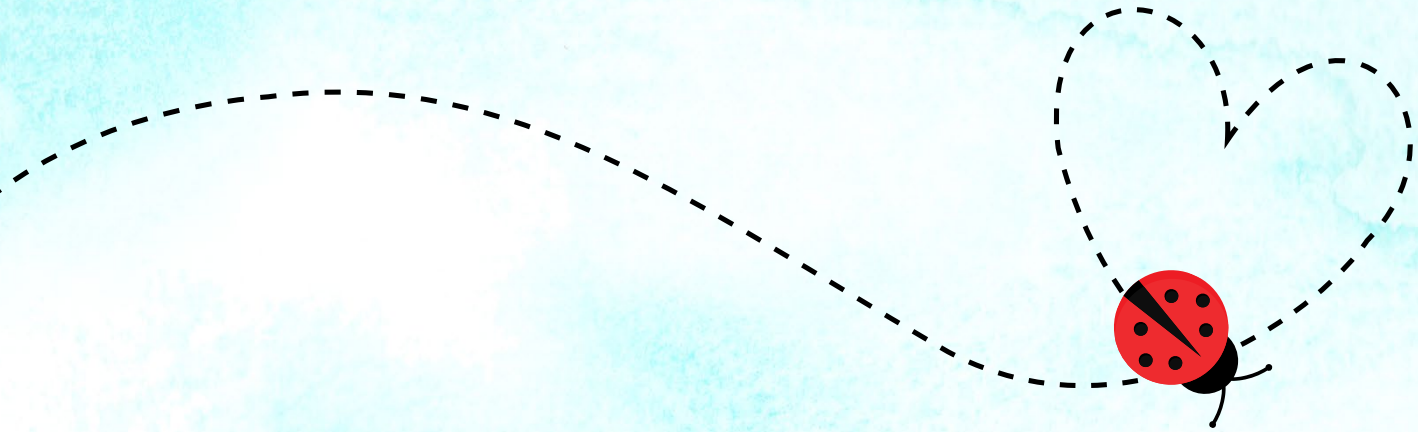
Ku·ring·gai Council

LOVING LIVING KU-RING-GAI
Sustaining Sydney's green heart



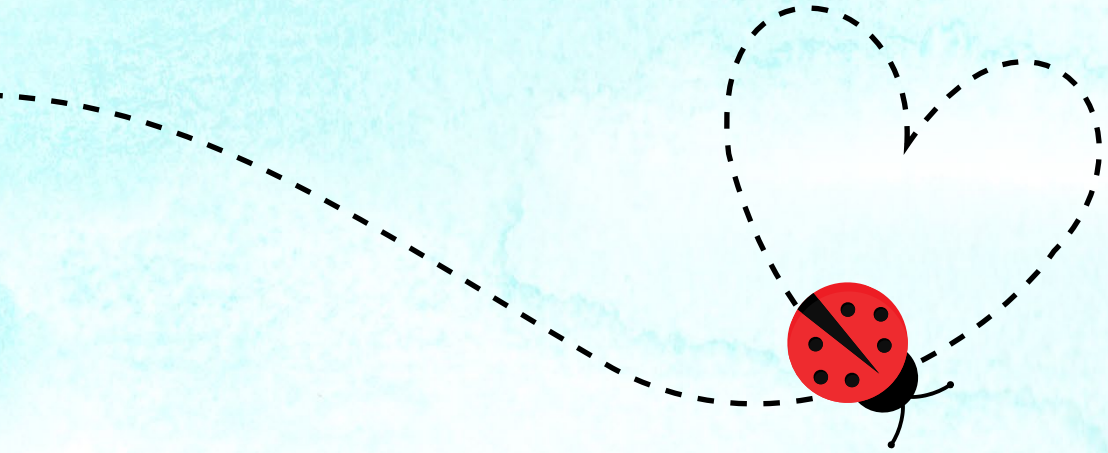
Net Zero Communities Strategy

2022 – 2027

Acknowledgment of Country

Ku-ring-gai Council recognises the traditional custodians of the land and pays tribute to elders past, present and emerging.

Contents



List of figures and tables

1. Background

It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred (IPCC 2021, p4). Global surface temperature was 1.09°C higher over the last decade (2011-2020) than the 1850-1900 average (IPCC 2021, p5), with larger increases over land (1.59°C). Almost all of that increase can be attributed to humans (IPCC, 2021, p5). In 2019, atmospheric CO_2 concentrations were higher than at any time in at least 2 million years (IPCC 2021, p8).

This has coincided with an increasing trend in the magnitude, intensity and frequency of climate and weather extremes, from heatwaves and droughts to floods and storms, in every region across the globe (IPCC 2021, p8), with extensive economic, environmental and social costs for local communities. Our climate is not merely changing, the rate of change is now accelerating (Climate Council 2021, p1), with many changes in the climate system becoming larger in direct relation to increasing global warming (IPCC 2021, p15).

The peak scientific body on climate change, the Intergovernmental Panel on Climate Change (IPCC), states that *"climate change represents an urgent and potentially irreversible threat to human societies and the planet*[1]*"*. Climate projections indicate the world faces large scale collapse and loss of entire ecosystems (IPCC 2018, p230); severe impacts to human health - from stronger heatwaves, lower air quality, and extreme loss of food and water security (IPCC 2018, p247); an increased extent of extreme weather and climate events – flooding, drought, severe storms and wildfire (IPCC 2018, p255); increased damage to critical infrastructure; and severe economic losses due to aggregated and compounding impacts (Climate Council 2019). These projected changes in extremes are larger in frequency and intensity with every additional increment of global warming (IPCC 2021, p18).

In December 2015, the United Nations Framework Convention on Climate Change (UNFCCC) hosted international discussions on the state of climate change and the threats posed by global heating, at the 21st Conference of the Parties (COP21) in Paris. The seriousness of those threats led to the adoption of the Paris Agreement by 196 parties at COP 21 (including Australia), a legally binding international treaty on climate change. Article 2 of the Paris Agreement commits signatories to *"holding the increase in the global average temperatures to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change"*. It entered into force on 4 November 2016. Today, 193 Parties (192 countries plus the European Union) have joined the Paris Agreement.

At the 2021 COP 26 United Nations Climate Change Conference (UNFCCC) in Glasgow, Scotland, nations met and agreed to adopt the Glasgow Climate Pact, aiming to turn the 2020s into a decade of climate action and support, so that the rise in the global average temperature can be limited to 1.5°C. The Glasgow Climate Pact requests all countries revisit and strengthen their 2030 targets by the end of 2022.

With clear benefits to people and natural ecosystems, limiting global warming to 1.5°C compared to 2°C could go hand in hand in hand with ensuring a more sustainable and equitable society[2].

[1] See Chapter 1 — Global Warming of 1.5 ºC (ipcc.ch)

[2] See Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments — IPCC

2. Policy context

2.1. Federal Government

In April 2016, Australia became a signatory to the Paris Agreement, and in November 2016, Australia announced its ratification of the Paris Agreement.

In June 2022, the newly elected Labor Government conveyed Australia's updated Nationally Determined Contribution (NDC) under the Paris Agreement to the Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC). This formalises Australia's pledge to reduce greenhouse gas (GHG) emissions by 43% below 2005 levels by 2030 and to achieve net GHG zero emissions by 2050, recently legislated in the Australian Parliament.

2.2. NSW Government

The state of New South Wales (NSW) contributes about a quarter of Australia's emissions and so has a key role to play in meeting Australia's international obligations and supporting further mitigation under the Paris Agreement. The NSW Government has committed to reach net zero GHG emissions by 2050, including a 50% emissions reduction on 2005 levels by 2030.

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.

2.3. Ku-ring-gai Council

The IPCC (2018) *Special Report on Global Warming of 1.5˚C* indicates that 1.5°C pathways with no overshoot (that are deemed to provide a one-in-two to two-in-three chance of limiting global heating to 1.5°C with no overshoot) have the following characteristics:

- the global economy reaches the point of annual net zero GHG emissions by 2040, or sooner
- the global economy reduces annual GHG emissions by 50% by 2030, or sooner
- 1.5°C pathways with no, or limited overshoot, include a rapid decline in the carbon intensity of electricity, and an increase in electrification of energy end use, with a reduction in the carbon intensity of electricity of about 90% between 2020 and 2030

In response to these findings and in accordance with the Paris Agreement, *Council's Climate Change Policy 2020* contains the objectives to:

- reduce Council's total GHG emissions (from fixed assets, street lighting and vehicles) by 50% by 2030 (relative to 2000 levels), or earlier
- reduce Council's total GHG emissions (from fixed assets, street lighting and vehicles) to net zero by 2040, or earlier

- reach 100% renewable energy for all grid-sourced electricity by 2030, whilst pursuing efforts to reach 100% renewable energy by 2025
- reduce fleet emissions to net zero GHG emissions by 2040, or earlier
- support the community in the goal of reaching net zero GHG emissions by 2040, through the delivery of programs and initiatives that further community GHG emission reduction efforts

This Policy is supported by the *Towards Net Zero Emissions - 2030 Action Plan*, which provides an overarching management framework for Council to continue to progress towards net zero GHG emissions and to support the Ku-ring-gai community on their pathway to net zero GHG emissions. Included in the Action Plan is a suite of emission abatement opportunities so that community GHG emissions follow a downward trend consistent with that required to limit global heating to no more than 1.5°C (that is, net zero GHG emissions by 2040), based on the commissioned 100% Renewables (2020) report: *Community Inventory and Climate Change Strategy - inputs to tasks supporting the review of Council's climate change strategy*.

Council also becoming a signatory (at the Ordinary Meeting of Council on 16 November 2021) to the Cities Race to Zero initiative, which involved a:

- pledge to recognise the global climate emergency and to commit to keeping global heating below the 1.5°C goal of the Paris Agreement.
- pledge to reach net zero GHG emission in the 2040s or sooner, or by mid-century at the latest, in line with global efforts to limit warming to 1.5°C
- pledge to set an interim target to achieve in the next decade, which reflects a fair share of the 50% global reduction in CO_2 by 2030, identified in the IPCC *Special Report on Global Warming of 1.5°C*
- commitment to putting inclusive climate action at the centre of all urban decision-making, to create thriving and equitable communities for everyone

Supplementing the *Climate Change Policy 2020* and *Towards Net Zero Emissions - 2030 Action Plan*, and informed by the commissioned 100 Renewables (2021) report: *Net Zero Strategy Community Consultation Outcomes*, the *Net Zero Communities Strategy 2022-2027* provides a detailed 5-year management framework to:

- facilitate systemic change at a scale that accelerates Ku-ring-gai's transition to net zero GHG emissions by 2040, or earlier
- provide opportunities for engagement and action by the community that are equitable across Ku-ring-gai's demographics
- build on the successful elements of Council's existing programs
- incorporate the community's vision for achieving a 'net zero' Ku-ring-gai

The Strategy will be delivered in conjunction with the initiatives in the *Towards Net Zero Emissions - 2030 Action Plan* to reduce Council's total GHG emissions (from fixed assets, street lighting and vehicles) by 50% by 2030 (relative to 2000 levels), or earlier; and to reduce Council's total GHG emissions to net zero by 2040, or earlier.

Council is also implementing a range of other strategies, including the *Urban Forest Strategy, Water Sensitive Cities Strategy* and *Waste Strategy*, that all play a role in supporting the Ku-ring-gai community's transition to net zero GHG emissions.

3. Scope

3.1. What does it mean to be net zero?

Net zero emissions is defined by the IPCC as: *"when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period*[3]*"*.

Simply put, we need to balance the amount of GHG emissions we put into the atmosphere with the amount we take out. We achieve net zero GHG emissions when all GHG emissions released by human activities are counterbalanced by removing GHG emissions from the atmosphere. First and foremost, human caused GHG emissions should be reduced to as close to zero as possible. Any remaining (residual) GHG emissions, including past GHG emissions we've already pumped into the atmosphere (cumulative GHG emissions), will then need be balanced with an equivalent amount of GHG removal[4].

3.2. Scale and timeframes for achieving net zero GHG emissions

Limiting human-induced global warming to 1.5°C will require limiting cumulative CO_2 emissions and reaching at least net zero CO_2 emissions, along with strong reductions in other greenhouse gas emissions (IPCC 2021, p27). There is a near-linear relationship between cumulative anthropogenic CO_2 emissions and the global warming they cause. This relationship implies that reaching net zero anthropogenic CO_2 emissions is a requirement to stabilise human-induced global temperature increase at any level, but that limiting global temperature increase to a specific level would imply limiting cumulative CO_2 emissions to within a carbon budget (IPCC 2021, p28).

Pathways limiting global warming to 1.5°C with no or limited overshoot will require rapid, far-reaching and in some cases unprecedented transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (IPCC 2018, p15). Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades (IPCC 2021, p14).

Achieving net zero GHG emissions by 2040 will be critical to limiting global average temperature increases and to limiting the worse effects of climate change. The lion's share of emissions cuts needs to occur this decade if we are to avoid catastrophic climate change.

Allowing the global temperature to temporarily exceed or overshoot 1.5°C would mean a greater reliance on techniques that remove CO_2 from the air to return global temperature to below 1.5°C by 2100. The effectiveness of such techniques is unproven at large scales, and some may carry significant risks for sustainable development[5].

Changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in ocean temperature and sea level (IPCC 2021, p21). Some impacts can no longer be avoided, but strong action today can make things far better than they would otherwise be (Climate Council 2021, p7).

[3] See Glossary — Global Warming of 1.5 ºC (ipcc.ch)

[4] See https://www.wri.org/insights/net-zero-ghg-emissions-questions-answered

[5] See https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

4. Community consultation

Council engaged 100% Renewables to undertake community consultation and report on the consultation outcomes, to inform the *Net Zero Communities Strategy 2022 - 2027*.

4.1. Methodology

The community consultation program involved:

1. an online discussion via Council's *Our Say* page and Council's Facebook page
2. an online community survey
3. two Community workshops (one face-to-face and one online)
4. five focus groups, to target specific community segments, namely:
    - the Culturally and Linguistically Diverse (CALD) community
    - the Uniting church
    - school leaders (teachers, principals and P&C members)
    - Independent Living Units (ILU) and strata members
    - the business community

The results of the community consultation were presented to the following four sets of Council teams, to get their input and to inform the Strategy:

- Environment and Sustainability
- Urban Planning, Transport and Major Projects
- Visitor Experience and Events, Community Development and Communications
- Waste Services

Almost 600 survey respondents and 136 participants across all of the other community consultations provided their input on how important acting on climate change is to them; their actions to date; the areas where they want to see more action in the community; and the barriers and enablers they see as important to address.

4.2. Outcomes

4.2.1. Online survey respondent's demographics

Survey respondents (N = 597) were mainly older than 35 years, with a fairly even spread of responses for all age ranges above 35 years. Importantly, just 8% of responses came from residents who are under 35 years of age, despite 22% of the Ku-ring-gai population being aged between 15-34 years in 2016[6].

Survey respondents were 54% female, 45% male and 1% other. More than half (54%) of the online survey respondents came from 5 suburbs, being St Ives (13%), Turramurra (13%), Pymble (11%), Killara (9%) and Gordon (9%). These suburbs, at the time of the survey, account for 46% of the Ku-ring-gai Local Government Area's (LGA's) population[7]. More than 90% of the online survey respondents own their houses and 88% of respondents live in a free-standing house. By contrast, at the time of the survey, 17% of dwellings in the area were rented and 27% of people lived in multi-unit dwellings[8].

[6] https://profile.id.com.au/ku-ring-gai
[7] https://profile.id.com.au/ku-ring-gai
[8] https://profile.id.com.au/ku-ring-gai

4.2.2. Online survey respondent's profile

The survey responses evidence an informed, motivated community regarding climate change. According to the online survey, 55% of all respondents have participated in Council's environmental programs, with 62-65% of respondents aged 35 to 54 years having done so, highlighting a very engaged cohort in the community.

An overwhelming percent of respondents (84-89%) agreed or strongly agreed that action is necessary to achieve net zero GHG emissions. With small differences in the level of agreement, respondents believe that individual action, government (Council) leadership and collaborative community effort are all necessary to achieve this outcome and deliver a safe climate.

The primary motivation for more than 90% of survey respondents to act is simply to create a safer climate and improve wellbeing and quality of life. While saving money is a motivating factor, this was only the case for 75% of respondents, and 56% were motivated by the ability to connect with like-minded people in the community.

Nearly 90% of respondents in total, and the vast majority across all age groups, have acted personally to reduce their emissions, while 31% indicated they have taken multiple actions and made a significant investment in reducing their carbon footprint.

4.2.3. Action on climate going forward

A total of 1,128 responses were consolidated from the online survey, mail-in comments, the *Our Say* page, the face-to-face and online community workshops, and the five focus groups, into a list and categorised into 'action area', 'barrier' and 'enabler'.

A total of 690 responses by the community could be clearly identified as a comment on or preference for a particular action to reduce GHG emissions.

As shown in Figure 1, below, the priority action areas were identified as:

- Sustainable transport (220 responses, **32%**)
- Circular economy/waste (168 responses, **24%**)
- Rooftop solar and batteries (99 responses, **14%**)

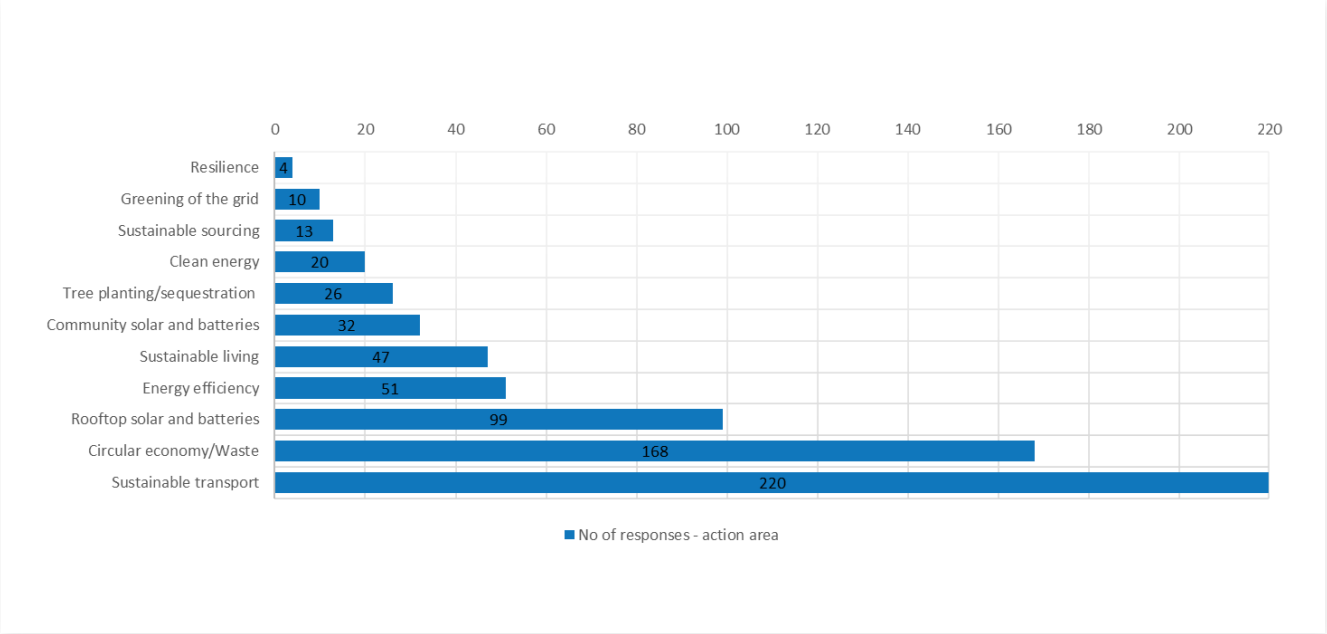


Figure 1: Split of responses per net zero action area from online survey

Table 1, below, shows the top ten net zero action areas and sub-categories.

Subcategory of action	Main category	Number of responses
Rooftop solar and batteries	Rooftop solar and batteries	99
Cycling / walking	Sustainable transport	73
Energy efficiency	Energy efficiency	51
Recycling	Circular economy / waste	49
Electric vehicles	Sustainable transport	47
Sustainable living	Sustainable living	47
EV charging	Sustainable transport	38
Community solar and batteries	Community solar and batteries	32
Public transport	Sustainable transport	31
FOGO services	Circular economy / waste	28

Table 1: Top 10 net zero action areas and sub-categories from online survey

Figure 2, below, shows the breakdown of the net zero action areas per subcategory.

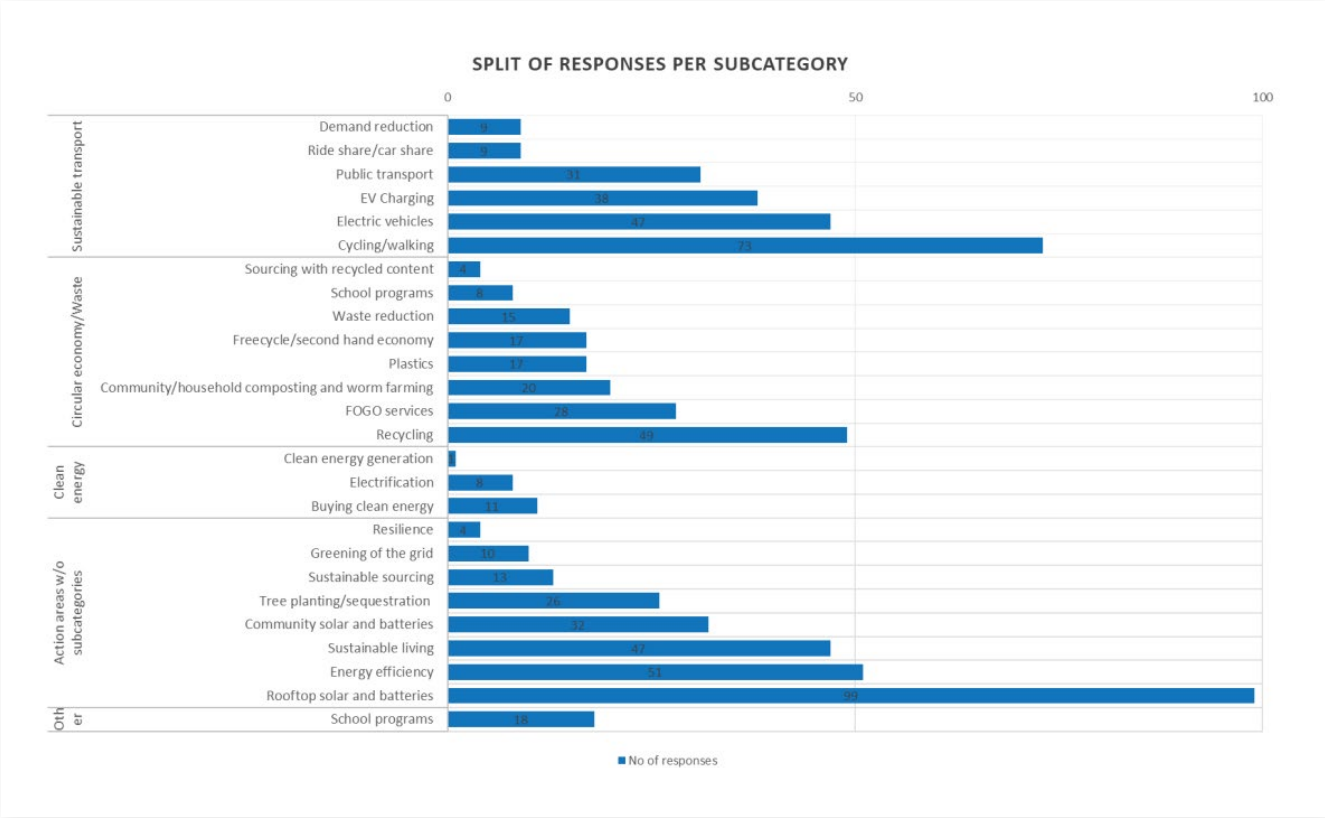


Figure 2: Split of responses per net zero action area sub-category from online survey

The community ranked cycling/walking, EV charging, recycling and Food Organics Garden Organics (FOGO) services as the most important when it comes to the provision of infrastructure and services by Council.

4.2.4. Barriers to action on climate change

The number of responses to this question – directly and inferred from narrative responses – was fairly modest at just 218. There was a fairly even split across several barriers to action, including:

- Planning/infrastructure
- Political inaction
- Knowledge/education
- Cost

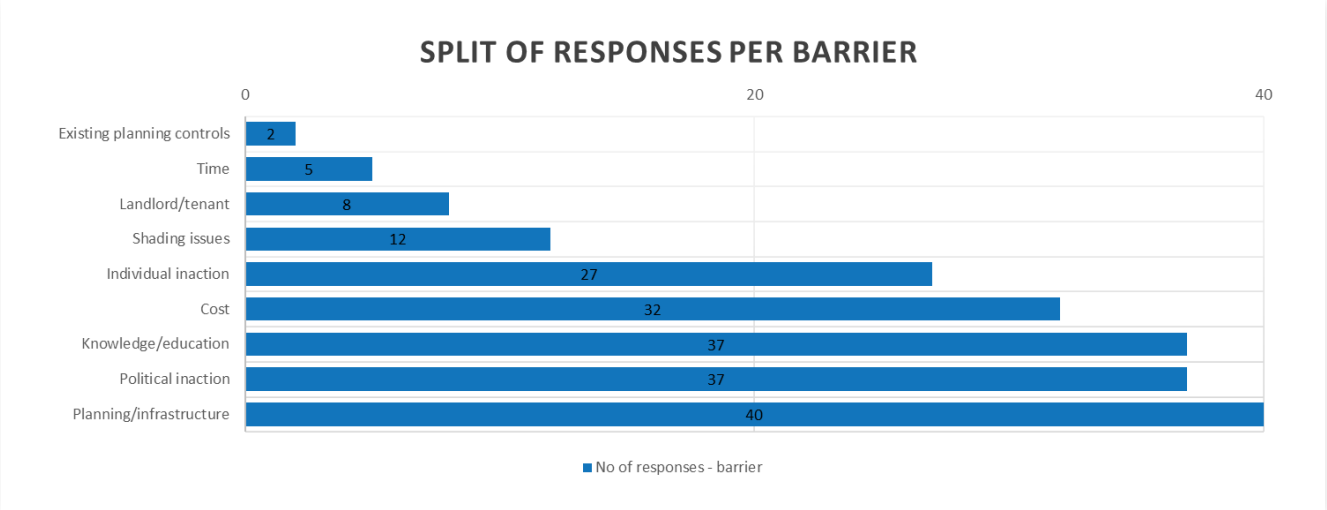


Figure 3: Split of responses per barrier from online survey

4.2.5. Enablers for action on climate change

The top four enablers to climate action are essentially the same as the top four barriers, albeit in different positions. These are:

- Education/training/workshops/communication
- Infrastructure/services
- Financial/other incentives
- Planning controls/building codes

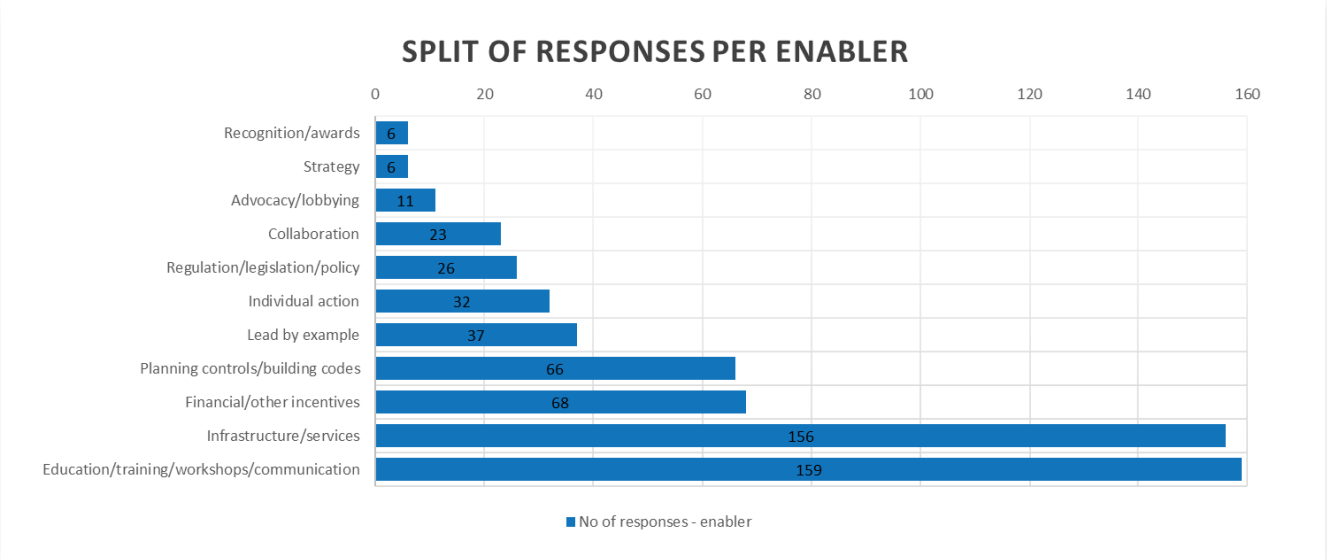


Figure 4: Split of responses per enabler from online survey

5. Ku-ring-gai LGA's GHG emissions profile

The GHG emissions profile created for the Ku-ring-gai LGA applies the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC), which allows cities and local governments to capture emissions that occur in city, as well as emissions that occur outside the city, but for which the city is responsible.
The GPC, launched in December 2014 by the World Resources Institute (WRI) and ICLEI Local Governments for Sustainability, is the most widely used framework to account for GHG emissions in a community.
GHG emissions are classified into three 'scopes' for reporting (scope 1, 2 and 3), as described below:

	Scope	Definition	Category	Examples
	Scope 1	Carbon emissions from sources located within the city.	In-boundary	• Natural gas consumption • Fugitive emissions from mining coal • Fuel consumption in vehicles • Wastewater generated in the city • Emissions from livestock
	Scope 2	Use of grid-supplied electricity in the city.	Grid-supplied energy sources	• Electricity use in commercial buildings • Electricity use in residential buildings • Electricity use for streetlighting • Charging electric vehicles • Electricity use for railways
S3	Scope 3	All other carbon emissions that occur outside the boundary of the city as a result of activities within the city.	Out-of-boundary	• Transmission and distribution losses of grid-supplied electricity • Waste disposal and treatment outside the city/LGA boundary • Transboundary transportation

Table 2: GPC reporting framework - scopes 1, 2 and 3

For the purposes of measuring the Ku-ring-gai LGA's GHG emissions, the 'city induced' framework has been adopted.

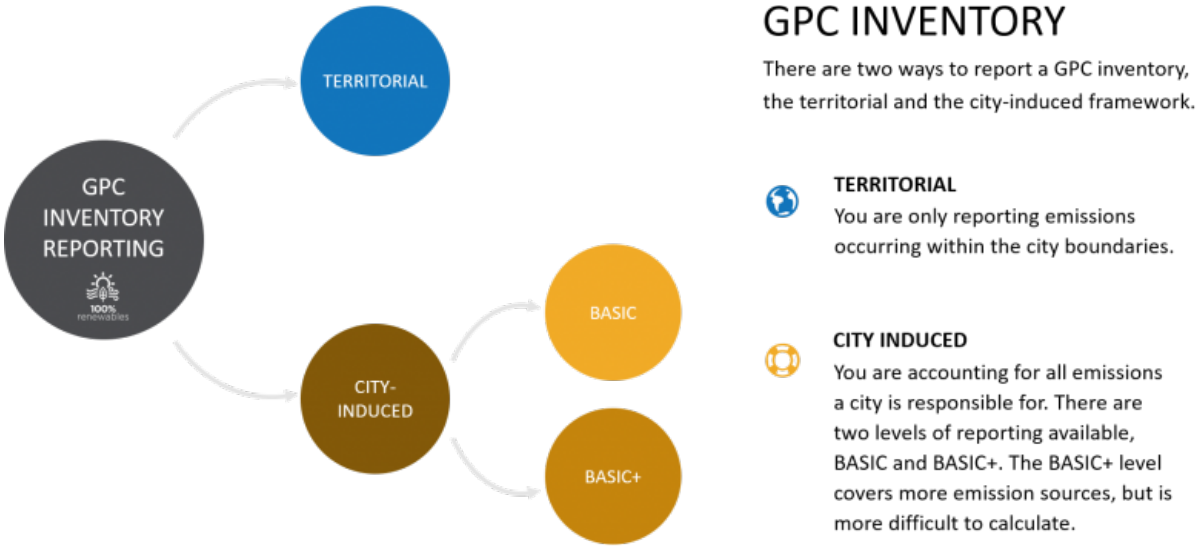


Figure 5: The territorial and city-induced ways of reporting a GPC inventory

GHG emissions calculated for the Ku-ring-gai LGA include GPC compliant BASIC reporting, plus some emissions data beyond that which is required for BASIC reporting, specifically Scope 3 emissions for electricity, gas and transport.

Emission source	Scope	BASIC	BASIC+
Stationary fuel combustion	1	✓	✓
In-boundary transportation	1	✓	✓
Grid-supplied electricity	2	✓	✓
Waste and wastewater generated and disposed in the city	1	✓	✓
Waste and wastewater generated in the city and disposed outside	3	✓	✓
Electricity transmission and distribution losses	3	x	✓
Out-of-boundary transportation	3	x	✓
Industrial Processes and Product Use (IPPU)	1	x	✓
Agriculture, Forestry, Land Use (AFOLU)	1	x	✓

Table 3: Summary of GPC BASIC level of reporting

Figure 6, below, tracks annual greenhouse gas emissions by source across the Ku-ring-gai LGA since 2013/14. Greenhouse gas emissions have remained relative stable since 2015/16.

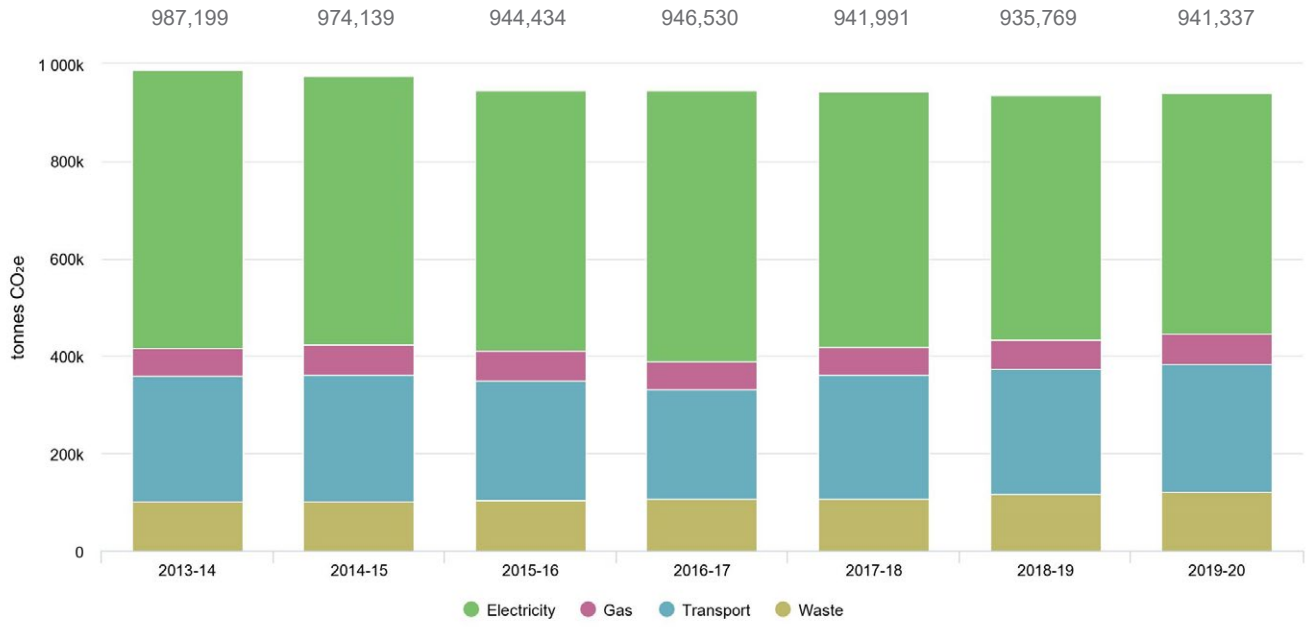


Figure 6: GHG emissions in the Ku-ring-gai LGA by source (2013/14 - 2019/20)

Total GHG emissions for the Ku-ring-gai LGA for the baseline year of this Strategy (FY 2019/20) are 941,337 tonnes CO2-e.

In 2019/20, the baseline year for this Strategy, electricity consumption is responsible for 52.7% of GHG emissions in the Ku-ring-gai LGA. Transport emissions contribute 28% to the GHG footprint, waste contributes a further 12.8%* and gas consumption the remaining 6.4%.

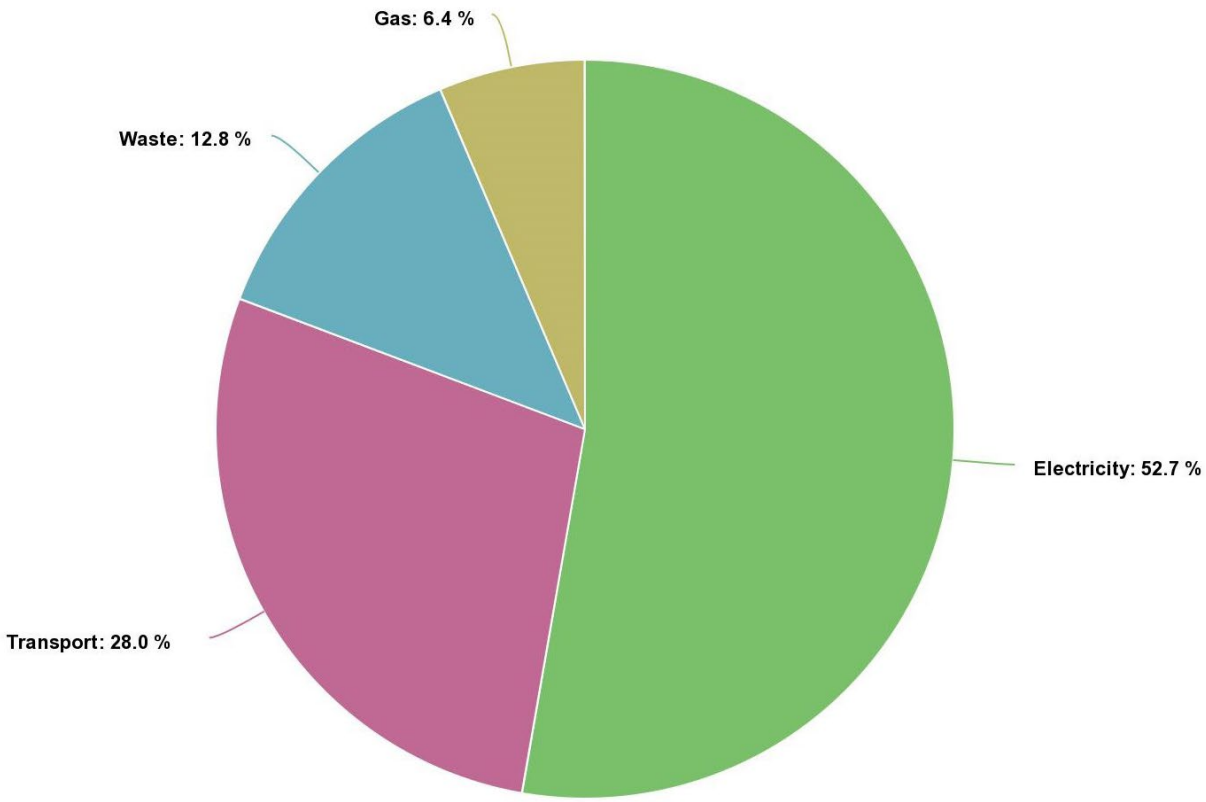


Figure 7: GHG emissions in the Ku-ring-gai LGA by source - 2019/20

* Please note that commercial and industrial waste, which represents 38% of the total waste emissions, has been estimated using some City of Sydney metrics, adapted for the broader Greater Sydney region.

6. Key GHG emission abatement opportunities for the Ku-ring-gai LGA

Figure 8, below, shows the Ku-ring-gai LGA's emission reduction pathway to 2050 by interventions under the NSW Government's 2021 Policy Setting Scenario.

The 2021 Policy Setting Scenario setting comes close to achieving net zero GHG emissions by 2050 but falls short of achieving net zero GHG emissions by 2040 (residual emissions are 275,761 tonnes CO2-e). The key abatement opportunity until 2029/30 is a reduction of GHG emissions from the grid (including rooftop solar). By 2039/40 a reduction of GHG emissions from the grid remains a key abatement opportunity, with reductions of GHG emissions from fuel switching, electric vehicles and public transport gaining importance.

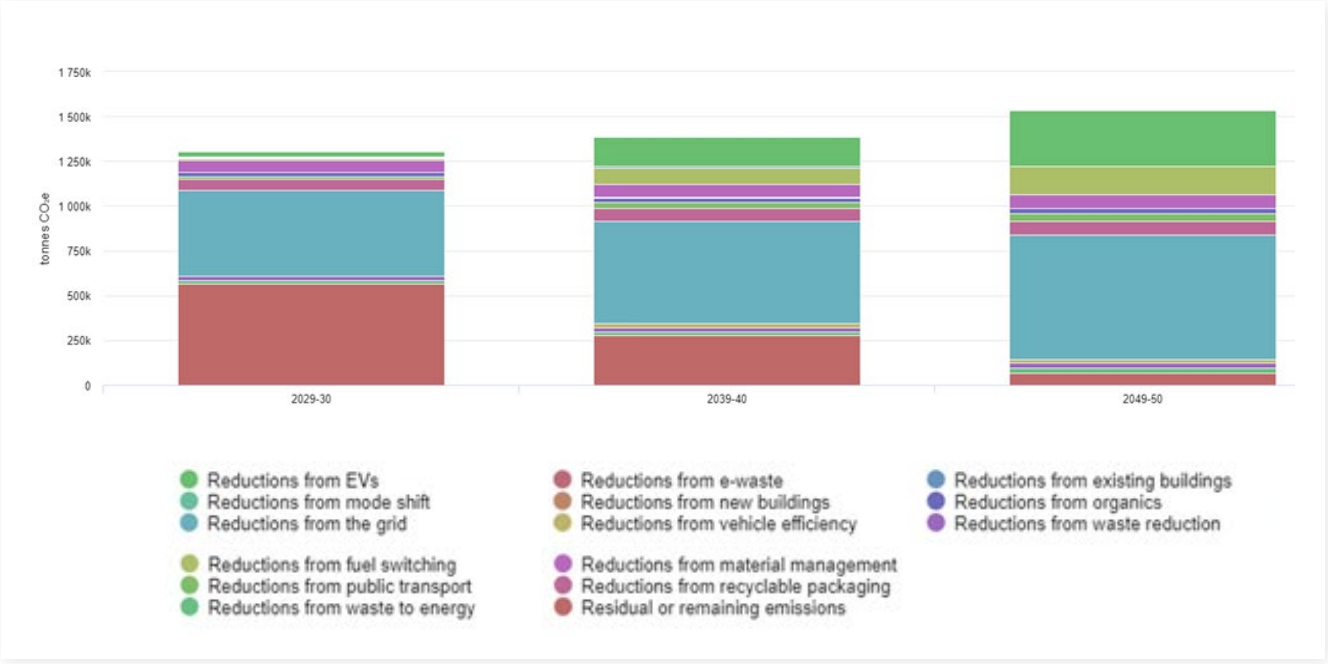


Figure 8: Ku-ring-gai LGA's emission reduction pathway to 2050 by interventions under the NSW Government's 2021 Policy Setting Scenario

More details about this analysis are outlined in the Greater Cities Commission report: Greater Sydney Pathways to Net Zero Emissions

Figure 9, below, tracks annual resident kilometres by transport mode for residents who live in the Ku-ring-gai LGA (based on the NSW Government Household Travel Survey which estimates kilometres for all trips for all residents within the Ku-ring-gai LGA). This demonstrates the reliance on car travel within the Ku-ring-gai LGA and the enormous opportunity that exists for reducing emissions in the Ku-ring-gai LGA through the uptake of electric vehicles.

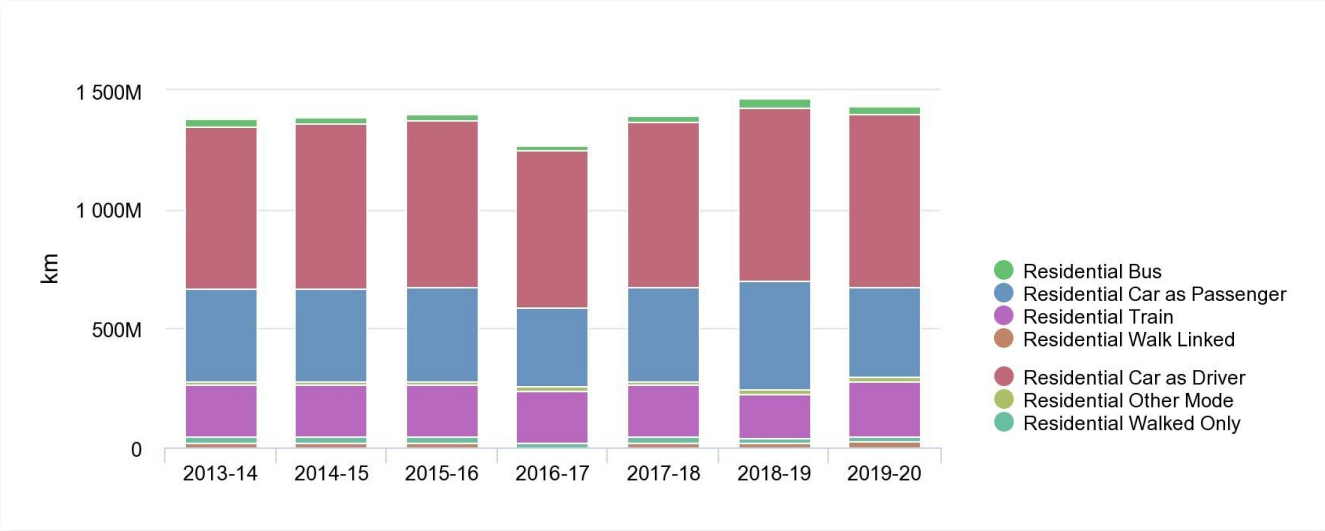


Figure 9: Residential transport by mode in the Ku-ring-gai LGA

Figure 10, below, shows GHG emissons in the Ku-ring-gai LGA by sector in 2019/20.

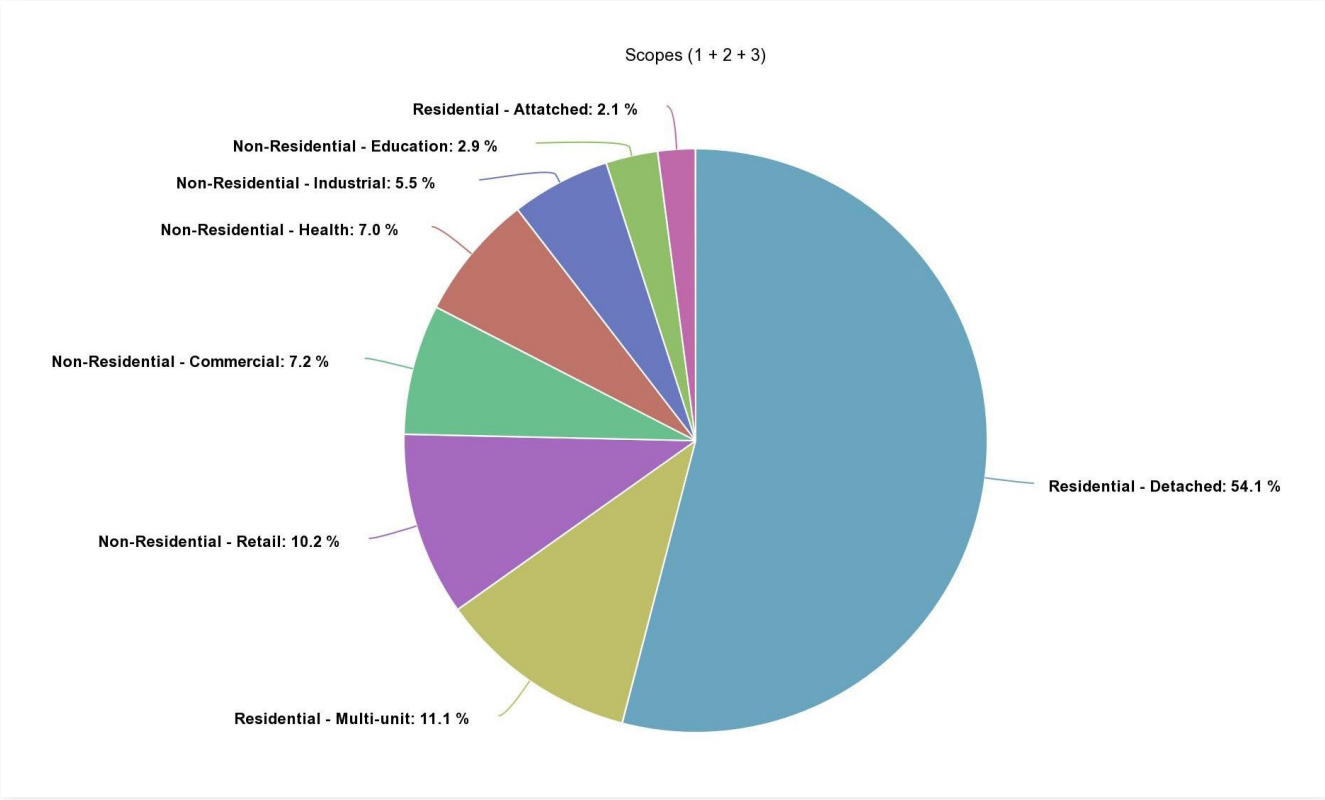


Figure 10: GHG emissions in the Ku-ring-gai LGA by sector in 2019/20

This shows that residential emissions represent 67.3% of total GHG emissions in the Ku-ring-gai LGA, with residential (detached) the most significant GHG emission sector at 54.1% of total GHG emissions. Significant gains in emissions reductions can therefore be made by targeting the residential sector, particularly on initiatives that increase the uptake of roof top solar. Non- residential (retail) represents the most significant non-residential emission sector at 10.2% of total GHG emissions.

In the Ku-ring-gai LGA, 76.2% of households were purchasing or fully owned their home, 19.2% were renting privately, and 0.3% were in social housing in 2021[9]. With homeowners more likely than renters to make improvements to their homes that contribute to GHG emission reductions, this is an encouraging statistic.

In 2016, 38.9% of people in the Ku-ring-gai LGA area were born overseas[10]. Of those who were born overseas and whose first language is not English, 7.1% were born in China, 2.5% were born in Hong Kong and 2.1% were born in South Korea. In the Ku-ring-gai LGA in 2016, 4,911 people who spoke a language other than English at home reported difficulty speaking English[11]. This highlights the importance of communicating with the local population on net zero concepts and initiatives in languages other than English.

[9] See Housing tenure | Ku-ring-gai Council | Community profile (id.com.au) (accessed on 25 July 2022)

[10] See Birthplace | Ku-ring-gai Council | Community profile (id.com.au) (accessed on 25 July 2022)

[11] See Proficiency in English | Ku-ring-gai Council | Community profile (id.com.au) (accessed on 25 July 2022)

7. Vision for a net zero Ku-ring-gai

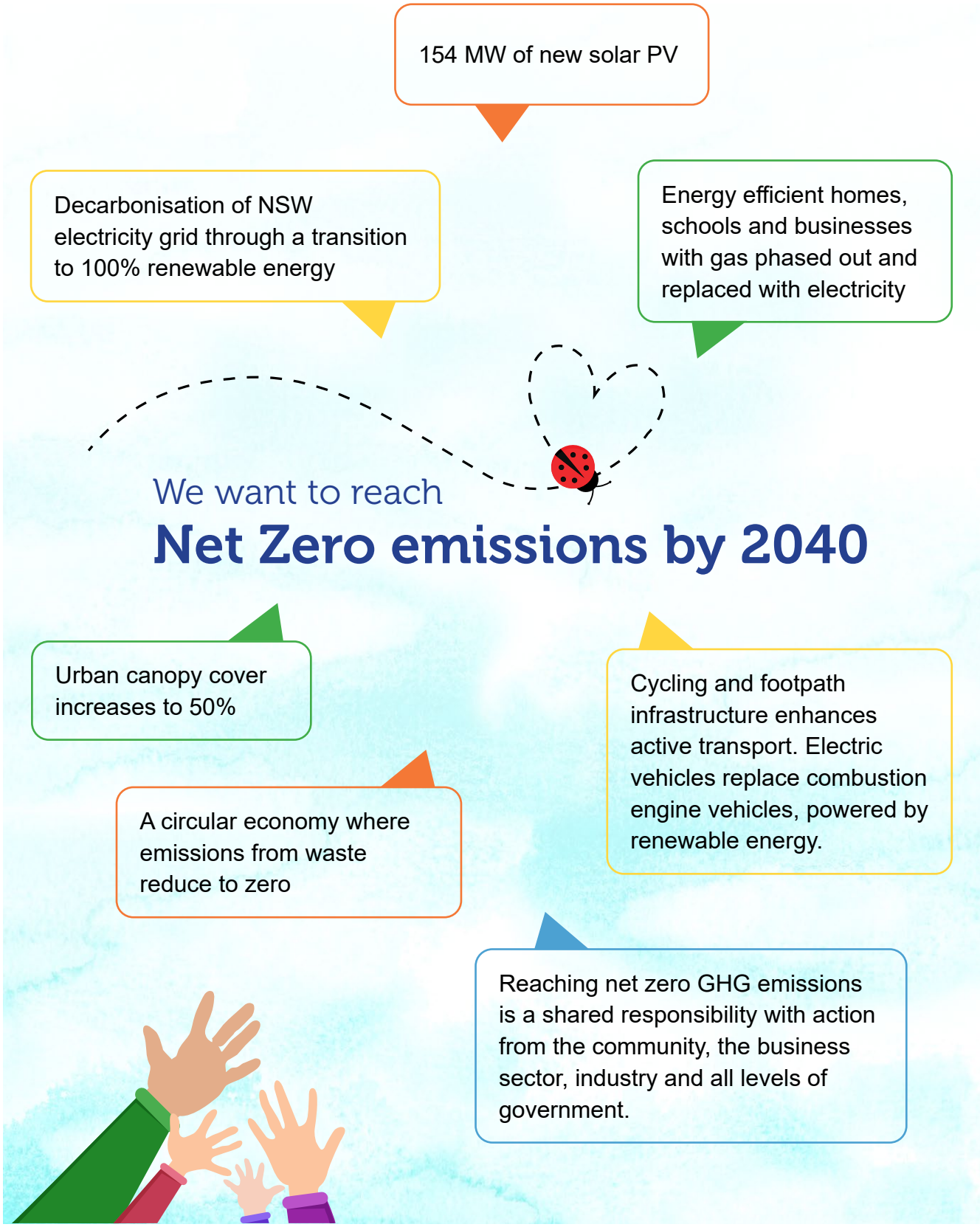
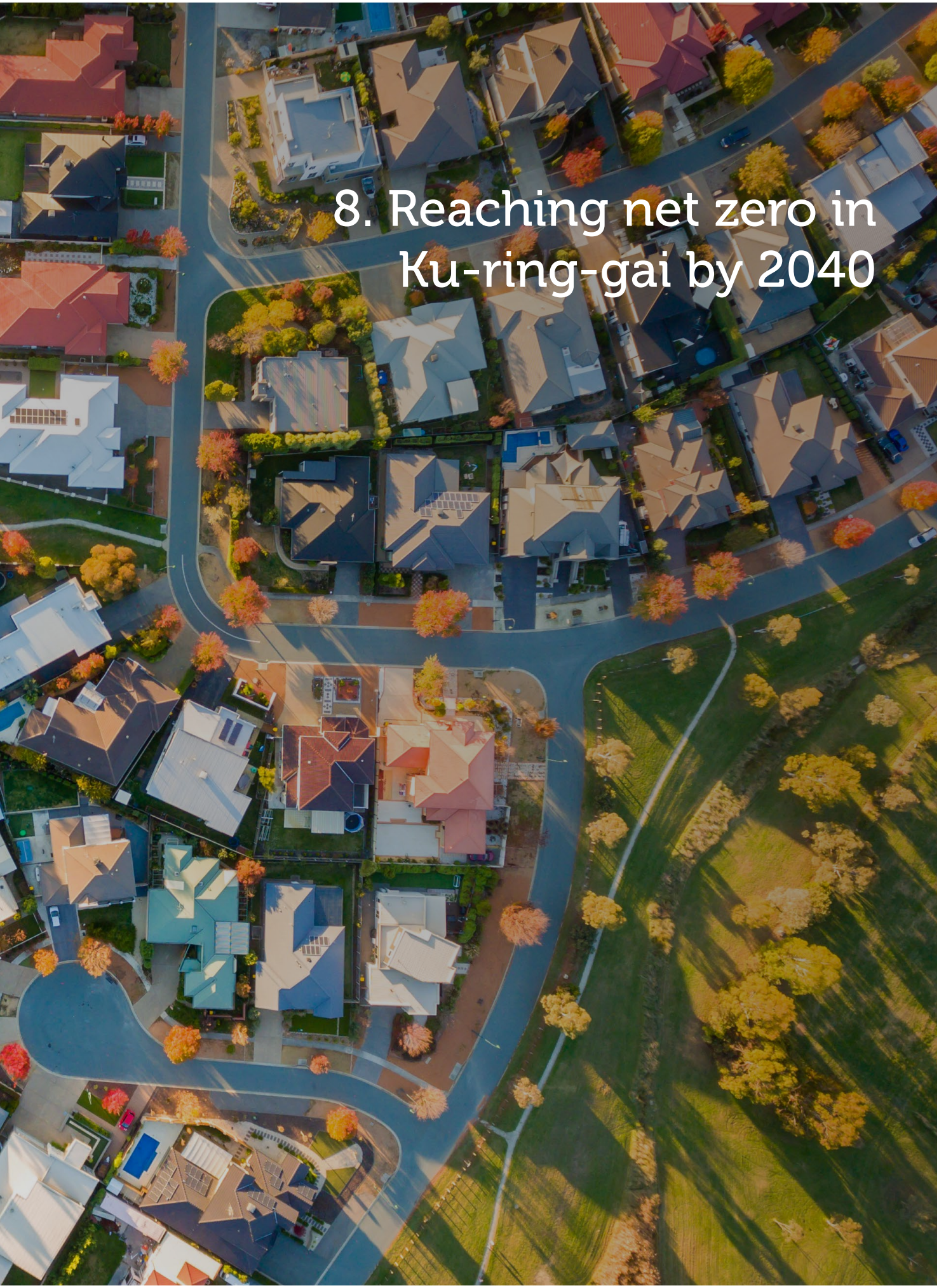


Figure 11: Vision for a net zero Ku-ring-gai



8. Reaching net zero in Ku-ring-gai by 2040

8.1. The story so far

Through its Environmental Levy, Ku-ring-gai Council implements a range of initiatives to reduce its GHG emissions from three main sources: fleet (vehicles), streetlights and fixed assets (buildings). These initiatives include solar PV installations, LED lighting upgrades, solar hot water system installations, heat pump upgrades, improvements to HVAC (air conditioning) controls, intelligent lighting controls, installation of ceiling insulation, installation of smart metering and/ or automated monitoring systems, installation of building management and control systems, purchasing of electric vehicles and the installation of electric vehicle base charging stations.

Council is saving around $338,000 per annum on its own energy use (based on 2020 relative to 2016 electricity consumption) and recently exceeded its emissions reduction target of a 20% reduction by 2020 (based on 2000 levels).

The Moree Solar Farm has supplied 30% of Council's electricity with clean energy since 2019, and in 2021, Council committed to sourcing 100% renewable energy through a joint electricity tender with 24 other Sydney Councils. This will accelerate Council's transition towards net zero emissions, ensuring that the electric vehicles used in Council's fleet and all Council facilities are powered by the sun. Council will achieve its target to 'reach 100% renewable energy for all grid-sourced electricity by 2030, whilst pursuing efforts to reach 100% renewable energy by 2025' ahead of 2025 and is on track to achieve its target to 'reduce Council's total GHG emissions (from fixed assets, street lighting and vehicles) by 50% by 2030 (relative to 2000 levels), or earlier'.

Council also delivers a range of initiatives to assist the Ku-ring-gai community to reduce GHG emissions, namely through its 'Smart' rebate programs, Smart Units program, Smart Schools and Solar My School programs, Better Business Partnership program, Composting Revolution program and Loving Living Ku-ring-gai events and workshops series.

A shared responsibility framework is fundamental to achieving net zero GHG emissions in Ku-ring-gai by 2040 and is dependent on action from the community, the business sector, industry and all levels of government. Similarly, Council cannot implement the programs in this Strategy without community and stakeholder investment.

8.2. What needs to happen now

A '1.5°C scenario' was modelled that would see abatement effort accelerated both inside and outside the Ku-ring-gai LGA from 2020 so that GHG emissions in the Ku-ring-gai LGA follow a downward trend consistent with that required to limit global heating to no more than 1.5°C (that is, net zero GHG emissions by 2040). This included abatement resulting from grid decarbonisation; buying clean energy; local (renewable energy) generation; energy efficiency and electrification; sustainable transport; and waste management. The modelled 1.5°C scenario is only one possible net zero pathway, out of many, but acts as a foundation for the design of a net zero management program for Ku-ring-gai.

Reaching net zero emissions will require Council to play a key role as leaders and place makers through their connection to local communities. In practical terms, Council has varying degrees of influence, but not control, over a number of the abatement areas.

Under a 1.5°C scenario, climate change mitigation efforts across the community will have to accelerate well beyond current trends, even if largely external measures such as grid decarbonisation occur much faster than forecast, and extend well beyond Council's current initiatives and level of impact.

Figure 12, below, captures the modelled 1.5°C scenario and shows the emissions reduction pathway.

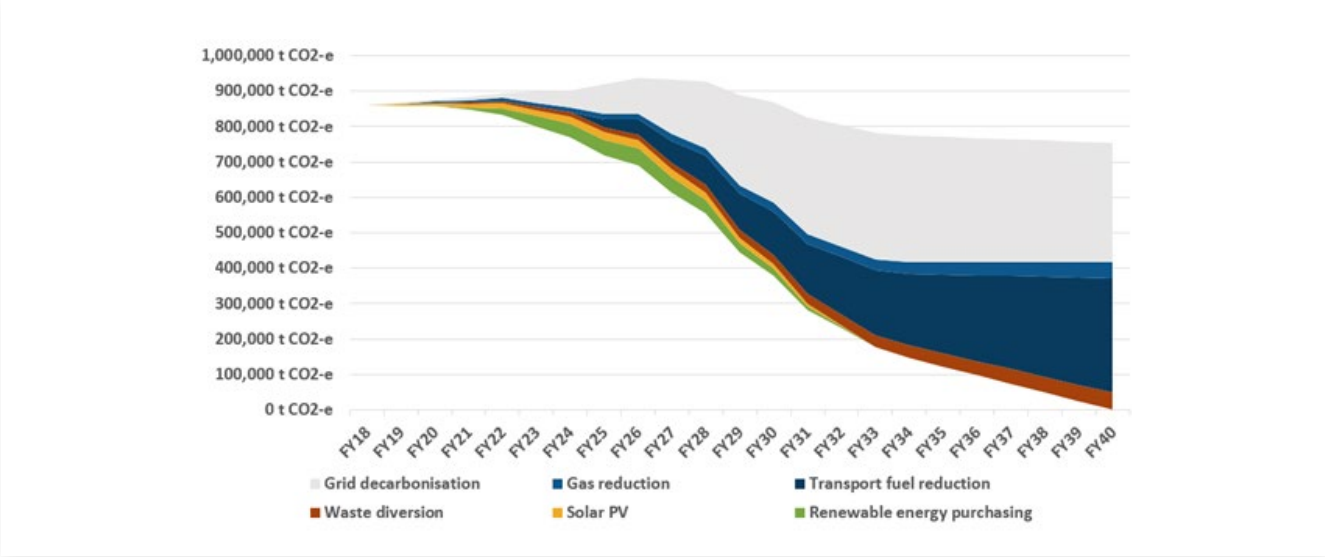


Figure 12: Pathway to net zero GHG emissions by 2040

While many actions will play a role in Ku-ring-gai's emissions reduction task, the decarbonisation of the electricity grid and the rapid development of electric vehicle or other low / zero emissions transport solutions will be critical to the total abatement that can be achieved. Solar PV uptake will become less important over time as the grid decarbonises and transport emissions will play a greater role in the pathway to net zero GHG emissions from 2030 onwards.

Figure 13 (not to scale), below, shows the emissions reduction pathway if GHG emissions in the Ku-ring-gai LGA are reduced in a linear fashion to net zero GHG emissions in 2040. This would see GHG emissions reduce by 35% from 2019/20 (to 611,869 tonnes CO2-e) by 2026/27 (the last year of the Strategy).

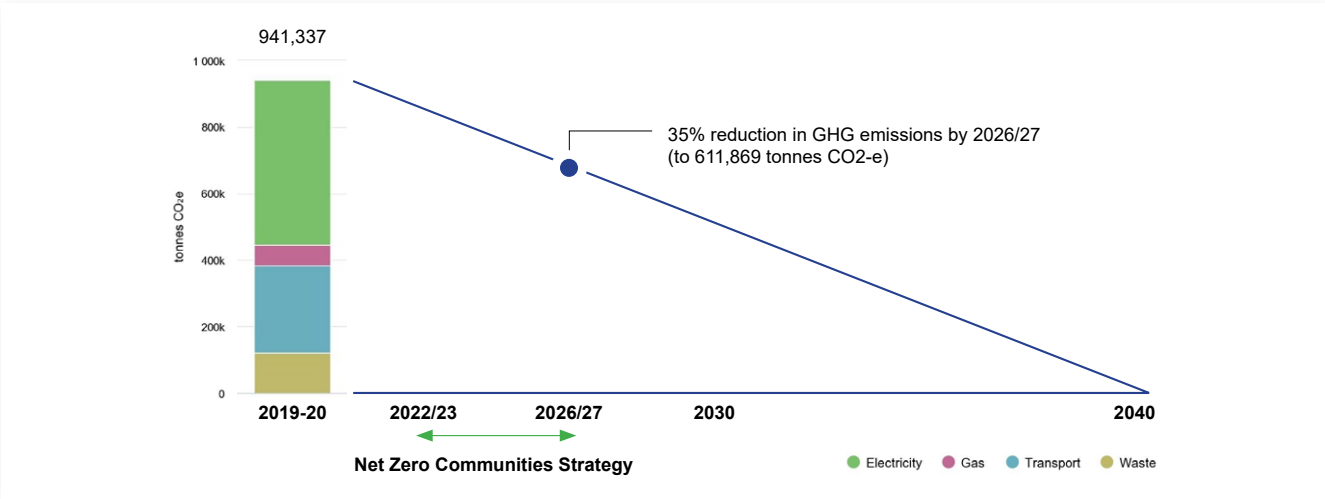


Figure 13: Ku-ring-gai's net zero GHG emissions pathway

In recognising the economic, environmental and societal benefits of abatement pathways that provide deeper, earlier GHG emission cuts over this decade, the linear pathway in Figure 13 should be considered as the minimum abatement effort required.

8.3. Key abatement categories

In accordance with the modelled 1.5°C scenario, the key abatement categories and opportunities are summarised, as follows:

8.3.1. Grid decarbonisation

As the five active coal-fired power stations in NSW (Liddell, Vales Point B, Eraring, Bayswater and Mount Piper) approach the end of their life (announced closures are in 2022, 2028, 2034, 2035 and 2043) they are most likely to be replaced with renewable energy, reducing the future carbon intensity of the NSW grid and having a significant impact on GHG emissions in the Ku-ring-gai community (although the majority of this impact would not be seen until the late 2030s). A more rapid pathway to grid decarbonisation, or conversely a slower change, will obviously affect the rate of change in NSW's grid carbon intensity and the subsequent impact on Ku-ring-gai's community emissions.

8.3.2. Buying green energy

There are multiple ways that clean energy can be purchased, including buying Green Power, through renewable energy buyers' groups, and through corporate Power Purchase Agreements (PPPAs) with renewable energy developers and retailers. Retail PPAs aimed at mid-sized energy users are also emerging.

An opportunity exists for customers in the Ku-ring-gai LGA to elect to buy renewables in the period between now and when grid decarbonisation occurs. Given the current market for PPAs, this opportunity is most likely to be available to mid to large-sized businesses in the foreseeable future (without paying a premium). Further evolution of the market for renewables will be required if renewable energy is to be readily accessible at a similar price to 'regular' power.

If all vehicles, public transport and gas-consuming appliances were also electrified and supplied with renewable energy then significant additional abatement would result.

8.3.3. Local (renewable energy) generation

As grid decarbonisation is a longer-term abatement measure, and with the urgency of GHG emission reductions needed this decade, a significant focus on cost effective, local renewable energy generation over the coming years is critical. The combination of high electricity prices, feed-in-tariffs (FiTs) and falling solar panel prices means that the business case for solar PV is stronger than it has ever been.

There are multiple opportunities to reduce emissions in the community with local renewable generation, based on existing and emerging technologies:

- with solar PV uptake at 17.82% of dwellings in the Ku-ring-gai LGA (as of 25 July 2022)[12] there is considerable scope for new solar installations, and scope for existing solar PV systems to be expanded. Commercial businesses have also begun to implement solar PV, but there are many more opportunities for new solar PV. Larger solar PV systems will be able to supply energy on demand, store for later use and power electric vehicles.
- with over 42,400 dwellings in Ku-ring-gai (in 2016), as well as local businesses, many hot water services will be replaced/upgraded over the next ten years, with a significant opportunity to see solar PV, solar hot water and heat pumps become the predominant forms of energy supply for this service.
- new residential dwellings present opportunities to lock in renewable energy solutions at design and planning stages.
- solar PV solutions for strata / multi-unit developments are emerging, involving systems serving common property only, shared roofs with separate systems for each occupant, and energy-sharing solutions with batteries and smart controls facilitating behind-the-meter solutions, however, the uptake of solar PV in strata is very low due to the multitude of stakeholders involved, poor understanding of the business case/options and low engagement.

[12] See Australian Photovoltaic Institute • (apvi.org.au) (accessed 25.7.22)

- battery storage allows for the implementation of larger solar PV systems, which results in greater carbon reduction. The main targets at present are residential (stand-alone, in micro-grids and in Virtual Power Plants or VPPs), and utility-scale. There may be a role for batteries (fed from off-peak electricity, as well as solar) in resolving local network and transmission-level constraints. This could further enable renewables uptake. For commercial/industrial users, batteries will be able to store and use solar, help with peak demand management, and allow cost-shifting from peak to off-peak. There is added potential for the future use of batteries for peer-to-peer (P2P) trading.

8.3.4. Community energy projects

Community energy projects enable communities to actively participate in response to climate change and can involve energy supply projects such as renewable energy installations and storage; energy reduction projects, such as energy efficiency and demand management; and community-based approaches to selling or distributing energy (for example, peer-to-peer energy trading). Community renewable energy projects are usually structured as a PPA or a community loan.

8.3.5. Energy efficiency and electrification

Avoiding catastrophic warming requires sharp reductions in both CO_2 and other greenhouse gases including methane (CH_4) (IPCC 2021, p27). In fact, CH_4 emissions currently account for 0.5°C of warming, compared to about 0.75°C for CO_2 (IPCC 2021, p 7). The increase in CO_2 emissions from Australia's gas industry have been a major factor behind Australia's failure to substantially reduce its overall CO_2 emissions and the gas industry is also responsible for fugitive emissions of CH_4 (Climate Council 2021). While shorter lived in the atmosphere, CH_4 has far greater potency as a greenhouse gas than CO_2. Limiting future warming depends on deep, rapid and sustained reductions in CH_4 emissions (IPCC 2021, p27).

Energy efficiency and electrification remains the cheapest form of GHG emission abatement and there are opportunities across all sectors and technologies to make further gains:

- new residential dwellings present opportunities to lock in low energy solutions at design and planning stages.
- improvements in energy efficiency in existing homes and businesses can target measures such as pool pump controls, underfloor and other home heating, LED lighting, efficient air conditioning technology and controls, efficient appliances, insulation, fuel switching (from gas to electricity) for cooking and heating, efficient boilers and gas technologies and efficient air handling systems. The numerous studies of commercial and residential energy efficiency conducted at national, state and technology levels over many years conclude that savings potential is broad, from 35% over 15 years to more than 50% in the long term[13].

The Ku-ring-gai LGA has the highest per-customer electricity and gas consumption in the Ausgrid and Jemena metropolitan network, so it is possible that savings potential is larger than in some other LGAs.

[13] See Climate Works Australia – http://www.asbec.asn.au/wordpress//wpcontent/uploads/2016/05/160509-ClimateWorks-Low-Carbon-High-Performance-Modelling-Assumptions.pdf

8.3.6. Sustainable transport

Sustainable transport measures to accelerate the transition to net zero GHG emissions include:

- changing to low and zero-emissions vehicles, including small cars, hybrids, electric vehicles and hydrogen vehicles (passenger and commercial vehicles)
- demand control measures, like reduced car spaces per dwelling in apartments, car-pooling, car-sharing and driver education
- improved and increased public transport
- active transport, like walking and cycling; and the provision of active transport infrastructure
- purchasing lower emissions fuel such as ethanol blends

The scope for significant emissions reduction to 2040 is highly dependent on the rate of uptake of electric vehicles and on the selection of renewable energy as the fuel source, notwithstanding low emissions vehicles and demand control measures.

Based on current forecasts it is likely that feasible emissions reduction from sustainable transport measures nationally is modest in the period to 2030, but significantly increased by 2050 as the grid greens and electric vehicle uptake increases.

The provision of cycling and walking infrastructure is a key component to facilitating an increased uptake of active transport within the community. The following projects have been identified by Council as current priority cycling infrastructure projects to be funded by this strategy over the next 5 years:

1. Killeaton Street St Ives (Warrimoo Avenue to Benaroon Avenue) – 2-way separated bicycle path
2. Eastern Arterial Road St Ives (Hunter Avenue to Burraneer Avenue) – shared user path
3. Station Street Pymble (Grandview Street to Telegraph Road) – configuration to be determined
4. Fiddens Wharf Road Killara (Golf Links Road to Pacific Highway) – shared user path
5. Burns Road/Eastern Road/Junction Road Wahroonga or equivalent route (Clissold Avenue to M1 Motorway) – shared user path

Figure 14, shows the location of these projects within the Ku-ring-gai LGA.

The order in which these projects will be delivered and the delivery timeframes for these projects will be dependent on funding opportunities and the ongoing strategic priorities of Council.

8.3.7. Waste management

Waste management initiatives to accelerate the transition to net zero GHG emissions include the implementation of consumer side (waste reduction/ reduced consumption, household composting/worm farms, 100% recycling rates) and post-collection side (100% organics processing, material recovery) measures.

The ability for Council to contribute to achieving net zero GHG emissions from waste are partly within its influence, in terms of education, recycling and collection strategies, but mostly relate to out-of-Council treatment processes that can successfully treat municipal solid waste (MSW) and divert it from landfill.

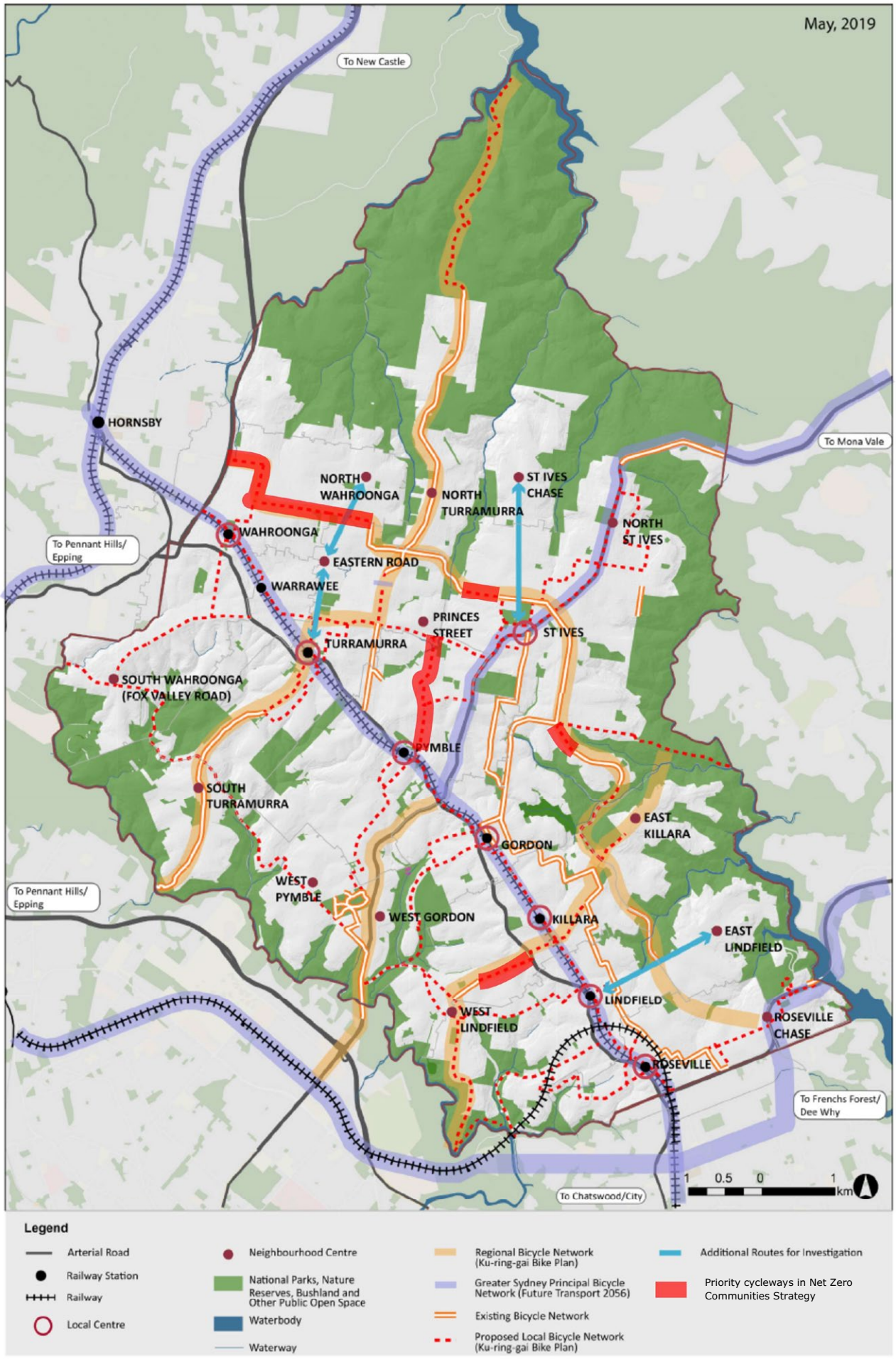


Figure 14: Priority cycling infrastructure projects in the Ku-ring-gai LGA

9. Management actions

Attachment 1 of this Strategy provides a list of management actions for Council to support the Ku-ring-gai community in transitioning to net zero GHG emissions by 2040, and the associated funding requirements, informed by:

- the key abatement opportunities modelled in the 1.5°C scenario and the action plans under the six abatement categories (grid decarbonisation, buying clean energy, local generation, energy efficiency, sustainable transport and waste management) in the commissioned 100% Renewables (2020) report: *Community Inventory and Climate Change Strategy - inputs to tasks supporting the review of Council's climate change strategy*
- the community and staff consultation outcomes presented in the commissioned 100 Renewables (2021) report: *Net Zero Strategy Community Consultation Outcomes*
- a series of workshops with key staff from across Council

Management actions are listed under eight abatement categories, namely: grid decarbonisation, buying green energy, local (renewable) energy generation, energy efficiency and electrification, sustainable transport, waste management, carbon sequestration and land rehabilitation, and engagement and communication.

Management actions have also been categorised into the following seven action areas:

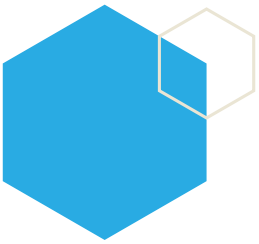
- collaboration
- strategy
- infrastructure services
- education, training and workshops
- planning controls
- financial / other incentives
- advocacy / lobbying

The funding allocated in the management action table excludes staff salaries. Staff with responsibilities for delivering components of the Strategy are as follows:

- Strategic Projects Leader – Environment and Sustainability
- Team Leader Sustainability Engagement
- Program Leader Energy Management and Net Zero Strategy
- Sustainability Engagement Officers (x2)
- Sustainability Communications Officer
- Sustainability Education Officer
- Better Business Partnership Program Coordinator
- Better Business Partnership Manager (Ku-ring-gai)

Staff with responsibilities for delivering components of the carbon sequestration / land rehabilitation management actions of the Strategy are as follows:

- Environmental Volunteering Programs Coordinator (delivery of environmental volunteering bush regeneration program)
- Environmental Volunteering Programs Officer (delivery of environmental volunteering bush regeneration program)
- Bushland Technical Officer (delivery of Council's bush regeneration program)
- Water and Catchments Program Leader (implementation of *Water Sensitive Cities Strategy*)
- Environmental Engineer (implementation of *Water Sensitive Cities Strategy*)
- Natural Areas Team Leader (implementation of *Urban Forest Strategy*)



10. Monitoring and evaluation

10.1. Tracking our progress towards a net zero Ku-ring-gai

Council's Manager Environment and Sustainability has overall responsibility for compliance with this Strategy.

Table 4, below, outlines how Council will track progress towards a net zero Ku-ring-gai:

Indicator	Reporting frequency	Data source	Baseline	5-year target (2026/27)
Greenhouse gas emissions (GHG) in the Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 941,337 tonnes CO2-e	35% reduction in GHG emissions in Ku-ring-gai LGA
Number of new solar installations in the Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 4,289 cumulative solar installations since 2013/14	3,270 new solar PV systems installed (654 every year)
Estimated new installed solar capacity (MW) in the Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 21.59 MW of cumulative installed solar capacity since 2013/14	36 MW of new solar capacity installed (7.2 MW every year)
Electric vehicle (EV) uptake in Ku-ring-gai LGA	Annually	Resilient Sydney platform	2020 399 registrations (Beta data)	11,800 new electric vehicles (5,900 for each year from 2025/26)
Tonnage of residential waste going to landfill in the Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 26,710 tonnes (municipal solid waste)	Decreasing trend
Tonnage of residential waste being diverted from landfill in the Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 32,753 tonnes (green waste and waste being recycled)	Increasing trend
Percentage of residential waste being diverted from landfill in Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 55% (green waste and waste being recycled)	Increasing trend
GHG emission reductions from residential waste	Annually	Resilient Sydney platform	FY 2019/20 37, 488 tonnes CO2-e (municipal solid waste)	25% reduction in GHG emissions from residential waste
Electricity use in Ku-ring-gai LGA	Annually	Resilient Sydney platform	FY 2019/20 551,606 MWh	Annual decrease of 1% year-on year until 2026/27
Reduction of gas related GHG emissions	Annually	Resilient Sydney platform	FY 2019/20 120,933 tonnes CO2-e	25% reduction in gas related GHG emissions
Community energy reduction as a result of participation in a Council program (MWh)	Annually	Council evaluation	FY 2021-22 442.72MWh - estimated	N/A
Waste diverted from landfill as a result of participation in a Council program (tonnage)	Annually	Council evaluation	FY 2021-22 24.972 tonnes - estimated	N/A

Table 4: Tracking our progress towards a net zero Ku-ring-gai

Achieving net zero GHG emissions in Ku-ring-gai by 2040 and the five-year targets in this strategy is a shared responsibility and is dependent on action from the community, the business sector, industry and all levels of government.

In addition to reporting on the indicators above, Council will promote case studies and community action and initiatives as a means of narrating our community's transition to net zero.

10.2 Strategy review

In adopting an evidence-based approach in response to climate change, Council is committed to regularly reviewing plans, strategies and benchmarks to ensure they remain consistent with the most recent knowledge and best available science.

In accordance with this principle, the *Net Zero Communities Strategy 2022 – 2027* will be updated to align with any revised GHG emission reduction and net zero targets adopted by Council through its Climate Change Policy, based on any advances in the climate science, and in accordance with any further abatement opportunities relevant to the Ku-ring-gai LGA.

11. References

100% Renewables (2020) *Community Inventory and Climate Change Strategy - inputs to tasks supporting the review of Council's climate change strategy*

100 Renewables (2021) *Net Zero Strategy Community Consultation Outcomes Report*

Climate Council (2019) *Compound Costs: How Climate Change Is Damaging Australia's Economy*. Accessed at: https://www.climatecouncil.org.au/wp-content/uploads/2019/05/costs-of-climate-change-report-v3.pdf

Climate Council (2021) *Climate Change 2021: The Physical Science Basis – Explainer*. Accessed at Microsoft Word - IPCC-6AR-WGI Explainer_updated.docx (climatecouncil.org.au)

IPCC (2018) *Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*.

IPCC (2021) *Climate Change 2021 The Physical Science Basis – Summary for Policymakers*