ALPINE SHIRE COUNCIL

CLIMATE ACTION PLAN 2025-2029

ALPINE SHIRE COUNCIL

Acknowledgement of Country

Alpine Shire Council acknowledges the Traditional Custodians of the lands on which we work, live, and play. We recognise the continuing connection to lands, waters, and communities of all First Nations cultures across Australia and pay our respects to Elders past and present.

Councillors' Message

We are pleased to introduce the Alpine Shire Council *Climate Action Plan 2025–2029*, which continues our commitment to addressing climate change and reducing our environmental impact. This Plan reflects Council's ongoing focus on responsible environmental management and recognises the importance of taking practical steps to respond to the climate challenges facing our region.

The Alpine Shire is home to a wide variety of natural landscapes, which play a key role in shaping the character and wellbeing of our community. With this comes a responsibility to protect and enhance our environment to support the long-term health and resilience of our ecosystems, economy, and community for generations to come.

Council acknowledges that its operations contribute to global greenhouse gas (GHG) emissions and that climate change poses risks to our assets, services, and operations. This will influence how we plan for and manage infrastructure, deliver community services, and support the wellbeing of both staff and residents.

Our first *Climate Action Plan 2021–2024* set the goal of achieving net zero scope 1 and 2 emissions from Council operations. This new Plan builds on that work, outlining the next steps to further reduce emissions, maintain our net-zero target for scope 1 and 2 emissions, begin reporting on scope 3 emissions, and build resilience to climate impacts. It also reinforces Council's commitment to being transparent and accountable for our environmental performance.

As the effects of climate change become more apparent, it is important that Council remains prepared to respond, while continuing to support a healthy, resilient organisation and community.

This Climate Action Plan will guide our actions over the next five years, but it is part of an ongoing process. We will monitor progress, adjust as needed, and work with our partners to deliver meaningful and achievable outcomes. Council remains committed to playing its part in addressing climate change and supporting a sustainable future for the Alpine Shire.

Table of Contents

Executive Summary

This Climate Action Plan has been developed to provide clear direction for Alpine Shire Council to reduce its corporate greenhouse gas (GHG) emissions and build resilience to climate change over the next five years. This commitment is underpinned by Council's declaration of a climate emergency in November 2021, acknowledging the need for urgent and extensive action to ensure a safe climate for current and future communities and ecosystems.

Alpine Shire covers a broad diversity of landscapes, from alpine environments, extensive native forests, river catchments, commercial wood plantations, to agricultural land. The region's environment is uniquely diverse, and home to a number of threatened and endangered species. The landscapes and recreational opportunities offered in the Alpine Shire are fundamental to the identity and prosperity of our community. They also draw visitors to the region, with tourism being a primary contributor to the Shire's local economy. Being home to such biodiversity comes with the responsibility to protect and enhance our environment, to ensure the health and resilience of the community, ecosystems and local economy for generations to come.

In 2021 Council endorsed the *Alpine Shire Council Climate Action Plan 2021-2024* (the Plan), which provided a framework for the organisation to mitigate its GHG emissions and achieve net zero GHG emissions by July 2023. Through implementing the Plan, Council has reduced its corporate GHG emissions from the baseline of 2,384 tonnes of carbon dioxide equivalent (t CO_2-e) per year in the 2018/19 financial year, to 610 t CO_2-e in the 2023/24 financial year. This reduction, and our broader net zero target, have been achieved through significant GHG emissions reduction efforts, combined with the purchase of carbon offsets for our residual GHG emissions. This commitment remains ongoing, with residual GHG emissions calculated annually and offset ethically.

This document is a progression of Council's *Climate Action Plan 2021-2024*. It is Council's renewed commitment to environmental sustainability and represents our updated response to the climate emergency. Refreshing our Climate Action Plan has allowed us to evaluate the impact of actions taken in the last Plan; understand our current GHG emissions profile and actions required to progress our GHG emissions reduction efforts; ensure we are prioritising action that will achieve the most

impactful mitigation and adaptation outcomes; ensure we are meeting stakeholder expectations and leading by example; incorporate updated climate science to ensure our approach reflects changing trends and challenges; and ensure alignment with best practice.

A corporate Climate Action Plan delivers more than just financial savings - it delivers local environmental benefits, supports community climate resilience, enhances reputation and trust among community and stakeholders, builds staff engagement and knowledge around climate change, supports the energy transition and creation of local green energy jobs, future-proofs our operations by building long-term climate resilience, and contributes to state, national and global sustainability goals, aligning the organisation with best practice climate action.

This document:

- Explains current and projected climate change impacts in the Alpine Shire
- Outlines legislative frameworks and obligations around climate change
- Details Council's climate action to date
- Highlights key focus areas for our ongoing climate action
- Outlines the actions we will take as an organisation to strengthen our climate change mitigation and adaptation responses

Council is committed to ensuring that our organisation is informed and well-placed to address climate change, and that staff are empowered to address climate change in their work. The actions associated with this document will be regularly revisited to enable us to respond to developments in climate science, technologies, legislation and best practice. This will enable us to provide clear direction and priorities for the future, so that our people and environment can continue to thrive. Implementation of this Plan will be monitored and publicly reported on annually.

Context

Climate Change

International scientific consensus is that human activity is the primary driver of global warming and climate change[1]. The unchecked burning of fossil fuels and extensive land use changes since the 1800s have increased the presence of atmospheric greenhouse gases at levels exceeding the bounds of natural variability, and contributed to the widescale degradation of carbon sinks.

Increased greenhouse gases in the atmosphere have resulted in rising global temperatures, forcing changes in weather and climate systems. In 2023, the Earth's average surface temperature was 1.36°C warmer than the late 19th-century (1850-1900) preindustrial average[2]. In Australia, the national climate has warmed by an average of 1.51°C since national records began in 1910[3]. The impacts of human-induced climate change are global and unprecedented in scale, with regions around the world now facing increasingly routine extreme weather and compounding climate events.

The Intergovernmental Panel on Climate Change (IPCC) is an international body responsible for assessing science related to climate change. IPCC assessments provide a scientific basis for governments to develop climate-related policies, and are fundamental to the negotiation of international climate agreements. The IPCC's latest report, the Sixth Assessment Report (2023), found that:

"Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people...It is unequivocal that human influence has warmed the atmosphere, ocean and land"[4].

The severity of climate change impacts depends on the speed at which global GHG emissions can be reduced. The IPCC reports that whilst some future changes caused by climate change are unavoidable and irreversible, they "can be limited by deep, rapid, and sustained global greenhouse gas emissions reduction"[5].

[1] (IPCC, 2023)
[2] (NASA, 2023)
[3] (CSIRO & BOM, 2024)
[4] (IPCC, 2023, p.5)
[5] (IPCC, 2023, p.18)

Observed and Projected Climate Change Impacts

Climate change is having significant environmental, economic and social impacts around the world. In recent decades, southeast Australia has observed:

- Increased average temperatures across all months
- Increased frequency of extreme heat events
- Increased frequency of extreme fire weather and duration of fire seasons, which has led to larger and more frequent fires
- Decrease of around 9% in April to October rainfall since 1994
- Increased intensity of heavy short-term rainfall events
- Decreased snow depth, snow cover and number of snow days in alpine regions since the late 1950s
- Significant decline in annual average streamflow since 1970[6]

Climate change modelling has projected that in the coming decades, southeast Australia is likely to experience:

- Continued warming, with more extremely hot days and fewer extremely cool days
- Increased frequency of heat wave events comprising three or more consecutive days with a daily maximum temperature greater than 35°C
- Increased frequency and duration of meteorological, agricultural and ecological droughts
- Increased duration of fire seasons, and an increase in the number of dangerous fire weather days
- Decrease in annual average and winter rainfall
- Increased intensity of short-duration heavy rainfall events, increasing the likelihood of flooding events
- Reduced average snow depth, but with variations from year to year[7]

Climate Change Risks

Climate change poses a number of risks to Council's assets, operations and services. Council needs to strategically plan for damage and disruptions to these, whilst continuing to mitigate its GHG emissions. Some of these risks could include:

- Magnified asset vulnerability, impacting the management and maintenance of infrastructure such as stormwater drainage, roads and buildings
- Growing water insecurity impacting our ability to irrigate public spaces, parks and recreational facilities
- Increasing demands on Council's emergency management capacity and procedures
- Health and wellbeing of staff who work outdoors and respond to emergency events
- Increased demands on weed and pest management services, due to climate change increasing ecosystem vulnerability to pest invasion
- Financial and human resource capacity to respond to extreme events, including cleanup costs, demands on customer service, and the need to spend significant budget unexpectedly in response to climate events
- Increasing demands from damage to private assets requiring Council response
- Risk of litigation, reputational damage and public scrutiny from a lack of climate action
- Variable or declining Council revenue from adverse climate impacts on local industries and property values

[6](CSIRO & BOM, 2024; CSIRO & BOM, 2024)

[7](CSIRO & BOM, 2024; CSIRO & BOM, 2024; NECMA, 2016)

Policy Drivers

This Climate Action Plan supports international, national and state policies and commitments on climate change, including:

- **2016 Paris Agreement –** a legally binding, global agreement that commits signatories to reduce GHG emissions and adapt to the impacts of climate change. It introduced emission reduction targets, with signatories agreeing to limit global temperature rise to below 2°C above pre-industrial levels by 2050, and to pursue efforts to limit this to 1.5°C. As a signatory to the Paris Agreement, Australia has set a national target to reduce its GHG emissions to 43% below 2005 levels by 2030[8].
- **Victorian Local Government Act 2020 -** sets an expectation that local governments consider the long-term adverse impacts of climate change on communities and future generations through their planning, decision-making and actions. Councils are required to promote the economic, social and environmental sustainability of their jurisdiction, including mitigation and planning for climate change risks.
- **Victorian Climate Change Act 2017 -** legislates state-wide net zero GHG emissions by 2050, and includes obligations for local governments to take action to protect their communities from the threats of climate change.

Climate Change Reporting

The Australian Government has established two frameworks to standardise how GHG emissions are measured and reported:

- National Greenhouse and Energy Reporting scheme for reporting organisational GHG emissions, energy use and energy production
- National Carbon Offset Standard which outlines how to measure, reduce, offset and report GHG emissions

Whilst Council is not required to report under these two frameworks, they have been used to guide the organisation's approach to GHG emissions reduction. This ensures that Council aligns with best practice standards, and also ensures it is prepared to address any legislative changes that may mandate new reporting requirements for local government in the future.

Strategic Context

- **Alpine Shire Council documents -** Council plans, policies and documents related to this Climate Action Plan include:
    - Alpine Shire's Community Vision, Council Plan and Municipal Public Health and Wellbeing Plan
    - Alpine Shire Land Development Strategy 2024
    - Environmental Sustainability Guide to Procurement Policy
- **Partnerships** - Council is an active member of various networks, collaborating with other councils and organisations to progress regional and state-wide climate change initiatives. Key partnerships include the Goulburn Murray Climate Alliance (GMCA), the Victorian Energy Collaboration Power Purchase Agreement (VECO PPA), and numerous local community groups.

  The GMCA is one of eight regional climate alliances across Victoria. As a member of the GMCA we work with other regional councils to complete joint projects, advocate to state and federal governments on climate action, and collaborate with other alliances to progress state-wide projects.

  We are also a member of various informal working groups, working with councils across Australia to share knowledge and experience in different areas of sustainability relating to local government.

[8](Australian Government, 2022)

Our Work So Far

Since adopting our corporate *Climate Action Plan 2021-2024*, we have made significant progress in reducing our operational GHG emissions. As of the 2023/24 financial year Council generated 610 t CO_2-e, a reduction of nearly 75% compared to our 2018/19 baseline of 2,384 t CO_2-e (see Figure 1).

Council became net zero in July 2023, meaning that the net GHG emissions (scope 1 and 2) arising from our operations are zero. This has been achieved through a range of GHG emissions reduction initiatives that have enabled us to drastically reduce our reliance on fossil fuels, combined with investing in offsetting projects to account for our residual GHG emissions. Most GHG emissions reduction initiatives have also generated long-term operational savings for the organisation.

Each financial year from 2022/23, our annual residual scope 1 and 2 GHG emissions are calculated and ethically offset.

We track Council's corporate GHG emissions using the carbon accounting platform Trellis. Invoices from service and utility providers are used to extract quantities of resources used, such as fuel consumed by Council's vehicle fleet. Trellis then uses national 'greenhouse accounts factors' to calculate our GHG emissions. By tracking GHG emissions for different resource types and assets, we are able to identify the greatest GHG emissions reduction opportunities within the organisation.

Table 1 outlines our annual GHG emissions by source since the 2018/19 baseline year. The evident increase from the 2022/23 financial year to 2023/24 is due to the variability of fleet use and closed landfill GHG emission measurements, as described below

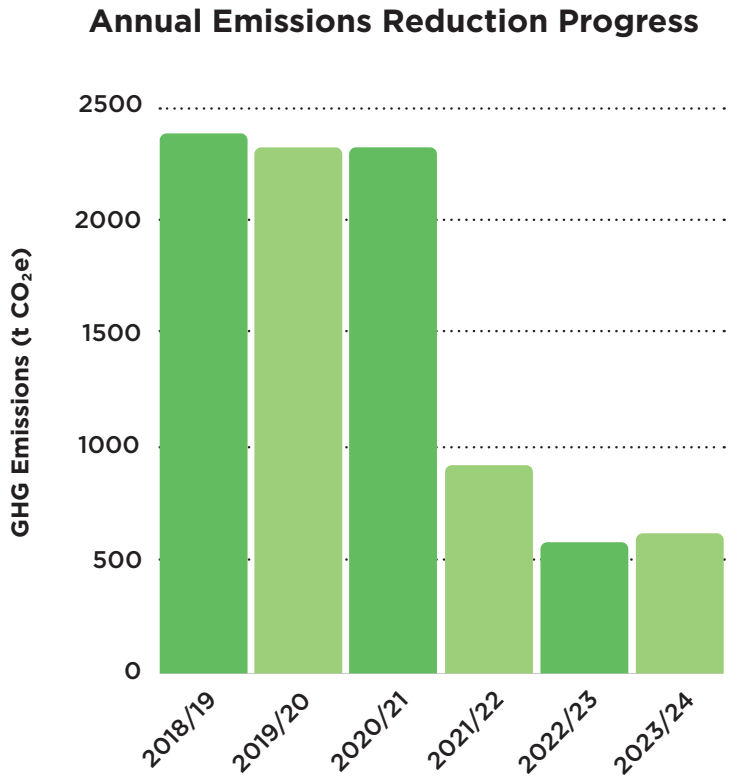

Figure 1. Annual corporate greenhouse gas emissions reduction progress since the 2018/19 baseline year

	Annual Emissions (t CO2-e)					
	18-19	19-20	20-21	21-22	22-23	23-24
Streetlights	620	592	566	0	0	0
Building and Facility Electricity	802	796	818	4	1	1
Fleet	431	405	406	384	326	340
Gas	13	10	6	5	6	6
Corporate Waste*	2	2	2	2	2	2
Closed Landfill**	516	516	516	516	234	261
TOTAL	**2384**	**2321**	**2314**	**911**	**569**	**610**

Table 1. Annual corporate scope 1 and 2 greenhouse gas emissions by source

*Actual data has not been recorded for the quantity of waste generated from corporate operations. The GHG emissions estimate is based on a calculation using standard Sustainability Victoria waste generation rates.

**GHG emissions from Council's closed landfill sites were determined through onsite measurements conducted in July 2021, October 2023 and October 2024 to determine methane emissions.

Council's corporate GHG emissions profile (Figure 2) is largely consistent with those of other local governments, with the majority of our GHG emissions arising from fuel used by our fleet and residual GHG emissions from our capped landfill sites. By understanding where our GHG emissions are coming from, we can make informed decisions on how to prioritise our efforts and resources.

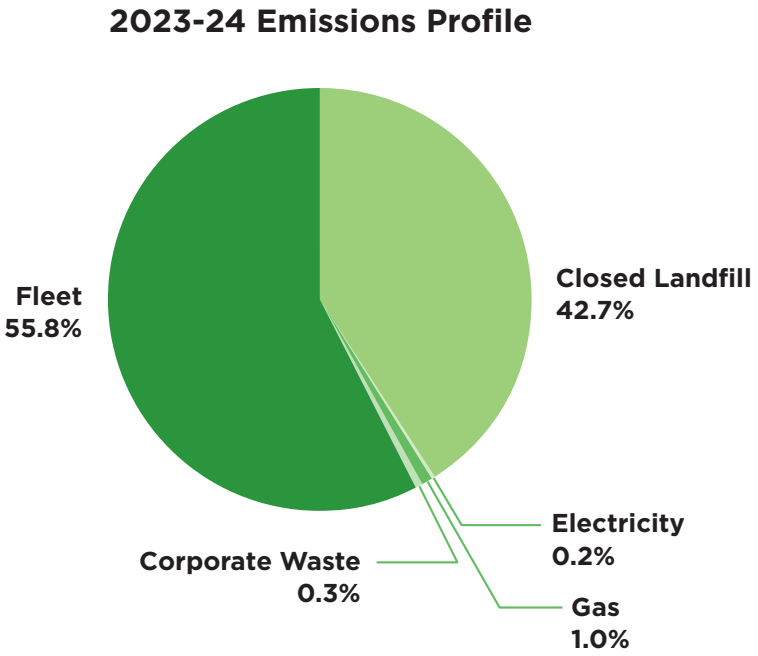

Figure 2. Council's 2023/24 scope 1 and 2 emissions profile

Electricity

Since July 2021, we have eliminated nearly all of our electricity-related GHG emissions through joining the VECO PPA with 59 other Victorian councils, which provides us with 100% renewable electricity. Joining the VECO PPA came with no upfront cost to Council, and has delivered the organisation savings of around $65,000 in annual electricity bills.

As of January 2025, we have installed 137kWp of solar photovoltaic (PV) systems across 12 Council owned and managed facilities, including nine batteries. Over the 2023/24 financial year these generated 15% of Council's total electricity needs, resulting in savings of nearly $38,000 in annual electricity bills.

A very small amount of our electricity is drawn from non-renewable sources; this is used to power non-contestable, unmetered security lights that cannot be powered via the VECO PPA, and we are therefore unable to influence any GHG emissions associated with these.

Energy efficiency

A number of energy efficiency improvement projects have been conducted since 2021. The most significant single project was the 'Energy Efficient Lighting Upgrade Project', which upgraded more than 1,200 Council-managed and shared inefficient streetlights to energy efficient LED lighting during 2023. This project was largely funded by external rebates and has achieved significant energy efficiency gains, saving around $100,000 in annual electricity bills as of the 2023/24 financial year. The annual electricity cost savings generated is realising a four to five year return on the approximately $450,000 out of pocket investment.

The new LED luminaires are up to 82% more energy efficient than the previous bulbs. They also increase lighting quality and reduce light pollution into the night sky, with more light being directed toward the ground where it is needed. The LED lights perform better, last longer, require lower maintenance, and are significantly more efficient than the old lights. Once the lighting has paid itself off, each year afterwards is a net operational saving for Council and, by extension, the community.

Additionally, we have been replacing inefficient appliances in Council facilities with energy efficient alternatives in line with asset replacement schedules, including phasing-out gas appliances.

Fleet and plant

We have been transitioning our light fleet to hybrid and electric vehicle alternatives where practicable, and switching to electric light plant (such as electric chainsaws and pole saws) where technology is practicable. At the time of publishing this document, we have replaced 11 internal combustion engine (ICE) vehicles with eight hybrid vehicles, three electric vehicles, and four corporate charging stations for our Bright office. Council's electric vehicle upgrades have resulted in annual GHG emissions savings of close to 4 t CO_2-e. Fuel emissions vary year-to-year due to the variability of heavy plant workload.

Landfill

Council commenced capping of its five nonoperational landfill sites to meet Environment Protection Authority (EPA) regulations in 2022, designed to mitigate methane emissions from residual landfill waste and reduce water infiltration that could lead to groundwater and runoff pollution. Capping construction follows strict guidelines provided by the EPA. Onsite field measurements have been conducted at these sites in 2021, 2023 and 2024 to measure methane emissions, and will continue to be conducted periodically to monitor ongoing fugitive emissions. Closed landfill emission readings vary depending on environmental factors at the time of measurement.

Offsets

In order to maintain our net zero target, we have invested in quality carbon offsets to account for our residual GHG emissions. For the 2022/23 financial year we purchased Australian native planting offsets from Greenfleet at a cost of $10,242. For the 2023/24 financial year and future years, we are investigating options to conduct our own ‘insetting’ vegetation planting projects within Shire boundaries, following recognised offsetting methodologies.

A pilot site for our 2023/24 offsets is being investigated. Following evaluation of the 2023/24 pilot project, and subsequent development of a Council offsetting policy, we will consider the viability of ongoing insetting projects for future residual GHG emissions.

ALPINE SHIRE COUNCIL CORPORATE CLIMATE ACTION

Installed 137kWp of solar, generating 15% of Council's electricity needs and -$38,000 in annual savings — Since 2014

July 2021 — Signed onto the Victorian Energy Collaboration Power Purchase Agreement with no upfront cost, saving -$65,000 in annual bills

- Adopted Climate Change Action Plan 2021-2024 — Sept 2021
- Declared a climate emergency — Nov 2021

Since 2021 — Replacing inefficient appliances with efficient alternatives and phasing-out gas appliances

Completing capping of former landfill sites to meet EPA regulatory requirements, with the co-benefit of reducing fugitive methane emissions — Since 2022

2022-23 — Purchased three electric vehicles, eight hybrids and charging infrastructure

Conducted LED streetlight upgrades to over 1200 streetlights, saving $100,000 in annual electricity bills — 2023

Since 2023 — Purchased offsets for 2022/23 costing $10,242, and developing an ongoing offsetting policy

Key Opportunity Areas

Based on our 2023/24 GHG emissions profile (Figure 2), progress made under our *Climate Action Plan 2021-2024*, and developments in legislation, climate science and best practice, we have identified key opportunity areas that this document will target over the next five years:

Reducing our annual residual GHG emissions

Whilst we have made significant progress in reducing our operational GHG emissions, there is still opportunity to mitigate our ongoing GHG emissions. This will ensure climate action remains a key priority for the organisation, reduce our reliance on offsets, and demonstrate leadership to the community.

Our largest source of GHG emissions is fuel used by our fleet and plant. Whilst we have transitioned some of our light fleet to low or zero emission vehicles (ZEV), there is opportunity to progress this transition, influence staff attitudes around alternative vehicle use, and support staff to use low GHG emissions vehicles as a first choice over fossil fuel alternatives. There is also opportunity to progress the transition of heavy fleet and plant to zero GHG emissions alternatives as technology develops to suit Council's operational needs.

Our second largest source of GHG emissions are our closed landfill sites, which produce methane emissions as waste within the landfill continues to decompose. As we continue to complete capping of these sites to limit their GHG emissions, it is not viable to directly control or reduce these GHG emissions any further. These sites will remain a key contributor to our corporate GHG emissions profile for years to come.

Reducing energy consumption across the organisation

Council owns and manages facilities that vary in age and condition, including office buildings, depots, community facilities and public lighting. There is opportunity for us to make significant energy efficiency improvements that ensure facilities are comfortable and efficient year-round. Despite having already eliminated most of our electricity-related GHG emissions, conducting energy efficiency improvements will allow us to reduce facility operational costs, and ensure resources are being conserved when not needed.

Increasing our generation and storage of onsite renewable energy

Council currently purchases 100% renewable electricity through the VECO PPA, and generates around 15% of its electricity needs from onsite solar generation. Whilst our electricity is generated from renewable sources, it is still important to reduce our reliance on grid-delivered electricity in order to reduce our vulnerability to grid volatility and disruptions. Installing solar generation and storage systems at our facilities is a viable and cost-effective way to produce local renewable energy, reduce our electricity costs, and improve our energy resilience.

Embedding a culture of climate action across the organisation

Climate action is the responsibility of all Council employees; successful implementation of this Plan relies on the awareness and engagement of all staff. Building staff knowledge around climate change and capacity to influence change will help to foster a culture of climate action, which will be essential to achieving our climate action goals.

Ensuring Council's assets, operations and services are resilient to climate change risks

The impacts of climate change, including increasing temperatures, changing rainfall patterns, and more severe flooding and bushfire events, pose risks to Council's assets, daily operations, and ability to deliver community services. The cost of not proactively preparing for and managing these risks could be extremely high, so Council needs to be diligent in adapting to climate change and building its climate resilience. This could include risks to

- Capacity of critical infrastructure such as community buildings, bridges, roads, footpaths and drainage to withstand climate change impacts, as well as asset management and maintenance requirements
- Environmental and recreational assets such as bushland, open spaces and sports reserves, and the viability of regular maintenance services such as irrigation and weed management with ongoing climate change
- Service delivery, including Emergency Management and Environmental Health resourcing capacities, increased demands requiring Council response, public access to places of extreme weather relief, cleanup costs from extreme climate events, and increasing demands on customer service teams
- Risk of litigation, reputational damage and public scrutiny from a perceived lack of climate action
- Variable or declining Council revenue from adverse climate impacts on local industries and declining property values
- Staff health and wellbeing, including increasing demands on limited human resources, outdoor staff exposure to extreme weather, service interruptions from extreme weather, and staff overtime during emergencies[9]

Whilst we have made significant progress in reducing our GHG emissions, no matter how quickly we reduce GHG emissions, some changes to our climate are already inevitable. To ensure Council is resilient to climate change, it is important that we assess these risks and vulnerabilities and develop adaptation responses.

[9](Department of Environment, Land, Water and Planning, 2017)

Baselining our scope 3 GHG emissions

To date, Council has only accounted for the GHG emissions it has direct control over (scope 1 and 2 GHG emissions). Scope 3 GHG emissions occur indirectly within Council's value chain as a result of the organisation's activity, and occur at sources the organisation does not own or control. Examples of scope 3 GHG emissions include employee commuting, business travel, operational waste, and procurement of goods and services.

Whilst there are currently no legislative or regulatory requirements for Council to report on its scope 3 GHG emissions, this may become a mandatory requirement in the future as organisations are increasingly being held accountable for their environmental impacts. An increasing number of organisations are voluntarily tracking their scope 3 GHG emissions to understand the full impact of their operations and to ensure public transparency.

A key action that we can take in our climate action journey is to measure and report on our scope 3 GHG emissions. Tracking scope 3 GHG emissions involves gathering GHG emissions data from our contractors, suppliers and leased or externally managed facilities, and accounting for these within our value chain. This process can be automated in our carbon accounting tool, Trellis, which will automatically map financial transaction data to GHG emissions factors.

Once we calculate our scope 3 GHG emissions, we will be able to set more detailed, longer-term GHG emissions reduction targets. Commencing this process will ensure we are prepared to meet legislative requirements when they come into effect, and also ensures we are aligning ourselves with best practice.

Embedding sustainability within Council's procurement process

GHG emissions occurring within our broader value chain as a result of the organisation's activity (scope 3 GHG emissions) are primarily the result of procured goods and services. These likely represent the largest source of Council's GHG emissions, and represent a significant emissions reduction opportunity.

We will quantify the scope 3 GHG emissions associated with our procurement using our carbon accounting tool Trellis. Using this data, we will identify the greatest opportunities for improvement and begin the long-term process of improving sustainability across our entire value chain. This will be achieved by strengthening minimum sustainability requirements and sustainability scoring criteria in our procurement processes, building staff awareness and capacity to integrate sustainable procurement in their work, and working with suppliers and contractors to encourage sustainable practices.

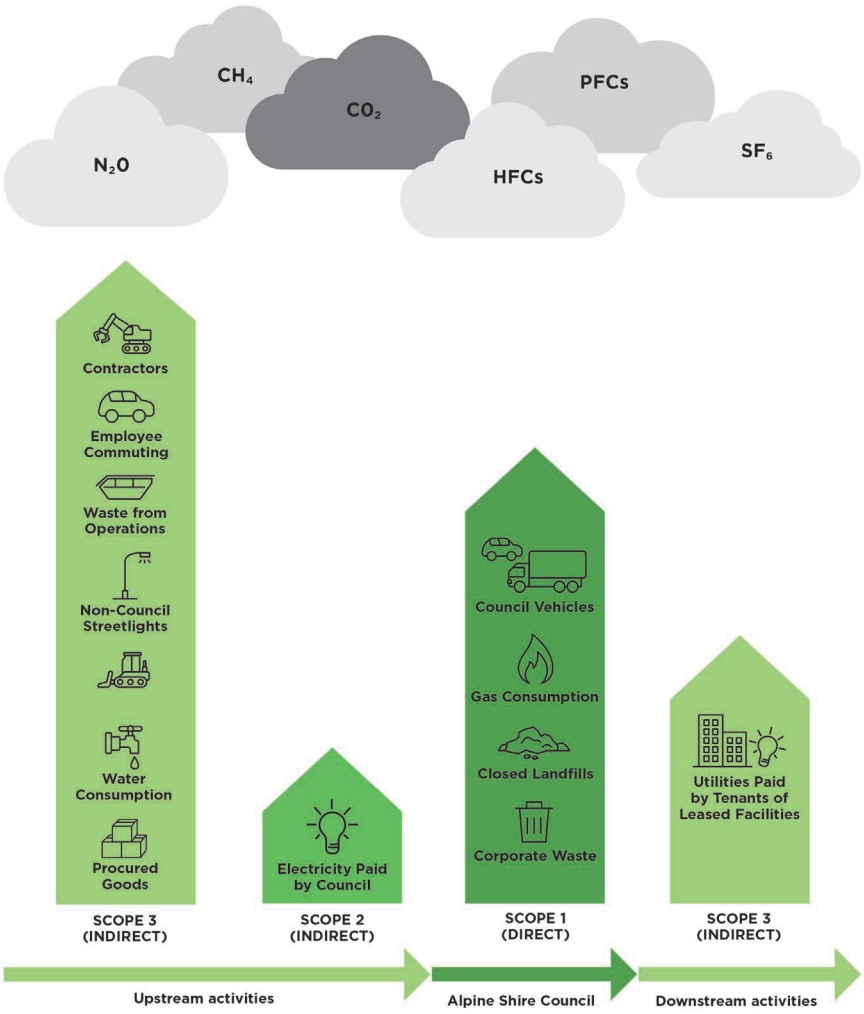

Figure 3. Scope 1, 2 & 3 GHG emissions sources

High quality offsets for unavoidable scope 1 and 2 GHG emissions to meet net zero commitment

To maintain Council's net zero commitment made in the previous Climate Action Plan, we will make every effort to control and reduce the GHG emissions we have direct control over (scope 1 and 2) and will only utilise offsets as a last resort. Where GHG emissions are unavoidable due to financial, technological or practical restraints, we have committed to invest in high quality offsetting projects that will remove the equivalent amount of carbon from the atmosphere.

For the 2022/23 financial year we purchased carbon offsets from Greenfleet to account for our residual GHG emissions at a cost of $10,242. For the 2023/24 financial year we are investigating conducting our own 'insetting' planting pilot project within Shire boundaries following recognised offsetting methodologies. Pending success of this pilot project, and subsequent development of a Council offsetting policy, we will consider the viability of ongoing insetting projects for future residual GHG emissions.

Developing the Plan

Whilst Council's *Climate Action Plan 2021-2024* focussed primarily on mitigation, our new *Climate Action Plan 2025-2029* will consider both mitigation and adaptation actions. The benefits of mitigation and adaptation far outweigh the costs of failing to act on climate change.

Mitigation and adaptation

In order to respond to the impacts of climate change, there are two main categories of response: mitigation and adaptation.

- **Climate change mitigation** consists of actions intended to reduce GHG emissions. For example, switching from fossil-fuel powered electricity to renewable electricity, or from internal combustion engine vehicles to ZEV. Mitigation actions will ensure we continue to reduce our GHG emissions and minimise our contribution to global warming.
- **Climate change adaptation** refers to the process of adjusting to the current and future impacts of climate change, in order to reduce vulnerability to climate change risks and limit adverse consequences. For example, ensuring our drainage infrastructure has the capacity to accommodate more intense rainfall and flooding events. Adaptation actions will ensure we are resilient and able to thrive in the face of climate change.

Some actions facilitate both mitigation and adaptation (see Figure 3); for example, restoring native vegetation will provide carbon sequestration benefits (mitigation), whilst providing shade to combat increasing temperatures and supporting our ecosystems to tolerate future climate conditions (adaptation).

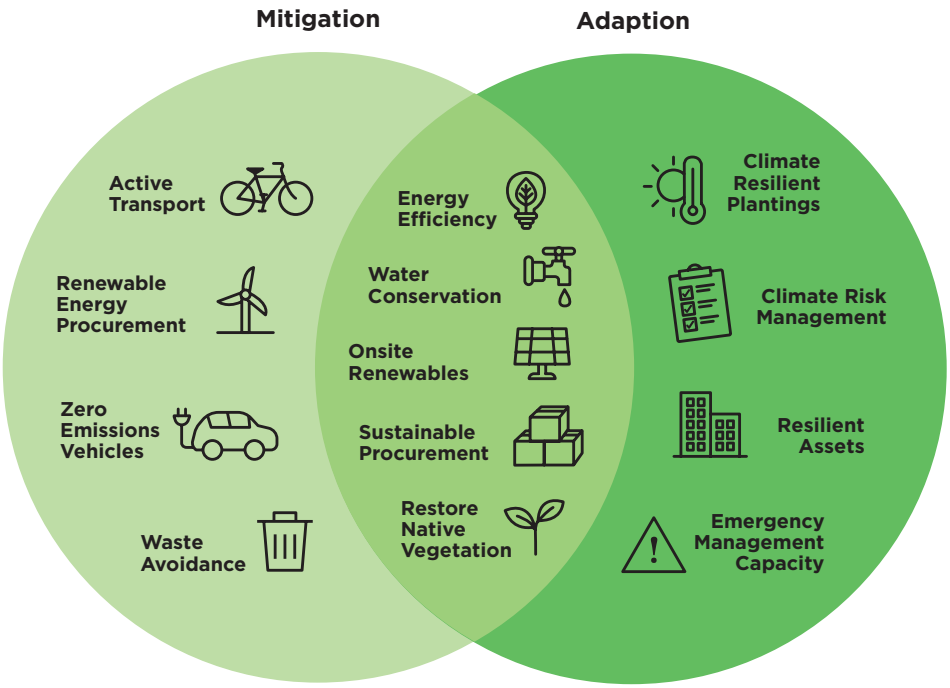

Figure 4. Examples of climate change mitigation and adaption actions

Prioritising actions

The actions outlined in this Plan involve every area of Council. The selection of actions has been guided by the following process:

- **Research:** We evaluated progress and lessons learned through implementation of Council's previous *Climate Action Plan 2021-2024*, and researched best practice by other local governments to identify areas for further action.
- **Staff consultation:** We conducted internal workshops (see Appendix 1) with all Council departments to:
    - Identify key opportunity areas for strengthened climate action
    - Understand what teams are already doing to address climate change
    - Identify how the new Climate Action Plan may impact staff
    - Understand where additional support and resources for climate action are needed
- **Shortlisting actions:** Following the workshops, we developed a list of potential actions to include in the Plan, and shortlisted these based on their:
    - Estimated cost to implement
    - Impact potential
    - Resourcing required to implement
    - Indicative savings
- **Structuring and prioritising actions:** Shortlisted actions were then organised around seven focus areas. Each focus area in the following Action Plan outlines a range of objectives and the actions we will implement to achieve these, with associated cost, resourcing needs and impact potential used to assist in allocating targeted timelines for these actions.

Timeframes, monitoring and review

This Plan sets out actions to be delivered over the next five years. We will publicly report on progress via Council's annual corporate reporting, and will communicate achievements through communication channels such as our website and social media platforms. We will take an adaptive approach to implementing the Plan, responding to changes and emerging priorities as they arise.

Monitoring, evaluation and review are an important component of this Plan; this process will allow us to assess progress against targets and ensure we are committed to continuous improvement. Reporting on progress will improve performance, build accountability and demonstrate that Council is committed to achieving its goals. We will hold ourselves accountable to delivering the objectives of this Plan via the following reporting schedule:

- Quarterly report to leadership team
- Annual report to executive and Councillors
- Review progress annually and report progress in the annual Council Report

Action Plan >>

1. Low Impact Facilities

Council owns and manages facilities that are a range of ages and conditions, including office buildings, depots, community facilities and streetlights. There is opportunity for us to make significant energy efficiency improvements that ensure facilities are comfortable and efficient year-round. Despite having already eliminated most of our electricity-related GHG emissions, conducting energy efficiency improvements will allow us to reduce facility operational costs, and ensure resources are being conserved when not needed.

There is also the opportunity for our new builds and civil works projects to prioritise low impact and efficient materials, ensuring the embodied carbon of our projects is kept as low as reasonably practicable. For new builds, renovations and maintenance programs, we will encourage the use of energy efficient initiatives, including Environmentally Sustainable Design (ESD) principles, to reduce the energy needed to operate facilities. We will also replace inefficient appliances with efficient alternatives in line with asset replacement programs.

We use our carbon accounting platform, Trellis, to track the energy consumption of facilities, which allows us to identify opportunities for efficiency improvements. Actions we will take to ensure our facilities are low impact:

1.1	**Council-owned buildings are energy efficient**
1.1.1	Develop an Energy Efficiency Register to track facility energy efficiency assessments, upgrades and recommendations
1.1.2	Deliver energy efficiency assessments and upgrades to Council facilities as resources allow
1.1.3	Improve waste separation at Council owned and managed facilities
1.1.4	Support sustainable cleaning practices at Council facilities
1.2	**Sustainability is considered in all stages of Council capital works and maintenance programs**
1.2.1	Add sustainability hold points throughout project workflow that must be addressed to secure infrastructure/civil project approval
1.2.2	Embed minimum ESD standards for new and renovated Council buildings into project management framework
1.2.3	Research methods for determining and implementing life cycle cost considerations in project proposals
1.3	**Streetlighting electricity consumption is optimised**
1.3.1	Conduct feasibility study to install sensor technology for streetlights

2. Fleet & Plant

Council's fleet and plant include passenger vehicles, trucks, mowers and various power tools, which generate GHG emissions through the direct combustion of fuel. We will work towards switching these to electric, hybrid and zero emissions alternatives in line with their replacement schedules and as technology becomes available, which will enable us to reduce our GHG emissions.

Our carbon accounting platform, Trellis, allows us to monitor fuel consumption of Council's fleet and plant. We will continue to track this data and evaluate the impact of new technologies as they are implemented. Actions we will take to reduce GHG emissions from our fleet and plant:

2.1	**Council prioritises transition to zero emission vehicles (ZEV)**
2.1.1	Conduct regular research on hybrid and ZEV technology updates and reflect in Fleet Procurement Plan
2.1.2	Ensure sustainability is prioritised in Fleet Renewal Policy
2.1.3	Install corporate EV charging infrastructure across Council facilities
2.1.4	Support installation of community EV charging infrastructure across Shire townships
2.2	**Fleet is optimised by avoiding fuel emissions**
2.2.1	Optimise fleet fit-for-purpose size and remove underutilised vehicles
2.2.2	Optimise operation of heavy plant and fleet
2.2.3	Reduce the need for staff to drive
2.3	**Transition small plant to electric alternatives where feasible**
2.3.1	Progress transition of plant and tools to electric alternatives

3. Renewable Energy

Council has been installing solar PV systems on its facilities periodically since 2014. As of January 2025, solar generation systems (and in some cases batteries) have been installed on 12 Council facilities. Together, these systems have 137kWp capacity, generating around 15% of Council's total electricity needs over the 2023/24 financial year.

Since signing on to the VECO PPA, Council's facilities and streetlighting now produce close to zero GHG emissions from electricity consumption. Whilst this electricity is generated from renewable sources, it is still important to reduce our reliance on grid-delivered electricity in order to reduce our vulnerability to grid volatility and disruptions. Installing solar PV generation and storage systems at our facilities is a viable and cost-effective way to produce local renewable energy, reduce our electricity costs, and improve our energy resilience.

We will continue to invest in the roll out of solar PV generation and storage systems on suitable Council owned and managed buildings, as part of an approach to building resilience and reducing our reliance on the grid. Additionally, we will continue to support external investment in community-scale batteries on Council facilities to facilitate community uptake of renewable energy.

Actions we will take to progress our investment in renewable energy:

3.1	**Council generates, stores and uses renewable energy**
3.1.1	Continue to install solar PV and battery systems at facilities owned and/or managed by Council
3.1.2	Contract solar viability assessments on Council facilities to prioritise facilities for solar installations
3.1.3	Support external investment in community-scale solar and batteries on Council facilities

4. Climate Action Culture

Action on climate change is everyone's responsibility. Successful delivery of this Climate Action Plan will rely heavily on staff across the organisation engaging and taking ownership of its implementation. Through building awareness of climate change and the need for action, and ensuring staff are empowered to make decisions that align with this Plan, we hope that climate action will become the new 'business as usual'.

Actions we will take to support climate action across the organisation:

4.1	**Council staff are empowered to consider climate change impacts and risks in their work, and take ownership for their role in delivering Council's Climate Action Plan**
4.1.1	Ensure climate change is considered across Council processes and documents
4.1.2	Facilitate staff education and engagement on climate change and sustainability
4.2	**Sufficient resources are available to undertake actions outlined in the Climate Action Plan**
4.2.1	Develop a revolving sustainability fund to allow savings from sustainability initiatives to fund future initiatives
4.2.2	Conduct regular reviews of upcoming and future grant opportunities
4.3	**Staff choose sustainable commuting options where possible**
4.3.1	Conduct a survey of staff commuting behaviours
4.3.2	Facilitate sustainable commuting options for staff
4.4	**Council conserves resources and minimises operational waste sent to landfill**
4.4.1	Support staff to prioritise sustainable waste management practices
4.4.2	Facilitate sustainable waste management in Council building projects and capital works programs
4.5	**Council is responsive to developments in climate science, legislation and best practice**
4.5.1	Keep abreast of changing legislation, climate science, and best practice, and advocate for greater state and federal government action
4.5.2	Conduct carbon accounting of Council's entire value chain and baseline scope 3 GHG emissions

5. Adaptation & Natural Environment

Under current projections, climate change will place increasing pressure on Council assets, operations and services. Council needs to strategically plan for damage and disruptions to these by building its capacity to effectively respond to climate change risks. Adaptation is an ongoing process of planning, preparing and responding to these risks, and creates opportunities for Council to improve the resilience of essential assets, operations and services.

Protecting and enhancing our natural environment through considered planting choices and improved water efficiency will also support Council and the community to adapt to climate change, and thus enhance the Alpine Shire's resilience to climate change impacts.

Actions we will take to build our adaptive capacity and protect our natural environment:

5.1	**Council assets, operations and services are resilient to climate change risks**
5.1.1	Develop and implement a Corporate Climate Adaptation Plan
5.1.2	Ensure emergency management capacity is adequate to respond to increased extreme weather and compounding events
5.2	**Council practices a holistic Integrated Water Management approach**
5.2.1	Prioritise efficient irrigation of parks and open space
5.2.2	Ensure Council facilities use and dispose of water responsibly
5.2.3	Ensure Council's stormwater management assets are resilient to a changing climate
5.3	**Shire townships and land management are sustainable**
5.3.1	Council's planning scheme adequately considers climate impacts and risks
5.4	**Council's natural environment supports local species, ecosystem resilience and community health and wellbeing**
5.4.1	Regenerate suitable areas of exotic green space with drought-tolerant native plantings
5.4.2	Support development of Council's new Street Tree Masterplan to ensure it reflects Council's climate goals

6. Sustainable Procurement

A key opportunity in reducing our GHG emissions and environmental impact involves greening our supply chain and prioritising lower impact procurement options.

By quantifying the scope 3 GHG emissions associated with our procurement, strengthening minimum sustainability requirements in our procurement processes, building staff capacity to prioritise sustainable procurement, and working with suppliers and contractors, we will aim to improve sustainability across our entire value chain.

In 2023, an internal Sustainable Procurement Working Group was established with the aim of integrating sustainability into Council's procurement process. This group will continue to advocate for stronger procurement standards across the organisation, and support staff to prioritise sustainability during the procurement process.

Actions we will take to improve our sustainable procurement processes:

6.1	**Council's procurement process enables low impact products and services to be prioritised**
6.1.1	Strengthen sustainable procurement standards within Council processes
6.1.2	Inform suppliers of the evolving requirements to reduce GHG emissions from Council's procured goods and services, to ensure all suppliers have the opportunity to continue to meet Council's sustainable procurement requirements
6.2	**Staff are empowered to prioritise sustainable procurement**
6.2.1	Develop guidelines and offer training for staff on assessing sustainability credentials of tenders as Council's sustainable procurement requirements evolve
6.2.2	Ensure any new and modified sustainability tender questions are relevant to different departments

7. Offsets

We will make every effort to reduce GHG emissions under our operational control, however, we will utilise offsets as a last resort where GHG emissions are unavoidable in order to maintain our net zero commitment.

For the 2023/24 financial year we are seeking to facilitate our own carbon offset planting pilot project within the Shire ('insetting'). This will involve securing identified sites and following recognised offsetting methodologies. Following evaluation of the pilot project, and subsequent development of a Council offsetting policy, we will consider the viability of ongoing insetting projects for future residual GHG emissions.

Actions we will take to operationalise an offsetting program:

7.1	**Local investment and co-benefits are prioritised for residual GHG emissions offsetting**
7.1.1	Develop a Council Offsets Policy

Appendix 1

Summary of staff workshops on development of the *Climate Action Plan 2025-2029*

Eight workshops with staff from all Council departments were held in October 2024. Discussions at the workshops yielded various ideas, themes and outcomes, which informed the actions within this Plan; these are summarised below:

Statutory planning – There is an opportunity for Council to drive community awareness and uptake of ESD principles in new builds, subdivisions and renovations. Shire-wide bushfire and flooding risks need to be measured and embedded in Council's planning scheme.

Procurement – Staff need greater knowledge, support and capacity to prioritise sustainability in the procurement process, and guidance in assessing the sustainability credentials of tenders. Council should be working with its suppliers and contractors to support sustainability and to trial low impact products.

Facilities and assets – There is opportunity to make extensive energy efficiency upgrades to Council owned and managed facilities, which would increase user comfort and therefore patronage year-round and also reduce operating costs.

Council documents and processes – Staff across the organisation need to take ownership for climate action and implementing the Climate Action Plan. Council documents, such as the Council Plan, need to adequately consider climate action. Financial savings from sustainability initiatives should be reinvested into funding further sustainability initiatives.

Staff engagement – There is opportunity to enhance staff understanding of climate change impacts, mitigation and adaptation, and to increase staff capacity to take action on climate change in their work and daily lives. Climate change poses risks to staff health and wellbeing, particularly crew who work outdoors, which should be reviewed against updated climate science. There is opportunity to increase staff awareness around consumption patterns and incentivise sustainable transport.

Capital works and maintenance programs – Sustainability should be considered in all stages of capital works programs and building/ renovation projects, from project inception to completion. New builds and upgrades should have to go above and beyond minimum ESD standards.

Waste – Contractors should be required to submit waste management plans with their tenders, and sites should be monitored by Project Managers to ensure commitments are met. There is opportunity to drive uptake of FOGO bins and support improved waste diversion at all Council facilities, including leased facilities .

Adaptation and resilience – Council needs to ensure it is prepared to respond to current and projected climate change impacts. Without effective adaptation action, Council's insurance premiums will likely continue to increase exponentially. Council's Emergency Management team needs sufficient resourcing to ensure service delivery is not adversely impacted during emergencies. Planting programs should prioritise native species over annual exotic species.

Fleet and plant – Low GHG emissions fleet and plant upgrades have been taking place where technology is appropriate and resources are available; this transition will continue as opportunities arise. Technology investments need to reflect the unique needs of a rural shire, and ongoing research into technology developments is essential. Council's Fleet Renewal Policy and Fleet Procurement Plan need to prioritise sustainability to ensure this is a first choice. EV charging should be made available to staff.

Community climate action – Whilst not a focus of this document, the workshops reinforced that there is significant opportunity for Council to influence community climate action, including areas of tourism, waste management, emergency management, sustainable events and community energy.

Glossary of Terms

Term	Definition
Adaptation	Taking action to respond to, prepare for, avoid, withstand or benefit from current and projected climate change impacts.
Atmospheric gases	The gaseous envelope surrounding the Earth, composed of various gases - including greenhouse gases - that play a role in regulating the Earth's climate.
Baseline year	A reference point in time against which future GHG emission reductions are measured.
Carbon accounting	The process of measuring and quantifying an entity's GHG emissions.
Carbon dioxide (CO_2)	A naturally occurring greenhouse gas that is also released by human activities, especially the burning of fossil fuels. It is the primary greenhouse gas emitted by human activity, contributing to global warming by trapping heat in the atmosphere. CO_2 is removed from the atmosphere (sequestered) when absorbed by plants and oceans through the natural carbon cycle.
Carbon dioxide equivalent (CO_2-e)	A metric used to compare the impact of different greenhouse gases in terms of the amount of CO_2 that would produce the same global warming effect, based on each gas's global warming potential.
Carbon sequestration	The process of capturing and storing carbon in natural or artificial sinks, such as forests, soils, oceans, or geological formations.
Circular economy	An economic model focused on reducing waste, reusing resources and designing products for longer life, recyclability and minimal environmental impacts.
Climate	The long-term pattern of weather in a particular area.
Climate change	Long-term shifts in average temperatures and weather patterns. Whilst such shifts can be caused by natural variability, climate changes observed since the mid-20th century have been driven by human activities, primarily the burning of fossil fuels that have increased concentrations of atmospheric greenhouse gases. This document refers to present-day climate change, which includes both global warming and its wider effects on Earth's climate system.
Climate change modelling	A computer simulation of the Earth's climate system, including the atmosphere, ocean, land, and ice, used by scientists to recreate past climate and predict future climate conditions.
Climate change projection	An estimate of how future climate might change based on different GHG emissions, aerosol and land use scenarios, as well as natural variability. Projections are derived from climate models and provide a range of possible future scenarios.
Closed landfills	A non-operational, historic landfill site that is no longer used to store waste. In Victoria, the EPA requires closed landfill owners to progressively rehabilitate their closed sites so there are no unacceptable risks to the environment.

Term	Definition
Community-scale solar and batteries	Solar electricity production and storage projects where the benefits are shared among multiple individuals, businesses, or other groups within a community.
Energy efficiency	The amount of energy required to perform a given task or produce a given result. Increasing energy efficiency means using less energy for the same result.
Environmentally Sustainable Design (ESD)	A building design approach that aims to minimise negative environmental impacts, such as energy and water use and waste production, while maximising positive social and economic benefits, such as air quality and comfort, throughout a building's lifecycle, including design, construction, operation and disposal.
Fossil fuels	Non-renewable energy sources such as coal, crude oil and natural gas that are found in the Earth's crust. Fossil fuels take millions of years to form from fossilised plant and animal remnants, and the process of formation is not fast enough to sustain current levels of consumption.
Fugitive emissions	The unintended or uncontrolled release of gases or vapours into the atmosphere, including those released from closed landfill sites.
GHG emissions profile	A detailed analysis of an entity's GHG emissions, which identifies the sources of GHG emissions and their respective magnitudes.
Global warming	The long-term heating of the Earth's surface, which can occur naturally but is currently influenced by human-caused GHG emissions.
GMCA	Goulburn Murray Climate Alliance, one of eight regional climate alliances across Victoria sharing resources on joint projects and advocacy work.
Greenhouse accounts factors	A data source published annually by the Australian Government, used to estimate and account for GHG emissions of different activities. The accounts factors relate to the emissions intensity of a production process or activity.
Greenhouse gas (GHG) emissions	The release of gases into the atmosphere that trap heat and contribute to the greenhouse effect, driving global warming. While GHG emissions can occur naturally, human activities like burning fossil fuels, industrial processes and agricultural practices are now major contributors. GHG emissions are quantified in terms of tonnes of carbon dioxide equivalent.
Greenhouse gases	Atmospheric gases (natural or produced by human activity) that trap heat by absorbing infrared radiation, contributing to the greenhouse effect and warming of the Earth's surface. Key greenhouse gases include carbon dioxide and methane.
Heavy plant	Vehicles and tools designed for heavy-duty applications such as construction, demolition and earthmoving. For example, trucks, tractors and loaders.
Insetting	A method of offsetting by undertaking GHG emissions reduction projects or activities within an entity's own value chain or operations to compensate for residual GHG emissions, for example undertaking eligible tree plantings within our municipality.

Term	Definition
Intense rainfall and flooding events	Current climate change is intensifying the hydrological cycle; paradoxically, this is leading to more intense rainfall and associated flooding in some areas, as well as an overall decline in average rainfall due to longer, more intense droughts in the same area.
IPCC	Intergovernmental Panel on Climate Change, an international body responsible for assessing science related to climate change.
Landfill capping	The process of covering a landfill with a barrier layer to isolate the waste from the environment. This cap acts as a barrier, restricting the flow of water, gases and contaminants from the landfill.
LED streetlights	Light Emitting Diodes (LED) convert electrical energy directly into light, making them much more energy-efficient than traditional incandescent or fluorescent bulbs. LED bulbs also have a much longer lifespan than traditional light bulbs.
Light plant	Smaller, portable, or less specialised equipment and machinery used for tasks like construction, landscaping, or maintenance, distinct from heavy plant. For example, chainsaws, pole saws and mowers.
Meteorological, agricultural and ecological droughts	• Meteorological drought: A period of significantly below-average precipitation over a region for a prolonged time, compared to historical norms. • Agricultural drought: A drought that affects soil moisture and water availability needed for crops and livestock, typically caused by reduced rainfall and increased evapotranspiration. • Ecological drought: A prolonged and widespread shortage of water that disrupts ecosystem function, leading to impacts such as vegetation stress, species migration, or habitat degradation.
Methane	A potent greenhouse gas that is emitted from both natural and human sources, capable of trapping 28 times more heat than CO_2 over a 100-year period. Sources of methane emissions include the decay of organic waste in landfills and livestock and agricultural practices.
Mitigation	Targeted action to reduce or prevent GHG emissions, or enhance the removal of greenhouse gases.
Natural variability	Variations in climate that are caused by processes other than human influence. This includes variability that is internally generated within the climate system, and variability that is driven by natural external factors (such as volcanic eruptions or solar activity).
Net-zero GHG emissions	An overall balance between GHG emissions and removals.
Offsets	Carbon offsets, or GHG emissions offsets, are actions intended to compensate for GHG emissions that occur elsewhere - typically by preventing the release of greenhouse gases or removing them from the atmosphere. Offsetting usually involves purchasing carbon credits or funding projects outside an organisation's direct operations, such as reforestation, renewable energy generation, or carbon capture initiatives.

Term	Definition
Renewable energy	Energy made from renewable natural resources that are constantly replenished and never run out, such as sunlight and wind.
Residual GHG emissions	The amount of GHG emissions that remain after GHG emissions reduction activities, but not including GHG emissions removal.
Resilience	The ability of a system and its parts to absorb disturbances while retaining the same basic structure and ways of functioning and the capacity to adapt to stress and change.
Scope 1 GHG emissions	Direct GHG emissions that an organisation emits from sources it owns or controls. For example, combustion of fuel in internal combustion engine vehicles.
Scope 2 GHG emissions	Indirect GHG emissions from the generation of purchased energy that an organisation consumes. These emissions occur at the facility where the energy is generated (e.g. a power plant), but they are attributed to the company that purchased and consumed the energy.
Scope 3 GHG emissions	Indirect GHG emissions that occur in an organisation's value chain, including both upstream and downstream activities. These are emissions that an organisation is indirectly responsible for, but are not from sources owned or controlled by the company. For example, purchased goods and services.
Solar PV and battery storage	Solar PV (photovoltaic) systems are devices that convert sunlight directly into electricity. Battery storage systems are devices that store electrical energy for later use, often from a renewable source like solar PV. Together, these technologies can be integrated to store excess solar energy in batteries for later use when the sun isn't shining or the grid is down.
Sustainable procurement	Procurement practices that consider the environmental sustainability of the whole lifecycle of products and services, including GHG emissions, raw material use and waste to landfill.
VECO PPA	Victorian Energy Collaboration Renewable Power Purchase Agreement, a collaboration between what is now 59 Victorian Councils where electricity needs are pooled into one long-term contract providing 100% renewable energy from wind farms in Victoria. Alpine Shire Council observed a total cost reduction of around 20% compared to the baseline year at no upfront cost.
Vulnerability	The degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes.
Zero emission vehicles (ZEV)	Vehicles that emit no GHG emissions during their operation, examples include electric vehicles, on the assumption that they are charged with 100% renewable electricity, and hydrogen vehicles.

References

Australian Government. (2022). *Australia's National Determine Contribution Communication 2022*. Retrieved from https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf

Alpine Shire Council. (2021). *Alpine Shire Council Climate Action Plan 2021-2024*. https://www.alpineshire.vic.gov.au/sites/default/files/2024-10/ASC_Climate_Action_Plan_2021-24.pdf

Climate Change Authority. (2014). *Coverage, Additionality and Baselines - Lessons from the Carbon Farming Initiative and other schemes*. Retrieved from https://www.climatechangeauthority.gov.au/sites/default/files/CCA_CFIStudyPublicReportGlossary.pdf

Climate Change Authority. (2024). Glossary. Retrieved from Climate Change Authority: https://www.climatechangeauthority.gov.au/cca-glossary

CSIRO & BOM. (2024). *Climate Change in Australia*. Retrieved from https://www.climatechangeinaustralia.gov.au/en/overview/about-site/

CSIRO & BOM. (2024). *State of the Climate 2024*. Retrieved from https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate

Department of Environment, Land, Water and Planning. (2017). *Climate Change Risks to Local Government*. Retrieved from Victoria State Government: https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0023/73049/Climate-Change-Risks-to-Local-Government_FINAL.pdf

IPCC. (2023). *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III*. Geneva: IPCC. Retrieved from https://www.ipcc.ch/report/sixth-assessment-report-cycle/

Local Government Association of South Australia. (n.d.). *Climate Change Glossary*. Retrieved from https://www.lga.sa.gov.au/members/environment/climate-change/climate-change-glossary

NASA. (2023). *Global Temperature*. Retrieved from https://climate.nasa.gov/vital-signs/global-temperature/?intent=121

NECMA. (2016). *Northeast Climate Ready NRM Strategy*. Retrieved from https://www.necma.vic.gov.au/Portals/0/files/Pdf/NRM%20Planning%20for%20Climate%20Change/NEClimateReadyNRMStrategy.pdf?ver=2016-07-19-145632-947

United States Environmental Protection Agency. (2025). *Overview of Greenhouse Gases*. Retrieved from United States Environmental Protection Agency: https://www.epa.gov/ghgemissions/overview-greenhouse-gases#:~:text=Methane%20(CH4):%20Methane,in%20municipal%20solid%20waste%20landfills.

alpineshire.vic.gov.au