We’re taking action to responsibly reduce greenhouse gas emissions and manage our environmental footprint, while providing customers with secure and affordable energy.

A number of our operations have a material environmental footprint. The Australian community has an interest in ensuring that we are held to high standards of accountability for the impact of our operations on the environment.

We are working to reduce the risk to the environment and to reduce our environmental footprint by considering environmental outcomes in all our activities. The AGL Environment Policy outlines our approach to protecting the environment and minimising our environmental footprint in the areas where we operate, and includes the following commitments:

- We will adhere to high standards to protect the environment where we do business.
- We will strengthen our business by integrating environmental considerations into all business activities.
- We will analyse and improve the way we do business to reduce environmental risks and impacts.
- We will use resources and energy efficiently, minimising emissions and waste.

We have established a culture where environmental principles are front of mind and part of everyday business, and which promotes excellent environmental performance, continuous improvement and the ongoing reduction of environmental risks. Our health, safety and environment management system is based on the requirements in Australian Standard AS/NZS ISO 14001:2016 Environmental Management Systems and AS/NZS 4801:2001 Occupational Health & Safety Management Systems. The environmental management systems at AGL Macquarie and AGL Torrens (together representing 58% of our total installed generating capacity) are certified to AS/NZS ISO 14001:2016, with AGL Loy Yang (an additional 22% of our installed generating capacity) also maintaining an environmental management system that is externally audited in line with the Environment Protection Authority Victoria’s ‘Accredited Licensee System - Guidelines for Environmental Management System Certification’.

This section focuses on:

- **Climate change (greenhouse and energy)**: The greenhouse and energy section shows how we measure and manage our greenhouse footprint, and how we are leading the transition to a carbon constrained future.
- **Renewable energy**: We are committed to the development of renewable energy in Australia, and through the Powering Australian Renewables Fund, we’ve commenced the construction of the Silverton Wind Farm in New South Wales.
- **Water management**: The management of water resources is a critical environmental issue facing Australia and one that is relevant to our business. We want to be recognised as a prudent and responsible user of water, and a user who does not adversely impact local water resources.
- **Air, waste and noise**: Emissions from our operations can potentially contribute to regional airshed environmental issues, so it is important that our operations run efficiently and within the parameters set by regulatory licences.
- **Biodiversity and cultural heritage**: We operate and develop assets on land that, in many cases, has value for reasons of biodiversity and cultural heritage, in addition to its commercial value.
- **Rehabilitation**: We recognise our responsibility to rehabilitate assets to an appropriate state upon the cessation of activity.
Climate change (greenhouse and energy)
Progressively decarbonise the energy supply to our customers.

<table>
<thead>
<tr>
<th>FY17 targets</th>
<th>FY17 performance</th>
<th>Status</th>
<th>FY18 target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance with AGL Greenhouse Gas Policy: 100%</td>
<td>Compliance with AGL Greenhouse Gas Policy: 100%</td>
<td></td>
<td>Annually offset the greenhouse gas emissions from electricity consumed at</td>
</tr>
<tr>
<td>FY17 performance</td>
<td>2,405 tCO₂e of Gold Standard abatement was purchased to offset the emissions</td>
<td></td>
<td>AGL’s corporate workplaces</td>
</tr>
<tr>
<td>FY18 target</td>
<td>associated with electricity purchased for AGL’s corporate workplaces</td>
<td></td>
<td>Customers signed up to AGL’s Future Forests carbon offset product: 10,000</td>
</tr>
<tr>
<td>FY18 target</td>
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As Australia’s largest scope 1 (direct¹) greenhouse gas emitting business, and given that emissions from Australia’s electricity generation sector comprise around one-third of Australia’s total emissions inventory, we recognise that we have a key role to play in gradually reducing greenhouse gas emissions while providing secure and affordable energy for Australian households and businesses.

We are committed to structuring our activities and operating our generation portfolio in a manner broadly consistent with the Commonwealth Government’s commitment to a global agreement to limit global warming to less than 2°C above pre-industrial levels. Achieving the ‘2 degree’ outcome will require transition to a decarbonised generation sector. This is likely to take several decades given the sheer scale of replacing the existing generation fleet with low-emissions substitute technology. Furthermore, it will require an evolution of public policy as the existing framework is insufficient to deliver significant cuts in emissions by mid-century.

Our approach to greenhouse gas emissions and climate change (greenhouse and energy) is documented within the AGL Greenhouse Gas Policy. The Policy acknowledges that Australia is moving to a carbon-constrained future, and provides a framework within which we will structure our greenhouse gas reduction activities. It also presents a pathway for the gradual decarbonisation of our generation portfolio by 2050.

The Policy states that we will:

- continue to provide the market with safe, reliable, affordable and sustainable energy options
- not build, finance or acquire new conventional coal fired power stations in Australia (i.e. without carbon capture and storage)³
- not extend the operating life of any of our existing coal fired power stations
- close, by 2050, all existing coal fired power stations in our portfolio
- improve the greenhouse gas efficiency of our operations, and those over which we have influence
- continue to invest in new renewable and near-zero emission technologies
- make available innovative and cost-effective solutions for our customers, such as distributed renewable generation, battery storage, and demand management solutions
- incorporate a forecast of future carbon pricing into all generation capital expenditure decisions, and
- continue to be an advocate for effective long-term government policy to reduce Australia’s emissions in a manner that is consistent with the long-term interests of consumers and investors.

“AGL’s Greenhouse Gas Policy is a demonstration of our commitment to move towards a carbon constrained future and our understanding that climate change is a significant issue to the business and the community

– Theo Comino, Manager Greenhouse & Sustainability
We are committed to engaging with our stakeholders in relation to the issues of climate change (greenhouse and energy) and reducing greenhouse gas emissions. It is important that investors, customers, employees, communities in which we operate, the broader community, and governments are all aware of the strategic steps we are taking to reduce emissions and transition to a carbon constrained future. In September 2015, we signed up to three specific commitments under the We Mean Business Coalition, a joint initiative of the Carbon Disclosure Project, the UN Global Compact and other global organisations. These public commitments comprise using an internal carbon price, reporting comprehensive climate change (greenhouse and energy) information in mainstream reports, and ensuring responsible corporate engagement regarding climate change (greenhouse and energy) policy.

During FY16, we undertook modelling to understand the risks and opportunities associated with decarbonisation of our generation fleet. Utilising PLEXOS modelling software, three scenarios of the National Electricity Market were analysed:

- no carbon constraint
- a carbon constraint that provides a linear pathway from emissions in 2016 to a 26-28% reduction in 2030, and
- a carbon constraint that represents a carbon budget consistent with limiting climate change (greenhouse and energy) to 2 degrees above pre-industrial levels.

The modelling shows that our power stations are likely to maintain much of their value in the shift to a carbon constrained world due to their relative low-cost and high efficiency. While the modelling is subject to significant uncertainty given the decadal timeframes involved, it is instructive for demonstrating the robustness of our assets across a range of potential outcomes.

The full analysis is presented in Carbon Constrained Future - AGL’s approach to climate change (greenhouse and energy) mitigation: a scenario analysis which was published in the 2016 AGL Sustainability Report. Achieving significant cuts in emissions will require substantial new investment in renewable energy capacity and the gradual cessation of operations by existing thermal generators. You can find out more about the investments we are making in the renewable energy section, and how we are working with affected communities as we transition away from coal in the community engagement section and in our Rehabilitation Report.

During FY17 we also launched the AGL Future Forest program, which allows customers to offset the greenhouse gas emissions association with their electricity consumption through diverse Australian forestry. We are also continuing to actively invest in other smarter and lower-emissions products and services to provide to our customers. For more information, visit the distributed energy services section.

**Greenhouse gas emissions**

We use three approaches (or ‘footprints’) to measure and communicate our greenhouse gas emissions. These greenhouse footprints are available in our data centre, and provide a complete account of the annual greenhouse gas impacts from our business:

- The operational greenhouse gas footprint covers the emissions from activities and assets that we operate.
- The equity greenhouse gas footprint sets out our share (by percentage of investment level) of the emissions from fully or partly owned assets, regardless of who operates the asset. The Equity Footprint indicates to our shareholders the greenhouse gas impacts associated with their investment.
- The energy supply greenhouse gas footprint estimates the supply chain emissions associated with the energy which we sell to our customers, covering emissions resulting from the production, transportation, distribution and consumption of electricity and gas.

We emitted 44 MtCO₂e of greenhouse gas emissions from our operated facilities in FY17.
The greenhouse intensity of our operated generation portfolio in FY17 was slightly higher than in FY16 due to a reduction in output from our renewable generation facilities. Hydro generation was below recent results primarily due to the unseasonably high rainfalls in the winter and spring months of 2016. This resulted in significantly reduced irrigation releases from the major storages of Dartmouth and Eildon, and accordingly generation from these major hydro schemes. Wind generation was also below historical averages primarily due to two planned maintenance outages at Macarthur Wind Farm during the course of the year and an unseasonably low wind resource in the months of May and June 2017.

**Energy use and production**

Visit the data centre to view or download information about the amount of electricity generated by our operations, as well as details of the energy consumed in our operations.

2. Corporate workplaces comprising offices under AGL’s operational control (as defined by National Greenhouse and Energy Reporting Act 2007).
3. This relates to the number of customers who have signed up to Future Forests during FY18.
4. Greenhouse gas (GHG) emission types can be explained as follows: Scope 1 - all direct GHG emissions; Scope 2 - Indirect GHG emissions from consumption of purchased electricity, heat or steam; and Scope 3 - other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. transportation and distribution losses) not covered in Scope 2, outsourced activities, waste disposal, etc.
5. The term conventional is used to refer to coal fired power plants that have a higher lifecycle emissions intensity than a combined cycle gas turbine (CCGT).

**Related Information**

AGL Greenhouse Gas Policy
Supplementary report (FY16): Carbon Constrained Future

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This information is included in an interactive online report at [http://agl2017.reportonline.com.au/sustainabilityreport](http://agl2017.reportonline.com.au/sustainabilityreport). Visit this website to access the full FY17 Sustainability Report, sustainability data centre and other online features. This report is subject to the important information statement which is also available on this website.
Renewable energy

We are committed to playing a leading role in developing a pathway to a modern, decarbonised generation sector through investment in new renewable and near-zero emission technologies.

Australia’s Renewable Energy Target requires electricity retailers (such as AGL) to progressively increase the proportion of renewable energy being supplied to customers.

In 2016, we launched an innovative new investment vehicle called the Powering Australian Renewables Fund (PARF). The fund is aimed at facilitating the construction of approximately 1,000 MW of renewable generation.

The PARF was designed to address a range of challenges faced by developers, retailers and investors. Specifically, the structure and nature of the fund enables:

- the opportunity for investors with long-term investment mandates to invest directly into renewable energy at a funding level that provides appropriate economies of scale
- diversification of risk across the supply chain (retailers, debt and equity providers and project developers) through the use of shorter term offtake arrangements and provisions for renegotiation
- efficiencies of scale with regard to financing, risk and governance arrangements leading to a reduction in cost of project delivery, and
- the ability to better manage risk through geographical diversification of renewable energy investment.

Our contribution is around $200 million in equity to the PARF. Our equity partners’ contribution is around $800 million. In November 2016, we sold our 102 MW Nyngan and 53 MW Broken Hill solar plants into the Fund.

In January 2017 we announced financial close on the 200 MW Silverton Wind Farm project. AGL is managing the construction of this project on behalf of the PARF, and once complete, will also operate this asset until 2023 (with both AGL and the PARF having an option to extend the offtake for a further five years). The Silverton Wind Farm is expected to achieve full generation in FY18.

During FY17, we continued to progress the development of the proposed 453 MW Coopers Gap Wind Farm project, which, if built, would be the largest capacity wind farm in Australia.

By gradually increasing investment in large-scale renewable energy capacity and not extending the operating lives of existing fossil fuel based generation, we are effectively reducing the greenhouse gas emissions intensity of the Australian electricity system.

Our portfolio of renewable energy

As of 30 June 2017, we operated 1,890 MW of renewable generation capacity, representing 18% of our total operated generation portfolio. We are Australia’s largest non-government operator of renewable energy generation.
## Installed capacity of operated generation assets

![Installed capacity of operated generation assets](image)

**Legend** Click on series name to show or hide

- Coal (MW)
- Hydro (MW)
- Landfill gas, biomass & biogas (MW)
- Diesel (MW)
- Gas (MW)
- Wind (MW)
- Utility-scale solar (MW)

### Notes

- This breakdown includes only those generation facilities where AGL has operational control, as at 30 June.
- Installed capacity generally refers to the name plate capacity / capacity as registered with AEMO (as market operator of the National Electricity Market), except in circumstances where there is a network or technical constraint and where generators are not connected to the NEM.
- Changes in the reported installed capacity between FY16 and FY17 reflect updates to the definition of installed capacity to ensure consistency between sites, rather than actual changes to plant capacity. However, the increase in landfill gas generation capacity reflects the addition of 2.8 MW installed capacity from the new Kemps Creel Landfill generator.
- Values may not sum to total due to rounding (FY17 total: 10,246 MW).
- Historical data is available in the download file.

### View in data centre

We currently operate the largest wind farm and the largest solar plant in Australia. The 420 MW Macarthur Wind Farm in Victoria provided enough energy in FY17 to power more than 150,000 average Australian homes\(^1\), and the 102 MW Nyngan Solar Plant provided enough energy in FY17 to power more than 40,000 average Australian homes.

**The combined output across all the renewable energy assets that we operate produced enough electricity to power over 620,000 average Australian homes.**

Visit the [data centre](#) to view the output from our operated renewable assets, and the capacity factors for our wind farms.

We are also continuing to deliver a range of residential solar products and services to our customers. For more information, visit the [distributed energy services](#) section.

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1. Average Australian home consumption is based on the Australian Energy Council residential electricity use and customer numbers per state for FY2015 as reported in Electricity Gas Australia 2016.

### Related Information

- AGL Greenhouse Gas Policy
- Powering Australian Renewables Fund

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This information is included in an interactive online report at [http://agl2017.reportonline.com.au/sustainabilityreport](http://agl2017.reportonline.com.au/sustainabilityreport). Visit this website to access the full FY17 Sustainability Report, sustainability data centre and other online features. This report is subject to the important information statement which is also available on this website.
Environment

Water management

Manage water resources sustainably

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The sustainable management of water resources, both quality and quantity, is a critical environmental issue in Australia and of direct relevance to our business.

Governments and the community expect the energy industry to act responsibly so that water resources are efficiently used and recycled, and not detrimentally impacted by exploration and development activities, or energy production operations.

Water monitoring, production and management at coal seam gas (CSG) projects

In FY16 we announced that we were exiting from CSG exploration and that CSG production at the Camden Gas Project would cease in 2023.

Understanding and protecting water resources are critical elements of the sustainable management of our CSG operations. Our water studies and monitoring networks have been developed to help the community understand what influences, if any, our former natural gas exploration and current production activities might have on water resources.

Dedicated groundwater monitoring networks were established to monitor the water level and the water quality characteristics of shallow beneficial aquifers to identify changes during CSG exploration and production programs and to characterise the groundwater prior to development. Surface water monitoring is also in place where there are surface water bodies nearby.

Camden Gas Project

- **Produced water**: 'Produced water' refers to deep groundwater that is brought to the surface from coal seams as a result of CSG exploration and production activities. Due to the geology of the region, the Camden Gas Project extracts only very small volumes of produced water to produce natural gas. In addition, the coal seams in this area are separated from shallow aquifers by around 400 metres of rock, including impermeable layers, which, in combination with the small volume of produced water extracted, provides natural protection for shallow aquifers. The volume of water produced in FY17 decreased to 1.7 ML from 2.6 ML in FY16. Produced water is transported from site to a third party EPA-licensed treatment facility where most water is treated and discharged to sewer, and a small volume is treated and recycled.

In FY17, we completed a produced water management project at the Camden Gas Project's Rosalind Park Gas Plant to improve the handling and storage of produced water. Previously, produced water was temporarily stored in 15,000-litre and 65,000-litre underground concrete tanks before being processed through an onsite water treatment facility. The treated water was then stored in the lined plant flare pond prior to offsite treatment, recycling or disposal. This project involved the installation of four 70,000-litre above ground steel tanks and one 4,500-litre above ground steel tank. These tanks are double walled with leak detection and high-level alarm systems.

The existing 65,000L underground tank was taken out of service. The remaining 15,000-litre underground tank has had a new cement floor poured and sprayed with an epoxy liner to reduce the risk of leakage and is now used to store only surface water run-off from bunded areas.

Visit the data centre to view or download information about the produced water quality and disposal methods at the Camden Gas Project.
• **Groundwater monitoring:** As at 30 June FY17, the Camden Gas Project groundwater monitoring program included 13 dedicated monitoring locations, which reduced from 17 in FY16. Four landholder bores were decommissioned from the monitoring network in consultation with the landholder. In addition, surface water monitoring networks across the Camden Gas Project comprised of eight perched water monitoring bores and one surface water monitoring location.

The Camden Gas Project Groundwater Management Plan provides a framework for early assessment of changes in the groundwater systems beneath the Camden Gas Project area, particularly to shallow aquifers. Monitoring and early identification enables us to prevent and/or mitigate adverse impacts. This plan outlines the monitoring program and reporting requirements to regulators.

A hydrogeological summary of groundwater systems in the region of the Camden Gas Project, which focuses on the geology, hydrogeology and groundwater use across the area, is available on our [website](http://agl2017.reportonline.com.au/sustainabilityreport). The report also outlines the potential (but unlikely) risks to shallow aquifers from the extraction of produced water, and the management and mitigation measures that we have adopted. Monitoring of produced water volumes, water levels and water quality has shown that CSG activities have not impacted shallow aquifers. Regular water monitoring reports are produced for the Camden Gas Project, and are available on our [website](http://agl2017.reportonline.com.au/sustainabilityreport).

More detailed annual status reports are also published in September/October each year.

Monitoring results to date confirm our conceptual understanding of the groundwater systems within the area and indicate that CSG activities can sustainably coexist alongside other land uses with negligible impact on the shallow aquifers and surface water resources. Observed water level and water quality trends are mostly consistent with natural variations.

**Gloucester Gas Project**

Following our announcement in February 2016 that the Gloucester Gas Project would not proceed to final investment stage, we have commenced a process to relinquish Petroleum Exploration Licence (PEL) 285 to the New South Wales Government, and commenced a comprehensive decommissioning and rehabilitation program for well sites and other infrastructure in the Gloucester region.

• **Water monitoring:** As part of the operation of the Gloucester Gas Project, we conducted Waukivory pilot testing and irrigation activities in accordance with government-approved water management plans. Intensive monitoring programs provided important baseline data. Monitoring of water levels and water quality has shown that CSG exploration activities have not impacted local water resources. Monitoring results are available on our [website](http://agl2017.reportonline.com.au/sustainabilityreport). During FY17 we completed decommissioning of the Gloucester groundwater monitoring network.

• **Produced water:** During FY17 we received approval from the New South Wales Environment Protection Authority (EPA) to irrigate the remaining water stored in dams at our Tiedmans property, after monitoring results showed that the water quality was suitable for beneficial reuse for irrigation and livestock. This water is derived from a mix of produced water from historical exploration programs (i.e. before the Waukivory Pilot) which was blended with freshwater and treated in preparation for beneficial reuse, through irrigation, paddock runoff from the irrigation area, and direct rainfall. This approval will enable a local landholder to beneficially reuse the water for irrigation and livestock watering purposes. We will continue to monitor surface and groundwater quality of irrigation activities until we relinquish the water storage infrastructure to a local landholder.

**Water improvement projects**

During FY17, we completed works to upgrade and modify the water management systems associated with the Antiene Coal Unloader. The Antiene Coal Unloader receives the majority of the coal delivered to AGL Macquarie and transfers it to Bayswater and Liddell power stations. The works involved diversion and treatment of clean stormwater runoff and upgrades to sediment basins to increase capacity and improve their treatment capability.

AGL Loy Yang has a bulk entitlement to draw water from the Latrobe River for its cooling water needs. To reduce its draw on the Latrobe catchment, AGL Loy Yang utilises the groundwater pumped from the aquifers underlying the Loy Yang mine. The groundwater is pumped from the aquifers to manage pressure in the mine batters and floor to maintain the stability of the mine. This water is of good quality and is collected separately, wherever practicable, and pumped into the power station's cooling water system, reducing the use of Latrobe River water. In addition, the AGL Loy Yang Mine fire service system is a closed loop where the run-off water from within the mine is pumped to the Fire Services Reservoir before returning for use in the mine forming a closed system. This maximises the water usage within the fire system and minimises the requirement for make-up water.
Water recycling
Coal fired power generation consumes substantial quantities of water. Water for AGL Macquarie's Bayswater and Liddell power stations is sourced from the Hunter River (via Lake Liddell). To limit the amount of water that needs to be extracted, we recycle the process water that is used to transfer ash to the ash dams. The ash dams are designed to settle out solids to enable the return of decant water back to the station for reuse in the ash transfer process and for wash down. By doing this we recycle onsite approximately 2 GL of water that would otherwise be withdrawn from the Hunter River.

AGL Macquarie also operates water treatment plants including reverse osmosis and brine concentrators to enable the treatment and recycling of saline cooling water. By treating this cooling water, the volume of water withdrawn from the Hunter River is significantly reduced by around 10.5 GL per annum. The water treatment plant removes approximately 28,000 tonnes of salt per annum. The water treatment plants also provide security during times of drought by enabling the reuse of cooling water onsite benefiting both AGL Macquarie and other water users who withdraw water from the Hunter River.

Water consumption and water management
We operate hydroelectric power stations in Victoria and New South Wales, with three major schemes located on different rivers in the Kiewa, Dartmouth and Eildon catchments, and seven minor schemes. The schemes divert and harness river water (run-of-river) or draw on water from reservoirs for the purpose of electricity generation to meet intermediate and peak customer demand. The water is channelled through the water turbines, through a series of penstock controls (including gates and sluices), to generate electricity. The channelled water is then directed to a reservoir for reuse or returned to the river as flow.

The hydroelectric schemes supply, on a long-term average, approximately 1,280 MWh per annum, or about 2% of the electrical energy consumed in Victoria. Despite 2% representing only a small proportion of total customer demand, the schemes' capacity to respond to rapid changes in demand and support the electricity system in the event of other generator plant failures, is extremely valuable. Each scheme is located on different river catchments, enabling AGL to maintain operational flexibility in order to maintain its customer commitments at any given time.

For information on how we consult with our communities at hydro sites, visit the community engagement section.

Visit our data centre for:

- the amount of water consumed at our energy generation, upstream gas and corporate facilities, broken down by facility type and by water source, and
- the amount of water passed through our hydroelectric power stations as well as seawater and surface water used for cooling the AGL Torrens and Liddell power stations (respectively) that is returned to the source (referred to as 'managed water').

1. ERRFR involves the number of Environment Regulatory Reported Incidents in a 12 month rolling period, per million hours worked in that 12 month period. The ERRFR target applies to the performance areas of: legislative compliance; water management; air, waste and noise; and biodiversity and cultural heritage.

Related Information
Water monitoring data
Air, waste and noise

Minimise our environmental footprint

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Air emissions

We operate a portfolio of power generation plants, many of which involve the combustion of fuels, resulting in the emission of combustion products to the atmosphere. Our gas production and storage assets also produce emissions to air.

Emissions to air from our operations can potentially contribute to regional airshed environmental issues, so it is important that our operations run efficiently and within the parameters set by regulatory licences. Undertaking regular maintenance helps keep equipment running efficiently and we monitor emissions to verify compliance with regulatory requirements.

Air emissions are reported to the Federal Government’s National Pollutant Inventory (NPI) each year. The NPI is a publicly available database of emissions from Australian industrial facilities.

FY16 saw some increases in NPI emissions data at AGL Macquarie, which were the direct result of improved emissions reporting since we acquired Bayswater and Liddell power stations. Since FY16, we have identified and implemented operating and maintenance efficiencies that have resulted in a reduction in emissions, as demonstrated in the data centre, which will be reflected in our FY17 NPI reports.

Emissions are also reported to state government regulators as required. As part of the Environment Protection Licences issued to Bayswater Power Station, Liddell Power Station, Rosalind Park Gas Plant (Camden Gas Project) and the Newcastle Gas Storage Facility by the New South Wales Environment Protection Authority (EPA), we are also required to publish air monitoring data on our website.

Visit the data centre to view or download data relating to emissions of the following pollutant types:

- Carbon monoxide (CO)
- Particulates (PM_{10})
- Particulates (PM_{2.5})
- Sulphur dioxide (SO_{2})
- Oxides of nitrogen (NO_{x})
- Volatile organic compounds (VOC)

Greenhouse gas emission data (including information about fugitive methane emissions from coal seam gas projects) is also available in the data centre, and discussed in the climate change (greenhouse and energy) section of this report.

Fugitive emission studies at upstream gas facilities

Fugitive emissions relate to the irregular gas emissions that occur, but are not captured or controlled through an emission point, and include emissions from livestock and natural / environmental processes such as wetlands, as well as emissions from gas operations infrastructure under typical operational conditions. We conduct leak detection and repair programs on our gas operations equipment and infrastructure as part of operations and maintenance performance monitoring activities to ensure that we are consistently operating in accordance with good industry practice.
• **Camden Gas Project**: The Leak Detection and Repair (LDAR) program implemented at Camden is a requirement of our Environmental Protection Licence and represents good industry practice. The LDAR Program is a critical operational control, which enables the operational site to closely monitor the performance and condition of plant and equipment. By identifying plant and equipment components that require repairs and maintenance, we are able to proactively manage risks relating to potential gas leaks from plant and equipment components.

As part of our LDAR program conducted during FY17, 10 leaks were identified across 13,760 gas well components and 15 leaks were identified at the Rosalind Park Gas Plant across more than 6,000 components. All repairs were recorded, completed and reported in consultation with the EPA and in accordance with the requirements of the LDAR program. The report is available on our website.

In FY17, we published the Annual Leak Detection and Repair Summary Report covering the period 22 December 2015 to 11 December 2016 for the Camden Gas Project. The report, required under our Environment Protection Licence, follows comprehensive, independent testing with highly sensitive gas detectors. The testing program uses the US Environment Protection Agency's 'Method 21' for leak detection, where the detector probe is placed at or on the component being tested. This can find leaks that are otherwise undetectable if the probe is moved just a few centimetres away.

During FY17, we installed two air compressors at the Rosalind Park Gas Plant (Camden Gas Project) to supply compressed air instead of coal seam gas to operate control instrumentation. This project has removed the need to use methane to operate instrumentation and has contributed to reducing fugitive methane emissions from the gas plant.

• **Gloucester Gas Project**: In FY16 we announced the decision to close the Gloucester Gas Project. As a result, during FY17 our activities at the Gloucester Gas Project focused on the intensive decommissioning and rehabilitation program committed to as part of closure of the project. As part of decommissioning and rehabilitation of the project we carried out standard operational leak detection activities at Gloucester Gas Project and no major leaks were identified.

• **Silver Springs Oil and Gas Project**: We conduct annual leak detection surveys of our processing facilities and associated infrastructure across our conventional oil and gas operations at Silver Springs, located in southern Queensland. These surveys were conducted at both aboveground and underground flowlines connecting the conventional gas wells to the processing facilities. During the monitoring period the assets surveyed included 104 wells, processing facilities at the Wallumbilla LPG plant and each of the satellite plants located at Silver Springs. Leak detection surveys were also conducted for more than 200 km of pipelines and gathering lines. The leak detection programs implemented at our conventional oil and gas operations in south Queensland represent good industry practice for maintenance monitoring and is one of the critical operational controls, which enables operational sites to closely monitor the performance and condition of plant and equipment. These programs are particularly critical for monitoring condition of oil and gas infrastructure in remote areas, where the absence of such a program could potentially lead to gas leaks remaining undetected until a significant loss of pressure indicates that repairs are required. These programs also enable operational performance and efficiency to be maintained, and the operational site to proactively manage risks relating to potential gas leaks from plant and equipment components.

**Improvements to air emissions management and monitoring**

• **AGL Macquarie**: The Environment Protection Licence that applies to our Bayswater Power Station currently requires continuous monitoring of nitrogen oxides (NOx) and sulphur dioxide (SO2) for one of its units, known as Unit 1. During FY17, we completed the voluntary installation and commissioning of Continuous Emissions Monitoring Systems (CEMS) for NOx and SO2 on the remaining three generating units at Bayswater Power Station. The monitors are set to alarm at set levels of NOx and SO2 to allow operators to act and respond to changes in emissions. The new CEMS will operate 24 hours a day, every day of the year. The units will continue to be subject to annual stack emissions testing to verify and validate the accuracy of the CEMS equipment.

During FY17 we also implemented a real-time PM10 monitoring network at AGL Macquarie to act as an early warning system to detect potential dust generation from ash disposal sites at Liddell Ash Dam and Ravensworth. The monitors send out alarms to site personnel indicating potential dust generation at the ash disposal sites. This system is linked to a dust Trigger Action Response Plan where the received alarms trigger management responses to stop/mitigate any potential dust generation.

• **AGL Loy Yang**: During FY17, we continued work on the AGL Loy Yang precipitator upgrade project. This refurbishment project involves the progressive replacement of electrodes in the plant's electrostatic precipitator flows which are used to manage particulate (dust) emissions to further enhance our controls. Each refurbishment takes approximately 20 weeks to complete.
Waste
Our operations produce a variety of different waste streams, which are either reused, recycled or disposed to landfill.

At our industrial sites, we seek opportunities to reuse waste, and materials such as scrap metal and waste oil are recycled. Hazardous wastes are transported to licensed waste management facilities using regulated waste tracking systems.

Visit the data centre to view or download the amount of hazardous and non-hazardous waste disposed and recycled from AGL's facilities. Refer to the water management section for information about the disposal of produced water.

Noise
The generation of noise is an unavoidable characteristic of some of our business activities. Many of our projects involve the development of rural land that is already occupied and used for other purposes by third parties. The management of noise is vitally important in such settings, where background noise levels are low and amenity expectations are high.

Some community stakeholders continue to be concerned about infrasound and low frequency sound arising from the operation of wind farms. Sound at or below these levels is considered to be inaudible to the human ear. We are supporting new scientific research into wind turbines and infrasound health impacts. For example, we are cooperating with researchers from Flinders University in a study measuring the effects of noise from our Hallett Hill Wind Farm on sleep at neighbouring residences. We continue to work closely with the National Wind Farm Commissioner and landholders neighbouring our Macarthur, Hallett and Wattle Point wind farms.

Noise monitoring conducted in FY17 at AGL's Oaklands Hill Wind Farm has confirmed that the wind farm is operating within the permitted noise levels. The Macarthur Wind Farm was determined by the Moyne Shire Council to be operating in compliance with the New Zealand Standard Acoustics - The Assessment and Measurement of Sound from Wind Turbine Generators (NZS 6808:1998) and confirmed that AGL satisfactorily met its compliance condition.

Quarterly noise monitoring conducted for the Camden Gas Project during FY17 has confirmed that noise emissions recorded at sensitive receiver locations are compliant with environmental licence conditions.

1. ERRFR involves the number of Environment Regulatory Reported Incidents in a 12 month rolling period, per million hours worked in that 12 month period. The ERRFR target applies to the performance areas of: legislative compliance; water management; air, waste and noise; and biodiversity and cultural heritage.

Related information
Continuous air monitoring data
National Pollutant Inventory
Environment

Biodiversity and cultural heritage

Biodiversity and cultural heritage
Minimise our environmental footprint

<table>
<thead>
<tr>
<th>FY17 targets</th>
<th>FY17 performance</th>
<th>Status</th>
<th>FY18 target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Regulatory Reportable Frequency Rate (ERRFR): ≤1.5</td>
<td>Environmental Regulatory Reportable Frequency Rate (ERRFR): 1.0</td>
<td>🌳</td>
<td>Environmental Regulatory Reportable Incidents: ≤12</td>
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We operate and develop assets on land that, in many cases, has value for reasons of biodiversity and cultural heritage in addition to its commercial value.

Our health, safety and environmental management system outlines the way in which potential impacts on biodiversity and cultural heritage resulting from our activities should be identified, assessed and as far as is reasonably practicable, managed and minimised prior to activities being undertaken. Our large assets and projects maintain risk registers that detail site-specific risks and risk management measures related to biodiversity and cultural heritage.

Specific information about how we manage biodiversity and cultural heritage is available on a project-by-project basis on our website, documented in project environmental assessments, project environmental management plans and/or other specific strategies. Of particular note during FY17:

- **Newcastle Gas Storage Facility (NGSF) nest box monitoring:** In August 2012, 100 nest boxes were installed on land that we own adjacent to NGSF as a requirement of the project approval. Four different box types were installed to suit a variety of arboreal mammals including sugar/squirrel gliders, brushtail/ringtail possums, pygmy possums and microbats. Monitoring of the boxes is undertaken annually. August 2016 monitoring has shown that the boxes continue to provide hollow-dependent fauna with a den resource, with 54% of boxes exhibiting signs of use (compared to 62% in 2015 and 41% in 2014). The continued observation of threatened squirrel gliders is a positive sign for this species in the area. Further information can be found on our website.

- **NGSF offsets property:** In May 2016, the New South Wales Minister for the Environment signed Conservation Agreements with AGL over two parcels of our land, located north of Newcastle. The Conservation Agreements satisfy a project approval commitment made to secure a biodiversity offset relating to the development of the NGSF project. The properties, together representing an area of 117.6 hectares, contain a range of biodiversity and landscape conservation values including habitat suitable for koalas and a range of other fauna species listed as vulnerable under New South Wales and Commonwealth threatened species legislation. We manage these properties in accordance with requirements of the Conservation Agreements. In FY17, property management works have included weed control, track maintenance, property inspections, waste removal and fencing improvements.

- **Silver Springs oil and gas operations:** Some of our site operational employees are trained and qualified fauna spotter-catchers who support fauna management across our remote oil and gas asset locations in Queensland. A number of our people are also trained as weed and seed hygiene specialists, who perform weed and seed hygiene inspections for vehicles and machinery used at our sites, including drilling and workover rigs and earthmoving equipment. Ongoing surveillance and the implementation of weed hygiene and inspection programs are critical to protecting the productive condition and agricultural land use values of the land on which we operate. Weed hygiene is also critical for the protection of native vegetation and protected flora species.

“We’re committed to looking after the biodiversity and cultural heritage of the areas that our projects are located in, and minimising our environmental footprint” – Simon Garnett, Environment Business Partner, Qld.

This information is included in an interactive online report at [http://agl2017.reportonline.com.au/sustainabilityreport](http://agl2017.reportonline.com.au/sustainabilityreport). Visit this website to access the full FY17 Sustainability Report, sustainability data centre and other online features. This report is subject to the important information statement which is also available on this website.
• **Macarthur Wind Farm**: Breeding pairs of brolgas, which are a listed threatened species in Victoria, use the wetlands within the Macarthur Wind Farm during the breeding season each year. The 2016 breeding season brought breeding success, with a brogla chick successfully born and raised on the wind farm till fledging stage before leaving the wind farm site in late November when the family migrated back to a flocking site. This is an important result for the conservation of the local brogla community, as brolgas are listed as vulnerable under Victorian legislation. Brogla monitoring conducted throughout the Macarthur Wind Farm and surrounding area has determined that the wind farm provides breeding habitat for brolgas in the region.

• **AGL Macquarie Compensatory Habitat**: A Compensatory Habitat of approximately 15 hectares was established in 2006 adjacent to the Antiene Rail Coal Unloader. On 27 April 2016, a grassfire occurred as a result of rail grinding works being carried out on the Drayton Rail Loop by a third party. The fire extended into and spread throughout most of the Compensatory Habitat area. The area was assessed by suitably-qualified consultant who found that the majority of the 15 hectares had been damaged. Plans are in place to restore the area, including replacing affected trees.

• **AGL Macquarie fish and platypus monitoring**: We are required to conduct fish and platypus monitoring as part of the development consent for the Bayswater Power Station Water Pumping Station Upgrade to Increase Water Extraction Capacity project. During FY17, fish monitoring involved tagging 30 Australian Bass with electronic tags and installing associated receiving stations to track the bass movements up and down the weir pool adjacent to the AGL Macquarie river pumps in the Hunter River. The platypus monitoring involved visual observations and taking E-DNA samples from the river water to determine platypus activity in the vicinity of the pump station. The results of the fish monitoring has shown the bass are travelling up and down the weir. The E-DNA sampling has shown that platypus inhabit the section of the river adjacent to the river pumps. The results from the fish monitoring and platypus monitoring demonstrate that the operation of the river pumps has had no detrimental impacts on fish and platypus.

• **AGL Macquarie vegetation community mapping and bio-banking assessment**: In FY17 we commenced a project to map vegetation communities across our land holdings at AGL Macquarie. This project has involved the preparation of a Vegetation Management Plan which enables better management of native vegetation, including asset protection and native seed harvesting. The project has also assessed our land holdings at AGL Macquarie for bio-banking potential through the New South Wales Biodiversity Banking and Offsets Scheme, which aims to address the loss of biodiversity values caused by habitat degradation.

• **AGL Macquarie rehabilitation**: During FY17 a total of 10 hectares of the Ravensworth mine site was rehabilitated using native woodland species typical of the Central Hunter Grey Box-Ironbark Woodland Vegetation Community.

**AGL Biomass Policy**

In recognition of the effect that electricity generation can have on biodiversity, we have established a **Biomass Policy** which states that AGL will not source fuel for power generation from native forest or from crops located in areas cleared of native forest after 1990.

1. **ERRFR** involves the number of Environment Regulatory Reported Incidents in a 12 month rolling period, per million hours worked in that 12 month period. The ERRFR target applies to the performance areas of: legislative compliance; water management; air, waste and noise; and biodiversity and cultural heritage.

**Related Information**

AGL Biomass Policy
Our fleet of assets has undergone, and will continue to undergo, changes in composition. As discussed in the sustainable business strategy section, AGL is committed to helping deliver a sustainable energy future for Australia. An intrinsic part of this commitment, first articulated in our Greenhouse Gas Policy, is our plan to close all existing coal fired power stations by 2050. To provide certainty to our employees, the communities in which we operate and our broader stakeholders (policy makers and investors) we have provided dates for the closure of our major generation assets. By providing a clear pathway for the operation and retirement of our coal fired assets, beginning in 2022, we are providing our stakeholders with a transparent and clear basis upon which to engage.

In addition to our ongoing legislative and regulatory requirements, we recognise our responsibility to rehabilitate these assets and sites to an appropriate state upon the cessation of activity.

We have embarked upon a journey towards decarbonisation with a long term and strategic intent – understanding that this is a transition that must be inclusive of the views of our stakeholders.

Our approach to the rehabilitation of assets is guided by the following underlying principles:

- **Transparency**: We will provide stakeholders with information to enable better understanding of the issues related to rehabilitation of our sites.
- **Engagement**: We will undertake ongoing engagement with stakeholders to ensure a diverse range of views are considered in rehabilitation plans and processes.
- **Accountability**: We will publish relevant information at least annually to enable external assessment of rehabilitation activities.

In FY16, we undertook to conduct a detailed review of the technical characteristics and costs of rehabilitation at our major generation sites and report back. During FY17, we completed this review, which considered the rehabilitation costs of returning our Liddell, Bayswater and Torrens Island power stations to a state as near to pre-development condition as practicable. The review also assessed the costs of rehabilitating the AGL Loy Yang mine and power station to a state as identified in the final closure plan agreed with the Victorian Government. Our Rehabilitation Report provides a detailed account of our approach to rehabilitation, the outcomes associated with our major generation sites, and the future challenges in managing a just transition.

We acknowledge the expectations of surrounding communities that appropriate site rehabilitation should support agreed future land uses. We believe the longer the planning timeframes and the more comprehensive the engagement with surrounding communities, the better the opportunities for positive outcomes for all parties.

Following the review, AGL has recorded and recognised provisions of $307 million for the estimated costs of rehabilitation, based upon returning sites to as near to pre-development condition as practicable. From this basis, we can commence an informed consultation process with impacted communities and stakeholders that considers alternative uses, potential repurposing and/or repowering. Undertaking these discussions in an environment of transparency and cooperation, we can work with communities and other stakeholders to arrive at mutually beneficial outcomes.
FY17 rehabilitation works

Coal seam gas projects

- **Camden Gas Project**: In November 2016, we announced the schedule for Stage One of the rehabilitation of coal seam gas wells in the Camden Gas Project. At the conclusion of the Stage One rehabilitation program, 41 of the original 144 gas wells will have been rehabilitated. Rehabilitation of wells is undertaken with a high level of regulatory oversight by the New South Wales Government's Division of Resources and Energy and the New South Wales EPA as lead regulator, and conducted in accordance with standards set in the New South Wales Government's Code of Practice for Coal Seam Gas. We continue to engage with the local Macarthur community on the full scope of our activities (operations, closure planning, decommissioning and rehabilitation) as we work towards full closure of the project in 2023.

- **Gloucester Gas Project**: Following our announcement in February 2016 that the Gloucester Gas Project would not proceed to final investment stage, we commenced a process to relinquish Petroleum Exploration Licence (PEL) 285 to the New South Wales Government, and commenced a comprehensive decommissioning and rehabilitation program for well sites and other infrastructure in the Gloucester region. To-date all gas exploration wells have been decommissioned and the surface infrastructure removed from the well leases. The disturbed areas of the well leases have been reshaped and seeded for revegetation. The well leases are located in an agricultural setting and have therefore been returned to pasture for agricultural use. During FY17 we also completed decommissioning of the Gloucester groundwater monitoring network.

**Thermal electricity generating facilities**

As outlined in the electricity generation section, we operate a diverse portfolio of electricity generation assets. However, in line with our Greenhouse Gas Policy commitment not to extend the life of any of our coal fired power stations, we have commenced discussions with communities in the Latrobe Valley (where AGL Loy Yang is located), and in the Hunter area (where AGL Macquarie is located), about how transitional arrangements may be structured over the medium to long term. Liddell and Bayswater power stations in the Hunter Valley are scheduled for closure by 2022 and 2035 respectively, and Loy Yang A Power Station and Mine in the Latrobe Valley are planned to close by 2048. Further discussion is provided in our Rehabilitation Report.

- **AGL Loy Yang**: Under the Mineral Resources (Sustainable Development) Act 1990, AGL Loy Yang has in place a work plan that incorporates a rehabilitation plan. Over FY17, we refined our community engagement process at AGL Loy Yang in line with planning for ongoing operations and site rehabilitation. We submitted a work plan variation to the Victorian Government, which outlines our approach to rehabilitation of the site. In 2017, AGL Loy Yang completed a major project centred on progressive rehabilitation with the movement of the Travelling Stacker 4 (TS4) (a large piece of equipment used to distribute excess soil and earth into the mine) to the base of the mine.

- **AGL Macquarie**: AGL has undertaken a comprehensive study of rehabilitation options for Liddell and Bayswater power stations, along with associated infrastructure such as water supply and ash depositories. This study has assessed potential re-use of the sites and the infrastructure and forms the basis of forward planning for site rehabilitation. Mining activities on the Ravensworth No. 2 site were completed at the end of 1993. In accordance with commitments made in the Bayswater Power Station – Flash Disposal in Ravensworth No. 2 Mine Void and Mine Rehabilitation Environmental Impact Statement (EIS) dated August 1993, site management at the time (i.e. Pacific Power) proposed to complete site rehabilitation by filling the final void with fly ash from Bayswater Power Station. Approval to extend the ash delivery and return water systems to Ravensworth Mine Void 5 and the approval of the Ravensworth South Mine Final Void Rehabilitation Management Plan was granted in late 2012. Completion of filling Void 3 occurred in May 2014, with capping completed in August 2014. Ash deposition into Void 5 started in March 2014 and it is expected to continue until 2032.

During FY17 we conducted rehabilitation of a total of 10 hectares of the Ravensworth Mine Site using native woodland species typical of the Central Hunter Grey Box-Ironbark Woodland Vegetation Community.

In addition to the rehabilitation, care and maintenance activities were carried out on site. The main activities undertaken included but were not limited to the following:

- commencement of construction of a composting facility on Void 3 to generate compost for use in rehabilitation of the site
- continuation of ash disposal into Void 5
- use of Void 4 as an effective Water Management Storage System, and
- vegetation maintenance on Void 1 and Void 2.

**Related Information**

Supplementary Report (FY17): AGL’s approach to rehabilitation of power generation infrastructure