

3 ENERGY CONSUMPTION



The production and use of energy causes significant environmental impacts, including being our main source of greenhouse gas emissions. The electricity sector's performance is improving while transport emissions continue to grow.

NSW meets most of its demand for energy from non-renewable sources (about 94% in 2012–13), mainly coal, gas, and petroleum products.

Around one-quarter of final demand is met by electricity. Total electricity consumption from the grid peaked in 2008–09 and has been falling over the past six years with the current demand close to 2001–02 levels. Electricity consumption from the grid per person peaked in 2007–08 and has recently been well below 1997–98 levels.

Diversification of NSW electricity supplies is growing strongly with an increase in renewable-based capacity and generation. Electricity generated from renewable sources (including Snowy Hydro) has increased from 6.1% in 2008 to 10.8% in 2014, driven mostly by the contribution of new, non-Snowy, renewable energy sources (from 1.6% in 2008 to 7.5% in 2014).

Diversification of other energy supplies has been limited, with continued strong growth in fossil fuel use by transport. This is now the largest sector for final energy demand in NSW and proportionally has the lowest use of renewable energy.

To help meet its goal of increasing use of sustainable energy sources and improving energy efficiency, the NSW Government is implementing the NSW Renewable Energy Action Plan and the NSW Energy Efficiency Action Plan. It continues to support a national Renewable Energy Target and has established a Renewable Energy Advocate; along with a suite of other actions to improve energy efficiency and lower power emissions. The NSW Government maintains biofuels mandates as a means of increasing use of sustainable energy sources in the transport sector.

NSW indicators

G Good **M** Moderate **P** Poor **U** Unknown

Indicator and status	Environmental trend	Information availability
Total NSW energy use P	Stabilising	✓✓✓
NSW non-renewable energy production P	Stabilising	✓✓✓
NSW renewable energy production M	Decreasing impact	✓✓✓
Electricity use per capita M	Decreasing impact	✓✓✓

Notes: Terms and symbols used above are defined in About SoE 2015 at the front of the report.

Context

Economically and environmentally sustainable energy is essential to the functioning of an advanced industrial society. NSW uses approximately one-quarter of Australia's total energy. It possesses large reserves of black coal and gas, as well as substantial renewable energy resources. As a result, NSW enjoys a reliable and secure energy supply – important factors underpinning the stability and growth of the economy. These energy sources are also important as feed stock into industrial processes, which help support the industrial sector of the local economy.

To support sustainable development of all NSW energy resources (coal, gas and renewable), a strong regulatory framework around planning, environmental controls and industry operations is in place. This involves managing surface water and groundwater pollution, mine site rehabilitation, dust and noise pollution, and disruption to landscapes, flora and fauna.

Energy production and conversion, such as coal and gas to electricity in power stations and energy used in the transport and industrial sectors, are the main emission sources of greenhouse gases as well as local and regional air pollutants (see Theme 5: Greenhouse gas emissions and Theme 8: Air quality). Energy conversion losses in electricity generation are also very significant.

Status and trends

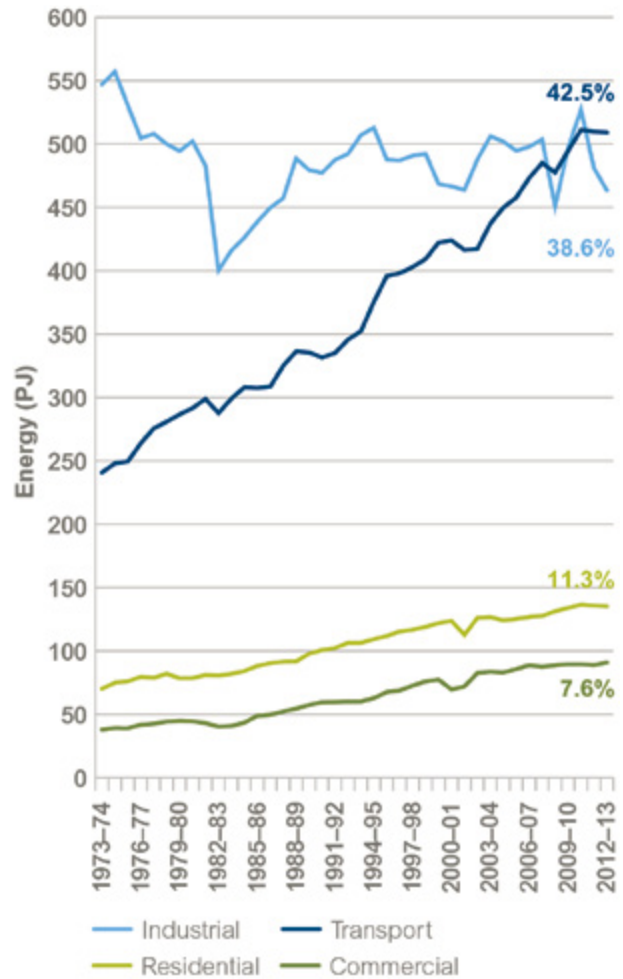
Final energy consumption

'Final energy' is the energy supplied to the end user. Final energy consumption includes secondary energy, such as electricity, and therefore excludes the coal and gas used to generate electricity.

Over the past three years, total NSW energy consumption has been decreasing at around 2.6% per annum. This is distinctly different from the trends of the previous four decades. The key reason for this recent change is reduced industrial energy use.

Figure 3.1 shows the sectoral trends in final energy consumed for the NSW and ACT economies. In 2012–13, final energy consumption was 1199 petajoules (PJ). The share of the industrial sector has been

Figure 3.1: Final energy consumption by sector, NSW and ACT, 1973–74 to 2012–13



Source: Derived from BREE 2014

Notes: The data includes NSW and the ACT, as source data cannot be disaggregated.

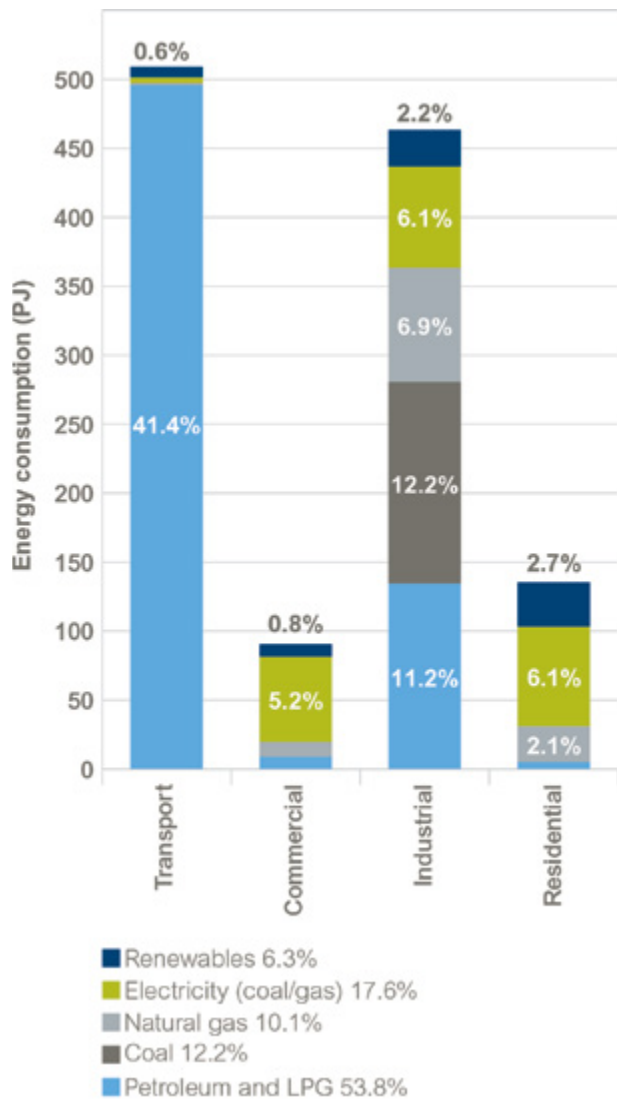
'Industrial' includes agriculture, mining and manufacturing.

'Commercial' includes general commercial, construction, and water, sewerage and drainage industries.

declining. In addition, four decades of strong growth in energy use in the transport sector (i.e. all residential and commercial/industrial transport fuel use) has led to industrial use falling below that of the transport sector (38.6% and 42.5% respectively in 2012–13), while the residential and commercial sectors used 11.3% and 7.6%, respectively. Over the past three years the transport, residential and commercial sectors have had relatively stable levels of energy use.

Not included in the final consumption are heat and conversion losses in power plant facilities and refineries, as well as network losses. In 2012–13, for example, waste heat from power

Figure 3.2: Final energy consumption by fuel and sector, NSW and ACT, 2012–13



Source: Derived from BREE 2014

Notes: Data re-analysed by NSW Department of Industry to avoid double-counting and better allocate energy use to sectors.

'Coal' excludes fossil fuel inputs to electricity generation.

'Renewables' includes wind, bagasse, solar, wood waste and hydroelectricity. However, this data source does not include estimates for wind, solar photovoltaic (PV), solar water heating, solar thermal and other biomass sources such as ethanol, biodiesel, landfill gas, black liquor (pulp mill by-product), sewage gas, food waste and municipal solid waste.

plants amounted to around 411 PJ, equivalent (and additional) to 34.3% of final energy consumption in NSW.

Figure 3.2 shows final energy consumption by sector for 2012–13. Petroleum comprises the largest component of final energy used in NSW and the ACT. The transport sector was the major user of petroleum in 2012–13, with some used in

the other sectors. Electricity use was highest in the industrial and residential sectors.

Gas consumption has been fairly level in NSW over the past five years. Most of the gas used in NSW is for manufacturing and electricity generation. Excluding the latter, gas accounted for 10.1% of final energy consumption in 2012–13.

Total NSW use of gas (excluding bottled LPG) was 19,541 MJ per person in 2012–13. In terms of residential use of gas (mainly for heating, hot water and cooking), average annual consumption was around 22,143 MJ per household (NSW Department of Industry data 2014), based on an average household size in NSW of 2.6 persons.

Energy generation

The supply mix

NSW is largely self-sufficient in terms of electricity supply, meeting about 90% of local demand. The remaining electricity is purchased from other states (in particular, Victoria and Queensland) through the National Electricity Market (NEM).

Partly due to declining electricity demand, the non-renewable component of electricity generation has been decreasing since 2008. Conversely, renewable electricity generation (excluding Snowy Hydro) has been increasing, helped by the Renewable Energy Target (RET) and other government policies supporting the use of renewables (see Responses below).

In 2014, NSW generated 66,066 gigawatt-hours (GWh) of electricity. This included:

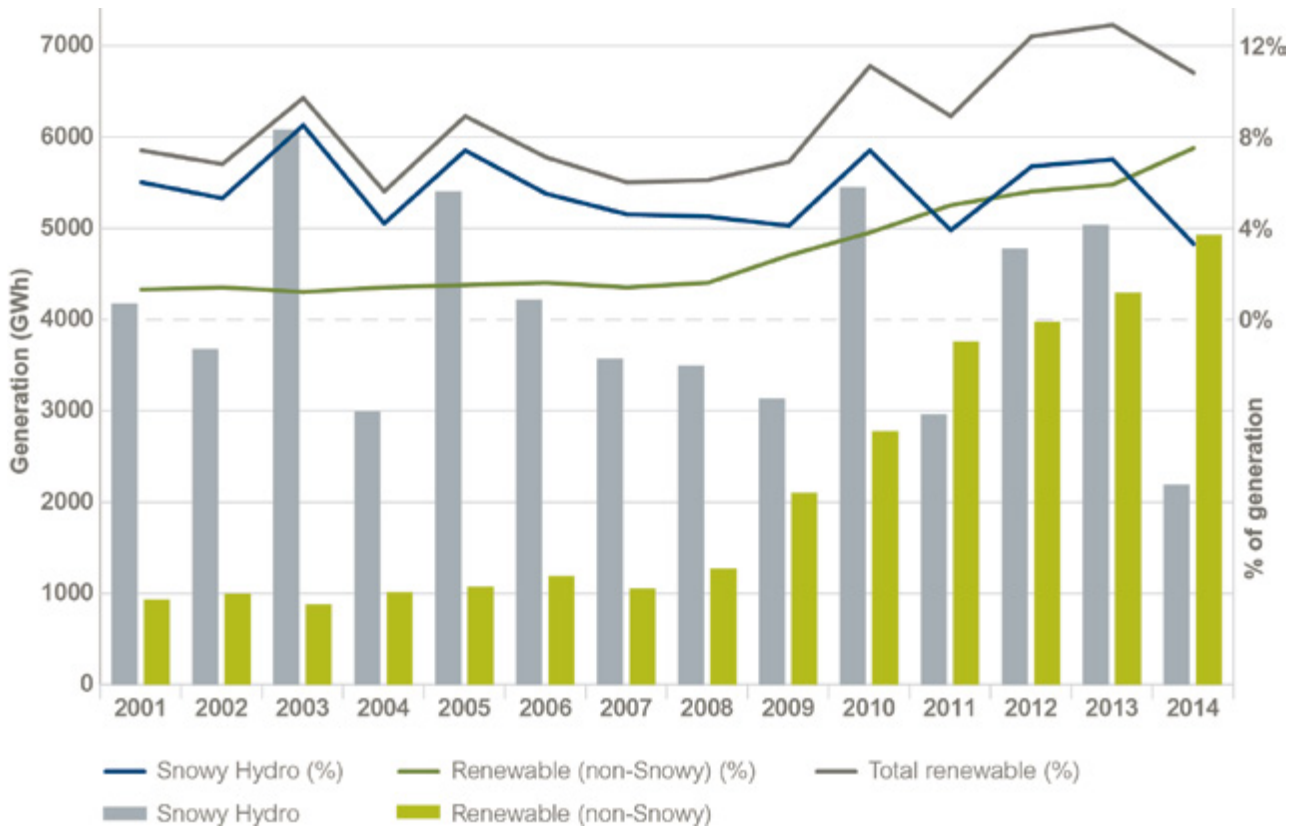
- coal – 82.3% (down from 91% in 2008)
- gas – 6.9%
- renewables – 10.8% (up from 6.1% in 2008).

Renewable energy generation and growth

Although more than 30% of current installed electricity generation capacity is powered by renewables, actual generation is lower and varies from year to year (e.g. due to weather-related water availability for hydroelectricity).

Electricity generation from renewable energy sources peaked at 12.9% of the state's total in 2013 (Figure 3.3, overleaf). Snowy Hydro is the largest renewable energy source for NSW, but can be quite variable.

Figure 3.3: Electricity generation from renewable sources, 2001–14



Source: NSW Department of Industry data 2015
 Notes: 'Total renewables' includes total Snowy output.

In 2014, renewable energy sources provided 10.8% of the state's total electricity generation; with Snowy Hydro accounting for 3.3% of total NSW electricity generation. Shares of the remaining 7.5% non-Snowy, renewable energy sources are:

- solar photovoltaic (PV) systems – 31%
- wind – 20%
- biomass – 12%
- solar water heaters (which displace electricity use from electric hot water systems) – 17%
- landfill gas – 9%
- other hydro – 11%.

The growth in non-Snowy renewable generation capacity is reflected in the trend in electricity generation from other renewable sources since 2008 (Figure 3.3).

Solar, wind and biomass resources have increasingly been developed over the past six years, largely due to the RET. Since 2008, wind generation has jumped 25-fold, and solar PV generation 50-fold. In 2014, wind plants in NSW (566 MW installed capacity) generated 975 GWh

of electricity, and solar PV systems, 1456 GWh (about 5.2 PJ) (NSW Department of Industry data 2015). Over 1030 GWh of electricity was also generated from bagasse, landfill and other bioenergy sources.

Pressures

The strongest growth in energy consumption in NSW has been in the commercial sector (about 140% growth over the past 40 years), while the residential and transport sectors have grown by 112% and 93% respectively. The industrial consumption in NSW has declined by about 15% (Figure 3.1).

Petroleum

NSW has the largest number of vehicles of any Australian state (ABS 2014a). It is also the largest market for petroleum. As clean and efficient combustion of fuels is more difficult to achieve in mobile engines (compared with stationary engines, power plants, etc.), the environmental and health impacts of energy use

in transport tend to be more pronounced (see Theme 8: Air quality).

Compounding the issue, transport has had a slow rate of uptake of alternative fuel sources (the sector represents only 1.9% of NSW electricity consumption). Although electric vehicles show considerable promise for improved environmental performance – especially if supplied from renewable energy sources – they are in a similar position to that of solar PV systems a decade ago, in that they are currently too expensive for widespread adoption.

Gas

Gas demand in NSW is forecast to decrease at an average rate of 1% per annum over the next 10 years. But as more than 95% of NSW gas needs are met by imports from other states, the surge in demand for liquefied natural gas exports from Queensland, which is expected to grow at an average annual rate of 60% over the next decade (AEMO 2014), means NSW will be buying gas from an increasingly internationally-exposed market as long-term low-cost gas contracts come to an end over the next two to three years.

Electricity

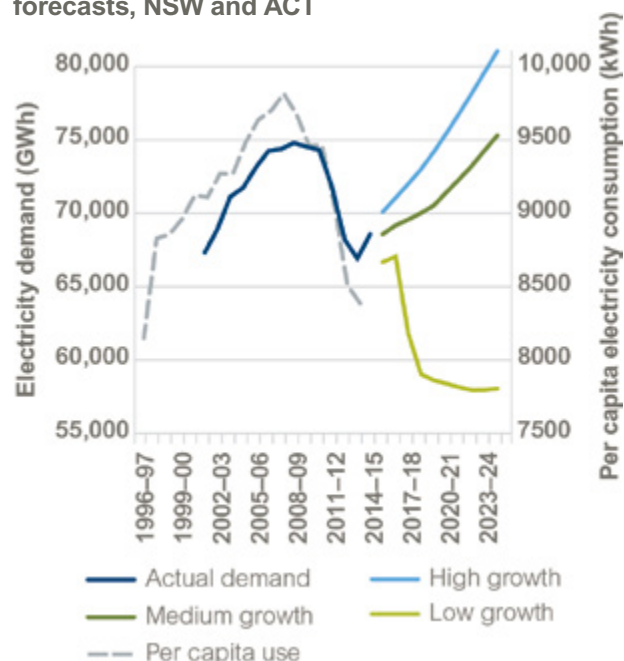
In 2013, NSW generated 66,066 GWh of electricity. The major sources of fuel for this electricity were non-renewable sources, such as coal and gas (89.2%). Renewable sources provided 10.8% of the state's total electricity generation. Heavy reliance on the combustion of fossil fuels has environmental and health impacts, including greenhouse gas emissions (see Theme 5: Greenhouse gas emissions) and air pollution (see Theme 8: Air quality).

The industrial and residential sectors use 34.6% and 34.3% respectively of the state's total electricity consumption, followed by the commercial sector at 24.7% (BREE 2014); thus, changes to economic conditions and population strongly influence demand.

Since 2008–09, consumption of electricity from the grid has been falling at an annual average rate of 2.2%. The AEMO electricity demand forecasts are also being regularly revised downwards. Factors behind these reductions include:

- decreasing demand by the industrial sector due to lower global demand and closure

Figure 3.4: Electricity consumption and demand forecasts, NSW and ACT



Source: TransGrid 2011; ABS 2014b; Energy Supply Association of Australia data 2014; AEMO 2015a

Notes: The data includes NSW and the ACT.

of large industries, such as the Kurri Kurri aluminium smelter, Kurnell and Clyde petroleum refineries

- increasing deployment of rooftop solar PV systems due to lower system prices and other incentives
- growth in energy efficiency due to federal and state government programs and consumer thrift in reaction to higher retail electricity prices.

There is a slight increase in the latest forecasts released in 2015 (AEMO 2015a) as compared to the 2014 forecasts. The population and economics growth from 2014–15 to 2024–25 is projected to be sufficient to grow electricity demand at 1.0% per annum (medium growth scenario, Figure 3.4). Over that period, summer and winter peak demands are also forecast to increase at an average annual rate of 0.9% and 1.1%, respectively.

Total electricity consumption per person has grown since the early 1990s. It peaked in 2007–08 and has been declining since then, and has recently been well below the levels of 1997–98 (Figure 3.4). Residential electricity consumption peaked in 2008–09 and has been falling since then, with the current consumption close to 1999–2000 levels.

Responses

Renewable energy developments

The NSW Government is promoting the development and use of alternative and renewable energy by:

- implementing the NSW Renewable Energy Action Plan (NSW Government 2013) (REAP) to increase renewable generation in NSW and help meet the national Renewable Energy Target (RET) at least cost to the energy consumer and with maximum benefits to the state
- establishing the Renewable Energy Advocate – a position that acts as a single, cross-government, point of contact for industry – helping address network, planning and financial constraints faced by renewable energy proponents
- reiterating its support (during the 2014 Review) for the Australian Government's 2014 RET of 41,000 GWh of renewable generation by 2020)
- managing the National GreenPower Accreditation Program, which helps residential and business electricity users purchase renewable energy – in 2014 sales in NSW stood at 377 GWh, about 30% of the total (NGPSG 2015)
- continuing gas pricing oversight by the Independent Pricing and Regulatory Tribunal (IPART) (regulation of the electricity retail market was removed from 1 July 2014 due to improved market competitiveness)
- continuing to support solar feed-in-tariffs (in line with annual IPART determinations)
- investigating ways to provide a sustainable and predictable future for the solar industry supporting the Regional Clean Energy Program (RCEP), which is helping communities with the regional development of renewable energy resources – both by fostering community engagement and awareness-raising with respect to large-scale developments, as well as helping communities use renewable energy sources to generate their own electricity locally.

The Renewable Energy Advocate has identified several priority areas under the REAP, such as:

- addressing challenges associated with network connection for renewable energy projects (such as mid-scale solar PV)
- conferencing and promoting Environmental Upgrade Agreements legislation and their application to renewable energy deployment
- developing an information package for small-scale solar PV, solar hot water, and wind generation systems.

Energy efficiency developments

The NSW Government released the NSW Energy Efficiency Action Plan (OEH 2013) (EEAP) in August 2013. The plan aims to reduce household energy use and improve energy productivity for business and government by removing the barriers that prevent the uptake of energy efficiency. Key actions include:

- enhancing the Energy Savings Scheme (ESS) to encourage a broader range of energy efficiency actions
- providing incentives to encourage new, innovative behaviour change programs that save energy
- implementing a digital information-sharing platform for households, businesses, and service providers – this will enable the sharing of: usage data; information on energy efficiency opportunities; and case studies, guides and tools.

In 2013–14, energy savings of 4649 GWh accrued from the ESS, appliances standards, building ratings, and other state and national efficiency programs active in NSW. The NSW Government is investigating expanding the ESS to support natural gas users to adjust to recent price rises and boost gas efficiency.

Funding

The NSW Climate Change Fund, established in 2007, is a key funding mechanism for EEAP, the NSW Government Resource Efficiency Policy (GREP; see Using energy wisely below) and RCEP.

Diversifying energy supply and lowering coal use

The NSW energy supply is dominated by coal (locally produced, but highly carbon-intensive), and petroleum and gas (mostly imported and also carbon-intensive). Therefore, there are sound strategic, economic and environmental reasons to diversify the mix of energy supplied.

Increasingly, individual industries, companies and households can make their own choice on which energy supply they want. However, government and industry can drive this on a broader scale by supporting the diversification of electricity generation sources and developing alternative transport fuels and new vehicle technologies.

The NSW Government is also committed to reducing greenhouse gas emissions from coal. Through the \$100 million Coal Innovation NSW Fund (CINSW Fund), the Government is carrying out research, development and demonstration of low emissions coal technologies, and improving public awareness. Trials include:

- investing directly into the Delta Carbon Capture and Storage Demonstration Project and the NSW CO₂ Storage Assessment Project
- funding a further seven research and development projects and other initiatives in low emissions coal technologies (see Future opportunities below).

Electricity

Whether NSW has sufficient electricity supply to meet demand depends on the balance between demand changes and the addition and retirement of generation capacity. According to the latest demand–supply balance outlook NSW has sufficient electricity supply to meet demand for the next six to eight years depending on the demand scenario (AEMO 2015b). This is largely due to:

- the recent retirement of Wallerawang and Redbank coal fired power plants (1150 MW capacity)
- the upcoming retirement of Liddell, the state's oldest coal fired plant (2000 MW)
- the upcoming retirement of a 170 MW gas fired power plant at Smithfield.

As AEMO demand–supply forecasts incorporate 'committed' projects only, the supply-side deficiency may only be nominal. Projects which currently have planning approval (but do not yet have financial backing), or are awaiting NSW planning approval, will improve supply capacity, as will any new investment under the RET.

Replacement capacity is coming from both conventional and renewable sources. New and large-scale renewable generation proposals, with a total capacity of 2700 MW, have development approval (2350 MW wind and 350 MW solar). A further 5100 MW wind generation proposals are seeking planning approvals. Around 8600 MW has also been approved for new coal and gas generators.

However, depending on future economic and regulatory conditions, not all of these proposals (conventional or renewable) may progress to completion.

With a growing proportion of new generation facilities being reduced or zero-emission designs, these proposals will reduce the state's reliance on coal and gas for power generation and aid the move to lower emission energy sources. Moreover, changes to demand, efficiency, along with other factors, may facilitate faster retirement of older fossil-fuelled power stations and the more rapid development of renewable generation capacity in preference to proposed coal or gas plants.

It is also forecast that residential roof-top solar PV generation is likely to grow to over four times the current level in the next 20 years. NSW is leading in commercial solar PV generation, which is likely to grow 13 times to 2600 GWh by 2035 (AEMO 2015a).

Gas

Given strong local and international demand for gas, ensuring security of a cost-effective supply is a key aim of the NSW Government. As NSW has traditionally had minimal local production, the new development of local supplies has been associated with significant environmental issues and community concerns.

In November 2014, the NSW Government released the NSW Gas Plan (NSW Government 2014). It aims to secure gas supplies for NSW households and businesses by establishing a safe, sustainable industry. To do so, the Government will:

- make better science and information available to decision-makers and the community
- introduce a strategic release framework for gas exploration, enabling up-front consultation with the community when determining the most appropriate areas for exploration
- appoint the independent Environment Protection Authority as the lead regulator for compliance and enforcement of conditions of approval for both gas exploration and gas production activities
- undertake policy and regulatory reform leading to strong and certain regulation and introducing worlds' best practice environmental and regulatory standards for gas development activities
- ensure additional water monitoring and reporting
- share the economic benefits of gas development with landholders and local communities by establishing a community benefits fund to fund local projects in communities where gas exploration and production occurs
- secure gas supplies by studying all supply options.

The NSW Gas Plan also adopts in full the recommendations of the NSW Chief Scientist & Engineer's Final Report of the Independent Review of Coal Seam Gas Activities in NSW (CS&E 2014). This includes the establishment of a whole-of-environment data repository for all state environment data including all data collected according to legislative and regulatory requirements associated with water management, gas extraction, mining, manufacturing, and chemical processing activities.

In addition, the NSW Government is developing and implementing policies to reduce land-use conflict between resource industries (including CSG), agriculture and the environment.

Alternative transport fuels and new vehicle technology

The NSW Government is supporting the development of a market for cleaner new motor vehicles and cleaner and alternative fuels.

This will improve air quality and reduce fuel consumption and greenhouse gas emissions.

Biofuels, such as ethanol and modified vegetable oil (biodiesel), create jobs in regional NSW, help farmers and reduce reliance on foreign fuel imports. Since 2007 NSW has mandated that ethanol comprises 6% of the total volume of petrol sold in NSW and for diesel 2% must be biodiesel (rising to 5% when there is sufficient local production). Approximately 30% of all petrol and diesel sold in NSW now contains biofuel.

Electric vehicles present significant opportunities to reduce the environmental impacts of road vehicle use. They do not cause air pollution when driven and emit slightly less CO₂ than internal combustion engine vehicles, even when charged through the electricity grid.

As well as technological advances, the uptake of electric vehicles may be assisted by infrastructure, policy and legislation changes. For example, the Australian Energy Market Commission has published a review of Energy market arrangements for electric and natural gas vehicles (AEMC 2012).

Using energy wisely

The Building Sustainability Index

The Building Sustainability Index (BASIX) was introduced by the NSW Government in 2004 to ensure that new homes, residential alterations and additions costing more than \$50,000 are designed and built to high energy and water efficiency standards. Each new home in NSW must meet a greenhouse gas emission reduction target compared with the average home built before the scheme's introduction. For Sydney and coastal NSW, this target is 40%. For houses approved between July 2004 and December 2011, the commitment to energy savings for BASIX-compliant dwellings translated to a cumulative reduction of greenhouse gas emissions of more than 1.5 million tonnes CO₂-equivalent.

The National Australian Built Environment Rating System

The National Australian Built Environment Rating System (NABERS) expands on a NSW program that rates buildings using measured environmental impacts. NABERS Energy ratings are available for commercial office buildings, hotels, shopping centres, homes, NSW schools and NSW hospitals. Office buildings using NABERS under Commercial Building Disclosure (CBD) have improved their greenhouse gas emissions performance by an average 11.5%.

Most office buildings over 2000 square metres in size are required to disclose their NABERS Energy rating at the point of sale or lease under the CBD program. In addition to this, NABERS ratings are crucial to a number of industry and government programs, such as the CitySwitch Green Office program, the NSW Energy Savings Scheme, Melbourne's 1200 Buildings program, the National Green Leasing Policy and Green Star ratings.

The NSW Government Resource Efficiency Policy

The NSW Government Resource Efficiency Policy (GREP) (OEH 2014), released in July 2014, encourages the NSW Government to lead by example by saving energy and electricity costs in its own operations through implementing energy efficiency projects across government facilities. The policy contains a range of measures that will ensure NSW Government agencies meet the challenge of rising costs for energy, water, clean air and waste management.

Key actions on government agencies include:

- undertaking energy efficiency projects at sites representing 90% of billed energy use
- introducing minimum efficiency standards for water and energy using appliances purchased
- development of waste reduction plans to further decrease or divert waste from landfill
- introduction of air emission standards for mobile non-road diesel plant and equipment owned or contractor supplied.

Agencies will report annually on performance with whole-of-government progress being reviewed every two years.

The Energy Efficient Government Program (EEGP) was established in 2013–14 in direct response to the Energy Efficiency Action Plan

with the aim to achieve energy bill savings of up to \$27.5 million a year from energy efficiency upgrades initiated at government sites.

The EEGP provides government agencies with access to the following range of tools and knowledge to ensure that energy efficiency projects are successful:

- a team of dedicated energy efficiency specialists with the expertise to identify and implement viable energy efficiency projects and operational experience in risk-reduction
- a panel of pre-qualified energy service companies (ESCOs) to streamline the procurement process
- repayable capital advances to fund energy efficiency upgrades through a Government Finance Facility with a total net liability of \$95 million.

Smart meters and grids

When coupled with appropriate price signals or other incentive measures, effective end-user metering of consumption can encourage better user-management of electricity use.

The NSW Government has announced electricity smart meters in NSW will be installed through a market-led rollout; supported by proposed new rules that provide for a competitive metering regulatory framework.

Both the NSW policy and the proposed national framework will encourage competition by allowing metering providers, such as electricity retailers or other new entrants, to offer smart meters to customers as part of retail energy packages that include the meter, installation, and options for time-of-day tariffs.

The Greenhouse and Energy Minimum Standards

The Greenhouse and Energy Minimum Standards (GEMS) is the national program for equipment and energy efficiency. Established in 2012 under Australian Government legislation (*Greenhouse and Energy Minimum Standards Act 2012*) the program stops the importation of poorly performing electrical appliances, and gives consumers information to help them choose more efficient appliances at the point of sale. Nationally, reduced energy use due to the program could save households and businesses an estimated \$60 billion between 2012 and 2030.

Energy market reform

The COAG Energy Council, through its Power of Choice Reforms, is looking at three elements to improve competition and support new products and services:

- cost reflective price signals, i.e. higher prices at the times of high cost for operating the network
- enhanced and more accessible information for consumers to allow them to better manage their energy use; this includes a rule change in late 2014 to provide minimum requirements for information provision to consumers and better tools
- metering changes to complement the above initiatives by facilitating timely information flows and enhancing the products available to customers.

In regards to gas policy, the COAG Energy Council has commissioned the Australian Energy Market Commission to review the design, function and roles of facilitated gas markets and gas transportation arrangements in the context of rapid transition in Australian gas markets.

Future opportunities

As a means of maintaining the security of energy supply while reducing emissions, research and development in NSW is currently examining suitable cost-effective technologies that can be added to conventional energy systems. These include the following.

Carbon capture and storage

The feasibility of retrofitting post-combustion capture and oxy-fuel combustion to existing NSW power stations is being evaluated. The CO₂ storage potential of the state's geological structures is also being investigated, with an initial drilling and testing program in the Darling Basin indicating positive preliminary results.

Combustion efficiency improvement technology

To accelerate the deployment of low emissions coal technologies, the CINSW Fund is supporting research and development of chemical looping air separation technologies to produce oxygen for use in oxy-fuel combustion power stations. The direct carbon fuel cell is also being funded by the CINSW Fund.

Reducing emissions from mines

The CINSW Fund is sponsoring a collaborative project with Centennial Coal trialling a new technology to mitigate ventilation air methane from underground mines; a source that is difficult to abate as standard mining operations greatly dilute the methane, making it difficult to capture.

Active smart meters

Moving beyond the data monitoring capabilities of 'passive' smart meters, active smart meters have the potential to manage energy consumption in real time. These programmable switches can assist in electricity demand management by switching off selected circuits or devices depending on factors such as periods of high electricity demand or low supply. Depending on the supply contract, they can be programmed by the consumer and/or the electricity supplier.

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