estimated annual residential bill savings from the ESS[18]

As forecast in the 2009 Better Regulation Statement on the ESS (NSW Department of Water and Energy 2009), the benefits of the ESS increase over time, and exceed the costs of the scheme after the early years of investment. The closure of Hazelwood power station in 2017

[15] See Objective 2C for discussion of scheme impact on energy infrastructure investment.

[16] This figure is an average of the pass-through costs for 2009–2018, which ranged from $0.5 and $1.70 per MWh. ESS costs passed through to residential customers are sourced from the AEMC's Annual Residential Electricity Price Trend reports (AEMC 2019a).

[17] The reduction in the annual average wholesale electricity price ranges from $0.2 to $10.50 per MWh. These are based on analysis undertaken by the Department using market simulation software PLEXOS for scenarios with and without the scheme. Energy savings from the scheme are sourced from IPART annual compliance and operation reports, which were reduced by 13% to adjust for the net impact of free-riders and spillovers, and evenly distributed across each half-hour interval.

[18] Analysis by the Department based on market modelling as above. Residential retail price analysis takes into account the pass-through costs of the scheme. It assumes an average residential consumption of 6000 kWh based on actual consumption as reported in the distributors' Regulatory Information Notices for 2017–18. Components that make up the electricity cost stack such as environmental policies, regulated networks and residual components were obtained from the AEMC's Annual Residential Electricity Price Trend reports (AEMC 2019a).

has led to higher wholesale prices in recent years, further amplifying the benefits of the ESS.[19]

3.2 The objective remains valid

The objective to reduce energy consumption and costs for businesses and households remains valid because:

- energy bill pressures remain for many customers due to high energy costs
- substantial energy efficiency opportunities remain to assist households and businesses to reduce their energy consumption and costs (see Section 2.2.1).

3.2.1 Energy bill pressures remain

Figure 4 shows the Sydney electricity and gas price indices relative to the consumer price index (CPI). This shows that on average energy costs have increased faster than other consumer prices for the last decade. Regional energy prices are higher than metropolitan prices (IPART 2018), indicating that bill pressures remain for the whole of New South Wales.

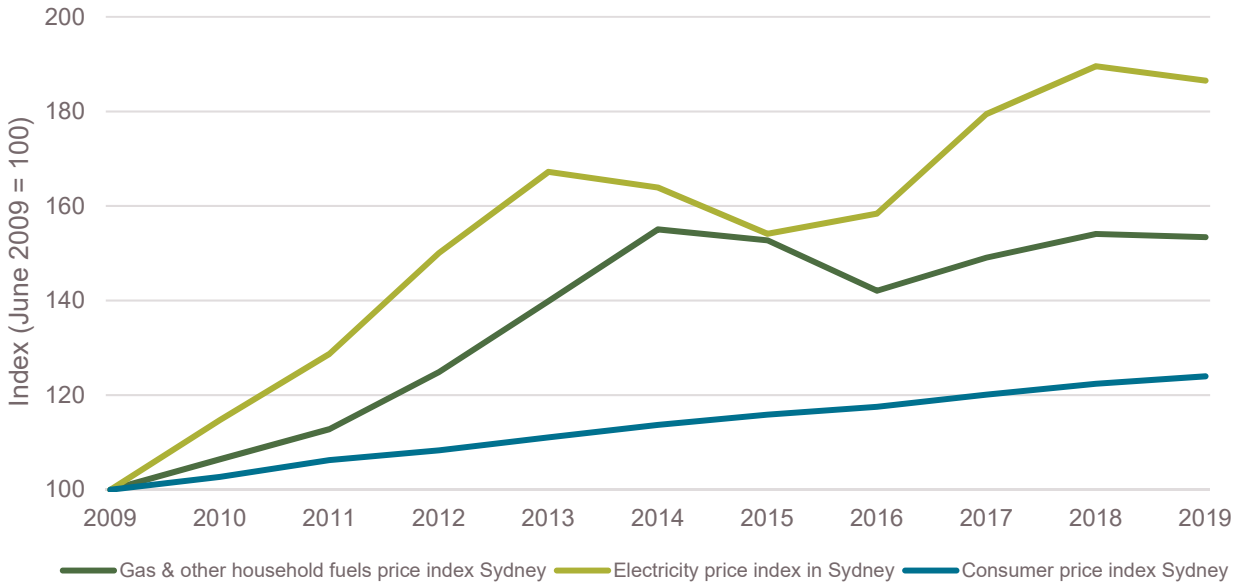

Figure 4 **Sydney electricity price, gas price and consumer price index**
Source: Australian Bureau of Statistics (2019)

Figure 4 shows that between 2018 and 2019, electricity prices moderated slightly. The Australian Energy Market Commission (AEMC) forecasts that between 2020 and 2022, electricity bills will decrease by 8.3% (AEMC 2019b); however, this is not enough to fully offset the sharp increases experienced between 2015 and 2018.

Beyond 2022, the Australian Energy Market Operator (AEMO) expects prices to remain relatively stable to 2033 and then increase to 2038.[20] Wholesale gas prices are expected to rise by almost 30% between 2018 and 2032 (AEMO 2019b, p.26). Energy costs and bills are

[19] Hazelwood power station closed in March 2017; nameplate capacity was 1600 MW.

[20] See Figure 14 in AEMO (2019a). Analysis carried out for the Department shows the same trends for both residential and commercial customers in New South Wales Jacobs (2019a).

therefore likely to remain high, and the objective to reduce energy consumption and costs remains valid.

Emissions reduction

4. Objective 2B – Complement national action to reduce the cost of greenhouse gas reduction

Objective 2 (b) of the ESS is to complement any national scheme for carbon pollution reduction by making the reduction of greenhouse gas emissions achievable at a lower cost.

4.1 The objective is being met

The ESS has complemented national action to reduce the cost of greenhouse gas reduction because it has:

- reduced the national abatement task required to meet Australia's obligations under the Paris Agreement
- made emissions abatement available at lower cost
- complemented the Australian Government's Emissions Reduction Fund (ERF) by providing an effective alternative pathway to encouraging energy savings projects.

4.1.1 The ESS has reduced Australia's abatement task

The Australian Government has committed under the Paris Agreement to reduce emissions by 26–28% below 2005 levels by 2030. The contributions of the ESS and other state-based energy efficiency schemes are factored into the national projections on progress towards this target. The Australian Government has revised the abatement task and forecast emissions in 2030 downwards due in part to energy efficiency (DEE 2019).

Figure 5 shows the annual energy savings from the ESS since it started and the associated emissions reductions. Based on New South Wales' historical emissions intensity, between 2009 and 2018 the ESS has helped avoid a cumulative total of 12.8 megatonnes (Mt) of CO_2-e emissions.

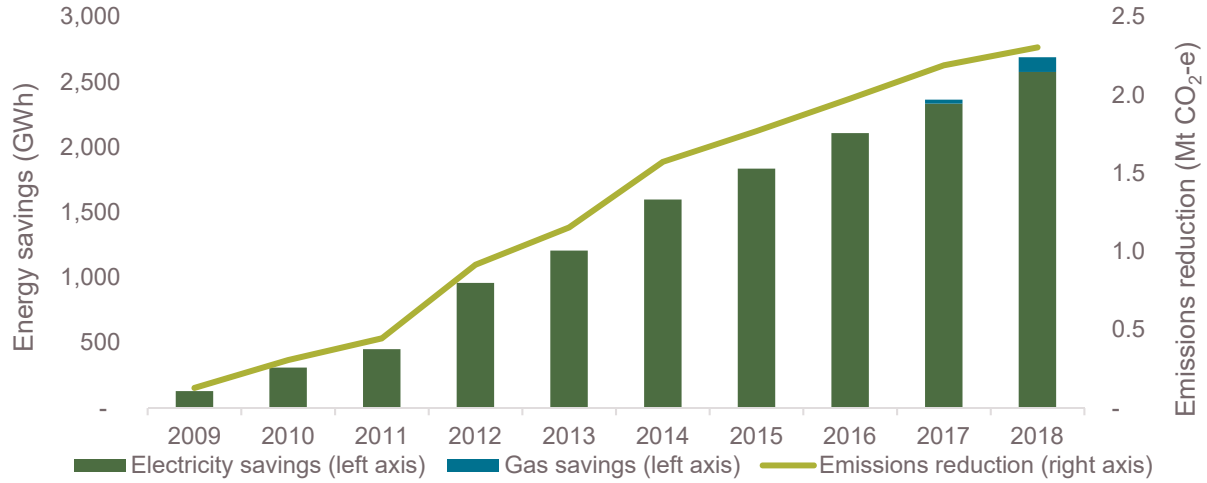

Figure 5 Estimated actual energy savings and emissions reductions from the ESS[21]

The Paris Agreement requires reductions in annual emissions levels. As of 2018, the ESS is contributing an annual reduction of 2.2 Mt of CO_2-e. This reduces the size of the abatement task required to meet Australia's obligations and helps New South Wales on its pathway to net zero emissions by 2050.

4.1.2 The ESS made emissions abatement available at lower cost

Many energy efficiency upgrades reduce emissions while delivering a positive net economic benefit. Energy efficiency therefore provides low-cost emissions abatement opportunities (Energetics 2017; Reputex 2017). The Australian Government's National Energy Productivity Plan (NEPP) also recognises this, arguing that realising low-cost emissions savings from energy efficiency is a smart way to tackle climate change (Australian Government and COAG Energy Council 2015).

However, as set out in Section 2.2.2, a variety of market barriers prevent the uptake of these cost-effective energy efficiency opportunities. The ESS helps overcome these barriers, and therefore increases the availability of lower-cost emissions abatement opportunities.

4.1.3 The scheme complements national action on emissions abatement

The ESS complements national action by providing an effective alternative pathway to the ERF for emissions reduction from energy efficiency projects. The ERF, the primary national vehicle for abatement, is an emissions reduction offsets scheme combined with government purchasing of abatement through reverse auctions. Emissions abatement is quantified as Australian Carbon Credit Units (ACCUs).[22]

As of January 2020, only two energy efficiency projects have been registered under the ERF in New South Wales. These have generated 5581 ACCUs. Nationwide, only 830,000 or 1.1% of ACCUs have been generated from energy efficiency projects. Many of these would

[21] Avoided emissions calculated by multiplying energy savings by fuel cycle emissions intensity, which is the number of tonnes of CO_2-e emitted per MWh of electricity generated. Fuel cycle emissions intensity sourced from the Carbon Dioxide Equivalent Intensity Index; energy savings sourced from IPART (n.d.).

[22] Energy efficiency projects can only create either a NSW Energy Savings Certificate or an Australian Carbon Credit Unit for any given MWh saved. See section 21(2)(c) *Carbon Credits (Carbon Farming Initiative) Rule 2015*.

be classified as electricity generation under the ESS. Vegetation, landfill and waste, and savanna burning account for 97% of ACCUs issued.[23]

In 2017, the Climate Change Authority reviewed the ERF and considered reasons for the low uptake of energy efficiency and other non-land sector projects. Submissions to the review suggested the lack of uptake was due to the low auction price, short contract lengths and crediting periods, restrictive calculation methods and high administrative and audit costs (Climate Change Authority 2017).

Importantly, the ERF does not provide upfront payments for certificate purchases. ACCUs are only created once emissions abatement has been achieved. The Clean Energy Regulator only holds auctions twice a year, with no certainty of purchase prior to entering the auction.

These conditions make the ERF a difficult vehicle to access incentives for energy saving activities, as individual energy savers will need to overcome a minimum threshold for the ERF to be worthwhile. For energy savings aggregators, the timing of certificate generation and the relative infrequency of auctions creates substantial uncertainty and risk that restricts effective business planning.

Conversely, the ESS provides a liquid market for ESCs and allows ACPs to enter forward contracts with scheme participants. Deeming rules for energy savings under the ESS[24] allow upfront payments to be received for projects, making them more economically viable and attractive for prospective energy savers (Climate Change Authority 2017). Aggregation can therefore occur effectively, which also makes the scheme accessible for small energy users.

4.2 The objective remains valid

There is a continuing need for the ESS to complement national action to make emissions reduction achievable at a lower cost because:

- cost-effective abatement measures are needed for the energy sector as electricity emissions intensity to 2030 will remain significant
- energy efficiency will reduce the amount of new renewable energy generation required to replace retiring generators
- gas efficiency is important to reducing gas emissions
- state-based energy efficiency schemes like the ESS remain an important part of national action on emissions reduction.

4.2.1 Cost-effective abatement measures are needed for the energy sector as electricity emissions intensity to 2030 will remain significant

Figure 6 shows projections for the emissions intensity of electricity generation in New South Wales. Although the emissions intensity is forecast to decline between 2020 and 2030, it will remain high. Reducing electricity consumption through cost-effective energy efficiency measures will be critical to manage emissions in the electricity sector before it completes its transition to a low emissions generation mix. This will also support the NSW Government's objective of net zero emissions by 2050.

[23] Data from the Clean Energy Regulator live map, accessed 16.1.2020.

[24] Deeming factors in the NSW Energy Savings Scheme Rule can be updated annually to reflect market and technological changes.

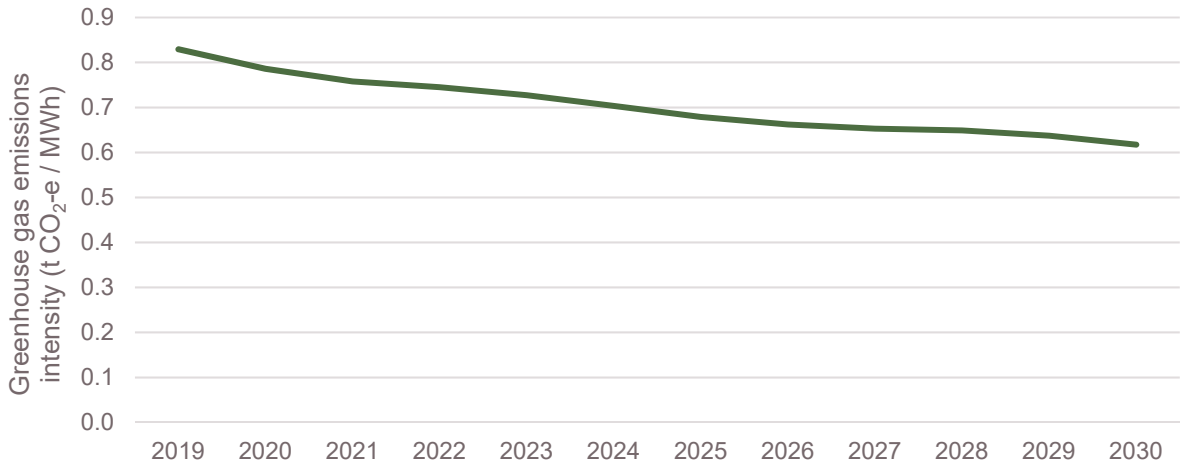

Figure 6 Greenhouse gas emission intensity for the NSW electricity supply[25]

4.2.2 Energy efficiency will reduce the amount of new renewable energy generation required to replace retiring generators

About 3120 MW of firm summer capacity will be removed from the energy system over the next decade as Liddell and Vales Point power stations reach the end of their economic lives (AEMO 2018a). Energy efficiency will reduce the amount of new renewable energy generation required to replace these retiring generators.

For example, the energy savings the ESS delivered in 2018 are equivalent to a 1050 MW solar farm. This is seven times the size of the largest operational solar farm in New South Wales, Coleambally. This is already reducing the cost of replacing retiring coal fired power stations with clean energy by $1.5 billion.[26]

4.2.3 Gas efficiency is important to reducing gas emissions

Unlike slowly declining emissions from electricity, NSW emissions from on-site use of gas and other fuels in factories, farms and homes are projected to remain stable at about 15 Mt CO_2-e per year without further action.[27] Until zero emission gaseous fuels become cost-effective, there remains a need to reduce these emissions through gas efficiency.

4.2.4 The ESS will remain an important part of national action

The Australian Government estimates the NEPP will deliver about 17% of the emissions reduction required for meeting Australia's Paris Agreement targets (Australian Government

[25] NSW emission intensity factors are three-year rolling averages estimated by the Department using generation, interconnector flow and emissions data based on AEMO ISPs Neutral with Storage case settings and Jacobs modelling.

[26] Estimated solar farm size to supply 2242 GWh of electricity per year assuming a line loss factor of 1.15 and a solar capacity factor of 28%. The average capital cost of utility solar developments in planning and approval stages in New South Wales is $1.4 million per MW. Annual electricity savings were reduced by 13% to adjust for freeriders and spillovers. Annual electricity savings were sourced from IPART (2019).

[27] This figure is New South Wales' estimated share of national emissions projections for *Stationary Energy: Other energy industries* in the National Greenhouse Gas Inventory. National emissions projections sourced from Australian Government (2018). These emissions were multiplied by New South Wales' estimated share of emissions, sourced from Australian Government (2019).

2015). The continued operation of the ESS, and other state market-based energy efficiency schemes, is a key part this.

As discussed in Section 4.1.3, there are barriers to the uptake of energy efficiency projects under the ERF, and these barriers are likely to persist. The NSW Government will continue to work with the Australian Government to ensure the two schemes complement each other.

Reliability and security of supply

5. Objective 2C – Reduce cost of and need for additional energy system infrastructure

Objective 2 (c) of the Act is to reduce the cost of, and the need for, additional energy generation, transmission and distribution infrastructure.

This includes the cost of, and the need for, additional:

- energy generation infrastructure to supply enough energy year round
- energy generation peaking infrastructure to supply enough capacity at peak times
- energy transmission and distribution infrastructure, with enough capacity at peak times.

5.1 The objective is being met

The ESS has reduced the cost of and need for additional energy system infrastructure because the scheme has reduced:

- electricity consumption and therefore the cost of and need for generation infrastructure
- peak demand and therefore the cost of and need for additional peaking plant
- peak demand and therefore the cost of and need for additional transmission and distribution infrastructure.

As a result, the ESS has helped improve the reliability and security of electricity supply in New South Wales.

5.1.1 The ESS has reduced electricity consumption, reducing the cost of and need for additional generation infrastructure

Over the review period, the ESS has reduced electricity consumption by an average of about 2100 GWh per year (IPART n.d.). In 2018, savings from the ESS were equivalent to 4% of grid-supplied electricity.[28]

AEMO's *2019 Electricity Statement of Opportunities* forecasts electricity demand will remain relatively flat over the next decade as growth in underlying residential and business load is offset by increasing energy efficiency (AEMO 2019a, p.9 & Figure 38).

Lower electricity consumption forecasts reduce the need to invest in new additional generation infrastructure. As discussed in Section 4.2.2, lower electricity consumption due to the ESS reduces the need for new generating plant to replace retiring coal fired power stations equivalent to a 1050 MW solar farm, costing about $1.5 billion.[29]

[28] Grid-supplied electricity in 2018 is the average of actual operational consumption less line losses for 2017–18 and 2018–19, sourced from AEMO (2019a).

[29] Estimated solar farm size to supply 2242 GWh of electricity per year assuming a line loss factor of 1.15 and a solar capacity factor of 28%. The average capital cost of utility solar developments in planning and approval stages in New South Wales is $1.4 million per MW. Annual electricity savings were reduced by 13% to adjust for

5.1.2 The ESS has reduced peak demand, reducing the cost of and need for additional peaking plant

As shown in Figure 7, the ESS is estimated to have reduced demand at peak times in 2018 by about 450 MW at the point of consumption. This is equivalent to deferring investment in additional gas peaking plant of about 500 MW at a capital cost of about $510 million.[30] By lowering peak demand, the ESS has helped reduce peak prices.

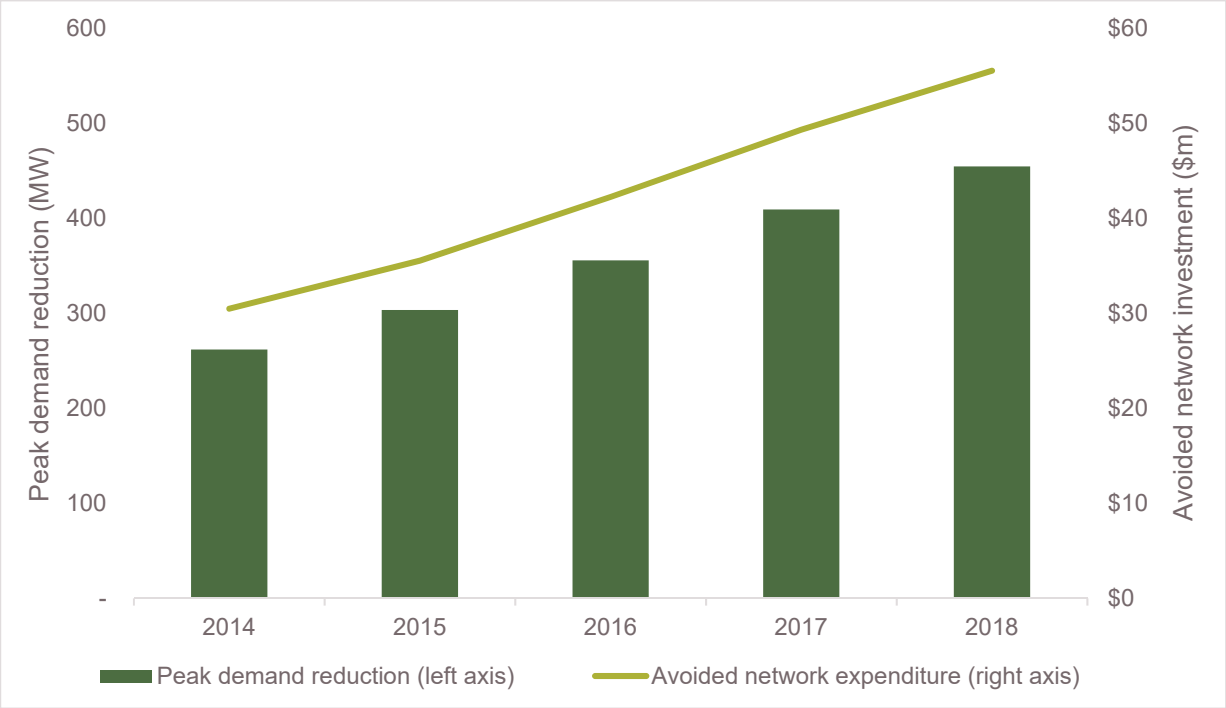

Figure 7 **Annual peak demand reduction and avoided network investment due to the ESS[31]**

The peak demand savings delivered by the ESS have reduced the need for load curtailment during system demand peaks. Notably, on 10 February 2017 at 7:30pm, NSW demand for electricity peaked at 14,233 MW at a time of substantial curtailment of major industrial load. Without this curtailment, TransGrid estimates system demand would have been 14,859 MW

freeriders and spillovers. Annual electricity savings are the actual electricity savings for 2018, sourced from IPART (2019).

[30] Estimated by the Department using a weighted network line loss factor of 1.062, assuming a 5% reduction in power station's output during summer peak due to seasonal de-rating and auxiliary load, and capital cost forecasts for Open Cycle Gas Turbines of $1009 per kW in 2019–20. Source for capital costs: AEMO (2018b).

[31] Electricity peak demand reduction is at the point of consumption and was estimated by the Department using conservation load factors for different technologies, matched using energy savings and project types from ESS registry data. Energy savings were reduced by 13% to adjust for freeriders and spillover. Source for conservation load factors for commercial lighting: Jacobs (2014). Weighted average long run marginal costs for the distribution network estimated by the Department assuming all commercial and residential customers are supplied by LV network and 30% of industrial customers are connected at sub-transmission voltages with the remainder connected to the HV network. The long run marginal cost represents the avoidable cost of supply in the long term, assuming all costs of production can be varied. Weighted average long run marginal costs per distributors' published tariff structure statements for 2019–2024: Ausgrid (2019); Essential Energy (2019); and (Endeavour Energy 2019). An estimate of the transmission network long run marginal cost was calculated using TransGrid's forecasts of capital expenditure and incremental peak demand (TransGrid 2019).

(TransGrid 2019, p.51, Table 19; Australian Energy Council 2017). This would have exceeded the state's previous peak demand record of 14,764 MW.[32]

If the ESS did not exist, up to 450 MW of additional load would need to have been curtailed during this peak event. Unlike load curtailment or demand response, the ESS delivers peak demand reduction without the need for central control of business or household activity.

5.1.3 The ESS has reduced peak demand, reducing the cost of and need for additional transmission and distribution infrastructure

Peak demand is a key driver for investment in electricity network infrastructure, including replacement expenditure, as forecast demand affects how much capacity is required. Figure 7 shows that based on peak demand reductions achieved between 2014 and 2018, the ESS has deferred an estimated $213.1 million of network investment.

Network operators recognise that energy efficiency programs are reducing peak demand. TransGrid stated that in the last decade, energy efficiency programs have, along with distributed energy resources and increasing electricity prices, contributed to limiting growth in peak demand (TransGrid 2019, p.47). Further, TransGrid forecasts that above-trend energy efficiency will reduce peak demand by 1588 MW in summer and 1366 MW in winter between 2019–20 and 2028–29 (TransGrid 2019, p.77).

5.2 The objective remains valid

There is a continued need to reduce the cost of and need for energy infrastructure, because:

- two major NSW power stations are expected to retire over the next decade
- the predictable nature of energy savings in the ESS helps minimise disruption from plant closures
- network businesses are planning investments to replace assets
- reducing the cost of energy infrastructure results in lower energy prices
- southern Australian states, including New South Wales, are expected to experience shortfalls in gas supply within the next decade due to infrastructure constraints.

5.2.1 New South Wales' coal fired power stations are retiring

By reducing electricity consumption and peak demand, the ESS can reduce the cost of and need for generation infrastructure to meet New South Wales' year-round electricity requirements. This role will be particularly important over the coming decade because it helps reduce the amount of new generating capacity needed to replace retiring coal fired plants.

Coal fired power stations in New South Wales are ageing. About 3120 MW of firm summer capacity will be removed from the system over the next decade as Liddell and Vales Point power stations reach the end of their economic lives. Figure 8 shows the projected gap in firm capacity when Liddell and Vales Point power stations close in 2022–23 and 2028–29 respectively.

[32] Wholesale market statistics published by the Australian Energy Regulator, Seasonal peak demand – regions.

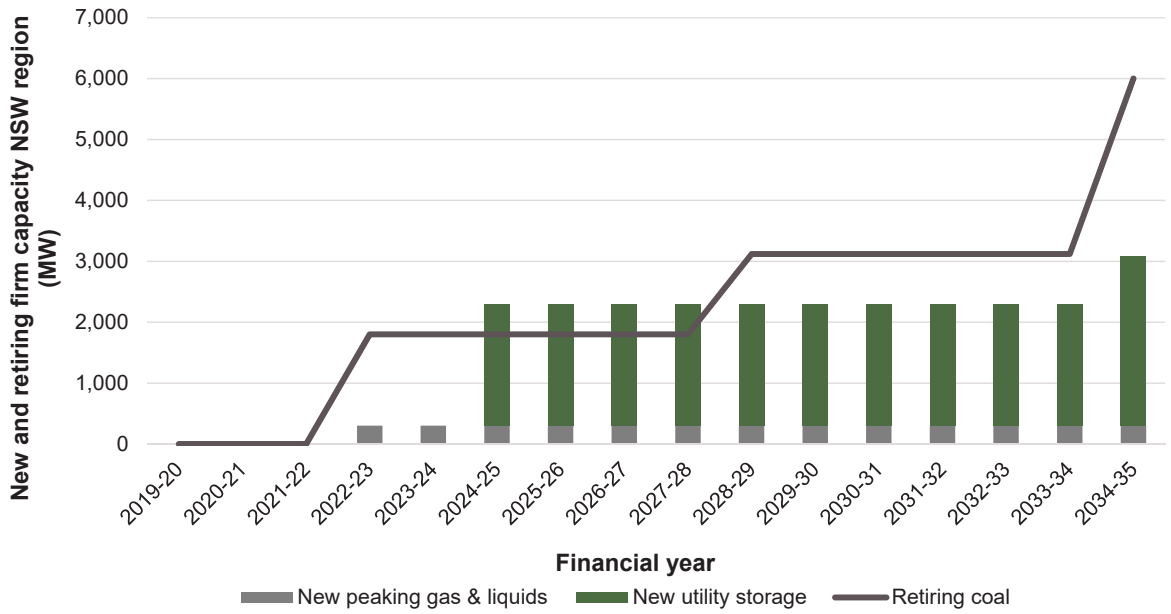

Figure 8 **Firm generation capacity forecast to be added and removed from the NSW system over the next 15 years as at 31 July 2018**

Source: AEMO (2018a)

Reducing energy consumption also helps the transition towards a lower emissions energy system for a smaller cost. The capital costs of lower emissions generation options such as solar PV and batteries are decreasing in real terms due to technological advancements.[33] Deferring the need for new generation infrastructure allows this generation to be deployed at a relatively lower cost.

5.2.2 The ESS helps minimise disruption around plant closures

As coal fired power stations approach retirement, owners face uncertainties such as future demand, competition from new generators and distributed generation, and plant failures. In contrast, energy savings from the ESS are predictable as targets are known years in advance and factored into demand projections by AEMO and network operators.

If needed, the Government can calibrate future targets to minimise disruption to the electricity market before and after planned plant closures. The NSW Electricity Strategy signals that the NSW Government intends to confer powers on the Minister to increase scheme targets if there is a forecast breach of the proposed Energy Security Target (DPIE 2019b). This will complement other measures such as the Retailer Reliability Obligation and the requirement for generators to provide three years' notice of closure.

5.2.3 Network businesses are planning investments to replace assets

The Australian Energy Regulator (AER) has approved NSW distribution networks to spend $2.7 billion on replacing network assets and $735 million on upgrading network assets between 2019 and 2024.[34]

[33] See, for example, Bloomberg New Energy Finance (2019).

[34] Analysis of figures for replacement expenditure (repex) and augmentation expenditure (augex) from AER regulatory determinations for Ausgrid, Endeavour Energy and Essential Energy (Australian Energy Regulator 2019a).

Reducing peak demand reduces the amount of investment required for both replacement and augmentation expenditure as forecast demand affects how much capacity the new infrastructure needs to provide.

As discussed in Section 5.1.3, by reducing peak demand the ESS has already deferred network investment. While investments for the current regulatory period are locked in, there is opportunity for the scheme to defer future investments.

5.2.4 Reducing the cost of additional electricity infrastructure lowers electricity prices

Reducing electricity consumption and peak demand places downward pressure on electricity prices by reducing the need for investment in generation, transmission and distribution infrastructure. This flows through to all electricity customers in the form of lower wholesale and network price components of their bills. This benefits all customers, not just energy savers participating in the ESS.

5.2.5 Infrastructure constraints are leading to gas supply shortfalls

AEMO forecasts that the southern states of Australia will face a shortage of gas by 2023. This is due to declining production in southern sources and pipeline capacity limiting imports from northern states (AEMO 2019b, p.40). AEMO expects that investment in additional gas infrastructure will be required over the next decade to prevent supply shortages during winter peak demand days (AEMO 2019b, p.3).

As discussed in Section 2.1.2, gas was added to the scheme in 2016 and certificates were first generated in 2017. Over time the share of gas activities in the scheme is expected to grow (NSW Government 2015a). This will enable the scheme to more significantly reduce the cost of, and need for, additional gas supply infrastructure.

6. Broad scheme design remains appropriate

6.1 The terms of the Act remain appropriate for securing its objectives

The terms of Part 9 of the Act set out the design of the ESS as a market-based certificate scheme requiring scheme participants (mainly NSW electricity retailers) to meet energy savings targets, served by a competitive market to deliver energy savings at least cost. Through the scheme, households and businesses choosing to implement energy savings projects can receive a discount or other financial incentive.

The 2009 Better Regulation Statement before the scheme's establishment considered alternatives including no action, government subsidies, regulation and market-based instruments requiring electricity distributors or all customers to meet energy savings targets. The ESS was chosen over the alternatives because it delivered (NSW Department of Water and Energy 2009):

- higher economic benefits by reducing the cost of electricity supply
- higher financial benefits of reduced energy bills
- lower compliance, reporting and administration costs.

The five-yearly review in 2015 did not reconsider these alternatives to the ESS. Rather, it considered options to terminate, extend and reform the scheme. The NSW Government decided to extend the scheme to 2025, increase its targets, expand it to include gas energy efficiency and fuel switching, add a regional network factor, and reform its administration.

The Government extended and expanded the scheme because the reforms were estimated to deliver (NSW Government 2015b):

- an additional net economic benefit of $853 million
- an additional $3.4 billion in bill savings in present value terms, more than offsetting the $608 million in additional short-term regulated costs that would be passed through to consumers
- an additional 524 GWh in 2020 towards the NSW energy savings target.

This Statutory Review takes the same approach that the broad scheme design as a market-based certificate scheme remains appropriate.

As announced in November 2019, the NSW Government is extending and expanding the ESS under a new name, the Energy Security Safeguard. The new Energy Security Safeguard will include an energy efficiency scheme and a peak demand reduction scheme. The energy efficiency scheme will run until 2050, have a more ambitious energy savings target and provide incentives for an expanded set of activities.

The NSW Government is seeking feedback on these reforms in the Energy Security Target and Safeguard Consultation Paper.

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