

Energy Strategy



CITY OF
TEA TREE GULLY
Naturally Better

Mayor's Message

Our community has many reasons to be concerned about energy issues. Residents face ever-rising costs for electricity, natural gas and petroleum fuels. Energy affordability is not just a cost-of-living pressure; it affects the competitiveness and viability of the local businesses, institutions, clubs and associations that collectively make the City of Tea Tree Gully a great place to live and work.

Rising energy costs also impact Council and the numerous services that we provide. Energy is a significant part of Council's annual operating expenditure. Public lighting, sports fields and recreation centres—to name a few—are all large energy consumers.

While tackling rising energy costs, citizens are also becoming increasingly concerned about the impact that their energy use has on greenhouse gas emissions and climate change. We are in the midst of an energy transformation as we move from non-renewable to renewable energy sources. This transformation presents challenges, but also opportunities. More efficient lighting and appliances, better buildings, electric vehicles, abundant daytime solar energy and battery storage all have the potential to reduce the energy cost burden on the City of Tea Tree Gully community.

This energy strategy paves the way for the City of Tea Tree Gully to realise the benefits of the energy transformation.



A handwritten signature in black ink, appearing to read 'Marijka Ryan'.

Mayor Marijka Ryan

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In Brief...

Council services and facilities consume significant amounts of energy each year.



Electricity
6,900 MWh



Natural Gas
7,000 GJ



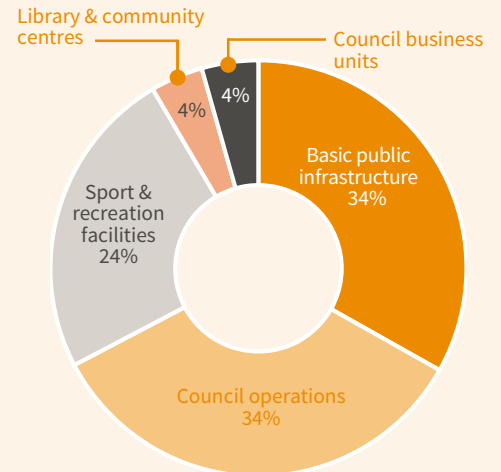
Petrol & Diesel
310,000 L



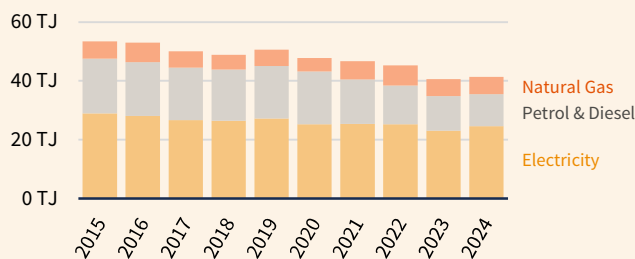
Total Cost
\$ 2.7m



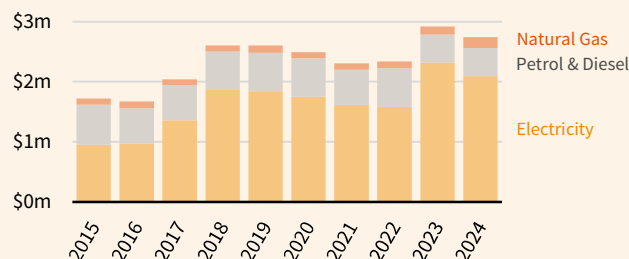
Council operations, basic public infrastructure (such as street lights and irrigation), and sport and recreation facilities represent the largest energy uses.



Historically, councils' annual energy use has been **declining**...



but energy costs have been **increasing**, and much faster than inflation.



Energy prices are volatile. They are affected by global supply and demand, geo-political events and natural disasters.

Council can't control these factors.

But Council can take sensible steps to manage its energy demand and use energy efficiently.



We need to prepare for a future where...

energy demands look different to today.

The energy efficiency of buildings, appliances and vehicles continues to improve, but a warming, drying climate could increase the need for air conditioning and pumping water for greening, cooling and irrigation of public open space.

the electricity grid has become more decentralised.

With rooftop solar photovoltaic systems and batteries, there are opportunities for Council to be more self-sufficient in its energy needs and even generate revenue by selling surplus energy to others.

there is an ongoing focus on emissions reduction and corporate responsibility.

Renewable energy is cheaper and results in lower greenhouse gas emissions and better air quality.

Mandated financial disclosure of climate-related risks and opportunities will become more commonplace.



We will focus on...

So that...

1 Reducing energy use



- 1.1 Underpinning energy management with accurate and timely measurement and monitoring of energy consumption.
- 1.2 Embracing technology and automation to reduce the energy consumption of Council buildings, facilities, machines, plant and fleet.
- 1.3 Understanding where the key opportunities are for energy conservation and energy efficiency.
- 1.4 Facilitating and empowering users of Council buildings and facilities (lessees and licensees) to reduce their energy use.
- 1.5 Helping residents, businesses and community groups contribute to their own energy conservation and energy efficiency measures.

Lower energy use reduces the cost to ratepayers and the community.

2 Efficiency by design



- 2.1 Aligning the planning and design of new or upgraded community buildings and facilities with relevant plans and strategies.
- 2.2 Considering and appropriately weighing the long-term benefits of choosing more efficient construction materials and building fit-out (fixtures, fittings and services) at the time of construction.
- 2.3 Designing flexible buildings and facilities to accommodate future changes in use.
- 2.4 Embedding sustainable development principles in Council plans and policies.
- 2.5 Developing staff capacity and capability in sustainable development practices.

Public spaces and places are fit-for-purpose, flexible and affordable to operate and maintain over the long-term.

3 Sustainable energy sourcing



- 3.1 Pursuing opportunities for energy self-generation and storage at Council buildings and facilities.
- 3.2 Maintaining energy assets to ensure their efficacy and full realisation of their intended lifespan.
- 3.3 Adopting innovative mechanisms for trading and using energy.

Energy procurement provides value for money, long-term security and price certainty.

4 Reducing emissions



- 4.1 Sharing climate-related knowledge, resources and actions.
- 4.2 Keeping informed of regulatory developments in climate-related reporting so that Council can respond proactively.
- 4.3 Supporting the uptake of low-emissions transport options.
- 4.4 Helping residents, businesses and community groups to benefit from climate-related opportunities including funding and new technology.

We are ready to meet climate responsibilities and realise opportunities.

Introduction

The Second Industrial Revolution (circa 1870 to 1914) brought gas supply, electrical power and mass transport to cities across the globe. Since that time, we have undoubtedly benefited from the energy harnessed to power our homes, businesses and transportation needs. Energy demand has increased rapidly and continues to grow globally, as well as in Australia.

As the provider of a range of public infrastructure, community, and recreational facilities, Council is a relatively large energy user. Over the last decade, Council's energy demand has been slowly declining in response to more efficient infrastructure; however, total cost has increased by more than fifty percent over the same period. Energy costs have risen significantly faster than inflation, putting pressure on individuals, families, clubs, businesses and governments alike.

In addition to the rising financial cost of energy, the exploitation of many energy sources has a detrimental impact on the environment. This is especially the case with 'fossil fuel' energy sources (such as coal, oil and gas) which, when combusted, release harmful greenhouse gases. But even renewable energy sources like solar, wind and hydro can have environmental impacts and require choices to be made about land use.

Decisions about how we purchase and use energy have significant implications for Council's long-term financial outlook. Reducing the amount of energy we need to buy is a commonsense way to manage financial expenditure while contributing to environmental sustainability.

It is said that we are entering a Fourth Industrial Revolution, characterised by the fusion of physical, biological, and digital technologies; smart and connected systems; artificial intelligence; and, importantly, an energy transformation from non-renewable to renewable sources. This Energy Strategy sets the foundation for:

- secure and affordable energy supplies to power our community facilities and services
- investments in smart infrastructure and facilities that reduce energy costs
- realising the benefits and opportunities presented by the energy transformation.



The Harper's Field Community Building and Sporting Club features energy-efficient design and lighting.

Strategic Context

Council recognises the natural environment as one of five themes in its Strategic Plan 2030.

The City of Tea Tree Gully Environmental Management Framework guides the Council in planning and delivering actions to achieve its environmental aspirations. Our community enjoys a high standard of living, but behind this lies an enduring demand for energy to power our homes, businesses, institutions and transport. The generation and consumption of energy have contributed to a range of environmental issues, including greenhouse gas emissions, air pollution, water pollution, habitat destruction and waste disposal.

The transformational shift to renewable energy, technological improvement and better planning and design of our homes, buildings and public places all have the potential to reduce our energy demand. This is not only better for our environment, but also reduces the cost of providing council services to the community. To this end, being an energy-efficient city (Figure 1) supports the strategic plan objectives shown in Table 1. This strategy and its related action plan will be reviewed regularly to ensure ongoing alignment with strategic plan objectives and other Council priorities.

Table 1: Related Strategic Plan objectives.

Strategic Objective	Wellbeing Pillars					
	Healthy	Safe	Prosperous	Connected	Vibrant	Liveable
3. We are leaders in how we manage and care for our environment and resources.						
3.2 We practice the responsible and sustainable use of resources.	●		●			●
3.3 We are resilient to extreme weather events, bushfires and environmental risks.	●	●				●
4. Our city is a desirable place to live, stay and play.						
4.1 Our public places are attractive, adaptable and fit for purpose.			●	●	●	●
5. We are trusted to make good decisions that are in the best interest of our community.						
5.1 Our service provision is sustainable and adaptable			●			●

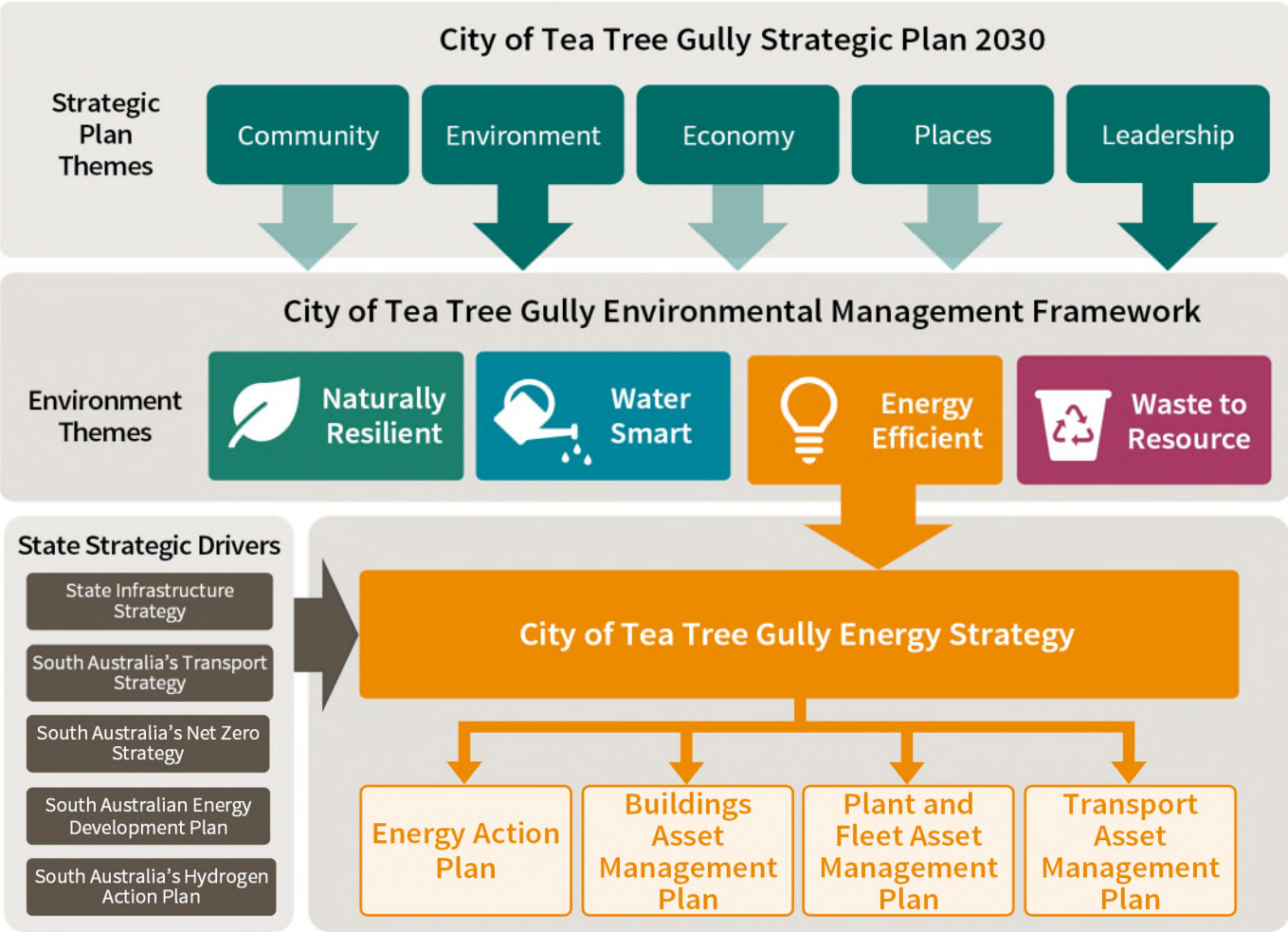
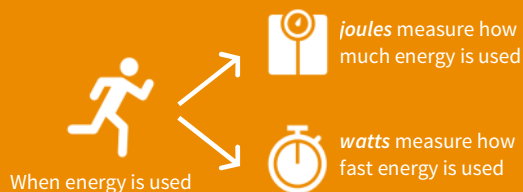


Figure 1: The way we purchase and use energy is part of being an energy efficient city.

Measuring energy

Different terms are used in this document to describe amounts of energy. The international standard (SI) unit for energy is the joule (J), and the unit for power is the watt (W). Energy and power are related; one watt of power is equivalent to one joule of energy used in one second.



It is common to refer to very large values of energy or power; therefore, SI prefixes are used.

Kilo (k)	=	1,000	=	10^3	=	one thousand
mega (M)	=	1,000,000	=	10^6	=	one million
giga (G)	=	1,000,000,000	=	10^9	=	one billion
tera (T)	=	1,000,000,000,000	=	10^{12}	=	one trillion
peta (P)	=	1,000,000,000,000,000	=	10^{15}	=	one quadrillion

The way that different energy supplies are measured and sold can be confusing. **Electricity** is metered in kilowatt-hours (kWh). A kilowatt-hour is one kilowatt of power supplied continuously for one hour and can be converted into megajoules by multiplying by 3.6.

$$1 \text{ kWh} = 3.6 \text{ MJ}$$

Natural gas is sold by volume (cubic metres or kilolitres). Natural gas is a mixture of different gases, and its energy content depends on the composition of the gases in the mixture. The natural gas retailer provides a conversion factor; however, an approximate figure of 38.61 MJ per cubic meter can be used for natural gas supplied to homes and businesses in South Australia.¹

$$1 \text{ m}^3 = 1 \text{ kL} \approx 38.61 \text{ MJ}$$

Liquid fuels used for transportation are sold by the litre. Different fuels have different energy content, and like natural gas, this can vary slightly depending on the makeup of the fuel and any additives.²

$$1 \text{ litre of diesel} \approx 38.6 \text{ MJ}$$

$$1 \text{ litre of petrol} \approx 34.2 \text{ MJ}$$

$$1 \text{ litre of LPG (liquid propane gas)} \approx 25.7 \text{ MJ}$$

¹ Government of South Australia (2005), *Reading your meter*, <https://www.sa.gov.au/topics/energy-and-environment/meters>.

² Department of Climate Change, Energy, the Environment and Water (2025), *Guide to the Australian energy statistics*, https://www.energy.gov.au/sites/default/files/2025-08/guide_to_the_australian_energy_statistics_2025.pdf.

Energy Systems and Sources

All energy comes from the natural environment. Energy sources extracted directly from the environment, such as solar, wind, coal and oil, are referred to as primary energy sources. These can be classified as being renewable or non-renewable sources (see Table 2 and box right ►).

Secondary energy sources are produced by refining or converting a primary energy source. Electricity, petrol and diesel are examples of secondary energy sources.

An ‘energy system’ is a chain of processes for generating, storing, transporting, converting and using energy. South Australians have come to rely on three main energy systems:

- the electricity grid
- the natural gas network
- the petroleum supply chain.

The electricity grid

Almost three-quarters of the electricity used in South Australia comes from renewable sources (see Figure 2). This figure is expected to reach 85% by mid-2026, with a target of 100% renewable electricity by 2030.³

The electricity grid in South Australia is interconnected with those in other states and territories as part of the National Electricity Market (NEM). Interconnection increases resilience and allows peak demand in one state to be met from generation in another state where demand may be lower.

The NEM (see box overleaf ►►) is complex and comprises different organisations acting as generators (wholesalers), transmitters, distributors and retailers serving both small and large customers. In South Australia, ElectraNet provides transmission services and SA Power Networks provides distribution services. Customers are free to choose their electricity retailer.

The existing widespread adoption of electricity, its ability to be generated renewably, and the relative ease with which it can be transported across a nationally interconnected grid mean that it will be a mainstay of energy systems into the future.

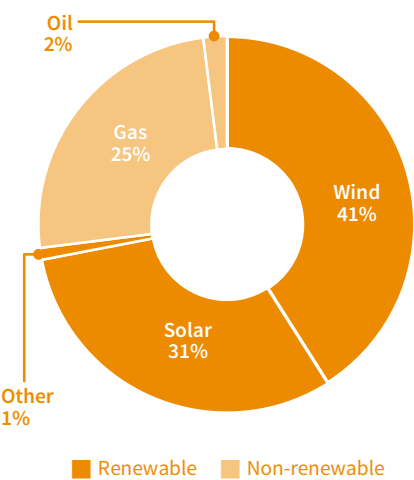


Figure 2: South Australian electricity generation by source (2023/24).

Table 2: Primary energy sources.

Renewable	Non renewable
• biomass • geothermal • hydro • solar • tidal • wave • wind	• coal • gas • nuclear • oil

Renewable and non-renewable energy

- **Renewable energy** comes from sources that are replenished by nature faster than they are consumed.
- **Non-renewable energy** comes from finite sources. While resources such as oil and gas are produced naturally, they take millions of years to form; in practice, these resources do not replenish in a human timescale.



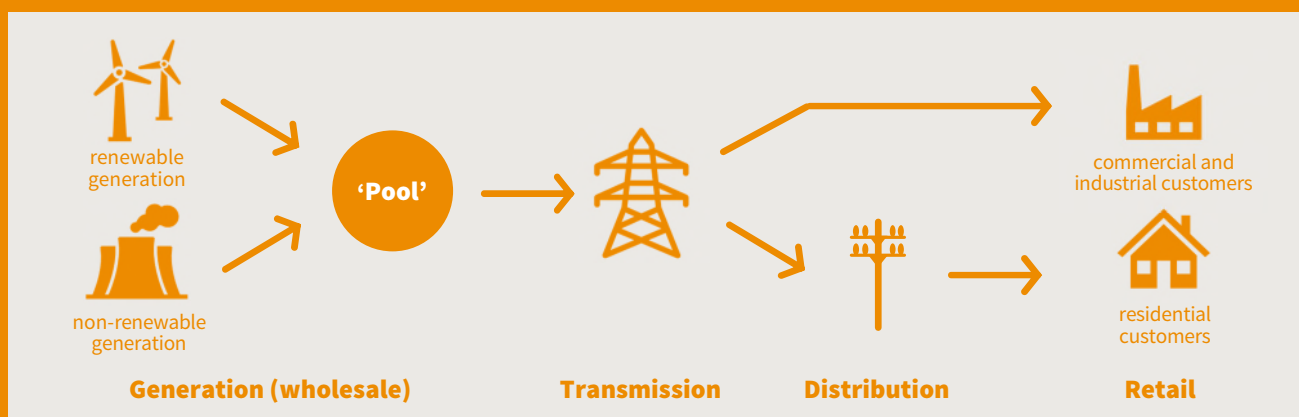
Wind generates almost half of the electricity used in South Australia. The Goyder Wind Farm supplies electricity to Council through a power purchase agreement.

³ Department of Climate Change, Energy, the Environment and Water (2024), *Australian Energy Statistics—Update Report 2025*, https://www.energy.gov.au/sites/default/files/2025-08/australian_energy_update_2025.pdf.

The National Electricity Market

The National Electricity Market (NEM) connects the electricity grids of South Australia, Queensland, New South Wales, the Australian Capital Territory, Victoria and Tasmania. It is one of the world's largest interconnected power systems, comprising approximately 40,000 km of transmission lines and cables that supply more than 23 million people.

In the NEM, electricity generated by wholesalers is transported through high-voltage transmission lines to large industrial users and local electricity distributors. Distributors in each region deliver electricity to homes and businesses through a network of 'poles and wires'. The wholesale of electricity is facilitated through a 'pool', or spot market, where the output from all generators is aggregated and scheduled at five-minute intervals to meet demand.



The natural gas network

Natural gas (or simply 'gas') is a naturally occurring mixture of hydrocarbons (primarily methane) that is extracted from underground reservoirs. It is the main alternative to electricity and is widely used for heating, hot water and cooking. Natural gas is also used to generate electricity; around 60% of gas use in South Australia is for this purpose.

South Australia's natural gas is sourced from gas fields in Victoria and Queensland, as well as the Cooper Basin, which crosses Queensland and South Australia.

Australian Gas Networks owns the natural gas distribution network in South Australia, which comprises over 7,500 kilometres of pipelines. Natural gas is transferred from gas fields through pipelines to city gate stations, where the pressure is reduced for supply to homes and businesses.



The Moomba to Adelaide pipeline is one of several supplying Adelaide from remote gas fields.

Petroleum supply chains

Petroleum products derived from crude oil include liquefied propane gas (LPG), petrol, kerosene (used as aviation fuel) and diesel. These are currently essential fuels for road, rail and air transport.

Australia has limited crude oil resources and minimal refining capacity. Around 90% of the petroleum products consumed in Australia are imported. China, Japan, Malaysia, Singapore and South Korea are the leading exporters of petroleum fuels to Australia.

There are no oil refineries in South Australia. All fuels used within South Australia arrive via bulk-handling terminals at Port Adelaide, Port Bonython and Port Lincoln.



All fuels sold in South Australia arrive through port facilities.

How We Use Energy

Billing data provides a picture of where Council uses energy and where that energy comes from. Figure 3 shows Council’s average annual energy use over the period 2022-2024. More detail on where energy is used in different aspects of Council’s operations is provided in Table 4.

Many of Council’s activities are energy-intensive:

- Basic public infrastructure (street lighting, non-drinking water supply, irrigation and traffic lights) accounts for around one-third of Council’s energy use.
- Council operations (offices, depots, plant and fleet) account for another one-third of energy use.
- Sport and recreation facilities account for around one-quarter of total energy use.

Figure 5 highlights the 20 highest energy-consuming sites, facilities or services across the city. Services like street lighting and irrigation (which are distributed across the whole city) are not shown in Figure 5, but consumption figures for these services are readily identified in Table 4.

Estimating the energy use for the City of Tea Tree Gully community is more difficult. One estimate suggests this is around nine petajoules (nine million gigajoules) per annum (see Figure 4).⁴ The Australian Government also compiles statistics on energy use.³ Figures for South Australia and Australia are shown in Table 3 for comparison purposes.

Table 3: Comparative energy use for the City of Tea Tree Gully, South Australian and Australian communities.

	City of Tea Tree Gully	South Australia	Australia
Annual energy use (PJ)	9	300	5,882
Per capita energy use (GJ)	90	162	221

There are many reasons why energy use varies from one area to another. Reasons for lower per capita energy use in the City of Tea Tree Gully include:

- a mild climate with fewer extremes of hot and cold weather
- the high penetration of rooftop solar in South Australia, resulting in residents and businesses meeting some of their own energy needs
- relatively fewer commercial and industrial buildings (which tend to use more energy than residential buildings)
- the relative availability and patronage of public transport, and proximity to services, which negates the need to travel long distances
- the coarse approach to estimating energy use in the city relative to the more sophisticated state and national estimates, which is a likely source of error.

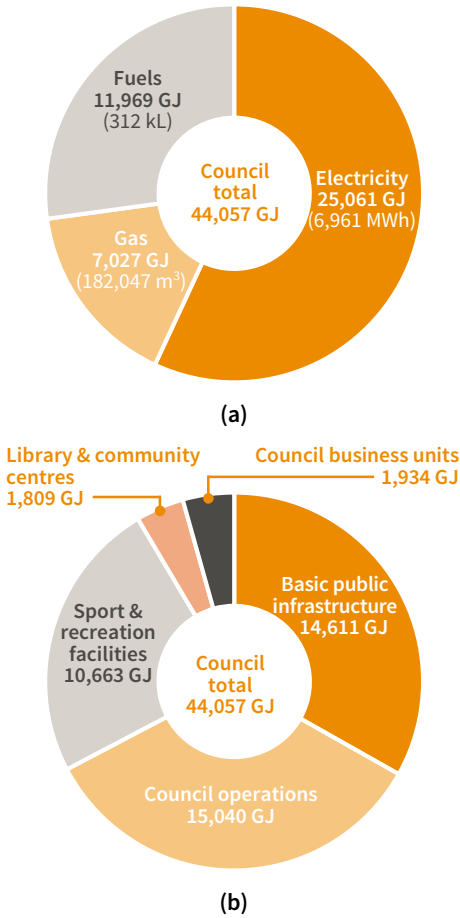


Figure 3: Annual energy use for the Tea Tree Gully Council (a) by source, and (b) by purpose.

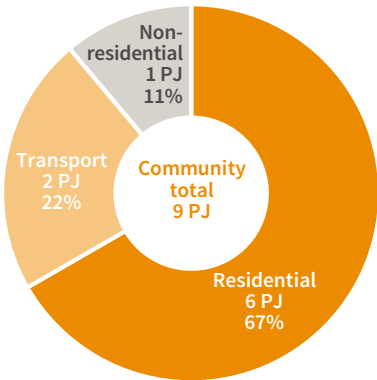


Figure 4: Estimated annual energy use for the City of Tea Tree Gully community.

⁴ Google (2025), *Environmental Insights Explorer*, <https://insights.sustainability.google/places/ChIJ-wqJpspMt2oRrRs6Lwie980>.

Table 4: Average annual energy use for the Tea Tree Gully Council by purpose (2022–2024).

Purpose	Electricity		Gas		Fuels		Total Use
	MWh	GJ	m ³	GJ	KL	GJ	GJ
Basic public infrastructure	4,059	14,611	—	—	—	—	14,611
Street and public lighting	3,112	11,200	—	—	—	—	11,200
Water supply (non-drinking)	629	2,264	—	—	—	—	2,264
Irrigation	304	1,095	—	—	—	—	1,095
Traffic lights	14	52	—	—	—	—	52
Council operations	853	3,070	—	—	312	11,969	15,040
Service Centre and sub-depots	475	1,708	—	—	—	—	1,708
Civic Centre	375	1,351	—	—	—	—	1,352
Fleet and plant	3	11	—	—	312	11,969	11,980
Sport and recreation	1,290	4,644	159,443	6,154	—	—	10,663
Waterworld	446	1,606	148,437	5,729	—	—	7,336
Recreation centres	507	1,826	2,503	97	—	—	1,923
Sports clubs and playing fields	337	1,212	8,503	328	—	—	1,404
Library and community centres	433	1,559	2,994	116	—	—	1,809
Library	288	1,038	—	—	—	—	1,037
Community centres	145	521	2,994	116	—	—	772
Council business units	327	1,177	19,610	757	—	—	1,934
The Tea Tree Suites and Convention Centre ¹	327	1,177	19,610	757	—	—	1,934
Total	6,961	25,061	182,047	7,027	312	11,969	44,057

Notes:

1. Energy use estimated. Council took ownership of the site in March 2025.



Public street lighting, while an essential service, is one of the largest energy uses in the city.

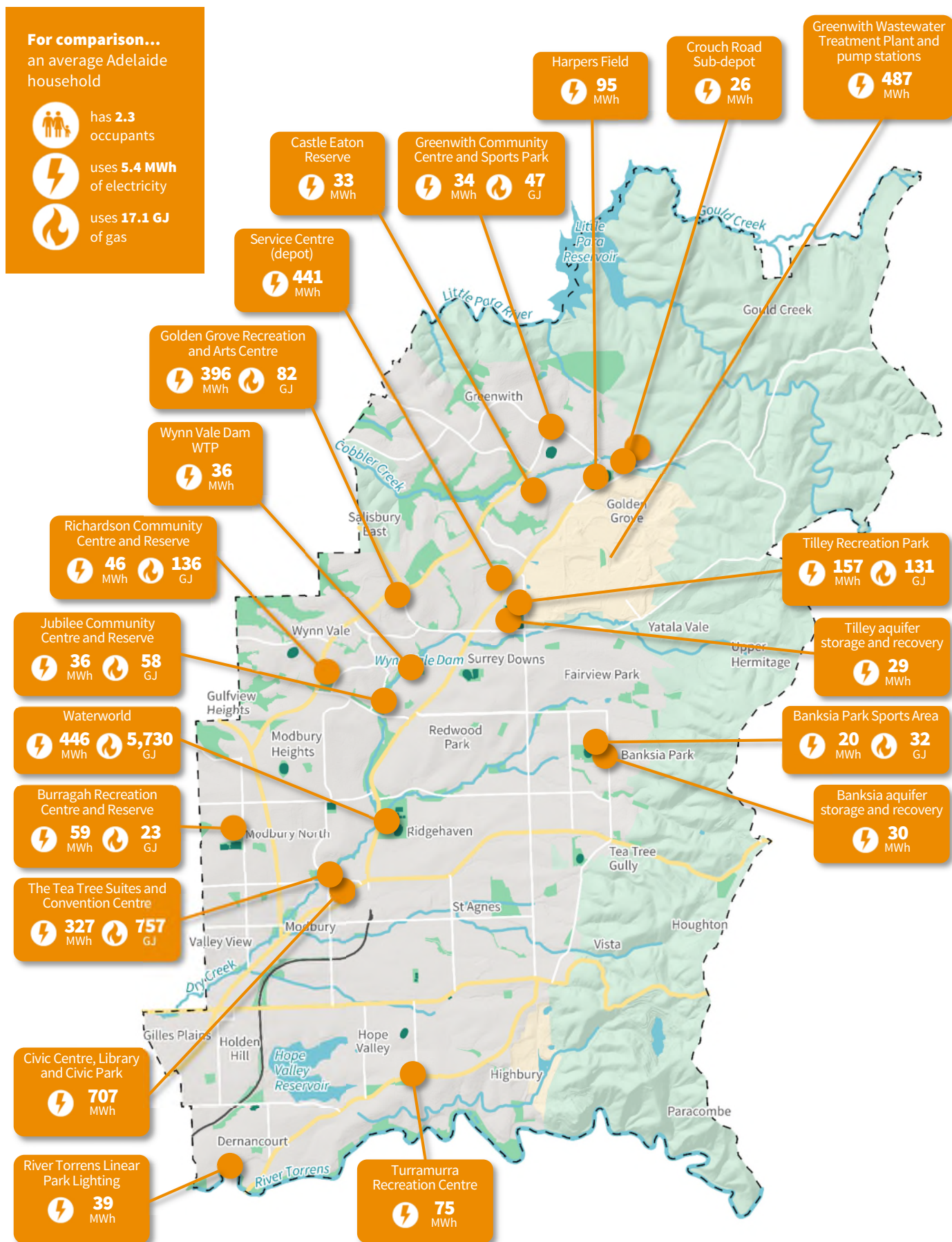


Figure 5: Top 20 energy consuming Council sites and facilities (electricity and gas use per annum).

Why the City of Tea Tree Gully Needs an Energy Strategy

Energy costs are increasing

Council spends an average of \$2.7 million on energy annually. Almost three-quarters of this expenditure is for electricity, with the remainder comprising transportation fuels and natural gas (Figure 6). Council's energy expenditure has trended upwards over the previous decade (Figure 7) despite energy consumption either declining or remaining relatively steady over the same period (Figure 8).

Council's electricity use is declining year-on-year (Figure 8a). This is a result of deliberate efforts to increase efficiency by upgrading public lighting, sports field lighting and lighting in Council buildings. While electricity use has declined, the 'at the meter' price for electricity (inclusive of supply charges and use tariffs) has risen from 12 cents per kilowatt-hour in 2015 to more than 30 cents per kilowatt-hour in 2024, increasing four times faster than the consumer price index (CPI) over the same period (Figure 8d).

Natural gas use has remained relatively stable over the past decade (Figure 8b). Restrictions on public activity during the COVID-19 pandemic would have had some impact on natural gas use throughout 2020 due to the temporary closure of Council-owned sport and recreation facilities. The 'at the meter' price paid by the Council has increased broadly in line with CPI (Figure 8e), although there has been a steeper rise in the last two years. Forecast scarcity in domestic gas supplies suggests upward pressure on natural gas prices in the immediate future.⁵

Transportation fuel use saw a steep decline from about 2021 (Figure 8c). This decline resulted from the rationalisation of plant and fleet and a significant

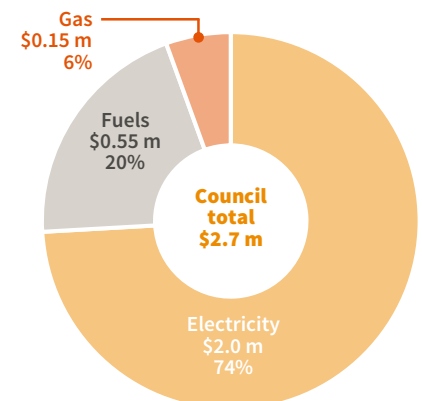


Figure 6: Council average annual energy expenditure (2022–2024).

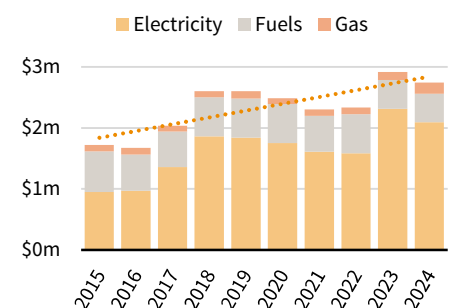


Figure 7: Council total annual energy expenditure (2015–2024).

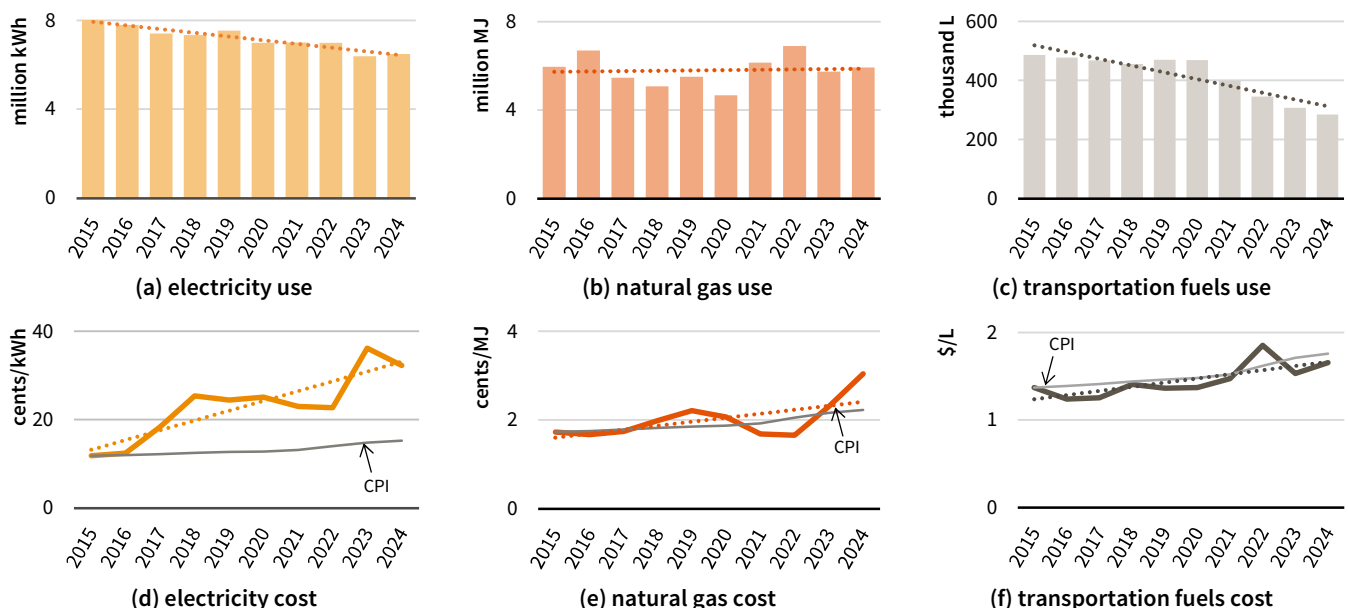


Figure 8: Trends in Council energy use and energy unit costs from 2015–2024, with reference to CPI over the same period.

⁵ AEMO (2025), 2025 gas statement of opportunities for Australia's east coast gas market, https://www.aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2025/2025-gas-statement-of-opportunities.pdf.

policy change regarding home-garaging of vehicles. These were both ‘once-off’ initiatives. There is no reason to presume that the downward trend will continue so markedly, and annual fuel use is expected to stabilise at around 300 kL per year. Like natural gas, the ‘at the pump’ price paid by Council for transportation fuels has increased broadly in line with CPI (Figure 8f).

There are many and varied reasons for the rapid escalation of energy costs, as well as the significant uncertainty about future prices. These include:

- a period of instability in national energy policy
- Australia’s reliance on oil imports and market exposure to geopolitical events
- global demand for gas from export markets driving domestic prices upwards
- Australia’s ageing electricity supply infrastructure and urgent need to modernise the grid to capitalise on cheaper renewable energy sources in the long term
- the increasing frequency and severity of natural disasters and their impact on the nation’s energy infrastructure.

These factors are beyond Council’s ability to influence and control. A significant portion of Council’s energy expenditure is non-discretionary, and like most Australians, Council is an energy ‘price-taker’. However, what Council can control is taking sensible measures to manage energy demand and reduce exposure to price volatility. Where there are opportunities to reduce energy costs without impacting services, Council must pursue these to shield ratepayers from the impacts of rising costs.

ESCOSA’s role in energy pricing

The Essential Services Commission of South Australia (ESCOSA) has a key role in ensuring price transparency and consumer protection in the South Australian energy market.

ESCOSA monitors and reports on prices offered by energy retailers through an annual report to the Minister for Energy and Mining, comparing energy retail price offerings available to small customers (residential and small business). ESCOSA does not have the authority to set retail energy prices.

By providing information on energy retail prices, ESCOSA helps South Australians understand their options and make informed decisions about their energy supply. ESCOSA also ensures that retailers comply with regulatory obligations, including productivity targets under the Retailer Energy Productivity Scheme designed to improve energy productivity for businesses and households



Rising energy costs put pressure on Council’s ability to deliver quality community facilities and services.

Energy demands are changing

The COVID-19 pandemic was a significant economic disruptor that had a pronounced impact on energy demand. In the decade preceding the pandemic, Australia's energy demand grew at a rate of about 1% per year. Total energy demand has not yet returned to pre-pandemic levels, but the trend has resumed the previous growth trajectory of approximately 1% per year. This growth has primarily been driven by industry, as household demand has remained relatively stable over this period (Figure 9a). Even the growth in industrial demand has not been universal. When the mining industry and transport industry are removed, the energy demand from all other sectors has been in decline (Figure 9b).

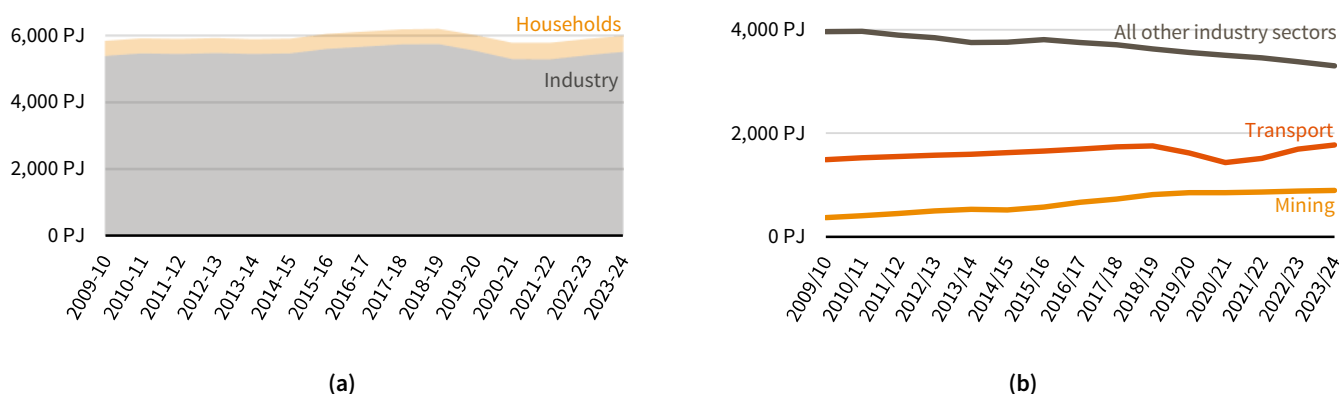


Figure 9: Trends in Australian energy use for (a) households and industry, and (b) selected industry sectors.

In South Australia, household demand has remained stable and industrial demand has been declining (Figure 10a). The decline in industrial demand is at least in part due to the closure of coal-fired power stations (and the reduction in thermal energy losses associated with these). When the electricity generation sector is removed, the trend in industrial demand from all other sectors in South Australia has been relatively flat (Figure 11b).

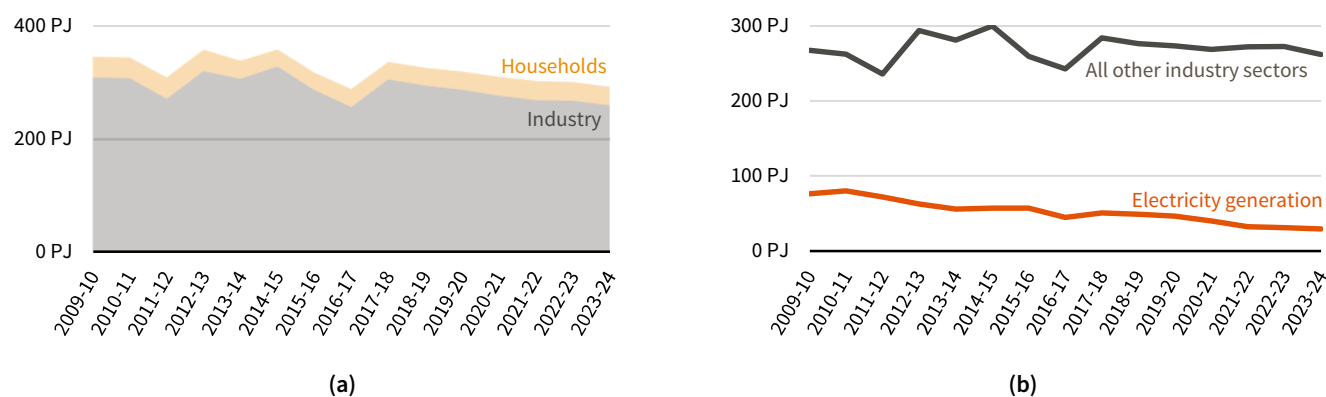


Figure 10: Trends in South Australian energy use for (a) households and industry, and (b) selected industry sectors.

The relatively stable, or even declining, trends in energy demand mask significant changes that have occurred in energy consumption habits over the past few decades. Figure 11 shows where energy is consumed in a typical residential building and a commercial building, but even twenty-five years ago, this would have looked quite different; only one in three homes had air conditioning in 2000.

A proliferation of electrical appliances in homes and businesses (for labour-saving, health and wellbeing, productivity, and entertainment), increased rates of motor vehicle ownership, and a trend towards larger motor vehicles should have resulted in a significant increase in energy demand. Yet, this has not been observed because technological advancements have delivered, in some instances, tremendous efficiency gains. LED (light-emitting diode) luminaires, for example, use approximately 75% less energy than an incandescent bulb for the same light output.

Policymakers and planners need to understand the trends in energy demand as well as the changing patterns of demand over time and across sectors. One factor that will contribute to changing demand patterns in the future is the expected increase in minimum and maximum daily temperatures. Climate projections for Adelaide indicate that the number of very hot days (with temperatures of 35°C or higher) is expected to increase by 30%.⁸ This has implications for the cooling of buildings, which is a significant energy demand.

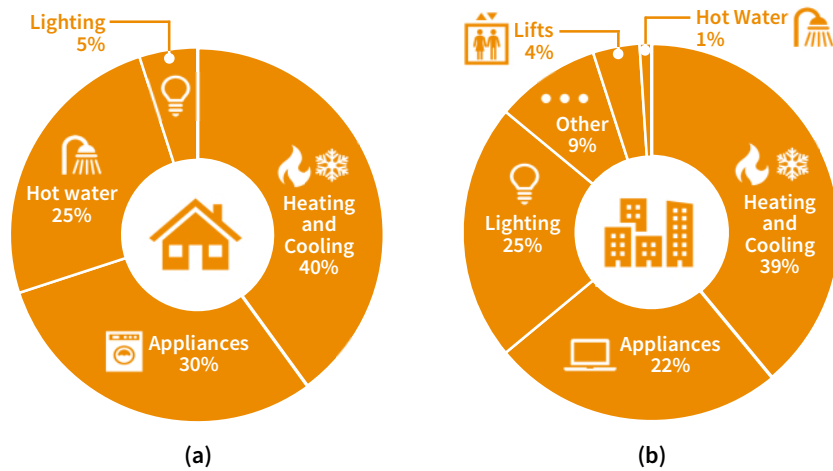


Figure 11: Typical energy consumption for (a) a domestic residence and (b) a commercial building.^{6,7}

For Council, community expectations for facilities that are comfortable (heated and cooled) and open for longer, green and well-maintained open spaces, and streets and public places that are safe and well-lit will all influence energy demand patterns into the future.

Understanding demand patterns and planning accordingly will give Council confidence that its energy needs can be met. Council must also be prepared to take advantage of opportunities to reduce demand through more efficient appliances and machines, improved building planning, design, and construction, and the use of more energy-efficient building materials.

Energy systems are transforming

Australia's energy systems are undergoing a transformation that involves a shift away from fossil fuels, decentralisation of energy production, and new market structures.

High gas costs and the desire to lower greenhouse gas emissions are driving the electrification of gas loads previously used for heating, hot water and cooking. This has implications for the electricity grid (in terms of increased demand) as well as the gas network. As more customers disconnect from the natural gas supply, the costs of operating the network must be shared among fewer customers, leading to higher tariffs.

In some jurisdictions, governments are taking action to accelerate electrification by offering subsidies to replace gas appliances with electric ones and implementing bans on new home gas connections.

A similar shift is occurring in the transport sector with the adoption of electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs). EVs and PHEVs are still only a small part of Australia's light vehicle fleet (about 1.5%), but sales of EVs and PHEVs now account for just under 10% of new car sales in Australia.⁹ The number of public EV chargers continues to grow, as well as those in



Air conditioning places a substantial load on the electricity grid in summer. Increasingly, reverse-cycle systems are also replacing gas heating in the winter.

⁶ Department of Climate Change, Energy, the Environment and Water (2024), *Quick wins to save energy*, <https://www.energy.gov.au/households/quick-wins>.

⁷ Department of Climate Change, Energy, the Environment and Water (2013), *HVAC energy breakdown*, <https://www.environment.gov.au/system/files/energy/files/hvac-factsheet-energy-breakdown.pdf>.

⁸ Department for Environment and Water (2022), *Guide to climate change projections for risk assessment and planning in South Australia 2022*, <https://data.environment.sa.gov.au/Content/Publications/Guide%20to%20climate%20projections%20for%20risk%20assessment%20and%20planning%20in%20South%20Australia%202022.pdf>.

⁹ Electric Vehicle Council (2024), *State of Electric Vehicles 2024*, <https://electricvehiclecouncil.com.au/wp-content/uploads/2024/12/1734312344781.pdf>.

workplaces and destinations such as shopping centres, accommodation facilities, and entertainment precincts. Kerbside chargers are an emerging development whereby small chargers are installed on the roadside, often on existing utility poles. This style of charging infrastructure is well-suited to high-density housing areas where residents often lack off-street parking.

By far the most significant aspect of the transformation is happening in the electricity grid. Australia's electricity grids are founded on a system of centralised generation and distributed use, where electricity generated at power stations is sent 'one-way' through the grid to customers. When the first power station was established in Adelaide in 1901 (see box right ►), the idea that one day people would be able to generate electricity in their own homes would have seemed like science fiction. The proliferation of small-scale solar photovoltaic (PV) and battery storage means that electricity generated by customers is routinely being sent back into the grid. We now have a grid that was designed and built to be 'one-way' trying to operate on a model of distributed generation and distributed use.

The benefits of solar generation are clear, so it is unsurprising that homeowners and businesses have capitalised on small-scale solar PV systems. It is estimated that one in every two homes in the City of Tea Tree Gully has a rooftop solar PV system. However, the broad adoption of rooftop solar PV creates challenges for the electricity grid (see box below ▼).

When electric lights came to Adelaide

The Grenfell Street Powerhouse on the corner of Grenfell Street and East Terrace (pictured below) was not the first power station in South Australia, but it was the first to supply electricity to Adelaide, and later, North Adelaide. Serving from 1901 to 1925, the station was replaced by a larger one constructed at Osborne. Today, the building is home to the Tandanya Cultural Centre.



The Grenfell Street Powerhouse during its period of ownership by the Adelaide Electric Supply Company, circa 1923. (Credit: State Library of South Australia, B 10366.)

Bells and ducks

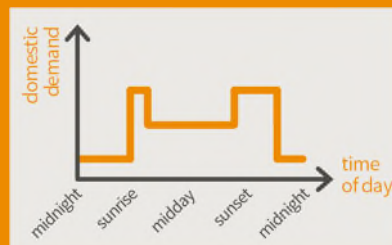
Solar panels only produce energy during daylight hours, with output typically peaking around midday when the sun is at its highest point in the sky. The characteristic shape of the solar output curve is known as the 'solar bell'.



When a solar system generates more electrical power than a site needs, the surplus power is directed back into the grid.

The demand on the grid varies throughout the day. For households, there are usually two peak periods—one when householders use lights and appliances before leaving for work, school and other activities, and another when they return home in the evening. Weekends are a little different, but the typical weekday household demand

profile looks something like the one below.



For commercial and industrial premises, the peak demand period coincides with business hours and looks like the one below.

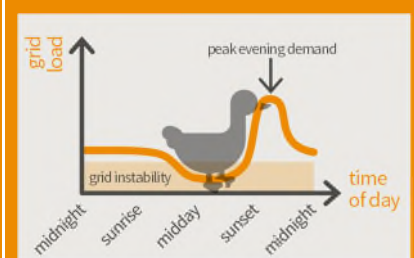


Commercial and industrial demands are well-matched to the daytime surplus of solar power. However, when solar meets all or most of the demand, the load on large coal, gas, wind, and hydro generators often reduces to zero.

Large generators are complex machines designed to operate at optimal load. They cannot simply be turned on and off, and they may take minutes or hours to start up and shut down. Grid instability occurs when these generators are expected to operate at very low outputs due to the availability of solar power.

As sunset approaches, solar output rapidly diminishes. This coincides with the onset of peak evening household demand. Consequently, large generators must be ready to meet the evening's demands.

The combination of these supply and demand effects gives rise to the grid load 'duck curve', so called because of its resemblance to its namesake.



Governments, regulators and industry are addressing these challenges by incentivising day-time energy use through lower tariffs, and through investment in infrastructure like:

- large-scale energy storage (big batteries and pumped hydro)
- machines that help regulate the grid, like synchronous condensers
- additional interconnectors between states and territories.

Council needs to be ready to capitalise on the opportunities that these initiatives present. There are considerable gains on offer for electricity consumers who can shift their demand to take advantage of lower time-of-day tariffs, utilise their self-generation effectively, and store energy when it is available cheaply (in batteries and the like) to use or export later when it is expensive.

Climate-related risks and opportunities

The scientific community widely accepts that emissions of carbon dioxide and other gases ('greenhouse gases') from the combustion of fossil fuels are the primary cause of global warming and climate change. Electricity generation and transport are estimated to be responsible for around 35% and 20% respectively of Australia's greenhouse gas emissions.¹⁰

The community expects governments at all levels to have policies and plans in place to become more energy efficient and reduce their reliance on fossil fuels. There are generous Australian Government and state government grant programs available to assist local governments and communities in becoming more energy efficient and adapting to a changing energy market. Demonstrating a commitment to practical climate change action is a prerequisite for accessing many of these grant programs.

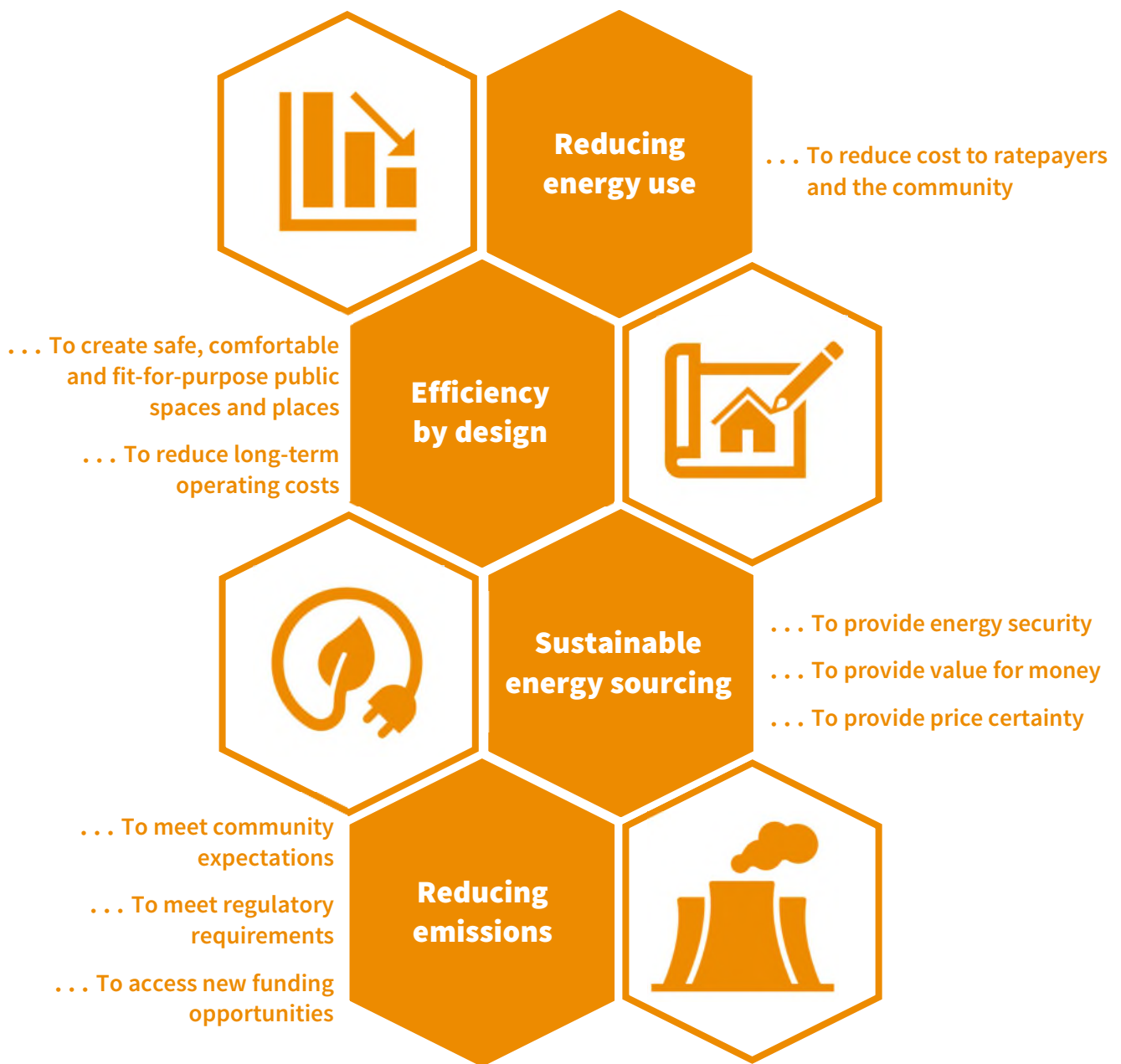
In September 2024, the Australian Parliament passed into law the *Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Act 2024 (C'th)*. This Act strengthened and extended existing obligations under the *National Greenhouse and Energy Reporting Act 2007 (C'th)* for Australian Government agencies, state governments and large publicly listed companies to report on their greenhouse gas emissions, energy production, energy consumption and climate-related risks and opportunities. While local governments are not currently required to undertake climate reporting (some do voluntarily), it is foreseeable that they will be brought into the scope of mandated entities within a few years. Developing an understanding now of the Council's energy use, risk and opportunities—for many of the reasons already outlined—positions the Council to meet future regulatory responsibilities with minimal administrative burden.



Approximately half of the households and businesses in the City of Tea Tree Gully have rooftop solar PV systems.

¹⁰ Department for Climate Change, Energy, the Environment and Water (2025), *Quarterly update of Australia's national greenhouse gas inventory: March 2025*, <https://www.dceew.gov.au/sites/default/files/documents/quarterly-update-australia-national-greenhouse-gas-inventory-march-2025.pdf>.

Our Energy Focus



Reducing Energy Use

Reducing energy use is the most straightforward way to lower energy costs. This can be achieved through *energy conservation* and *energy efficiency*.

It can sometimes be difficult to distinguish between energy conservation and energy efficiency measures. While they are closely related, energy conservation involves changing behaviours to consume less energy and energy efficiency involves technological advancements that allow the same task to be done with less energy (see Table 5).

Eliminating energy waste provides a straightforward return on investment—typically there is minimal cost or inconvenience associated with turning off machines and appliances that are not in use. Encouraging this behaviour change can be more difficult. This is where technology can help. Well-configured building management systems, for example, can help reduce energy. These systems detect building occupancy and adjust lighting and HVAC (heating, ventilation and air conditioning) accordingly.

Energy efficiency often requires upfront investment to upgrade machines, appliances, fixtures or materials. Council has made significant investments in energy efficiency, including the installation of LED lighting in streets, sporting facilities, and community buildings (see box right ►). The capital cost associated with these upgrades often means that these are best considered from the outset (see *Efficiency By Design*) or incorporated into major maintenance works.

Monitoring, measuring, auditing and benchmarking are key to identifying opportunities to reduce energy consumption. Facility audits can help identify where energy is being wasted or used inefficiently.

Table 5: Energy conservation and energy efficiency.

Energy conservation is...	Energy efficiency is...
- reducing overall energy consumption - eliminating energy waste - changing habits and behaviours.	- using less energy to do the same task - changing technology.

LED lighting

An LED (light-emitting diode) is a semiconductor device that emits light when an electric current passes through it.

LED lights use less energy, emit less heat, and have a much longer useful life than other forms of lighting. LED lighting typically offers energy savings of around 75% compared to incandescent and 35% compared to fluorescent lighting.

Council has invested in LED lighting upgrades for:

- almost 5,000 street lights
- sports court and sports field lighting
- the library and community centres.



Energy efficient LED public lighting at the Modbury Skate Park, Ridgehaven (Credit: Sports Lighting SA.)

How we will reduce energy use

Outcome	Key Directions
1 Lower energy use reduces the cost to ratepayers and the community.	1.1 Underpin energy management with accurate and timely measurement and monitoring of energy consumption. 1.2 Embrace technology and automation to reduce the energy consumption of Council buildings, facilities, machines, plant and fleet. 1.3 Understand where the key opportunities are for energy conservation and energy efficiency. 1.4 Facilitate and empowers users of Council buildings and facilities (lessees and licensees) to reduce their energy use. 1.5 Help residents, businesses and community groups all contribute to their own energy conservation and energy efficiency measures.

Efficiency By Design

Buildings are significant energy consumers and contributors to greenhouse gas emissions. Approximately one-third of the Council's electricity use is attributable to offices, depots, community centres, recreation centres and sports club buildings.

It is sometimes possible to retrofit building elements, like lighting and appliances, to realise efficiency gains. It is a much more complex undertaking, however, to retrofit services such as HVAC or to upgrade the building's fabric itself. Building energy efficiency measures are most effective when they are considered upfront and 'designed in' from the outset. New facilities and major building upgrades present one of the best opportunities for Council to manage future energy costs. Conversely, poor design and construction choices could lead to a lifetime of otherwise avoidable higher energy costs.

The key considerations in building energy efficiency are passive design, building services and building power supply (Figure 12).

Passive design involves making design choices that work in harmony with the local topography and climate, taking advantage of natural heating, ventilation, and lighting from the sun and wind. The objective of passive design is to create a comfortable building that minimises future energy costs by considering some or all of the items shown in Table 6.

In the context of designing community buildings, the passive design concept can be extended to minimise energy use in transport by locating (or co-locating) buildings so that they are easily accessible by 'active transport' (walking and cycling) and public transport.

Building services are the systems and equipment installed to ensure a building is functional, comfortable and safe. These include HVAC, electrical, plumbing, fire safety, and security systems. The capital cost of building services typically accounts for only a fraction of their lifecycle costs, and incremental capital investment in a more efficient system can be recouped many times over in reduced energy costs over the life of the system.

Heat pumps (see box far right ►►) are becoming popular for their extraordinary efficiency. While heat pumps are already popular for air conditioning (i.e., reverse cycle air conditioning), their use for water heating is becoming increasingly prevalent in both domestic and commercial buildings, as well as at large swimming pools and aquatic centres.

Finally, equipping buildings to meet all or part of their own energy needs (via rooftop solar PV and battery storage) can have a profound effect on energy costs.

Table 6: Some passive design considerations.

Design Aspect	Consideration
Orientation	• solar exposure • shading
Doors, windows and skylights	• natural light availability • ventilation where desirable
Materials—cladding, glazing, roofing and walling	• thermal mass • thermal conductivity • insulation
Construction standards and quality of work	• airtightness (from unwanted leaks and draughts)



(a)



(b)



(c)

Figure 12: 'Designing in' energy efficiency involves choices about building (a) design elements, (b) services and (c) power supply.

How we will achieve efficiency by design

Outcome	Key Directions
2 Public spaces and places are fit-for-purpose, flexible and affordable to operate and maintain over the long-term.	2.1 Align the planning and design of new and upgraded community buildings and facilities with relevant plans and strategies. 2.2 Consider and appropriately weigh the long-term benefits of choosing more efficient construction materials and building fit-out (fixtures, fittings and services) at the time of construction. 2.3 Design flexible buildings and facilities to accommodate future changes in use. 2.4 Embed sustainable development principles in Council plans and policies. 2.5 Develop staff capacity and capability in sustainable development principles practices.



Solar thermal water heaters at Golden Grove Recreation and Arts Centre. Solar water heaters are an efficient method of heating water and have been used in domestic and commercial buildings in Australia since the 1950s.

Sustainable Energy Sourcing

Sustainable energy sourcing means procuring energy from sources that are renewable and fiscally efficient. Institutions like Council are motivated to procure renewable energy because it:

- delivers cost savings—renewable energy sources (such as wind and solar) consistently provide the lowest average cost of energy¹¹
- delivers environmental benefit through reduced greenhouse gas emissions
- contributes to enhanced reputation, by aligning with community expectations
- provides for energy security through long-term arrangements with trusted suppliers.

The two key aspects of Council’s energy sourcing approach are self-sufficiency through on-site generation (particularly rooftop solar PV systems, see Table 7) and a long-term power purchase agreement (PPA, see box below ▼).

In 2025, Council joined with six other eastern Adelaide councils in a 9.5-year PPA. Under the PPA, most of Council’s electricity demand is met by ‘fixed price’ renewable energy from the Goyder Wind Farm in South Australia’s mid-north with the balance of demand met through the wholesale market. The combined market power of the seven councils results in competitive pricing for the ‘fixed price’ part of the agreement, which significantly reduces Council’s exposure to wholesale market price volatility.

Over the next few years, the PPA should contribute to stabilising the trend in Council’s annual electricity cost. The PPA also

Table 7: Installed solar PV capacity at Council-owned buildings and facilities.

Site	Capacity (kW)
CTTG Service Centre	200
Harpers Field Community Building and Sporting Club	36
Golden Fields	30
Turramurra Recreation Centre	30
Greenwith Community Centre and Sports Park	29
Tilley Recreation Park	28
Pegasus Pony Club	24
Tea Tree Gully Sports Club	23
Hope Valley Bowling Club	20
Tea Tree Gully Senior Citizens Club	19
Greenwith Wastewater Treatment Plant	9
Lyons Reserve	8
Modbury Community Learning Centre	7
Banksia Park Athletics Centre	5
Modbury Bowling Club	5
Total	473

What is a power purchase agreement?

A power purchase agreement (PPA) is a contract between an energy buyer and an energy retailer, typically a renewable energy project developer, that allows the buyer to purchase electricity at a fixed price over a specified period. A PPA provides:

- a stable price for the buyer, removing exposure to the volatility of electricity markets
- a guaranteed revenue stream for the seller that it can use to finance new renewable energy projects.

PPAs are long-term contracts, with terms typically ranging from 10 to 25 years.

What is a virtual power plant?

A Virtual Power Plant (VPP) is a network of distributed energy resources, such as solar panels, batteries and smart appliances, that are managed by a central platform acting as a single, large power plant. By aggregating these individual resources, VPPs can contribute to grid stability, balance supply and demand, and offer financial benefits to participants.

provides Council with a range of tools to monitor and manage energy use. These tools will help identify opportunities to reduce energy waste, increase energy efficiency and engage in the energy market in innovative ways such as:

- Demand shifting, to maximise use of lower tariffs when they are available.
- Offsetting supply and demand across multiple sites (virtual net metering). For instance, using ‘credit’ for surplus power generated at the Service Centre on a weekend when staff activity is low to offset high weekend power use at recreation centres or the library.
- Market arbitrage, using batteries to store energy in periods of low demand (when tariffs are low) to take advantage of high feed-in tariffs when demand is high.
- Being part of a virtual power plant (◀ see box left), which could provide Council with a financial return when it is producing surplus solar energy.

¹¹ Graham P, Hayward J and Foster J (2024), *GenCost 2024-25: Consultation draft*, https://www.csiro.au/-/media/Energy/GenCost/GenCost2024-25ConsultDraft_20241205.pdf.

How we will sustainably source energy

Outcome	Key Directions
3 Energy procurement provides value for money, long-term security price certainty.	3.1 Pursue opportunities for energy self-generation and storage at Council buildings and facilities. 3.2 Maintain energy assets to ensure their efficacy and full realisation of their intended lifespan. 3.3 Adopt innovative mechanisms for trading and using energy.



Small-scale battery energy storage systems (BESS) and ‘community batteries’ offer the capability to store electricity when it is surplus and cheap for use later when it is in high demand.

Reducing Emissions

Greenhouse gas emission from human activities intensifies the ‘greenhouse effect’ which is driving global climate change. Local governments play a leading role in helping their communities adapt to climate change. Their strong connection to the community and local knowledge means they are well-placed to effect action at a local scale.

Like many jurisdictions around the world, South Australia has committed to achieving ‘net zero’ carbon emissions.¹² Substantial reductions in greenhouse gas emissions are required to deliver on this commitment.

Energy and transport are responsible for almost half of the greenhouse gas emissions in Australia.¹³ Emissions reduction outcomes are therefore closely linked to energy and transport policy. Reducing emissions goes hand in hand with efforts to reduce energy consumption, build-in energy efficiency and source energy sustainably. As well as limiting the future impacts of climate change, emissions reduction contributes to reducing the public health and biodiversity impacts of poor air quality.

The City of Tea Tree Gully is a party to the sector agreement for the Resilient East Regional Climate Change Adaptation Plan, under the *Climate Change and Greenhouse Emissions Reduction Act 2007*. The sector agreement recognises the importance of leadership and cooperation in addressing climate change. Council collaborates with and supports the Resilient East partnership (see box below ▼) in developing and implementing its climate change adaptation plan.¹⁴

In addition to supporting Resilient East, Council is taking steps to reduce emissions by:

- purchasing a minimum of 80% renewable energy through its PPA
- investing in energy efficiency for new buildings, street lighting, sports courts and sports field lighting
- investing in rooftop solar PV and battery storage
- piloting electric vehicles for light fleet and partnering with industry to increase the number of electric vehicle chargers in the city (see box far right ►►).

A Resilient East

Resilient East is one of several regional climate adaptation partnerships across metropolitan Adelaide. Resilient East comprises the Cities of Adelaide; Burnside; Campbelltown; Norwood, Payneham and St Peters; Prospect; Tea Tree Gully and the Town of Walkerville. The regional climate adaptation partnerships are supported by the state government Department for Environment and Water and Green Adelaide.

By sharing information, resources, responsibilities and action, Resilient East strives to keep eastern Adelaide a vibrant, desirable and productive place to live, work and visit, where businesses and communities can respond positively to the challenges and opportunities presented by a changing climate.

From online tools helping homeowners reduce their energy bills to building capacity and knowledge in member councils, driving reductions in energy use and greenhouse gas emissions is a key focus for the Resilient East partnership.



¹² Department for Environment and Water (2024), *South Australia's Net Zero Strategy 2024–2030*, <https://cdn.environment.sa.gov.au/environment/docs/SA-Net-Zero-Strategy-WEB.pdf>.

¹³ Department for Climate Change, Energy, the Environment and Water (2024), *Quarterly update of Australia's national greenhouse gas inventory: December 2024*, <https://www.dcccew.gov.au/sites/default/files/documents/nggi-quarterly-update-december-2024.pdf>.

¹⁴ Resilient East (2016), *Regional climate change adaptation plan*, <https://static1.squarespace.com/static/5c4d88b5aa49a11b1eae4b9f/t/5c4eff521ae6cf21fd5466/1548681110049/Regional+Adaptation+Plan>.

How we will reduce emissions

Outcome	Key Directions
4 We are ready to meet climate responsibilities and realise opportunities.	3.1 Share climate-related knowledge, resources and actions. 3.2 Keep informed of regulatory developments in climate-related reporting so that Council can respond proactively. 3.3 Support the uptake of low-emissions transport options. 3.4 Help residents, businesses and community groups benefit from climate-related opportunities including funding and new technology.

Electric vehicles pilot and public charging stations

Many local governments are making or have made the switch to electric vehicles (EVs) for their light fleet. These vehicles help reduce the environmental impacts of council operations, while providing a total cost of ownership comparable to that of a petrol- or diesel-powered vehicle. The running costs of EVs can be further reduced by using rooftop solar PV to recharge. Council is evaluating two EV sedans and a light truck.



Electric vehicle charger.

Council has also partnered with Energy Australia to install four electric vehicle chargers at Golden Fields, Harpers Field, Tilley Recreation Reserve and Turramurra Recreation Centre. These chargers will provide a much-needed service for owners of EVs living in or visiting the city and regularly using our recreational facilities. Under the arrangement with Energy Australia, Council will not pay any costs associated with the installation, maintenance, repair, or removal of the EV chargers.

The EV trial and installation of EV chargers are two ways that Council is supporting emissions reduction.



The transition away from thermal coal for energy production has had a marked impact on greenhouse gas emissions in South Australia. The Playford B Power Station and Northern Power Station (pictured), both near Port Augusta, were the last coal-fired power stations operating in South Australia, ceasing operation in 2016. (Credit: Port Augusta Operations).

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CITY OF
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