DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Net Zero Emissions Guidance for NSW Councils

Helping councils plan for a low emissions future

environment.nsw.gov.au

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Cover photo: Hunter Valley Flood Mitigation Scheme, Photographer: John Spencer, Department of Planning, Industry and Environment.

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Overview

In 2015 the world committed to keeping global temperature increases below 2°C compared to pre-industrial levels. At the 2019 United Nations Climate Action Summit experts warned that current global commitments to cut greenhouse gas emissions will likely lead to global temperature increases between 2.9°C and 3.4°C by 2100 (Science Advisory Group 2019). Scientists agree that decisive action now can limit warming to 2°C, although countries will need to commit to emissions reductions that are triple their current commitments (United Nations 2018).

The NSW Government has committed to reach net zero emissions by 2050 (OEH 2016). Achieving net zero emissions will slow down the increase in global temperatures and the associated increased likelihood of climate-related risks for natural and human systems. This will require action by governments, communities, and business.

Working towards a net zero emissions target is about more than meeting our international obligations. It will help us plan for and drive the transition to a cleaner, more efficient and resilient society. The world which NSW operates is in transition. As the world moves to net zero emissions, NSW will be part of the global transformation of the world's energy system. This will attract investment and job opportunities in emerging industries such as advanced energy, transport, carbon farming and environmental services.

As at October 2019, 65 countries have committed to a net zero by 2050 target (United Nations 2019). Major businesses and investors are also responding - 67 per cent of 200 major global companies surveyed by the G20 Task Force on Climate-related Financial Disclosures in 2018 plan to implement climate impact disclosure recommendations by mid-2022.

Net zero related actions include carbon-positive energy efficient buildings, smarter infrastructure, renewable energy technologies, circular economy waste solutions, sustainable transport services and increasing canopy cover and green restoration projects.

Photo: Central Park, Sydney. Photographer: Lisa Madden, DPIE

About this guide

This document provides NSW councils with guidance on key steps involved in developing a net zero emissions strategy across their entire local government area (LGA) – referred to as a community net zero strategy.

A community net zero strategy differs from a council's operational net zero strategy, which is focused only on emissions from council assets and operations. Many NSW councils have already developed operational strategies to reduce emissions and examples are widely available.

This guide is intended to be a high-level roadmap including an overview of key concepts and a step-by-step process to develop your own ongoing community net zero strategy.

Additional resources

A range of resources and tools are available for those who want to take further action. Refer to the 'References' and 'Resources' sections for more information.

Case studies will be provided alongside this guide to showcase what is being delivered by other councils and organisations, and to inspire potential projects that could form part of the path to net zero emissions for your community.

A net zero emissions future

Net zero emissions[1] broadly refers to a state where any emissions of greenhouse gases generated are counterbalanced by the removal of greenhouse gases from the atmosphere. In practice this means reducing emissions as far as possible, then offsetting the remainder.

Emissions are currently tracked and reported at a global, national, and NSW scale, across a series of sectors in line with the <u>National Greenhouse and Energy Reporting Scheme</u> and our international obligations.

> 'The NSW Government endorses the Paris Agreement and will take action that is consistent with the level of effort to achieve Australia's commitments to the Paris Agreement.
>
> Our response will build on NSW's strong track record in expanding renewable energy, helping households and businesses reduce their energy bills by saving energy and preparing for the impacts of climate change.'
>
> *NSW Climate Change Policy Framework, 2016*

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[1] There are several terms that are similar to, but often slightly differentiated from, net zero including 'low carbon', 'carbon neutral' and '100% renewable'. These terms are defined in the glossary at the end of this document.

NSW emissions profile

The NSW Government is working to provide councils and communities with updated, detailed emissions profiles to support local decision-making and achieve net zero emissions by 2050.

In 2017 NSW produced 131 million tonnes (Mt) of CO_2 equivalent emissions across several sectors including electricity generation, stationary energy, transport, fugitive emissions, industrial processes, waste, and agriculture, and land use (including forestry), as shown in Figure 1. The land use is shown as a carbon 'sink' with some of our carbon sequestered in forests and the natural environment. Note that this sector includes both carbon emitting (e.g. land clearing) and carbon sequestering (e.g. growing forests) activities.

Figure 2 shows the change in emissions by sector over time since 1990. While some sectors have steadily increased, such as transport, other sectors such as electricity and waste show they are already rapidly reducing emissions.

Sector	Emissions
Electricity generation	51.1 Mt CO_2-e
Transport	28.0 Mt CO_2-e
Agriculture	19.4 Mt CO_2-e
Stationary energy (excluding electricity generation)	15.1 Mt CO_2-e
Fugitive emissions	14.0 Mt CO_2-e
Industrial processes	13.4 Mt CO_2-e
Waste	3.1 Mt CO_2-e
Land use	-12.7 Mt CO_2-e
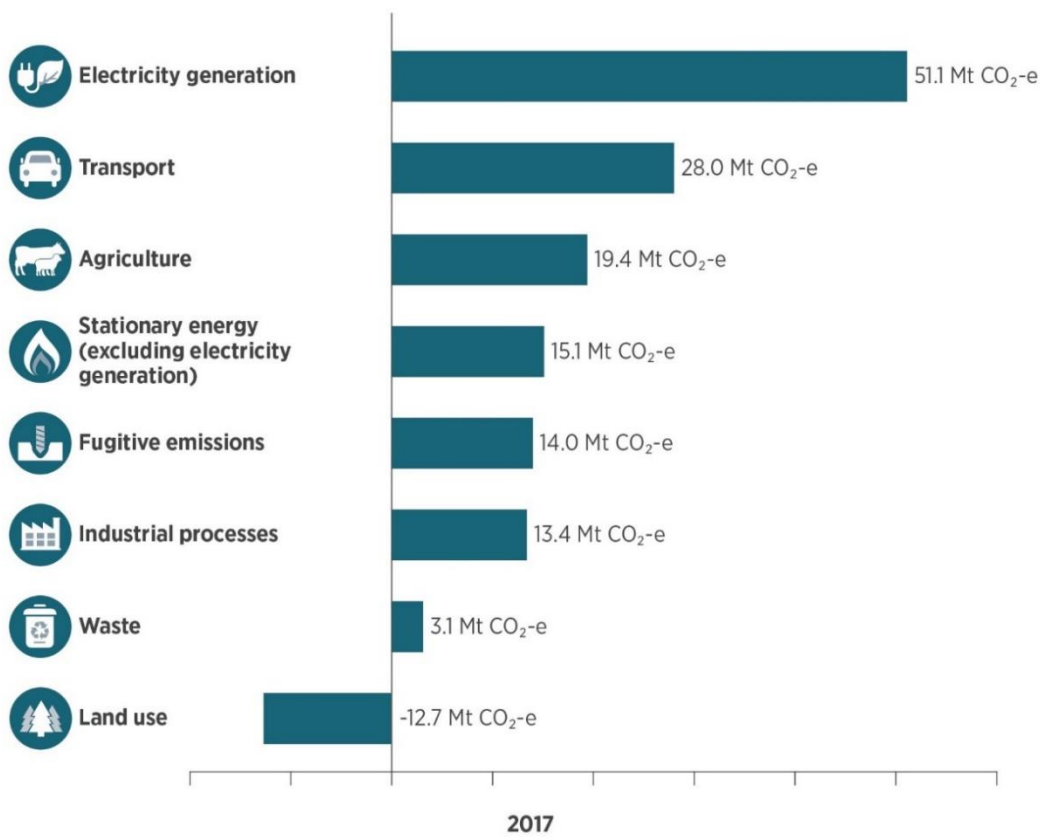
2017

Figure 1   NSW emissions by sector, 2017
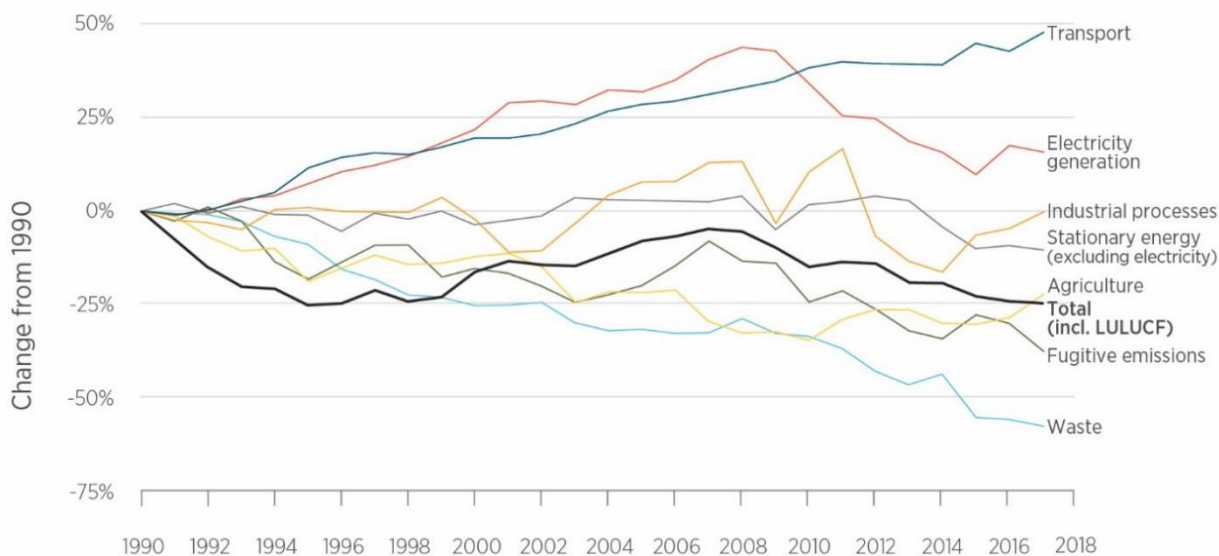
Figure 2   Changes in NSW emissions 1990–2018

Note: LULUCF = Land use, land-use change and forestry

Local government area emissions profiles ('community emissions profiles')

Greenhouse gas emissions generated within an LGA are called 'community emissions'. For local councils, achieving net zero at a community level will mean first reducing emissions as much as possible in a way that balances the economic, social and environmental needs of an LGA or place. For example, emissions can be reduced through energy efficiency and renewable energy, alternative transport and waste reduction initiatives. When emissions have been reduced as much as possible, the remaining emissions need to be offset through actions such as storing carbon in trees and soils – either within the LGA, or by purchasing carbon credits created outside the LGA. (See Step 3 in the next chapter for more information about offsets). The timeframe to achieving net zero emissions may differ by LGA, with some communities being able to achieve net zero more readily than others.

Why consider 'net zero'?

The term 'net zero' gained prominence following the signing of the Paris Climate Change Agreement in 2015. The Paris Agreement is named after a meeting of global leaders under the UN Framework Convention on Climate Change (UNFCCC) in Paris in December 2015 (United Nations 2015). The resulting agreement saw a global commitment to limit global average temperature increases to 'well below 2°C', and to pursue efforts to keep warming below 1.5°C above pre-industrial levels[2].

To stand a good chance of achieving the 1.5°C goal, the IPCC has said that the world must stay within a 'carbon budget' of 580 gigatonnes of carbon dioxide equivalent as of the end of 2017 (IPCC 2018). If the rate of emissions generation remains unchanged, we will exceed this budget before 2050. Many parts of our society – including councils – are starting to plan their

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[2] 'Pre-industrial' refers to the time before humans began burning fossil fuels in large quantities to meet our energy needs. The IPCC adopts a baseline of 1850–1900 to reflect this 'pre-industrial' period.

strategies for achieving net zero emissions[3]. Further local and global policy drivers to pursue a net zero strategy are illustrated in Figure 3.
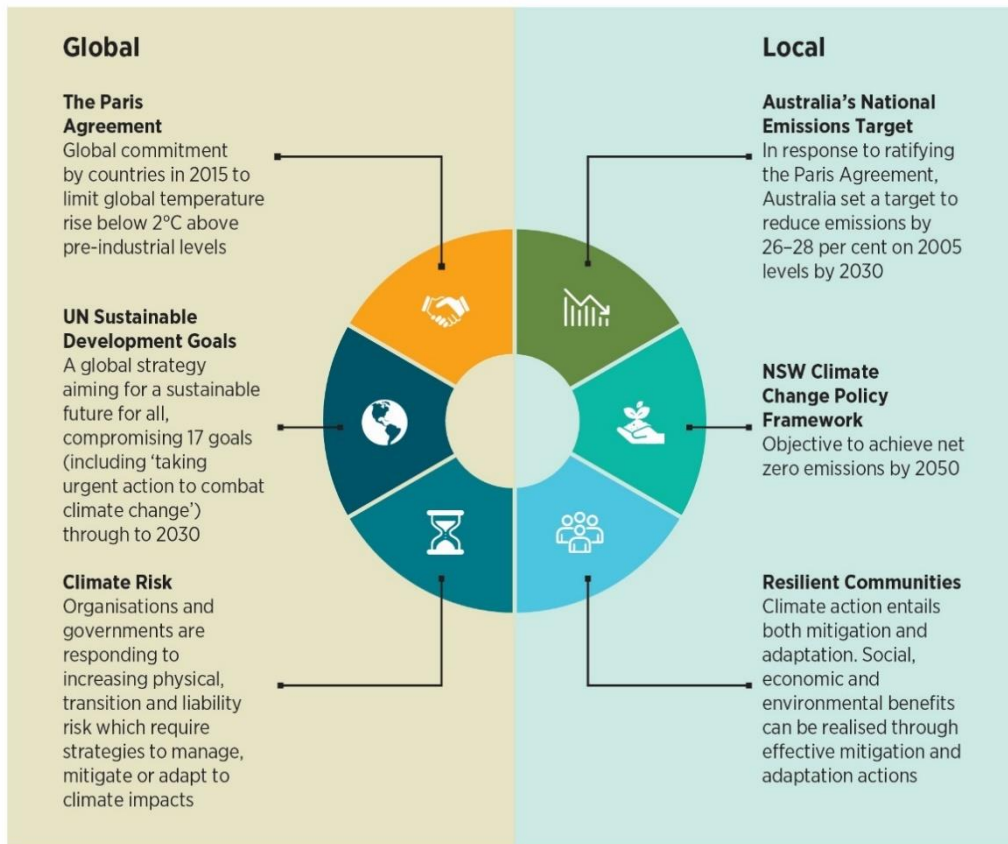
Figure 3   Key policy drivers of climate action

The importance of a place-based approach

Taking a place-based approach is important in addressing complex issues in a specific geographical location. The transition to net zero emissions will vary in different places due to the social, environmental and economic challenges and opportunities in those places. Local councils are uniquely placed to incorporate their knowledge of an area, planning expertise, local networks and collaboration skills to work towards a low emissions future that is sensitive to local values and opportunities.

Building resilience to climate change

The challenge of responding to climate change includes both reducing our emissions and building our resilience to the impacts of climate change that we are already experiencing.

Local government is often at the forefront of addressing climate impacts, and communities will increasingly look to their council to provide solutions to adapt to, manage, transfer or share the risks associated with climate change impacts (Baker & McKenzie 2011).

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[3] 'The Paris Agreement is not only possible; it is necessary and urgent. We are counting on everyone's contribution.' – *Christiana Figueres, Executive Secretary UNFCCC*

The NSW Government has updated the <u>Guide to Climate Change Risk Assessment for NSW Local Government</u>, which sets out a process to assist councils as they address the uncertainty presented by the changing climate.

This assessment aims to ensure council systems are resilient, by working through an analytical process that:

- identifies and assesses the risks that climate change poses to council assets and services
- prioritises actions for decision-making, adaptation planning, budgeting and community engagement.

It is important to note that this guide is focused on assessing the risks to council operations rather than wider community risks. Councils are advised to also carry out a process to consider these broader risks, in consultation with the community. This could be done as part of the community strategic planning process or as a further stage of the risk assessment process.

There is also a growing understanding among governments and international investors of the impact of unaddressed impacts of climate change on assets, service delivery and business practices. Early action to manage and mitigate these risks presents opportunities for LGAs and businesses at all scales and locations to build a competitive edge and benefit from 'green investment' and sustainable finance trends, such as green bonds or discounts from sustainability-linked loans. Councils can provide strategic direction and support to help businesses and their own internal operations align to these trends and take advantage of these opportunities.

We all have a role to play

Reaching net zero emissions by 2050 requires action by governments, business and community. What we collectively do now will limit the increase in global temperatures.

Leading the way through net zero targets

In Australia, many state and local governments have set net zero targets and are developing comprehensive strategies to ensure these targets are met.

Several councils have set ambitious targets including:

- Armidale Regional Council has partnered with University of New England on ProjectZero30 that aims to reduce emissions in the Local Government Area to zero by 2030
- Byron Bay Council has a net zero target for council operations by 2025
- City of Sydney has set a net zero emissions target by 2050
- Clarence Valley Council has a net zero target by 2050.
- Lismore Council has a 100% renewable energy target by 2023
- Kyogle Council has a 100% renewable energy target by 2030

Net zero emissions commitments by businesses, governments and other organisations can be followed on the <u>Net Zero Momentum Tracker</u> launched by ClimateWorks, a research-based, non-profit organisation based in Australia.

The role of the NSW Government

The NSW Government objective to reach net zero emissions in NSW by 2050 is incorporated in numerous plans and strategies, providing a consistent policy framework within which stakeholders can work towards net zero.

Key relevant policies include:

- Net Zero Plan Stage 1: 2020-2030
- NSW Infrastructure Strategy
- NSW Electricity Strategy
- Future Transport Strategy
- planning policies and instruments (e.g. Local Strategic Planning Statements).

The NSW Government also has a range of initiatives to support the transition to net zero, targeting energy efficiency, clean energy and land-use focused activities. More information about these initiatives can be found on the AdaptNSW and Energy NSW websites.

The Net Zero Plan Stage 1: 2020-2030 is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050. The plan aims to enhance the prosperity and quality of life of the people of NSW, while helping the state to deliver a 35% cut in emissions by 2030 compared to 2005 levels.

The role of councils

Councils are uniquely positioned to help the drive towards net zero emissions through their connection to local communities, and their existing mandate to provide support and infrastructure to residents and businesses.

Local councils can play a key role in this transition as place-makers, custodians and curators of our urban and regional environments. Councils can provide leadership through engagement, design, planning, education and service delivery at a local (place-based) level.

Within their own operations, councils can support and demonstrate the cultural and technological shift required through trialling new technologies and improving the environmental performance of council owned assets. Many communities are taking the lead in the move to a low carbon society and are actively partnering with councils to enable a more rapid community wide transition.

Councils can drive new sustainable development through model Development Control Plans, and support community initiatives towards reducing emissions. Key benefits for councils include reduced operational costs, improved social and economic benefits, enhanced environmental outcomes and improved liveability. Councils are well-placed to coordinate efforts between residents, businesses, and workers within their LGA to move towards reducing emissions, as shown in Figure 4.

Aligning your strategy with environmental objectives in your Community Strategic Plan and with the Integrated Planning and Reporting guidelines can provide a streamlined framework for monitoring and reporting on your progress towards net zero emissions.

Direct council operations	Council planning, regulations & services	Community engagement
• Councils have a direct ability to implement energy efficiency and renewable energy solutions across their own assets and operations. • Setting a council commitment to achieve net zero emissions is a key first step in driving emissions reductions across the community.	• Councils can use their direct regulatory powers and advocacy position to influence climate action through areas such as planning, community services (e.g. health, traffic, management and parking, and waste), and emergency management. • Councils can individually and collectively lobby state and federal governments and advocate for action on specific issues. • Council can influence building regulations to support energy efficient residential and commercial developments and provide active, connected green spaces.	• There is an opportunity to use partnerships with community groups and businesses to promote climate action, and influence how people live and function in their area. • This may be through education programs and workshops, informational devices, and voluntary agreements. • Setting climate goals and targets helps residents and businesses understand and prepare for the transition.

Figure 4   How councils can help drive towards net zero emissions

Local Strategic Planning Statements

Every NSW council is required to develop a Local Strategic Planning Statement (LSPS), which sets out a 20-year vision for land use in the local area, the character and values to be preserved, and how change will be managed into the future.

The LSPS is a key opportunity for councils to embed a net zero commitment within the statutory planning process.

The role of council staff

A successful community net zero strategy will have the buy-in and support from all levels of council. Figure 5 provides an indication of actions and considerations that may apply to staff across your council, recognising there is a huge variety of staffing structures and resourcing levels across NSW councils.

Councillors and executives	• Provide leadership and help drive strategies through council processes • Provide financial and non-financial resources to ensure successful implementation of strategies • Dedicate time to reviewing the development and implementation of strategies • Communicate council objectives to communities and stakeholders
Senior management	• Build required skills and capacity among related staff • Allocate adequate time for coordination of mitigation and adaptation efforts • Define KPIs to take into account climate action objectives
Sustainability/ environment team	• Develop and maintain the carbon inventory • Undertake technical work to identify and analyse emissions reduction opportunities • Monitor and report progress towards net zero targets
Planning	• Liaise with the Sustainability team to embed sustainability in all planning decisions • Introduce an Environmentally Sustainable Development (ESD) policy into council's planning scheme
Community engagement team	• Engage early and authentically with the community to enable them to have meaningful input into the overarching net zero goal • Use the community as a source of knowledge when formulating emissions reduction opportunities
All staff	• Embed emissions reductions into everyday activities • Provide technical or administrative support to emissions reduction activities • Act as a conduit between the net zero strategy and the community

Figure 5   **How different council functions can support a community net zero strategy**

The role of the community

The community has an essential role to play in developing and delivering a net zero strategy. Obtaining community input to and support for the strategy will:

- secure widespread support and buy-in from the community through early, targeted engagement
- establish effective partnerships with businesses and community groups to identify and implement emissions reduction opportunities
- build resilience within the community to respond and adapt to the physical and transitional impacts of climate change.

This guide covers the different touchpoints for involving the local community during the development and implementation of a net zero strategy. Engagement with the community and internal council stakeholders is likely to be an iterative process that occurs at each stage of your journey toward net zero emissions.

Developing a community net zero strategy

The key steps to developing and delivering your own community net zero strategy are shown in Figure 1 and explained in more detail below.

Figure 6   **Step-by-step process for developing a community net zero strategy**

1. Engage stakeholders

Minimum

Develop your community net zero strategy informed by consultation with local businesses and the community

Go further

Integrate commitments from business and the community to actively collaborate when delivering the strategy

Engaging internal and external stakeholders, as well as broad community engagement, is central to achieving net zero emissions. Developing a net zero emissions strategy is easier when the right people are engaged from an early stage and involved for the duration of the strategy.

Successful stakeholder engagement enables councils to:

- secure widespread support and buy-in
- gather the most appropriate and comprehensive data and information
- improve the overall quality of the strategy
- establish partnerships and strengthen relationships that will be necessary for delivery.

During this process, it is important to remind stakeholders that a community net zero strategy can deliver more than climate mitigation – it also has potential to bring wider benefits like a cleaner environment, energy security and local investment and jobs.

Table 1 outlines the touchpoints with key stakeholders throughout each step of a net zero strategy.

Format of engagement

Multiple engagement formats can be used to provide an opportunity for everyone in the community to contribute to the community net zero strategy. Your community consultation might include co-design workshops, drop-in sessions and/or online platforms, for example.

Ongoing interaction

Feedback is an important component of community engagement that can help maintain momentum. You can keep the community informed about what you heard them say, and new developments and opportunities, through a range of mechanisms including:

- exhibition of public consultation documents issued for comment
- updated reports documenting stakeholder concerns and suggestions
- social media channels and local media reports
- 'pledges' from business and society to support the council's climate change goals.

Table 1 **Involving stakeholders in the development of a community net zero strategy**

Stage of progress	Objectives	Interactions with stakeholders
1. Engage stakeholders	- Gain internal buy-in to proceed with the project - Start collaboration with the community - Set a clear direction within council for developing the strategy - Gather input and build support and ownership from the community	- Seek support from councillors and senior managers - Make council's intentions public - Undertake community stakeholder mapping (residents, business and government) - Prepare a community consultation plan - Allocate senior level responsibility for developing the strategy
2. Get to know your community emissions profile	Understand and refine your community emissions profile	- Raise awareness about the community profile and key emissions sources - Define the challenge of reducing emissions
3. Identify emissions reduction pathways	- Understand your 'business-as-usual' emissions - Develop a list of emissions reduction opportunities - Agree on a robust plan to net zero emissions	- Seek ideas about emissions reduction opportunities - Demonstrate how the LGA can deliver emissions reductions at required level - Seek input on emissions reduction targets and pathway

Stage of progress	Objectives	Interactions with stakeholders
4. Establish a net zero emissions target	• Establish a net zero emissions target with a timeframe	• Provide information about different targets and opportunities • Seek endorsement of the net zero emissions target from council and community
5. Develop and implement your net zero strategy	• Develop the strategy based on feedback from preferred emissions reduction pathways • Empower the community to reduce emissions • Prompt community groups to take ownership of emissions reduction opportunities	• Communicate the strategy and actions with the community • Seek endorsement and commitment from council, community and business • Allocate resources (time and finance) to deliver actions • Develop programs to empower and enable the community and business to deliver emissions reductions • Train staff to facilitate actions
6. Monitor and refine the strategy	• Establish a transparent process to monitor progress • Continually review and refine the strategy • Ensure council stays on track to achieve the strategy	• Keep the community informed of progress to net zero • Provide opportunities for ongoing engagement around emissions reduction opportunities • Periodically revisit the emissions reduction pathways and refine as needed
7. Share your success	• Recognise the community's contributions to the strategy	• Invite case studies from community, business and industry

2. Get to know your community emissions profile

Minimum

Quantify emissions from stationary energy, transport and waste associated with your LGA

Go further

Quantify all community emissions associated with your LGA

Your community emissions profile (also known as an inventory) identifies and quantifies the key sources of greenhouse gas emissions attributable to your LGA.

The NSW Government is working to ensure councils across New South Wales have access to emissions profiles that are based on consistent data sources and assumptions. Emissions can be rolled up to a precinct or state level, and councils with similar characteristics can utilise comparable data to gain new insights.

If you would like to understand more about generating an emissions profile and emissions reduction pathways, a detailed outline is provided in Appendix A.

You may already have a community emissions profile, through previous work or initiatives by other organisations. Every council will have online access to a BASIC[4] community emissions profile. There are opportunities to build and refine this using local data.

Analyse your emissions profile

To develop a robust community net zero strategy and enable better decision-making, you need to know your emissions profile in detail. You can do this in several ways:

1. Identify and explore the largest emissions sources in the profile.
2. Analyse your emissions against key indicators (see Table 2 below) to better understand the underlying drivers of emissions in your LGA.
3. Analyse source data for trends and evaluate any secondary data to gain insight into the key factors driving community emissions.

Conducting this analysis will help you to benchmark your profile against similar LGAs and may help generate ideas about emissions reduction activities to include in your net zero strategy.

Table 2 lists several of the indicators that can be used to analyse emissions sources for the BASIC level. This allows you to report on: standard emissions sources; scope 1 and scope 2 emissions from stationary energy and transportation; and scope 1 and scope 3 emissions from waste (refer to the Glossary for definitions of scopes).

Table 2   **Key indicators to build an emissions profile for BASIC level reporting**

Sector / emissions source	Key indicators
General – all sectors	Population and population growth Total dwellings by type Employment Geographic area
Stationary energy – electricity	Average electricity use per household Installed capacity of solar photovoltaic (PV)
Stationary energy – gas	Average gas use per household Number of households connected to gas mains
Transport – private	Mode share of private vehicles Fleet composition that is all-electric
Transport – public	Fuel type of public transport mode Number of trips
Transport – freight	Trips by freight Fuel efficiency of freight vehicles
Waste – all types	Waste diversion rates Kerbside recyclables and garbage per house Green waste collected per year Landfill gas capture

[4] The BASIC level of greenhouse gas emissions profile includes the emissions that occur in most LGAs: stationary energy, transportation and waste. See Appendix A for more details.

3. Identify emissions reduction pathways

Minimum

Analyse the drivers of emissions within your emissions profile. Identify opportunities to make the biggest impact on emissions

Go further

Benchmark your performance against similar councils and identify where actions can make the biggest difference to emissions

Emissions reduction pathways explore various emissions reduction opportunities councils might consider for their LGA, and the potential impact these will have on future emissions.

Understand your 'business-as-usual' emissions trajectory

The 'business-as-usual' emissions trajectory provides a picture of what your emissions might look like in future if no action is taken to reduce them. An example of a business-as-usual emissions trajectory is shown in Figure 7.

Future emissions projections are usually modelled based on changes to two types of factors:

- changes to levels of consumption (activity data); for example, increases in population will lead to increases in electricity use or petrol consumption
- changes to emissions intensity; for example, as technologies improve, they often become more efficient, so fewer greenhouse gas emissions are generated from the same amount of activity.

Pathways to 2030
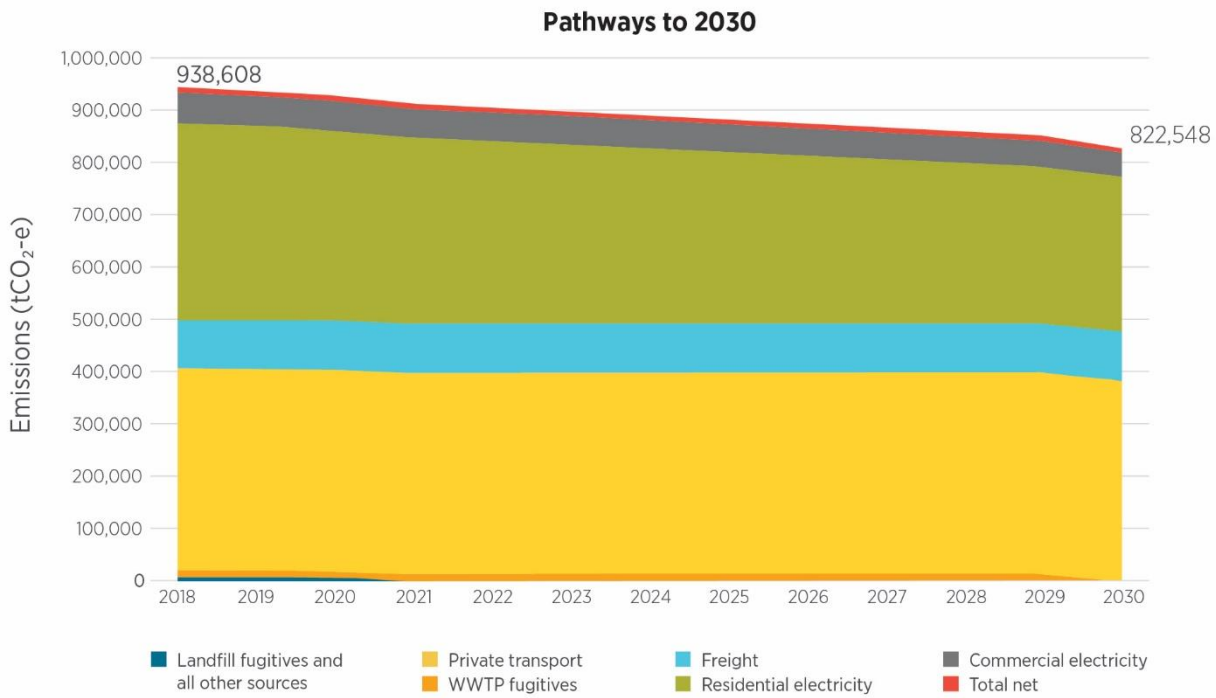
Figure 7   **Example of a business-as-usual trajectory**

Include effects of grid transition and energy transformation in the electricity grid baseline

For most councils, scope 2 emissions associated with electricity consumption are one of the most significant sources in the community emissions profile. With coal fired power stations closing and an increasing amount of renewable energy in the electricity grid, the emissions factor for grid electricity has been falling in recent years and will continue to fall over time irrespective of council actions. It is important this is considered when modelling a business-as-usual emissions trajectory.

Identify opportunities to reduce emissions
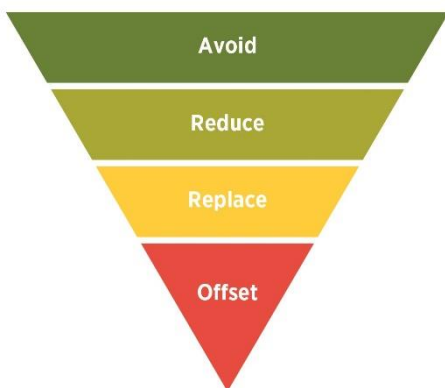
Councils can first investigate ways to reduce community emissions, starting with the sources of highest emissions identified in their emissions profile. In this step, councils can identify as many options as possible. They will later be refined to create the emissions pathway.

Emissions reduction actions can be considered according to the hierarchy outlined in Figure 8, with a priority on avoiding emissions. It is recommended that offsetting is generally used as a last step, after all other options to reduce emissions have been exhausted. The various actions are covered in more detail below.

Figure 8   Hierarchy of emissions reduction actions

The process of identifying opportunities to reduce emissions is ongoing. Numerous opportunities will exist within each sector and can be expanded over time through further scoping work, and as new technologies become available (or affordable).

The **Emissions reduction opportunities by sector** chapter of this guide provides more detail about specific reduction opportunities, supported by case studies.

Avoid

The best way to reduce community emissions is to avoid creating them in the first place. This means identifying activities that create emissions that could be stopped with no or minimal adverse impacts. Usually avoiding emissions also involves avoiding costs, so these activities tend to be highly cost-effective.

Examples include turning off electrical devices when not in use, avoiding travel by using video conferencing or encouraging the community to walk or ride their bike rather than driving petrol or diesel-powered vehicles.

Reduce

Reducing emissions generally involves making activities less emissions-intensive by introducing more efficient technologies or upgrading to more modern processes.

Examples include switching to energy-efficient LED lighting, encouraging more fuel-efficient vehicles and reducing waste sent to landfill.

Replace

Replacing emissions typically refers to transitioning to low-emissions sources of energy (e.g. renewable electricity) instead of traditional fossil fuel sources. Solar PV, wind and hydro power are examples of renewable energy technologies.

Technology improvements and a growing awareness of the need to transition away from fossil fuels is seeing the electrification of many sectors. All buildings now have options to completely replace natural gas with renewable energy to power heaters and boilers. Electric transport is also becoming a practical option, with recent technological improvements and cost reductions in electric vehicles.

Electrification will provide more options to reduce emissions in the future as the electricity grid decarbonises further.

Examples of replacing high-emissions sources include:

- installing on-site solar PV to displace the need for emissions-intensive grid electricity
- buying renewable energy (e.g. through the GreenPower program or a corporate Power Purchase Agreement (PPA))
- switching to electric vehicles powered by renewable energy.

Offset

To achieve net zero emissions, any 'residual emissions' that remain after undertaking the actions above can be addressed by purchasing and retiring an equivalent number of carbon offset credits.

A 'carbon credit' is a unit, usually represented in an accredited certificate, representing one tonne of CO_{2-e} prevented, reduced or sequestered by an activity. These credits can then be sold as carbon offsets to compensate for emissions occurring elsewhere. Carbon markets are a mechanism for trading credits and funding emission reduction projects.

Offsetting is usually considered a transitional measure when implementing a net zero strategy. For example, some communities or businesses may wish to bring forward their net zero plan but have some harder to mitigate activities in the short to medium term. It is an option available to address the emissions you are unable to reduce through other methods.

This may also present an economic opportunity for some communities and businesses, such as agriculture or public land managers, to sell offsets to others.

Offsetting needs to be carefully considered. If it is not done well it can lead to reputational risks and can be expensive. Reputational risks arise when the community feels that real efforts to reduce emissions have not been taken, and offsets have been purchased as an 'easy fix'. This can be avoided by ensuring all emissions reduction options are investigated and where feasible, implemented.

Another reputational risk comes from selecting poor quality or controversial offsets. Offsets with co-benefits meeting a broad range of sustainability commitments for the environment and society are generally well accepted. They often also meet higher standards of measurement, verification and longevity.

Table 3   Key traits to consider when choosing carbon offsets

Trait	Relevance to councils
Certification	Best practice offsets purchased are certified to a reputable standard, such as Australian Carbon Credit Units (ACCUs), Eligible-International Emissions Units (EIEUs), Verified Emissions Reductions (VERs) and Verified Carbon Units (VCUs).
Location	Give preference to purchasing credits from within the LGA (where available) so council funds support local initiatives; however, many councils will not have carbon offsetting projects in their LGA. Give next preference to domestic offsets with co-benefits such as enhanced biodiversity outcomes or support indigenous communities.
Project type	Different project types may be regarded as more credible, or better aligned to council values; for example, reforestation or hydroelectricity.
Co-benefits	There is growing demand for offsets with high additional co-benefits beyond carbon abatement, such as biodiversity outcomes, Aboriginal cultural and economic development, amenity, agricultural productivity, and landscape resilience. However, these co-benefits also typically increase the price of the offset unit.

As more businesses and organisations move towards net zero, the provision of offsets is creating an enormous economic and employment opportunity for regional NSW. This includes diversified revenue streams for land managers and an increased number of jobs that service and supply carbon markets such as renewable energy and environmental monitoring. Councils can consider creating carbon offset projects on council-managed land, such as Blacktown Council and Liverpool Plains Shire Council's 2010 Regenesis project, an Australian first.

Insetting

Unlike offsetting, which is typically undertaken by an unrelated third party, insetting is the process of including emissions reduction and carbon storage in a supply chain or in a local setting. As an example, an ice-cream manufacturer supports agroforestry in their supplier's vanilla plantations thereby balancing the emissions resulting from importing the vanilla. In a local setting, some farmers' markets are now incorporating a carbon price for local produce that has been grown using regenerative carbon farming techniques.

Develop net zero emissions pathways

The net zero emissions pathway maps out the activities that will be undertaken to achieve net zero emissions, and the resulting emissions plan over time.

To develop the pathway, review the emissions reduction opportunities identified in the previous step and decide which of these will be adopted in the net zero strategy. This process works well when it is collaborative, involving all affected internal and external stakeholders to ensure there is buy-in for the chosen actions and a good likelihood of success.

Deciding which opportunities to adopt will often be primarily based on their cost-effectiveness, noting that many emissions reduction actions (e.g. energy efficiency projects) will result in cost savings over time. A robust approach to building a pathway, where possible, is the use of a marginal abatement cost curve (MACC) that is developed for or adapted to the local specific conditions. The MACC may be built on the emission reduction opportunities identified in the previous steps.

There are other important factors that can be considered, including:

- council's ability to control or influence the emissions source
- the level of technical or financial uncertainty and risk associated with the opportunity
- associated co-benefits (e.g. local economic development or biodiversity enhancement)
- community perceptions
- staff and councillor appetite
- level of ambition and related targets of both council and potential partners within the LGA
- state and federal programs, grants and policies.

Once chosen, key emissions reduction actions can be modelled to establish a pathway for community emissions over time. The gap between planned actions and the net zero target is referred to as 'residual emissions'. These can be addressed by revisiting the list of actions to be implemented, or by purchasing offsets.

4. Establish your emissions target

Minimum

Set an emissions reduction target, potentially a net zero emissions 2050 target aligning with NSW government climate change policy

Go further

Set interim targets that drive decarbonisation across all emission sources

Define commitments and publish emissions reduction targets

Once the net zero pathway is established, targets can be set to cement the net zero objective. Targets can consist of an ultimate net zero goal (i.e. the year in which net zero emissions will be achieved) and interim targets to help ensure the net zero trajectory is maintained over time.

Wherever possible, it is preferable to have interim targets that are 'science based' – that is, they should align with the level of decarbonisation required to keep warming within 2°C (or 1.5°C for more ambitious councils). Table 4 gives an indication of what level of emissions reduction is required in which year, measured against a 2015 baseline. Always bear in mind that these are minimums, if possible deeper emissions reductions and shorter timeframes are preferable.

Table 4   **Extract from <u>Deadline 2020</u> showing the projected emission savings per capita to inform interim targets**

	Savings against 2015 emissions	
	1.5°C scenario	**2°C scenario**
2020 saving[5]	–5%	–5%
2030 saving	26%	24%
2040 saving	68%	51%
2050 saving	100%	78%

In a best-case scenario, all commitments and targets are guided by public consultation with residents and businesses.

In many cases, net zero targets are also endorsed by council. A commitment showing leadership from council with additional support from local stakeholders will strengthen the plan's delivery. This could be in the form of a signed agreement made publicly available.

5. Develop and implement your net zero emissions strategy

Minimum

Council highlights options to reduce community emissions and indications of how the LGA can achieve this

Go further

A clearly defined strategy outlining the actions council and community will take towards net zero emissions by 2050 at the latest

Develop the strategy

Your emissions reduction strategy outlines how you plan to achieve your emissions pathway and targets, and will be built on the knowledge, insights and feedback from across council and the community.

A comprehensive strategy document will contain the following:

- clearly defined responsibilities for implementing the strategy
- the defined LGA boundary,
- community emissions profile
- notes on sources excluded from the profile, and why
- the business-as-usual trajectory, forecasting emissions out to 2050 (and any underlying assumptions)
- a summary of emissions reduction opportunities, including an economic analysis of costs and benefits over time to inform investment decisions
- transparent documentation of a method for prioritising and selecting actions

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[5] Negative percentage indicates an allowance for an increase in emissions to 2020 (i.e. emissions peak before declining rapidly).

- planned or future pathways to reach commitments
- discussion on abating residual emissions (the 'gap' between projected emissions and the emissions reduction target)
- for all actions selected, a lead institution is nominated, while commenting on the partnership or collaboration arrangement with council
- acknowledgement of the dependencies inherent within the strategy including reliance on state and federal governments, residents and business, and how council can influence or assist these stakeholders to achieve the required changes
- planned 'touchpoints' with stakeholders to communicate progress and correct any shortfalls in emissions reductions
- a risk assessment of actions and the barriers to achieving success.

Once drafted, the strategy is then presented to relevant councillors and executives for approval.

As previously discussed in this guide, many councils are engaging with their community, who often have expertise and ideas to provide input to the strategy, contribute to actions, and take ownership of actions to drive emissions reductions.

You may choose to create a holistic climate change strategy, integrating the net zero strategy with a climate risk assessment and the required climate adaptation actions.

Implement the strategy

To be successful, community net zero strategies must be adequately resourced. In a council context, resources can refer to financial support, staff time, and training to build capacity.

Resources – both internal and external – are allocated for developing the net zero strategy itself, along with implementing actions defined in the strategy. Figure 9 outlines approaches to ensuring the effective implementation of the community net zero strategy.

Internal resourcing	External resourcing
• Communicate net zero strategy and related commitments within council • Train staff to facilitate actions to deliver the strategy • Incentivise the successful meeting of milestones and targets	• Communicate net zero strategy to local households and businesses • Support local households and businesses by providing information and financial resources such as grants, materials and capacity building to pursue emissions reduction pathways

Figure 9   **Approaches to allocation of resourcing**

6. Monitor, evaluate and review your strategy

Minimum

Keep your net zero strategy relevant and up to date

Go further

Update your net zero strategy over time, with input from local residents and businesses

For your net zero strategy to stay current and improve over time, it is best to consider regular updates and evaluation. This can be achieved by developing a formal process that covers the three steps listed below.

Recalculate your emissions profile

It is important to recalculate the community emissions profile regularly to enable you to monitor the progress of your net zero strategy. It is preferable to do this at least every four years in alignment with the Integrated Planning and Reporting guidelines, to capture changes to the emissions profile and ensure the latest science and carbon accounting methodologies are being used.

Monitor and track progress against targets

Monitoring emissions over time and tracking performance on an ongoing basis ensures you know if you're deviating too far from the chosen pathway or are at risk of missing any interim targets. In its simplest form, this can be done by reviewing the most recent emissions profile against projected emissions; however, it's often worthwhile tracking the progress of individual projects to ensure they are having the desired impact.

Update emissions reduction opportunities and pathways

With the information provided from the monitoring and tracking of progress and following regular recalculation of the emissions inventory, you can return to Step 4 and update the emissions reductions opportunities that make up the selected pathway. This may involve recalculating the emissions reductions from chosen actions or identifying brand new actions for consideration. Updating emissions reduction opportunities is vital considering the rapid developments in both technology and climate science, which result in new opportunities for emissions reductions becoming available on a continual basis.

7. Share your success

Minimum

Report your progress on your website and in council newsletters

Go further

Celebrate success with community events, local media and awards.

Report your progress

Clearly communicate your net zero strategy in a manner that is accessible to the intended audience. Communicating successes, along with the reasons for any failures will create confidence and help consolidate support from key stakeholders. This process can also be used to encourage community members to identify emissions reduction opportunities in their own homes and businesses.

Globally, over 9000 cities have committed to develop a full climate action plan through the Global Covenant of Mayors for Climate and Energy. Over 800 cities worldwide are reporting and disclosing carbon data on the global Carbon Disclosure Project platform, demonstrating their commitment to building a sustainable economy and tackling climate change.

Celebrate your success

Share case studies and stories of local achievements through a range of media channels that acknowledge actions of business, council and community. Recognition of local effort helps build capacity and inspire others. Think about entering awards that recognise and celebrate your commitment and success by participating in local, state or national awards.

Emissions reduction opportunities by sector

This section provides further details about the types of emissions reduction opportunities that councils may wish to adopt in key sectors as part of their net zero strategy.

Stationary energy

Stationary energy covers the energy used to power buildings, factories and infrastructure. It is the largest sector, contributing 60% of NSW's greenhouse gas emissions in 2017[6], primarily from public electricity production. For community emissions, it usually represents the largest source of emissions and includes electricity consumption and the combustion of natural gas in heaters and boilers.

Energy efficiency is the first step in reducing emissions from stationary energy. Improving the energy efficiency of existing and new buildings decreases emissions and has numerous other benefits including reduced power bills, improved comfort and increased productivity.

Remaining electricity emissions can be addressed through renewables. This can be generated on site or purchased off site. On-site solar PV is cost-effective to install on most buildings to offset grid electricity consumption and costs. Precincts provide an opportunity for integrated renewable energy systems (combining energy generation and battery storage) to be designed and installed to supply their own needs and to sell to other consumers. Residents and businesses within LGAs can also procure renewables through GreenPower or PPAs – either through rooftop PPAs for local business or aggregated offtake agreements from large-scale renewable developments such as wind and solar farms.

Non-electricity stationary energy sources can often be electrified (i.e. replaced or retrofitted so they use electricity only) and powered by renewable electricity to reduce emissions. For example, gas heaters can be replaced by electric heaters and gas hot water systems can be replaced by heat pumps. Currently green hydrogen is being trialled as a substitute for gas.

Figure 10 summarises some ways councils can drive greenhouse gas emissions reductions for stationary energy. Many councils have already implemented energy actions.

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[6] NSW emissions profile, see Figure 2 of this document

Direct council operations	Council planning, regulations & services	Community engagement
• **Energy efficiency:** • Retrofitting and optimising heating, ventilation, and cooling (HVAC) • Upgrade lighting (LEDs, sensors): facilities, street lights • Building fabric ugrades • Energy efficient appliances and hot water • Electrification of space and water heating, and cooking systems • **Renewables:** • Install rooftop solar PV or large scale solar/wind • Power purchase agreements to procure renewable energy • Electrify gas appliances and vehicle fleet • Microgrids and virtual power plants	• Adopt energy efficiency objectives and controls in development control plans to reduce emissions and prepare for low carbon technologies • Provide council access to funding and/or incentives for energy efficiency upgrades • Provide guidance to households and businesses on how to access renewable energy • Offer reduced rates to low-emissions buildings and businesses • Develop emissions reduction guidance for different building types (e.g. offices, schools, factories, etc)	• Promote the use of green building ratings tools (e.g.NABERS, Green Star Communities) • Provide community access to funding and/or incentives for energy efficiency upgrades • Provide guidance to households and businesses on how to access renewable energy • Facilitate Environmental Upgrade Finance to help businesses access funding for projects • Run community and business workshops on sustainable practices • Support communities to create microgrids

Figure 10 Opportunities for councils to reduce greenhouse gas emissions from stationary energy

Transport

The transport sector contributes 21% of NSW's greenhouse gas emissions, with road-based transport contributing almost 85% of this figure.

Electric vehicles, autonomous driving and smart technology (e.g. ride hailing apps and the 'internet of things') are large disruptors in the transport sector. Public and active transport are also central components of any transport emissions reduction strategy.

A sustainable transport future can provide many benefits within a community, including:

- increased mobility for all members of a community
- improved air quality through reduced emissions from cars and trucks
- more active communities
- improved safety outcomes for pedestrians and cyclists
- reduced isolation by improving access to facilities and connectedness.

Figure 11 below summarises some of the main ways councils can drive greenhouse gas emissions reduction in the transport sector.

Some councils have already implemented transport actions.

Direct council operations	Council planning, regulations & services	Community engagement
• Electric vehicle transition strategy for council vehicles • Ride-sharing and car-sharing programs for council business trips • Minimum efficiency standards for council vehicles • Enable staff to work flexibly to reduce commuting transport • Prioritise video conferencing over work travel	• Priority parking for electric and hybrid vehicles and ride-sharing services • Install electric vehicle charging stations in high traffic areas and at public transport hubs • Ensure availability and quality of walking and cycling infrastructure to reduce reliance on vehicles • Expand cycleways and pedestrian infrastructure • Advocate for congestion charging • Facilitate on-demand bus services and community transport services • Mandate cycle parking stations and showers for high density residential, commercial, and retail development	• Provide information to residents on the benefits of electric vehicles • Organise co-working hubs encouraging people to work closer to home • Create or update existing transport plans in collaboration with the community to improve active and public transport, as well as community initiatives such as car-sharing

Figure 11   **Opportunities for councils to reduce greenhouse gas emissions from transport**

Waste

Waste accounts for 2.2% of total emissions from NSW in 2017. These emissions occur when organic matter (e.g. food and garden waste) breaks down in landfills and wastewater treatment facilities, emitting methane (CH_4), which has a global warming potential (GWP) 25 times greater than carbon dioxide. One tonne of organic waste in landfill emits 1.9 tonnes of CO_2-equivalent emissions as it breaks down over 100 years (Department of the Environment and Energy 2018). Each LGA on average disposes of 212 tonnes of organic waste per year (EPA 2014). This will vary widely between councils.

Significant economic value and emissions reductions can be achieved from activities that:

- minimise the amount of waste, particularly organics generated, thereby reducing the amount of waste that could potentially end up in landfill and improving resource efficiency

- divert waste from landfill (with a focus on organic waste), thereby reducing emissions and potentially creating a new saleable product (e.g. recycled plastic or garden compost)

- increase the capture of landfill gas and either flare (which converts methane to CO_2 with a lower GWP), or generate power for boilers, kilns or even electricity generators.

Furthermore, there is diminishing capacity in existing landfill sites in Greater Sydney and more waste is being sent to landfill outside the region, adding to environmental concerns, transport emissions and the cost of waste processing.

A net zero strategy that addresses waste can therefore help reduce emissions and reduce other environmental impacts. Figure 12 below summarises some of the main ways councils can drive greenhouse gas emissions reductions for the waste sector.

Direct council operations	Council planning, regulations & services	Community engagement
• Waste minimisation strategies at council-operated sites • Filtration and reuse of grey water • Water tanks at council facilities • Encourage the procurement of local recycled content through council tenders and procurements e.g. by mandating a percentage of local recycled content for council procurement for construction materials and/or operations (e.g. purchase of fertiliser)	• Recovery of food and garden organic waste for households and businesses via additional kerbside bin • Expand auditing of kerbside bins to improve the quality of waste data • In high density residential, commercial, and retail developments, mandate waste stream infrastructure • Adopt targets to increase on-site waste management for new developments • Adopt on-site waste management objectives and controls in development control plans • Encourage local reuse and repair initiatives	• Roll out community education campaigns to reduce contamination of recycling streams, promote drop-off centres for problem wastes, and minimise waste generation • Promote 'circular economy' among local manufacturers to maximise benefits from resource recovery in the area • Free or subsidised sustainable waste management tools for the community (e.g. worm farms) • Incentives for local businesses to prevent single use plastic at council events • Collection or drop off services for reusable and repairable household and business items

Figure 12   Opportunities for councils to divert waste from landfill

Agriculture, Forestry and Other Land Use

In this guide, Agriculture, Forestry and Other Land Use (AFOLU) is considered as one combined emission sector. This is consistent with current IPCC and UNFCCC guidelines.

This was first adopted in the IPCC Guidelines in 2006. The UNFCCC adopted these guidelines for its reporting purposes from 2015. Previously AFOLU was reported as two individual sectors; Agriculture and LULUCF (Land Use, Land-Use Change and Forestry). The main difference between Agriculture and LULUCF is there are only emissions in Agricultural processes, however in LULUCF it is possible to also have removals of carbon dioxide and carbon storage. In summary, AFOLU can act as both a source of emissions and an emissions sink. Agriculture alone accounted for 19.4 Mt CO_2-e in NSW in 2017, whilst forestry and land use contributed to an overall reduction of 12.7 Mt CO_2-e.

As demonstrated in Figure 1, Commonwealth and NSW governments continue to report Agriculture and Land Use emission sectors separately.

Considered separately, agricultural practices are the third largest source of emissions in New South Wales. Over 70% of these emissions are methane (CH_4) produced from ruminant livestock such as cattle and sheep (NSW Department of Primary Industries 2018). The remaining 30% of emissions sources include manure, nitrous oxides from fertiliser use, crop waste decomposition, rice cultivation and stubble burning. Although a significant source of emissions, agriculture, forestry and other land use as a combined sector present a unique opportunity to draw down carbon from the atmosphere. In this way, these sectors may also serve as a carbon sink through a range of carbon farming and land management practices including:

- sustainable grazing systems for livestock

- conversion of cropland to pasture

- stubble retention

- environmental planting including shelter belts

- native vegetation regrowth

- agroforestry.

Forestry and appropriate land-use management strategies, such as revegetation, reforestation and soil carbon management, offer some of the best opportunities for rapid, cost-effective carbon sequestration. In addition to carbon sequestration activities, it is important that existing carbon stocks, including national parks, are conserved and improved. Conversely, poor land management practices and land clearing are a major source of greenhouse gas emissions. This includes losses in soil carbon through wind erosion and dust emissions.

Significant market opportunities and emissions reductions can be achieved from activities that:

- reduce methane production from livestock (e.g. through feed supplements)

- support carbon farming practices and access to carbon markets

- increase consumer demand for carbon neutral agricultural and forestry products.

While council may have limited control over agricultural practices, council can be a conduit to promoting and connecting agricultural producers and managers with new opportunities. The NSW Department of Primary Industries (DPI) is leading two projects that will directly contribute to emissions reduction within the agriculture sector:

- Emissions Reduction Pathways Project – This project will investigate the feasibility of cost-effective emissions reduction and carbon sequestration for primary industries.

- Accessing Carbon Markets Project – This project seeks to increase primary industries' access to carbon markets and opportunities to optimise industry contribution to reduce emissions.

DPI's broader climate change strategy identifies other opportunities for farmers that support emissions reduction in the stationary energy sector. For example, DPI has several projects in this area including the Clean Energy Solutions, Biomass for Energy and Energy Efficiency projects. For more information, visit DPI's Climate Research Strategy webpage.

Farmers can connect with DPI directly or engage with Local Land Services (LLS) for support and advice. In addition, the CSIRO has developed tools to provide land managers with an insight to potential opportunities and estimated income from opportunities currently available under the Emissions Reduction Fund (ERF). Visit the LOOC-C website for more information.

Emissions reduction activities in this sector may also have additional benefits such as increased resilience to climate change or positive biodiversity outcomes. Increasing urban tree canopy can reduce the impact of flooding and limit urban heat island effect. Cooler streets mean cooler cars and households, and therefore can reduce energy use. A greater urban canopy allows for more active and social communities.

Research has shown that increased urban canopy cover in retail areas can have local economic benefits, by improving retail activity by up to 20% (Greater Shepparton City Council 2017). Increasing native tree cover can have many positive environmental benefits for native wildlife.

By expanding or maintaining the urban green grid (e.g. tree canopy and green space) in your LGA, carbon can be drawn out of the atmosphere into plants and soil. There are now several methods to create (and sell) carbon credits for undertaking these activities under the federal government's Emissions Reduction Fund (Department of the Environment and Energy 2017).

Direct Council operations	Council planning, regulations & services	Community engagement
• Review procurement practices to identify low emissions products where practical • Greenwaste can be processed into compost or biochar and made available for application to gardens and farmland to increase soil carbon and reduce fertiliser use • Install green roofs and green walls in Council buildings • Increase tree canopy on Council-owned sites	• Ensure appropriate zoning to support use of land according to potential (capability) and to ensure balance between production/conservation/ urban & infrastructure • Promote low-emissions resources in construction projects (such as recycled and sustainably harvested timber, hempcrete and other alternatives to high-emissions building materials • Ensure sufficient tree planting in new developments and provide tree protection controls • Protect and maintain native vegetation and habitat, including grasslands, when approving new development. • Adopt vegetation clearing controls in the development control plan to protect and maintain native vegetation and habitat in established areas. Set targets for tree planting in established areas. • Identify sites for bush and soil regeneration projects • Plan for parks and greenspace - also provides social amenities for the community • Increase urban tree canopy by greening pavements, streets and carparks with native verge gardens and median strips • Plan for community gardens	• Work with local businesses to measure and manage emissions from peri-urban agriculture and forestry (if relevant) • Engage with local interest groups to foster carbon reduction to build awareness of the role of agriculture in achieving net-zero • Encourage land holders to plant trees and create green space • Support local carbon farming opportunities and link farmers to Department of Primary Industries and Local Land Services initiatives and programs • Support local farmers markets that promote and value carbon farming practices • Facilitate gardening and vegetation workshops • Support local community "greening" organisations and work together on bush and soil regeneration projects • Implement "citizen forester" programs

Figure 13 **Opportunities for councils to reduce greenhouse gas emissions in Agriculture, Forestry and Other Land Use**

Industrial processes

Industrial processes can account for significant greenhouse gas emissions, particularly from intensive industries such as cement, steel and glass materials which are used in construction projects. In New South Wales, these materials are responsible for 13 Mt or 10% of NSW total emissions.

Although your LGA may not include heavy industry, local government can demonstrate leadership by choosing low emissions materials and alternative resources for new developments where practical. Your LGA may also be able to offer offsets to help some heavy emitters elsewhere achieve their net zero goals, such as through revegetation projects.

Direct council operations	Council planning, regulations & services	Community engagement
• Support market for use of existing low emissions construction materials • Embed green standards and targets into local government procurement processes.	• Encourage developers and construction projects to specify lower emissions materials and alternative resources or 'green' products	• Where heavy industry is present within your LGA, opportunity to work with industry to understand its impact on your community emissions profile, and support continuous improvement • Opportunities to link manufacturers and industry stakeholders to relevant Department Planning, Industry and Environment programs e.g. - Manufacturing Efficiency Fundings, Energy Management Services, Business Connect and Sustainability Advantage

Figure 14 Opportunities for councils to reduce greenhouse gas emissions in Industrial processes

Community net zero strategy checklist

Use the checklist below to assess your progress on the net zero journey.

Check the appropriate box to indicate you have completed an action.

	Done?
1. Engage stakeholders (ongoing)	☐
2. Get to know your community emissions profile	
2.1 Set your emission boundaries	☐
2.2 Collate data	☐
2.3 Calculate your community emissions	☐
2.4 Analyse your baseline emissions profile	☐
3. Identify emissions reduction pathways	
3.1 Understand your 'business-as-usual' emissions	☐
3.2 Identify opportunities to reduce emissions	☐
3.3 Develop a net zero emissions pathway	☐
4. Establish a net zero emissions target	
4.1 Establish your target	☐
4.2 Seek council and community endorsement	☐
5. Develop and implement your net zero emissions strategy	
5.1 Define commitments and publish emissions reduction targets	☐
5.2 Develop a strategy in collaboration with the community	☐
5.3 Update commitments and publish emissions reduction targets	☐
6. Monitor, evaluate and review your strategy	
6.1 Recalculate your emissions profile	☐
6.2 Monitor and track progress against targets	☐
6.3 Update emissions reduction pathways	☐
7. Share your success	
7.1 Celebrate your progress	☐
7.2 Share case studies of local achievements	☐

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Resources

The AdaptNSW website provides resources on climate change mitigation and adaptation relating to urban greening.

climatechange.environment.nsw.gov.au

Australian PV Institute's *Solar PV Maps and Tools* can provide tools to explore rooftop PV potential and per-postcode market penetration.

pv-map.apvi.org.au

Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities: How to improve waste management at commercial facilities.

www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/managewaste/120960-comm-ind.pdf

Better Practice Guide for Resource Recovery in Residential Developments: How to improve waste management in residential developments

http://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/warrlocal/19p1559-resource-recovery-in-residential-developments.pdf

Beyond Zero Emissions have a range of resources, research and guides for communities and businesses planning for net zero across all sectors, including land use.

bze.org.au

BZE have developed the Zero Carbon Communities initiative

www.bze.org.au/zero-carbon-communities

Cities Power Partnership is a network for councils designed to provide sharing between members. Councils who join the partnership make five action pledges in either renewable energy, efficiency, transport or working in partnership to tackle climate change.

citiespowerpartnership.org.au

The Climate Action Planning Framework developed by C40 provides a framework for cities to deliver climate action in line with the Paris Agreement, enabling councils to drive rapid and systematic change. The framework also considers climate adaptation.

resourcecentre.c40.org/climate-action-planning-framework-home

The Climate Active Carbon Neutral Standard (formerly NCOS) enables the certification of carbon neutrality for organisations, events, buildings and precincts. Climate Active may be expanded in the future to include a standard for the certification of carbon neutral cities, which will likely be like the approach adopted for Precincts. Climate Active also provides guidance on carbon offset units that have been assessed as meeting the Standard's offsets integrity principles.

www.environment.gov.au/climate-change/government/climate-active/

C40 Cities Climate Leadership Group (C40) in partnership with the University of Leeds (United Kingdom), the University of New South Wales (Australia), and Arup have conducted a joint study to establish consumption-based GHG inventories to better understand the ability of cities to contribute to GHG emissions reduction activities beyond their city boundaries.

www.c40.org/researches/consumption-based-emissions

COAG Trajectory for Low Energy Buildings is a national plan that sets a trajectory towards zero energy (and carbon) ready buildings for Australia.

coagenergycouncil.gov.au/publications/trajectory-low-energy-buildings

Co-operative Research Centre for Low Carbon Living (CRC-LCL) is a national research and innovation hub based at UNSW that seeks to enable a globally competitive low carbon-built environment sector in Australia.

www.lowcarbonlivingcrc.com.au

Deadline 2020 is the first significant route map for achieving the Paris Agreement, outlining the pace, scale and prioritisation of action needed by C40 member cities over the next five years and beyond.

www.c40.org/researches/deadline-2020

Food Smart is an interactive program to help NSW households learn how to reduce food waste at home. Households receive a toolkit with resources like bag clips and food huggers to help them reduce food waste and receive email prompts and tips to help them on their way.

www.lovefoodhatewaste.nsw.gov.au/at-home/food-smart-program

Green Star is a suite of ratings tools and resources for the sustainable design, construction and operation of buildings, industries and communities. It is administered by the Green Building Council of Australia.

new.gbca.org.au/green-star

The National Australian Built Environment Rating System (NABERS) is a suite of rating tools to rate buildings on their energy efficiency, water consumption, waste generation and internal environment quality.

www.nabers.gov.au

The National Greenhouse Accounts (NGA) factors are a set of carbon calculation methodologies and emissions factors published annually by the Australian Government. This document can be used by councils to assist in calculating their community greenhouse gas emissions.

 www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications/national-greenhouse-accounts-factors-august-2019

The Net Zero Emissions Tracker will be a free online database of emissions reduction commitments from Australian organisations, with a focus on net zero emissions commitments. The tool is being developed by ClimateWorks and is scheduled for release in late 2019.

https://www.climateworksaustralia.org/project/net-zero-momentum-tracker/

Open Cities is a national peak association for Next-Gen infrastructure and services. It works with utility and mobility businesses, councils, government agencies, and financial and research organisation to create policy and market setting that transition Australia's utility and mobility sectors to the future. It has co-designed a 5-Step Guide to Next-Gen infrastructure to assist councils and communities to procure and build Next-Gen utility and mobility solutions.

opencities.net.au

The Point Advisory Net Zero Pathways Tool enables councils to visualise different climate action trajectories by switching emissions reduction opportunities on and off, and by adjusting key assumptions.

www.pointadvisory.com/tools/netzero

The NSW Government Architect has developed reports on Sydney's Green Grid by district.

www.governmentarchitect.nsw.gov.au/projects/sydney-green-grid

PAS 2070:2013 (Specification for the assessment of greenhouse gas emissions of a city) is an accounting methodology for community-scale greenhouse gas emissions. It expands upon the

number of reportable emissions sources in the GPC[7]. The standard should only be used once a comprehensive strategy focusing on emissions reductions has been created for the GPC categories.

shop.bsigroup.com/Browse-By-Subject/Environmental-Management-and-Sustainability/PAS-2070-2013

UTS Institute for Sustainable Futures undertakes research on waste minimisation and renewable energy opportunities.

www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures

Initiatives to assist funding available to NSW councils

Budget pressures can be a major barrier to NSW councils implementing the initiatives needed to realise their net-zero goals. There are currently various government backed initiatives that can assist NSW councils with grant funding, competitive finance or capacity building services:

NSW Sustainable Government team provides strategic support and advice for energy efficiency projects. They can provide government organisations with access to a pre-qualified panel of energy service companies, energy-usage data analysis tools and access to finance.

https://www.environment.nsw.gov.au/topics/sustainable-business-and-government/sustainability-in-government-agencies

Australian Renewable Energy Agency ARENA was established by the Australian Government on 1 July 2012 to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia.

https://arena.gov.au/

Clean Energy Finance Corporation, CEFC has a unique role to increase investment in Australia's transition to lower emissions. We invest to lead the market, operating with commercial rigour to address some of Australia's toughest emissions challenges - in agriculture, energy generation and storage, infrastructure, property, transport and waste.

https://www.cefc.com.au/

The Emissions Reduction Fund is a scheme that provides financial incentives to organisations and individuals to use new practices and technologies in their business, so they can reduce their greenhouse gas emissions and improve their energy efficiency.

https://www.business.gov.au/assistance/emissions-reduction-fund

The NSW Energy Savings Scheme (ESS) seeks to reduce energy consumption in NSW by creating financial incentives for organisations to invest in energy saving projects. Energy savings are achieved by installing, improving or replacing energy savings equipment.

https://www.ess.nsw.gov.au/Home/About-ESS

TCorp Green Term Deposits - TCorp's position as a programmatic issuer has enabled it to pilot the issue of green term deposits to the NSW local government sector. The net proceeds from these deposits are earmarked against the same pool of eligible green assets as the Green Bond, with Climate Bonds Standard Certification received in August 2019. A maximum cap will be applied to this product to ensure the asset pool exceeds the total size of all sustainability bonds and green term deposits on issue at any given point in time.

https://www.tcorp.nsw.gov.au/resource/TCORP-Sustainability-Bond-Programme-Annual-Report-2019-Secured.pdf

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[7] Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories; see Appendix A

Appendix

How to develop your current community emissions profile

Minimum

Quantify emissions from stationary energy, transport and waste associated with your LGA

Go further

Quantify all community emissions associated with your LGA

Your community emissions profile (also known as your inventory) identifies and quantifies the key sources of greenhouse gas emissions attributable to your LGA.

The **Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories** (GPC) is a globally accepted standard used to identify, calculate and report community greenhouse gas emissions. The GPC is recommended for all councils seeking to develop a community emissions inventory and is compatible with internationally recognised programs such as the Global Covenant of Mayors.

Other accounting standards and frameworks, many of which are based on the GPC, are included in the 'Resources' section of this document.

You may already have a community emissions profile, through previous work or initiatives by other organisations. For example, Resilient Sydney have developed community emissions profiles for Greater Sydney councils, and some regional councils have also already developed emissions baseline profiles.

Decide on the types of emissions to be included in your community emissions profile

The first step is to identify what sources should be included and excluded in your emissions profile. Adopting an appropriate definition means your profile will be credible, comparable with your peers' profiles and consistent over time.

The emissions profile covers activities that occur within the physical LGA boundary. The GPC allows for two levels of reporting:

- BASIC – covers emissions that occur in almost all LGAs (stationary energy, in-boundary transportation, and in-boundary generated waste)
- BASIC+ – covers BASIC sources as above plus industrial emissions, agriculture, land sector, transboundary transportation, and indirect energy emissions.

Emissions 'scopes' help to categorise the sources of emissions that should be included in the boundary, as defined in Table A1.

The GPC also specifies that an emissions inventory must cover a time period of one year.

Table A1   Definition of community emissions 'scopes'[8]

Scope	Definition (GPC)	Examples
Scope 1	Greenhouse gas emissions from sources within the LGA boundary	Combustion of transport fuels, fugitive emissions from landfills
Scope 2	Greenhouse gas emissions occurring because of the use of grid-supplied electricity, heat, steam and/or cooling within the LGA boundary	Purchased electricity
Scope 3	All other greenhouse gas emissions that occur outside the boundary from activities taking place within the LGA boundary	Electricity transmissions and distribution losses, waste and wastewater exported from the LGA

Collect data

Once the sources of emissions have been identified, the quantity of emissions from each of these sources can be calculated.

Emissions are typically calculated based on 'activity data', which refers to how much of something is being done – for example the amount of electricity being consumed (in kilowatt hours) or the amount of petrol being combusted (in kilolitres). Table A2 provides examples of sources of activity data typically needed by councils in developing their community profile.

Table A2   Examples of data sources of activity data

Source	Data sources
Electricity	Customer data from energy utilities Zone substation data from electricity networks
Transport	Transport surveys Freight statistics
Waste	Council collection records Waste transfer station and landfill weighbridge records

Calculate your community emissions

In their simplest form, emission calculations involve multiplying activity data by an 'emissions factor'. An emissions factor is a representative value that relates to the quantity of emissions specific to an activity. In Australia, the most widely used set of emissions calculation methodologies and factors is the National Greenhouse Accounts, published annually by the federal government. An example of a Scope 2 emissions calculation from grid electricity consumption is provided in Figure A1.

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[8] From GPC, section 3.5

Activity data		Emissions factor		Emissions
Electricity consumption 450,000,000 kWh	X	2018 NSW electricity grid factor 0.82 kg CO_2-e per kWh	=	(divided by 1,000) 369,000 t CO_2-e

Figure A1   **Example of emissions calculation for grid electricity consumption**

Emissions profiles usually take the form of a spreadsheet providing a list of emissions sources showing the associated activity data and greenhouse gas emissions, presented as 'tonnes of carbon dioxide equivalent' (tCO_2-e).

Glossary

100% renewable: Refers to instances where all electricity consumption is sourced from renewable sources (either directly via on-site renewables, via retailer GreenPower programs, or through the purchase and retirement of renewable energy certificates).

Australian Carbon Credit Unit (ACCU): 1 ACCU = 1 tonne of carbon stored. ACCUs are the central tradeable unit of the Commonwealth Emissions Reduction Fund. ACCUs are issued by the Clean Energy Regulator in accordance with *Carbon Credits (Carbon Farming Initiative) Act 2011*.

BASIC: The BASIC level covers scope 1 and scope 2 emissions from stationary energy and transportation, as well as scope 1 and scope 3 emissions from waste.

BASIC+: This is an extension of BASIC, involving more complex data collection and calculation processes, and additionally includes emissions from IPPU (Industrial Processes and Product Use), and AFOLU (Agriculture, Forestry and Other Land Use) and transboundary transportation.

BASIX: The Building Sustainability Index (BASIX) is a planning measure developed by the NSW Government under the Environmental Planning and Assessment Regulation (2000) to ensure that residential buildings have efficient water use and reduced greenhouse gas emissions integrated into their design and management.

Building Upgrade Finance: Many financiers offer specialist environmental upgrade finance products to support businesses to upgrade commercial buildings and reduce emissions. These finance products can be used to reduce the carbon footprint of buildings, improve energy efficiency and thermal comfort with benefits for commercial landlords and tenants. For more information visit www.environment.nsw.gov.au/business/upgrade-agreements.htm.

Carbon budget: The carbon budget is the estimated amount of carbon dioxide equivalent emissions the world can emit while limiting global temperature rise to 2°C above pre-industrial levels.

Carbon dioxide equivalent (CO$_2$-e): The standard unit for measuring greenhouse gas emissions. Different greenhouse gases have different global warming potential; CO$_2$-e brings them all into a single, comparable unit.

Carbon neutral: Where the net carbon emissions associated with an activity or entity are equal to zero because emissions have been reduced and offset units cancelled to fully account for all emissions.

Carbon offsets: Activities that reduce greenhouse gas emissions or remove greenhouse gases from the atmosphere to compensate for emissions produced elsewhere. One tonne of offsets is equivalent to one tonne of CO$_2$ equivalent. There are various types and qualities of offsets, depending on the methodologies used to create them. In Australia credible offsets are accredited under the Climate Active Carbon Neutral Standard (formerly National Carbon Offset Standard (NCOS)). Some offsets have additional social or environmental benefits.

Community emissions profile: A quantitative summary of a council's community greenhouse gas emissions across its local government area (LGA) by source, also referred to as an emissions inventory. This includes business, industry and residential related emissions.

Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC): A protocol that provides a robust framework for accounting and reporting city-wide greenhouse gas emissions created through of partnership of World Resources Institute, C40 Cities Climate Leadership Group and International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability.

Greenhouse gas (GHG): A gas that absorbs infrared radiation, thus contributing to the 'greenhouse effect', a phenomenon of sealing the sun's warmth in the Earth's lower atmosphere. This is what is driving man-made climate change.

Global warming potential (GWP): A measure of how much heat a greenhouse gas traps in the atmosphere, relative to carbon dioxide with a GWP of 1.

Intergovernmental Panel on Climate Change (IPCC): Established in 1998 for the purposes of assessing climate change based on the latest science. The IPCC published a 5th special report in 2018 that reported on the impacts of global warming of 1.5°C above pre-industrial levels and related greenhouse gas emissions pathways.

International Council for Local Environmental Initiatives (ICLEI) – Local Governments for Sustainability: A global network of cities, towns and regions committed to a sustainable future. More than 1750 local and regional governments from over 100 countries are members of the network, which influences sustainability policy and drives local action.

Kyoto Protocol: An international treaty adopted in 1997 and entered into force in February 2005, establishing the objective of the UNFCC to reduce the onset of global warming by reducing the six greenhouse gases (see below).

Kyoto Protocol greenhouse gases: The Kyoto Protocol initially listed six gases driving the greenhouse effect: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Nitrogen trifluoride (NF_3) was more recently added to this list. Of these six gases, three are largely due to human activity. Carbon dioxide is the main contributor to climate change, due to burning fossil fuels. Methane is produced naturally when vegetation is burned, digested or rotted in anaerobic conditions. Livestock farming, landfill, rice farming and oil and gas production activities all release methane. Nitrous oxide, released by chemical fertilisers and burning fossil fuels, has a global warming potential 310 times that of CO_2.

Local government area (LGA): The geographic area governed by a local government. In this case the LGA boundaries are used to define the area the emissions baseline is based upon.

Low carbon: A state where carbon emissions are reduced compared to a previous baseline, through energy efficiency and renewable energy projects. Implementing low carbon initiatives is the first step towards achieving a net zero emissions target.

Net zero emissions: A state where any emissions of greenhouse gases generated are counterbalanced by the removal of greenhouse gases from the atmosphere. In practice this means reducing emissions as far as possible, then offsetting the remainder through activities such as tree planting, soil management and carbon capture and storage.

Paris Agreement: At the 21st session of the Conference of the Parties ('COP21') to the UNFCCC (see definition below) held in Paris in 2015, the world agreed to a global goal to limit average temperature increases to 'well below 2°C' and pursue efforts to keep warming below 1.5°C above pre-industrial levels.

A total of 176 Parties have ratified the Paris Agreement, including Australia, which officially did so on 10 November 2016. All signatory countries are to set emissions reduction targets from 2020 and review their targets every five years to build ambition over time, informed by a global stocktake.

Power purchase agreement (PPA): A long-term contract to purchase a certain amount of electricity directly from a power plant, usually at a competitive rate. Most (but not all) current PPAs involve purchasing electricity from wind and solar farms but can also apply to on-site contracts that allow organisations to purchase energy from rooftop solar managed by a third-party provider.

Science-based targets (SBTs): Targets are considered 'science based' if they are consistent with the level of decarbonisation required to achieve the goals set in the Paris Agreement. SBTs provide a pathway for an organisation to future-proof growth by specifying how much and how quickly they need to reduce their greenhouse gas emissions.

Scopes 1, 2 and 3: The concept of scopes categorises emissions sources for the purposes of carbon accounting and reporting to improve transparency and avoid the double-counting of emissions. Three scopes are defined in carbon accounting:

- **Scope 1** emissions are direct emissions from sources located within a designated boundary (e.g. natural gas combusted in homes and factories within an LGA)
- **Scope 2** emissions occur as a result of the use of grid-supplied electricity (or from heat, steam, and/or cooling) imported into the boundary area
- **Scope 3** emissions occur outside the boundary as a result of activities taking place within the boundary (e.g. landfill gas emissions from tips outside the LGA caused by waste generated from households and businesses within the LGA).

Sustainable Development Goals: A global strategy, agreed by the United Nations General Assembly, that contains 17 goals for the 2015–2030 period. *SDG Goal 7: Affordable and Clean Energy* and *SDG Goal 13: Climate Action* have specific targets and indicators that can be tied to a net zero strategy.

United Nations Framework Convention on Climate Change (UNFCCC): An international environmental body formed as a result of a treaty adopted in 1992. The UNFCCC is the body responsible for organising global consensus on climate change related issues. The UNFCCC convenes an annual conference, referred to as the Conference of the Parties (COP).