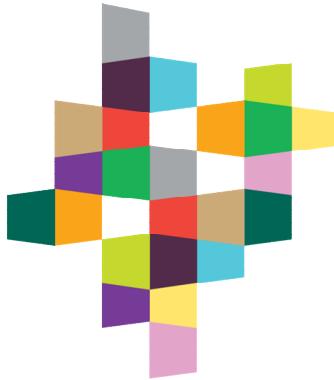


QPRC



QUEANBEYAN-PALERANG REGIONAL COUNCIL CLIMATE CHANGE ACTION PLAN: COUNCIL OPERATIONS PLAN PERIOD: 2020 TO 2030

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OVERVIEW

Queanbeyan-Palerang Regional Council (QPRC) recognises that climate change is a serious and significant issue and is committed to reducing its carbon footprint and supporting the community in addressing climate change. Both Council and the community have roles to play in ensuring the Queanbeyan-Palerang region contributes to efforts to mitigate climate change through action to reduce our greenhouse gas (GHG) emissions. Two documents comprise Council's Climate Change Action Plans:

- QPRC Council Operations Climate Change Action Plan (this document)
- QPRC Community Climate Change Action Plan

Both Action Plans cover the period from 2020 to 2030. The plans set out the potential for emissions abatement in Council operations and in the community, as well as actions that Council and the community can undertake to implement the plans. Council is committed to develop annual public reports on its progress implementing the plans. In addition, Council will conduct a midterm and final evaluation of the plans at the end of its term, to inform updated Climate Change Action Plans.

These plans complement other strategies that Council has developed or is developing, which also act upon climate change in our region.

Council's Operations Climate Change Action Plan will impact on Council's budget in a number of ways.

- The plan identifies a range of solar photovoltaic (PV) power generation opportunities at Council-owned facilities. It is estimated that these will cost \$1 million and will return more than \$140,000 annually in net cost savings to council for 25 years.
- Streetlighting systems can be upgraded to LED technology, with savings in energy costs and maintenance. Initial cost estimates of \$2.4 million will save an estimated \$440,000 each year.
- Council's pre-existing Sustainable Design Policy for Council Buildings will see energy efficiency and sustainable design built into major building and infrastructure projects, including the new Queanbeyan Civic and Cultural Precinct, the Queanbeyan Sewerage Treatment Plant, and the expansion of the Googong Water Reclamation Plant.
- Council is encouraged to consider policy measures that will lead to lower greenhouse gas emissions, including LED lighting for new and refurbished sporting fields and public lighting, fleet policy changes that will see Council's vehicles transition to low and zero emissions over time, and the adoption of updated guidelines for local councils on sustainable procurement.
- Council is encouraged to consider purchasing some or all of the electricity for its operations from renewable energy sources, where this is shown to be no more expensive nor to involve any additional risk compared with Council's current electricity purchasing arrangements, as other councils and large organisations have done.
- Future opportunities such as the expansion of solar PV systems with battery energy storage are not costed in this plan and will form part of a future revision of the plan by Council.

Implementation of energy and emissions reduction measures could see Council achieve significant cost savings and abatement over time. Pathways for Council's energy consumption and emission reductions are set out in this plan.

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KEY ABBREVIATIONS

AR	Assessment Report
BAU	Business As Usual
CCAP	Council Operations Climate Change Action Plan
CCCAP	Community Climate Change Action Plan
COP	Conference Of the Parties
CO ₂ -e	Carbon Dioxide Equivalent
CO ₂	Carbon Dioxide
CSP	Community Strategic Plan
DPIE	Department of Planning, Industry and Environment
EVs	Electric Vehicles
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HVAC	Heating, Ventilation, Air conditioning
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
IS	Infrastructure Sustainability
KPIs	Key Performance Indicators
LGA	Local Government Area
LULUCF	Land use, Land-Use Change and Forestry
PPAs	Power Purchase Agreements
PPM	Parts Per Million
PV	Photovoltaic
QPRC	Queanbeyan-Palerang Regional Council
RCP	Representation Concentration Pathways
RET	Renewable Energy Target
SBTs	Scientific Based Targets
SDGs	Sustainable Development Goals
SEROC	South East Regional Organisation of Councils
SSPs	Shared Socioeconomic Pathways

STP	Sewage Treatment Plant
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1. SUMMARY

Queanbeyan-Palerang Regional Council recognises that climate change is a serious and significant issue and is committed to supporting the community in addressing it through a local response. This is the first Climate Change Action Plan for the new Queanbeyan-Palerang Regional Council. It builds on previous action plans and implementation of energy efficiency and renewable energy initiatives by the former Queanbeyan City Council and Palerang Council.

The previous Queanbeyan City Council Operational Climate Change Action Plan (2013-17) targeted a 25% reduction in GHG emissions by 2020 compared with 2009-10, to be achieved through rooftop solar, energy efficiency and integration of the action plan into Council's policies. Many actions were completed, including the installation of 382 kW of solar panels on council buildings so far.

Focusing on Council's operations, this action plan covers the period 2020 to 2030, and accompanies QPRC's first Community Climate Change Action Plan. Taken together these plans form the framework for Council and the community to work together to address climate change issues in our region.

1.1. SUGGESTED ENERGY & ABATEMENT TARGET OPTIONS FOR QPRC OPERATIONS

An analysis of energy use committed projects and future opportunities shows that there are opportunities for Council to make significant reductions in its emissions through a cost-effective program of action. 'Moderate' and 'ambitious' reduction scenarios were developed based on identified initiatives. These scenarios allow for abatement that is occurring through 'greening' of the grid with the addition of new large-scale renewable energy projects.

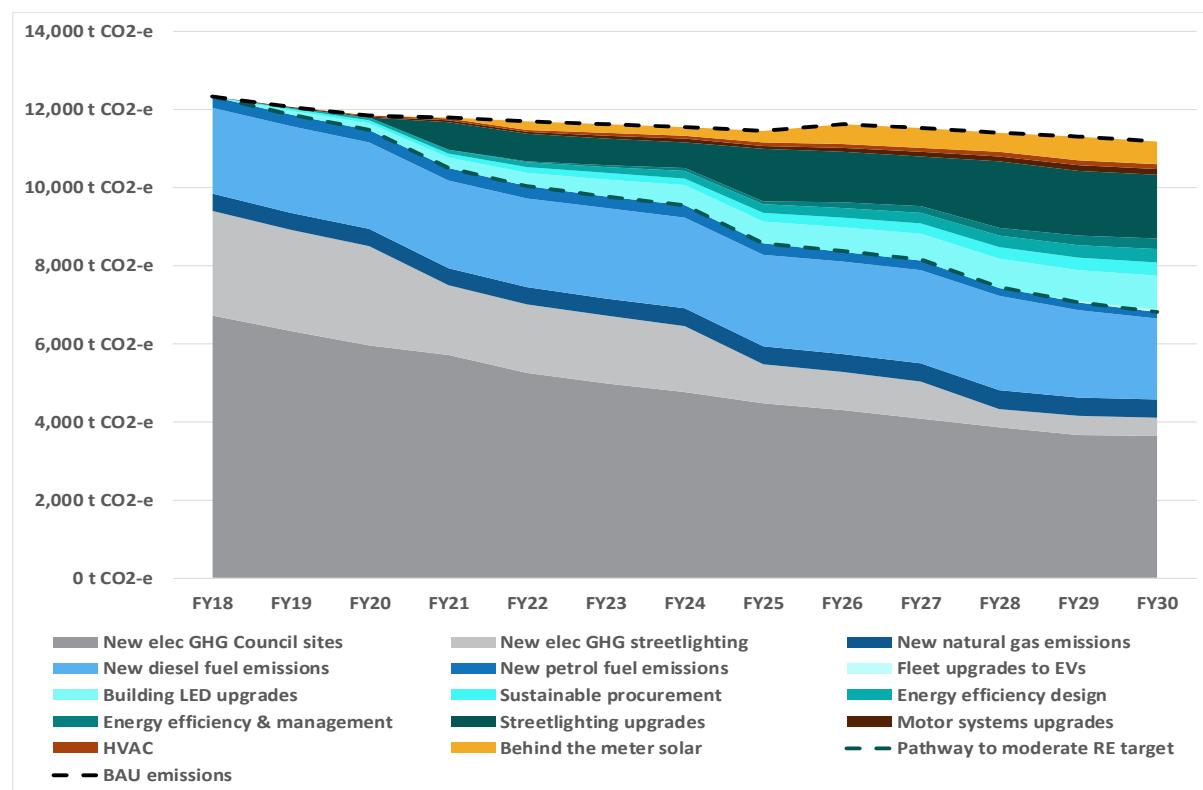
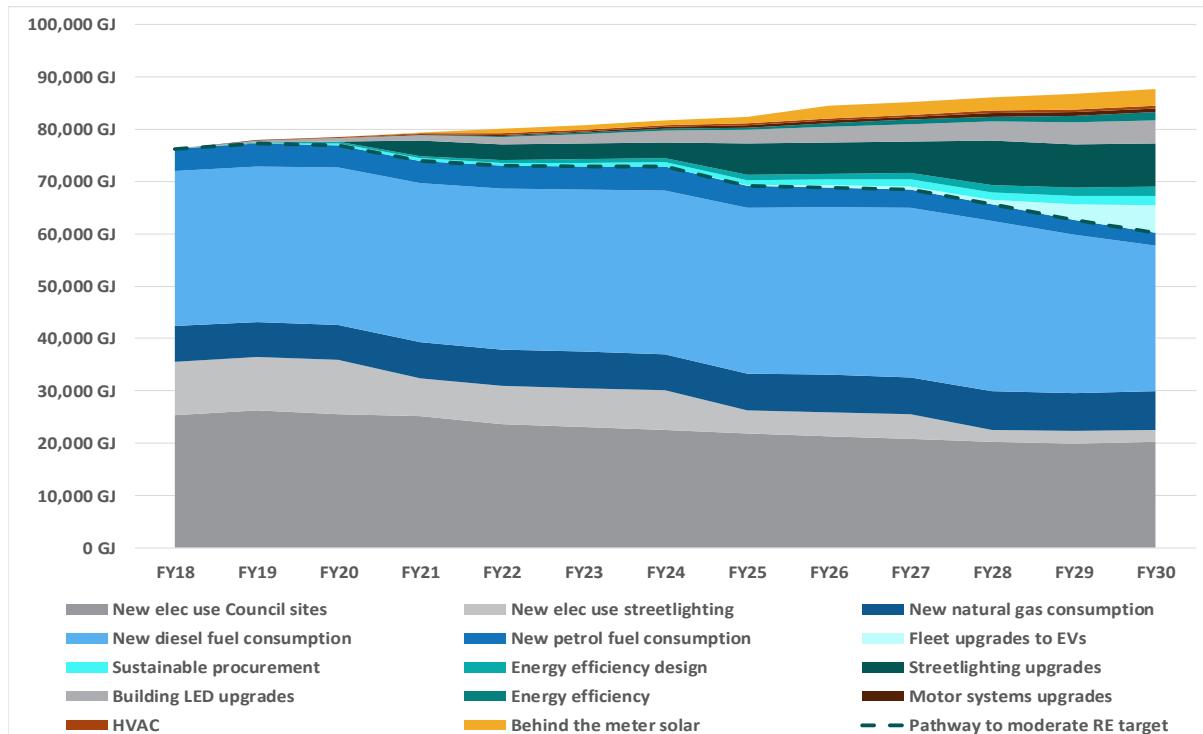
Moderate abatement can be achieved by upgrading all of QPRC's streetlights with LED technology, expanding Council's rooftop / onsite solar PV portfolio, and implementing cost-effective energy efficiency at its sites, continuing and extending current practices. These measures would require a budget of more than \$3.4 million and see Council's costs (energy and maintenance) fall by around \$580,000 per year, excluding planned capital works such as the Queanbeyan Civic and Cultural Precinct and the Queanbeyan STP. Council can also start to source some of its fleet from low and zero emissions sources such as electric, hybrid or hydrogen fuel cell vehicles over the next several years.

The impact of this approach can be seen in the two charts below, which highlight Council's operational energy demand forecast as well as the associated emissions forecast. This would suggest:

- 20% reduction in energy use in 2030 compared with 2017-18 levels
- 45% reduction in emissions in 2030 compared with 2017-18 levels inclusive of onsite actions and the greening of the grid i.e. reduced emissions intensity of the electricity grid

Ambitious abatement would see Council accelerate a transition to zero and low emissions vehicles in the period to 2030 and enter into one or more renewable energy Power Purchase Agreements (PPAs) to source clean electricity. Implementation of these measures, including 100% renewable electricity, would suggest:

- 70% reduction in non-renewable energy use by 2030 compared with 2017-18 levels
- 90% reduction in emissions by 2030 compared with 2017-18 levels inclusive of onsite actions and the greening of the grid



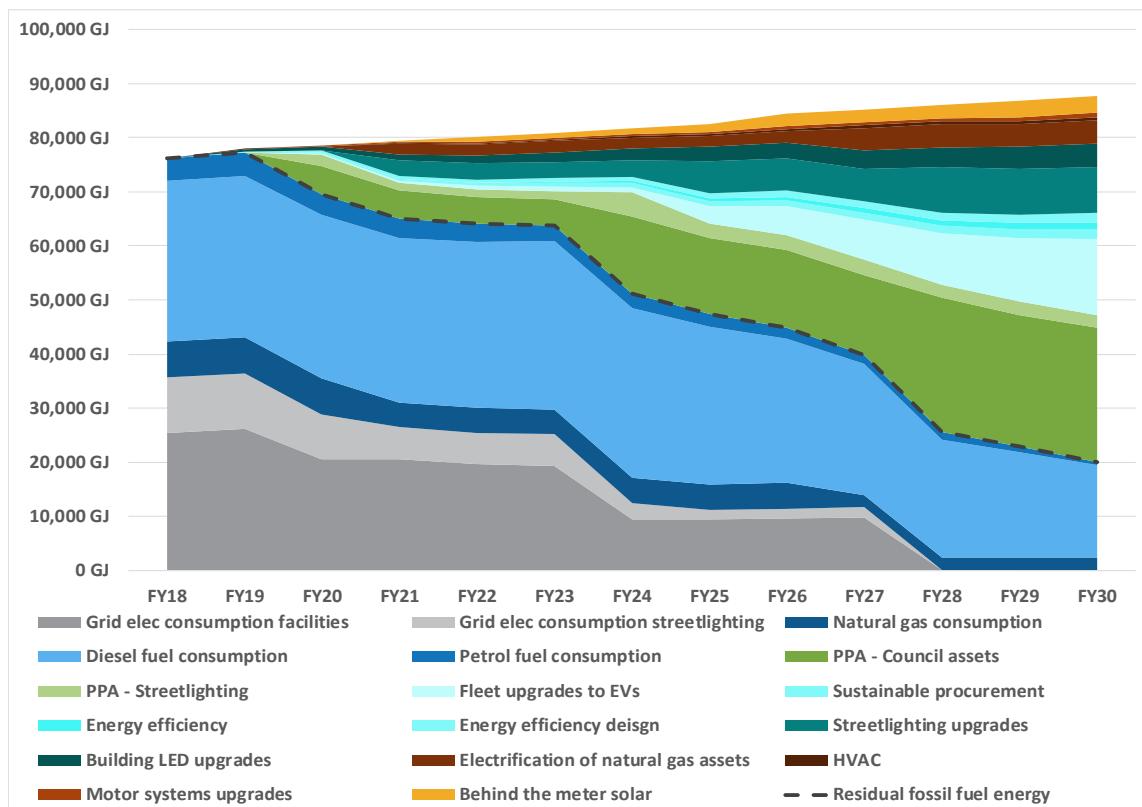


FIGURE 3: AMBITIOUS (70%) ENERGY REDUCTION PATHWAY

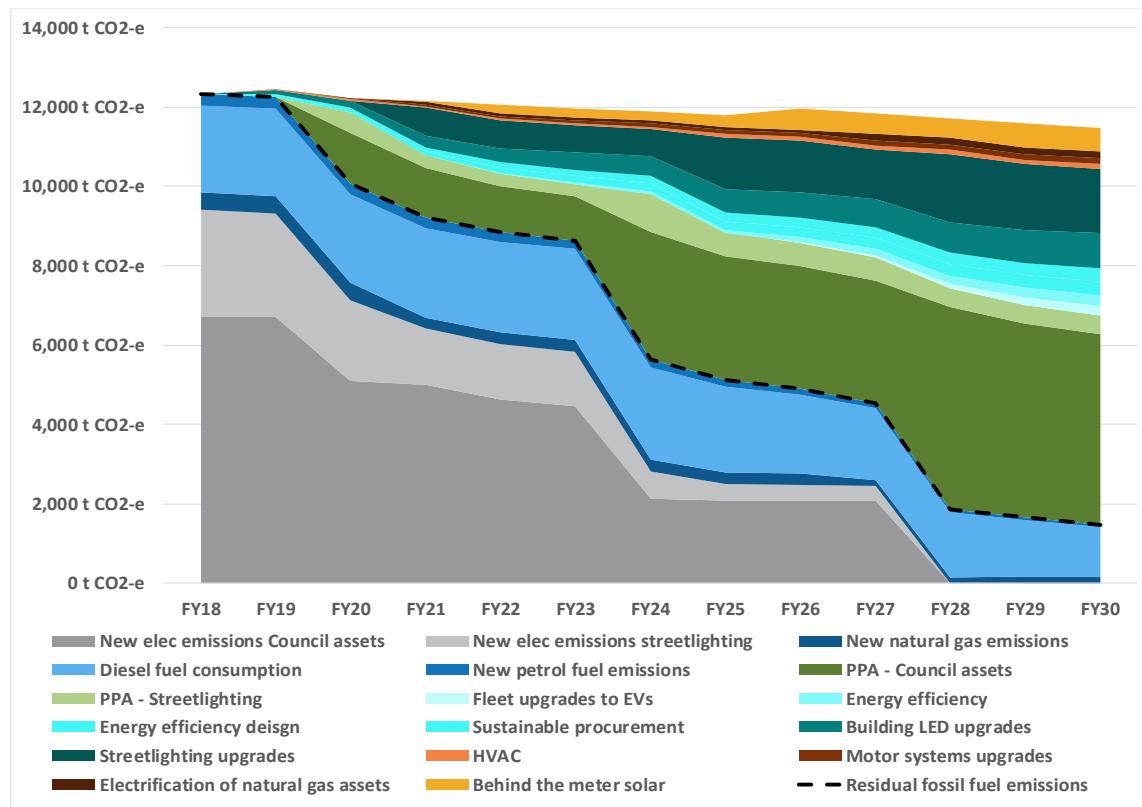


FIGURE 4: AMBITIOUS (90%) EMISSIONS REDUCTION PATHWAY

INTRODUCTION

2. INTRODUCTION AND QPRC CONTEXT FOR ACTION ON CLIMATE

Queanbeyan-Palerang Regional Council (QPRC) continues to recognise that climate change is a serious and significant issue and is committed to supporting the community in addressing it through a local response. The reasons to act now on climate change are many and calls to action have been increasing both locally and globally.

This is the first Climate Change Action Plan for the new Queanbeyan-Palerang Regional Council. It builds on previous action plans¹ and implementation of energy efficiency and renewable energy initiatives by the former Queanbeyan City Council and Palerang Council.

Focusing on Council's operations, this action plan accompanies our first Community Climate Change Action Plan for Queanbeyan-Palerang. Importantly, the community action plan includes measures to mitigate future climate change effects and adapt to current and future climate change impacts. Taken together these Action Plans will form the framework for Council and the community to work together to address climate change issues in our region.

The Action Plans were developed via an assessment of the opportunities available in Council's operations and in the community to mitigate and adapt to climate change, and via engagement of Council and community stakeholders to ensure a broad range of views and ideas were input to the process. Engagement of stakeholders has helped to ensure a common understanding of the climate change issues requiring a local response and will help in fostering a Council/community partnership in implementing the Action Plans in coming years.

2.1. QUEANBEYAN-PALERANG COMMUNITY STRATEGIC PLAN 2018-2028

The Queanbeyan-Palerang Community Strategic Plan (CSP) sets out the long-term aspirations of the community in terms of where we see our region over the next 10 years and the things, we most value about living here. The Strategic Plan 2018-2028 highlights five strategic pillars that the CSP is built around, including two that are particularly relevant to this Plan:

- Strategic Pillar 3: Character
 - A sustainable Queanbeyan-Palerang
 - A clean, green community that cherishes its natural and physical character
- Strategic Pillar 4: Connection
 - A connected Queanbeyan-Palerang
 - A well-connected community with good infrastructure enhancing quality of life

The five strategic pillars of the CSP, reflecting the desired outcomes are illustrated on the next page.



Accordingly Queanbeyan-Palerang's Community Strategic Plan is structured around **FIVE STRATEGIC PILLARS** consisting of:



COMMUNITY OUTCOMES – As identified within the Community Strategic Plan

FIGURE 5: QUEANBEYAN-PALERANG COMMUNITY STRATEGIC PLAN – 5 STRATEGIC PILLARS

The five Key Goals associated with Strategic Pillar 3 provide further direction in relation to actions that need to be developed and pursued in order to meet the community's objectives.

- Key Goal 3.1: We consider the environmental impacts of future development
- Key Goal 3.2: Our region's urban landscapes are well managed and maintained promoting community pride
- Key Goal 3.3: Our natural landscapes and water resources are sustainably managed
- Key Goal 3.4: We actively promote and implement sound resource conservation and good environmental practice
- Key Goal 3.5: We ensure the future planning for the region is well coordinated and provides for its sustainable development

KEY STRATEGIES	COMMUNITY INDICATORS	DATA SOURCE
3.1 We consider the environmental impacts of future development	Level of community satisfaction on the state of the Queanbeyan-Palerang environment	Community Satisfaction Survey
3.2 Our region's urban landscapes are well managed and maintained promoting community pride	Level of community satisfaction with presentation of urban landscapes	Community Satisfaction Survey
3.3 Our natural landscapes and water resources are sustainably managed	Level of community satisfaction on the state of natural landscapes and water resources	Community Satisfaction Survey
3.4 We actively promote and implement sound resource conservation and good environmental practice	Level of community satisfaction with resource conservation and good environmental practice promoted by QPRC	Community Satisfaction Survey
3.5 We ensure the future planning for the region is well coordinated and provides for its sustainable management	Level of community satisfaction on strategic planning for the region	Community Satisfaction Survey

FIGURE 6: KEY GOALS ASSOCIATED WITH STRATEGIC PILLAR 3 – CHARACTER

The six Key Goals associated with Strategic Pillar 4 also provide further direction in relation to actions that need to be developed and pursued in order to meet the community's objectives.

- Key Goal 4.1: Our transport infrastructure and networks are well planned and maintained
- Key Goal 4.2: We plan for and provide access to potable water supplies for communities across our region
- Key Goal 4.3: We plan for and provide for the management of sewage, stormwater and recycled water within the communities of our region
- Key Goal 4.4: We actively promote and implement sound resource conservation and good environmental practice for our waste management system
- Key Goal 4.5: We plan for and provide regional facilities which promote better social connection and access for the community
- Key Goal 4.6: We undertake planning to ensure infrastructure is prepared for future growth

STRATEGIC PILLAR 4 - CONNECTION		
KEY GOAL	COMMUNITY OUTCOME	COMMUNITY STRATEGY – Service Objective
4.1 Our transport infrastructure and networks are well planned and maintained	The region's transport network and infrastructure allows for the safe ease of movement throughout Queanbeyan-Palerang	Support the safe and equitable movement of commuters, visitors and freight into and through the Local Government Area through contemporary maintained and renewed roads, bridge and paths infrastructure and public transport facilities
4.2 We plan for and provide access to potable water supplies for communities across our region	The region's potable water supply systems meet national standards and are managed to adequately meet community demand	Support public health and growth through integrated water cycle management and the safe and equitable delivery of potable supply to residents and businesses in Queanbeyan-Palerang
4.3 We plan for and provide for the management of sewage, stormwater and recycled water within the communities of our region	The region's sewage treatment, stormwater and recycled water systems meet national standards to support public and environmental health in our region	Support public and environmental health through integrated water cycle management and the safe and equitable treatment of sewage and stormwater, the delivery of recycled water supply to residents and businesses in the Local Government Area, and improved water quality flows into the regional environment
4.4 We actively promote and implement sound resource conservation and good environmental practice for our waste management systems	The region increases waste minimisation and greater recycling levels of our waste	Support public and environmental health and generation of business through changing community and business behaviours, minimisation of waste to landfill and greater utilisation of recycled waste
4.5 We plan for and provide regional facilities which promote better social connection and access for the community	Social connection within our region is provided for via access to a range of community facilities across the region	Support the safe and equitable access to facilities and amenities through well-presented, sited, efficient, secure and clean buildings for community, civic and recreational use
4.6 We undertake planning to ensure infrastructure is prepared for future growth	Changing community demand is met by well planned for and placed infrastructure	Provide the asset management logistics for the organisation through well planned, sited and designed infrastructure and support facilities

FIGURE 7: KEY GOALS ASSOCIATED WITH STRATEGIC PILLAR 4 – CONNECTION

2.2. DELIVERY PROGRAM AND OPERATIONAL PLANS

Climate change response measures that are identified and assessed to be feasible to implement will be progressed in line with Council's 4-year Delivery Program and annual Operational Plans.

The Delivery Program sets out what the Council will do during its electoral term (4 years) to assist the community in achieving their long-term aspirations. Operational Plans set out the specific activities (including budget) the Council will undertake in each financial year.

The current Delivery Program covers the period July 2018 to June 2021 (3 years), following which the Delivery Program from July 2021 to June 2025 will revert to the 4-year cycle of non-merged councils.

In the context of Council's operations, the current Delivery Program 2018-21 includes a number of actions that will have an impact on Council's carbon footprint over the long term. In particular:

- Planning and commencement of construction of the Queanbeyan Civic and Cultural precinct and the subsequent treatment of Council-owned facilities in the Queanbeyan Central Business District (CBD) that may be divested and redeveloped as part of the CBD Transformation.
- Re-development of the Queanbeyan sewerage treatment plant from a 1930s facility to a modern treatment works with capacity to service the region's growing population, as well as

expansion or upgrading of other sewerage treatment facilities including Googong and Bungendore.

This Council Operations Climate Change Action Plan aims to identify and evaluate a range of measures that can be developed and implemented, both within Operational Plans that are aligned with the current Delivery Program to June 2021, and considered in the planning and development of the next four-year Delivery Program.

2.3. LEGISLATIVE INFLUENCES ON CLIMATE AND SUSTAINABILITY ACTION BY QPRC

A number of Acts provide a legislative basis for QPRC's past and ongoing action on sustainability and climate change. For example:

- ***Local Government Act 1993*** - the following principles apply to decision-making by Councils (subject to any other applicable law).
 - Section 8(2c) "Council's should consider the long term and cumulative effects of actions on future generations".
 - Section 8(2d) "Council's should consider the principles of ecologically sustainable development".
- ***Biodiversity Conservation Act 2016***
 - Section 1.3 "The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development".
- ***Biosecurity Act 2015***
 - Section 22 imposes a duty to prevent, eliminate or minimise a biosecurity risk, including the control of pest plants and animals on council land and avoiding the spread of weed material.
- ***Environmental Planning and Assessment Act 1979*** - the objects of this Act, which are reflected in Council's environmental planning instruments that council development activities often must comply with, include:
 - Section 1.3(b) "to facilitate ecologically sustainable development in decision-making about environmental planning and assessment";
 - Section 1.3(e) "to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats"; and
 - Section 1.3(f) "to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)".
- ***Pesticides Act 1999***
 - Part 2 specifies controls on the use of pesticides in accordance with labels and to prevent harm to non-target plants or animals, and material harm to endangered, vulnerable or protected animals.
- ***Protection of the Environment Operations Act 1997***
 - The objects of the Act include to protect, restore and enhance the quality of the environment having regard to ecologically sustainable development, such as through compliance with EPA licence requirements for scheduled activities and avoiding activities being carried out in an environmentally unsatisfactory manner that is likely to cause pollution.
- ***QPRC Procurement Policy***

- Council acknowledges that it has a vital role to play at the local level in promoting sustainable development and can make a contribution towards meeting the global challenges of creating a sustainable society.
- Council can implement sustainable procurement practices based on the 2017 Sustainable Procurement Guide for NSW local governments (<https://www.lgnsw.org.au/files/imce-uploads/127/esstam-sustainable-procurement-guide-30.05.17.pdf>)
- **Water Management Act 2000**
 - The objects of the Act are to provide for the sustainable and integrated management of water sources, such as the use of water at council's facilities and for irrigating urban landscapes and roadworks.
- **Waste Avoidance and Resource Recovery Act 2001**
 - Council is expected to contribute to meeting the targets in the NSW Waste Avoidance and Resource Recovery Strategy.

2.4. QPRC'S CURRENT SUSTAINABILITY POLICIES

2.4.1. COUNCIL OPERATIONS SUSTAINABILITY POLICY

Council recently developed a sustainability policy to manage its operations and ensure that all operational procedures prioritise sustainability. This policy highlights QPRC's commitment to reducing the environmental impacts of its operations, by adopting a quadruple bottom-line approach (financial, social, environmental and governance) to its focus on water use, energy use, waste management, fleet management, natural resource management, and parks management.

Council's efforts to lead the region in sustainable practices across these areas will be accomplished via the development of:

- Integrated management plans
- Specific action plans
- Standard operating procedures
- Training
- Communication
- Monitoring and reporting

Council has also developed a set of key performance indicators (KPIs) that it plans to report against annually as part of the policy.



2.4.2. SUSTAINABLE DESIGN POLICY FOR COUNCIL BUILDINGS

This policy was adopted by Council in May 2017. The policy applies to all new building and other infrastructure construction, refurbishment and upgrades. It sets standards to ensure that all Council building and infrastructure works support Council's Sustainability goals, including, but not limited to:

1. Reduced energy consumption, water use and waste.
2. Reduced on-going operating and maintenance costs.
3. Demonstrating community leadership in implementing renewables and passive solar design.
4. Using alternative water sources and improving stormwater water quality.
5. Better occupant health and comfort.
6. Continued Council growth and development with reduced environmental footprint; and
7. Increased staff and community awareness of sustainability.

Targets set for this policy include:

- Zero net impact on GHG emissions and water use compared to previous years.
 - No Net Increase in GHG emissions
 - No Net Increase in Council Water Use
 - Increase waste recovery rates to 80%
- What this means in practice is that as new projects are added:
 - Their environmental impact shall be as low as is practical; and
 - Efficiency upgrades of existing sites will offset environmental impacts of new facilities

2.4.3. SUSTAINABLE EVENT MANAGEMENT POLICY

The QPRC sustainable event management policy applies to all events operated by Council. It is designed to identify sustainability considerations for event organisers in relation to the planning, implementation, and evaluation of events.

2.5. COMMUNITY ACTION AND RESPONSES TO CLIMATE CHANGE

QPRC action on climate change is also informed by the actions and attitudes of the community. This is evidenced by the uptake of solar PV by the community in recent years, and also by a recent survey carried out as input to the development of this Plan.

2.5.1. SOLAR UPTAKE IN QUEANBEYAN-PALERANG REGIONAL COUNCIL

Some 20.7% of dwellings (APVI <http://pv-map.apvi.org.au/>) in the local government area (LGA) have installed solar PV as of mid-April 2020. This places Queanbeyan-Palerang Regional LGA in the middle of NSW councils in terms of the number of residents taking up solar panels. In addition to 4,507 residential systems there have been 375 installations of 10-100 kW in capacity, which tend to be commercial-scale systems, plus three systems greater than 100 kW in scale.

Local governments near Queanbeyan-Palerang have comparable levels of solar PV uptake. Councils in the north of the state, including Tweed, Moree Plains and Narrabri, have reached solar uptake levels of 35% to 42% and lead the way for NSW councils.

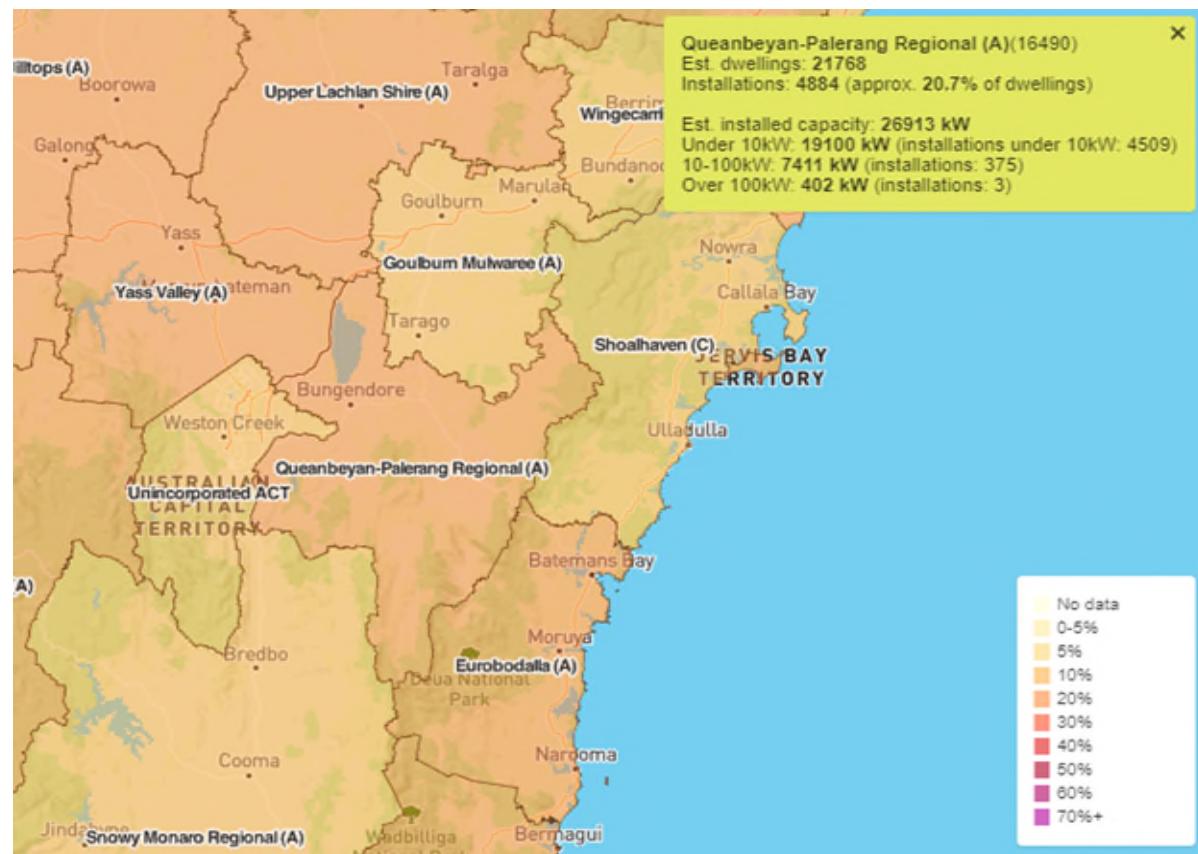


FIGURE 8: SOLAR PV UPTAKE BY QPRC (APVI 2020)

2.5.2. SURVEY RESULTS

QPRC ran a survey to gauge community attitudes about climate change and to get the community's recommendations on what Council should focus on in response to climate change, and what targets Council should adopt for its operations. The community's response to selected survey questions focused on Council's operations are summarised below, and highlight that:

1. Climate change is very important to the community,
2. Council is currently not doing enough to address climate change,
3. The top five things that Council should prioritise are:
 - a. Increased usage of renewable energy,
 - b. Increased recycling and the reduction in waste going to landfill,
 - c. Protection of creeks and waterways,
 - d. Reduced energy usage,
 - e. Council leadership (e.g. leadership role in efficiency and renewables, setting targets)
4. Council should aim to be carbon neutral for its operations

These responses are illustrated below. *Please note the below results do not represent the entire LGA community perspective.

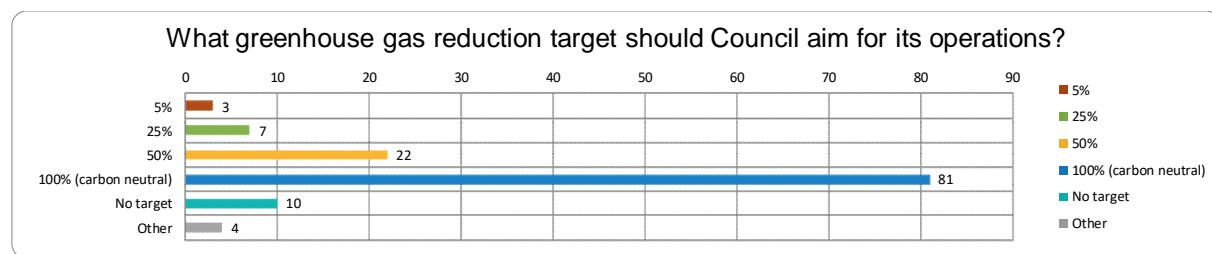
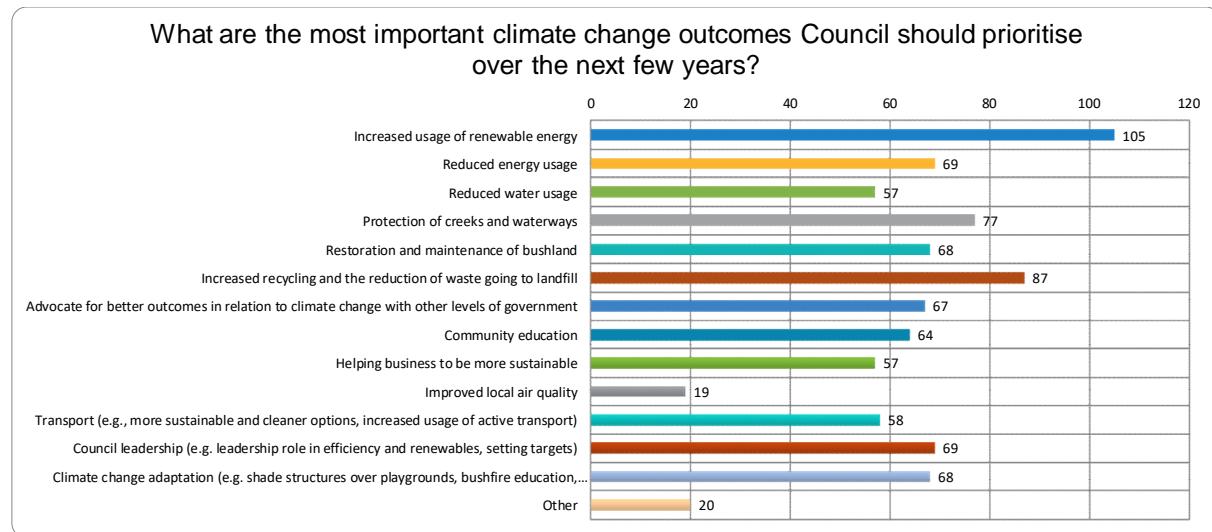
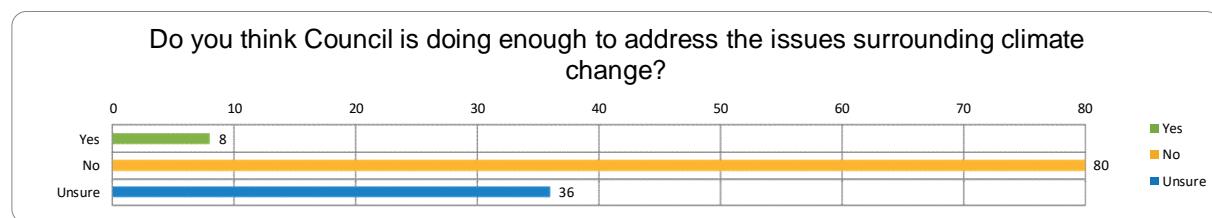
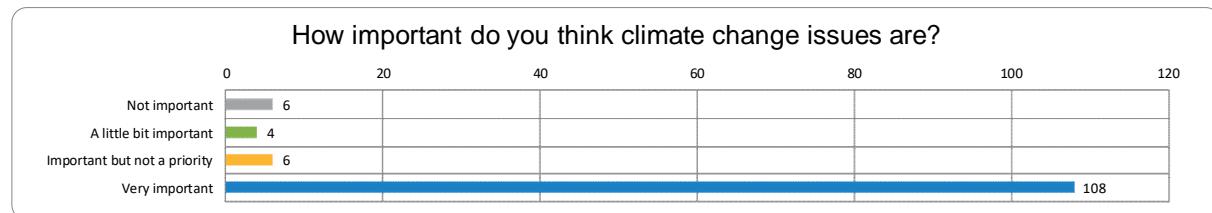
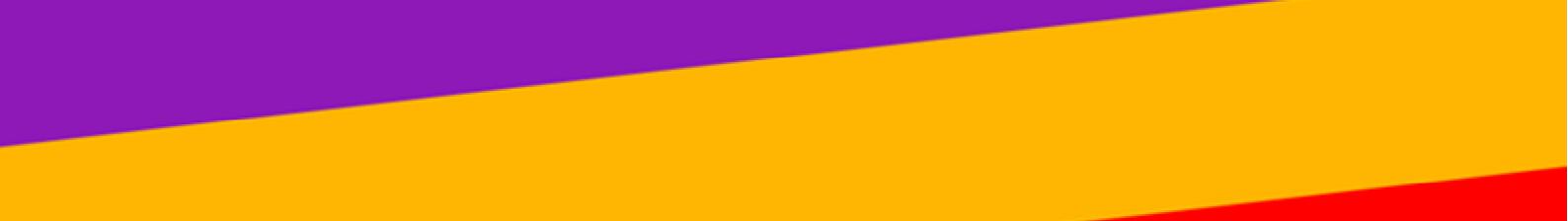
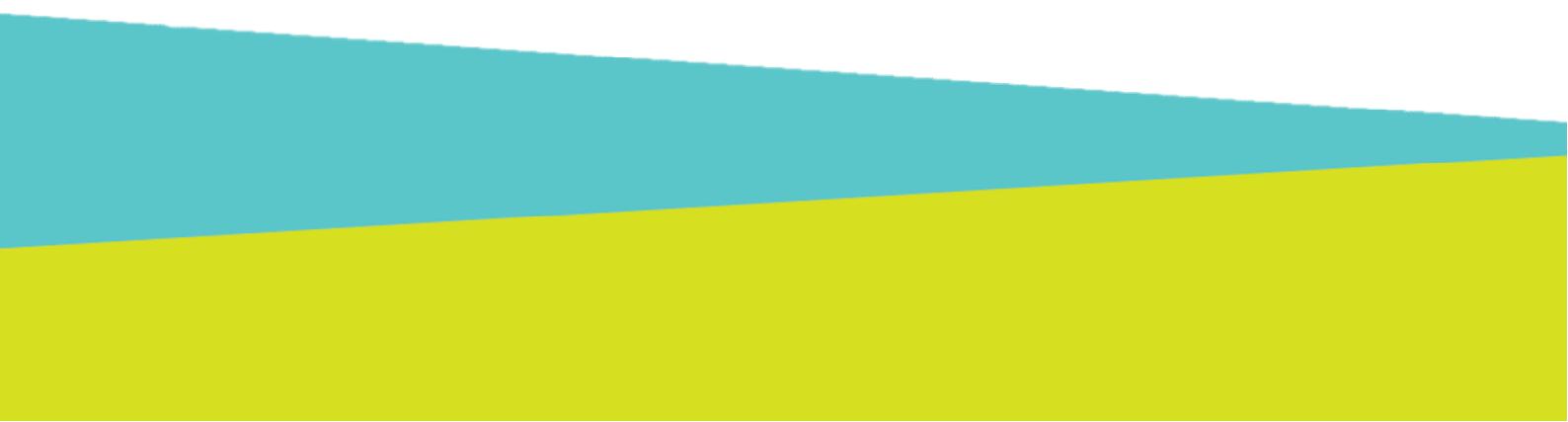


FIGURE 9: RESPONSES TO QPRC'S SURVEY – FOCUS AND TARGETS FOR COUNCIL



BROADER CONTEXT FOR CLIMATE CHANGE ACTION



3. BROADER CONTEXT FOR ACTION ON CLIMATE

3.1. WHAT IS CLIMATE CHANGE?

Climate is the set of averages, variation and extremes of weather in a region over long periods of time. Thirty years or more is the usual period for estimating average climate. Geological and historical records show that the earth's climate has always been dynamic, with change driven by natural cycles and events. However, over the last three centuries, since the beginning of the Industrial Revolution (mid-18th century) there is substantial evidence that the world has been rapidly warming (global warming) and the climate has been changing at a greater rate. Scientific evidence has found that it is extremely likely that human influence has been the dominant cause of the observed global warming and the resulting climate shift. Significant quantities of GHG's such as carbon dioxide (CO_2), nitrous oxide and methane, have been added to the earth's atmosphere from activities such as the burning of fossil fuels, land clearing and waste disposal. This enhances the greenhouse effect by absorbing infrared radiation which heats the planet, resulting in the observed global warning and climate changes for example the increased frequency and severity of drought. The term climate change is now commonly used to refer to anthropogenic (human caused) climate change and global warming, rather than the result of natural processes.

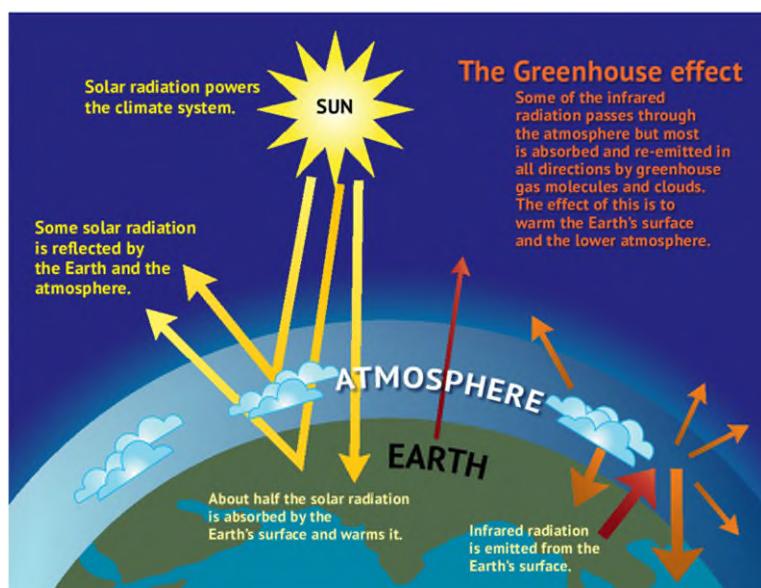


FIGURE 10: OVERVIEW OF THE GREENHOUSE EFFECT

Sourced from: <https://climate.nasa.gov/>

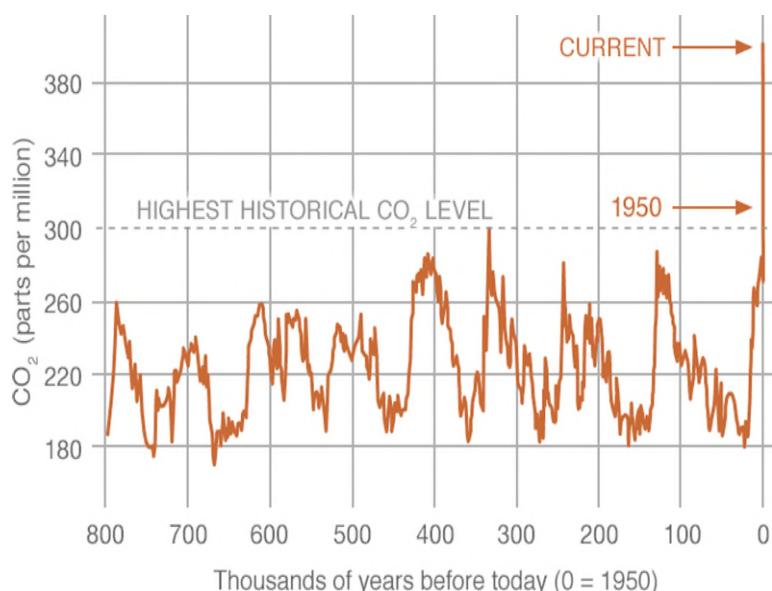


FIGURE 11: ATMOSPHERIC CO₂ CONCENTRATIONS PPM (LAST THREE GLACIAL CYCLES) Sourced from: <https://climate.nasa.gov/>

Data collected by the CSIRO shows that the concentration of carbon dioxide in our atmosphere in March 2020 was approximately 408.6 parts per million (PPM)¹. The level of carbon dioxide in the Earth's atmosphere is now higher than at any time over the past 800,000—and possibly 20 million—years. Similarly, the levels of the other two GHG's, methane and nitrous oxide, have risen significantly in recent years.

Carbon dioxide and other GHG's were produced in NSW in 2017 by the following activities²:

¹ <https://www.csiro.au/en/Research/OandA/Areas/Assessing-our-climate/Latest-greenhouse-gas-data>

² Sourced from: <https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-emissions>

- * Stationary energy – 50-%
- * Coal Mines- 11%
- * LULUCF- (negative) 10%

- * Transport- 21%
- * Industry- 10%

- * Agriculture- 15%
- * Waste- 2%

This accumulation of atmospheric GHG's is already having an economic, social and environmental impact. Some environmental changes are irreversible and if not addressed will have severe future implications. Furthermore, the costs of climate change inaction are likely to be significant with some models predicting that the Australian economy (GDP) could lose 130 billion per year if Paris Agreement targets are not met³.

3.1.1. EMISSION SCENARIOS AND SHARED SOCIOECONOMIC PATHWAYS

Representation Concentration Pathways (RCPs) are scenarios that describe alternative trajectories for a number of GHG's and the resulting atmospheric concentrations from 2000 to 2100. The four RCP scenarios as defined by the Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR) 5⁴ are:

- RCP 2.6- Methane emissions reduced by 40%, CO₂ emissions decline by 2020 and become negative in 2100.
- RCP 4.5- Stable methane emissions, CO₂ emissions increase only slightly before decline commences around 2040.
- RCP 6.0- Stable methane emissions, CO₂ emissions peak in 2060 at 75 per cent above today's levels, then decline to 25 per cent above today.
- RCP 8.5- Characterized by increasing Methane and CO₂ emissions that lead to high concentrations overtime⁵.

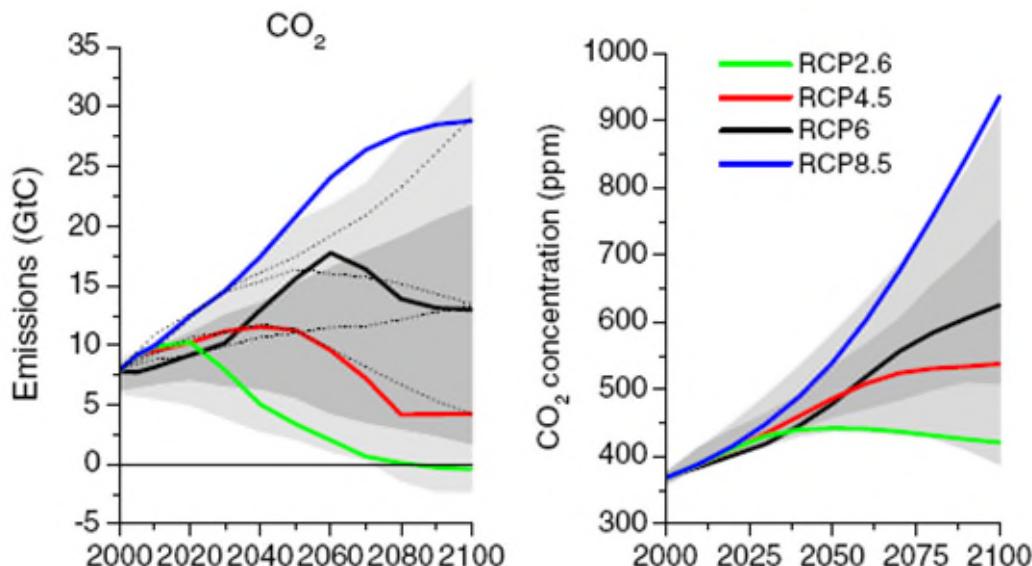


FIGURE 12: RCP SCENARIOS OF CO₂ EMISSIONS

The Intergovernmental Panel on Climate Change (IPCC) predicts an increase of global mean surface temperature by the end of the 21st century (2081-2100) relative to 1986-2005 is *likely* to be 0.3°C to 1.7°C under RCP2.6, 1.1°C to 2.6°C under RCP4.5, 1.4°C to 3.1°C under RCP6.0, and 2.6°C to 4.8°C under

³ Sourced from: <https://www.tai.org.au/content/analysis-130-billion-year-benefit-gdp-avoiding-climate-change>

⁴ <https://www.ipcc.ch/report/ar5/syr/>

⁵ New Coast: Strategies for Responding to Devastating Storms and Rising Seas

RCP8.5⁶. Please note the IPCC are set to include three new RCP scenarios in the upcoming AR6 report (due to be released in 2021-2022) those being RCP 1.9, RCP 3.4 and RCP 7.0.⁷

Shared Socioeconomic Pathways (SSPs) are new ‘pathways’ that have been developed over the past decade that examine how global society, demographics and economics might change over the century. These SSPs are now being used as important inputs for the latest climate models, feeding into the IPCC AR6⁸. Each SSP looks at how the different RCPs could be achieved within the context of the underlying socioeconomic characteristics and shared policy assumptions of that world. The SSPs five alternative socio-economic futures compromise:

- SSP1: Sustainability- Taking the Green Road (Low challenges to mitigation and adaptation)
- SSP2: Middle of the Road (Medium challenges to mitigation and adaptation)
- SSP3: Regional Rivalry- A Rocky Road (High Challenges to mitigation and adaptation)
- SSP4: Inequality- A Road Divided (Low challenges to mitigation, high challenges to adaptation)
- SSP5: Fossil- fuelled Development- Taking the Highway (High challenges to mitigation, low challenges to adaptation)

When combined with the RCPs they provide a powerful framework to explore the space of future mitigation and adaptation pathways in terms of different levels of mitigation stringency and different assumptions about socioeconomic development⁹.

3.1.2. HOW CLIMATE CHANGE WILL AFFECT THE REGION

Using data and information from the CSIRO and AdaptNSW, in the future in a high emissions scenario (no action to reduce emissions) the Queanbeyan-Palerang area will be hotter, have more intense heat waves, and an increasing risk of flash floods, high intensity storms, fire, and drought. In addition, the region will also likely see a decrease in biodiversity, human health and water security issues and land use changes.

Based on long-term (1910–2011) observations, temperatures in the South East and Tablelands Region have been increasing since about 1960, with higher temperatures experienced in recent decades. The region is projected to continue to warm in the near future (2020–2039) and far future (2060–2079), compared to recent years (1990–2009). There will be more hot days and fewer cold nights. The warming projected for the region is large compared to natural variability in temperature.

The South East and Tablelands currently experience considerable rainfall variability across the region and from year-to-year - this variability is also reflected in the projections. However, all the models agree that spring rainfall will decrease in the future.

⁶ Sourced from: <https://www.ipcc.ch/report/ar5/syr/>

⁷ Sourced from: <https://www.carbonbrief.org/>

⁸ Sourced from: <https://www.carbonbrief.org/>

⁹ Sourced from: <https://www.sciencedirect.com/science/article/pii/S0959378016300681>

TABLE 1: PROJECTED CLIMATE CHANGES FOR THE QPRC REGION

	2030: ↓	2060: ↓
	Projected Temperature Changes Maximum temperatures are projected to increase in the near future by 0.5-1.3°C	Maximum temperatures are projected to increase in the far future by 1.5-3°C
	Minimum temperatures are projected to increase in the near future by 0.4–0.7°C	Minimum temperatures are projected to increase in the far future by 1.4–2.3°C The number of cold nights will decrease
	The number of hot days are likely to increase with an additional 1-5 days above 35°C projected for the region	The number of hot days are likely to increase with an additional 10-20 days above 35°C projected for the region
	The duration of warm spells (heat waves) is projected to increase	The duration of warm spells (heat waves) is projected to significantly increase
	Projected Rainfall Changes and Flash Floods Rainfall is projected to decrease in spring and winter and increase in summer and autumn	Rainfall is projected to increase in summer and autumn
	No change in 1 in 20-year rainfall events	Small increase in the number of 1 in 20-year rainfall events
	Projected Forest Fire Danger Index (FFDI) changes Average fire weather is likely to increase in summer and spring	Number of days with severe fire weather is projected to increase in summer and spring
	Projected High Intensity Storm changes (including East Coast Lows) Frequency of high intensity summer storms are projected to increase in the near future. High intensity winter storms are projected to slightly decrease in the near future.	
	Projected Time Spent in Drought changes Time spent in drought is likely increase over the course of the century	

Data obtained from the CSIRO¹⁰ and Adapt NSW¹¹

¹⁰ <https://www.climatechangeinaustralia.gov.au/en/climate-projections/climate-futures-tool/introduction-climate-futures/>

¹¹ <https://climatechange.environment.nsw.gov.au/>

3.2. GLOBAL RESPONSE TO CLIMATE CHANGE

Internationally there are three primary drivers for urgent action on climate, additional to the second commitment period of the Kyoto Protocol from 2013 to 2020. These are:

1. Sustainable Development Goals (SDGs)
 - o In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 SDGs. Governments, businesses and civil society together with the United Nations are mobilising efforts to achieve the Sustainable Development Agenda by 2030¹². The SDGs came into force on 1 January 2016 and call on action from all countries to end all poverty and promote prosperity while protecting the planet.
2. Paris Agreement
 - o To address climate change, countries adopted the Paris Agreement at the Conference of the Parties (COP) 21 in Paris on December 25th, 2015. The Agreement entered into force less than a year later. In the agreement, signatory countries agreed to work to limit global temperature rise to well below 2° Celsius, and given the grave risks, to strive for 1.5° Celsius¹³.
3. IPCC Reports
 - o In October 2018 in Korea, governments approved the wording of a special report on limiting global warming to 1.5°C. The report indicates that achieving this would require rapid, far-reaching and unprecedented changes in all aspects of society. With clear benefits to people and natural ecosystems, limiting global warming to 1.5°C compared to 2°C could go hand in hand with ensuring a more sustainable and equitable society. The report states that limiting warming to 1.5°C implies reducing CO₂ emissions by 45% by 2030 (from 2010 levels) and reaching net zero CO₂ emissions globally around 2050 with concurrent deep reductions in emissions of non-CO₂ forcers, particularly methane¹⁴.



FIGURE 13: GLOBAL CONTEXT FOR ACTION ON CLIMATE

¹² Sourced from <https://www.un.org/sustainabledevelopment/development-agenda/>

¹³ Sourced from <https://www.un.org/sustainabledevelopment/climatechange/>

¹⁴ Sourced from <https://www.ipcc.ch/sr15/>

In addition, the World Economic Forum's Global Risks Report 2019¹⁵ highlights adverse climate change-related outcomes as among the most likely to occur with the highest impacts to the global economy.

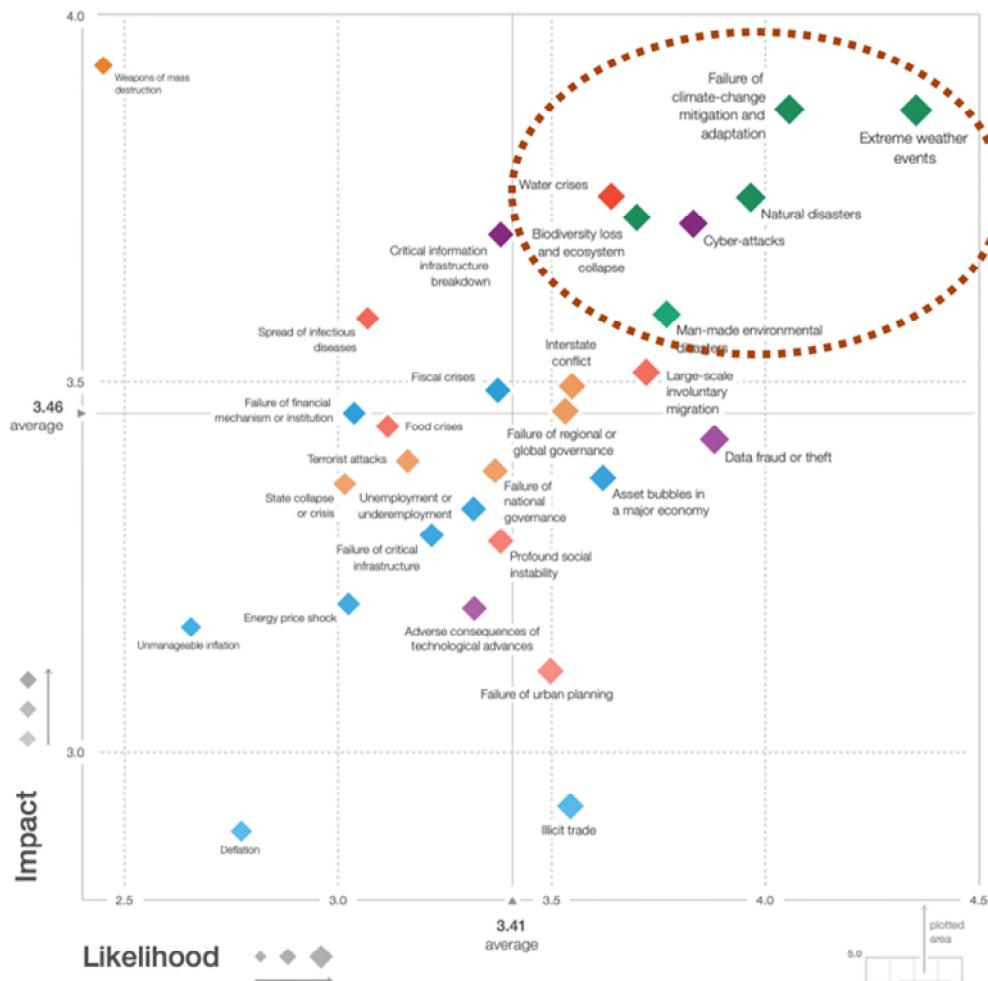


FIGURE 14: GLOBAL RISKS REPORT – LIKELIHOOD & IMPACT OF CLIMATE RISKS TO THE GLOBAL ECONOMY

3.3. NATIONAL, STATES AND TERRITORIES RESPONSE TO CLIMATE CHANGE

At a national level, Australia's response to the Paris Agreement has been to set a goal for GHG emissions of 5% below 2000 levels by 2020 and GHG emissions that are 26% to 28% below 2005 levels by 2030. A major policy that currently underpins this is the Renewable Energy Target (RET). This commits Australia to source 20% of its electricity (33,000 GWh p.a., estimated to equate to a real 23% of electricity) from eligible renewable energy sources by 2020. The scheme runs to 2030. These two key targets are illustrated below.

¹⁵ <https://www.weforum.org/reports/the-global-risks-report-2019>



FIGURE 15: AUSTRALIA'S RENEWABLE ENERGY AND EMISSION REDUCTION GOALS – NATIONAL LEVEL

At a sub-national level, most states and territories have established emissions targets as well as some legislated targets for renewable energy, as seen below.

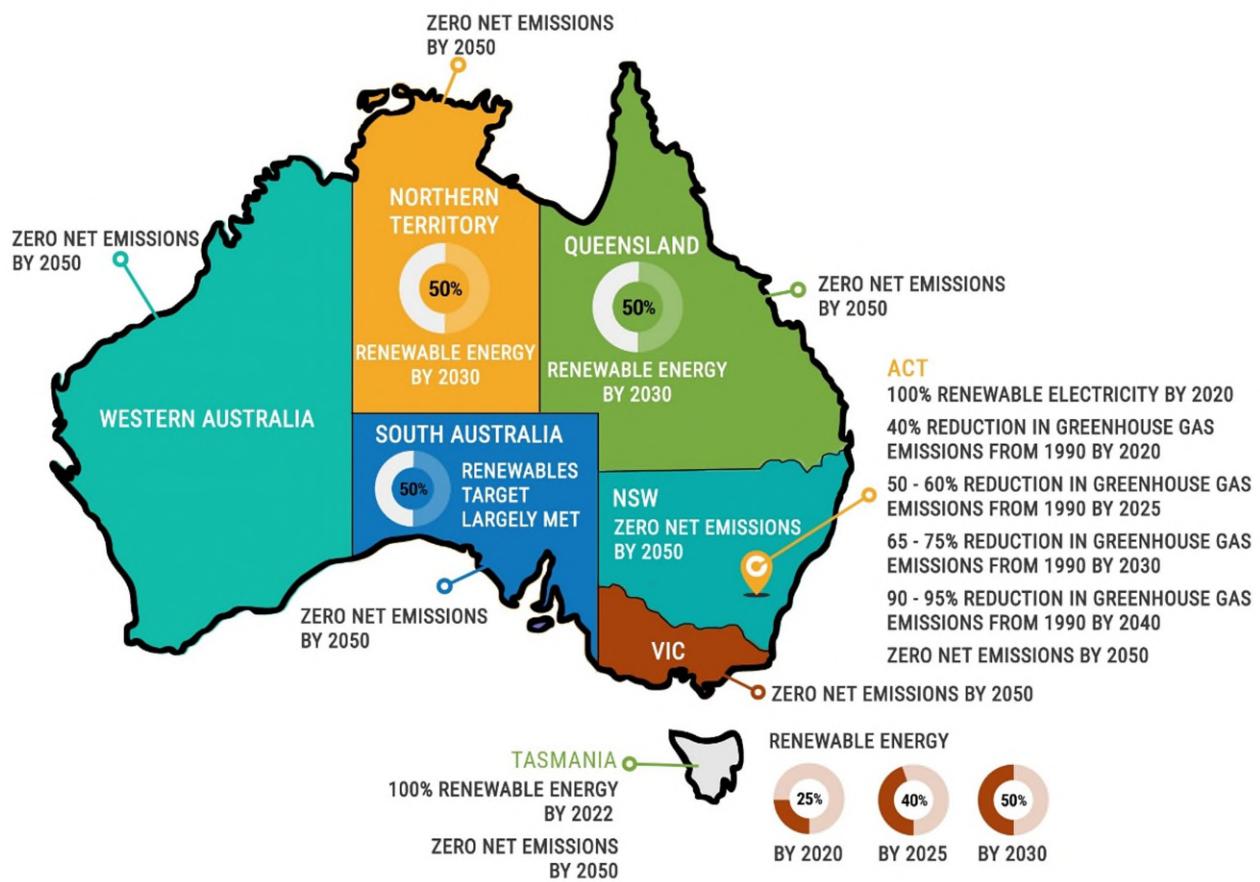


FIGURE 16: AUSTRALIA'S RENEWABLE ENERGY AND EMISSION REDUCTION GOALS – STATE & TERRITORY LEVEL

3.3.1. NSW RESPONSE

The NSW Government is committed to effective action on climate change and has developed a wide range of policies, strategies, and frameworks to reduce emissions and adapt to a changing climate.

NSW Climate Change Policy Framework¹⁶

Outlines the State's target of reaching net-zero emissions by 2050. This helps to set expectations about future GHG emissions pathways to help others to plan and act.

Net Zero Plan Stage 1: 2020–2030¹⁷

This is a big milestone that sees the first of three 10-year plans released that will set a pathway to net zero emissions by 2050 by creating new jobs, cutting household costs and attracting investment.

Some of the key highlights and priorities of the Plan include:

- Commits NSW to reducing State emissions (from 2005 levels) **by 50% by 2030 & net zero by 2050** and articulates that this is a shared responsibility. There is a clear expectation that all business sectors, individuals, and governments must play their part.
- Drives uptake of proven emissions reduction technologies that grow the economy, create new jobs, and reduce the cost of living, by;
 - Establishing a \$450 million Emissions Intensity Reduction Program & \$450 million Climate Solutions Fund to support business, farms, and land managers to transition to low emissions alternatives and undertake low-cost actions to reduce emissions.
 - Providing an additional \$1.07 billion in funding via both NSW and Commonwealth Governments for a range of measures.
 - Commits to a net zero emissions target for organic waste by 2030.
 - Establishes an Energy Security Safeguard (Safeguard) to extend and expand the Energy Savings Scheme and Programs.
 - Expanded Electric and Hybrid Vehicle Plan with the Electric Vehicle Infrastructure and Model Availability Program to fast-track the EV market in NSW.
 - Primary Industries Productivity and Abatement Program to support primary producers and landowners to commercialise low emissions technologies.
 - Development of a Green Investment Strategy, with Sydney as a world leading carbon services hub by 2030.
- Empowers consumers and business to make sustainable choices
 - Enhancement of the EnergySwitch service by allowing consumers to compare the emissions performance of energy retailers.
 - Advocate to expand NABERS to more building types and improve both the National Construction Code and BASIX.
- Invests in the next wave of emissions reduction innovation
 - To boost commercialisation of low-emissions hydrogen production and applications, the NSW Government will establish a Hydrogen Program that will help the scale-up of hydrogen as an energy source and feedstock. The NSW Government will set an aspirational target of up to 10% hydrogen in the gas network by 2030.

¹⁶ <http://www.environment.nsw.gov.au/topics/climate-change/policy-framework>

¹⁷ © State of New South Wales 2020. Published March 2020

- Establishment of a Clean Technology Program to develop and commercialise emissions reducing technologies that have the potential to commercially out-compete existing emissions-intense goods, services and processes.
- Ensures the NSW Government leads by example.
 - Aligning action by government under GREP with the broader state targets through clear targets for rooftop solar, EVs, electric buses, diesel-electric trains, NABERS for Government buildings, power purchasing and expansion of national parks
- Attracts up to \$37 billion in private investment.

Council will continue to work with and support the NSW Government in their goal to reduce the States (communities) emissions by 50% by 2030 (from 2005 levels) and net zero emissions by 2050. This will be aided through the delivery and implementation of the QPRC Climate Change Action Plans 2020-2030.

Climate Change Fund (CCF) 2017-2022 Draft Strategic Plan

Established to address the impacts of climate change, encourage energy and water saving activities and increase public awareness and acceptance of climate change. Several initiatives are currently being progressed with a total funding allocation of \$170 million. The five major initiatives being developed include:

1. supporting regional community energy projects and community energy hubs to give communities more control, avoid costly infrastructure upgrades and reduce rural energy costs.
2. supporting feasibility studies and commercialisation of emerging energy projects including pumped hydro generation and utility-scale batteries, with potential co-funding from the Australian Renewable Energy Agency, to bring forward private sector investment to support the next generation of energy and storage projects in NSW.
3. providing small incentives to coordinate assets such as home and electric vehicle storage to beat energy peaks and provide household demand response to the grid, as highlighted by AEMO and the NSW Energy Security Taskforce as a key priority for system security.
4. supporting energy storage in state-owned sites, such as schools, to lower peak demand and potentially attract investment in local manufacturing.
5. increasing the energy-savings for eligible recipients of the Low-Income Household Rebate by allowing them to opt-out of the rebate and install a solar system on their roof. This would add solar capacity to the grid and more than double the energy-savings for the households involved.

NSW Electricity Strategy & NSW Electricity Infrastructure Roadmap

Sets out the NSW Government's plans to transform the electricity system into one that is affordable, clean, and resilient through investment in generation, storage and firming infrastructure and making it easier to do energy business in NSW. Importantly the plans set out to deliver the state's first 5 Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions. These REZs will play a vital role in delivering affordable, reliable energy generation to help replace the State's existing power stations as they come to their scheduled end of operational life.

The Central-West Orana, New England, and South-West REZs will unlock a significant pipeline of large-scale renewable energy and storage projects, while supporting up to \$20.7 billion of private sector investment in the regions and over 5000 construction jobs at their peak.

FIGURE 15: INDICATIVE RENEWABLE ENERGY ZONES


NSW Electric Vehicle Strategy

The NSW Electric Vehicle Strategy is the NSW Government's plan to accelerate the State's vehicle fleet of the future. It outlines the government's commitments to increasing the uptake of electric vehicles to ensure New South Wales shares in the benefits. The Strategy is intended to increase EV sales to 52% by 2030–31 and help NSW achieve net-zero emissions by 2050.

NSW Hydrogen Strategy

The NSW Hydrogen Strategy brings together the NSW Government's existing and new policies into a framework to support the development of a commercial green hydrogen industry in NSW. The strategy, which will provide up to \$3 billion in incentives is set to attract more than \$80 billion in investment and drive deep decarbonisation. In addition to delivering an already committed \$70 million to develop the State's hydrogen hubs in the Illawarra and the Hunter, the strategy includes:

- Exemptions for green hydrogen production from government charges.
- A 90% exemption from electricity network charges for green hydrogen producers who connect to parts of the network with spare capacity.
- Incentives for green hydrogen production.
- A hydrogen refuelling station network to be rolled out across the State.

Adapt NSW

The NSW Department of Planning Industry and Environment (DPIE) has developed the AdaptNSW program and website¹⁸ which offers a range of regionally and state based information and data about climate change impacts, projections and how businesses, governments and communities can adapt to future conditions.

3.4. NSW LOCAL GOVERNMENTS RESPONSE TO CLIMATE CHANGE

While there are a large number of examples of what local governments around the world are doing, we focus here on Australia and on New South Wales in particular, as this is broadly representative of what is occurring in many other countries or regions. Two approaches in particular are relevant.

¹⁸ <https://climatechange.environment.nsw.gov.au/>

1. Adoption and publication of ambitious targets for renewable energy and/or emissions for Council operations, and potentially adopting or setting targets for renewables or emissions reduction in the community.
 - a. The chart below shows the current status of target-setting by local councils in NSW (as at September 2020). A total of 33 councils and towns, plus the ACT have set ambitious goals for renewable energy and/or emissions – typically 50-100% renewable energy or renewable electricity, and some net zero emissions targets are seen.
 - b. Typically, Councils set targets following a period of analysis of their data and information, and/or consultation with their stakeholders.
 - c. Other councils have developed plans and have adopted internal targets but have not publicly released these at this time.
2. Partnering with local government-focused emission reduction programs such as the Cities Power Partnership (CPP), as of May 2019 43, NSW local councils were part of CPP. While this does not involve setting specific targets per se, the commitment to key actions can either serve as a set of de facto targets or can provide a basis from which to set targets in future.

There has been a trend towards staged and evidence-based target setting compared with aspirational targets that may set the goal first to reflect what is required to decarbonize and then develop the plan to fit this goal.

There has also been a small but increasing trend towards examining the scope for renewables and abatement in communities, in terms of local action and how communities can participate more in the shift to renewable energy at scale. This is being informed by greater awareness of the need to act on climate, growing accessibility of information on community emissions, and the desire to ensure that communities and local business are part of and benefit from technology changes that are occurring.

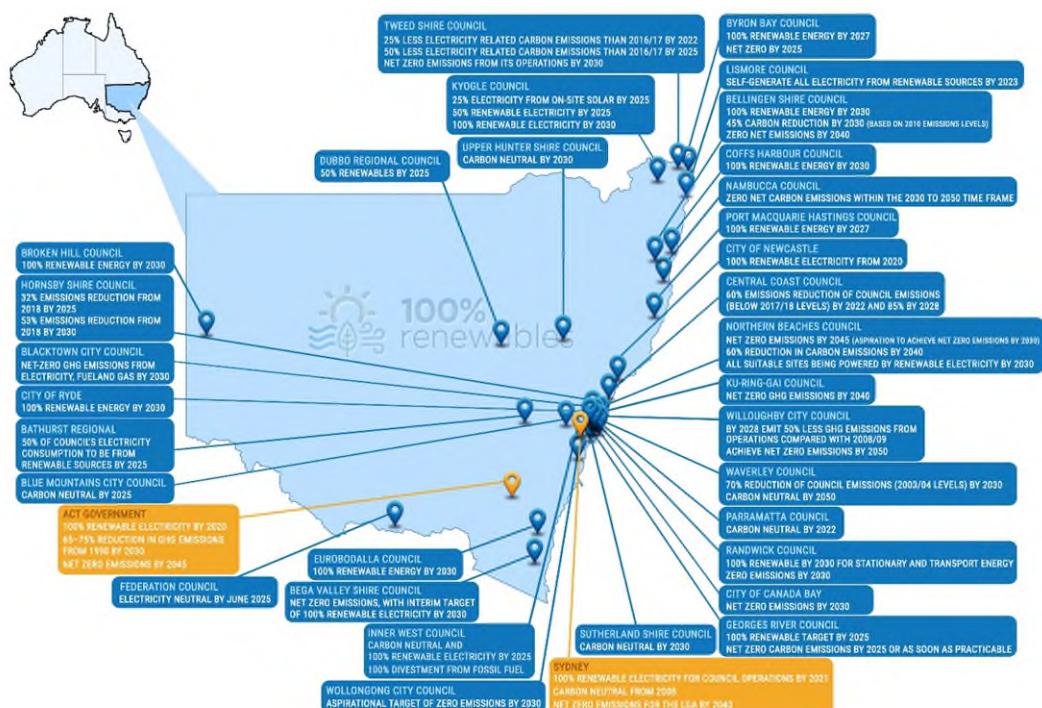


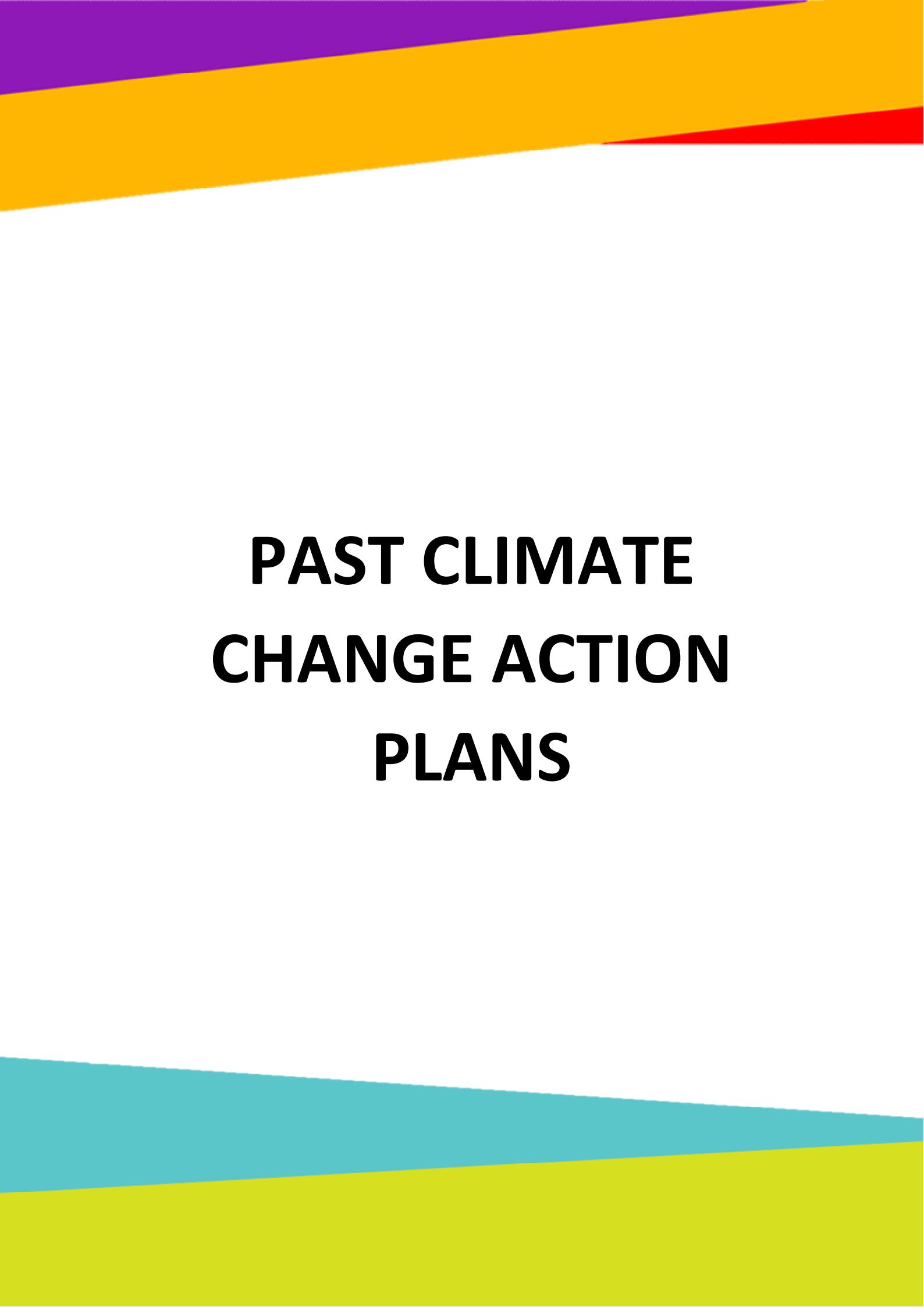
FIGURE 16: RENEWABLE ENERGY & EMISSION REDUCTION TARGETS BY NSW COUNCILS AND COMMUNITIES

3.5. Queanbeyan-Palerang Targets

QPRC has adopted the following emissions reduction targets for its internal operations (as established in the QPRC Operations Sustainability Policy) and the QPRC community. These targets are:

Energy & Transports Emissions (Council Operations): 30% reduction in total greenhouse gas emissions by 2025 from 2012-13 baseline levels. This is in-line with the Moderate (45% reduction by 2030) Emissions Reduction Pathway stated in this document.

Community Emissions: support the NSW Government in their goal to reduce the States (communities) emissions by 50% by 2030 (from 2005 levels) and net zero emissions by 2050.



PAST CLIMATE CHANGE ACTION PLANS

4. PAST CLIMATE CHANGE PLANS AND PERFORMANCE OF QPRC

4.1. COMMUNITY CLIMATE CHANGE ACTION PLAN 2013-17

The Community Climate Change Action Plan (CCCAP) 2013-2017 was developed by Queanbeyan City Council (QCC) to recognise and address climate change through a local response. The CCCAP formed a framework for Council and the community to work together on addressing climate change issues. A separate plan was developed for Council operations (The QCC Operational Climate Change Action Plan). The overall objectives of the plan were:

- a significant reduction of waste, energy use and fuel consumption in Queanbeyan
- the implementation of positive actions to increase community resilience, confidence and resolution in dealing with the challenges of climate change and realising the benefits and opportunities that result from those actions.

The ‘Aspirational goal’ of the plan was for **‘Council and the community partner to work together for a significant reduction in Queanbeyan’s Greenhouse Gas emissions by 2020’**. This ‘goal’ would be likened to at least a 25% reduction in emissions and was established based on feedback from the community.

Difficulty in obtaining accurate data for many of the actions was a challenge to monitor in terms of actual GHG savings. Hence the aspiration goal of at least a 25% reduction in Queanbeyan GHG’s was unable to be verified. Some major highlights included:

- Googong Sustainable Housing Project
- ActSmart Program for Local Businesses
- Education Campaigns e.g. Hey Tosser and Garage Sale Trail

4.2. COUNCIL OPERATIONS CLIMATE CHANGE ACTION PLAN 2013-17

The Council Operations Climate Change Action Plan 2013-2017 (CCAP) was developed by QCC to recognise and address climate change through a local response. The aim of the plan was to set out a baseline and understanding of Council’s emissions sources, establish a realistic yet ambitious target for reducing these emissions and put forward practical actions to achieve these targets.

Discussions with staff led to the development of a target of 25% reduction in total Council GHG emissions from the 2009/2010 baseline by 2020. Some major highlights included:

- Installation of solar power on a number of Council facilities and buildings
- Integration of the action plan into a number of Council policies
- Development of a Council Sustainable Building Design Policy

4.2.1. REVIEW OF THE COUNCIL OPERATIONS CLIMATE CHANGE ACTION PLAN 2013-17

A review was carried out in 2018-19 of the Council Operations CCAP. This found that a total of 17 actions had been completed, 30 actions are ongoing, one was unsuccessful and 10 had not progressed.

Actions that were assessed as completed include:

- Transport: staff education of low emissions driving and use of technology to lower kilometres travelled, and the creation of a car-pooling register for Council staff.
- Energy efficiency: completed energy audits of all major buildings, implement priority findings from energy audits, procure high star-rated IT equipment, implement energy efficiency measures at the Queanbeyan swimming pool, and make a staff member accountable for energy management.
- Alternative energy: install solar hot water for the Queanbeyan swimming pool and review the case for continued investment in GreenPower® compared with other renewable energy strategies.
- Street lighting: work with SEROC and other Councils to negotiate with street light network providers for a fair price for future lamp replacements.
- Waste: Improve recycling and reuse rates in Council operations and roll out public place recycling to City public areas.
- Land use planning and development: develop an education program for residents to encourage 'green' building (Sustainable Googong Project).
- Governance: integrate CCAP actions into existing operational and work plans and policies, investigate incentives under the Renewable Energy Target and the NSW Energy Savings Scheme, allocate staff resources for sustainability initiatives and planning, and induct & train staff in Council's sustainability policies and initiatives.

Selected actions that are continuing at the conclusion of the 2013-17 Plan include:

- Investigation of EV and prioritisation of low emissions and fuel-efficient vehicles when purchasing new fleet vehicles.
- Progressively upgrading to more energy efficient air conditioning and passive energy efficiency measures in Council's main buildings.
- Ensuring sustainable building policies and objectives are implemented in new building design, particularly the new Queanbeyan Civic and Cultural Precinct.
- Implementation of solar PV systems at Council facilities – to date more than 382 kW of capacity has been installed at 14 sites across the QPRC municipality.
- Investigation of offsite / large-scale renewable energy potential in the LGA or in partnership with neighbouring councils.
- Evaluate costs and benefits to upgrade to LED technology and smart controls for streetlights in line with planned bulk upgrades.
- Assess opportunities for reduced energy intensity and consumption, and for renewable energy as part of all water and sewer upgrades.

A full review of the performance of the CCAP for Council's operations was submitted to Council during 2018-19.



OPERATIONAL CARBON FOOTPRINT

5. CARBON FOOTPRINT OF QUEANBEYAN-PALERANG REGIONAL COUNCIL

5.1. EMISSIONS BOUNDARY

The focus of this Council CCAP is energy-related, including electricity, natural gas and vehicle fuel used by Council in its operations. Emissions from these sources are included across all “scopes” – that is:

- Scope 1: direct combustion of fuel on Council sites or in Council vehicles,
- Scope 2: electricity supplied to Council’s sites from the grid, and
- Scope 3: upstream emissions associated with the provision of energy and streetlighting services to Council

Council’s activities, including waste management, planning, infrastructure and the like all influence emissions by the Queanbeyan-Palerang LGA. These emissions are reported in the Community CCAP, together with proposed strategies and actions to reduce emissions and adapt to climate change impacts on the region.

5.2. QPRC’S 2017-18 ENERGY AND CARBON FOOTPRINT

Data supplied by Council was used to develop QPRC’s energy and carbon footprint for the financial year 2017-18. This is tabulated below. Overall, this shows that Council operations consumed 77,681 gigajoules (GJ) of energy, resulting in GHG emissions of a little over 12,000 tonnes of carbon dioxide equivalent (t CO₂-e).

This equates to 1.45% of the total estimated GHG emissions by the Queanbeyan-Palerang LGA.

TABLE 2: QPRC ENERGY & CARBON FOOTPRINT 2017-18

Emission Source	Energy (GJ)	Activity Data	Units	Scope 1	Scope 2	Scope 3	Total t CO ₂ -e
Diesel for fleet	29,527	764.95	kL	2,082		106	2,188
Petrol for fleet	4,150	121.33	kL	281		15	296
Ethanol for fleet	62	2.63	kL				
Natural Gas	6,815	6,815	GJ	351		93	444
Electricity used in Council assets	25,476	7,076,676	kWh		5,874	849	6,723
Electricity used by Streetlighting	10,141	2,817,017	kWh			2,676	2,676
Electricity use from Solar PV	1,510	419,468	kWh				
TOTAL:	77,681			2,714	5,8074	3,739	12,327

Energy use and emissions from Council’s operations are dominated by electricity from the grid, used to supply Council’s assets / facilities as well as streetlights (which are owned by Essential Energy but paid for by Council). This is illustrated in the chart below.

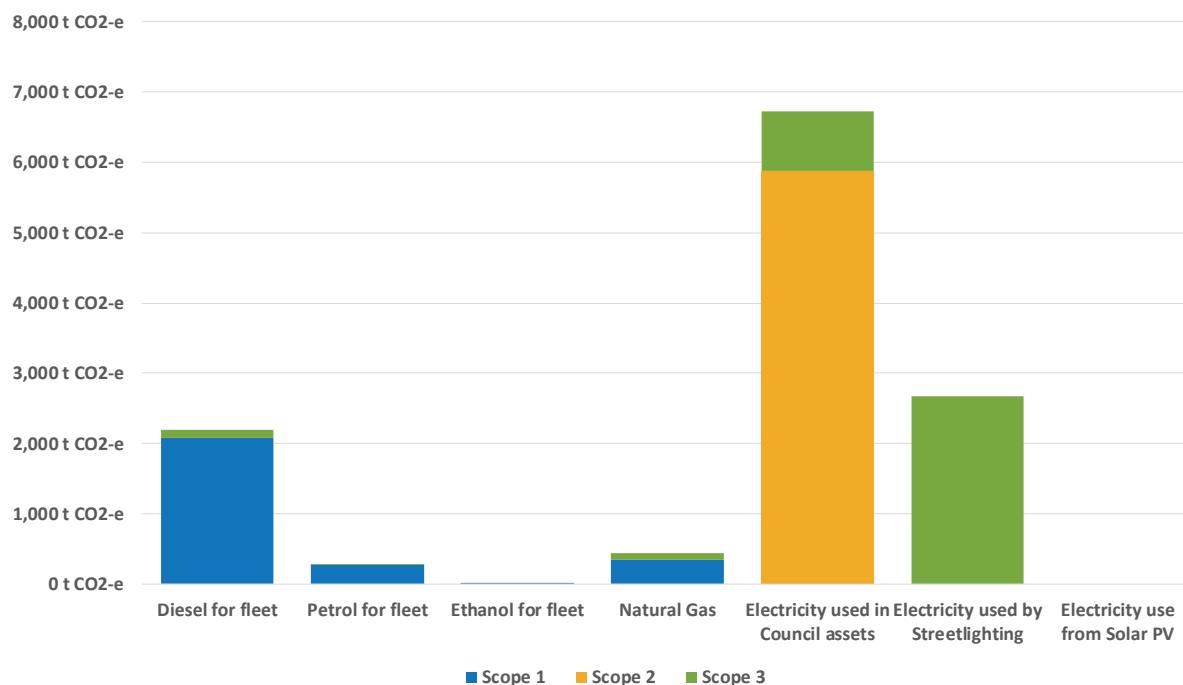


FIGURE 19: QPRC ENERGY & CARBON FOOTPRINT 2017-18

This chart shows that 76% of Council's emissions are related to electricity consumption, with 18% due to diesel fuel consumption by Council's road plant and trucks. Just 6% of emissions result from the consumption of natural gas for heating and petrol for Council's passenger vehicle fleet.

5.3. ENERGY END USE IN COUNCIL OPERATIONS

It is useful to develop an understanding of the end use of energy in order to inform the identification and development of opportunities to reduce emissions.

- Diesel and petrol are used for heavy / light commercial and for passenger vehicles, respectively.
- Natural gas is used for water heating, with 67% consumed for pool heating at Queanbeyan Aquatic Centre, and 26% consumed at the Queanbeyan Bicentennial Hall and Q Centre.
- Based on the carbon footprint the primary focus of the CCAP for QPRC Operations is on electricity demand. The charts below highlight the following:
 - The top 10 grid-electricity consuming sites (including streetlighting) account for 70% of grid electricity demand and 67% of all electricity demand with solar PV included. Of these streetlighting and wastewater are the major energy-using accounts.
 - Solar PV accounts for 4% of electricity. Water and wastewater consume 41% of all electricity, while facilities consume 28% and streetlighting 27% (all excluding solar).
 - Understand end-use of electricity is important as it can help to target areas for identification and evaluation of abatement opportunities. An analysis of electricity use drawing on experience from previous audits and other Councils indicates that electric motors (mostly associated with water and wastewater pumping and aeration), and lighting (for streets, buildings, parks) are the dominant uses of electricity.

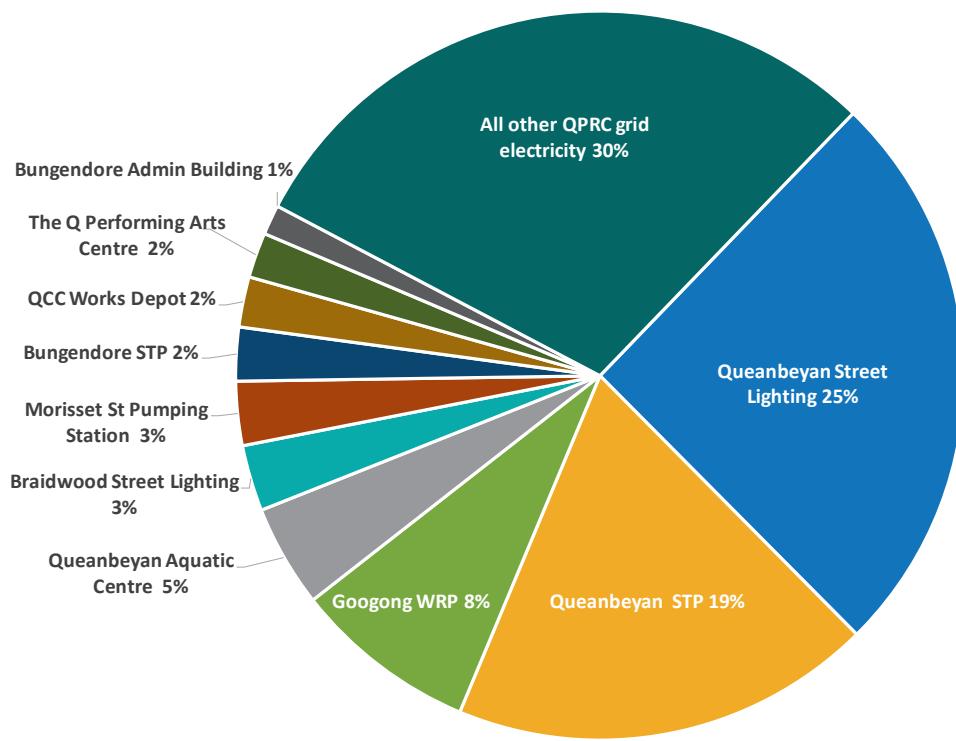


FIGURE 20: QPRC GRID ELECTRICITY USE BY TOP 10 SITES

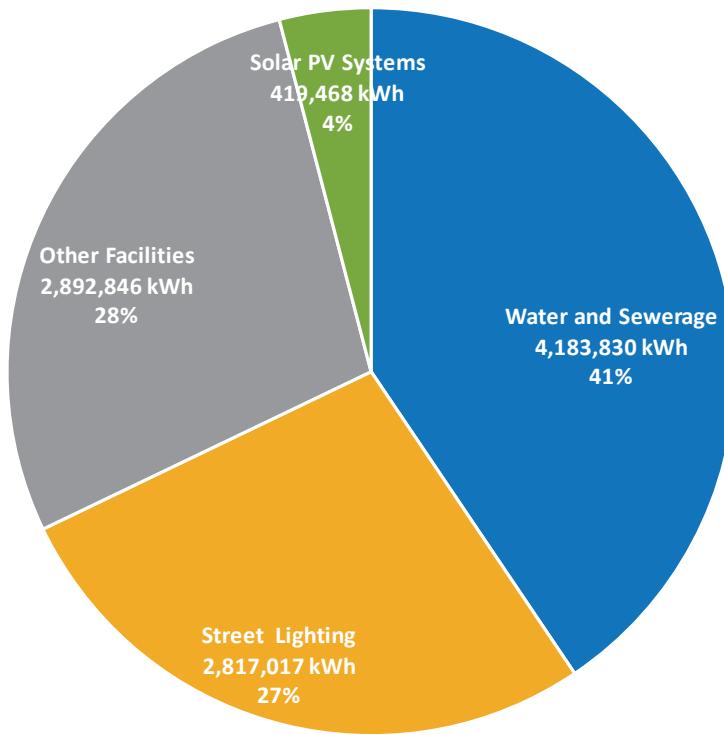


FIGURE 21: QPRC ELECTRICITY BY ASSET CATEGORY PLUS SOLAR PV CONTRIBUTION

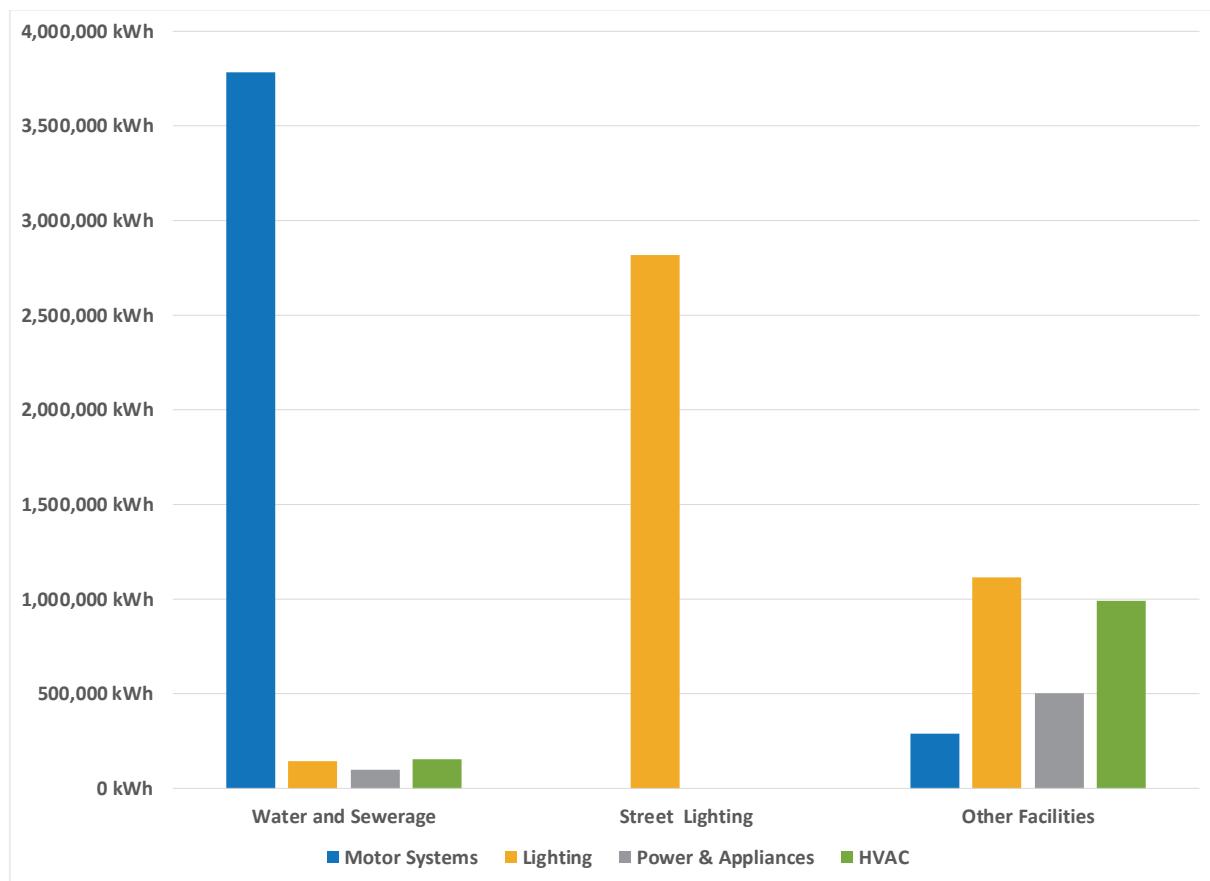


FIGURE 22: QPRC ELECTRICITY END USE ESTIMATE (EXCLUDING SOLAR PV)

5.4. QPRC FORECAST BUSINESS-AS-USUAL CARBON FOOTPRINT

The Queanbeyan-Palerang region is a growth area, and as such energy demand and emissions in Council's operations to service the LGA will not remain static.

Three factors have been modelled to estimate Council's future demand for fossil-fuel energy and associated emissions in the absence of further abatement action by Council.

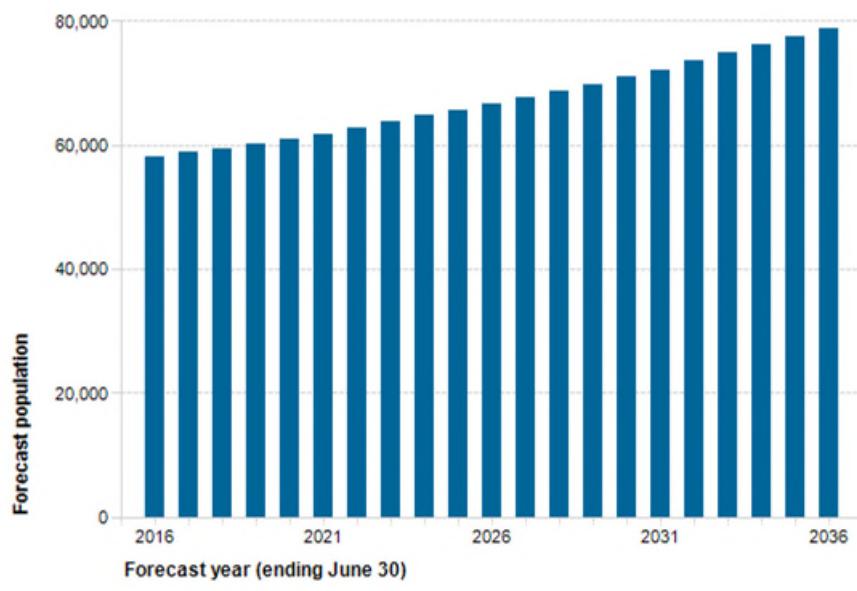
These include:

- Population growth as estimated by profile.id drawing on 2016 census data and projections to 2036,
- Advised major asset changes to occur within Council's portfolio – specifically major new-build and expansion projects that will have a material impact on selected assets' energy demand, and
- Grid decarbonisation – both the Renewable Energy Target (RET) and most forecasts of long term (2050) carbon intensity of the electricity grid show a pathway towards a grid that is largely supplied by renewables

5.4.1. POPULATION

Current population of fewer than 60,000 is expected to grow to almost 80,000 by 2036, a growth rate of more than 1% per year. This can impact on Council's energy demand in a number of ways – through the increased demand for water and wastewater services, more road maintenance and parks maintenance, new street lighting for new sub-divisions, and higher demand for Council's community services facilities, sporting fields and the like. The following growth forecasts were applied:

- Council facilities and fleet 1% per annum increase
- Street lighting 0.5% per annum increase



Population and household forecasts, 2016 to 2036, prepared by .id, December 2017.



FIGURE 23: QPRC POPULATION GROWTH FORECAST TO 2036, BY .ID DECEMBER 2017

5.4.2. MAJOR ASSET CHANGES

The following asset changes are planned and/or expected to occur and will influence energy demand beyond any business as usual (BAU) growth projections.

- Rebuilding of the Queanbeyan Wastewater Treatment Plant – despite an upgrade to a 60,000 EP from the present 40,000 EP plant it is expected that significant energy efficiencies can be achieved, and a new plant with 25% less energy demand is forecast from 2023-24,
- Googong Water Reclamation Plant energy demand will grow in line with population growth. For this projection, a doubling of energy demand is forecast from 2023-24 to 2025-26,
- Several facilities in Queanbeyan (mainly Crawford Street and Rutledge Street) will no longer be used for Council operations from 2024-25, following the expected completion of the Queanbeyan Civic and Cultural Precinct.
- Construction of the new Queanbeyan Civic and Cultural Precinct, forecast to consume 300 MWh per year from 2023-24, plus the construction of the new waste transfer station in Braidwood.

5.4.3. GRID DECARBONISATION

For NSW, a mid-range forecast is made of grid carbon intensity based on:

- Achievement of the RET of 20% renewables for the state by 2020,
- Reaching 80% renewables for the NSW grid by 2050, with a straight-line decrease in emissions from 2020 to 2050, and a pro-rated decrease by 2030, the end year for this Action Plan

There is uncertainty in the timing and scale of grid decarbonisation due to policy and consequent investment risk, and due to the lifetime of coal-fired power stations in the grid. However, there is little doubt that the vast majority of proposed and committed new electricity generation is from solar, wind, hydro and battery technologies, as shown below from AEMO. It is recommended that Council maintain a watch on grid emissions intensity for NSW and the NEM in coming years and take updated projections of grid decarbonisation into account when this Action Plan is renewed.

If grid decarbonisation were forecast in future to be slower than is estimated here, then Council's abatement efforts may need to be raised to meet targets. If purchasing electricity from renewables forms part of Council's strategy, then the level of RE purchases could simply be raised. However, if onsite solar and energy efficiency forms all of council's response and buying renewables is excluded, Council may need to revise its implementation plans for efficiency, solar and battery storage to meet its targets.

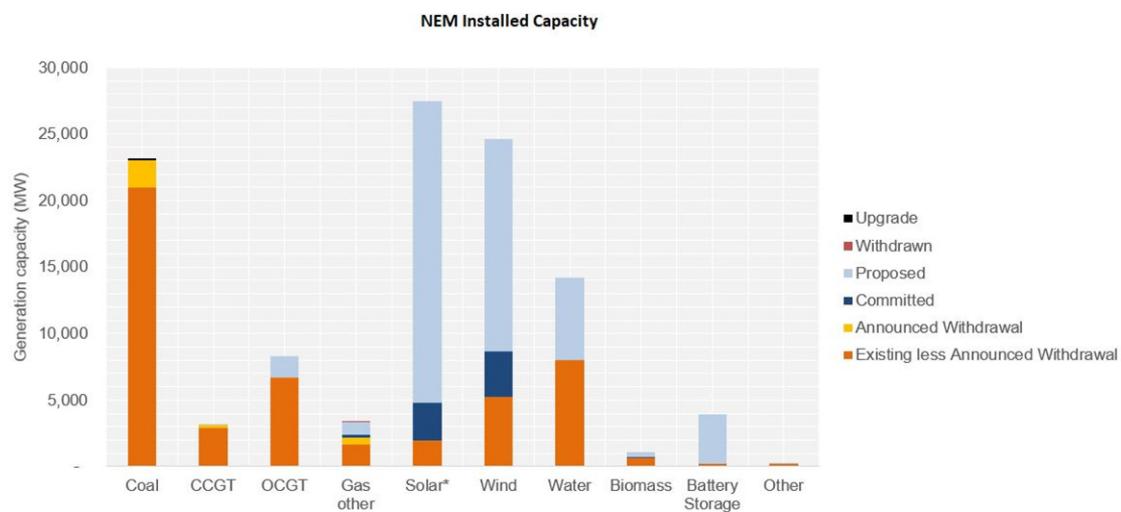


FIGURE 24: NATIONAL ELECTRICITY MARKET – CURRENT, PROPOSED AND COMMITTED GENERATION AT 2019¹⁹

5.4.4. NET PROJECTED ENERGY DEMAND AND GHG EMISSIONS FOR QPRC

Applying the above changes to the base year energy in 2017-18 sees the following outcome.

- An overall increase in energy demand from 77,681 GJ to 87,610 GJ in 2030, a 13% increase,
- Growth underpinned by a 17% increase in electricity demand by Council's assets (excluding streetlighting)

¹⁹ <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information>

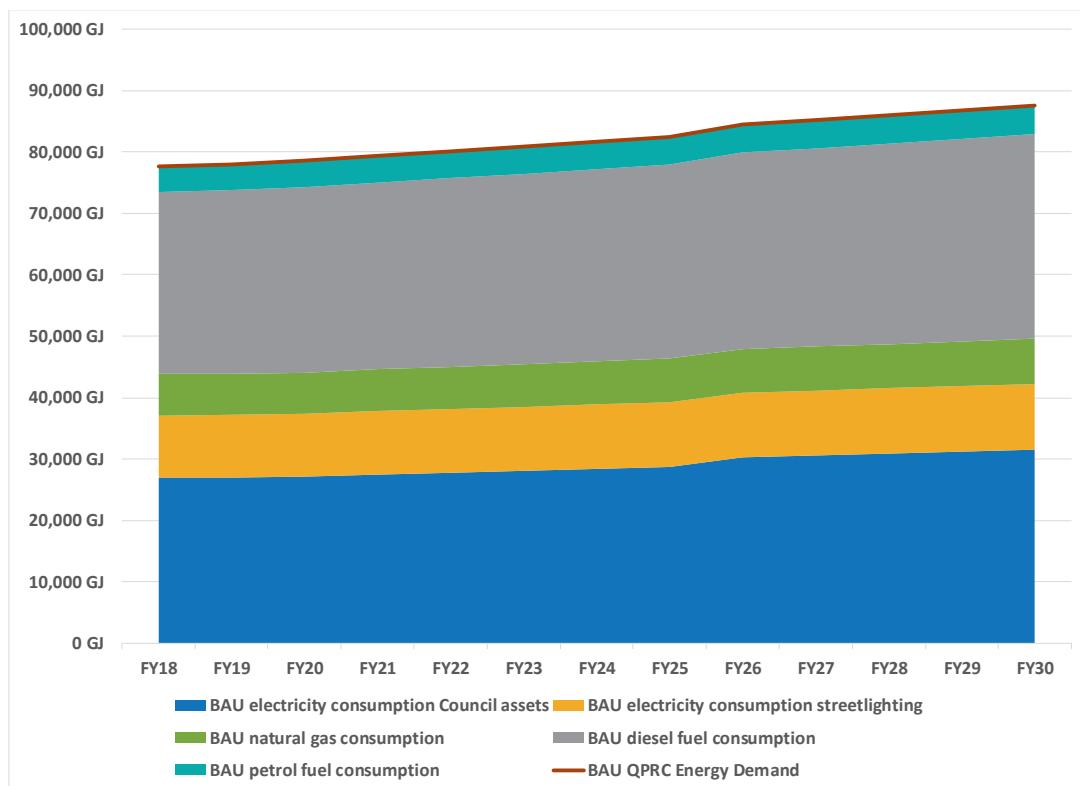


FIGURE 25: QPRC BAU ENERGY DEMAND GROWTH 2017-18 TO 2029-30

However, owing to the potential changes to the carbon intensity of the electricity grid, QPRC's business-as-usual GHG emissions may decrease by 9% by 2030.

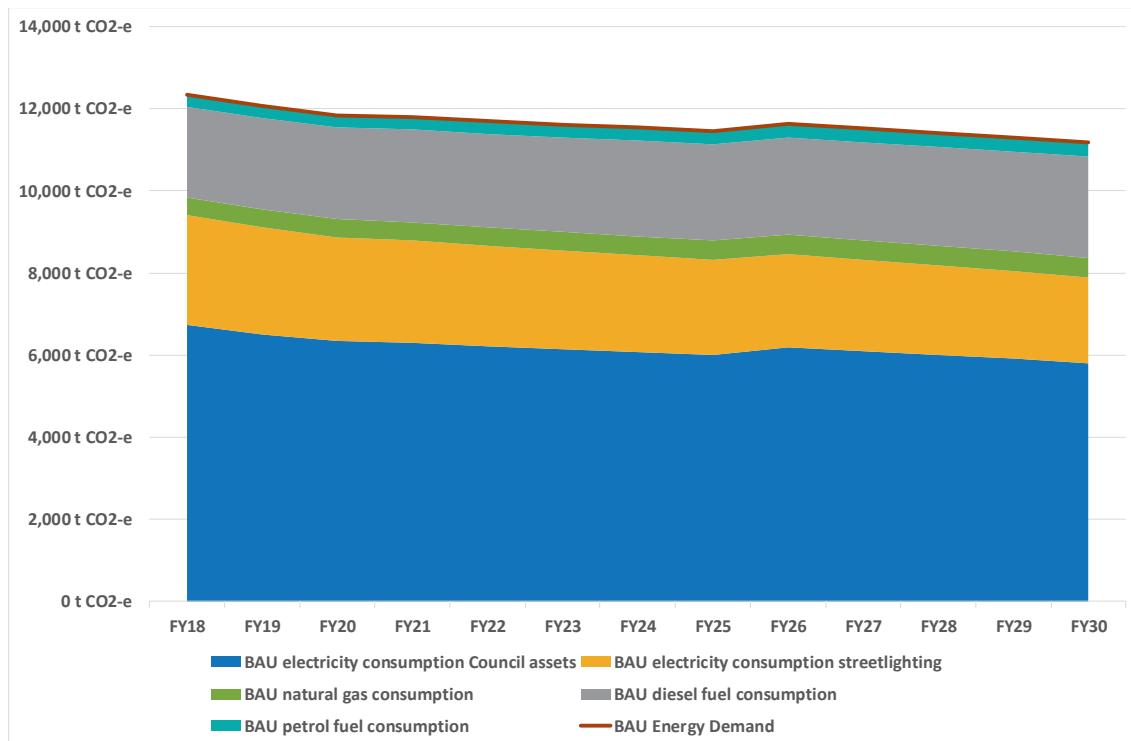


FIGURE 26: QPRC BAU EMISSIONS DEMAND CHANGE 2017-18 TO 2029-30

COMMUNITY INPUT

6. Public Exhibition

Following the public exhibition period (December 2019-March 2020), the online data analysis indicates that a total of 918 visits occurred on the 'Your Voice-QPRC Climate Change Action Plans' webpage with 586 visitors downloading the documents. Of these visitors, 41 participants responded to survey questions shown below. Most participants live in Queanbeyan-Palerang and were mostly from Queanbeyan, Bungendore, and Braidwood.

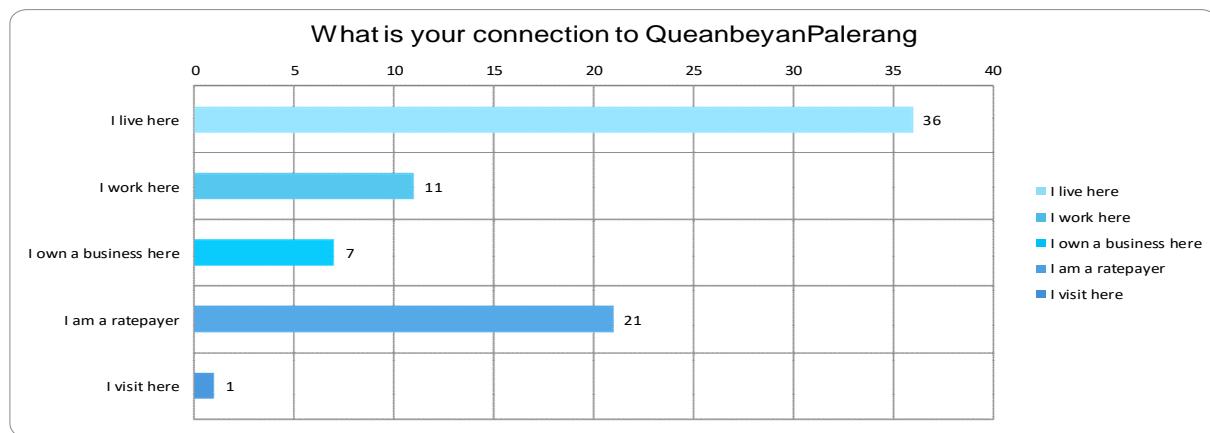


FIGURE 27: PUBLIC EXHIBITION – CONNECTION TO QUEANBEYAN-PALERANG

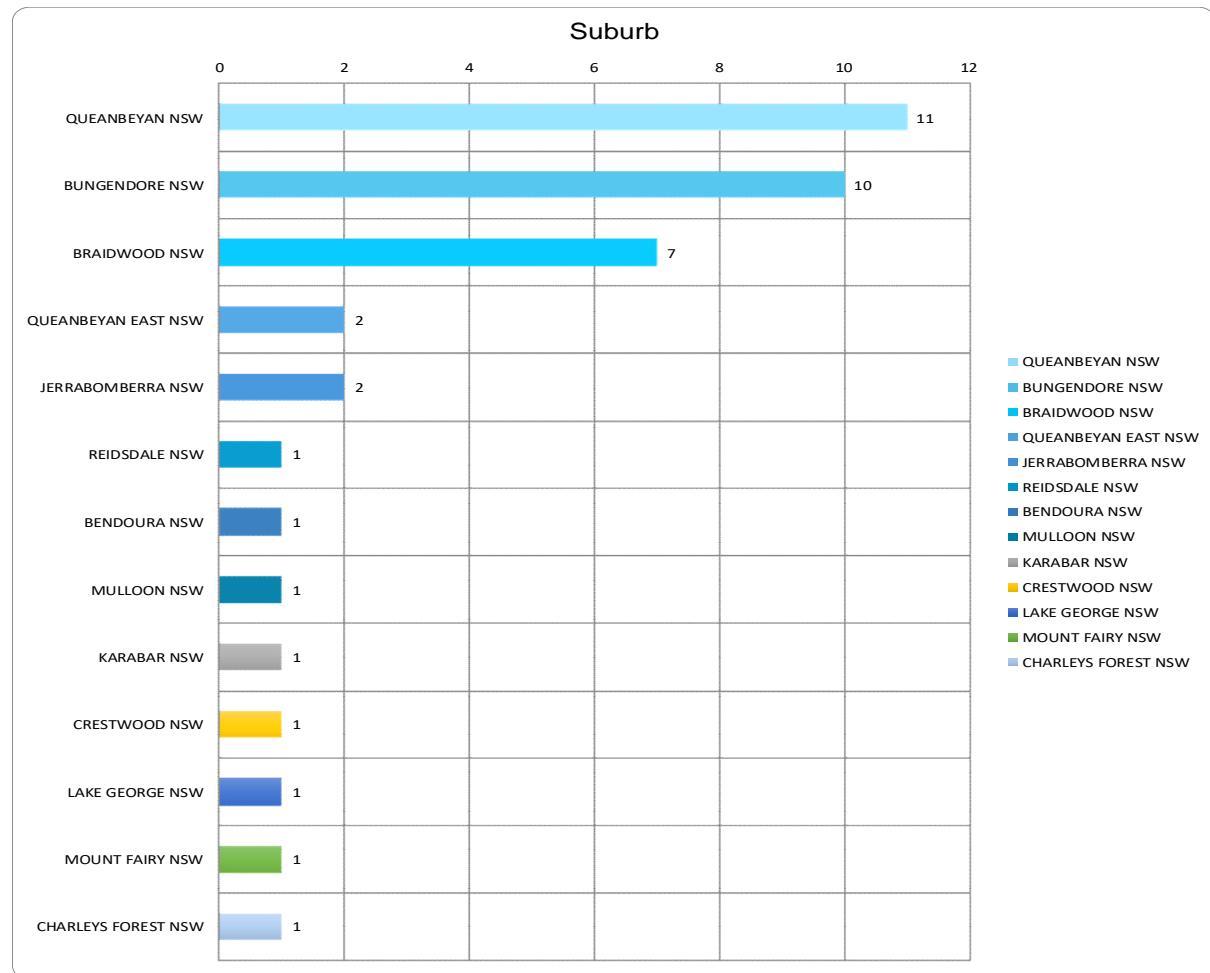


FIGURE 28: PUBLIC EXHIBITION – LOCATIONS OF RESPONDENTS

During the course of public exhibition Council received a total of 32 written submissions and 40 'Your Voice' comments from the community and Council staff on the Community Climate Change Action Plan and the Council Operations Climate Change Action Plan. The majority of respondents indicated that they are in support of the plans proposed, with 60% indicating that they would like to see ambitious action taken by Council. The results of the responses are summarised below.

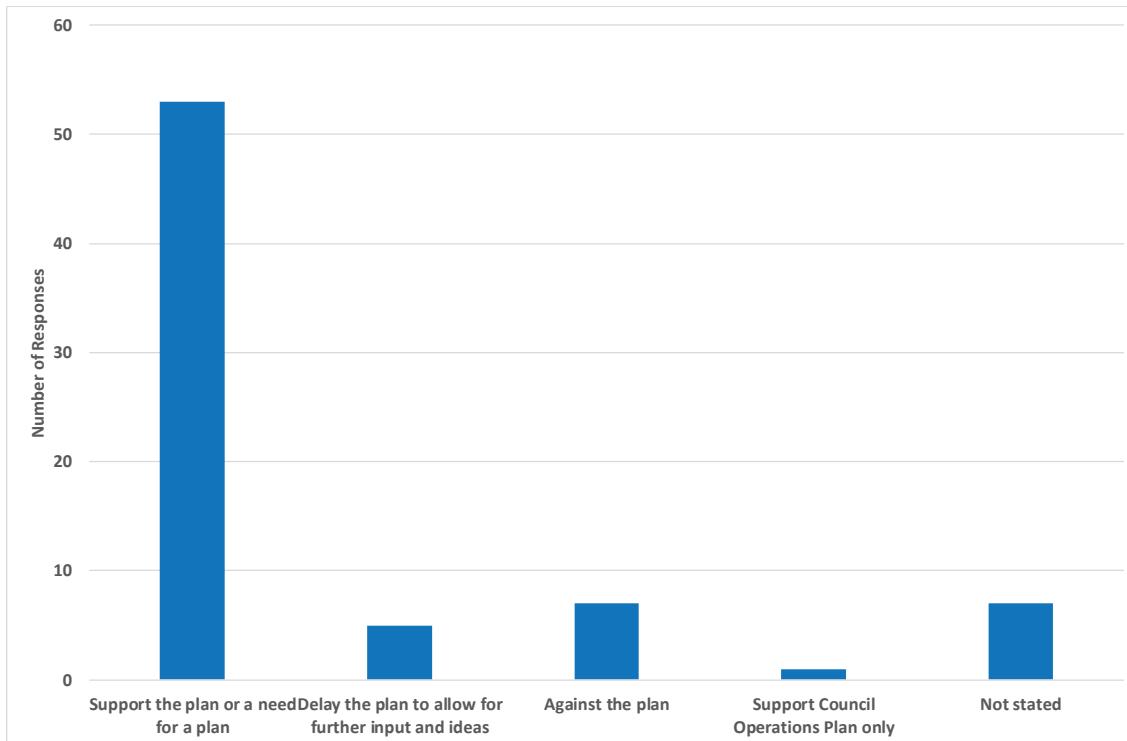


FIGURE 29 PUBLIC EXHIBITION RESPONSE TO THE ACTION PLANS

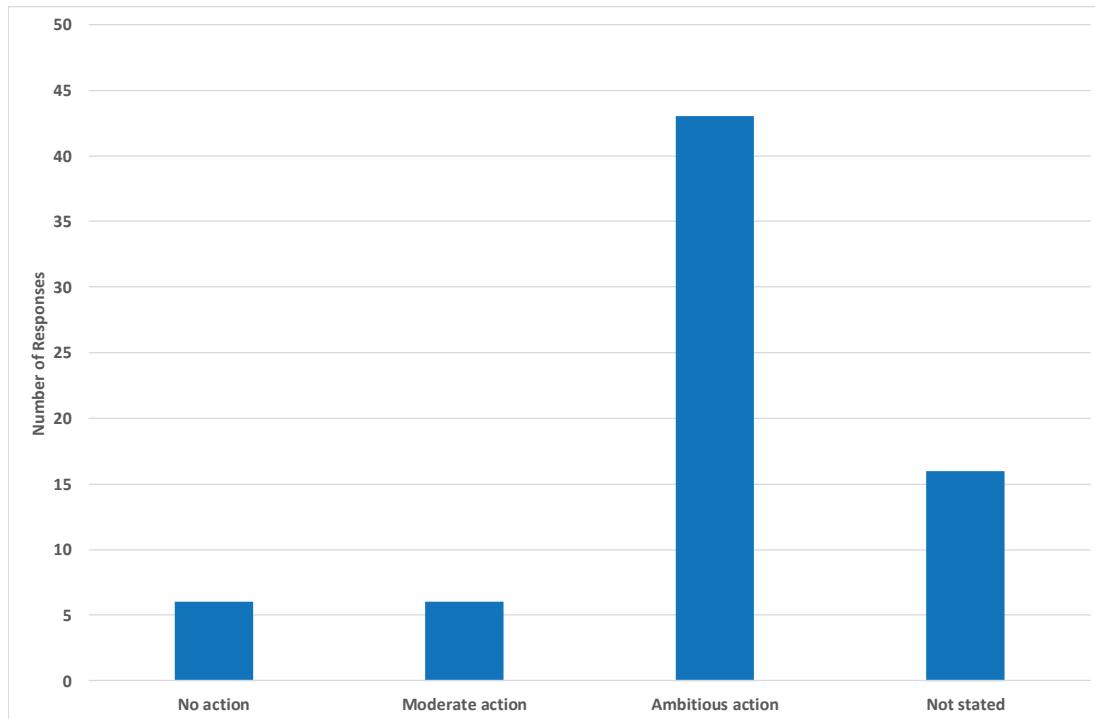


FIGURE 30: PUBLIC EXHIBITION RESPONSE TO THE LEVEL OF ACTION THEY WOULD LIKE TO SEE FROM COUNCIL

Of the submissions and comments that were received by Council, 15 of the top suggested changes or key comments are highlighted in Table 3 below. Some of these comments call for the following:

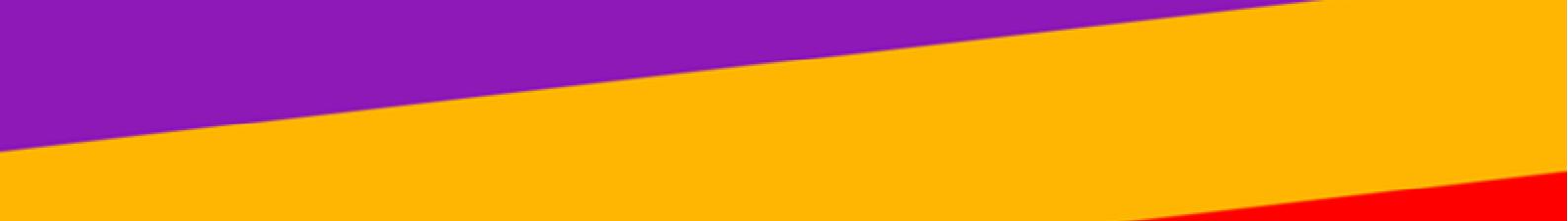
- Exploring actions that:
 - incorporate carbon sequestration and sinks
 - address water supply and conservation issues
 - accelerate the implementation of light rail, better bus services, and active transport options
- Greater focus on evacuation plans for extreme weather events focusing on air and water contamination, mental health, and fuel shortages.
- Establishing an urban tree canopy target and planting more trees in urban settings to mitigate the effects of heat islands in a warming world.
- Assistance from Council to implement microgrids, community renewable energy and storage projects, and support for sustainability-focused local community groups.

TABLE 3: TOP 15 SUGGESTED CHANGES OR KEY COMMENTS FROM THE PUBLIC EXHIBITION

Top responses from public exhibition
Explore further actions within the plans with regards to carbon sequestration and sinks
Incorporate community emission reduction targets
More actions to address water supply and conservation issues in Braidwood and Bungendore
Evacuation plans and information for communities with regards to extreme weather events. Including information on dealing with air and water contamination, mental health + fuel shortages
Community Action Plan seems to highlight that Council staff are doing everything – there needs to be more community-based actions
Accelerate actions within the integrated transport management plan for example light rail, better bus services (especially Braidwood)
Facilitate active transport options – walking and cycling (comment: still a huge issue within Queanbeyan)
Microgrids/or other community renewable energy projects and storage - need more support and direction from Council, including funding. This may include regulatory and commercial support
Establish an urban tree canopy target and plant more trees in urban settings to mitigate the effects of heat islands in a warming world
Strengthen DCP requirements on renewable energy, energy efficiency and water conservation
Full or more rebate opportunities from Council
Support or fund 'climate' or 'sustainable' local community groups – this could be as little as providing rooms for meetings
Please include annual reporting of emissions/actions undertaken as a set action
There is no prioritisation of the actions (suggest a time frame instead)
Increase emission reduction target to 90%-100% by 2030 for Council Operations

Along with the above responses, several key phrases from the community are presented below.

- *Transitions are manageable when the return / impact is well communicated. Awareness of climate impact and adversity across our community is high from our horror summer experiences. The community acceptance I expect would be high if the Council showed strong leadership on transitions to low energy strategies.*
- *This is a very comprehensive and encouraging Plan. Council are to be congratulated on formulating it. I look forward to the implementation.*
- *The past Summer has shown us what the future for us is going to be like. Water restrictions in Bungendore and Braidwood plus other effects of severe drought have been very damaging to the residents of our region. The fires have shown us how vulnerable we are to severe weather events which are the result of climate change.*
- *Strong action on climate change by Council would give the next generation of farmers and local residents confidence to remain in the region and make their lives here.*
- *As a young person in the local community, it is evident that climate change and the issues accompanying it are held at the utmost importance within my generation. I believe the change has to come from a local and individual level. I believe it is very important to adopt the ambitious targets especially as they are affordable and achievable benefiting all within the local community.*
- *Carry out more environmental projects within the local area that sequester carbon. This would include assisting local landowners who own land considered environmentally important to mitigating climate change (much like Greening Australia does). This could also include participating in carbon projects that earn QPRC additional revenue from the federal Clean Energy Reduction Fund.*
- *Local and state governments can and must play a leadership role as part of the growing global movement of communities and state and local jurisdictions to reduce greenhouse gas emissions, and it is good to see the importance of leadership mentioned in the draft CCCAP.*
- *There is also a risk in relying on the 'greening' of the grid to achieve emission cuts compared to growth projections, as the council plan appears to do for its more ambitious emissions reduction target. Risks relate to external factors over which the council will have no control.*
- *I also believe this represents an excellent opportunity for strong action and leadership, in an uncertain time when the community is looking to you for both of these things. Recent events with fire, drought and heat have caused much anxiety amongst our families, business owners, and the wider community.*
- *Street trees are proven to have significant cooling effects, are aesthetically pleasing, increase value and have a positive mental health impact.*
- *I am not opposed to Council making carbon-reduction decisions where the economical business case supports them. LED street lighting and solar PV power for council facilities appear to be examples of sound business cases. Battery storage is not a good example and is completely inadequate in residences with electric heating.*



COUNCIL OPERATIONS CLIMATE CHANGE ACTION PLANS



7. ACTION PLAN TO REDUCE GHG EMISSIONS IN QPRC OPERATIONS

Numerous hierarchies are commonly used to describe a broad approach to emissions reduction, typically centred on reduction measures, increasing renewable energy, offsetting residual emissions and having measurement, review and governance processes in place to ensure accountability and a continued focus on achieving objectives. The following hierarchy is applicable to this document:

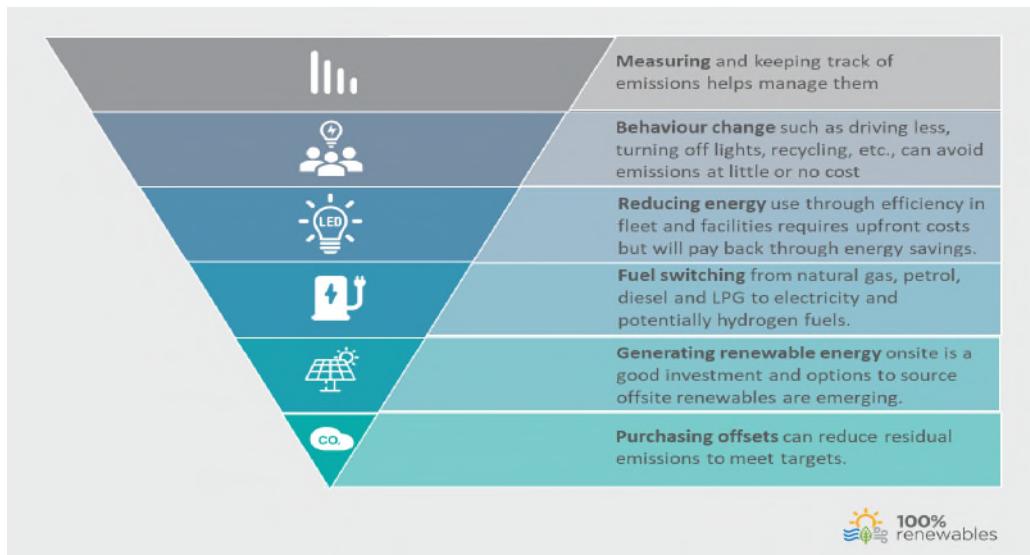


FIGURE 31: QPRC EMISSIONS REDUCTION HIERARCHY

Actions that are to be developed and implemented by QPRC that align with this approach, were developed via inspections of Council assets and internal consultation between Council's Sustainability team and other stakeholders. Actions are organised into the following six categories:

1. Leadership, Governance and Environment
2. Procurement
3. Energy efficiency and management
4. Street lighting
5. Renewable energy on Council facilities
6. Transport

Timeframes Key

-  **Short Term**- actions will be considered for inclusion in the QPRC Operational Plans
-  **Medium Term**- actions will be consider for inclusion in the QPRC 2021-2025 Delivery Plan
-  **Long Term**- actions will be consider for inclusion in the QPRC 2025-2029 Delivery Plan
-  **Ongoing**- actions will be considered for inclusion in Operational and Delivery Plans throughout the implementation of the Action Plan i.e. 2020-2030

7.1. LEADERSHIP, GOVERNANCE, PARTNERSHIPS AND ENVIRONMENT

TABLE 4: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – LEADERSHIP, GOVERNANCE, PARTNERSHIPS & ENVIRONMENT

Leadership, Governance, Partnerships & Environment	Action	Benefit	Responsibility	Timeframe	Performance Metric
CO 7.1.1	QPRC will assess and review the benefits of participating in local government focused programs that directly relate to Council's emission reduction targets, values and belief	Local government knowledge sharing aids in delivering better climate outcome	Natural Landscapes & Health	S	Participation in local government focused programs
CO 7.1.2	Review emissions and renewable energy targets and consider adopting 100% renewable energy and net zero greenhouse gas emission targets for Council operations by or before 2050	Local government leadership on climate. Aligning emission targets with NSW Government. Responding and showing commitment in achieving the IPCC 1.5°C special report emission reduction recommendations	Natural Landscapes & Health	S	Targets adopted by Council
CO 7.1.3	Integrate CCAP into Delivery and Operational Plans for QPRC and ensure that annual budget planning for all areas of Council includes consideration of climate change actions	Most CCAP actions require funding - ongoing focus will help ensure opportunities are not missed	Organisational	O	Annual Operational Plans and 4-year Delivery Programs' CCAP-linked commitments
CO 7.1.4	Management of Council's CCAP efforts will include a focus on funding sources, including a Revolving Energy Fund, grant opportunities and NSW Government support programs		Natural Landscapes & Health	O	Annual status of "REF", number of total and successful grant applications
CO 7.1.5	Allocate sufficient staff resources to manage and implement Council's CCAP.	Support at senior management level in addition to staff committed to driving QPRC's CCAP implementation are essential to success	Organisational	O	Progress on implementation of the CCAP and on outcomes achieved
CO 7.1.6	Provide regular staff education, updates and news items that focus on the QPRC Climate Change Action Plans. This should include soliciting ideas from staff on actions Council can implement.	Staff engagement is essential to the continuation of efforts to reduce emissions	Natural Landscapes & Health	O	Survey of awareness and satisfaction of staff with QPRC efforts to reduce climate impact

Leadership, Governance, Partnerships & Environment	Action	Benefit	Responsibility	Timeframe	Performance Metric
CO 7.1.7	QPRC to source some or all its energy from renewables, through procurement or by building offsite renewable energy projects, collaboration opportunities with other Councils or businesses will be evaluated	Collaboration has been shown to be effective at sourcing large volume renewables at costs close to or lower than 'standard' grid power	Natural Landscapes & Health	O	Effectiveness of partnerships measured by delivered outcomes
CO 7.1.8	Develop a heat adaptation & urban forest strategy for the QPRC LGA, including heat mapping	A strategy to adapt and build capacity for increasing temperatures in the LGA	Natural Landscapes & Health + Urban Landscapes	M	Strategy developed by Council
CO 7.1.9	QPRC will assess the potential benefits of partnering with other local and other governments to procure low to zero emission vehicles	The ACT Government invited local governments to join their bulk-purchase of EVs in order to avail of any cost reductions. This may be a beneficial approach for QPRC to take	Natural Landscapes & Health + Utilities	O	Cost reduction in low to no emission vehicles purchased or leased by QPRC
CO 7.1.10	Expand the QPRC Street Tree Planting Strategy to include other urban and natural areas within the LGA	The strategic planting of trees will maximise benefits to the community, environment and wildlife while also providing for abatement through carbon capture and storage	Natural Landscapes & Health + Urban Landscapes	M	Strategy expanded by Council (in consultation with the community) to include natural and other urban landscapes

7.2. PROCUREMENT

TABLE 5: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – PROCUREMENT

Procurement	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.2.1	All sites	QPRC will review the opportunity to source some or all of its electricity under Power Purchase Agreements (PPAs) from renewable energy projects in future energy procurement processes	Several Councils and businesses have been able to source renewables at a comparable cost to 'standard' grid power in recent years and renewable energy is becoming cheaper	Natural Landscape & Health	O	Up to 100% renewable electricity for Council assets	Electricity supply agreements	Minor - typically advisory services	Aim to achieve a cost-neutral outcome or better
CO 7.2.2	All sites	Implement sustainable procurement practices based on the 2017 Sustainable Procurement Guide for NSW local governments (https://www.lgnsw.org.au/files/imce-uploads/127/esstam-sustainable-procurement-guide-30.05.17.pdf). This may include: <ul style="list-style-type: none"> • Updating Council's Procurement Policy • Incorporating sustainable procurement requirements in documented processes: <ul style="list-style-type: none"> ◦ Specs for commonly sourced services and equipment ◦ Briefs for major capital works • Engage with facilities maintenance and capital works to develop the specifications and briefs that will seek low-emissions outcomes 	New equipment purchases including appliances, ICT equipment, up to major design and asset upgrades can benefit from lower energy use and emissions by adopting sustainable procurement guidelines	Finance	O	Review of major project briefs and delivered outcomes. Review of briefs / specs for goods and services purchased	Marginal cost for energy efficient solutions		

7.3. ENERGY EFFICIENCY & MANAGEMENT

TABLE 6: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – ENERGY EFFICIENCY & MANAGEMENT

Energy efficiency & management	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.3.1	Bicentennial Hall	Upgrade HVAC to energy efficient technology and controls	Reduced operational costs and GHG savings	Transport Facilities & Safe Cities		GHG savings will be small as the site has solar PV	Not estimated at this time	Not estimated at this time	Not estimated at this time.
CO 7.3.2	Queanbeyan Aquatic Centre	Upgrade energy services at the site, including 2 x Raypak boilers (with condensing boilers and potentially heat pumps), VSD control of pool pumps, external lighting to LED and HVAC controls	These measures would build on past efficiency and renewable energy initiatives at the aquatic centre	Natural Landscapes & Health + Transport Facilities & Safe Cities		~381 t CO ₂ -e pa.	Overall energy consumption of the Queanbeyan Aquatics Centre	\$550,000	\$70,000
CO 7.3.3	All sites	QPRC will review energy conservation techniques that can reduce energy use from appliances and IT equipment, including removal of surplus devices and implementation of smart control	Reviewed cost, energy and GHG savings	Natural Landscapes & Health		Not estimated at this time			
CO 7.3.4	All sites	Implement LED lighting at all QPRC sites - retrofit for medium and high-use sites and replace on fail with LED for low use sites	LED technology is typically 40-70% more energy efficient than standard lighting	Transport Facilities & Safe Cities		Not estimated at this time			

Energy efficiency & management	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.3.5	Parks & Sporting Fields	Select energy efficient lighting such as LED and smart controls when upgrading sporting fields + public spaces	LED and controls can save significant energy demand even when improving overall lighting and services to parks and sporting fields	Urban Landscapes	O	Not estimated at this time			
CO 7.3.6	Queanbeyan STP	Implement best practice energy efficient technologies and control in the design of the new Queanbeyan sewerage treatment plant, and achieve targets aligned with QPRC's Sustainable Design Policy for Council Buildings, (Design and As-Built Infrastructure Sustainability (IS) Ratings of Excellent)	An IS score of 65% to 75% or better would include actions in design and operation to reduce energy and GHG emissions	Utilities-Technical & QSTP & Googong + Contracts & Projects	S	A 25% reduction in energy for e.g. equates to 460 MWh per year and 380 t CO ₂ -e on a Scope 2 basis	Overall energy consumption by the new Queanbeyan STP	Not estimated at this time	Not estimated at this time
CO 7.3.7	Queanbeyan civic and cultural precinct	Implement best practice energy efficient technologies and control in the design of the new Queanbeyan Civic and Cultural Precinct, and achieve targets aligned with QPRC's Sustainable Design Policy for Council Buildings	The new building can be an exemplar of sustainable design and can demonstrate Council leadership	Contracts & Projects	S	Not estimated at this time			

Energy efficiency & management	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.3.8	Braidwood Office & Library	Upgrade lighting to LED technology and optimise heating strategies	LED technology is typically 40-70% more energy efficient than standard lighting	Natural Landscapes & Health	M	GHG savings will be small as the site has solar PV	Overall energy consumption of the office & library	~\$25,000	~\$4200
CO 7.3.9	Bungendore Offices	Upgrade lighting to LED technology	LED technology is typically 40-70% more energy efficient than standard lighting	Natural Landscapes & Health	M	GHG savings will be small as the site has solar PV	Overall energy consumption of the office	~\$40,000	\$5200
CO 7.3.10	Q Carpark	Upgrade lighting to LED technology	LED technology is typically 40-70% more energy efficient than standard lighting	Natural Landscapes & Health	M	Not estimated at this time			
CO 7.3.11	Googong Water Reclamation Plant	Implement best practice energy efficient technologies and control in the expansion of the Googong Water Reclamation Plant	An IS score of 65% to 75% or better would include actions in design and operation to reduce energy and GHG emissions	Utilities-Technical & QSTP & Googong + Contracts & Projects	L	Not estimated at this time			

7.4. STREETLIGHTING

TABLE 7: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – STREETLIGHTING

Street Lighting	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.4.1	Upgrade minor road streetlights to LED technology. There is approximately 650 kW of street lighting across the LGA (>5,400 lights), with approximately 50% of demand for local road lights (~4,200 lights)	LED lighting will reduce energy demand by about 65%	Transport Facilities & Safe Cities	S PRIORITY	A 65% reduction in local road lighting would save over 700 t CO ₂ -e on a Scope 2 basis	Electricity consumption for street lighting	\$1,400,000	~\$200,000 including energy and maintenance savings
CO 7.4.2	Upgrade main road streetlights to LED technology. There is approximately 650 kW of street lighting (>5400 lights), with approximately 50% of demand for main road lights (~1,200 lights)	LED lighting will reduce energy demand by about 65%	Transport Facilities & Safe Cities	S PRIORITY	A 65% reduction in main road lighting would save over 700 t CO ₂ -e on a Scope 2 basis	Electricity consumption for street lighting	\$1,000,000	~\$200,000 including energy and maintenance savings
CO 7.4.3	Smart Controls applied to street lighting may enable further energy savings to be achieved through, for example dimming controls at night. Future work on smart controls would be developed in conjunction with Essential Energy to ensure standards are met at all times	Smart controls have the potential to yield added energy savings of about 25%	Transport Facilities & Safe Cities	M PRIORITY	A 25% reduction in remaining energy demand using smart controls would save 200 t CO ₂ -e on a Scope 2 basis	Electricity consumption for street lighting	Unknown	~\$40,000
CO 7.4.4	Investigate the opportunity for using solar powered streetlighting for new 'streetlighting assets' in Council carparks and parks. NOTE this only relates to those streetlighting assets that are intended to be Council owned and maintained	100% electricity savings when compared to traditional streetlights	Transport Facilities & Safe Cities & Urban Landscapes	O PRIORITY	A 100% reduction in CO ₂ -e when compared with standard street lighting	Electricity consumption for street lighting	Equivalent to a standard streetlight	~\$50-\$115 per streetlight. Including energy and maintenance savings

7.5. RENEWABLE ENERGY ON COUNCIL FACILITIES

TABLE 8: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – RENEWABLE ENERGY ON COUNCIL FACILITIES

Renewable energy on Council facilities	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.5.1	Queanbeyan Aquatic Centre	A small area of roof on the indoor pool building will be reviewed for solar PV potential, estimated to be 120m ² in size	10 kW of solar PV would add to the renewable energy use at the site	Natural Landscape & Health + Transport Facilities & Safe Cities	S	A 10 kW PV array would reduce emissions by 11 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar output	\$13,000	\$2,500
CO 7.5.2	Googong Water Reclamation Plant	QPRC will maximise solar PV implementation at the plant, focusing on rooftop systems on the main building, chemical store and other structures. An estimate of 200 kW PV capacity is feasible	200 kW solar PV would reduce the impact of continued demand growth at the site through expansion	Natural Landscape & Health + Utilities-Technical & QSTP & Googong	S	A 200 kW PV array would reduce emissions by 230 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar output	~\$320,000	~\$45,000
CO 7.5.3	Bungendore STP	Council will assess the business case for solar PV on the roof of the treatment plant building and a ground-mount array. Based on current demand a 20-kW array is estimated to be the preferred size	A 20 kW PV array would displace an estimated 22 MWh of grid electricity with 6 MWh exported to grid	Natural Landscape & Health + Utilities-Operations	S	A 20 kW PV array would reduce emissions by 23 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar output	\$26,000	\$5,000

Renewable energy on Council facilities	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.5.4	Queanbeyan STP	QPRC will consider the implementation of a ground-mount and/or rooftop solar PV array on the site of the STP to meet daytime energy demand	A 250 kW PV array would displace an estimated 350 MWh of grid electricity	Utilities-Technical & QSTP & Googong + Contracts & Projects	M	A 250 kW PV array would reduce emissions by 287 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~\$400,000	~\$60,000
CO 7.5.5	Queanbeyan Aquatic Centre	In future Council will review the shade structures' potential for flexible solar PV to generate renewable energy at the site. A preliminary size of 50 kW capacity is estimated	50 kW of solar PV would add to the renewable energy use at the site	Natural Landscape & Health + Transport Facilities & Safe Cities	M	A 50 kW PV array would reduce emissions by 57 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	\$65,000	\$12,500
CO 7.5.6	Bungendore STP	The STP may be upgraded to a 7000 EP plant in future. As part of this Council will seek to incorporate solar and potentially battery storage to minimise additional grid electricity use	A 50 kW PV array would displace an estimated 70 MWh of grid electricity with a battery to store surplus and minimise export	Utilities-Operations + Contracts & Projects	M	A 50 kW PV array would reduce emissions by 57 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~\$100,000	~\$10,000
CO 7.5.7	Braidwood STP	In future Council will consider expansion of the existing 30 kW solar array with more solar and battery storage	A further 30 kW would reduce grid energy by a further 42 MWh per year	Natural Landscapes & Health + Utilities-Operations	L	A 20 kW PV array would reduce emissions by 34 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~\$90,000	~\$7,000
CO 7.5.8	Braidwood Office & Library	Council will evaluate the business case to install additional solar PV with battery storage	Onsite solar PV increases Council's	Natural Landscapes & Health	L	A 10 kW PV array would reduce emissions by 17t	Monitoring of solar PV output	~ \$27,000	~ \$4,500

Renewable energy on Council facilities	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
			renewable energy capacity			CO ₂ -e pa on a Scope 2 basis			
CO 7.5.9	Braidwood WTP	Council will evaluate the business case to install additional solar PV with battery storage	Onsite solar PV increases Council's renewable energy capacity	Utilities-Operations	L	A 10 kW PV array would reduce emissions by 37 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~ \$27,000	~ \$2,400
CO 7.5.10	Bungendore Offices	Council will evaluate the business case to install additional solar PV with battery storage	Onsite solar PV increases Council's renewable energy capacity	Natural Landscapes & Health	L	A 10 kW PV array would reduce emissions by 17t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~ \$27,000	~ \$4,500
CO 7.5.11	Queanbeyan Depot	Council will evaluate the business case to install additional solar PV with battery storage	Onsite solar PV increases Council's renewable energy capacity	Natural Landscapes & Health	L	A 10 kW PV array would reduce emissions by 34 t CO ₂ -e pa on a Scope 2 basis	Monitoring of solar PV output	~ \$27,000	~ \$4,500
CO 7.5.12	Queanbeyan Aquatic Centre	Council will review performance of the Edwards boilers and solar matting and plans for future replacement or upgrade (e.g. to heat pump and solar PV)	Continued use of renewable energy for pool heating. Future upgrade using heat pumps may allow the site to be fully electric and remove use of fossil fuels	Natural Landscapes & Health + Transport Facilities & Safe Cities	L	Not estimated at this time			
CO 7.5.13		A future water treatment plant will consider solar PV and	Onsite solar PV increases	Utilities-Operations	L	Not estimated at this time			

Renewable energy on Council facilities	Site/s	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
	Bungendore WTP	battery storage to meet part of the site's energy demand	Council's renewable energy capacity	+ Contracts & Projects					
CO 7.5.14	All small sites	Council will continually review the business case for smaller solar and battery storage installations at all small sites	Onsite solar PV increases Council's renewable energy capacity	Natural Landscapes & Health	L	Not estimated at this time			
CO 7.5.15	All Sites	QPRC will review its land (and water) sites to determine if any are suitable for a future solar farm at mid-scale (e.g. 2-5 MW)	Offsite solar may complement Council's onsite renewables as well as its electricity purchasing process	Natural Landscapes & Health	L	Not estimated at this time			
CO 7.5.16	Closed or nonoperational landfill sites	Explore opportunities for methane capture at closed or nonoperational landfill sites	Methane can be used as an energy source throughout Council Operations. Increases Council's renewable energy capacity	Utilities- Technical & QSTP & Googong	L	Not estimated at this time			

7.6. TRANSPORT

TABLE 9: QPRC SHORT, MEDIUM- AND LONG-TERM ACTIONS – TRANSPORT

Transport	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.6.1	Continue to monitor and improve data collection on fuel use and emissions from Council's fleet.	Data management and analysis	Natural Landscapes & Health	S		Quality of reported fuel data	\$14,000 pa.	
CO 7.6.2	Develop policy and plan to encourage use of teleconferencing, Web ex, Skype to replace the need for travel when possible (continued from 2013-17 CCAP)	Reduce time spent travelling, save money spent on fuel and reduce emissions	Natural Landscapes & Health	S	Not estimated at this time	Reduced vehicle kms for pool vehicles		
CO 7.6.3	Continue the 'Trees 4 Cars' program to help offset emissions for new fleet cars (continued from 2013-17 CCAP)	Awareness, sequestration of GHG's and improving local environment	Natural Landscapes & Health	M		Number of trees planted	\$4000 pa.	
CO 7.6.4	Prioritise low to zero emissions as criteria when purchasing fit for purpose vehicles and evaluating whole of life costs. Remove less efficient cars (when viable) from the fleet and provide incentives for staff to take up cars that are fuel efficient. Review Council's policy for vehicle selection on an annual basis	More appropriate vehicle selection for fleet list – fuel and cost savings	Natural Landscapes & Health + Utilities	S	Not estimated at this time.	Weighted emissions intensity of Council's passenger and heavy fleet.	Not estimated at this time	Not estimated at this time.
CO 7.6.5	Implement a low to zero emissions vehicle trial for QPRC operations	Reduced GHG emissions	Utilities	S	Not estimated at this time	Trial implemented	Not estimated at this time	Not estimated at this time

Transport	Action	Benefit	Responsibility	Timeframe	GHG Reduction	Performance Metric	Capital Cost	Annual Savings
CO 7.6.6	Develop a comprehensive Council fleet strategy that includes assessing a transition to low to zero emissions for passenger and heavy vehicles	Electric and hydrogen passenger vehicles are proven, and trials of heavy vehicles include buses, garbage trucks, utes, rigid trucks	Natural Landscapes & Health + Utilities	M	Not estimated at this time	Council fleet strategy including transition plan to low and/or zero emissions	Not estimated at this time	Not estimated at this time
CO 7.6.7	Investigate the possibility of ensuring all new roads and footpaths contain at least 5-10% recycled glass or other material	Lower embedded GHG emissions in road / footpath materials	Transport Maintenance + Contracts & Projects	M	Not estimated at this time	% recycled content in new road and footpath materials		
CO 7.6.8	Increase permanent bike racks and maintenance stations throughout the LGA	Staff and community mobility leading to lower emissions	Urban Landscapes	O	Not estimated at this time	Number of permanent bike racks installed	~\$10,000	
CO 7.6.9	Investigate opportunities for increasing the use of recycled water for grading road.	Reduced use of potable water especially during times of drought	Transport Maintenance + Contracts & Projects	M		Litres used. % portable vs recyclable used for grading roads	~\$30,000 (increased storage capacity)	Not estimated at this time

7.7. ADAPTATION

Queanbeyan City Council developed a climate change adaptation action plan in 2015 that sets out close to 40 discrete actions to adapt to climate change risks, across four key action areas:

- Rainfall
- Fire Weather
- Temperature/Hot Days
- General Risk Scenario

The Plan sets out approximately \$1.6 million in potential expense plus substantial staff time to respond to the range of actions identified. The 2015 plan was not adopted by Council. There was no similar Plan developed for the Palerang region at the time.

With the creation of the new QPRC, Council will re-assess its adaptation plan for Council's operations by:

1. Review of the 2015 adaptation plan, noting that most actions are long-term measures and likely to remain relevant,
2. Expand the scope of the review to encompass the whole of the QPRC operations, and
3. Identify and develop specific readiness and adaptation plans for critical sites such as water infrastructure, depots and sites hosting significant IT infrastructure

Council will also assess the potential to increase tree canopy on council property (including reserves, road verges, parks) to reduce heat island effects, as part of tree canopy efforts across the whole community.

EMISSIONS PATHWAYS

8. POTENTIAL COST-EFFECTIVE EMISSIONS PATHWAYS

Many organisations and local councils have committed to transition their organisations to zero or low emissions well within the timeframe required to avoid serious global warming. Typically, these targets are 100% renewables or net-zero carbon emissions, often with interim goals leading to the final target. The emergence of SBTs is also seeing organisations commit to doing their pro-rated ‘share’ of the effort required to limit warming to no more than 1.5 degrees.

8.1. COST-EFFECTIVENESS OF ACTION TO REDUCE EMISSIONS

Implementation of the measures identified in the Action Plan above, allied to good leadership and governance of Council’s abatement efforts, and could see QPRC achieve a step change in their emissions and level of renewable energy cost effectively. In fact, aside from purchasing carbon offsets, the premise for action by most organisations is that abatement measures pay for themselves within a prescribed time or achieve a minimum commercial return on investment.

The premise that action to reduce GHG emissions is cost effective is applied in the development of this action plan. It is assumed that Council would likely seek to act on measures in the short and medium term that are cost-effective today and will deliver a good return on investment to Council. For actions that are just emerging or are not yet cost-effective, it is assumed that action by Council will wait until this improves, so that a good financial return is achieved at that time.

Two scenarios are presented here to help QPRC take decisions on how it wishes to develop and implement abatement opportunities within its operations.

8.1.1. SCENARIO 1: EMISSIONS ABATEMENT IN COUNCIL OPERATIONS

Scenario 1: Emissions Abatement focused on action in Council operations now, moderate investment in low to zero emission vehicles by 2030, and excluding large-scale renewable energy purchasing. Actions are:

1. Upgrade all streetlights to LED on local and main roads and implement smart controls.
2. Implement solar PV on all feasible rooftops for QPRC sites.
3. Implement a range of energy efficiency measures, including upgrading building & sports field lighting to LED, achieve efficiencies in sustainable procurement and energy efficient design.
4. Begin to transition Council’s petrol-fuelled fleet to electric from FY2025, and diesel-fuelled fleet to electric from FY2029 (~50% of petrol and ~15% of diesel fleet taken to be electric by 2030).

The costs of this approach to Council will include:

- Sustainable design and equipment purchasing: Council is committed to implementing sustainability in new building design, including the Queanbeyan STP and the new Queanbeyan Civic and Cultural Precinct. In the same way, buying energy efficient appliances and equipment when upgrading or replacing existing equipment is based on this being a cost-effective investment over the life of new equipment.
- Energy efficiency initiatives such as LED lights in buildings and sporting fields, efficient air conditioning plant and controls and variable speed drives on treatment plant pumps have been implemented at many sites. Actions to improve energy efficiency are simply a continuation of existing good practices.
- New LED street lighting and smart controls may cost over \$2.4 million covering local and main roads plus smart controls. Cost savings are likely to exceed \$440,000 per year to Council.

- New solar PV and battery storage initiatives will cost more than \$1 million and return more than \$140,000 annually in savings to Council.
- It is assumed that Council will increase the uptake of low to zero emission vehicles when these are cheaper to buy and there is a resale market so that the whole-of-life cost to Council is no more than for petrol vehicle options. In the meantime, Council can look to increase the number of hybrid cars in its fleet to reduce fuel costs and emissions.

The impact of this approach can be seen in the energy demand chart below. Energy demand would be reduced by around 27,400 GJ compared with the forecast level (with no actions to reduce), or a 31% reduction. This is also a reduction of almost 16,000 GJ compared with 2017-18 energy consumption, or 21%.

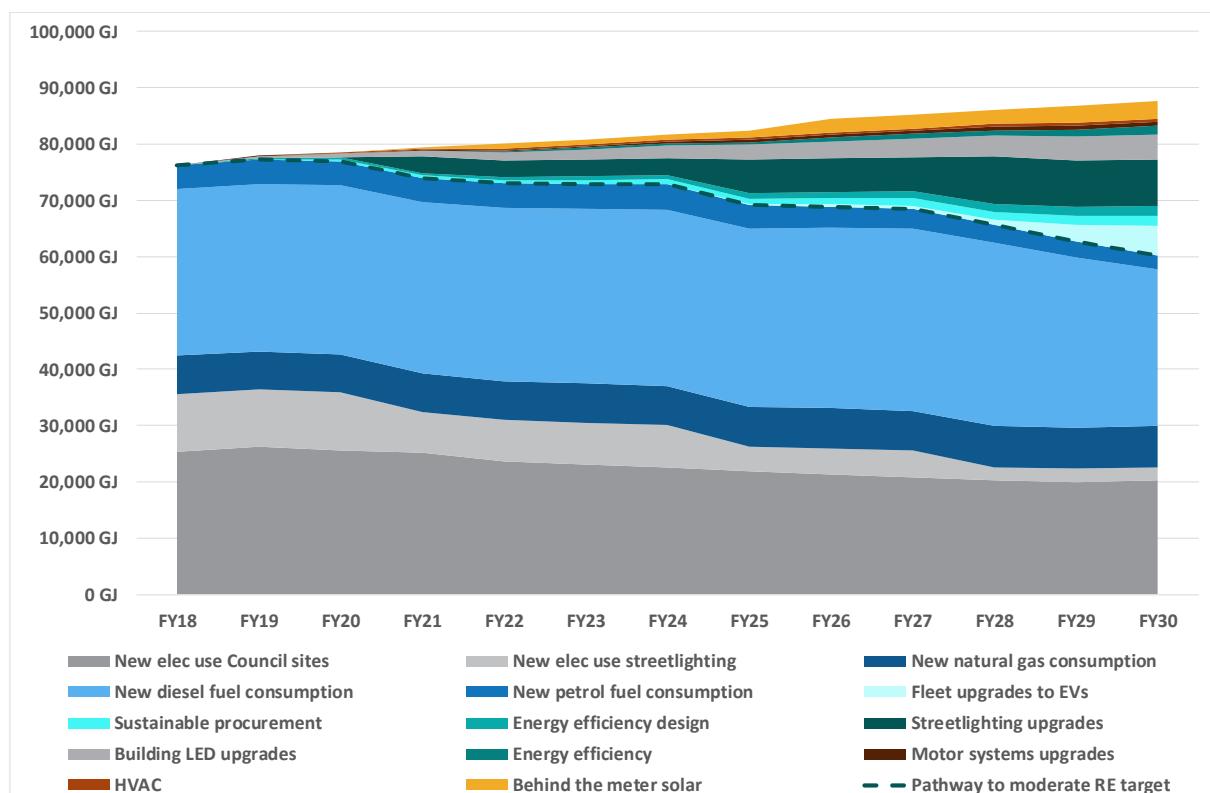


FIGURE 32: SCENARIO 1 ENERGY REDUCTION PATHWAY

Because the electricity grid is becoming ‘greener’ with the implementation of more and more utility-scale renewable energy projects, the impact on Council’s carbon footprint will be more significant from these measures. Emissions would be reduced by around 4,370 t CO₂-e in 2030 compared with the forecast level (with no actions to reduce), or a 39% reduction. This is also a reduction of 5,517 t CO₂-e compared with 2017-18 energy consumption, or 45%.

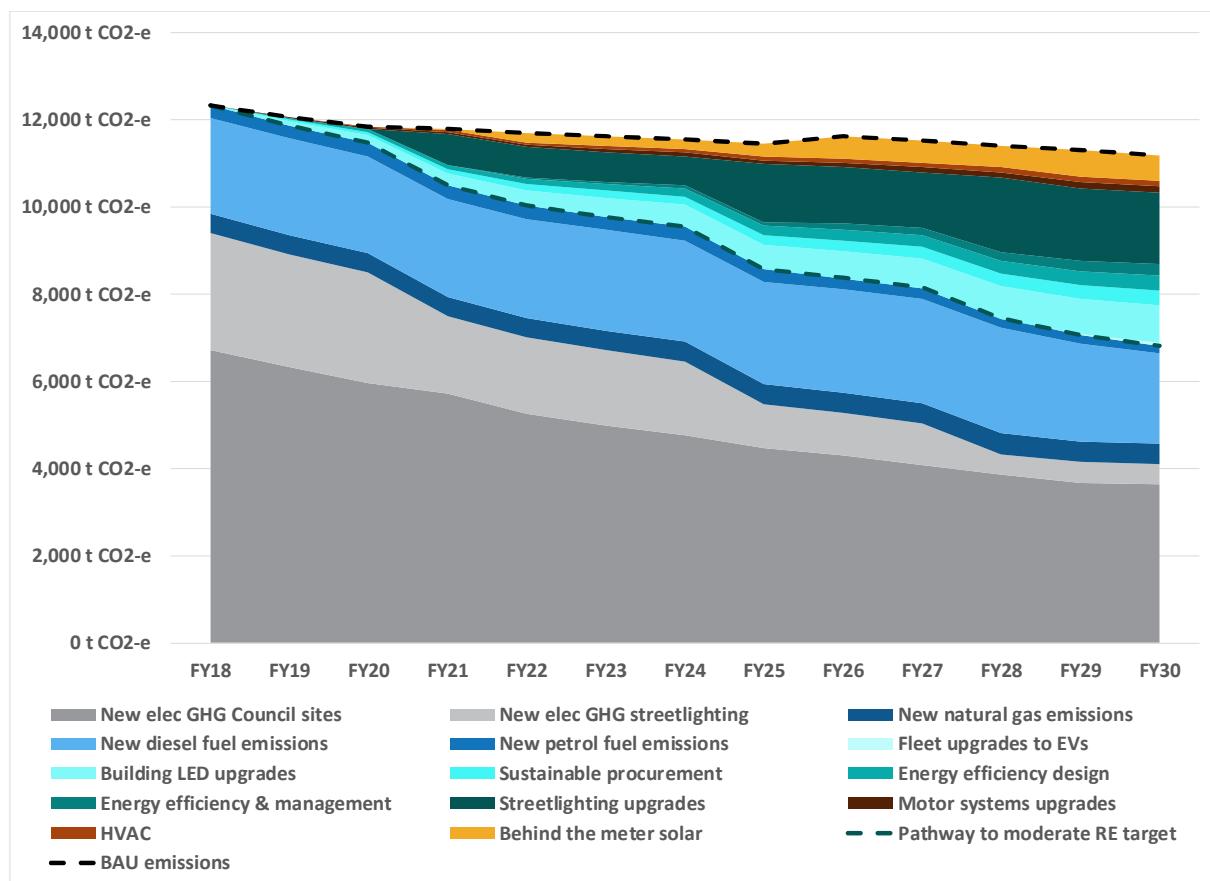


FIGURE 33: SCENARIO 1 EMISSIONS REDUCTION PATHWAY

8.1.2. SCENARIO 2: EMISSIONS ABATEMENT IN COUNCIL OPERATIONS

Scenario 2: Implementation of cost-effective measures out to 2030, including currently cost-effective opportunities, high penetration of low to zero emission vehicles by 2030, and buying all of Council's electricity from renewables by 2030. Included actions are:

1. Renewable energy power purchase agreements (PPAs) for Council facilities and street lighting, rising to 100% PPA over three energy procurement rounds.
2. Upgrade all streetlights to LED on local and main roads and implement smart controls.
3. Implement solar PV on all feasible rooftops for QPRC sites.
4. Implement a range of energy efficiency measures, including upgrading building lighting to LED, achieve efficiencies in sustainable procurement and energy efficient design.
5. Electrification of natural gas use in major gas-using sites such as the aquatic centre.
6. Begin to transition Council's petrol fleet to electric from FY2020, and diesel-fuelled fleet to electric from FY2025 (~90% of petrol and ~50% of diesel fleet taken to be electric by 2030).

In addition to the measures outlined in the scenario 1 approach above, this approach would see the following added costs and/or risks:

- Renewable energy Power Purchase Agreements (PPAs) have been based on energy and renewable certificates that are similar or at lower cost to 'regular' grid power, assessed against forecast views of electricity markets, typically over 10-15 years. So, benefits are estimated but must be risk-managed over the long-term duration of most PPAs. A stepped approach

modelled here is also premised on renewables being cheaper than coal-fired power, staged so risks can be managed, and Council can avail of new developments and benefits over time.

- A more ambitious low to zero emissions vehicles policy is premised on this being a cost-effective action (taking into account purchase price, running cost savings and resale value) quickly, based on initiatives such as the ACT Government switching its fleet to electric and hydrogen fuel cell vehicles within the next few years and evaluating the role for electric buses and other plant.

The impact of this approach can be seen in the energy demand chart below. Non-renewable energy demand would be reduced by around 67,500 GJ compared with the forecast level (with no actions to reduce), or a 77% reduction. This is also a reduction of 56,000 GJ compared with 2017-18 energy consumption, or 73%.

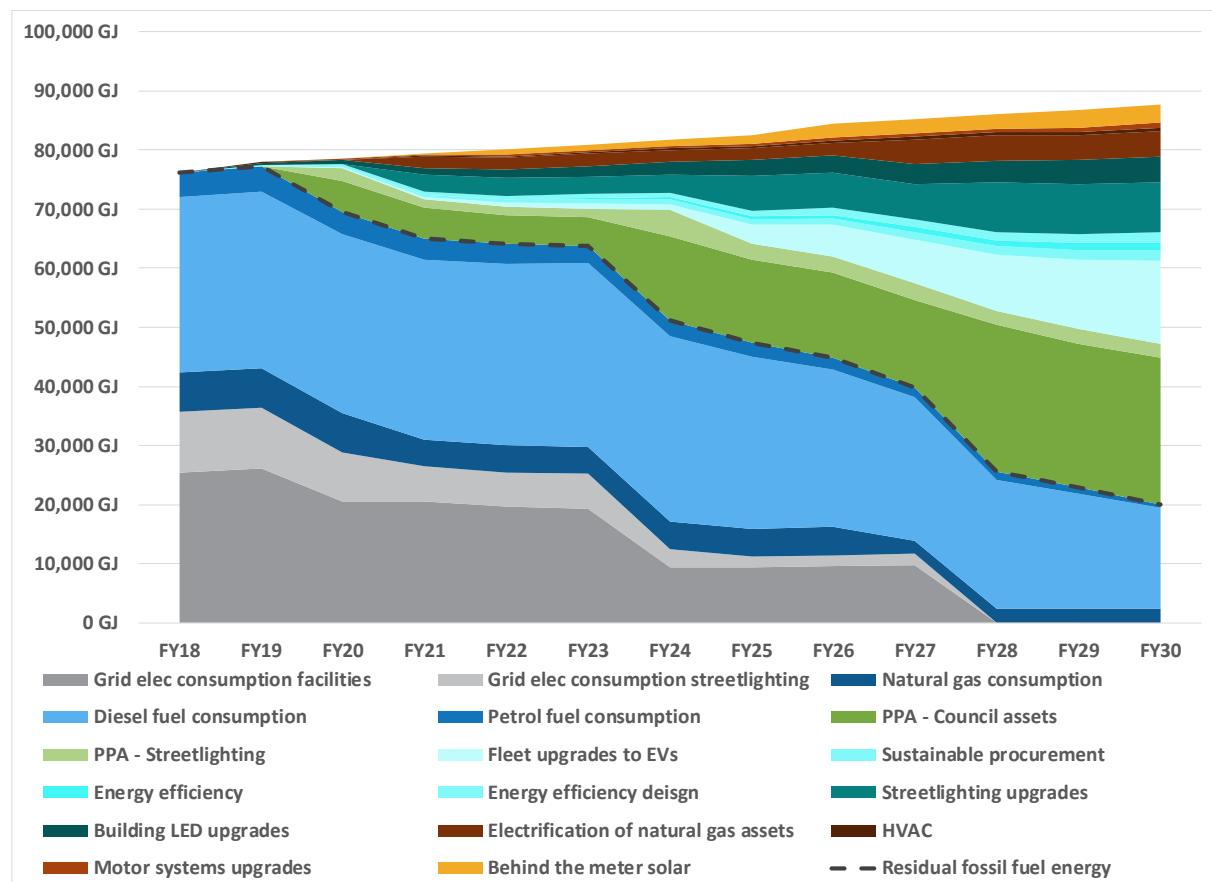


FIGURE 34: SCENARIO 2 ENERGY REDUCTION PATHWAY

As with scenario 1, because the electricity grid is becoming ‘greener’ with the implementation of more and more utility-scale renewable energy projects, the impact on Council’s carbon footprint will be more significant from these measures. Emissions would be reduced by around 9,713 t CO₂-e compared with the forecast level (with no actions to reduce), or a 78% reduction. This is also a reduction of 10,860 t CO₂-e compared with 2017-18 energy consumption, or 88%.

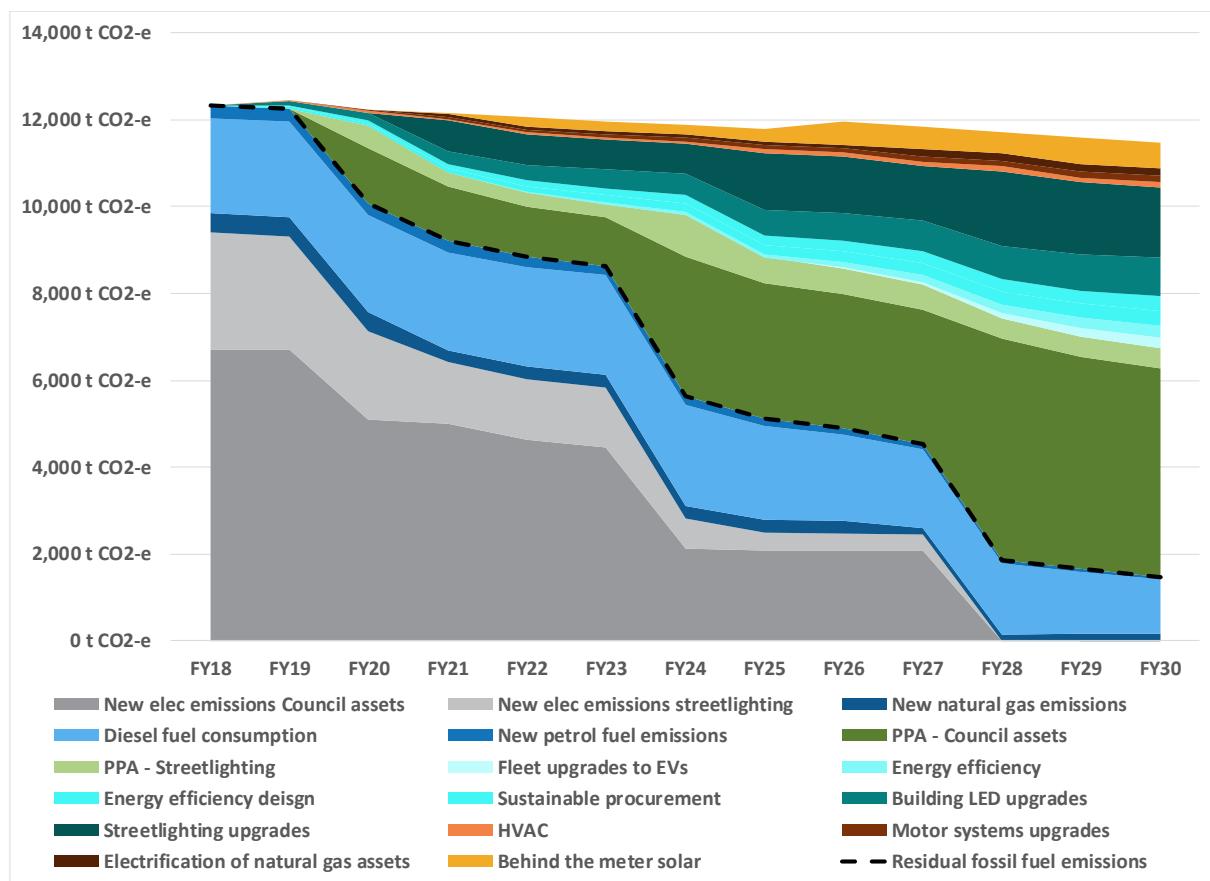


FIGURE 35: SCENARIO 2 EMISSIONS REDUCTION PATHWAY

Either of these savings / abatement levels are plausible and cost-effective, with scenario 2 requiring that Council purchase its electricity from renewable energy sources by 2030. Council could aim to source a fraction of energy from renewables in the short or medium term before committing to 100% renewables.

The implementation of street lighting, rooftop solar PV and energy efficiency (excluding major capital works projects) in the short to medium term is likely to require a budget of more than \$3.4 million, and see Council's costs (energy and maintenance) fall by around \$580,000 per year. Additional costs would be seen where a premium is paid for efficient equipment, higher costs for low or zero-emissions vehicles, and expert advice to assist Council to enter into a renewable energy PPA.

QPRC

