100% renewables

MIDCOAST council

NSW GOVERNMENT | Planning, Industry & Environment

MidCoast Council

CLIMATE CHANGE STRATEGY: PHASE 1

FINAL

June 2021

www.100percentrenewables.com.au

Acknowledgement of Country

We acknowledge the traditional custodians of the land on which we work and live, the Gathang-speaking people and pay our respects to all Aboriginal and Torres Strait Islander people who now reside in the MidCoast Council area. We extend our respect to elders past and present, and to all future cultural-knowledge holders.

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Glossary of climate change and project abbreviations

Acronym	Definition
AC, DC	Alternating and direct current
ACCU	Australian Carbon Credit Unit
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AFOLU	Agriculture, Forestry and Other Land Use
APVI	Australian Photovoltaic Institute
ATA	Alternative Technology Association
B20, B50	Diesel blends with 20% and 50% biodiesel
BASIX	Building Sustainability Index
BAU	Business-as-usual
BCA	Building Code of Australia
BEEC	Building Energy Efficiency Certificate
BESS	Battery Energy Storage System
BMS	Building Management System
BEV	Battery electric vehicle
CDM	Clean Development Mechanism
C40	Network of the world's megacities committed to addressing climate change
CCF	Climate Change Fund
CER	Certified Emissions Reductions (offsets)
CFL	Compact fluorescent
COP	Coefficient of performance
COP21	Conference of the Parties in Paris at which the Paris Agreement was reached
CO_2-e	Carbon Dioxide Equivalent
CPP	Cities Power Partnership
CPRS	Australia's Carbon Pollution Reduction Scheme
CSP	Community Strategic Plan
C4CE	Coalition for Community Energy
DOL	Direct On Line
DPIE	NSW Department of Planning, Industry and Environment
E3	Equipment Energy Efficiency program
EER	Energy efficiency ratio
EPA	Environmental Protection Authority
EPC(M)	Engineer, Procure, Construct (Maintain)
ERF	Emissions Reduction Fund
ESB	Energy Security Board
ESC	Energy Saving Certificates
ESS	NSW Energy Savings Scheme
EUA	Environmental Upgrade Agreement
EV	Electric Vehicle
FiT	Feed-in-tariff

GFC	Global Financial Crisis
GHG	Greenhouse Gas
HVAC	Heating, ventilation, and air conditioning
ICE	Internal combustion engine
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kWh, MWh, GWh	Units of energy – usually used for electricity
LED	Light Emitting Diode (lighting technology)
LGC	Large-scale Generation Certificate
MJ, GJ	Units of energy – usually used for gas
LGA	Local Government Areas
LPG	Liquefied Petroleum Gas
NABERS	National Australian Built Environment Rating System
NCC	National Construction Code
NDC	Nationally Determined Contributions by countries to meet Paris commitments
NEM	National Electricity Market
NCOS	National Carbon Offset Standard
NGA	National Greenhouse Accounts
NRMA	National Roads and Motorists' Association
NSW	New South Wales
O&M	Operation and maintenance
PHEV	Plug-in hybrid electric vehicle
PPA	Power Purchase Agreement
PV	Solar photovoltaic technology
REF	Revolving Energy Fund
RET	Australia's Renewable Energy Target
RMU	Removal Units (offsets)
S1	Scope 1 greenhouse gas emissions, from combustion of fuel at your facilities
S2	Scope 2 greenhouse gas emissions, caused by consuming electricity
S3	Scope 3 greenhouse gas emissions, indirect up- and downstream emissions
SDGs	Sustainable Development Goals
SRES	Small-scale Renewable Energy Scheme
SPS	Sewer Pumping Station
STC	Small-Scale Technology Certificates
STP	Sewerage Treatment Plant
VCS	Verified Carbon Standard
VFD, VSD	Variable Frequency Drive / Speed Drive
VGA	Virtual Generation Agreement
VPPs	Virtual Power Plants
W, kW, MW	Units of power – usually used for electricity
WTP	Water Treatment Plant

Executive Summary

Over the last 2 years, the MidCoast region has experienced firsthand the disastrous effects of climate change including the worst bushfire season on record, which burnt a quarter of the local government area and resulted in a significant loss of biodiversity, life and property; an increase in the number of intense storm events resulting in coastal erosion and localised flooding; and a substantial reduction in annual rainfall leading to a crippling drought and the introduction of Level 4 (severe) water restrictions for the very first time. Since 2009, the MidCoast LGA has also had 23 natural disaster declarations; the second worst affected council area in NSW (NSW Office of Emergency Management, 2020).

In declaring a state of climate emergency, Council affirmed that urgent action is required by all levels of government, including local councils, to avert a climate crisis by reducing our carbon emissions and helping our communities adapt to the impacts of climate change.

In March 2020 the NSW Government released its Net Zero Plan Stage 1: 2020-2030, which lays the foundation for the State's action on climate change and its goal to reach net zero emissions by 2050.

MidCoast Council will achieve net zero greenhouse gas emissions from its operations (including all facilities, transport and landfill waste) and 100% renewable electricity for its operations by 2040, by implementing actions to reduce its emissions. Council will offset those emissions that can't be mitigated by investing in renewable energy and local carbon sequestration initiatives such as wetland restoration, where feasible.

Council will use its influence to lead and support the community to reduce its own emissions, which encompasses action around strategic planning, education and capacity building, incentives and financial support, advocacy and collaboration, infrastructure development and land use planning.

Council will also plan and implement measures to increase the resilience of Council's assets and operations and to help the MidCoast community adapt to the impacts of climate change; in particular to the increased inundation of low-lying areas as a result of sea level rise, accelerated coastal erosion, and the reduction in annual rainfall, stream flow and water supply.

An expert consultant, 100% Renewables, was engaged by MidCoast Council through its participation in the NSW Department of Planning, Industry and Environment's Sustainability Advantage Program to develop a Climate Change Policy and a Climate Mitigation and Adaptation Strategy for Council's operations (***Climate Change Strategy***). The scope of the engagement also included an investigation into the development of a Sustainability Framework for Council to ensure Council's response to climate change, and sustainability in general, is embedded in its corporate planning framework and delivered through its daily operations.

This Strategy is the first phase of Council's response to climate change and is focused on Council's assets and operations so it can lead by example. The second phase will focus on working with the community of MidCoast to develop a plan to help them reduce the region's emissions and increase their resilience to climate change.

1 Introduction

This Strategy sets out the case for a range of cost-effective actions that can be implemented progressively over several years to reduce Council's carbon emissions and adapt its operations to the impacts of climate change. These actions include investing in renewable energy, becoming more energy efficient, sequestering carbon, transitioning to more sustainable transport options and reducing our waste to landfill. Specifically, Council's Climate Change Strategy is intended to:

- Demonstrate Council's leadership, through the development of a Climate Change Policy that provides a framework and ten guiding principles (see below) for climate action, sets ambitious targets for climate mitigation, undertakes to reduce risk to and increase the resilience of Council's operations to climate change, and undertakes to support the community's efforts to do the same.
- Focus Council's efforts on increasing solar PV and batteries, energy efficiency and the purchase of renewables in the short to medium term[1]; progressively increase its renewable energy supply as batteries and electric vehicles become cheaper; continually improve sustainable procurement policies and practices; minimise waste; and continue to invest in wetland restoration and tree plantings that sequester carbon and improve the region's biodiversity.
- Provide a roadmap of actions that Council can initiate and progress in the short, medium and long term that respond to the risks of climate change that are considered to have the greatest potential impact on Council's operations and the safety and wellbeing of the community.
- Initiate a process to determine what a suitable Sustainability Framework looks like for MidCoast Council, with particular consideration of how a climate action strategy can inform Council's key strategies and plans across all sustainability-focused areas, including Council's Resourcing Strategy and its Delivery Program and Operational Plans.

MidCoast Council's Climate Change Strategy is represented by the graphic below, which illustrates the key areas for action that when implemented together in a planned way, can significantly reduce energy demand, increase onsite renewables, reduce emissions and increase climate resilience.

FIGURE 1: CLIMATE CHANGE STRATEGY

[1] Short-term includes the next one to two Operational Plan periods, while Medium-term should be taken to mean the period covered by Council's next Delivery Program period – i.e. four years

Guiding Principles

1. Council will adopt a precautionary-principled response to climate change, by taking urgent action in line with its June 2019 resolution and subsequent climate emergency declaration, to mitigate and adapt to the effects of climate change over the long term.
2. Council will adopt and implement an evidence-based and risk-informed approach to assessing climate change impacts and responses in its operations.
3. Council recognises the importance of protecting biodiversity from the risks of climate change and the value of trees and wetlands in sequestering carbon.
4. Council will reduce the emissions from its operations and ensure its assets and services are resilient to the impacts of climate change by adopting adaptation measures.
5. Council will integrate economic, social and environmental factors, as well as good governance into its decision-making processes that deal with its response to climate change.
6. Climate change planning will be integrated into Council's Integrated and Planning Reporting Framework.
7. Council will adopt a proactive and collaborative process to inform, educate and work with the community, business and other levels of government to develop solutions to climate change.
8. Council recognises that the risks of climate change and the adaptation responses vary across the region, and collaboration and planning to make communities and environments more resilient will reflect this.
9. Responding to climate change is a responsibility shared by Council, the community and business, and significant reductions in regional emissions will happen if all stakeholders work together.
10. Identifying and developing climate change finance and investment opportunities in partnership with the community will be a key element of Council's approach.

1.1 Recommended targets for MidCoast Council

MidCoast Council will achieve **net zero greenhouse gas emissions from its operations, including its facilities, transport fleet and landfills, and 100% renewable electricity for its operations by 2040**.

Net zero emissions will be achieved through electricity purchasing, onsite solar and batteries, energy efficiency and sustainable procurement. It will also include cost-effective measures to reduce Council's fuel emissions over the next 20 years. Fuel reduction and electrification will begin with Council's passenger and light commercial vehicles, and expand to its heavy vehicle fleet as electric and other low-emission technologies become viable. Residual emissions will be offset by purchasing renewable energy and investing in local carbon sequestration, such as wetland restoration and tree planting.

A target of 100% renewable electricity by 2040 is feasible, has been adopted and implemented by numerous organisations, including many local councils in NSW.

Council has currently adopted a target to divert 75% of the region's waste from landfill by 2030.

1.2 Short and medium term action plan

In the short to medium term (i.e. within the next two Operational Plan periods up to the end of the next Delivery Program cycle for MidCoast Council), more than 200 mitigation and adaptation actions are recommended and included in this report that will help Council to achieve significant resource, emissions and cost savings, and achieve its targets. There are a number of actions that Council can progress immediately to begin to unlock savings and secure support for a multi-year program of work, including:

1. Prepare and adopt Council's Climate Change Policy;
2. Develop Council's Sustainability Framework and management and governance systems for its Climate Change Strategy;
3. Create a new staff position to progress Phase 1 and in particular Phase 2 work that engages with the MidCoast community;
4. Implement small to medium-sized solar PV projects across the Water Services portfolio that will achieve some 'quick wins' and put in place specifications and a process for future installations;
5. Ensure that solar PV, best practice efficiency and control is incorporated within all new developments (such as the energy efficiency measures and 160kW solar PV system recently installed at its new administration centre - Yalawanyi Ganya);
6. Ensure that all Council sections review and incorporate priority actions for mitigation, sequestration and climate adaptation in Council's next Delivery Program and Operational Plans, and develop consistent planning frameworks for use across Council.

1.3 Budget for short to medium term emissions reduction

The impact of climate mitigation measures on Council's budget will depend on the actions implemented, with multiple options identified for several sites. Implementation of all short and medium term solar PV and energy efficiency measures could cost $6.3 million, with expected annual cost savings of more than $1 million and a simple payback of six years.

Extending to the identified long term solar PV and energy efficiency measures, the cost to Council could be close to $11 million, though future revisions to the climate mitigation strategy would seek to refine these cost estimates as well as the expected savings to Council.

The costs for measures such as renewable energy power purchasing, hybrid or EV fleet, and sustainable purchasing policies would be justified where whole-of-life project costs to MidCoast Council are similar to or less than the cost of not pursuing these approaches.

The future development of a mid-scale solar farm to meet part of Council's electricity demand via a local generation solution should be considered on its financial merits. In the current market, this option would likely deliver low returns to Council and is not recommended in the short to medium term.

1.3.1 Grant funding opportunities

Access to grant funding is an important element of many Councils' action to increase their renewable energy generation and reduce their greenhouse gas emissions. Funding received through the Regional Community Energy Fund (RCEF) by Energise Gloucester to develop a community solar farm is an excellent local example. Pre-existing incentives for efficiency and renewables are available through programs such as the NSW Energy Savings Scheme (ESS) and the Renewable Energy Target (RET), which subsidises the upfront cost of small-scale solar PV systems up to 100 kW. The NSW Department of Planning, Industry and Environment highlights a number of potential funding sources in its May 2020 Net Zero Guidance for NSW local councils[2]. These include:

- NSW Sustainable Government team can provide access to a pre-qualified panel of energy service companies, energy-usage data analysis tools and access to finance: https://www.environment.nsw.gov.au/topics/sustainable-business-and-government/sustainability-in-government-agencies
- Australian Renewable Energy Agency ARENA: https://arena.gov.au/
- Clean Energy Finance Corporation, CEFC: https://www.cefc.com.au/
- The Emissions Reduction Fund: https://www.business.gov.au/assistance/emissions-reduction-fund
- The NSW Energy Savings Scheme (ESS): https://www.ess.nsw.gov.au/Home/About-ESS
- TCorp Green Term Deposits: https://www.tcorp.nsw.gov.au/resource/TCORP-Sustainability-Bond-Programme-Annual-Report-2019-Secured.pdf

Further to these potential funding sources, with the development of the NSW Government's Net Zero Plan 2020-2030 a range of programs and funding opportunities will arise in coming years, in areas such as solar PV, battery energy storage, electric vehicles and waste management. These are likely to be relevant sources of potential funding for Council. Grants for regional development, communities and infrastructure for example can also be accessed to develop projects that improve regional services as well as deliver energy and emissions savings. It is recommended that the resourcing of MidCoast Council's Climate Change Strategy include seeking and applying for grant funding as a key priority.

1.3.2 Revolving Energy Fund

MidCoast Council can consider the establishment of a Revolving Energy Fund in future to assist with the sustainable funding of initiatives that help to drive Council's emissions footprint down.

A Revolving Energy Fund (REF) is a sustainable funding mechanism, whereby savings from sustainability projects are tracked and used to replenish the fund for the next round of investments. In this way, funds used for energy efficiency, renewable energy, and sustainability projects can be spent multiple

[2] © State of New South Wales and Department of Planning, Industry and Environment 2020. Net Zero Emissions Guidance for NSW Councils, May 2020.

times to drive emissions reduction, energy and cost savings. REFs allow a monetary investment to be spent a number of times (through reinvesting energy cost savings) without reducing its value.

NSW Government has developed resources aimed at helping local councils to set up and operate a REF in their organisation, through its Sustainable Councils and Communities Program (SCC). A REF Implementation Guide and Excel toolkit are provided to MidCoast Council as part of this project.

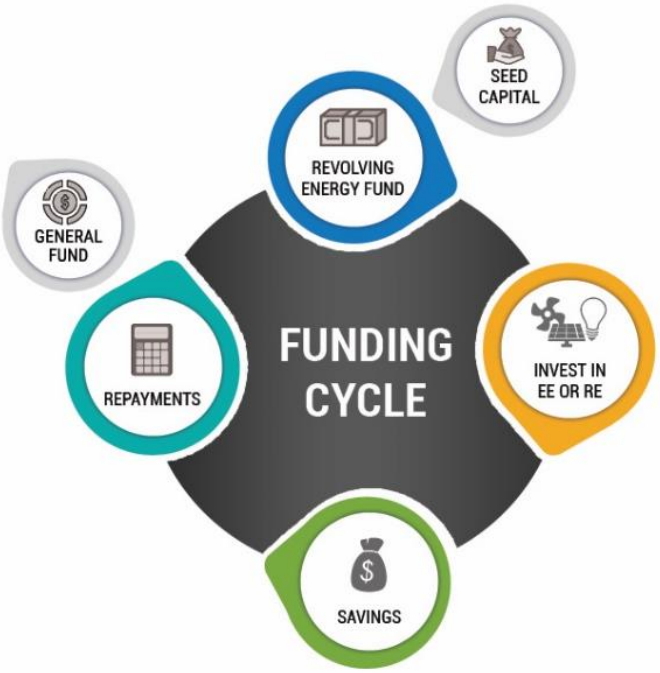

FIGURE 2: REVOLVING ENERGY FUND – TYPICAL FUNDING CYCLE

1.4 Supporting MidCoast community to reduce their emissions

Council will use its influence to support the community to reduce its emissions, as part of its Phase 2 work on the community's climate change response and when staff resources are allocated. This will encompass action on planning, education, capacity building, incentives, leading by example, recognition of community leaders, advocacy, collaboration, infrastructure development and strategic planning. In 2018-19 it is estimated that the MidCoast region's greenhouse gas emissions were 1.5 million tonnes of CO_2-e, highlighting the scale of the regional decarbonisation task.

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Scope of work

Approach to MidCoast Council's Climate Change Strategy

2 Approach and scope of work

100% Renewables was engaged by MidCoast Council via the NSW Department of Planning, Industry and Environment's Sustainability Advantage Program to develop a Climate Change Policy, Climate Mitigation and Climate Adaptation strategy for MidCoast Council's operations (Climate Change Strategy). The work was also to develop a high-level Sustainability Framework for Council to progress and develop further, to reflect the significance of climate change and to encompass other aspects of Council's sustainability actions. The scope of this project is outlined below.

2.1 Development of a Climate Change Policy

FIGURE 3: APPROACH TO DEVELOPING COUNCIL'S CLIMATE CHANGE POLICY

2.2 Climate mitigation – renewables and emissions reduction

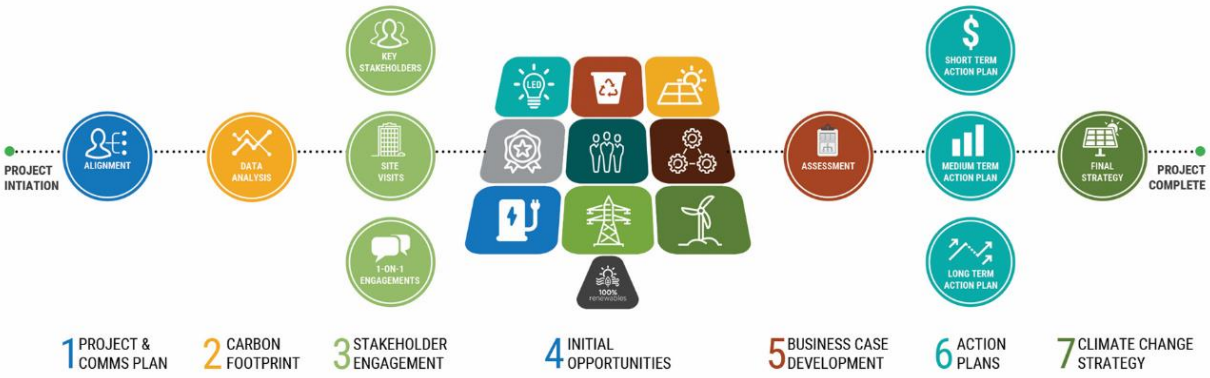

FIGURE 4: APPROACH TO DEVELOPING COUNCIL'S EMISSIONS REDUCTION STRATEGY

- **Step 1 – Project and Communications Plan**
  - Conduct a meeting with Council key stakeholders and develop a project plan.
- **Step 2 - Carbon Footprint**
  - Collect data from Council's energy management platform or billing information
  - Analyse interval data
  - Develop a carbon footprint for Council operations
- **Step 3 – Stakeholder Engagement**
  - Set up meetings with key stakeholders across Council
  - Set up and conduct site visits across key sites at Council
- **Step 4 – Initial Opportunities**
  - Develop draft opportunities in excel for discussion with stakeholders
  - Circulate these opportunities to Council staff for input, discussion and prioritisation
- **Step 5 – Business Case Development**
  - Model solar PV business cases
  - Assess energy efficiency opportunities
  - Discuss transport and renewable energy Power Purchasing Agreement options
- **Step 6 – Action Plans**
  - Develop short, medium and long-term action plans for Council
- **Step 7 – Climate Change Strategy**
  - Develop and distribute a draft report for review by Council stakeholders
  - Adjust the draft report as well as opportunities based on comments and feedback from Council stakeholders to develop and distribute a final report
  - Conduct a workshop/presentation to management/Councillors

2.3 Climate adaptation strategy

FIGURE 5: APPROACH TO DEVELOPING COUNCIL'S CLIMATE ADAPTATION STRATEGY

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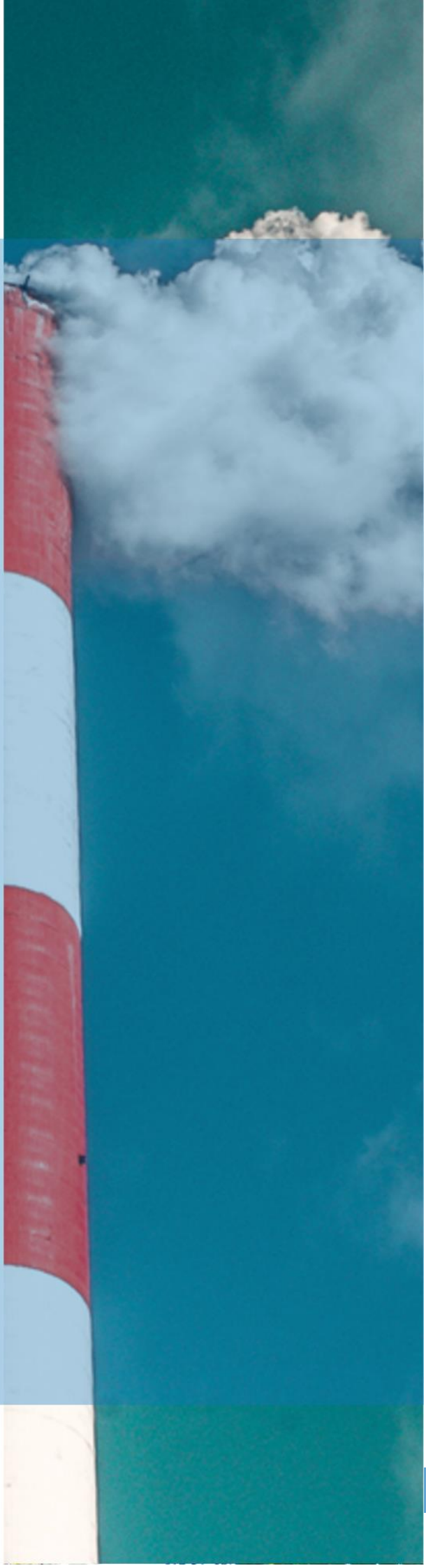
Global Context

Factors underpinning climate action at global, National and State levels



3 Global context for climate action and targets

3.1 The need to reach 'net-zero' greenhouse gas emissions

Due to all historical and current carbon emissions, global temperatures have increased by ~1°C from pre-industrial levels. The main driver of long-term warming is the total cumulative emissions of greenhouse gases over time. As shown by the *Climate Action Tracker*[3] below, without additional efforts, human-caused carbon dioxide (equivalent) emissions may increase to over 100 billion tonnes annually by 2100, which is double current global emissions. The resulting increase in global temperatures would be up to 4.8°C (as per the IPCC Climate Change 2014 Synthesis Report[4]).

With current policies around the world, global temperatures are projected to rise by up to 3.1°C. To prevent dangerous climate change by limiting global warming, close to 200 of the world's governments signed the landmark Paris Agreement. This Agreement underpins science-based targets to limit global temperature increase to well below 2°C by 2050. With current pledges, and if all countries achieved their Paris Agreement targets, it would limit warming to 2.4°C. According to the Climate Action Tracker, to limit warming to 1.5°C, carbon emissions must decline sharply in the short-term and reach net-zero by mid-century (refer to the green line / band in the chart).

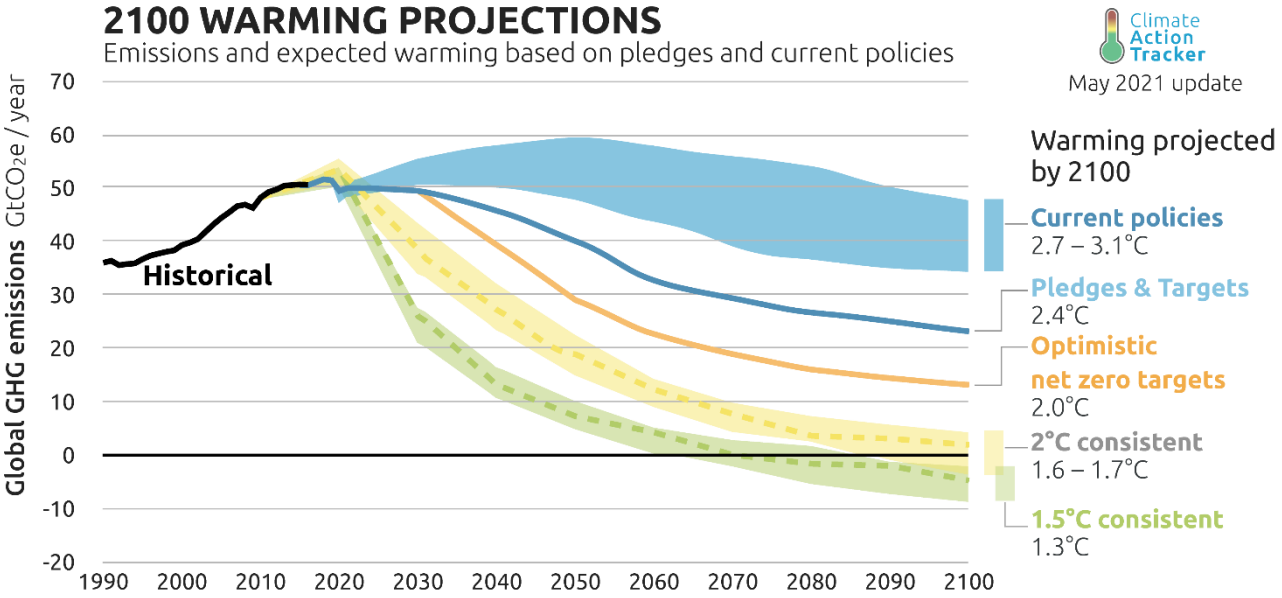


FIGURE 6: THE CLIMATE ACTION TRACKER'S WARMING PROJECTIONS FOR 2100, VARIOUS POLICY SCENARIOS

A net-zero target means that by the target date, there must be no greenhouse gas emissions on a net basis. For energy use in a local government's operations, for example, this could mean:

1. GHG emissions from stationary fuel combustion such as LP gas use are minimised, and
2. GHG emissions from transport fuel combustion are minimised, and
3. GHG emissions from electricity consumption are minimised, and
4. Remaining emissions are offset or removed through sequestration measures.

[3] https://climateactiontracker.org/global/temperatures/
[4] IPCC Climate Change 2014 Synthesis Report

3.2 International drivers for climate action

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)**

   In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. Governments, businesses and civil society together with the United Nations are mobilising efforts to achieve the Sustainable Development Agenda by 2030[5]. 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**

   To address climate change, countries adopted the Paris Agreement at the COP21 in Paris on 12 December 2015, referred to above. 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°C, and given the grave risks, to strive for 1.5°C Celsius[6].

3. **Special IPCC report on 1.5°C warming (SR15)**

   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[7].

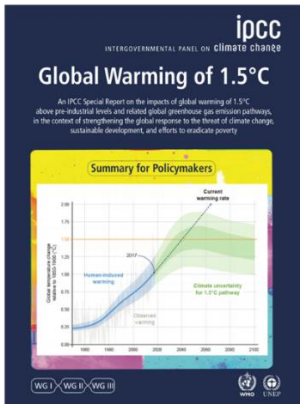


FIGURE 7: GLOBAL CONTEXT FOR ACTION ON CLIMATE

The IPCC is currently in its sixth assessment report cycle (AR6), and their synthesis report is due to be released in 2022, which will bring together the latest science, evidence and projections for global warming. Recent reports, such as Climate Reality Check 2020[8], suggest that past warming projections

[5] Sourced from https://www.un.org/sustainabledevelopment/development-agenda/
[6] Sourced from https://www.un.org/sustainabledevelopment/climatechange/
[7] Sourced from https://www.ipcc.ch/news_and_events/pr_181008_P48_spm.shtml
[8] Sourced from https://www.climaterealitycheck.net/

and impacts by IPCC are already being exceeded, and that decarbonisation requires even more urgent effort and deeper and faster cuts to emissions than have been stated before.

In addition, the World Economic Forum's Global Risks Report 2021[9] highlights adverse climate change-related outcomes as among the most likely to occur with the highest impacts to the global economy. The chart below from the WEF's report shows several key climate risks clustered in the top right corner; that is, these risks are assessed to be among the most likely to eventuate, with the greatest economic impact among all the global risks that were assessed.

FIGURE 8: GLOBAL RISKS REPORT 2021 – LIKELIHOOD AND IMPACT OF CLIMATE, OTHER RISKS TO GLOBAL ECONOMY

[9] https://www.weforum.org/reports/the-global-risks-report-2021

4 National and State Government action

4.1 National targets

At a national level, Australia's response to the Paris Agreement has been to set a goal for greenhouse gas (GHG) emissions of 5% below 2000 levels by 2020 and GHG emissions of 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 from renewable energy sources by 2020.

FIGURE 9: AUSTRALIA'S RENEWABLE ENERGY AND CARBON GOALS – NATIONAL LEVEL

According to the Clean Energy Regulator[10], the Renewable Energy target has been met and renewable energy generation will exceed the target by some 7,000 GWh in the short term.

The RET is the main successful policy underpinning Australia's climate mitigation efforts. Other key initiatives include the Climate Solutions Fund, formerly the Emissions Reduction Fund, which sources abatement from eligible activities in the economy via periodic auction processes. Despite these initiatives, Australia's GHG emissions remained relatively steady over the period 2015 to 2020, with a sharp dip in emissions observed throughout calendar year 2020 due to Covid-19.

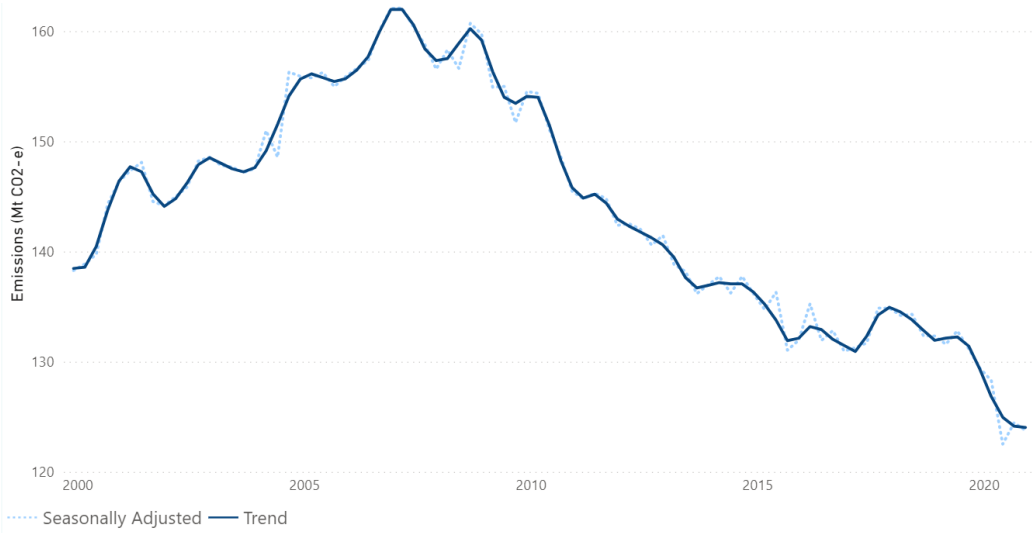


FIGURE 10: AUSTRALIA'S QUARTERLY GHG EMISSIONS FROM ALL SOURCES[11]

[10] March 2018, Australian Government – Clean Energy Regulator. 2018 Annual Statement to the Parliament on the progress towards the 2020 Large-scale Renewable Energy Target.

[11] https://www.industry.gov.au/data-and-publications/national-greenhouse-gas-inventory-quarterly-update-december-2020#quarterly-emissions-data

4.2 NSW State targets

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.

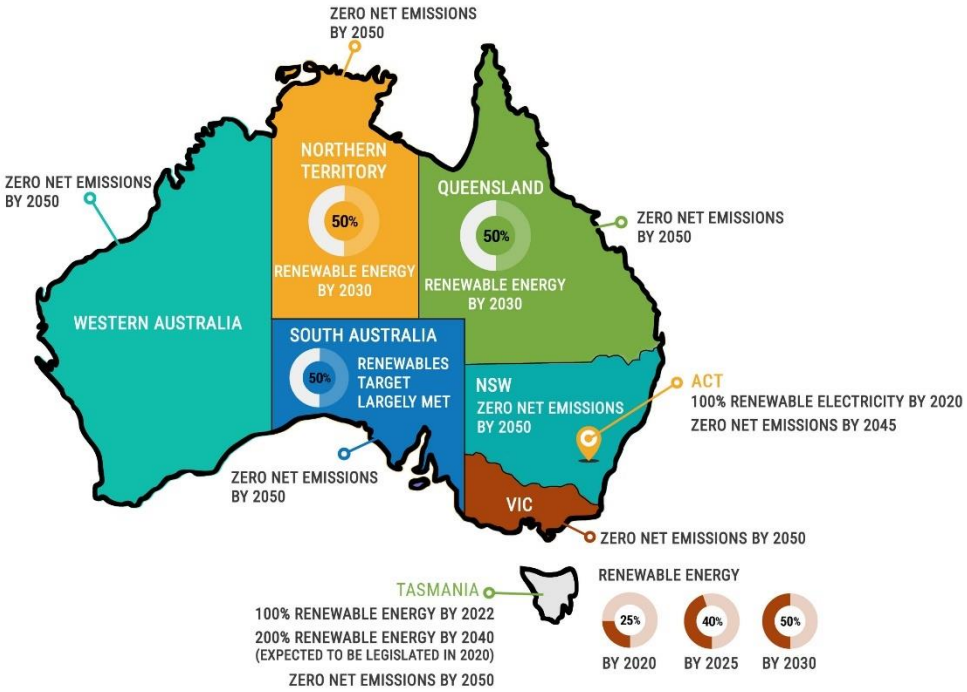


FIGURE 11: AUSTRALIA'S RENEWABLE ENERGY AND CARBON GOALS – STATE AND TERRITORY LEVEL

Supporting the NSW Government's commitment to reach net zero emissions by 2050, NSW Government recently released its **Net Zero Plan Stage 1: 2020–2030**[12]. This sees the first of three 10-year plans released that will set a pathway to net zero emissions in NSW by 2050.

In addition the NSW Government has developed a **NSW Electricity Strategy**[13] which will help the State to deliver on its goal to attract renewable energy investment. On 27th November 2020 the NSW Government passed the *Electricity Infrastructure Investment Bill (2020)* which will help to drive the transition to renewables in the state in coming years by coordinating investment in new generation, storage and network infrastructure in New South Wales[14].

In the first instance a renewable energy zone (REZ) in Central West Orana will be developed, attracting significant private sector investment to developing new generation assets in this region. A larger renewable energy zone is to be developed in the New England region, with up to seven additional REZs' to be developed in future, including a recently-announced REZ for the Hunter Valley region.

The figures below show the approximate locations of the Central West Orana and New England REZs'.

[12] © State of New South Wales 2020. Published March 2020
[13] https://energy.nsw.gov.au/renewables/renewable-energy-zones
[14] https://www.parliament.nsw.gov.au/bill/files/3818/XN%20Electricity%20Infrastructure%20Investment%20Bill.pdf

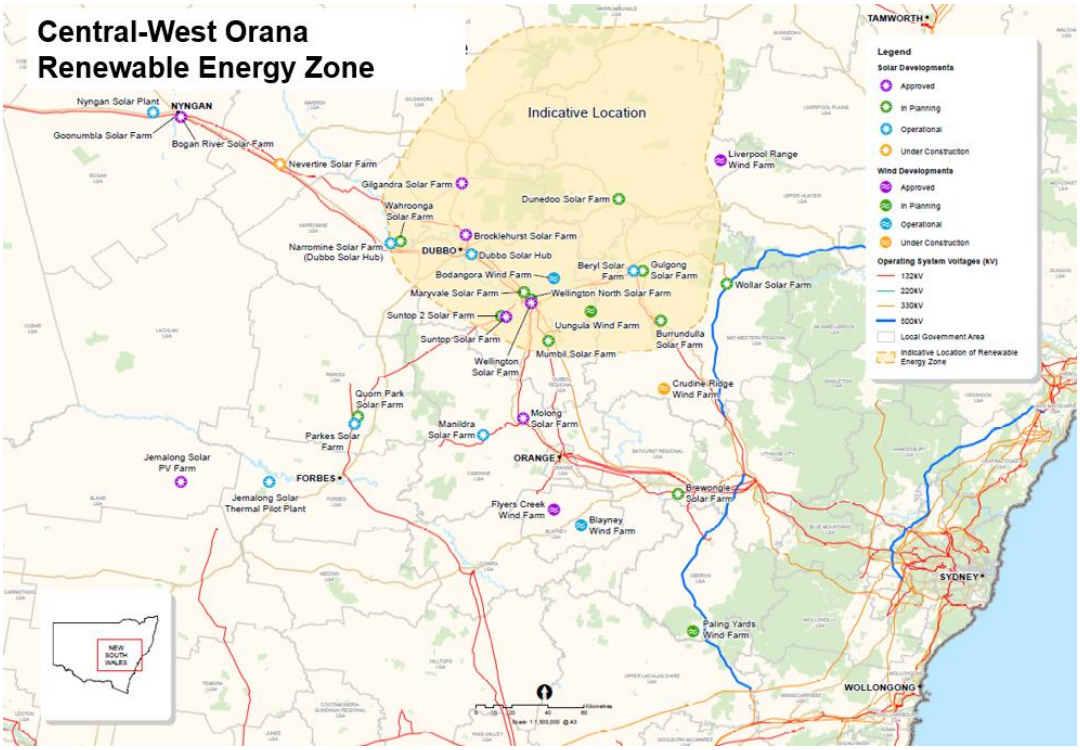


FIGURE 12: INDICATIVE CENTRAL-WEST ORANA NSW RENEWABLE ENERGY ZONE

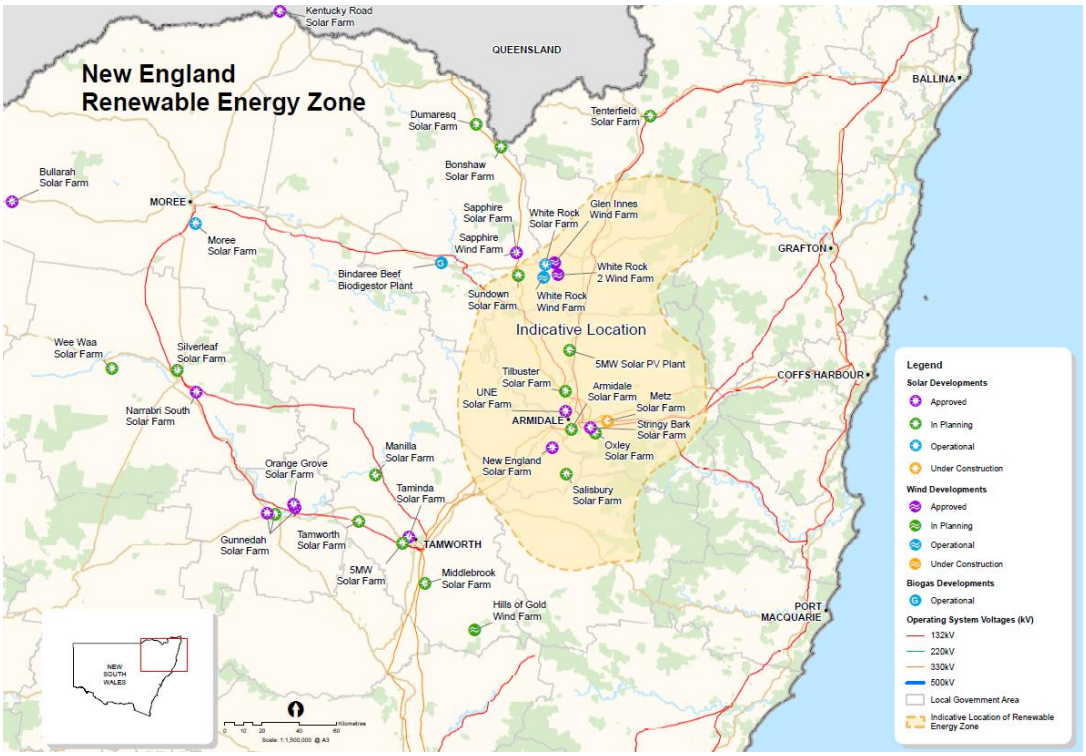


FIGURE 13: INDICATIVE NEW ENGLAND NSW RENEWABLE ENERGY ZONE

Some of the key highlights of the 2020-2030 Net Zero Plan include:

- A central focus of the Plan is about jobs that will be created and about the lowering of energy costs for consumers. Many renewable energy jobs will be created in regional NSW.
- The Plan commits to breaking down barriers that remain to people and business investing in commercially-available technologies, such as energy efficient appliances and buildings, rooftop solar, firmed grid-scale renewables, and electric vehicles.
- The Plan commits NSW to reducing State emissions by 35% by 2030 and to net zero by 2050 and articulates this is a shared responsibility among business, individuals and governments.
- There will be a broadening of the focus of abatement to encompass low-carbon products and services and providing consumers with more information to influence buying decisions.
- Clarity on some of the funding, targets and programs that will help drive this change, such as:
    - $450 million Emissions Intensity Reduction Program
    - $450 million commitment to New South Wales from the Climate Solutions Fund
    - $1.07 billion in added funding via NSW and Commonwealth across several measures
    - Development of three Renewable Energy Zones in the Central-West, New England and South-West of NSW to drive up to $23 billion in investment and create new jobs
    - Energy Security Safeguard to extend and expand the Energy Savings Scheme
    - Expanded Energy Efficiency Program
    - 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
    - Target of net-zero emissions from organic waste by 2030
    - Development of a Green Investment Strategy, with Sydney as a world-leading carbon services hub by 2030
    - 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
    - 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
    - Establishment of a Hydrogen Program that will help the scale-up of hydrogen as an energy source and feedstock, and target 10% hydrogen in the gas network by 2030
    - 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

Several of these initiatives will be of interest and benefit to MidCoast Council and its community.

100% renewables

Local context

Local government and MidCoast Council's action on climate change

5 NSW local governments response to climate change

5.1 Emissions reduction commitments by NSW local councils

Much of the leadership on renewable energy and climate in Australia comes from local government. Prominent examples of how local governments are demonstrating leadership are highlighted below.

1. Cities Power Partnership (CPP) is an initiative of the Climate Council and it represents Australia's largest local government climate action network with 140 councils at June 2021, including MidCoast Council.
2. Adoption and publication of ambitious [15] targets for renewable energy and/or carbon emissions for Council operations. The chart below shows the status of target-setting by local councils in NSW (at October 2020).

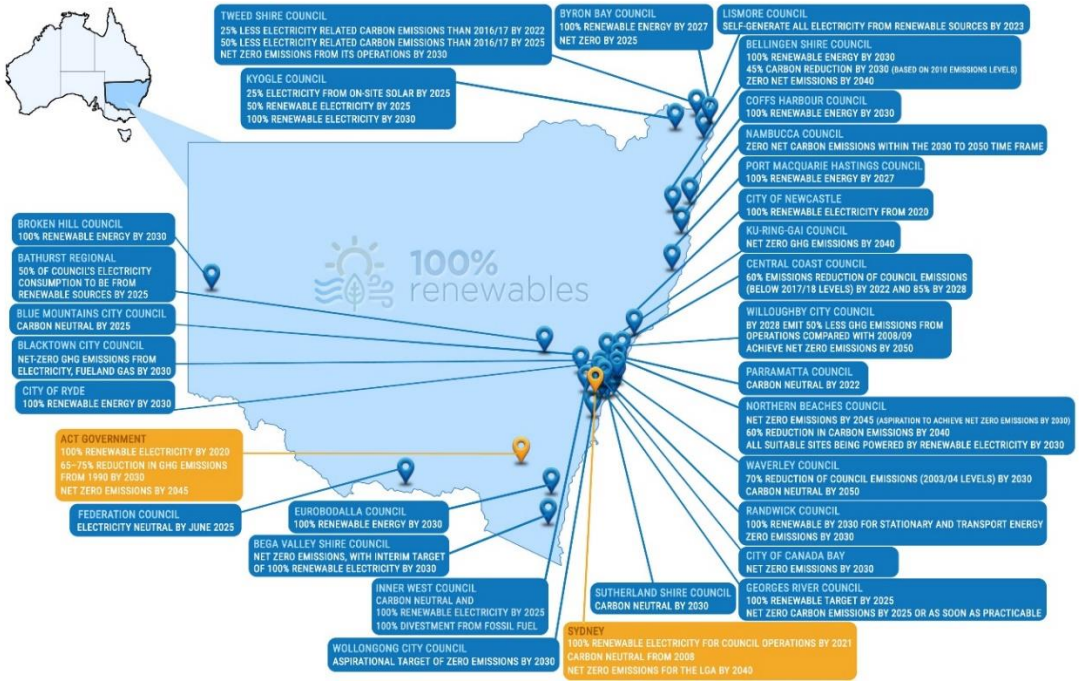


FIGURE 14: RENEWABLE ENERGY AND CARBON TARGETS BY NSW COUNCILS AND ACT

3. In declaring a climate emergency, MidCoast Council joins a further 102 Australian local governments (including 35 councils in NSW) and 1,970 jurisdictions globally who have made a commitment to act now to avoid the worst impacts of climate change and call on all levels of government to do likewise (figures are current at June 2021).
4. In terms of climate change adaption, nearly all councils in NSW have completed a climate change risk assessment. The majority of these risk assessments were completed over 5 years ago. Most councils have focused on climate change risks to council assets, operations and services. Councils are starting to revise their climate change risk assessments and are increasingly looking to address risks that extend beyond their operations to local communities. The next step for many is to identify adaptation actions following from the risk identification.

[15] Most ambitious commitments by local councils include targets for renewable energy (electricity) and/or overall emissions that are aligned with or ahead of a science-based target timeframe for their included emissions sources

5.2 Local trends – what is occurring in MidCoast?

MidCoast Local Government Area is in the upper middle of LGAs in terms of the uptake of solar hot water and solar PV systems. According to data sourced from the Australian Photovoltaic Institute (APVI), MidCoast LGA has:

- 13,417 PV installations, a 32.6% penetration rate, as at May 2021, with over 71.2 MW of installed capacity. (Refer to the APVI map with MidCoast Council LGA details highlighted below.)
- 3 installations over 100 kW (including MidCoast Council's 160 kW array at its new Yalawanyi Ganya building at Biripi Way), 772 installations over 10 kW and less than 100 kW, and 14,337 installations of less than 10 kW.

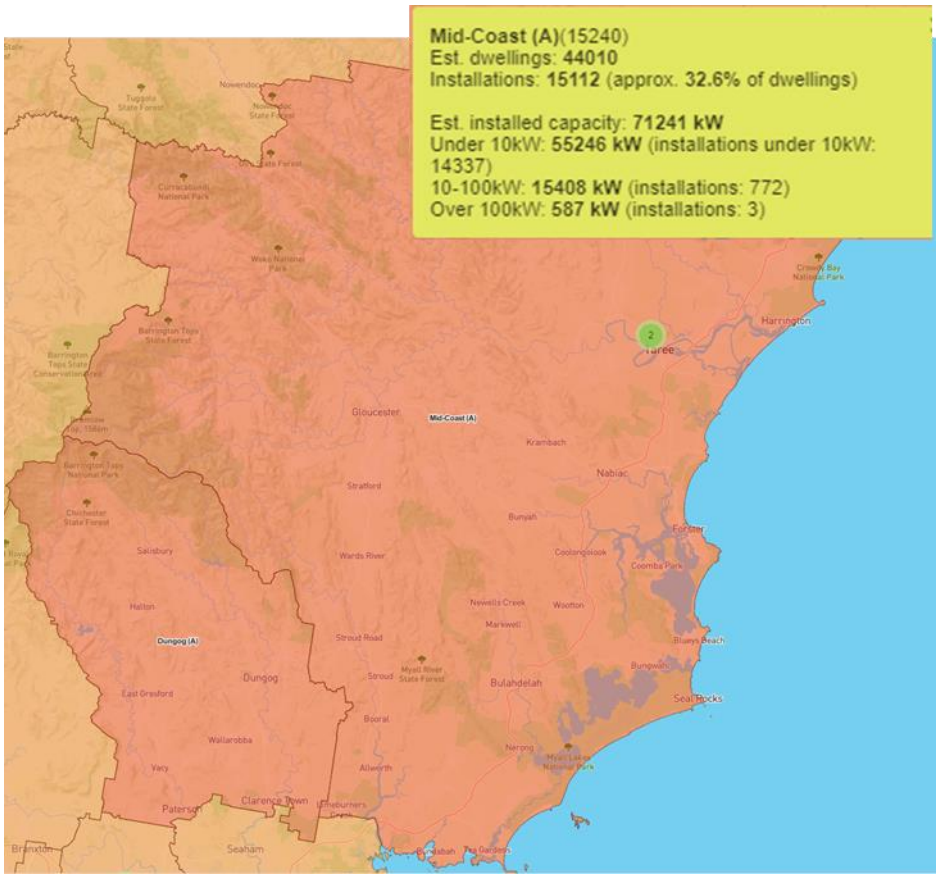


FIGURE 15: SOLAR PV UPTAKE ON THE MIDCOAST[16]

In addition, the community group, Energise Gloucester, was successful in an application to the NSW Government for grant funding to develop and operate a community-owned solar farm. The solar farm will be approximately 500kW capacity utilising about 2,000 solar PV panels on suitable land leased from owners within the Gloucester region[17].

[16] https://pv-map.apvi.org.au/
[17] https://www.energisegloucester.org/projects/community-solar-farm-project

5.3 Previous sustainability actions by MidCoast Council[18]

Prior to joining the Cities Power Partnership, resolving to develop a draft Climate Change Strategy or declaring a climate emergency, MidCoast Council and its prior constituent councils and MidCoast Water were active in making their operations more energy efficient and installing renewable energy systems.

Examples of prior actions that have been taken across the MidCoast by Council include:

- Continued participation in the NSW Government's Sustainability Advantage Program
- Undertaking energy audits and developing energy management plans for Council's major facilities
- Installing over 200 kW of solar panels on public buildings including the former Forster and Taree administration centres, Great Lakes and Manning Aquatic Centres, Kolodong works depot, Tea Gardens and Bulahdelah waste management centres, the Manning Entertainment Centre, the Manning Regional Art Gallery and the Taree Airport
- Successful application for a grant by the Men's Shed to install a 40kW solar array on its shed at the Tuncurry Waste Management Centre
- Implementing various energy efficiency measures such as lighting retrofits, replacing electric hot water systems with heat pumps, air conditioning upgrades and power factor correction
- Procurement of three hybrid passenger vehicles in Council's fleet
- Completion of carbon sequestration activities including wetland acquisition and restoration, and major revegetation projects at various sites owned by Council including Bootawa Dam
- Undertaking an LED street lighting retrofit program with around 5,369 streetlights retrofitted to date
- Participating in the Cities for Climate Protection, Sustainability Advantage and Sustainable Procurement Programs
- Preparing a Local Greenhouse Action Plan and setting emission reduction targets
- Preparing Climate Change Risk Assessments and Adaptation Plans for Council's operations and services
- Monitoring Council's energy and water consumption, carbon emissions and reductions through its subscription to Azility
- Installing an Energy Management System at Council's Taree Administration Centre and the Manning Aquatic and Leisure Centre

A 160kW solar PV system has also recently been installed at Council's new administration centre – Yalawanyi Ganya.

These and other initiatives evidence a track record of action to reduce energy consumption and greenhouse gas emissions by MidCoast Council, which provides a sound base from which to set more ambitious goals for the future.

[18] Sourced from Council's website: https://www.midcoast.nsw.gov.au/Environment/Climate-Change-and-the-MidCoast

5.3.1 MidCoast Council Notice of Motion and Resolution 187/19

At its ordinary Council meeting on 26th June 2019, the following Notice of Motion and resolution were considered and passed.

NOTICE OF MOTION

That the General Manager commissions a Report on a 'Draft' Climate Change Policy and a 'Draft' Climate Change Action Plan for the MidCoast Council Local Government Area, which is to be presented for debate at a Council Meeting within 120 days.

187/19 RESOLUTION

(Moved Cr P Epov/Seconded Cr D Keegan)

1. A 'Draft' Climate Change Policy.

2. A 'Draft' Climate Change Action Plan.

3. Identification of potential climate change risks to the MidCoast Council Local Government Area including the residents, businesses, farmers and our environment and our biodiversity.

4. The identification of current (that is existing) activities by Council to mitigate carbon emissions, energy consumption and broader climate impact.

5. The identification of currently planned activities to mitigate climate impacts.

6. The identification of future activities by Council which would further mitigate climate impacts.

7. The identification of activities, programs and projects that Council could undertake in partnership with the residents, businesses and farmers of MidCoast Council to reduce climate impacts.

8. Identification of potential partnership opportunities with:

   a. Other Councils

   b. NSW Government

   c. Australian Government

   d. Other parties and NGO's

9. In addition to the allocation of Council resources, the identification of potential sources of funding and financing opportunities from other levels of Government, the Private sector and NGOs.

5.3.2 MidCoast Council climate emergency declaration

At its ordinary Council meeting on 23rd October 2019, the following resolution was passed.

355/19 RESOLUTION

(Moved Cr C Pontin/Seconded Cr D Keegan)

That Council:

1. ***Notes progress in developing a risk-based Climate Change Policy and Action Plan.***
2. ***Recognises that we are in a state of climate crisis that requires urgent action by all levels of government, including by local governments, and declares a climate emergency.***
3. ***Engages with the community in the development of this climate action work; and***
4. ***Calls on the state and federal governments to declare a climate emergency and in a bipartisan manner, make clear, effective and unambiguous steps to avert a climate crisis in NSW and Australia.***

Following the passing of this resolution by councillors, the following information and commitments were publicised.

MidCoast Council recognises a state of climate emergency exists, with the elected Councillors declaring a climate emergency in October 2019.

In declaring a state of climate emergency, Council affirmed that urgent action is required by all levels of government to take clear steps to avert a climate crisis.

This declaration recognises our commitment to mitigating the impacts of climate change over a number of years.

It also recognises the responsibility of all government, including local councils, to reduce carbon emissions and help our communities adapt to the impacts of climate change.

We need to plan for the unavoidable impacts of climate change, especially the risk of inundation of low-lying areas, accelerated coastal erosion, the reduction in annual rainfall, stream flow and water supply.

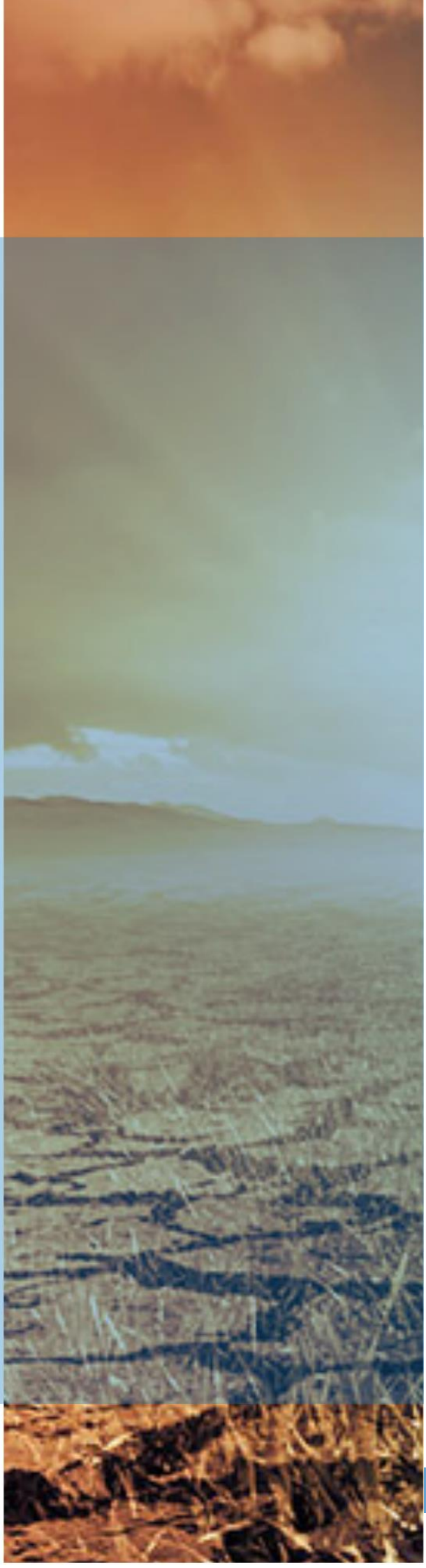
To do this we are developing a risk-based Climate Change Policy and Action Plan, to both manage and reduce our greenhouse emissions, and adapt our practices to reduce our impact on the environment and our communities.

While mitigation and adaptation actions have been undertaken across the MidCoast for some time now, the action plan is an opportunity to bring all these measures together, and plan for future sustained actions to mitigate and adapt to climate change.

Developing a climate change policy and an action plan is the first step, and we will engage with our community to ensure climate change risks and impacts are understood and managed collaboratively.

100% renewables

Climate Change Strategy



6 MidCoast Council's Climate Change Strategy

A review of MidCoast Council's carbon footprint and climate change risk assessment in consultation with Council staff, suggests there are twelve strategies that Council could undertake to significantly reduce Council's energy demand, increase the use of renewables, reduce carbon emissions, and increase Council's resilience to climate change. These can be organised into the following three categories:

1. **Leadership and Governance**:
    a. Climate Change Policy
    b. Sustainability Framework
2. **Climate Change Mitigation**:
    a. Grid decarbonisation
    b. Buying clean energy
    c. Behind-the-meter solar
    d. Energy efficiency
    e. Sustainable transport
    f. Sustainable procurement
    g. Waste management
    h. Carbon sequestration
    i. Carbon offsets
3. **Climate Change Resilience:**
    a. Climate Change Risk Assessment and Adaptation Plan

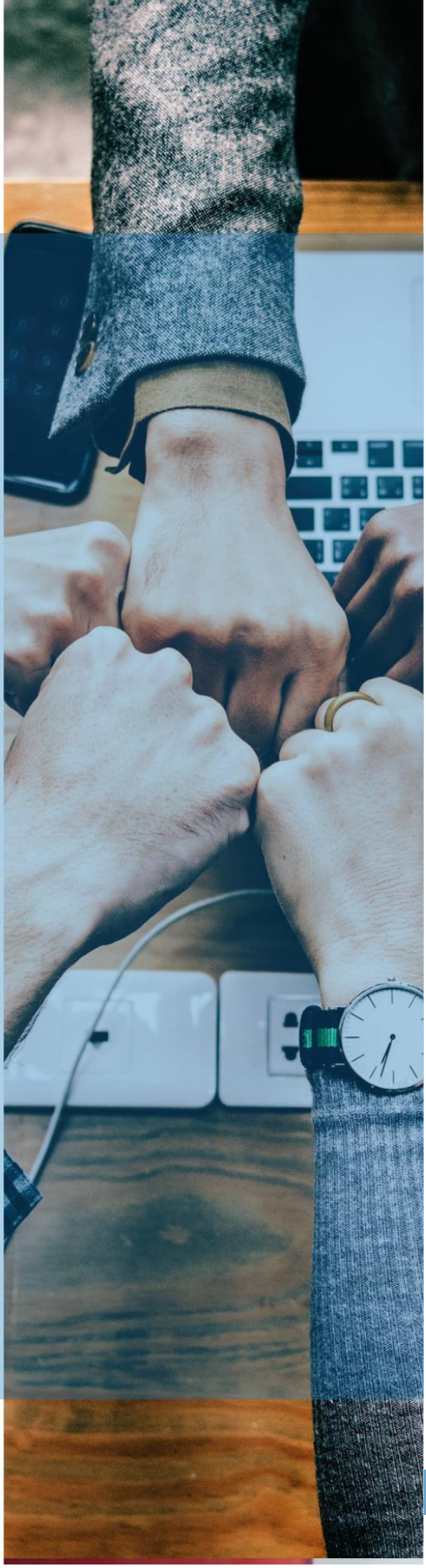
These strategies are illustrated in the graphic below and discussed in more detail in the report. The actions required to be implemented to achieve its mitigation and adaptation objectives are included in the appendices.

FIGURE 16: MIDCOAST COUNCIL'S CLIMATE CHANGE STRATEGY

100% renewables

Climate Change Strategy

Leadership and governance



7 Leadership and governance

7.1 Climate Change Policy

Description

A draft Climate Change Policy has been developed as part of this project and is a stand-alone document. The Policy responds to Council's June 2019 resolution and its subsequent declaration of a climate emergency, by providing a framework to guide Council's response to climate change.

The key elements of the Climate Change Policy include:

- **Purpose**: Council's recognition that a state of climate emergency exists is noted, and Council's commitment to demonstrate leadership in response to this by setting emissions reduction targets for its operations and implementing sustained action to reduce its greenhouse emissions is affirmed. A commitment to incorporate risk-based assessments of climate change impacts in decision-making processes and to partner with industry and the community to manage risks and impacts is also made.
- **Context**: Council's resolution 187/19 and its declaration of a climate emergency affirm that all levels of government will act to help communities reduce emissions and adapt to climate change. The Community Strategic Plan *MidCoast 2030: Shared Vision, Shared Responsibility* provides local context for action, and the NSW Government's Net Zero Plan Stage 1: 2020-2030 outlines targets and measures that can help the MidCoast community to respond to climate change.
- **Impact**: regional impacts resulting from climate change are noted, including hotter temperatures, increased risk of drought and changing rainfall patterns, increased flooding and inundation of low-lying areas, increased frequency and intensity of bushfires, and sea level rise are noted.
- **Targets**: recommended targets for renewable energy and greenhouse gas emissions by 2040 are noted for Council's operations. Commitments to plan and implement measures to help MidCoast Council and the community adapt, and to use its influence to help the community reduce its annual greenhouse gas emissions of 1.5 Mt CO_2-e are also noted.
- **Guiding principles**: a set of recommended guiding principles for Council's Climate Change Strategy are articulated, encompassing:
    - A precautionary principled response to climate change
    - Evidence-based and risk-informed approaches to actions
    - Recognition of the importance of protecting biodiversity and the value of trees and wetlands in sequestering carbon
    - Council's responsibility to 'lead by doing' in its operations
    - Adoption of economic, social and environmental factors, as well as good governance into its decision-making
    - Integration of climate change planning into business processes
    - A proactive approach to working with others on climate action
    - Recognition that risks are not uniform and that responses should reflect local community situations

  - That responding to climate change is a shared responsibility by government, community and business
  - That climate finance and investment opportunities are key elements of Council's approach

- **Implementation**: the Climate Change Policy is implemented through the development of a Climate Change Mitigation and Adaptation Plan, through budgeting for and implementing plans through Council's normal processes, by developing services that help the community, and by collaborating with community, business, other local and State Government.

Scope for abatement

Recommended targets include:

- MidCoast Council will achieve net zero greenhouse gas emissions from waste as well as its operations and 100% renewable electricity for its operations by 2040.
- Council will use its influence to support the community to reduce its emissions.
- Council will plan and implement measures to help MidCoast Council's operations and the MidCoast community adapt to the impacts of climate change.

Risks and mitigation

Achieving the policy's goals will be at risk if the resources and investments are unable to be made to achieve Council's targets for its operations and its goal to help the community to respond and adapt to climate change.

The policy should be reviewed periodically to reflect changing situations and to reflect action at State and Commonwealth levels to progress action on climate aligned with science and the targets of local governments.

Costs and benefits

The main cost will be staff time to establish and review Council's Climate Change Policy, including review of best practices by other organisations and changes in international and national guidance and policies.

7.2 Management systems including sustainability framework

Description

Executive leadership and commitment are required if Council's Climate Change Strategy is to be successful. The implementation of management and governance systems for the strategy, and commitment and authority to act at relevant levels to reduce emissions and adapt, is also key for success to be achieved.

Key priorities at leadership and management systems level may include:

- A leadership group that brings together key stakeholders from cross-functional areas in Council
- Review and set targets for Council for renewable energy, carbon abatement and adaptation, including scale, timing and any interim targets
- Employ a dedicated staff resource to implement the plan and work with the community to develop a plan for their emissions
- A reporting framework that integrates the plan, key performance indicators (KPIs), climate change policy, and relevant strategic plans
- Establish responsibilities and accountabilities related to the plan, included in position descriptions
- Planning, resourcing, budgeting and funding actions through asset management plans, long term financial plans, key Council strategies and plans, Delivery Program and Operational Plans
- Review metering and continue with existing data management systems for the collection and reporting of energy and carbon emissions (i.e. Azility)
- Implement suitable measurement and verification systems, including M&V of significant abatement and adaptation projects, and the analysis of monitoring systems to determine overall progress on emissions reduction
- Develop communication, engagement and capacity-building plans that identify key staff, identify communication channels, report progress against Council's goals, identify and develop training, induction and awareness materials, and solicit input that increases awareness, recognition and buy-in

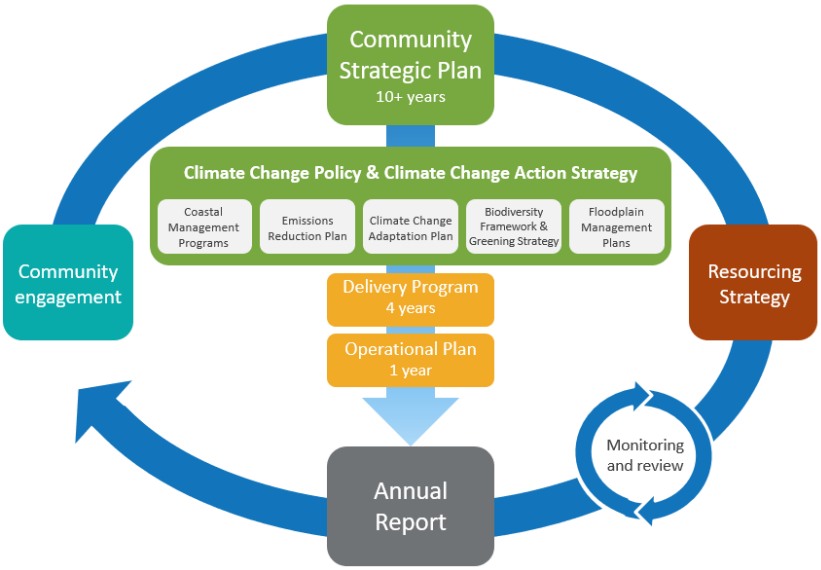
Sustainability Framework

A Sustainability Framework has been identified by Council as a top priority for Council's future. A key part of this is embedding sustainability into the way Council does business.

The desired outcome is that *sustainability becomes one of our guiding principles in our Business Plans*, with this measured against targets around energy, greenhouse gas, water consumption and waste, and reporting against the projects in Council's Delivery Program and Operational Plans.

In order to be 'part of the way we do business' and deliver these outcomes, sustainability will need to be embedded within Council's Integrated Planning & Reporting Framework (IP&R) (illustrated below), including:

1. Community Strategic Plan *MidCoast 2030: Shared Vision, Shared Responsibility* – the CSP's value of environment already provides a mandate to act to improve outcomes on climate and broader sustainability issues across Council's assets and within the community.
2. Council's Climate Change Policy and Climate Change Mitigation and Adaptation Plan (this document, the Climate Change Strategy), informs the development of a 4-yearly Delivery Program and Annual Operational Plans for each section of Council.
3. This Climate Change Strategy sits alongside Council's other key strategies, policies and plans, and is used to inform updates to these where relevant, such as the:
    a. Waste Management Strategy
    b. Vehicle Fleet Policy
    c. Procurement Policy and Procedure
    d. Our Water Our Future: Council's Integrated Water Cycle Management Strategy
    e. Coastal Management Plans
    f. Floodplain Risk Management Plans
    g. Catchment and Estuary Management Plans
    h. Draft Biodiversity Framework and Greening Strategy
4. The Climate Change Strategy, and climate mitigation and adaptation measures reflected in other strategies and plans are used to inform Council's Resourcing Strategy, including future updates to Asset Management Plans, Long Term Financial Plans and Workforce Management Planning.



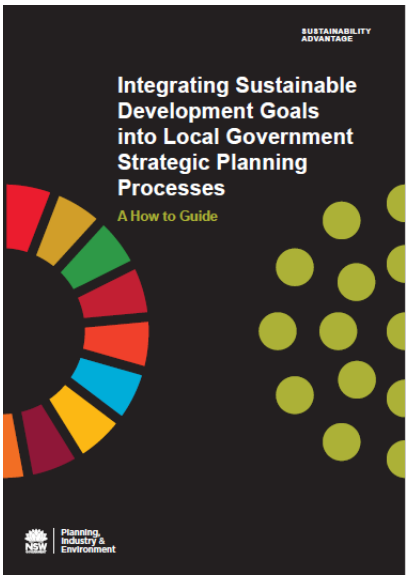
Sustainable Development Goals (SDGs)

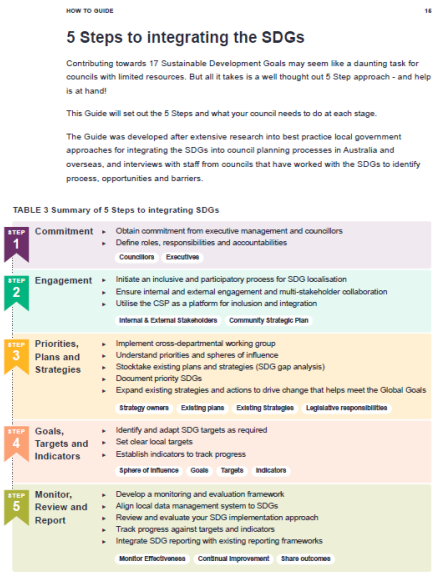
An evolution of Council's Sustainability Framework could include the integration of the United Nations Sustainable Development Goals into Council

strategies. These “Global Goals” are one of the primary drivers behind urgent action on climate change, among other sustainability actions.

The Sustainability Advantage Program, of which MidCoast Council is a member, has recently released a Guide to help council executives, staff and councillors understand and integrate the United Nations Sustainable Development Goals into council strategies, plans, policies and operations.

This can be considered further in the development of Phase 2 of Council’s Climate Change Strategy with the MidCoast community, and in future updates to this Strategy for Council’s operations.




HOW TO GUIDE 16

5 Steps to integrating the SDGs

Contributing towards 17 Sustainable Development Goals may seem like a daunting task for councils with limited resources. But all it takes is a well thought out 5 Step approach - and help is at hand!

This Guide will set out the 5 Steps and what your council needs to do at each stage.

The Guide was developed after extensive research into best practice local government approaches for integrating the SDGs into council planning processes in Australia and overseas, and interviews with staff from councils that have worked with the SDGs to identify process, opportunities and barriers.

TABLE 3 Summary of 5 Steps to integrating SDGs

STEP 1	Commitment	▸ Obtain commitment from executive management and councillors ▸ Define roles, responsibilities and accountabilities Councillors · Executives
STEP 2	Engagement	▸ Initiate an inclusive and participatory process for SDG localisation ▸ Ensure internal and external engagement and multi-stakeholder collaboration ▸ Utilise the CSP as a platform for inclusion and integration Internal & External Stakeholders · Community Strategic Plan
STEP 3	Priorities, Plans and Strategies	▸ Implement cross-departmental working group ▸ Understand priorities and spheres of influence ▸ Stocktake existing plans and strategies (SDG gap analysis) ▸ Document priority SDGs ▸ Expand existing strategies and actions to drive change that helps meet the Global Goals Strategy owners · Existing plans · Existing Strategies · Legislative responsibilities
STEP 4	Goals, Targets and Indicators	▸ Identify and adapt SDG targets as required ▸ Set clear local targets ▸ Establish indicators to track progress Sphere of influence · Goals · Targets · Indicators
STEP 5	Monitor, Review and Report	▸ Develop a monitoring and evaluation framework ▸ Align local data management system to SDGs ▸ Review and evaluate your SDG implementation approach ▸ Track progress against targets and indicators ▸ Integrate SDG reporting with existing reporting frameworks Monitor Effectiveness · Continual Improvement · Share outcomes

Scope for abatement

By itself, this will not result in actual emissions reduction, but good leadership and an effective sustainability framework will be key factors in Council achieving their targets.

Risks and mitigation

Without good governance, management and monitoring of progress Council’s efforts to reduce its emissions and adapt to climate change will be less effective in the long term.

Costs and benefits

The main cost will be the allocation of staff time to establish, govern and implement Council’s Climate Change Strategy, in particular employment of dedicated staff resources to implement the plan and work with the community to develop a plan to reduce their emissions.

In addition, Council will continue its participation in the NSW Government’s Sustainability Advantage Program to guide Council in this space.

100% renewables

Climate Change Strategy

Climate change mitigation plan

8 Climate Change Mitigation Plan

8.1 Scope 1, scope 2 and scope 3 emissions

To help differentiate between different greenhouse gas emission sources, emissions are classified into the following scopes according to the GHG Protocol[19] – Corporate Standard:

- **Scope 1 emissions** are emissions directly generated at your operations such as the production of waste, driving company cars, or refrigerant gases in your air conditioning equipment.
- **Scope 2 emissions** are caused indirectly by consuming electricity. These emissions are generated outside your organisation (think coal-fired power station), but you are indirectly responsible for them.
- **Scope 3 emissions** are also indirect emissions and happen upstream and downstream of your business. Typical examples are waste, air travel, the consumption of goods and services, contractor emissions, or leased assets.

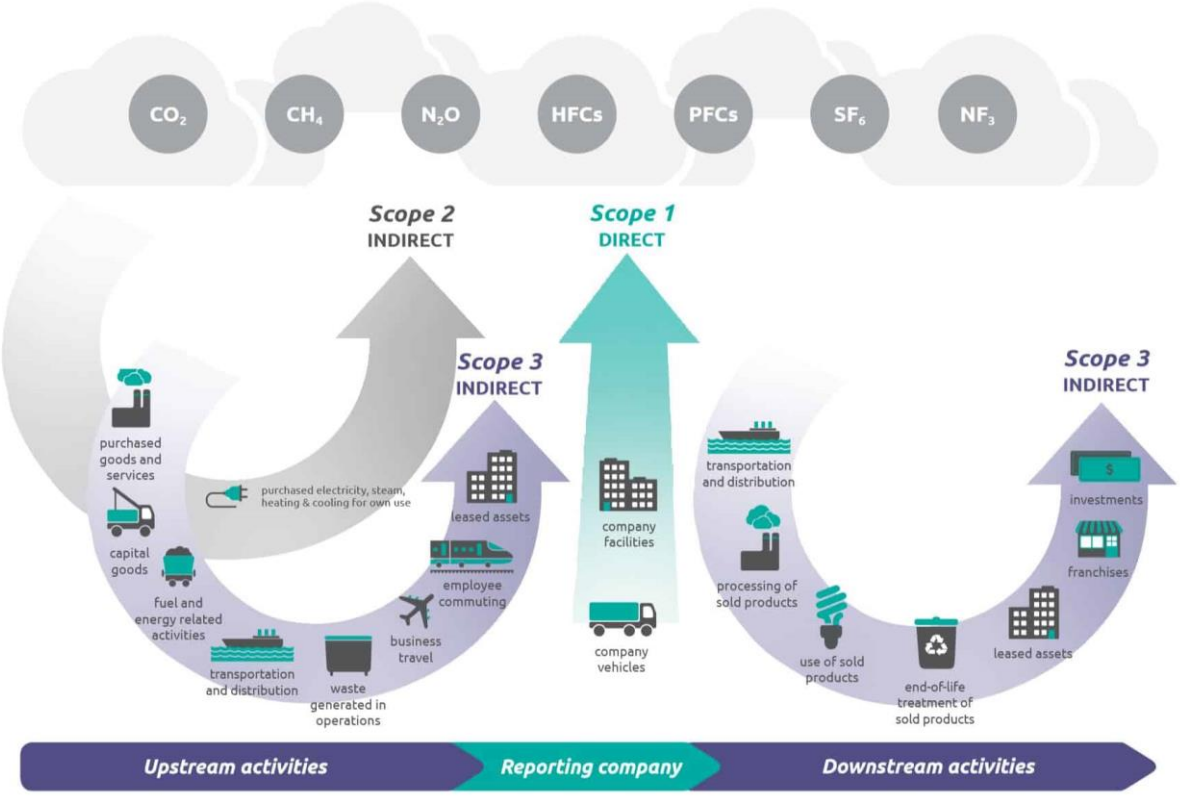


FIGURE 17: SCOPE 1, SCOPE 2 AND SCOPE 3 EMISSIONS

[19] https://ghgprotocol.org/

8.2 MidCoast Council's carbon footprint

8.2.1 Council's overall carbon footprint

Inclusive of energy and waste, MidCoast Council's greenhouse gas emissions were estimated to be 101,540 t CO_2-e in 2018-19, the base year selected for the development of this Strategy. These emissions are the focus of this Climate Change Strategy.

TABLE 1: MIDCOAST COUNCIL – CARBON FOOTPRINT 2018-19

	Emission source	Activity data	Units	Scope 1 t CO_2-e	Scope 2 t CO_2-e	Scope 3 t CO_2-e	Total	%
	Diesel for fleet	1,374	kL	3,739		191	3,929	3.9%
	Petrol for fleet	185	kL	428		23	451	0.4%
	Ethanol for fleet	1	kL	0.01		0	0.01	0.0%
	Biodiesel	3	kL	0.28		0	0.28	0.0%
	LPG	10	kL	16		1	17	0.0%
	Electricity used in council assets	23,896,597	kWh		19,356	2,151	21,507	21.2%
	Electricity used by streetlighting	3,431,681	kWh			3,089	3,089	3.0%
	Electricity use from solar PV	86,470	kWh				0	0.0%
	Waste water	9,052	t CO2-e	9,052			9,052	8.9%
	Landfill waste	52,912	t	63,494			63,494	62.5%
	TOTAL:			**76,730**	**19,356**	**5,454**	**101,540**	**100.0%**

More than 71% of these emissions are associated with waste, with most of this from the disposal of the community's waste to landfill. Almost 9% of emissions relate to direct emissions from wastewater treatment plants.

The remainder of emissions from Council's operations (28.6%) are caused by the consumption of electricity and fuel to operate facilities and fleet that are used to administer Council, provide community services and manage and maintain Council's roads, parks and public spaces.

A summary of each of the main categories of Council's emissions is provided below. An overview of the community's estimated greenhouse gas emissions is also provided for comparison with Council's emissions.

8.2.2 Energy related emissions from Council's operations

Council's energy use and carbon footprint were assessed based on energy consumption for Council's operations for the 2018-19 financial year.

TABLE 2: MIDCOAST COUNCIL – ENERGY-RELATED CARBON FOOTPRINT 2018-19

	Emission source	Activity data	Units	Scope 1 t CO_2-e	Scope 2 t CO_2-e	Scope 3 t CO_2-e	Total	%
	Diesel for fleet	1,374	kL	3,739		191	3,929	13.6%
	Petrol for fleet	185	kL	428		23	451	1.6%
	Ethanol for fleet	1	kL	0.01		0	0.01	0.0%
	Biodiesel	3	kL	0.28		0	0.28	0.0%
	LPG	10	kL	16		1	17	0.1%
	Electricity used in council assets	23,896,597	kWh		19,356	2,151	21,507	74.2%
	Electricity used by streetlighting	3,431,681	kWh			3,089	3,089	10.7%
	Electricity use from solar PV	86,470	kWh				0	0.0%
	TOTAL:			**4,184**	**19,356**	**5,454**	**28,994**	**100.0%**

The above inventory summary is repeated graphically below, to highlight the dominance of electricity in the operational footprint.

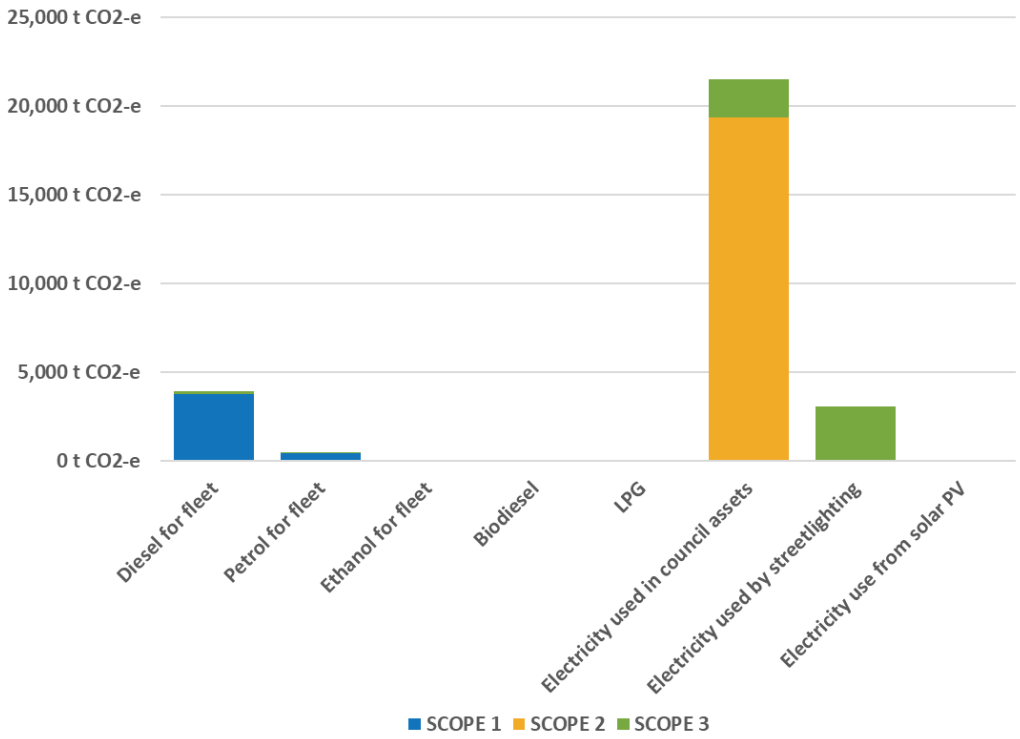


FIGURE 18: MIDCOAST COUNCIL ENERGY-RELATED CARBON FOOTPRINT BY EMISSIONS SOURCE 2018-19

8.2.2.1 Electricity consumption summary

As the main source of non-waste greenhouse gas emissions, baseline electricity use was assessed further. The following three charts provide a summary of where and how electricity is used, including:

- Top 10 electricity using sites seen against the balance of consumption,
- Electricity use by site type, and
- Estimated electricity end use by equipment type

Electricity use is dominated by a small number of large sites (including the main streetlighting accounts) and many individually small electricity using sites. The 'top 10' sites' use 58% of all Council's electricity.

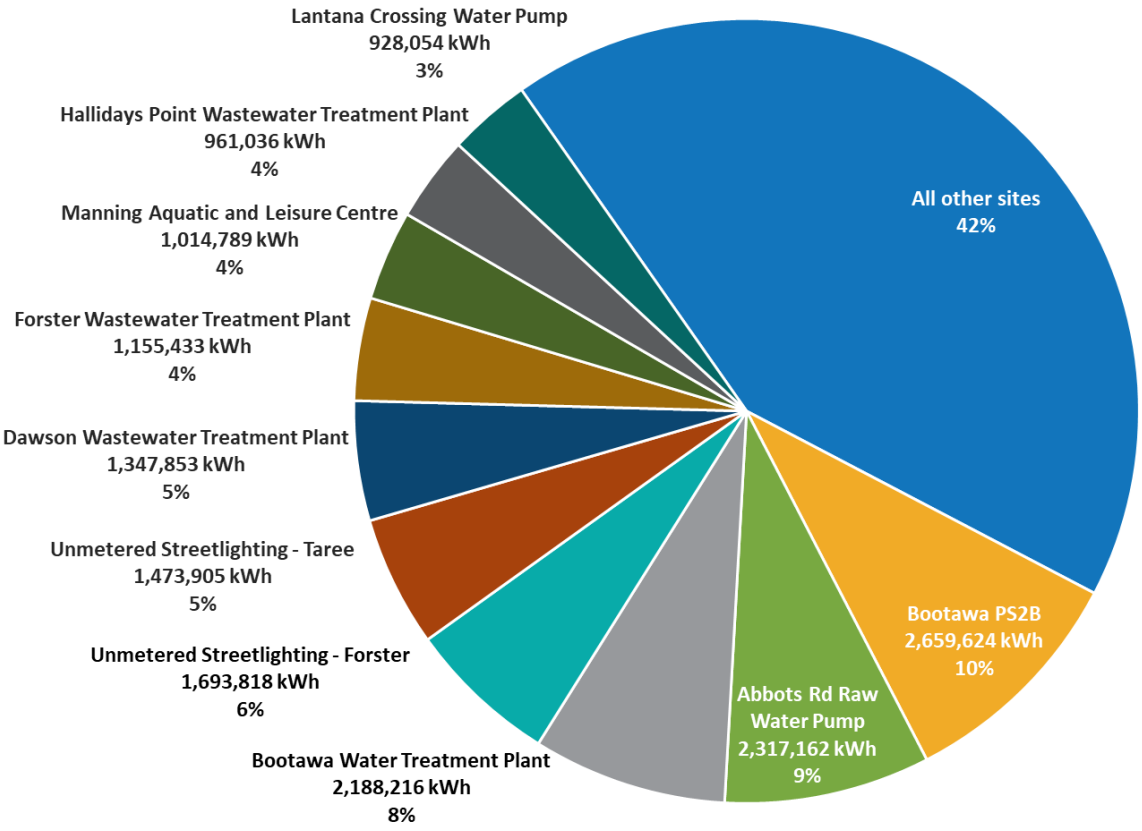


FIGURE 19: MIDCOAST COUNCIL'S LARGE ELECTRICITY USING SITES

Viewed by site type water and sewer assets consume 65% of Council's power, while unmetered streetlighting and swimming pools use 13% and 9%, respectively. Council's buildings, sporting facilities, parks, public lighting and amenities together consume 11% of power, and 'all other sites' are small users, aggregated into depots, emergency services and others.

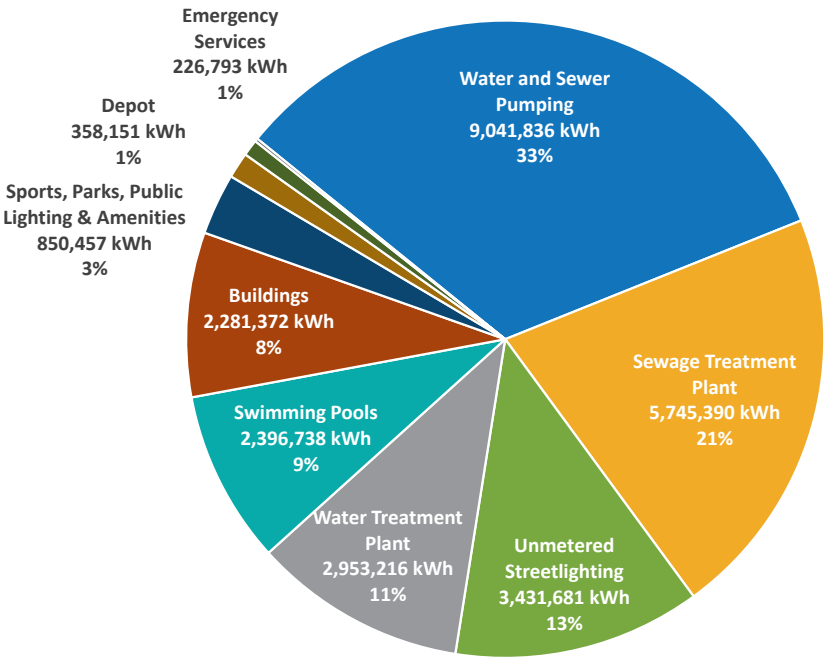


FIGURE 20: MIDCOAST COUNCIL'S MAIN ELECTRICITY USING ASSET CATEGORIES

It is also possible to estimate the contribution of major equipment types to electricity use, based on experience with similar operations. The major equipment types include motor systems, lighting, air conditioning (HVAC) and power and appliances. The estimated contribution to Council's electricity consumption is illustrated below, highlighting motor systems and lighting as the major users, and therefore the major focus areas for energy efficiency.

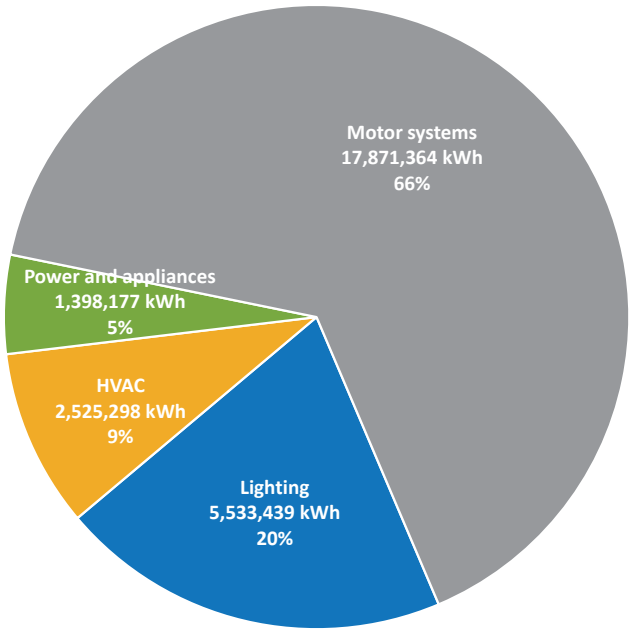


FIGURE 21: MIDCOAST COUNCIL'S ELECTRICITY USE BY END USE EQUIPMENT

8.2.3 Landfill gas emissions

The total waste landfilled in Council-owned waste sites in the MidCoast LGA in 2018-19 was 52,912 tonnes (clean fill waste deducted from total landfill amount). Using a greenhouse gas emissions factor for Commercial and Industrial waste of 1.2 t CO_2-e per tonne of waste, landfill gas emissions were estimated to be 63,494 t CO_2-e. This does not consider legacy emissions from previous years' waste[20].

TABLE 3: MIDCOAST LGA LANDFILL GAS EMISSIONS IN 2018-19

Total landfilled	79,824 t
Total landfilled less clean fill	52,912 t
Emission factor (C&I)	1.2
Landfill GHG emissions	**63,494 t CO_2-e**

Through its measurement of waste quantities being landfilled, Council is able to report trends in emissions over time, and can link this to actions being progressed to reduce emissions as identified in Council's Waste Management Strategy, regional waste strategy[21], including waste avoidance, recycling and reuse, and diversion of waste from landfill, particularly organics. In addition, the NSW Government's Net Zero Plan 2020-2030 has set a target of zero emissions from organic waste by 2030, and this target may influence both State Government programs or incentives, and future local and waste management strategies beyond the current strategy period.

8.2.4 Direct water and wastewater emissions

Direct fugitive emissions from water and wastewater processes are calculated using mass balance formulae and tend to focus on emissions from treatment processes rather than on collection processes. Reported emissions for 2018-19 are shown below.

TABLE 4: MIDCOAST REPORTED WASTEWATER FUGITIVE EMISSIONS 2018-19

Water Type	Description	2018-2019
Sewage Business	GHG emissions - Operations	8,489 t CO_2-e
Sewage Business	GHG emissions - Other activities	563 t CO_2-e

As fugitive emissions are calculated – based on default factors and formulae applied to population data or known inflows, measuring and claiming credit for actual reductions of these gases, such as through process optimisation, is not feasible. Better monitoring approaches for both methane and nitrous oxides that are based on sewer system design and treatment plant design and operating conditions, wastewater flow and conditions would help to improve emissions and reduction estimates. When better monitoring is feasible Council will be in a position to more accurately report this source.

[20] A previous report by Mike Ritchie and Associates (pre-amalgamation) considers legacy and new waste plus forecasting to estimate future landfill emissions at a number of landfills, including those in the three former MidCoast Council areas. This could be drawn on or updated to generate a more precise estimate of landfill gas emissions for MidCoast Council in the context of abatement opportunities for the MidCoast community.
[21] MIDWASTE Regional Waste Avoidance and Resource Recovery Strategy 2014-2021, reviewed 2017

8.2.5 Carbon footprint of the MidCoast Local Government Area

This Strategy does not cover emissions for the MidCoast community (except waste as this is managed by Council), however it is helpful to understand Council's emissions compared with the community as a whole. Typically, a council's carbon footprint is 1% to 2% of the emissions of the whole community.

Hence for climate action to be successful, leadership by Council and helping the community reduce its emissions are important. Council's climate resolution achieves this by recognising the need for Council to act and to work with the community to help them mitigate the effects and risks of climate change. While Phase 1 addresses Council's emissions reduction and adaptation plans, Phase 2 will be focused on the community's emissions. This work will draw on guidance on net zero planning for NSW local councils developed by NSW DPIE[22], and will commence when MidCoast Council has allocated staff resources to develop this work.

According to Beyond Zero Emissions, the 2018-19 carbon footprint of MidCoast LGA was 1,500,200 t CO_2-e, meaning Council energy-related emissions are 1.93% of the emissions of the whole community, and Council's emissions inclusive of waste are 6.8% of community emissions. This is illustrated below.

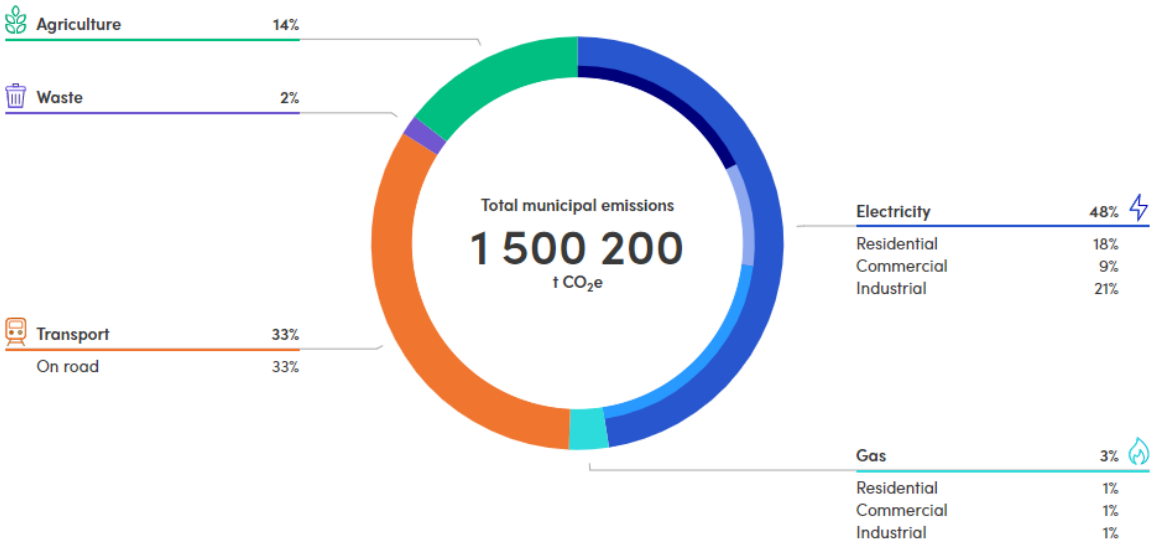


FIGURE 22: MIDCOAST LGA'S CARBON FOOTPRINT 2018-19[23]

Any future assessment of the opportunities to reduce the community's emissions would draw on this (or similar) data as a key input. This 'top-down' data can be supplemented with other data that may more accurately reflect the region's emissions or provide a basis for the ongoing monitoring of trends. For example, Essential Energy provides annual data on electricity consumption by customer type by LGA, which can be used to track the success of community efforts to reduce grid electricity consumption and install solar panels. Similarly, as the operator of the region's landfills and wastewater systems Council also has estimates of fugitive emissions (methane and nitrous oxide – CH_4 and N_2O) from these facilities resulting from community-generated waste, as summarised above.

[22] © State of New South Wales and Department of Planning, Industry and Environment 2020. Net Zero Emissions Guidance for NSW Councils, May 2020.
[23] Sourced from https://snapshotclimate.com.au/locality/australia/new-south-wales/mid-coast/2018/fy

8.3 Grid decarbonisation

Description

In NSW there are five coal-fired power stations with combined 10,240 MW capacity that supply most of the State's electricity and make up the majority of electricity sector emissions (Liddell, Vales Point B, Eraring, Bayswater and Mount Piper).

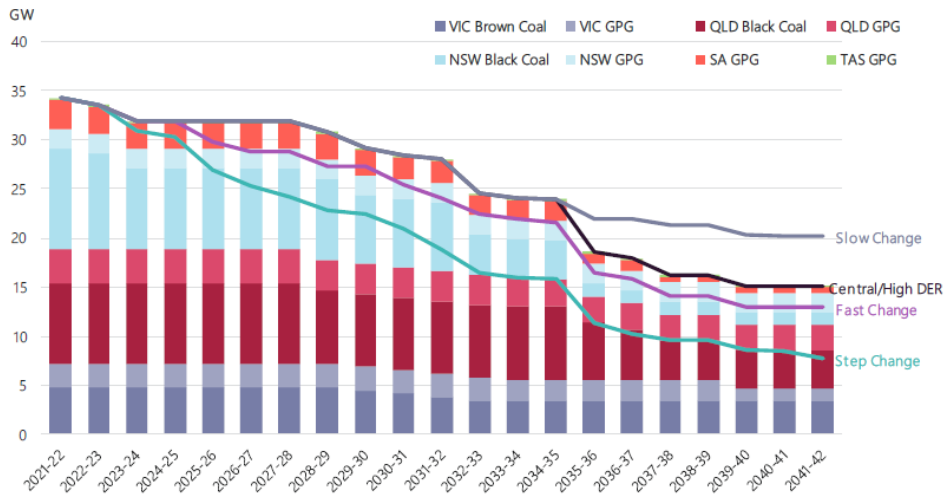
The state is largely self-reliant for power, with this supplemented by interstate links as and when required. Since 2010 three coal-fired power stations with 1,744 MW of capacity have closed in NSW (Wallerawang C, Redbank and Munmorah).

In recent years the development of large-scale solar and wind energy generation has accelerated in NSW, and battery storage and pumped hydro are beginning to be developed alongside these intermittent generation sources. A total of 11,000 MW of capacity in two Renewable Energy Zones was recently announced for the State's Central West Orana and New England regions. In addition, rooftop solar installations have accelerated in recent years.

As more coal-fired power stations approach the end of their life – announced closures are in 2023, 2028, 2034, 2035 and 2043 respectively for the five active coal-fired power stations noted above – they will be replaced with mostly renewable energy. This is most likely to be from large-scale wind and solar PV, together with Distributed Energy Resources (DER) and demand-side measures.

Assuming this, the future carbon intensity of the NSW grid will decline, gradually until around 2035, then accelerating towards zero by the mid-2040s. The grid emissions intensity will be influenced by a range of factors, and AEMO's Integrated System Plan 2020[24] (ISP2020) models five scenarios with differing assumptions for key influencing factors including demand drivers, DER uptake, emissions, large-scale renewable build cost trajectories, investment and retirement considerations, gas market settings and coal price settings, together with assumptions regarding policy settings and transmission infrastructure development.

The resultant scenario outcomes for closure of large-scale generators in the NEM is illustrated below, highlighting the potential for a rapid transition to renewables.



[24] AEMO: https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp

The NSW Government's *Electricity Infrastructure Investment Bill* may facilitate an even more rapid transition to renewables in NSW than the AEMO Step Change scenario, and future ISP forecasts will reflect any new scenario modelling.

Scope for abatement

The above potential change to the NSW grid carbon intensity would have a significant impact on GHG emissions for MidCoast Council, with the potential for more than 28,000 t CO_2-e of abatement if electricity supply is nearly all renewable and vehicles have transitioned to electric over time.

Under most of AEMO's scenarios (excepting Step Change) the majority of this impact would not be seen until the late-2030s and into the 2040s', and under a Step Change scenario this would still not be seen until the 2030s. Hence, if MidCoast Council wants to see its emissions decline at a faster rate, then significant abatement through energy efficiency, more onsite solar PV and battery storage, and switching to electric vehicles powered with renewables will be required.

Risks and mitigation

A slower change to the carbon intensity of grid electricity could see a slower rate of change in emissions intensity of grid electricity. MidCoast Council has little influence over the rate of change in the grid carbon intensity, and the main risk mitigation strategy is to try and build capacity across MidCoast Council to respond with local solutions to reduce emissions. MidCoast Council could also have a role through its advocacy for change, potentially in collaboration with other Councils and representative organisations.

Costs and benefits

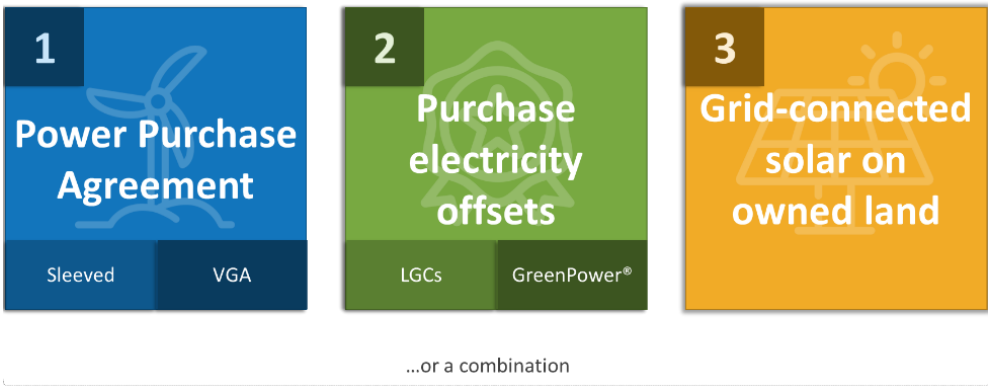
There is no direct cost to MidCoast Council associated with the decarbonisation of the electricity grid, excepting impacts on energy pricing in future years.

8.4 Buying clean energy

8.4.1 Renewable energy power purchase agreement

Description

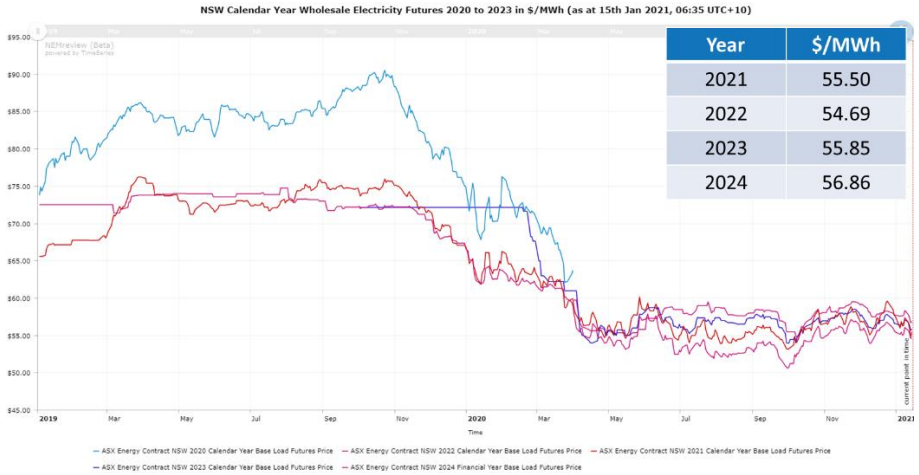
Electricity consumption accounts for 85% of MidCoast Council's non-waste/wastewater carbon footprint, and more than 75% of electricity is consumed by just 25 sites (including street lighting). **The single biggest opportunity to reduce electricity emissions is to purchase renewable energy** and/or renewable energy offsets **via Council's electricity procurement process**. Unlike other abatement options, this does not require MidCoast Council to physically implement change, only to stipulate that renewables be purchased to meet part or all of its electricity needs. This approach has been taken by several local governments in recent years and underpins most goals to reach carbon neutrality/net-zero emissions[25]. There are three main ways in which an organisation can source renewable energy, illustrated below.



The most favourable approach in the current market is to enter into a renewable energy power purchase agreement (PPA) with bundled electricity and Large-scale Generation Certificates (LGCs) and to consider the purchase of renewable energy offsets where a bundled PPA falls short of any targets Council may set in future. This can potentially be implemented for MidCoast Council's next agreement from January 2023, with Council's large sites, street lighting and small sites agreements all renewing at this time.

The cost for a PPA (typically 7 up to 10 years unlike regular electricity agreements that are for 2-3 years) should be compared with regular grid power offers. One current 5-year forecast for wholesale electricity is shown below[26], and a process to develop a renewable energy PPA should seek to compare offers with regular grid offers to enable net costs or benefits of RE purchasing to be evaluated.

[25] Examples of NSW Councils' purchasing renewables as part of their electricity supply include: Southern Sydney Regional Organisation of Councils, City of Sydney, City of Newcastle and Hawkesbury City Council.
[26] Note that this shows one forecast of NSW wholesale electricity and does not include margins, network charges / rates and other prices that would be added to a customers' bill.



In the current market there are several types of PPA offers and going forward more will emerge. Challenges for the PPA market include:

- Development of simpler and more customer-focused offers that resemble more closely regular grid supply agreements
- Contracts for shorter terms with low management burden
- Cost-effective pricing, particularly in the current and forecast market
- De-risking PPAs for customers, with risk ideally managed by retailers rather than building in-house expertise

Two potential models are outlined below that are representative of current market offers that local councils have adopted, and these along with other models would be assessed in greater detail as Council's contract renewal time approaches. These models include:

- Fixed price de-risked offer for 50% up to 100% renewable energy (for all or potentially just for large sites), and likely for up to 7-years covering both renewables and regular grid power and including LGCs in the pricing.
- Virtual Generation Agreement (VGA): under this model around 75-80% of Council's load under the PPA may be load matched to renewable energy projects. Council's load profile would inform the proportions of wind vs solar, and the balance of load would be spot market exposed. This introduces some risk given the cap on spot prices is more than $14,000/MWh, and added costs may be incurred to cap this exposure. This model has underpinned some recent local council renewable energy PPAs.

One possible approach that Council could consider is engaging with locally-developed solar farms to investigate the potential for Council to be an off taker from one of these, via a retailer. This approach is similar to that being undertaken by City of Newcastle (Summerhill Waste Management Facility 5 MW solar farm), and City of Sydney (REPower Shoalhaven's 3 MW solar farm in Nowra).

Scope for abatement

This opportunity for MidCoast Council should be looked at in conjunction with grid decarbonisation since this will see all or most electricity sourced from renewables

in any event in future. So, the opportunity is for MidCoast Council to elect to buy renewables in the period between now and when decarbonisation occurs.

Based on MidCoast Council's current energy mix, purchasing 100% renewables would lead to abatement of 24,595 t CO_2-e, and 50% renewables would lead to abatement of 12,298 t CO_2-e per year (the exact abatement would change based on annual energy demand, on the selection of large-only sites or all sites, and the proportion of renewables selected).

If all vehicles were also electrified and supplied with renewable energy, then additional abatement of 4,398 t CO_2-e per year would result based on current grid intensity, though this will be much lower if vehicle electrification largely occurs through the 2030s and 2040s as expected.

Risks and mitigation

Establishing a corporate PPA is complex, time-consuming and contains approaches and risks not previously considered by most consumers. These take time and resources to assess and manage, and this would be an integral part of MidCoast Council's procurement process.

A renewable energy PPA:

- is typically for a longer time period than a regular agreement,
- is associated with new-build solar, wind, hydro and battery projects,
- may be with recent or new entrants to the energy market, and
- occurs in an uncertain policy environment for renewable energy and climate change response

The key risk areas are illustrated below and would be assessed as part of a process to determine the best procurement solution for MidCoast Council.

Costs and benefits

The costs or benefits of a renewable energy PPA are assessable via comparison of PPA offer pricing with forecast regular power pricing, and so is inherently subject to the quality of knowledge and assumptions underpinning forecasting.

The market, pricing and contract models for renewable energy PPAs are still evolving, and the costs and benefits to MidCoast Council should be assessed as part of Council's next procurement process.

8.4.2 Mid-scale renewable energy build by MidCoast Council

Description

An option available to MidCoast Council is to build its own mid-scale renewable energy plant on land it owns. Power generated would be exported to the grid, and Council could then purchase this electricity (and LGCs) via a licensed retailer or could simply take the grid spot price as income and retire or sell LGCs depending on its income and/or abatement goals.

This arrangement is like projects developed in recent years by Sunshine Coast Council (15 MW solar farm at Valdora generates electricity equivalent to all of Council's needs) and City of Newcastle (5MW Summerhill landfill solar farm meets ~30-40% of Council's electricity needs).

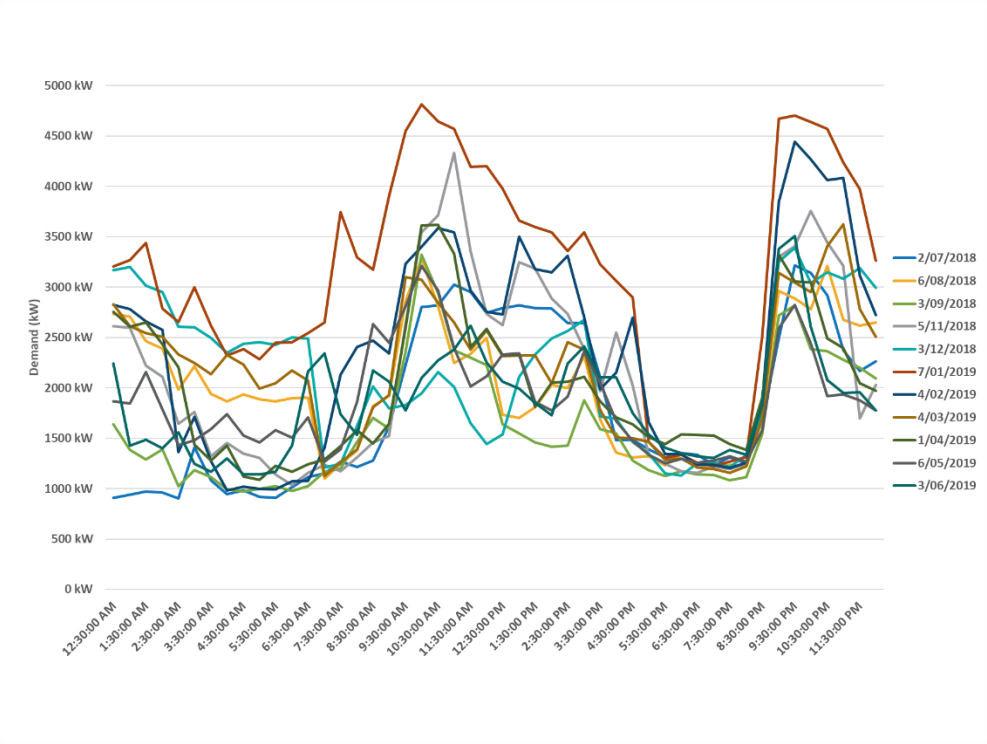
A key aspect to note in these projects is that Council can't simply 'allocate' the renewable energy generated to its sites. If it wants to offset its regular power use with power from its own renewable energy plant, it must do so via a licensed retailer as an intermediary.

Like a PPA that is negotiated for supply from remote / non-Council projects, developing a mid-scale project is a complex undertaking and requires assessment of a range of aspects, such as design, connection agreements, EPC and O&M contracts, ownership models, and the development of retail agreements to supply the power to Council.

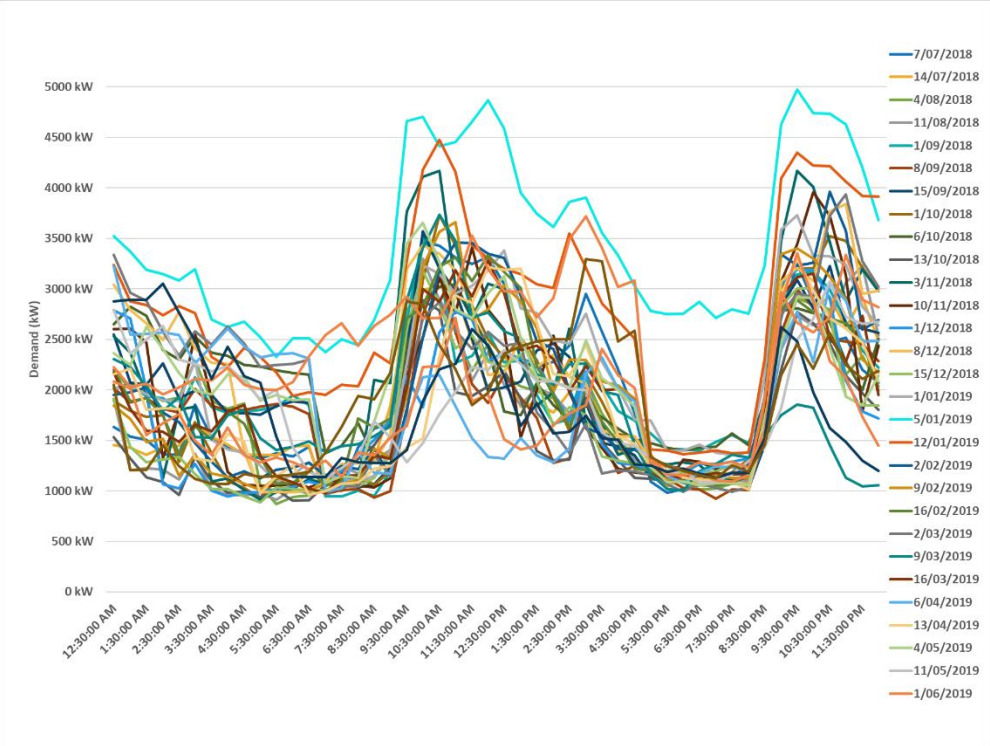
Community involvement in the ownership and/or purchasing of clean energy from the project could also be considered.

The following graphs below show the aggregated load profile in weekday, weekend and holiday for all large sites with interval data.

Weekday combined load profiles for MidCoast Council's large sites



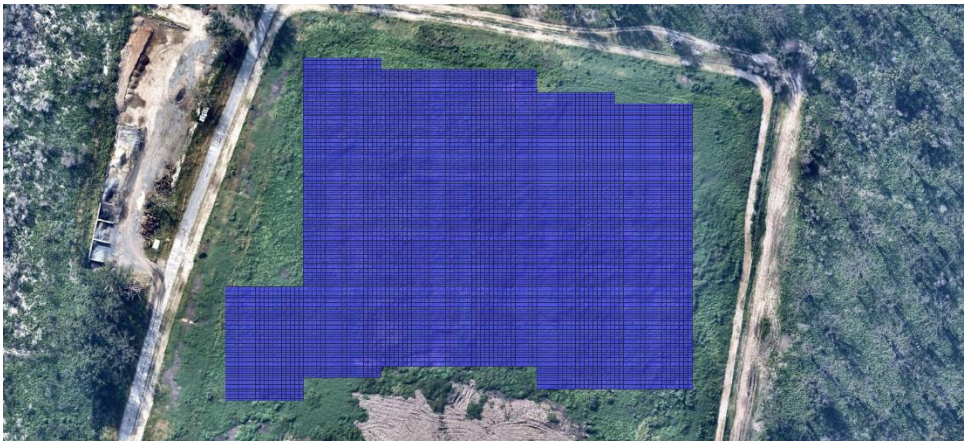
Weekend and Holiday combined load profiles for MidCoast Council's large sites



This likely represents a medium to long term opportunity for MidCoast Council, and this strategy does not assess the costs, benefits, options and risks associated with this approach. However, this project has highlighted three possible options that Council could examine in future, and these are highlighted below.

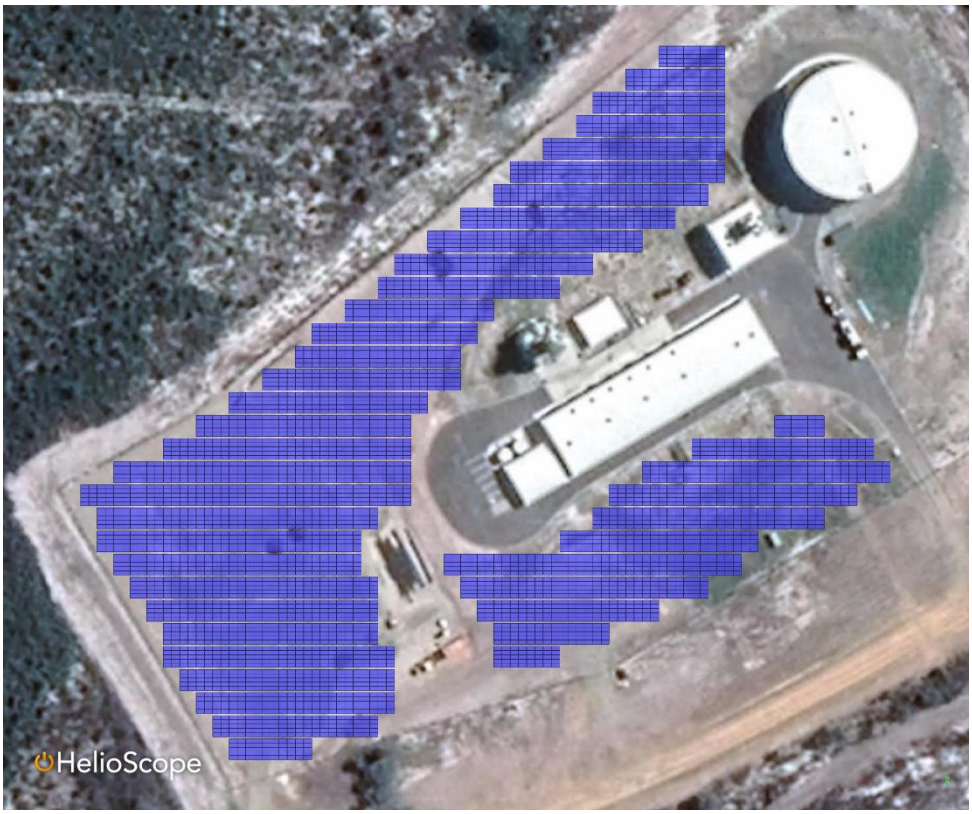
Option 1: Tuncurry Landfill – 5 MW

An option for MidCoast Council is a solar farm on the Tuncurry Landfill site off Midge Orchid Road, given the proximity to the electricity network (11 kV or 33 kV) and the cost and ability to connect to the grid at this level. The image below is of a modelled 5 MW solar array ground-mounted at Tuncurry Landfill on the capped area (using east-west 5B technology as this is ballasted and has high energy density), which would generate an estimated 7,122 MWh per year, 26% of MidCoast Council's total electricity demand.



Option 2: Nabiac WTP – 1.98 MW

A second option for MidCoast Council is a solar farm at Nabiac WTP site off Elliots Road, subject to proximity to the electricity network (e.g., 11 kV or 33 kV) and ability to connect to the grid at this level. The image below is of a modelled 1.9 MW solar array east-west ground-mounted at Nabiac WTP on the land surrounding the buildings, which would generate an estimated 2,808 MWh per year, 10% of MidCoast Council's total electricity demand.



Scope for abatement

The scope for abatement of Council's emissions would depend on the scale and type of project, treatment of LGCs generated from the project's operation, Council's offtake fraction of energy generated, for example.

The case for Council to develop a project such as this may have multiple aspects, such as meeting its own targets for renewables and abatement, its desire to see more renewable energy projects built in MidCoast, its desire to build projects that involve community ownership and/or establishment of a community energy retailer, opportunities for grant funding that may make such a project economically viable compared with other options.

So, the scope for abatement of Council's emissions can range from a small fraction up to 100% of electricity emissions, and the scope for abatement in the wider community is potentially even larger.

Risks and mitigation

In addition to the renewable energy PPA risks highlighted above (which would also apply in the case of a mid-scale project), additional risks apply when looking at this opportunity. These include:

- Retailers may not want to be party to off-take, so ability to sleeve with Council's electricity agreement may be limited
- If the plant exceeds 5 MW in capacity, then registration with AEMO will be required, with associated registration and recurrent fees, which may increase
- At more than 5 MW (up to 30MW) and above 30MW in capacity a range of AEMO regulations will apply, leading to greater complexity in the operation of the asset and associated skills and knowledge required, as well as added risks to operation and income that would need to be modelled as part of project development
- Greater skills and knowledge of wholesale markets would be required to manage revenue risk over time

These are examples and other risks may apply and would need to be identified, assessed and managed/mitigated as part of the project development.

Costs and benefits

In the current market – with declining wholesale prices, declining LGC prices, and lower offtake rates available for much larger renewable energy projects compared with mid-scale projects, the business case likely favours a PPA-only model to sourcing renewables for Council's facilities.

However continuing declines in costs for mid-scale solar projects, continued developments to lower the cost / increase the value of bioenergy projects, and grant support to community-based renewables may make a mid-scale project viable for MidCoast Council.

8.5 Energy efficiency

Description

Energy efficiency remains the cheapest form of greenhouse gas abatement in many situations, and it is recommended that energy use be cost-effectively minimised so that sizing and investment in solar and batteries is optimised. This is reflected in MidCoast Council's past and continuing efforts to manage energy efficiently as described in Section 5.3.

The following is a summary of the identified energy efficiency opportunities at Council sites:

- **Lighting: office/indoor** lighting is progressively being upgraded to LED technology. A prominent example of the potential is LED upgrades to Council's administration offices in Gloucester, and the Taree Library. Lighting with medium to high utilisation can be cost-effectively upgraded to LED, while low use facilities can be upgraded to LED when lamps fail. Lighting controls can also be considered when retrofitting lights to LED.
- **Lighting: residential (P1 & P2) and main road (Category V) streetlights** are owned by Essential Energy accounting for a total of 7,957 lights across Council. Council has recently replaced 5,369 lights to LED through Essential Energy resulting in estimated savings of 1,003 MWh/annum. Additional future replacements are likely to save a further 1,134 MWh/annum by replacing the remaining 2,457 streetlights.
- **Swimming pool motor VSD controls**: most recirculating pumps are fixed speed-controlled, in some cases reflecting older pools where achieving required water turnover requires pumps to run at full load. There may be opportunities to review the potential for VSD control at some pools where required water turnover rates are being achieved.
- **Design**: Several WTP and STP are due for re-design in the future and Council should ensure that energy efficiency is incorporated into the design of these facilities. For example, Council has moved its main administration offices in Taree and Forster to a new centralised building in Taree (Yalawanyi Ganya) and incorporated energy efficient design into the new premises which will minimise lifetime costs for energy.
- **WTP, SPS and STP motor VSD controls**: most large pumps at Council are already VSD controlled, and council can continue to work towards optimising efficiency of blowers, pumps etc as part of its operations.
- **STP UV Treatment**: UV-LED technology has recently been trialled by UK company United Utilities. The company is trialling technology created by UK start-up company Typhon which claims to reduce energy costs by up to 90% compared to traditional bulbs. Council would look to upgrade if/when appropriate technology is available.
- **Air Conditioning / HVAC**: except for office buildings and aquatic centres air conditioning is estimated to be a low proportion of energy demand. The main opportunities are to implement effective controls for existing plant, to specify energy-efficient replacement plant including packaged air conditioning, pool heating / conditioning systems, multi-unit splits and individual split systems, to design energy efficiency into new HVAC system,

and to implement effective passive conditioning measures such as insulation and shading.

Efficiency plans and budgeting will be informed by regular auditing of facilities and equipment, and by operational budget and Delivery Program planning that considers projects that will continuously reduce Council's energy footprint.

Scope for abatement

The scope for energy efficiency across Council's sites is estimated to be around 2,458 MWh per year, equal to more than 8.9% of current electricity demand. Around 7.4% of this potential is associated with upgrading all streetlights to LED.

While energy savings potential is significant, the design and construction of new facilities such as buildings and treatment plants may see increases in energy demand as well, even where these new facilities are energy efficient. Hence the net savings potential is likely to be less than 8.9% of current energy use.

Risks and mitigation

The risks associated with energy efficiency upgrades are generally low provided business cases, specification and contractor management processes are robust. Some of the main risks and mitigants will include:

- Designing effective measurement and verification at an affordable cost that provides useful feedback about the success of projects
- Persistence of energy savings – it is not uncommon, particularly for education initiatives and control settings to lapse in their performance and be changed back to poor practices or inefficient settings, and providing resources to sustain energy savings is also important
- Regular review processes for energy management is important. For example, design guidelines and procurement guidelines should stay at the level of development of new technologies, practices and services

Costs and benefits

Refer to Appendix A for the table of indicative costs and savings for energy efficiency for Council-operated sites.

8.6 Behind-the-meter solar

Description

Solar PV is a well-established technology, and more than 20% of Australian homes and an increasing number of businesses are installing solar panels to reduce their grid energy costs and greenhouse gas emissions. Uptake of battery energy storage (BESS) remains low but is expected to become more cost-effective in future.

Council has several solar PV systems installed across MidCoast Council area, with a few examples including:

- 25.65 kW installed at the Manning Entertainment Centre
- 21 kW installed at the former MidCoast Water Administration Office
- 15 kW installed at the former Forster Administration Building
- 30 kW installed at the Stroud WTP
- 160 kW installed at Yalawanyi Ganya, Council's new administration building

Visits to Council's operations as well as discussions about planned new facilities and upgrades has highlighted opportunities for solar at 34 sites. Most sites are operated by Council, but some are operated by third parties, and opportunities for solar may need to be considered and adopted by these operators rather than by Council. At several sites, more than one option can be considered. At some sites implementation of solar and storage may be a staged approach.

The following is a summary of the identified solar PV and BESS opportunities that have been identified at Council operated sites:

Site name	Behind-the-meter solar potential
Manning Aquatic and Leisure Centre (3rd party operated)	A 25 kW system initially can be expanded to 99 kW, later on, to remain under the STC limit. In the medium, to long term, this can be expanded to 150 kW and up to a maximum capacity of 333 kW covering all roof spaces.
Manning Entertainment Centre expansion	A 25 kW and 50 kWh battery initially, expanding to 50 kW and 100 kWh battery later on.
Taree Visitor Information Centre	A 10 kW system can be installed on the roof building and absorb the majority day time load
Manning Regional Art Gallery	An additional 15.7 kW of solar PV on the NW facing roofs of the gallery, potentially with a 30 kWh battery to increase self-consumption
Taree Depot	An additional 36.9 kW system initially, expanding to 214 kW later with 300 kWh of battery storage covering all roof spaces. In the long term, this site could become an electric vehicle charging station with solar and storage meeting daytime charging needs for electric vehicles at the depot.
Taree Library	A 25 kW system can be installed on the roof of the tenanted building and be absorbed by library energy demand
Bootawa WPS	A 99 kW system on the roof of the PS2B with an additional 143 kW on the roof of the clear water reservoir later on.

Bootawa WTP	A 99 kW system on the roofs of the WTP initially with up to 431 kW system on the remaining roofs of the WTP later on
Dawson Wastewater Treatment Plant (STP)	A 99 kW ground mount system initially can be expanded to 200 kW later on
Lansdowne STP	A 10 kW system can be installed on the roof of the STP building, east-west orientation.
Hallidays Point Wastewater Treatment Plant (STP)	A 50 kW rooftop system initially, expanding to 90 kW with ground mount in the medium term and up to 200 kW ground mount in the long term.
Old Bar Wastewater Treatment Plant (OB-STP)	A 50 kW ground mount system initially can be expanded to 99 kW later on
Nabiac WTP	A 99 kW system can be installed on the roof of the WTP
Great Lakes Aquatic and Leisure Centre (3rd Party operated)	An 80 kW system initially can be expanded to 120 kW later on. Additional options include a 288 kW system maximising available roof space with 200 kWh of battery storage and up to 612 kW with 600 kWh of storage by installing solar in the car parks.
Hawks Nest Wastewater Treatment Plant (HN-STP)	A 75 kW rooftop system initially can be expanded to 99 kW later on.
Stroud WTP	An additional 45 kW ground mount system with 100 kWh battery to capture existing and new export
Stroud STP	A 21 kW system maximising available roof space or a 50 kW ground mount system
Stroud Admin and Library	A 6.7 kW system with 14 kWh on the available space reducing consumption from the grid significantly
Tea Gardens WTP	A 50 kW system on available roof spaces initially, expanding to 99 kW with potential for battery storage in the future
Gloucester Library and VIC	A 10 kW system on available roof spaces initially, expanding to 16 kW with 20 kWh of storage to capture export during times of low demand.
Tuncurry RTP	A 50 kW system on the roof of the main building or a 78 kW system maximising the available roof spaces
Forster Tuncurry Community Centre + Health Clinic	A 30 kW system on the roof of the centre

Tuncurry Depot	A 16 kW system on the roof of the main workshop, expanding to 153 kW with 150 kWh battery in the future to charge electric vehicles at the depot.
Gloucester Depot	A 10 kW system initially, expanding to 28 kW with 30 kWh battery later on.
Harrington SPS-09	An 8 kW system on the roof of the SPS building
Gloucester Senior Citizens	A 5 kW system initially, expanding to 8 kW with 10 kWh battery later on.
Bulahdelah WTP	A 38 kW system on the roof of the WTP building
Darawank WPS	A 17 kW roof mount system initially can be expanded to 35 kW later on
Kolodong WPS/RES	A 90 kW with 100 kWh battery system on top of the reservoir with the existing solar
Lawson Crescent / Taree SPS-06	A 5.8 kW rooftop system initially with up to an additional 25 kW post mounted system
Manning Point STP	An 18 kW initially increasing up to 36 kW later on
Coopernook STP	A maximum 8 kW system can be installed on the available roof space
Tea Gardens SPS-09/13	A 20-25 kW system maximising the available roof space at the SPS
Wingham Library	A 10 kW system on the back roof of the library

Scope for abatement

The above opportunities can be summarised as:

- Council-operated sites have scope for ~1,170 – 3,345 kW of solar PV, with scope for ~194 – 1,454 kWh of BESS in the medium to long term at sites with low / intermittent demand.
- This can generate between ~1,722 – 4,893 MWh of electricity per year with most of this consumed on Council sites and some export to grid. Abatement at current grid carbon intensity would be from 1,257 – 3,042 t CO_2-e per year.

Risks and mitigation

Risks associated with solar PV implementation are minimal provided systems are appropriately sized, designed, installed, connected and maintained on sound buildings and structures, as with any other asset.

The cost-effectiveness of solar PV has long been demonstrated, and panel prices continue to fall. The commercial sector has embraced solar PV in recent years, and this is the main factor that has driven further acceleration in the implementation of rooftop solar.

Costs and benefits

Refer to Appendix B for the table of estimated costs and savings for behind-the-meter solar PV for Council-operated sites.

8.7 Sustainable transport

Description

Transport emissions are a medium-sized GHG source for MidCoast Council, primarily from diesel used in Council's vehicle fleet. Petrol, including E10 ethanol blended petrol use for passenger cars is small by comparison. Given the dominance of larger diesel-fuelled vehicles and plant the opportunities for Council to transition rapidly to low and zero-emissions fleet are currently limited. Council currently has one Plug-in Hybrid Electric Vehicle (PHEV), nine hybrid vehicles (in operation or ordered) in its passenger fleet including the Mayor's vehicle.

NSW Government's Net Zero Plan 2020-2030 is developing a range of measures that will start to shape the future of transport in the State. Current measures under development in relation to electric vehicles (EV), for example, include:

- EV infrastructure
- Transport Consumer Information
- EVs in Government fleet
- Financial support for purchasing EVs
- Electric buses/trucks

For Councils such as MidCoast, some of the key aspects that these measures will need to consider in order for EV strategies to be locally applicable will include:

- Real data examining performance of hybrid and EVs in regional communities,
- Supply, warranty and servicing issues at a local regional level, and
- Coordination on EV charging infrastructure development, between State Government, councils/groups of councils through JO/ROCs, and private + motoring association providers

The focus of this section of Council's Climate Change Policy, Mitigation and Adaptation Strategy is to provide an overview of the current status of some of these key areas that will shape future transport, including current EV infrastructure, EV growth, and actions that Council can start to progress[27].

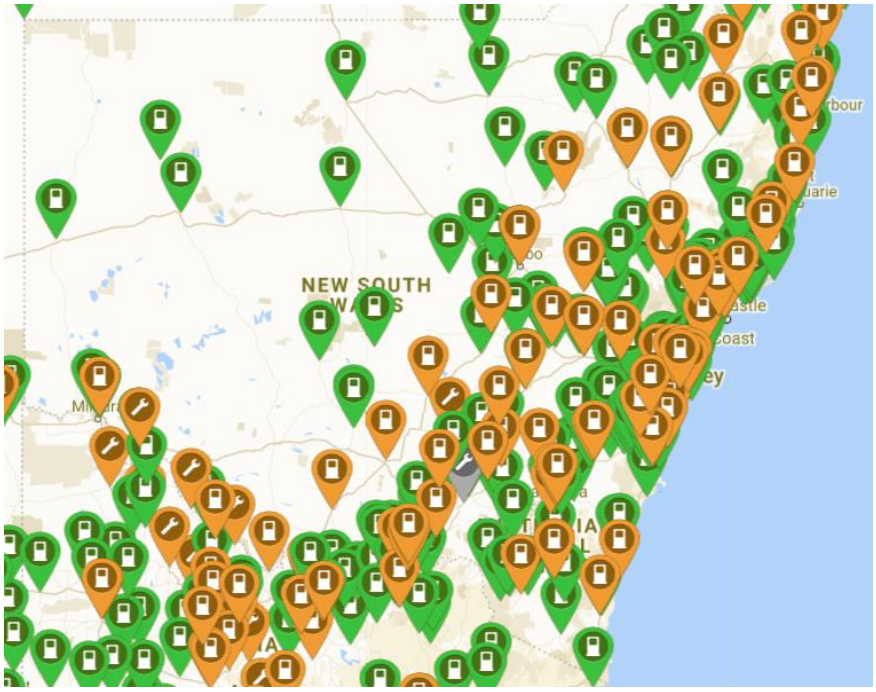
EV charging infrastructure

In August 2020 the Electric Vehicle Council reported that there were 2,307 DC and AC chargers in Australia[28]. Locations of DC and public chargers are readily accessible, see below[29], where green pins denote public chargers and orange pins denote fast, or rapid chargers. Increasing numbers of private chargers are also being installed, retrofitted to homes and businesses as well as designed into new buildings.

[27] Note that this Strategy (Phase 1) report does not address the broader sustainable transport task in the community, including active transport opportunities identified in Council's Pedestrian Access & Mobility & Bike Plan, adopted in 2021. These opportunities for emissions reduction will be discussed with the community during Phase 2.

[28] https://electricvehiclecouncil.com.au/reports/state-of-electric-vehicles-2020/, p38

[29] https://www.plugshare.com/



PLUGSHARE MAP OF NSW PUBLIC (GREEN) AND FAST (ORANGE) EV CHARGERS, MAY 2021

In MidCoast itself there are dedicated fast chargers installed in Taree South Service Centre (Glenthorne), Nabiac Park, the BP Service Station in Karuah, MidCoast Council's main offices at Yalawanyi Ganya in Taree, and at Stocklands shopping centre in Forster. In many regions, public chargers are being installed at facilities such as hotels and motels, with local businesses seeking to provide charging for guests driving EVs.

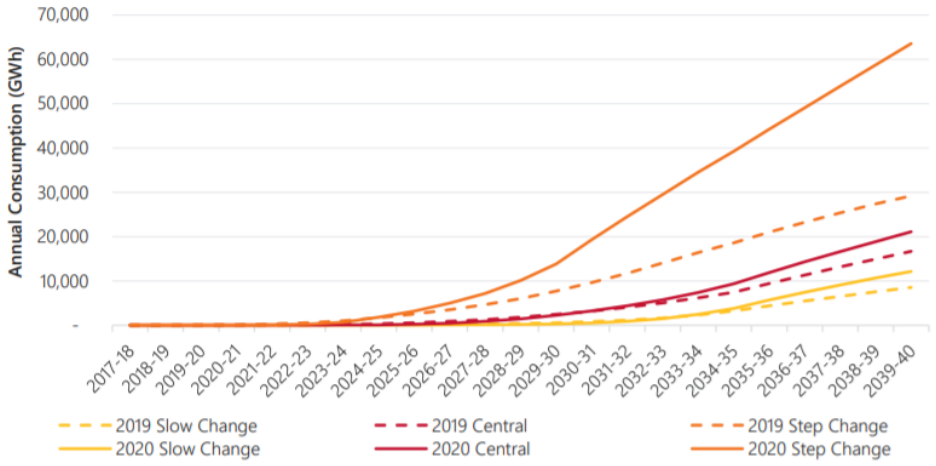
Current and continued growth in EV charging infrastructure will facilitate uptake of EVs, and Council should continue to develop and/or enable the implementation of chargers in the region.

Projected growth in electric vehicles

AEMO's 2020 Electricity Statement of Opportunities (SOO) forecasts energy demand for EV uptake through to 2040[30]. Except under a step-change forecast EV uptake forecasts remain low until the late 2020s' and into the 2030s.

Where fuelled with regular grid power in NSW, EVs currently have higher operational emissions than hybrids, whereas where fuelled from renewables this is not the case. As the grid changes with retirements of coal fired power stations, this situation will change and emissions from EVs will become less than those from hybrids.

[30] https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2020/2020-electricity-statement-of-opportunities.pdf?la=en



AEMO PROJECTIONS OF EV ELECTRICITY CONSUMPTION – SOO 2020

Based on these forecasts it is likely that emissions reduction from sustainable transport measures nationally will be modest in the period to 2030, but significantly increased by 2050 as the grid greens and EV uptake increases. Forecasts are updated periodically, and Council should monitor these from time to time. As indicated above the NSW Government's Net Zero Plan for the 2020-2030 period includes significant work to incentivise and encourage uptake of EVs well ahead of the above forecasts, so this is an area that may accelerate quicker than current forecasts.

Availability of electric passenger vehicles in Australia

According to the Electric Vehicle Council[31], in 2020 there were 28 EV models available in Australia (both BEV and PHEV) from 11 manufacturers, and this was forecast to grow by a further 6 vehicles in 2021, with a continued shift towards battery electric vehicles (BEV).

In addition, the EV Council reports the commitments by most major car manufacturers to develop EVs in coming years. For example:

- Ford: By 2025, will invest $11 billion with the aim of having 24 hybrid and 16 fully electric vehicles in its global model portfolio by 2022.
- General Motors: 20 BEVs by 2023
- Hyundai: By 2024, $20 billion investment in EVs, AVs and batteries
- Nissan: 8 BEVs by 2022, $10 billion investment in EV
- Toyota: 10,000 units planned for 2020 and 30,000 for 2021, first new BEVs by 2021, 10 models are expected by 2025
- Subaru: By 2030, a minimum 40% of global sales will be electric vehicles (EVs) or hybrid electric vehicles (HEVs)

[31] https://electricvehiclecouncil.com.au/wp-content/uploads/2020/08/EVC-State-of-EVs-2020-report.pdf, p24

Corporate and government fleets make up more than 50% of new EV sales, and many Councils are now developing long term transport strategies that explicitly include a shift in their fleet to low and ultimately zero-emissions fleet. Most prominent at this time is the ACT Government, which is switching its passenger fleet to EVs for all new leases from 2020-21 and has trialled electric buses with a view to shifting these to all-electric by 2040 as part of the ACT's carbon neutral commitment. Councils close to MidCoast that are also progressing towards an EV future include the City of Newcastle[32] as well as Lake Macquarie and Central Coast Councils.

Availability of low emissions Light Commercial Vehicles in Australia

Light Commercial Vehicles (LCVs), including utility vehicles are common among Council fleets and often account for a sizeable proportion of total diesel fuel use. Over the medium term, most of the major ute manufacturers have plans in place to provide electric and hybrid electric options in their ute range, often driven by customer demand in regional and agricultural areas. A short summary of the current status for several vehicles is provided below

- Mitsubishi Triton[33]: in September 2019 Mitsubishi advised that the next-generation Mitsubishi Triton ute – due two to three years from now (~2022/23) – will have the option of hybrid power, with decisions still to be made whether this will be a PHEV or a paired electric battery with fuel engine.
- Toyota has committed to including electric options with all new vehicle models going forward, which will include utes[34]. Toyota is developing a hybrid version of its next-generation HiLux ute. It is expected this will be available from 2023. At this stage, Toyota has not committed to an all-electric model. A diesel-electric powertrain is one of the options under consideration.
- Nissan is also planning for an electric vehicle future, with a hybrid diesel-electric Nissan Navara ute potentially available by the mid-2020s[35]. Nissan also indicated that commercial vans were also candidates for electrification.
- Ford's next-generation Ranger and Everest models will include plug-in hybrid variants of both the dual-cab ute and off-road SUV, understood to be from 2022.

Most of the current activity and plans points to electric and hybrid electric utes being a medium to long-term proposition, and day-to-day performance while

[32] https://www.newcastle.nsw.gov.au/Council/News/Latest-News/City-prepares-for-electric-vehicle-future
[33] https://www.caradvice.com.au/790317/mitsubishi-triton-to-get-hybrid-power-precede-nissan-navara-development/
[34] https://www.motoring.com.au/toyota-hilux-to-go-hybrid-121251/
[35] https://www.motoring.com.au/nissan-navara-e-power-hybrid-by-2025-119492

carrying load, and charging infrastructure are key factors that will evolve in the next couple of years.

For MidCoast Council HiLux and Ranger utility vehicles are widely used and hybrid models for these from 2022/23 may provide an opportunity to trial one or more in Council's fleet.

Recommended actions – electrification of vehicles

Suggested actions for Council to pursue in coming years in relation to electrification of its vehicle fleet include:

- Consider the development of EV charging infrastructure on Council land and by supporting local businesses.
- Consider trialling or implementing telematics on fleet to get more detailed data that can help to inform future vehicle selection decisions.
- Continue to assess the costs and benefits of hybrid passenger cars within Council's petrol and diesel fleet for new purchases.
- In future reviews of Council's transport/vehicle procurement strategy, integrate planning to assess/evaluate and progress Council's fleet towards electric technologies where and when feasible.
- Stay abreast of developments in EV incentives, policy and other support, and incorporate these in Council's planning process for its transport fleet.
- In the medium-term increase the switch to hybrid passenger vehicles and LCVs when these become commercially available and viable, and potentially one or more electric passenger vehicles. Continue to review sustainable transport plans as this area is evolving rapidly.
- Over the longer term, progressively migrate fleet to lower and zero emissions where it is technically and financially viable, including passenger vehicles, utes, commercial vans/buses and other operational plant.
- Continue transition from diesel to petrol vehicles where hybrids are not available (NOx, Euro 6).

Scope for abatement

The scope for emissions reduction for MidCoast Council overall from transport measures is 4,380 t CO_2-e inclusive of both scope 1 and scope 3 emissions. The speed of emissions reduction will depend on the rate of adoption of EVs and hybrids, and on selection of renewable energy as the fuel source.

Risks and mitigation

MidCoast Council should assess the range of factors influencing the uptake of EVs for different types of vehicle user – wholly owned by MidCoast Council, salary-sacrificed by staff, or driven by contractors. Factors will include:

- Whole of Life costing basis that consider purchase price, incentives (external and within MidCoast Council), resale, and operating costs including electricity price

- Range and charging infrastructure
- Fit for purpose
- Availability, serviceability, warranties
- The role of other technologies such as hydrogen, autonomous vehicles, etc in MidCoast Council's long-term fleet strategy

Costs and benefits

The capital cost premium for EVs and hybrid models that are fit for purpose for MidCoast Council requirements, as well as the future resale value will be assessed alongside fuel, registration, insurance and maintenance cost savings from time to time using a Whole of Life cost calculation. A cost-neutral approach would see low-emission vehicles have comparable total-cost-of-ownership to current fleet.

8.8 Sustainable procurement

Description

Opportunities for Council to make step-changes in its grid energy use and emissions are described above in relation to solar panel procurement opportunities and renewable energy power purchasing (PPAs). Sustainable procurement can also incrementally reduce Council's energy consumption, water consumption, emissions and improve sustainability over time through multiple individually small purchasing decisions. It can also reduce Council's indirect upstream and downstream emissions in its supply chain, referred to as its Scope 3 emissions[36]. There are three main components to sustainable procurement:

1. Updating the existing policy framework to incorporate a sustainable procurement framework
2. Providing engagement and training to Council staff to educate and drive the use of a sustainable procurement framework in all aspects of Council's operations
3. Review current equipment and services specifications, and identify opportunities to incorporate the sustainable procurement framework into the procurement and use of equipment

Sustainable procurement framework

A policy relating to sustainable procurement can set out Council's overall intent to procure products and services with consideration of Council's sustainability goals, such as emissions reduction, energy efficiency and water conservation (among others). Alongside a policy, Council should develop its internal sustainable procurement guidance, drawing on an appropriate framework. The NSW Local Government Guide is briefly summarised here:

NSW Local Government Guide

*"Sustainable procurement takes into consideration responsibility for the **economic**, **environmental**, **social** and **governance** impacts of any purchase – products or services. These four factors are referred to as the quadruple bottom line and relate to a total purchase cost, and not just the upfront dollar expense. Sustainable procurement, applied to NSW councils' spending, represents a significant opportunity to drive social and environmental change throughout a wide range of not only direct suppliers, but also the associated supply chains[37]".*

[36] Scope 3 GHG emissions are emissions upstream and downstream of Council's operations and are associated with goods and services sourced for Council's activities. Examples are upstream emissions from fuel and electricity production, stationary, capital goods, business travel, staff commute, professional services and the like. These are not Council's emissions but are within their control, and typically add around 20-40% to a council's carbon footprint. Council's carbon footprint, targets and actions in this strategy exclude these emissions, but they can be considered for inclusion at a later time and can nonetheless be the focus of Council's Sustainable Procurement where there are cost benefits to Council.

[37] Sustainable Procurement Guide for Local Governments in NSW, 2017: https://www.lgnsw.org.au/files/imce-uploads/127/esstam-sustainable-procurement-guide-30.05.17.pdf

The 2017 Sustainable Procurement Guide for NSW local governments aims to help councils develop and embed sustainable procurement practices in their organisation. The guide presents information on key concepts, certifications, standards and processes and is designed for all council staff involved in any purchasing. The Guide is applicable from major tenders through to one-off equipment purchases.

Council should examine the guide to identify key areas within its procurement processes where this can add value and lead to more informed and better procurement decisions.

NSW Government Sustainable Choice Program

MidCoast Council has joined the Local Government Procurement (LGP) Sustainable Choice Program, which provides a sustainable supplier database for NSW local councils. A range of sustainability indicators are attached to companies and/or products on the database, which can help Councils to source products that are aligned with its goals for emissions reduction. Sustainability criteria that can be attached to suppliers include:

- Environmental Leadership
- Ethical Leadership
- Australian Made/Manufactured
- Contains Recycled Content
- Energy Efficient
- Water Efficient
- Low Carbon
- Non-toxic Content
- Minimal Environmental Impact
- Sustainable Choice Champion

Engagement and Training

Even with a policy and sustainable procurement framework in place, decisions to source services and products that deliver best practice sustainability outcomes will only happen when people who are buying these services and products take these decisions.

Underpinning this needs to be a program of engagement, education and training of staff across Council who procure services and products. This could encompass:

- Capital works staff involved in the design of new projects such as new water and sewer treatment plants, or new / renovated buildings, where energy and water efficiency and onsite renewables and battery storage could be specified,

- Roads and pavement repair/maintenance teams who specify the types of materials to be used, where there may be opportunities to use more sustainable materials,
- Fleet procurement staff who assess plant and vehicle needs and specify new purchases and leases that will impact fuel use and other environmental performance measures for a number of years,
- Operational staff who may repair or replace equipment as it fails, such as appliances, air conditioners, lights, where there are opportunities to ensure that replacements are fit for purpose and energy efficient.

Equipment and Services Specifications

Policy, procurement frameworks and education / training should ultimately lead to the specifications that Council develops for services and works / products being modified to include requirements for efficiency and renewables where applicable. In addition, the evaluation criteria and weighting of responses to tenders and quotes should be designed to properly evaluate and weight performance against specified sustainability requirements, such as level of efficiency, emissions reduction and whole-of-life cost.

Products and services where Council could potentially amend its specifications include:

- **Building lighting:** many sites will have a range of lighting, including older fluorescent lamps and halogen or CFL downlights. Council will see added savings over time as these are replaced with LED lights on fail.
- **HVAC:** Air conditioning at Council's sites is generally supplied by split system AC units. Replacement is generally not justified for energy-savings, and controls are generally user-managed. The opportunities for Council to improve the energy efficiency of air conditioning include:
    - Review the design of planned new systems,
    - Review energy-efficient models in the current market (e.g. refer to www.energyrating.gov.au) and specify minimum efficiencies (COP / EER) in cooling and heating mode that align with good to best practice.
- **Power and appliances:** Power and appliances represent a fairly modest % of Council's electricity use, including servers that run 24/7, office equipment such as computers, copiers and printers, and appliances like fridges, boiling water units, microwaves, dishwashers and televisions. Efficient appliances and 'green IT' options are available, and specifications can be developed that ensures all equipment such as these is energy efficient when purchased.
- **Water and sewer pumps** are upgraded or rebuilt from time to time, typically more frequently with sewer pumping systems. Upgrades offer the opportunities to assess system design, evaluate VSD opportunities and improve control systems. As these systems account for around

65% of Council's electricity use, all savings made in these systems will impact on Council's future energy demand.

- **Public park lighting:** LED lighting is gradually emerging as the default technology here. As parks are upgraded this will emerge as the preferred technology, integrated with controls where feasible/practical.
- **Sporting oval lighting:** some councils have started to select LED as the default technology for new sporting oval lighting, and more suppliers of both LED and traditional sporting oval lighting technologies are giving equal prominence to both solutions. Ovals have relatively few operating hours, so the technology cost and warranties need to more closely match those for existing technologies to make a compelling case for change to LED.
- **Building design policies:** The National Construction Code is a uniform set of technical provisions for the design, construction and performance of buildings throughout Australia. It is published and maintained by the Australian Building Codes Board, on behalf of and in collaboration with the Australian Government and each State and Territory Government. Energy efficiency performance requirements are set out in Section J of the BCA and these or an improvement to these could be stipulated by Council in designing new facilities. Section J recently underwent a review, with changes coming into effect mid-2019. Changes include:
    - quantification of the mandatory Performance Requirements
    - introducing a NABERS Energy Commitment Agreement Verification Method
    - introducing a Green Star Verification Method
    - introducing commissioning requirements
    - improved consideration of on-site renewables such as solar power
    - improved thermal bridging requirements, and simpler Deemed-to-Satisfy Provisions

  The measures under NCC2019 are expected to deliver energy and carbon savings of at least 25% compared with the provisions of the 2016 NCC.

Scope for abatement

The scope for abatement from sustainable procurement is sizeable, with incremental gains made via all purchased goods and services over the long term complementing potentially large abatement from the procurement of solar panels across Council's sites and the procurement of electricity from renewables via Council's supply agreements. MidCoast Council also has the capacity to influence emissions reduction by its suppliers and contractors.

Risks and mitigation

An assessment of risks and mitigation strategies would be part of any periodic review of procurement policies and processes for goods and services.

Costs and benefits

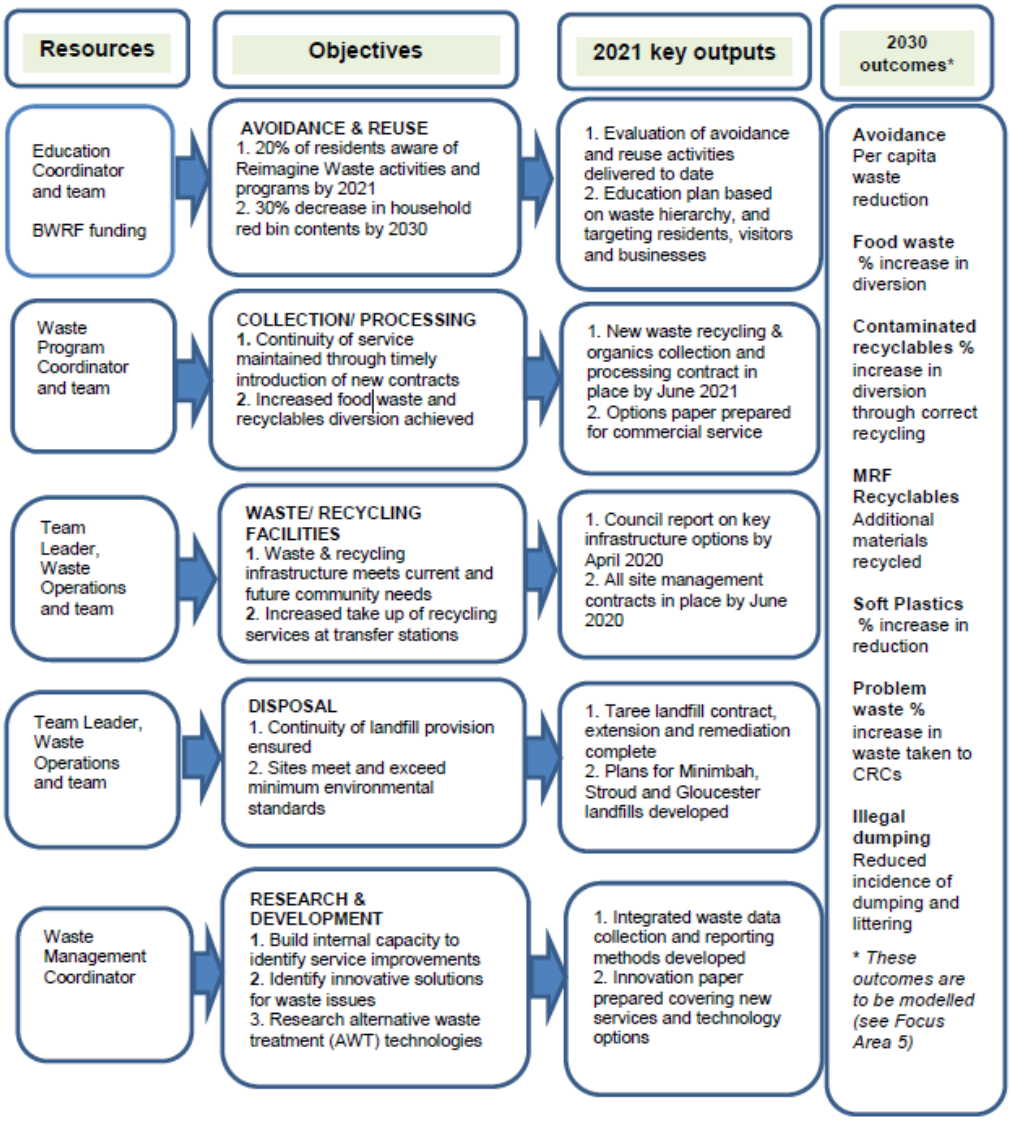
A robust sustainable procurement approach would see sustainable services and goods sourced on a whole-of-life cost basis, which will tend to favour efficiency and lower lifetime cost. Similarly, contractors and suppliers who are sustainable in their own operations are likely to have lower, not higher costs.

8.9 Waste management

Description

Waste to landfill comprises the largest source of emissions in Council's carbon footprint, with 63,494 t CO_2-e representing 62.5% of Council's total emissions. The vast majority of these emissions result from the decomposition of waste created by the community because when organic waste breaks down in landfill it generates methane - a greenhouse gas 25 times more powerful than carbon dioxide.

MidCoast Council adopted the Waste Management 2030 Strategy in 2019, with a key target of achieving a 75% diversion rate for waste to landfill, up from the 2018/19 diversion rate of 63%. The Strategy also aims to increase the diversion of food waste, lower contamination in recyclables, increase recycling, and reduce soft plastics. Council's Strategy is informed by and informs the Regional MidWaste Strategy which is in the final year of its coverage (2021).



SUMMARY OF MIDCOAST COUNCIL'S WASTE MANAGEMENT 2030 STRATEGY

MidCoast Council is aware of many of the measures or levers available to it to reduce emissions from waste, such as:

- Food Organics and Garden Organics (FOGO) processing can increase diversion rates from landfill towards targets of 75%. The development of FOGO is in Council's proposed plans over the next 10 years.
- The Taree landfill will develop a new cell in the near future which will lift the site's capacity to around 50,000 tpa. At this scale it is generally cost effective to install gas capture, and it is intended that the infrastructure for this be put in place.
- With three former Councils merged into a single Council, legacy bin collection systems are still in place, but there is an opportunity over the next two+ years to consider future bin sizes and collection strategies for the next contract period. This can give consideration to bin sizing and pricing that could lead to lower contamination in mixed waste bins and further increase diversion-from-landfill rates.
- Council could seek to use its influence to require, encourage or incentivise contractors to reduce emissions through collection truck emissions and truck technology (electric, hydrogen for example).
- Council wants to improve education and literacy around waste, and to that end has already established many resource recovery initiatives at the Materials Recovery Facility (MRF) at Tuncurry. This includes a tipshop, mens shed, and other initiatives. Council would like to establish a sustainability centre at the Tuncurry landfill to further inform and educate the community, and to make waste more visible to the community
- Council recently supported a reportassessing the possibility of implementing textile recycling facilities at waste management sites across the region, with an estimated 2,070 tonnes of textiles received annually at these facilities. Council will seek grant funding for a textile recycling trial and will also investigate partnerships with textile recyclers
- Progress towards a circular economy model approach to resources, where a 'take-make-recreate' approach can replace the current 'take-make-waste' model of resource management.

The NSW Government is in the process of developing its next 20-year waste strategy, and its Net Zero Stage 1 Plan (2020-2030) has an aspirational target of zero organics to landfill by 2030. It is expected that the 20-year waste strategy will embed circular economy principles, paving the way for this to be embedded in decision making and in regional and local government waste management strategies going forward.

When completed, this strategy will inform future strategies (and funding) for regional bodies such as MidWaste, and in turn this will inform MidCoast Council's review of its waste management 2030 strategy.

As well as emissions reduction strategies, other key aspects that are relevant from a broader emissions reduction perspective will include reduction and management of soft plastics, the continuing viability of waste glass crushing and use commercially, and the impact of global factors on operation of Council's MRF to achieve desired contamination levels.

Scope for abatement

Measures such as landfill gas capture and flaring at the next cell in Taree, the development of FOGO, bin strategies, further development and enhancement of MRFs including textiles recovery, regional engagement (via MidWaste, Hunter Joint Organisation, etc), community (residential and business) engagement and education will all help to reduce emissions from waste.

The extent to which emissions can be reduced will be influenced to a significant extent by State-level targets, and measures and funding available to support the achievement of these in the next two decades.

In reviewing its Waste Management 2030 Strategy MidCoast Council will seek to include a focus on, and targets for, reducing greenhouse gas emissions from waste, informed by:

- 20-Year Waste Strategy for NSW (https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/20-year-waste-strategy-for-nsw), and
- MidWaste's next Regional Waste Avoidance and Resource Recovery Strategy (https://www.midwaste.org.au/about-midwaste/regional-waste-strategy/)

Risks and mitigation

Waste management strategies and waste collection contracts are long term agreements. If emissions reduction measures and goals are not built into these at the outset it can be difficult to set or achieve Council's overall goals for emissions reduction.

Clearly many measures to reduce emissions from waste – from infrastructure to education measures – require significant funding and resources to progress, with long term funding for regional waste reduction strategies key to success. Council's ability to achieve further deep emissions cuts will be influenced by available funding.

Costs and benefits

The costs and benefits of measures being planned and proposed by Council, as well as costs and benefits of future waste management strategies – specifically measures that can reduce emissions – will be developed by Council and used to inform decision making in coming years.

8.10 Sequestration

Description

The MidCoast region of NSW has high potential for carbon sequestration through its extensive vegetation cover and coastal wetlands. The total area of the MidCoast is just over 1,000,000 hectares (ha), which includes:

- 23,266 ha of coastal wetlands (2% of the LGA), and
- 635,651 ha vegetation cover (63% of the LGA).

Increased coverage and management/restoration of vegetation and wetlands provides an opportunity for increased carbon sequestration in the region.

Wetlands

The MidCoast is home to 23,266 ha of coastal wetlands. Council has acquired and remediated around 5,160 ha of coastal wetlands to date, and is working to increase this to more than 6,000 ha in the near future.

Coastal wetlands are generally known to be 10 times more effective at sequestering carbon than other forest vegetation types [38]. Seagrass beds, mangroves and saltmarshes store large amounts of carbon. They draw in carbon as they grow, and much of this is later transferred into the rich organic soils held by their roots. That carbon can remain in the soil for thousands of years, making wetland protection, management, and restoration important long-term natural climate solutions.

Recent research published in Geophysical Research Letters[39] reports on studies of two hydrologically restored freshwater coastal acid sulfate soil (CASS) wetlands located in MidCoast at Cattai and at Darawakh wetlands and restored by MidCoast Council. This reports organic carbon accumulation rates of, on average 0.24 kg per square metre per year. Extrapolated on a simple basis to the whole LGA, this suggests the following approximate sequestration rates:

- 200,000 tonnes of CO_2 per year across all wetlands in MidCoast,
- 45,000 tonnes of CO_2 per year in wetlands already restored by Council,
- 7,500 tonnes of CO_2 per year in wetlands Council is set to acquire and remediate in coming years

Considering emissions by Council's operations and waste, and by the MidCoast community as a whole, 'blue carbon' sequestration through restoration of the region's coastal wetlands is a potentially significant part of any strategy for achieving net zero emissions in line with science.

[38] https://climatechange.lta.org/wetlands/
[39] Brown, D. R., Johnston, S. G., Santos, I. R., Holloway, C. J., and Sanders, C. J. (2019). Significant organic carbon accumulation in two coastal acid sulfate soil wetlands. Geophysical Research Letters, 46, 3245–3251. https://doi.org/10.1029/2019GL082076

In addition, considering that degraded wetlands can actually release significant quantities of carbon back into the atmosphere, restoration of wetlands may actually deliver even more significant carbon sequestration than the figures above.

Vegetation

Council efforts to manage and enhance tree canopy cover and green spaces across the MidCoast, and to manage the region's natural heritage are set out in:

- MidCoast Council's (draft) Vegetation Magement Policy and Greening Strategy[40], and
- MidCoast (draft) Biodiversity Framework 2020-2030[41]

Initiatives set out in these documents, and other actions and plans by Council include:

- The draft Biodiversity Framework 2020-2030 includes initiatives related to partnering with private landholders to protect and enhance vegetation including the Land for Wildlife Program.
- The draft Greening Strategy includes tree planting initiatives on public and private land including increasing the capacity of Council's nursery to supply local native plants. During 2019/20 approximately 18,000 plants were propagated and planted in the region.
- A Tree Preservation Order (TPO) to minimise and regulate the removal of native vegetation in urban areas currently only applies to parts of the former Great Lakes LGA. Council's draft Vegetation Management Policy is proposing to replace the current TPO with a broader, more targeted approach that will apply to the entire MidCoast LGA and aim to protect native vegetation that has significant ecological value or contributes to the scenic amenity or character of an area.
- Council has an Offsetting Procedure which provides a framework for the planting of trees on public land to replace trees lost through Council's infrastructure improvement projects. This procedure results in more trees, since the trees removed are replaced at higher ratios, i.e. at 2:1; 4:1 and 10:1 ratios depending on their conservation status. This is also generally applied to private developments through Council's Development Application process, but a formal policy has not yet been adopted. Since this procedure was introduced in 2018 around 10,000 plants have been or are proposed to be planted to offset tree losses.
- Significant tree planting for biodiversity purposes will also be undertaken during 2021 and 2022 in conjunction with a number of bushfire recovery

[40] https://haveyoursay.midcoast.nsw.gov.au/greening-strategy-and-vegetation-management-midcoast/draft-midcoast-greening-strategy
[41] https://haveyoursay.midcoast.nsw.gov.au/biodiversity-framework

grants Council has received under Federal and State Governments' funding programs.

Carbon sequestration from increased vegetation will depend on the type and scale of new vegetation, and on the age of planted trees. A mature tree will typically sequester around 20 kg of CO_2 annually, while young trees may sequester around one quarter to one third of this.

Further to these initiatives Council may seek to partner with third parties (e.g. not-for-profit organisations like Greenfleet) to develop and restore biodiverse forest areas within MidCoast, whether to directly offset Council's emissions or to create carbon offsets in local afforestation that helps other organisations to reduce their carbon footprint.

Scope for abatement

The scope for abatement is clearly significant both in the context of Council's emissions from its operations, and for the region as a whole.

The net amount of carbon that will be sequestered as a direct result of Council's initiatives, through its wetlands restoration program, Greening Strategy and Biodiversity Framework actions is not estimated. The development of a simple framework to estimate carbon sequestered from Council's actions can be considered as part of the ongoing implementation of the Climate Change Strategy.

Risks and mitigation

Risks and mitigation strategies for wetlands restoration and vegetation management would be addressed within Council's strategies, programs and projects related to these activities.

Costs and benefits

Costs and benefits of wetlands restoration and vegetation management would be addressed within Council's strategies, programs and projects related to these activities.

8.11 Carbon offsets

Description

This Strategy advocates for a net zero emissions reduction target for Council's operations by 2040. It is feasible that by this time most emissions from energy will have been eliminated, however some emissions may remain, for example in heavy fleet such as trucks and large road plant, as well as waste. Future revisions to this Strategy may consider Council's supply chain emissions, such as emissions in goods and services that Council purchases. These are referred to as scope 3 supply chain emissions, and Australia's Climate Active standard sets out methodologies for estimation of these that are aligned with global standards.

Given the potential for Council to have residual emissions by 2040, it is prudent to be aware of carbon offset options that are available that could help Council to achieve its targets. This section outlines the national standard for carbon neutrality and what this may look like for MidCoast Council given the experience of other local councils.

What is Climate Active?

Currently, the 'gold standard' for carbon neutrality in Australia is Climate Active certification (formerly the 'National Carbon Offset Standard', or NCOS). NCOS was launched by the Australian Government in 2010 to provide a credible framework for achieving carbon neutrality. Initially, the Standard was designed for organisations, products and services and was expanded to events, buildings and precincts in 2017.

The Climate Active Carbon Neutral Standard for Organisations (Organisation Standard) is a voluntary standard to manage greenhouse gas emissions and achieve carbon neutrality. It provides best-practice guidance on how to measure, reduce, offset, validate and report emissions that occur as a result of the operations of an organisation (encompassing scopes 1, 2 and 3 emissions as explained earlier). Further information is available at www.climateactive.org.au.

What additional emissions might MidCoast Council need to consider?

As well as residual scope 1 and 2 emissions (such as from transport fuel), Council may need to consider its supply chain scope 3 emissions under Climate Active, including:

1. Purchased goods and services
2. Capital goods
3. Fuel- and energy-related activities (not included in Scope 1 or Scope 2)
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Upstream leased assets
9. Downstream transportation and distribution

10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Downstream leased assets
14. Franchises
15. Investments

An assessment of each data category will highlight those sources that must, should and do not need to be included in a Climate Active-compliant carbon inventory, based on an assessment of how relevant these sources are to MidCoast Council.

What might MidCoast Council's emissions be under Climate Active?

For regional local governments it is typical for works associated with road and pavement construction and maintenance to be significant sources of supply chain emissions, including from concrete / cement, reinforcing or pipe steel and bitumen / asphalt. Other building construction is also significant, but tends to be an irregular source of emissions. Other relevant emissions sources usually include the procurement of business services, business travel, information technology services, communications, postal services, paper consumption, water consumption, etc. Employee commute emissions may also be relevant and are commonly included.

A typical scope 3 supply chain carbon footprint can add substantially to existing reported energy and waste emissions from Council's operations, with 20-40% increase seen in relevant examples.

Options to reduce Council's supply chain and residual scope 1, 2 emissions

If Council has residual emissions in 2040, and was to determine that its greenhouse gas emissions reduction target should extend to Council's scope 3 supply chain emissions, then three primary options will be available to achieve reductions in these:

- Extend sustainable procurement to encompass the emissions embodied within goods / capital works materials that Council purchases, and to encourage, incentivise or require suppliers to reduce their carbon footprint
- Implement local sequestration projects, including through Council's Greening Strategy and through continued restoration of local wetlands. These sequestration / blue carbon initiatives are likely to be difficult to measure in terms of carbon sequestration
- Purchase carbon offsets to reduce residual emissions, including consideration of abatement as well as sequestration / removal offsets.

What other Councils have been certified under Climate Active?

The following is a list of Councils that have undergone Climate Active certification[42].

- Bayside City Council
- Brisbane City Council
- City of Adelaide
- City of Melbourne
- City of Sydney
- City of Yarra Council
- City of Moonee Valley
- Maroondah City Council
- Moreland City Council
- Randwick City Council
- Woollahra Municipal Council

Instead of full Climate Active certification, Councils can decide to self-certify their carbon neutral status. The recommended way to undertake self-certification is to use the Climate Active Standard for guidance, from determining the boundary of the carbon footprint and preparation of the carbon account to the purchase of carbon offsets. The following Councils have undergone self-certification:

- Maribyrnong City Council
- City of Fremantle[43]

Scope for abatement

Carbon offsets will enable Council to achieve a net zero emissions target by 2040, with the amount of offsets required dependent on the boundary of Council's carbon footprint and the success of abatement and sustainable procurement measures in reducing this footprint.

Key decisions that Council would need to take include the role of abatement offsets (e.g. from renewable energy projects elsewhere) and sequestration offsets (e.g. from regional / national tree planting schemes).

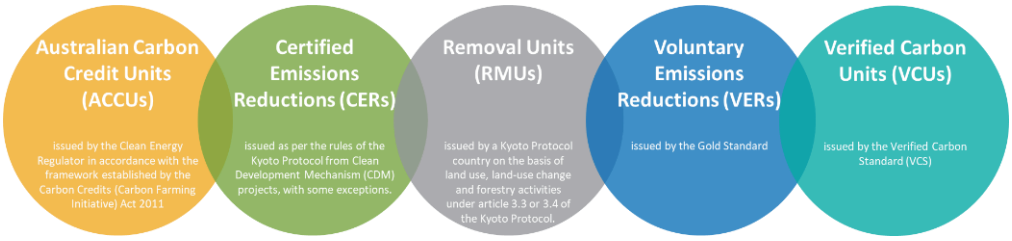
Risks and mitigation

Two of the principal risks associated with purchasing carbon offsets and achieving Climate Active certification are:

- Purchasing reputable carbon offsets and balancing cost and offset sources (see the main types of offsets below),

[42] https://www.climateactive.org.au/buy-climate-active/certified-brands#category1
[43] https://www.fremantle.wa.gov.au/towards-zero-carbon

- Data collection systems integrity including records management, data analysis frameworks and methods to receive and handle data from multiple sources on a recurrent basis



ACCEPTED OFFSETS FOR CLIMATE ACTIVE CARBON NEUTRAL CERTIFICATION

- Australian Carbon Credit Units (**ACCUs**) issued by the Clean Energy Regulator in accordance with the framework established by the Carbon Credits (Carbon Farming Initiative) Act 2011 which has now been amended to establish the Emissions Reduction Fund (ERF).
- Certified Emissions Reductions (CERs) issued as per the rules of the Kyoto Protocol from Clean Development Mechanism (**CDM**) projects, with some exceptions.
- Removal Units (**RMUs**) issued by a Kyoto Protocol country on the basis of land use, land-use change and forestry activities under article 3.3 or 3.4 of the Kyoto Protocol.
- Voluntary Emissions Reductions (VERs) issued by the **Gold Standard**.
- Verified Carbon Units (VCUs) issued by the **Verified Carbon Standard** (VCS).

When deciding what offsets to purchase, the location, type, volume, price and accreditation standard would ordinarily be taken into account. In particular organisations will typically evaluate the balance between price (e.g. for high volume international offsets) and location (e.g. Australian removal offsets) or sustainability credentials.

Costs and benefits

The cost to offset an organisation's emissions is a function of the actual offset projects selected, their location, the volume of offsets purchased, the accreditation standard under which offsets have been created, and market demand and supply. In the current market offsets can be purchased for as little as ~$1.50/offset and up to $18/offset.

Costs for licensing and verification would also be considered so that the full cost of offsets can be estimated and used to inform future decisions by Council.

8.12 MidCoast Council climate change mitigation plan

In order to achieve deep cuts in its energy and water use, and its carbon emissions, MidCoast Council will need to commit time, resources and financial support to a multi-year program of work that will implement measures identified in this plan that reduce emissions. A key priority in this should be to invest in measures that also improve Council's bottom line.

These measures are identified and tabulated into short, medium and long-term, based on priorities, costs and maturity of the technology recommended. The opportunities identified build upon the measures identified in the above section.

8.12.1 Mitigation short term action plan

Based on the assessment of onsite measures, the current electricity market, sustainable transport, waste management and sequestration or offset opportunities, a suggested short-term action plan for MidCoast Council is outlined in Appendix C: Short-term mitigation plan for Council operations.

8.12.2 Mitigation medium-term action plan

Based on the assessment of onsite measures, the current electricity market, sustainable transport, waste management and sequestration or offset opportunities, a suggested medium-term action plan for MidCoast Council is outlined in Appendix D: Medium-term mitigation plan for Council operations

8.12.3 Mitigation long term action plan

Based on the assessment of onsite measures, the current electricity market, sustainable transport, waste management and sequestration or offset opportunities, a suggested long-term action plan for MidCoast Council is outlined in Appendix E: Long-term mitigation plan for Council operations

100% renewables

Climate Change Strategy

Climate Change Adaptation Plan

9 Climate change resilience and adaptation plan

9.1 Climate change

Climate change is a significant issue for Australian communities. Even with local and international action to reduce greenhouse gas emissions, the global climate is projected to undergo significant change, creating risks to both communities and the environment as well as opportunities to improve processes, behaviors and technologies.

9.2 Adaptation planning

Adapting to climate change means taking action to manage or reduce the adverse consequences of a changed climate.[44]

To manage current and future climate, local governments need to adapt their assets, resourcing and operations. Adaptation planning is the process of analysing, selecting and prioritising measures in response. Adaptation planning on climate change can help to:

- embed adaptive measures into council operations and processes
- comprehensively address climate risks while reducing the cost and extent of remedial action
- engage management in long-term risk management
- build internal partnerships for adaptation responses across the different functional areas of councils
- identify community expectations about service provision.

The first step in adaptation planning is to complete a climate change risk assessment across Council's assets and operations. The geographic location, the projected effects of climate change, and the demographics and culture of the council area need to be taken into account. The 'adaptive capacity' of council staff - their capability and resources to respond to climate change - should also be considered.

Assessing and responding to climate-related risks requires the skills of all functional areas of a council, including staff in natural resources and sustainability, as well as those in engineering, planning, health, property services and the executive for example.

The level of priority given to each specified adaptation measure needs to take into account the immediacy of the threat, the resources available, the vulnerabilities of the location, and community expectations.

Some effects of climate change may present extreme risks that are very unlikely to occur; others may not require a response until sometime in the future, even though they may already be affecting council operations.

[44] https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Local-government/Adaptation-planning

Climate change threats addressed in a typical adaptation plan include emergencies (such as bushfires, more frequent storms, heatwaves and flooding) or longer-term issues (such as rising average temperatures, water resourcing and asset maintenance).

9.3 Current climate conditions in the North Coast region

According to the NSW Government's climate snapshot for the North Coast region[45], the topography of the region and coastal setting results in climate conditions that vary across the region. It is very wet along the coast, especially in the north, but drier inland. Summers are warm across the region, with cool winters in the foothills and along the Great Dividing Range.

Temperature

In summer, average temperatures range from 16–18°C along the mountains to 24–26°C north of Grafton. In winter, temperatures range from 4–6°C along the mountains to 14–16°C along the far north coast.

Average maximum temperatures during summer range from 30–32°C near Casino to 20–22°C in the mountains. In winter, the minimum temperature ranges from 0–2°C along parts of the Great Dividing Range to 10–12°C on the far north coast.

Seasonal variations are shown by the monthly average, minimum and maximum temperatures averaged over the region (Figure 1). The average monthly temperatures range from around 11°C in July to just over 22.5°C in January.

The long-term temperature records indicate that the temperature in the North Coast region has been increasing since the 1960s, with the most sustained period of increase occurring in the last few decades.

Temperature extremes

Temperature extremes, both hot and cold, occur infrequently but can have considerable impacts on health, infrastructure and the environment. Changes to temperature extremes often result in greater impacts than changes to average temperatures.

Hot days

On average, the North Coast experiences fewer than 10 hot days per year (maximum temperature is greater than 35°C).

Cold nights

The number of cold nights per year (minimum temperature less than 2°C) increases moving away from the coast. Along the coast, there are on average fewer than 10 cold nights per year while in the mountains there are on average over 50 cold nights per year.

45 http://www.climatechange.environment.nsw.gov.au/~/media/NARCLim/Files/Regional%20Downloads/Climate%20Change%20Snapshots/NorthCoastsnapshot.pdf

Rainfall

Rainfall varies significantly over the region, with average annual rainfall ranging from over 1600 mm on parts of the far north coast to 800–1200 mm along parts of the Great Dividing Range.

Along the southern and central parts of the North Coast, annual rainfall is typically 1200–1600 mm. Rainfall generally decreases as you move away from the coast.

Rainfall is very seasonal with much more rain falling in summer than in winter. During summer, the North Coast experiences 400–600 mm of rainfall, with some areas receiving over 600 mm. During winter, much of the region sees 100–200 mm, and on average 200–300 mm along the coast.

The North Coast region experiences its greatest spatial variation in rainfall during August, where it varies from more than 600 mm along parts of the far north coast to between 200–300 mm in some parts of the west.

The region has experienced considerable rainfall variability in the past with periods of both wetter and drier conditions. During much of the first half of the 20th century, the region experienced drier conditions. The first decade of the 21st century saw a long period of below average rainfall during the Millennium Drought. This dry period ended with two of the wettest years on record for Australia (2010-2011), with 2010 being the third wettest year on record for NSW.

Fire weather

The risk of bushfire in any given region depends on four 'switches'. There needs to be enough vegetation (fuel), the fuel needs to be dry enough to burn, the weather needs to be favourable for fire to spread, and there needs to be an ignition source (Bradstock 2010). All four of these switches must be on for a fire to occur. The Forest Fire Danger Index (FFDI) is used in NSW to quantify fire weather. The FFDI combines observations of temperature, humidity and wind speed with an estimate of the fuel situation.

Long-term observations of FFDI come from daily measurements of temperature, rainfall, humidity and wind speed at only a small number of weather stations in Australia, with 17 stations located in NSW and the ACT (Lucas 2010).

FFDI estimates are available for three stations in the region: Lismore, Casino and Coffs Harbour. The average annual FFDI estimated for 1990–2009 is lowest in Coffs Harbour (3.3) and highest in Casino (6.4). The highest average FFDI occurs in spring and the lowest in autumn.

Fire weather is classified as 'severe' when the FFDI is above 50, and most of the property loss from major fires in Australia has occurred when the FFDI reached this level (Blanchi et al. 2010). FFDI values below 12 indicate low to moderate fire weather, 12-25 high, 25- 49 very high, 50-74 severe, 75-99 extreme and above 100 catastrophic.

Severe fire weather conditions are estimated to occur on average two days per year at Casino but are rare at Lismore and Coffs Harbour. Spring is the peak season for extreme fire weather conditions in Casino.

9.4 Climate change projections for the region

The NSW Government has developed Climate Change Snapshots for NSW and each of the state's planning regions[46]. The following climate change projections are from the NSW and ACT Regional Climate Modelling (NARCliM) project. NARCliM is a multi-agency research partnership between the NSW and ACT governments and the Climate Change Research Centre at the University of NSW.

Based on long-term (1910–2011) observations, temperatures have been increasing in the North Coast Region since about 1970, with higher temperatures experienced in recent decades.

The North Coast Region is projected to continue to warm in the near future (2020–2039) and far future (2060–2079), compared to recent years (1990–2009). The warming is projected to be on average about 0.7°C in the near future, increasing to about 2°C in the far future.

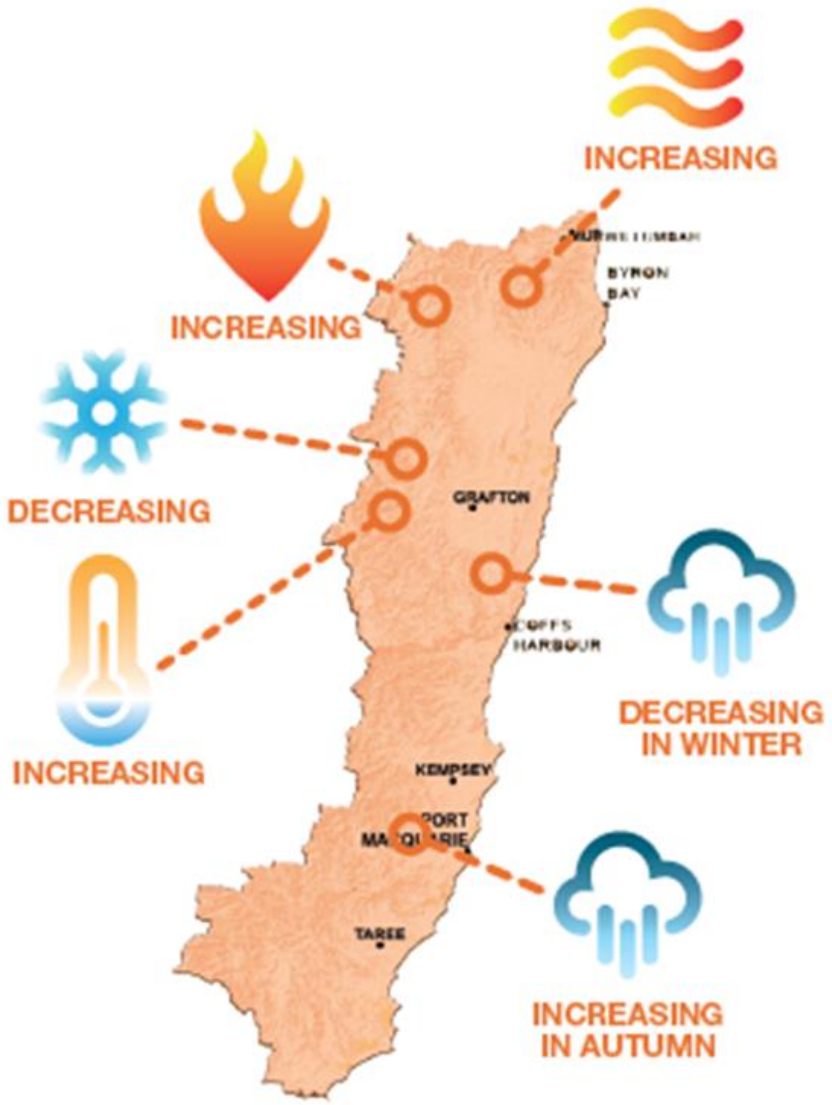
The number of high-temperature days is projected to increase, while a reduction is anticipated in instances of potential frost risk. The warming trend projected for the region is large compared to the natural variability in temperature and is of a similar order to the rate of warming projected for other regions of NSW.

The North Coast currently experiences considerable rainfall variability across seasons and from year-to-year and this variability is also reflected in the projections.

The sea level is projected to rise by up to 0.4m by 2050 and up to 0.9 m by 2100 (including future rapid dynamic change in ice flow).

There is a risk that there will be an increase in average wind speed of 8% by 2030 (Summer and Autumn).

[46] https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Hunter-Climate-Change-Downloads



	2030	2070
	Projected temperature changes	
	Maximum temperatures are projected to increase in the near future by 0.4 – 1.0°C	Maximum temperatures are projected to increase in the far future by 1.5 – 2.4°C
	Minimum temperatures are projected to increase in the near future by 0.5 – 1.0°C	Minimum temperatures are projected to increase in the far future by 1.6 – 2.5°C
	The number of hot days will increase	The number of cold nights will decrease
	Projected rainfall changes	
	Rainfall is projected to decrease in winter	Rainfall is projected to increase in autumn and spring
	Projected Forest Fire Danger Index (FFDI) changes	
	Average fire weather is projected to increase in summer and spring	Severe fire weather days are projected to increase in summer and spring

FIGURE 23: CLIMATE CHANGE PROJECTIONS FOR THE REGION

9.5 Previous climate adaptation work

Before the 2016 council amalgamation, adaptation risks and plans had been developed for Greater Taree (2011) and Great Lakes Council (2010) as part of the Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) delivered by Hunter Councils.

9.5.1 Hunter and Central Coast Regional Environmental Management Strategy

As part of work for the Hunter Central Coast Regional Environmental Management Strategy, it has been determined that key changes in climate that are likely to influence the region are[47]:

- Sea Level Rise – flooding and inundation of low-lying coastal areas, coastal recession and erosion, asset damage, loss of coastal and estuarine ecosystems
- Increases in average and extreme temperatures – human and livestock health, changes to bushfire behaviour and seasonality, increased building operational costs and asset deterioration
- Extreme rainfall, flooding and storms – flash floods and catchment flooding, increased need for emergency response and recovery, damage to infrastructure, buildings and facilities, community anxiety, damage to natural assets
- Rainfall and water availability – fluctuations in water supply for drinking, irrigation and industrial use, as well as more pronounced flooding and drying cycles.

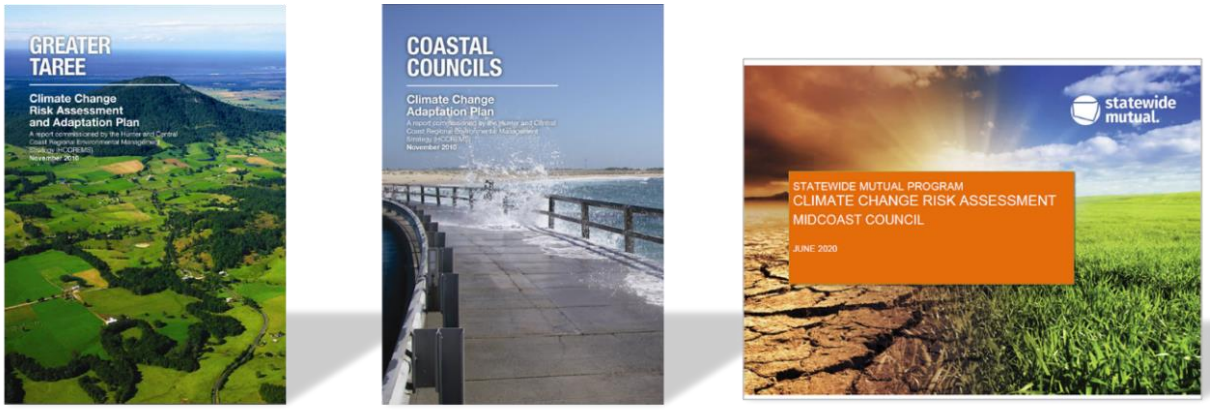
Key initiatives delivered through the Hunter Joint Organisation Climate Change Program to date include:

- Research to identify historic climate variability and projected changes in the region's climate
- Completing a spatial assessment of the potential impacts of climate change across the region
- Coordinating development of local and regional (Rural and Coastal) climate change risk assessment and adaptation plans by councils
- Developing a Decision Support Framework and Guide to support consistent, transparent and objectives-based decision making by councils for coastal adaptation planning
- Collating and analysing spatial information datasets (representing population, environmental and natural hazards) to identify the location and relative vulnerability of communities to natural disasters.
- Social research exploring the level of awareness and preparedness of `at risk' communities to climate induced natural disasters.

[47] https://www.hccrems.com.au/climate/

9.5.2 2020 climate change risk assessment

In December 2019, Council undertook a climate change risk assessment in collaboration with its insurers Statewide Mutual.



GTCC Climate Change Adaptation Plan 2011

HCCREMS Coastal Councils Climate Change Risk Assessment and Adaptation Plan 2010

Statewide Mutual Program Climate Change Risk Assessment MidCoast Council 2020

FIGURE 24: PREVIOUS CLIMATE ADAPTATION WORK BY MIDCOAST COUNCIL AND FORMER CONSTITUENT COUNCILS

The 2019 assessment resulted in the identification of 74 risks. Three risks were rated low, 27 risks were rated medium, 37 risks were rated high, and 7 risks were rated extreme as shown in Figure 25.

Table 1 - Impact Rankings by Scenario								All Impacts Total	
	Temperature	Hot Days	Rain	Fire Weather	Sea Level	Wind	Rain Intensity		
Low	0	0	0	2	0	0	1	Low	3
Medium	7	4	2	3	5	1	5	Medium	27
High	2	4	5	7	7	2	10	High	37
Extreme	0	0	2	2	1	0	2	Extreme	7
	9	8	9	14	13	3	18	74	74

FIGURE 25: IDENTIFIED CLIMATE RISKS FROM STATEWIDE MUTUAL ASSESSMENT, DECEMBER 2019

Potential climate change impacts were considered in relation to the following Council functional areas:

- Infrastructure and Assets
- Environment Management & Protection
- Community Services
- Land-use Planning and Development
- Emergency Management & Natural Disaster Preparedness
- Corporate Services

One of the recommended next steps of the climate risk identification was the development of adaptation actions for the 44 high and extreme-rated risks.

9.6 MidCoast Council climate adaptation planning

The risk assessment facilitated by Statewide Mutual resulted in the identification of 44 high and extreme risks across seven climate change scenarios, as shown below:

1. **Hot days** – 4 identified risks (HD001, HD005, HD006, HD008)
2. **Temperature** – 2 identified risks (T006, T007)
3. **Rainfall** – 7 identified risks (R001, R002, R003, R004, R006, R007, R008)
4. **Fire weather** – 9 identified risks (F001, F002, F004, F005, F008, F009, F011, F012, F013)
5. **Sea level rise** – 8 identified risks (SLR001, SLR002, SLR003, SLR004, SLR005, SLR006, SLR009, SLR010)
6. **Rain intensity and severe storm** – 12 identified risks (RI001, RI002, RI003, RI005, RI006, RI007, RI009, RI010, RI014, RI015, RI016, RI017)
7. **Wind** - 2 identified risks (WCI1, WCI2)

For these 44 extreme- and high-level risks, risk adaptation actions needed to be developed. On 6 July and 6 August, two climate adaptation workshops were held with Council staff. Participants were split into 5 groups, as shown in Figure 26.

Community Services	Corporate Services	Environmental Management & Protection	Infrastructure & Assets	Land Use Planning & Development
Community Spaces	MANEX	Natural Systems	Operations	Planning & Development
MidCoast Assist	Finance	Environmental Health	Transport Assets	Strategic Planning
LEMO – Emergency Management	Human Resources	Waste Management	Water & Sewer	
Library	Property Management			

FIGURE 26: COUNCIL FUNCTIONAL GROUPS REPRESENTED AT THE RISK ADAPTATION WORKSHOPS

The 44 high and extreme risks were allocated to functional areas, as shown above. Each group looked at the identified risk, as well as existing controls, and then worked on identifying adaptation actions to reduce the risk to an acceptable level.

Adaptation actions were structured into a short, medium, or long-term timeframe to align with the current (short) and next (medium) delivery cycle, as well as beyond (long).

In order to adapt to climate change, MidCoast Council will need to commit time, resources and financial support to a multi-year program of work that will implement measures identified in the adaptation plans.

9.7 Adaptation action plan

Suggested short-term, medium-term and long-term action plans for MidCoast Council are outlined in Appendix F: Adaptation short-term, medium-term and long-term plans

9.8 Implementation of the adaptation action plan

9.8.1 Integration into IP & R framework

Council should take care to align adaptation actions with the *planning and reporting guidelines for NSW local government*, which include a 10-year community strategic plan, a resourcing strategy, a delivery program and annual operational plans.

As such, the adaptation plan should be developed further to include a timetable for completion and further details of who is responsible for delivering each component of the plan.

9.8.2 Prioritisation of identified adaptation actions

It is recommended that Council perform further work to prioritise the identified adaptation actions. The criteria used to prioritise actions should include political feasibility, cost, community acceptance, influence level and concurrent effects.

9.8.3 Integration at the regional level

Many of the adaptation actions can be pursued at the regional level through Council's participation in the Hunter Joint Organisation of Councils.

9.8.4 Monitoring progress and updating the plan

Adaptation is an iterative process. Effective management requires regular monitoring and review to consider whether actions are achieving the desired results and whether any early assumptions have changed (e.g. based on new climate science data or adaptation trials). As part of further work, Council should outline the indicators, performance measures and targets used to measure success.

On a regular basis, Council needs to monitor the NSW Government's NARCliM webpage[48] for new climate change projections, particularly once NARCliM 1.5 is released. Council also needs to regularly review every measure in Council's adaptation plan as the understanding of climate risks alters or as priorities change, for example, because of:

- new or improved climate data becoming available
- changes to community demographics
- changes in technology lowering implementation costs
- new regulatory or legislative obligations or requirements.

[48] https://climatechange.environment.nsw.gov.au/climate-projections-for-NSW/About-NARCliM

9.8.5 NSW Sustainability Funding Programs for adaptation

To help with the implementation of the adaptation plan, Council can consider the following funding programs that are being run by the NSW Government.

Sector	Program	Funding Agency	Description	Link
Communities	Increasing Resilience to Climate Change (IRCC) - Community grants	DPIE	Supports Community organisations to address identified climate change risks and vulnerabilities. NOTE: to be run concurrently with Local Government IRCC program (see below) in Rounds 2 and 3	https://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Community-Grants
Communities	Bushfire Community recovery and resilience fund	Resilience NSW	Social recovery and preparedness including (only recorded resilience ones here): community is aware of risks of future disasters; community improves capacity and capability to respond to future disasters; business and have in place adequate mitigation practices for risks and threats; government, private sector, civil society and organisations are engaged in plans for preparedness and management of recovery.	https://www.emergency.nsw.gov.au/Pages/for-the-community/disaster-assistance/financial-support.aspx#NEW!BushfireCommunityRecoveryandResilienceFund
Communities	Community Resilience Innovation Program	Resilience NSW	The CRIP supports a broad range of community-led projects designed to increase all-hazard disaster preparedness and build community capacity and resilience. CRIP projects are based on collaboration and partnership between local community organisations and emergency services agencies.	https://www.emergency.nsw.gov.au/Pages/emergency-management/funding-programs/community-resilience/Community-Resilience-Innovation-Program.aspx
Communities	My Community Project	DP&C	My Community Project is all about local ideas, local projects and local decisions. The NSW Government is investing a total of $24.4 million in projects across NSW to help improve the wellbeing of the people and communities that live there.	https://www.nsw.gov.au/improving-nsw/projects-and-initiatives/my-community-project/
Government agencies	Community Resilience Innovation Program	Resilience NSW	The CRIP supports a broad range of community-led projects designed to increase all-hazard disaster preparedness and build community capacity and	https://www.emergency.nsw.gov.au/Pages/emergency-management/funding-

Sector	Program	Funding Agency	Description	Link
			resilience. CRIP projects are based on collaboration and partnership between local community organisations and emergency services agencies.	programs/community-resilience/Community-Resilience-Innovation-Program.aspx
Government agencies	Cross-Dependency Initiative (XDI) NSW	DPIE	XDI NSW supports NSW Government agencies and local government to understand how their assets and infrastructure will be impacted by climate change, and allows them to identify and cost options to adapt these assets and infrastructure over time. Additionally, XDI NSW provides a safe platform for infrastructure agencies to share data for the purposes of collaboration and cost-sharing for adaptation.	N/A
Government agenices	Climate Risk Ready NSW	DPIE	The Climate Risk Ready NSW Program aims to increase NSW Government preparedness to respond to the impacts of a changing climate, and is delivered by DPIE in partnership with NSW Treasury.Climate Risk Ready provides a framework for how government agencies can understand plan and respond to climate change risks. Agencies get access to:-a guide with resources to support implementation, and;-accredited training for relevant Government sector staff to support skills and capacity to address climate change risks.	N/A
Councils	Floodplain Management Program	DPIE	The Floodplain Management Program provides financial support to local councils to help them manage flood risk in their communities. The primary objective of the Program is to support the implementation of the NSW Flood Prone Land Policy, which aims to reduce the impacts of existing flooding and flood liability on communities and to reduce private and public losses resulting from floods.	https://www.environment.nsw.gov.au/topics/water/floodplains/floodplain-management-grants

Sector	Program	Funding Agency	Description	Link
Councils	Coastal and Estuary Grants Program	DPIE	Primary objective is to support local government in managing the risks from coastal hazards, such as coastal erosion, and restoring degraded coastal habitats and improving the health of NSW estuaries, wetlands and littoral rainforests.	https://www.environment.nsw.gov.au/topics/water/coasts/coastal-and-estuary-grants
Councils	Increasing Resilience to Climate Change (IRCC) - Local Government grants	DPIE	Supports Local Government organisations to address identified climate change risks and vulnerabilities. Objectives The Increasing Resilience to Climate Change program has been established to encourage: • Implementation of actions to address identified climate risks • Regional consideration of climate change impacts in decision making • Implementation of climate change adaptation actions beyond business as usual projects and programs • Enhanced adaptive capacity	https://www.lgnsw.org.au/policy/increasing-resilience-climate-change
Councils	Bushfire Community recovery and resilience fund	Resilience NSW	Social recovery and preparedness including (only recorded resilience ones here): community is aware of risks of future disasters; community improves capacity and capability to respond to future disasters; business and have in place adequate mitigation practices for risks and threats; government, private sector, civil society and organisations are engaged in plans for preparedness and management of recovery.	https://www.emergency.nsw.gov.au/Pages/for-the-community/disaster-assistance/financial-support.aspx#NEW!BushfireCommunityRecoveryandResilienceFund
Councils	CommunityResilience Innovation Program	Resilience NSW	The CRIP supports a broad range of community-led projects designed to increase all-hazard disaster preparedness and build community capacity and resilience. CRIP projects are based on collaboration and	https://www.emergency.nsw.gov.au/Pages/emergency-management/funding-programs/community-

Sector	Program	Funding Agency	Description	Link
			partnership between local community organisations and emergency services agencies.	resilience/Community-Resilience-Innovation-Program.aspx
Councils	Cross-Dependency Initiative (XDI) NSW	DPIE	XDI NSW supports NSW Government agencies and local government to understand how their assets and infrastructure will be impacted by climate change and allows them to identify and cost options to adapt these assets and infrastructure over time. Additionally, XDI NSW provides a safe platform for infrastructure agencies to share data for the purposes of collaboration and cost-sharing for adaptation.	N/A

100% renewables

Appendices

Appendix A: Energy efficiency for Council-operated sites

Site visits and data analysis were used to identify energy efficiency opportunities at MidCoast Council.

The analysis of these opportunities was performed with the following inputs and parameters:

- Council's energy billing data and site interval data was used to determine the rates for each site
- Benchmark pricing for energy efficiency upgrades (HVAC, VSD controls, and Lighting), including:
  - HVAC upgrades – assumed to have a payback of around 20 years
  - VSD controls upgrades – assumed to have a payback of around 7-8 years
  - Lighting upgrades – assumed to have a simple payback of around 5 years, excepting streetlighting where the payback estimated for local road LED upgrades is assumed to apply when main roads are upgraded to LED in future
- A single discount rate of 5% is applied for net present value (NPV) calculations.

TABLE 5: INDICATIVE COSTS AND SAVINGS FOR ENERGY EFFICIENCY FOR COUNCIL-OPERATED SITES

Site	Description	Capital cost	Cost savings	Payback (years)	NPV	IRR	Resource savings (kWh)	Emissions reduction (t CO_2-e)	% energy savings
Manning Aquatic and Leisure Centre (3rd party operated)	*Short-term option:* Replace two old heater / humidifier systems with modern energy-efficient water and air heating systems.	$194,187	$9,709	18.32	-$43,378	2.7%	76,109	61.6	8%
	Medium-term option: Install VSD control on the main recirculating pumps for the indoor pool	$36,410	$4,855	7.27	$38,995	13.6%	38,055	30.8	4%
	Short-term option: Upgrade all fluorescent lights and downlights to LED	$19,419	$3,884	4.90	$36,494	20.5%	30,444	24.7	3%

Site	Description	Capital cost	Cost savings	Payback (years)	NPV	IRR	Resource savings (kWh)	Emissions reduction (t CO_2-e)	% energy savings
	Medium-term option: Install VSD control on the main recirculating pumps for the outdoor pool	$21,846	$2,913	7.27	$23,397	13.6%	22,833	18.5	2%
Manning Entertainment Centre	*Short-term option:* Engage with service provider to recommission the chillers, VSDs, and controls	$9,373	$937	9.58	$5,186	9.7%	4,764	3.9	6%
	Medium-term option: Upgrade all 150W halogen bulbs and balance of fluorescent lights to LED	$2,343	$469	4.90	$4,404	20.5%	2,382	1.9	3%
	Long-term option: Install LED stage lighting to replace around 100 older lights	$350,000	$3,749	>25 years	-$371,267	0.0%	19,055	15.4	24%
	Medium-term option: Upgrade external lights with dimmable LED sensor lights	$9,373	$937	9.58	$3,056	8.4%	4,764	3.9	6%
Taree Water Office	*Medium-term option:* Sub-meter the depot so that the energy use and demand for the leased offices can be accurately determined,								Not estimated
Manning Regional Art Gallery	*Medium-term option:* Upgrade air conditioning, dehumidifiers and ceiling insulation	$120,000	$4,273	24.88	-$53,634	0.0%	13,903	11.3	15%
	Short-term option: Upgrade remaining lights in the heritage section to LED in existing tracking sheet	$7,000	$855	7.91	$4,683	11.4%	2,781	2.3	3%

Site	Description	Capital cost	Cost savings	Payback (years)	NPV	IRR	Resource savings (kWh)	Emissions reduction (t CO_2-e)	% energy savings
	Medium-term option: Upgrade track lighting and other lighting in the new side of the gallery to LED	$45,000	$2,564	22.16	-$15,402	0.1%	8,342	6.8	9%
Taree Depot	*Short-term option:* Upgrade all fluorescent lights and downlights to LED	$12,245	$2,449	4.90	$23,013	20.5%	12,463	10.1	12%
Taree Library	*Short-term option:* Replace fluorescent lights with LED panels.	$26,276	$5,255	4.90	$49,381	20.5%	17,508	14.2	15%
	Medium-term option: Upgrade Temperzone AC units with modern energy efficient units	$56,055	$2,803	18.32	-$12,522	2.7%	9,338	7.6	8%
Unmetered Street Lighting	*Short term option:* Install LED streetlights for local roads (Completed June 2019)	$1,574,823	$290,985	5.30	$2,587,144	18.8%	1,003,412	812.8	29%
	Medium-term option: Install LED streetlights for main roads and remaining Essential Energy streetlights	$1,612,452	$297,882	5.30	$2,648,097	18.8%	1,027,196	832.0	30%
Great Lakes Aquatic and Leisure Centre (3rd party operated)	*Short-term option:* Optimise the VSD controls on the recirculation pumps	$30,103	$4,014	7.27	$32,240	13.6%	31,367	25.4	4%
	Medium-term option: Replace the two pool hall AC systems (R22) with new energy efficient systems	$171,254	$8,563	18.32	-$38,255	2.7%	66,916	54.2	8%

Site	Description	Capital cost	Cost savings	Payback (years)	NPV	IRR	Resource savings (kWh)	Emissions reduction (t CO_2-e)	% energy savings
Gloucester Library and VIC	*Short-term option:* Upgrade linear fluorescent lighting to LED	$8,525	$1,705	4.90	$16,021	20.5%	5,008	4.1	18%
Forster Tuncurry Community Centre + Health Clinic	*Medium-term option:* Upgrade all lights at the centres to LED, including controls where warranted	$22,914	$4,583	4.90	$43,063	20.5%	15,829	12.8	15%
Tuncurry Depot	*Short-term option:* Complete lighting upgrade to LED for all offices and workshops	$16,622	$3,324	4.90	$31,238	20.5%	11,906	9.6	18%
Gloucester Depot	*Short-term option:* Upgrade linear fluorescent lighting to LED	$9,271	$1,854	4.90	$17,422	20.5%	5,446	4.4	18%
Gloucester Senior Citizens	*Short-term option:* Upgrade fluorescent lighting to LED	$3,475	$695	4.90	$6,530	20.5%	2,041	1.7	18%
	Medium-term option: Remove remaining electric bar heaters and draw on split system AC only	Not estimated	$386	0.00	$5,996	0.0%	1,134	0.9	10%
Gloucester Administration	*Medium-term option:* Upgrade linear fluorescent lighting to LED	$26,361	$5,272	4.90	$49,541	20.5%	25,000	20.3	21%
Taree and Forster – new office buildings	*Short-term option:* Incorporate good practice energy efficient design into new works		Not assessed						
Maximum total (short, medium and long term options)		**$4,385,328**	**$664,914**	**6.60**	**$5,091,443**		**2,457,993**	**1991.0**	**9.0%**

Appendix B: Behind-the-meter solar PV for Council-operated sites

Site visits and data analysis were used to identify sites that are most likely to be suitable to install solar PV.

The analysis of these opportunities was performed with the following inputs and parameters:

- Solar modelling software (Helioscope with Nearmap / Six maps) was used for all proposed installations.
- Council's energy billing data and site interval data was used to determine optimum solar array sizes and to calculate the level of self-consumption of solar and the amount likely to be exported in each case.
- Benchmark pricing for solar PV systems (flush roof-mount, tilted roof-mount and ground-mount systems) and inverters has been used, including:
    - Flush and fixed roof-mount systems - $1/W STC scale and $1.5/W LGC scale
    - Ground-mount systems - $1.3/W STC scale and $1.8/W LGC scale
    - Floating solar systems - $3/W STC scale and $3.5/W LGC scale
    - Carport solar systems - $2.8/W STC scale and $3.3/W LGC scale
- Annual expenses include cleaning / maintenance. Cleaning costs of $15/MWh of solar energy generation have been used. These are applied to each solar PV opportunity with annual escalation at 2.5%.
- For all exported energy a feed-in rate of $0.08/kWh was assumed to be available, which will require Council to seek this in electricity agreements.
- A single discount rate of 5% is applied for net present value (NPV) calculations.

TABLE 6: ESTIMATED COSTS AND SAVINGS FOR BEHIND-THE-METER SOLAR PV FOR COUNCIL-OPERATED SITES

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
Manning Aquatic and Leisure Centre (3rd party operated)	*Short-term option:* **25.10 kW** Roof-mounted solar PV		$25,100	$5,295	4.74	$49,453	20.9%	37,593	0%	4%	30.4
	Medium-term option: **99.50 kW** Roof-mounted solar PV		$99,500	$20,925	4.76	$195,119	20.8%	148,596	0%	15%	120.3

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Long-term option 1: **149.70 kW** Roof-mounted solar PV		$224,550	$30,668	7.32	$207,249	13.0%	217,827	0%	21%	176.2
	Long-term option 2: **333.30 kW** Roof-mounted solar PV		$499,950	$63,359	7.93	$382,526	11.8%	491,749	20%	39%	319.6
Manning Entertainment Centre	*Medium-term option 1:* **25.10 kW** Roof-mounted solar PV on new building	50	$70,100	$6,116	11.59	$14,438	7.0%	38,340	41% (based on current load)	28%	18.2
	Medium-term option 2: **50.90 kW** Roof-mounted solar PV on new building	100	$140,900	$11,507	12.43	$17,445	6.2%	76,641	48% (based on current load)	50%	32.1
Taree Visitor Information Centre	*Medium-term option:* **10.10 kW** Roof-mounted solar PV		$10,100	$2,602	3.89	$26,259	25.6%	14,190	20%	43%	9.2
Manning Regional Art Gallery	*Medium-term option:* **15.70 kW** Roof-mounted solar PV	30	$42,700	$5,965	7.17	$40,815	13.3%	24,240	20%	21%	15.7
Taree Depot	*Short-term option:* **36.90 kW** Roof-mounted solar PV		$36,900	$9,942	3.72	$101,999	26.8%	53,035	21%	40%	34.0
	Long-term future expansion for EV charging: **214.10 kW**	300	$591,150	$38,265	15.95	-$73,064	3.7%	308,508	68% (based on current load, will be lower with EV charging)	96% (based on current load, will be lower with EV charging)	81.1

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Roof-mounted solar PV across all roof spaces										
Taree Library	*Medium-term option:* **25.10 kW** Roof-mounted solar PV		$25,100	$10,573	2.37	$123,381	42.1%	39,620	10%	31%	28.9
Bootawa WPS	*Medium-term option 1:* **99.5 kW** Roof-mounted solar PV		$99,800	$19,019	5.25	$167,978	18.8%	141,053	0%	6%	114.1
	Long-term option: **Additional 143.40 kW** Roof-mounted solar PV on top of the reservoir		$215,100	$29,150	7.38	$195,332	12.9%	216,196	0%	10%	174.9
Bootawa WTP	*Medium-term option:* **99.8 kW** Roof-mounted solar PV		$99,800	$19,989	4.99	$181,647	19.8%	148,249	0%	6%	120.0
	Long-term option: **431.10 kW** Roof-mounted solar PV across all roof spaces		$646,650	$76,933	8.44	$425,703	10.9%	614,990	18%	19%	409.3
Dawson Wastewater Treatment Plant (STP)	*Medium-term option 1:* **98.80 kW** Ground-mounted solar PV on north-west corner		$128,440	$23,503	5.47	$202,430	18.0%	167,138	0%	12%	134.8
	Medium-term option 2: **199.90 kW**		$359,820	$47,389	7.60	$306,886	12.5%	338,814	2%	25%	269.9

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Ground-mounted solar PV on north-west corner										
Lansdowne STP	*Short-term option:* **10.10 kW** Roof-mounted solar PV		$10,100	$2,499	4.04	$24,953	24.6%	13,910	10%	23%	10.1
Hallidays Point STP	*Short-term option:* **50.60 kW** Roof-mounted solar PV		$50,600	$10,108	5.01	$91,720	19.7%	71,799	0%	7%	58.1
	Medium-term option 1: **Additional 39.50 kW (totalling 90 kW)** Ground-mounted solar PV on south eastern corner		$51,350	$8,966	5.73	$74,887	17.1%	63,691	0%	7%	51.5
	Medium-term option 2: **90.10 kW** Ground-mounted solar PV on south western corner		$117,130	$20,983	5.58	$178,305	17.6%	149,065	0%	15%	120.5
	Long-term option: **199.90 kW** Ground-mounted solar PV on south western corner		$359,820	$43,501	8.29	$250,699	11.2%	317,497	6%	31%	240.9
Old Bar Wastewater	*Medium-term option 1:* **50.60 kW**		$65,780	$11,816	5.57	$100,486	17.6%	84,343	1%	25%	67.5

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
Treatment Plant (OB-STP)	Ground-mounted solar PV on southern grassed area										
	Medium-term option 2: **99.50 kW** Ground-mounted solar PV on southern grassed area		$129,350	$20,628	6.30	$156,788	15.3%	165,196	26%	36%	98.6
Nabiac WTP	*Short-term option:* **98.50 kW** Roof-mounted solar PV		$98,500	$19,256	5.13	$170,480	19.2%	151,600	14%	19%	105.2
Great Lakes Aquatic and Leisure Centre (3rd party operated)	*Short-term option 1:* **80.00 kW** Roof-mounted solar PV		$80,000	$15,128	5.29	$132,560	18.6%	109,366	4%	13%	84.9
	Short-term option 2: **119.90 kW** Roof-mounted solar PV		$179,850	$22,374	8.05	$133,918	11.6%	164,375	8%	18%	122.8
	Long-term option: **288.80 kW** Roof-mounted solar PV	200	$613,200	$51,250	12.04	$101,505	6.6%	393,915	18%	39%	262.7
	Long-term option: **Additional 323.10 kW** Carport solar PV	400	$1,426,230	$53,069	>25 years	-$898,105	-2.7%	456,619	40%	32%	220.1
Hawks Nest Wastewater Treatment Plant (HN-STP)	*Short-term option:* **74.70 kW** Roof-mounted solar PV		$74,700	$14,201	5.26	$125,090	18.7%	101,571	2%	22%	80.9
	Medium-term option: **99.80 kW**		$99,800	$18,248	5.47	$156,388	18.0%	132,800	6%	28%	101.5

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Roof-mounted solar PV										
Stroud WTP	*Medium-term option:* **45.00 kW** Ground-mounted solar PV on grassed area at the rear of the site	100	$148,500	$11,660	12.90	$12,523	5.8%	74,020	43%	70%	34.3
Stroud STP	*Short-term option:* **21.10 kW** Roof-mounted solar PV		$21,100	$4,053	5.21	$35,925	18.9%	28,932	1%	17%	23.1
	Medium-term option: **49.80 kW** Ground-mounted solar PV at the south of the site		$64,740	$10,001	6.50	$74,182	14.8%	79,237	24%	36%	48.7
Stroud Admin and Library	*Medium-term option:* **6.70 kW** Roof mounted solar PV	14	$19,300	$2,468	7.84	$15,257	12.0%	10,030	20%	84%	6.5
Tea Gardens WTP	*Short-term option:* **50.30 kW** Roof-mounted solar PV		$50,300	$8,398	6.02	$66,144	16.1%	67,465	27%	17%	39.9
	Medium-term option: **99.50 kW** Roof-mounted solar PV		$99,500	$15,631	6.41	$115,526	15.0%	132,985	38%	27%	66.4
Gloucester Library and VIC	*Short-term option:* **10.10 kW** Roof-mounted solar PV		$10,100	$4,188	2.41	$48,739	41.4%	13,320	10%	43%	9.7

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Medium-term option: **16.10 kW** Roof-mounted solar PV	20	$34,100	$6,556	5.21	$58,001	18.9%	20,850	10%	67%	15.2
Tuncurry RTP	*Short-term option 1:* **50.30 kW** Roof-mounted solar PV		$50,300	$9,121	5.52	$77,909	17.8%	65,678	3%	23%	51.5
	Short term option 2: **78.40 kW** Roof-mounted solar PV		$78,400	$13,220	5.95	$106,116	16.4%	100,947	16%	31%	68.5
Forster Tuncurry Community Centre + Health Clinic	*Medium-term option:* **30.00 kW** Roof-mounted solar PV		$30,000	$11,072	2.71	$125,006	36.8%	44,990	20%	34%	29.2
Tuncurry Depot	*Short-term option:* **16.10 kW** Roof-mounted solar PV		$16,100	$5,296	3.04	$58,041	32.8%	21,680	20%	26%	14.0
	Long-term option: **153.40 kW** Roof-mounted solar PV	150	$365,100	$43,366	8.47	$237,034	10.9%	213,400	40%	194%	103.7
Gloucester Depot	*Short-term option:* **10.10 kW** Roof-mounted solar PV		$10,100	$3,925	2.57	$44,893	38.8%	13,610	20%	36%	8.8
	Long-term option: **28.10 kW** Roof-mounted solar PV	30	$55,100	$10,013	5.52	$84,752	17.8%	38,170	30%	88%	21.6
Harrington SPS-09	*Short-term option:* **8.00 kW**		$8,000	$1,618	4.95	$14,678	20.0%	10,290	10%	17%	7.5

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
	Roof-mounted solar PV										
Gloucester Senior Citizens	*Short-term option:* **5.00 kW** Roof-mounted solar PV		$5,000	$1,971	2.54	$22,618	39.3%	6,835	20%	48%	4.4
	Medium-term option: **8.00 kW** Roof-mounted solar PV	10	$17,000	$3,155	5.40	$27,204	18.2%	10,940	20%	77%	7.1
Bulahdelah STP	*Short-term option:* **37.90 kW** Roof-mounted solar PV		$37,900	$10,225	3.71	$105,001	26.8%	54,230	20%	33%	35.1
Darawank WPS	*Medium-term option 1:* **17.40 kW** Roof-mounted solar PV		$17,400	$3,175	5.49	$27,193	17.9%	24,000	5%	5%	18.5
	Medium-term option 2: **34.80 kW** Roof-mounted solar PV		$34,800	$5,595	6.24	$43,006	15.5%	45,500	22%	8%	28.9
Kolodong WPS/RES	*Long-term option:* **90.50 kW** Roof-mounted solar PV	100	$180,500	$18,882	9.61	$82,464	9.2%	129,015	23%	53%	80.8
Lawson Crescent SPS-06	*Short-term option 1:* **5.76 kW** Roof-mounted solar PV		$5,760	$1,229	4.69	$11,549	21.2%	7,428	0%	4%	6.0
	Short-term option 2: **25.30 kW** Post-mounted solar PV on south western corner		$32,890	$6,453	5.10	$57,901	19.4%	39,251	2%	21%	31.3

Site	Modelled PV size	BESS (kWh)	Capital cost	Cost savings	Payback (years)	NPV	IRR	Solar yield (kWh)	% of solar export	% energy saving	Emissions reduction (t CO_2-e)
Manning Point STP	*Short-term option 1:* **18.10 kW** Roof-mounted solar PV		$18,100	$5,780	3.13	$63,191	31.9%	27,384	3%	19%	21.4
	Short-term option 2: **36.50 kW** Roof-mounted solar PV		$36,500	$9,698	3.77	$98,853	26.4%	52,589	23%	30%	32.8
Coopernook STP	*Short term option:* **8.04 kW** Roof-mounted solar PV		$8,040	$2,233	3.60	$23,284	27.7%	12,430	10%	18%	9.1
Tea Gardens SPS-09/13	*Short-term option 1:* **20.10 kW** Roof-mounted solar PV		$20,100	$4,174	4.83	$38,114	20.5%	28,080	20%	42%	18.2
	Short-term option 2: **25.50 kW** Roof-mounted solar PV		$25,500	$4,950	5.17	$43,144	19.0%	35,340	30%	46%	20.0
Wingham Library	*Short-term option:* **10.00 kW** Roof-mounted solar PV		$10,000	$2,935	3.41	$30,698	29.1%	15,970	40%	62%	7.8
Taree and Forster – new office buildings	*Medium-term option:* **Install r**oof-mounted solar on both buildings as part of new works		Not assessed								
Minimum total	**1,170.9 kW**	**194**	**$1,403,820**	**$269,537**	**5.21**	**2,374,454**		**1,722,419**	**10%**	**6%**	**1,257.0**
Maximum total	**3,344.8 kW**	**1454**	**$6,564,430**	**$686,862**	**9.56**	**2,793,321**		**4,892,640**	**23%**	**14%**	**3,042.0**

Appendix C: Short-term mitigation plan for Council operations

TABLE 7: MIDCOAST COUNCIL SHORT TERM MITIGATION PLAN FOR COUNCIL OPERATIONS

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Climate Change Policy	Policy	Whole-of-Council	Finalise and adopt MidCoast Council's Climate Change Policy.	Sustainability	Staff time
Management Systems	Human resources		Create a new staff position who will work to implement this Phase 1 strategy, and in particular work on Phase 2 to engage with the MidCoast community to help themdecarbonise in coming years and decades	Corporate / HR	Salary for 1 x FTE
Sustainability Framework	Management Systems		Develop Council's sustainability framework that links this Climate Action Strategy to Council's Integrated Planning and Reporting Framework and links to other strategies and plans of Council with climate aspects.	Sustainability	Staff time
Sustainability Framework	Monitoring Systems		Maintain and continually review monitoring systems that collect and report on Council's resource consumption, and enable overall progress towards emissions reduction targets to be reported on.	Sustainability	Subscription services and staff time
Grid Decarbonisation	Electricity Supply		Council will periodically update its emissions so that progress towards targets can be tracked and reported. This will capture the impact of grid decarbonisation and allow Council to adjust any of its forecasts to reflect changes.	Sustainability	Staff time
Grid Decarbonisation	Electricity Supply		Council will proactively respond to and advocate to State or Commonwealth governments regarding clean energy policies that can provide investment certainty, lead to more renewable energy and regional jobs, and reduce energy costs to Council and the community.	Sustainability	Staff time

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Buying clean energy	Electricity Procurement		Develop an electricity procurement plan for MidCoast Council's next procurement cycle, to include a goal to source part or all of MCC's electricity from renewable energy sources subject to the market and contract models for renewables.	Procurement	Staff time and/or consulting advice
Sustainable Procurement	Services and Equipment Purchasing		Review purchasing policies and frameworks for sustainability inclusions, and assess if / how sustainable purchasing decisions are made across Council.	Sustainability / Procurement	Staff time
Sustainable Procurement	Services and Equipment Purchasing		Develop and implement internal engagement and training to encourage the specification of sustainability in all Council buying decisions.	Sustainability / Procurement	Staff time
Sustainable Procurement	Services and Equipment Purchasing		Start to develop / update specifications and evaluation criteria for services and equipment / products that Council purchases to include Council's sustainability requirements.	Sustainability / Procurement	Staff time
Waste management	Waste strategy		Review and update Council's 2030 waste strategy based on State Government's 20 year strategy, and MidWaste strategies that respond to this and available funding, and look to incorporate emissions reduction as a key goal alongside diversion strategies	Waste	Staff time and/or consulting advice
Carbon sequestration	Greening Strategy		Subject to adoption by Council of the draft Greening Strategy, track implementation and net increase in tree canopy to assist in estimating sequestration impacts	Natural resources / Sustainability	Staff time
Carbon sequestration	Wetlands restoration		Continue to monitor carbon sequestration impacts of restored wetlands to inform estimates of sequestration in the region, and pursue opportunities for creation of offsets	Natural resources / Sustainability	Staff time
Carbon offsets	Value chain emissions		Review Council's potential value chain emissions (scope 3) and opportunities available to Council to impact these through its procurement processes	Sustainability	Staff time

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Sustainable Transport	Electric Vehicles infrastructure		Keep abreast of State and industry efforts to coordinate the development of infrastructure, programs, incentives and information relating to EV infrastructure, particularly where this relates to regional areas	Fleet	Staff time
Sustainable Transport	Electric Vehicles and hybrids		Investigate installing a telematic solution in the current fleet to get data about current driving behaviours and km driven, plus a report on potential business case for electric or hybrid vehicles.	Fleet	Cost of telematics solution (to be determined)
Energy efficiency	HVAC	Manning Aquatic and Leisure Centre	Replace two 20-year-old heater / humidifier systems with modern energy-efficient water and air heating systems. E.g. Rheem or EVOheat units at a COP between 5 and 6.	Building Assets	$194,187
Behind the meter solar	Solar PV - Roof - STC		Install 25 kW of solar PV on the roof of MALC	Building Assets	$25,100
Energy efficiency	Lighting		Upgrade all fluorescent lights and downlights to LED	Building Assets	$19,419
Energy efficiency	HVAC	Manning Entertainment Centre	Engage with service provider to recommission the chillers, VSDs, and controls	Building Assets	
Energy efficiency	Lighting	Manning Regional Art Gallery	Upgrade remaining lights in the heritage section to LED in existing tracking sheet	Building Assets	$7,000
Energy efficiency	Lighting	Taree Depot	Upgrade all fluorescent lights and downlights to LED	Building Assets	$12,245
Behind the meter solar	Solar PV - Roof - STC		Install an additional 36.9 kW of solar on the depot roof, which will be 79% self-consumed	Building Assets	$36,900
Energy efficiency	Lighting	Taree Library	Most lights are recessed linear fluorescents, but some LED downlights are installed. Replace fluorescent lights with LED panels.	Building Assets	$26,276

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Behind the meter solar	Solar PV - Roof - STC	Lansdowne STP	Install a 10.1 kW solar PV system on the roof of the site's building	Water Services	$10,100
Behind the meter solar	Solar PV - Roof - STC	Hallidays Point STP	Install 50.6 kW of a rooftop-only solar PV system that maximises PV capacity on the roofs of the three onsite buildings	Water Services	$50,600
Behind the meter solar	Solar PV - Roof - STC	Nabiac WTP	Install 98.5 kW of solar PV system on the roof of the WTP that maximises the roof space and meets site demand	Water Services	$98,500
Behind the meter solar	Solar PV - Roof - STC	Great Lakes Aquatic and Leisure Centre	Install an additional ~80 kW solar PV on the roof of the GLAC to stay below the 100kW STC limit	Building Assets	$80,000
Behind the meter solar	Solar PV - Roof - LGC		Install an additional 120 kW solar PV on the roof of the GLAC to maximise supply from solar (*alternative option*)	Building Assets	$179,850
Energy efficiency	Motor Systems		Optimise the VSD controls on the recirculation pumps (currently set at 50 Hz)	Building Assets	$30,103
Behind the meter solar	Solar PV - Roof - STC	Hawks Nest STP	Install 74.7 kW solar PV on the three roofs at the south of the STP (below and above the storage tank)	Water Services	$74,700
Behind the meter solar	Solar PV - Roof - STC	Stroud STP	Install 21.1 kW solar PV on the roofs of the buildings in the centre of the site	Water Services	$21,100
Behind the meter solar	Solar PV - Roof - STC	Tea Gardens WTP	Install 50.3 kW on the large main roof subject to proximity of electrical connection	Water Services	$50,300
Behind the meter solar	Solar PV - Roof - STC	Gloucester Library and VIC	Install 10.1 kW of east-west solar PV array on the roof of the library	Building Assets	$10,100
Energy efficiency	Lighting		Upgrade linear fluorescent lighting to LED	Building Assets	$8,525
Behind the meter solar	Solar PV - Roof - STC	Tuncurry RTP	Install 50.3 kW solar PV on the main building roof at the RTP	Water Services	$50,300
Behind the meter solar	Solar PV - Roof - STC		Install 78.4 kW solar PV on the main building roof at the RTP	Water Services	$78,400

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Behind the meter solar	Solar PV - Roof - STC	Tuncurry Depot	Install 16.1 kW solar PV on the east side of the roof of the main workshop	Building Assets	$16,100
Energy efficiency	Lighting		Complete lighting upgrade to LED for all offices and workshops	Building Assets	$16,622
Behind the meter solar	Solar PV - Roof - STC	Gloucester Depot	Install 10.1 kW of solar PV on the main workshop roof	Building Assets	$10,100
Energy efficiency	Lighting		Upgrade linear fluorescent lighting to LED	Building Assets	$9,271
Behind the meter solar	Solar PV - Roof - STC	Harrington SPS-09	Install 8 kW of solar PV on the roof of the sewage pump station building	Water Services	$8,000
Behind the meter solar	Solar PV - Roof - STC	Gloucester Senior Citizens	Install 5 kW of solar PV on the lower east and west slopes to meet daytime demand	Building Assets	$5,000
Energy efficiency	Lighting		Upgrade linear fluorescent lighting to LED	Building Assets	$3,475
Behind the meter solar	Solar PV - Roof - STC	Bulahdelah STP	Install 37.9 kW of solar PV on the north-facing roof of the main building with additional space available on the green roof building	Water Services	$37,900
Behind the meter solar	Solar PV - Roof - STC	Lawson Crescent / Taree SPS-06	Install 5.76 kW of solar on the east and west-facing roofs of the main building.	Water Services	$5,760
Behind the meter solar	Solar PV - Ground - STC		Install 25.3 kW of additional pole mount solar PV on the southwestern corner of the site.	Water Services	$32,890
Behind the meter solar	Solar PV - Roof - STC	Manning Point STP	Install 18.1 kW of solar PV across the north-facing roofs of the site.	Water Services	$18,100
Behind the meter solar	Solar PV - Roof - STC		Install 36.5 kW of solar PV across all roof spaces of the site to maximise solar capacity.	Water Services	$36,500
Behind the meter solar	Solar PV - Roof - STC	Coopernook STP	Install 8 kW of solar PV across the north-facing roof of the building to maximise solar capacity.	Water Services	$8,040

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Behind the meter solar	Solar PV - Roof - STC	Tea Gardens SPS-09/13	Install 20.1 kW of solar PV across the west and north-facing roof of the site	Water Services	$20,100
Behind the meter solar	Solar PV - Roof - STC		Install 25.5 kW of solar PV across the west and north-facing roof of the site to maximise solar capacity.	Water Services	$25,500
Behind the meter solar	Solar PV - Roof - STC	Wingham Library	Install 10 kW of fixed-tilt north-facing solar PV towards the back end of the building.	Building Assets	$10,000

Some actions have been completed following the end of the baseline period, so the impact of these will be seen in future years. These are tabulated below.

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Energy efficiency	Lighting	Unmetered Street Lighting	Install LED streetlights for local roads	Transport Assets	$1,574,823 (Completed in June 2019)
Behind the meter solar	Solar PV + BESS	Yalawanyi Ganya Office Centralisation and Forster office redevelopment	Install 160 kW solar PV	Building Assets	Part of overall project
Energy efficiency	Design		Maximise energy efficiency in the new Yalawanyi Ganya offices on Biripi Way	Building Assets	

Appendix D: Medium-term mitigation plan for Council operations

TABLE 8: MIDCOAST COUNCIL MEDIUM-TERM MITIGATION PLAN FOR COUNCIL OPERATIONS

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Buying clean energy	Electricity Procurement	Whole-of-Council	Implement a 'market test' process to determine the current contract models, renewable energy availability and price for renewables as part of a PPA.	Procurement	Staff time and/or consulting advice
Buying clean energy	Electricity Procurement		Target for next procurement to purchase 50% to 100% of MCC's electricity from renewable energy, subject to cost and risk assessment. Weigh up the costs and risks of a renewable energy PPA against a regular power agreement.	Procurement	Staff time and cost difference between 'regular' supply agreement and PPA
Sustainable transport	Electric Vehicles		Install EV charging infrastructure / supply points to support Council Battery Electric Vehicle (BEV) / Plug-in Hybrid Electric Vehicle (PHEV) trial vehicles and/or public charging point.	Fleet	Not estimated
Sustainable transport	Fleet		In Council's next fleet plan, incorporate assessment and development of plans for EV charging at Council-owned sites, transition to hybrid, Plug-in Hybrid EV, Battery EV for passenger cars and utility vehicles in the med term.	Fleet	Staff time and/or consulting advice
Sustainable transport	Fleet		Consider implementation of an EV trial for a passenger vehicle in Council's fleet.	Fleet	Cost premium between petrol / hybrid and EV
Sustainable Procurement	Services and Equipment Purchasing		Continue to deliver internal engagement and training to encourage the specification of sustainability in all Council buying decisions.	Sustainability / Procurement	Staff time

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Sustainable Procurement	Services and Equipment Purchasing		Continue to develop / update specifications and evaluation criteria for services and equipment / products that Council purchases to include Council's sustainability requirements.	Sustainability / Procurement	Staff time
Waste management	Waste strategy		Capture scope and implementation of measures that reduce Council's carbon footprint from waste deposited in landfill (e.g. through flaring, FOGO, additional diversion, demand management)	Waste / Sustainability	Staff time
Carbon sequestration	Greening Strategy		Subject to adoption by Council of the draft Greening Strategy, continue to track implementation and net increase in tree canopy to assist in estimating sequestration impacts	Natural resources / Sustainability	Staff time
Carbon sequestration	Wetlands restoration		Continue to monitor carbon sequestration impacts of restored wetlands to inform estimates of sequestration in the region, and pursue opportunities for creation of offsets	Natural resources / Sustainability	Staff time
Carbon offsets	Value chain emissions		Include value chain emissions in future Strategy reviews	Sustainability	Staff time
Energy efficiency	Motor Systems	Manning Aquatic and Leisure Centre	Install VSD control on the main recirculating pumps for the indoor pool (main and hot water)	Building Assets	$36,410
Behind the meter solar	Solar PV - Roof - STC		Install 99.5 kW of solar PV on the roof of MALC (or upsize to 99kW if a smaller system is installed in the short term)	Building Assets	Up to $99,500
Energy efficiency	Motor Systems		Install VSD control on the main recirculating pumps for the outdoor pool	Building Assets	$21,846
Behind the meter solar	Solar PV + BESS - Roof - STC	Manning Entertainment Centre	Install 25 kW on the planned new building on the N-W side plus a 50 kWh battery	Building Assets	$70,100
Behind the meter solar	Solar PV + BESS - Roof - STC		Install 50 kW solar PV on the planned new building on the N-W side with a 100 kWh battery	Building Assets	$140,900

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Energy efficiency	Lighting		Upgrade all 150W halogen bulbs and balance of fluorescent lights to LED	Building Assets	$2,343
Energy efficiency	Lighting		Upgrade external lights with dimmable LED sensor lights	Building Assets	$9,373
Behind the meter solar	Solar PV - Roof - STC	Taree Visitor Information Centre	Install 10 kW solar PV on the roofs of the VIC	Building Assets	$10,100
Energy efficiency	Metering and Accounts	Taree Water Office	Sub-meter the depot so that the energy use and demand for the leased offices can be accurately determined, and remove the leased office from Council's energy / carbon footprint	Building Assets	Not estimated
Energy efficiency	HVAC	Manning Regional Art Gallery	Upgrade air conditioning, dehumidifiers and ceiling insulation	Building Assets	$120,000
Energy efficiency	Lighting		Upgrade track lighting and other lighting in the new side of the gallery to LED	Building Assets	$45,000
Behind the meter solar	Solar PV + BESS - Roof - STC		Install an additional 15.7 kW of solar PV on the NW facing roofs of the gallery, potentially with a 30 kWh battery	Building Assets	$42,700
Energy efficiency	HVAC	Taree Library	Upgrade Temperzone AC units with modern energy-efficient units	Building Assets	$56,055
Behind the meter solar	Solar PV - Roof - STC		Install 25 kW of solar PV on the roof of the building	Building Assets	$25,100
Behind the meter solar	Solar PV - Roof - STC	Bootawa WPS	Install 99.8 kW of solar PV on the PS2B roof to remain under the STC limit	Water Services	$99,800
Behind the meter solar	Solar PV - Roof - LGC	Bootawa WTP	Install 99.8 kW rooftop solar on all WTP roofs except old plant building and green storage sheds (excludes PS2B roof) – note if both the WPS and WTP systems are implemented	Water Services	$99,800

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
			the STC opportunity may not apply and should be confirmed with the CER		
Energy efficiency	Lighting	Unmetered Street Lighting	Install LED streetlights for main roads and remaining streetlights (review if smart controls are cost-effective)	Infrastructure	$1,612,452
Behind the meter solar	Solar PV - Ground - STC	Dawson STP	Install ground mount solar array in the north-west corner of the site - 99kW	Water Services	$128,440
Behind the meter solar	Solar PV - Ground - LGC		Install ground mount solar array in the north-west corner of the site - 200kW (alternative option)	Water Services	$359,820
Behind the meter solar	Solar PV - Ground - STC	Hallidays Point STP	Install an additional 40 kW solar PV ground mount system at the south eastern corner (near the existing small rooftop array)	Water Services	$51,350
Behind the meter solar	Solar PV - Ground - STC		Install ~90kW solar PV system based on ground mount at the southwestern corner (alternative option)	Water Services	$117,130
Behind the meter solar	Solar PV - Ground - STC	Old Bar STP	Install 50kW ground mount solar PV on the southern grassed area of the STP	Water Services	$65,780
Behind the meter solar	Solar PV - Ground - STC		Install 99kW ground mount solar PV on the southern grassed area of the STP (alternative option)	Water Services	$129,350
Energy efficiency	HVAC	Great Lakes Aquatic and Leisure Centre	Replace the two pool hall AC systems (R22) with new energy-efficient systems	Building Assets	$171,254
Behind the meter solar	Solar PV - Roof - STC	Hawks Nest STP	Install 99kW solar PV on the three roofs at the south of the STP (below and above the storage tank)	Water Services	$99,800
Behind the meter solar	Solar PV + BESS - Ground - STC	Stroud WTP	Increase onsite solar with a 45 kW ground mount array on the grass area at the rear of the site, with 100 kWh battery to meet most of the site's energy demand.	Water Services	$148,500
Behind the meter solar	Solar PV - Ground - STC	Stroud STP	Install 50 kW ground mount solar at the south of the site near the inlet works	Water Services	$64,740

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Behind the meter solar	Solar PV + BESS - Roof - STC	Stroud Admin and Library	Install 6.7 kW solar array and 14 kWh battery on the rear of the building to meet the site's energy demand	Building Assets	$19,300
Behind the meter solar	Solar PV + BESS - Roof - STC	Tea Gardens WTP	Install 99.5 kW solar PV on all available rooftops, excluding small green storage sheds with single-phase power with 100 kWh battery	Water Services	$99,500
Behind the meter solar	Solar PV + BESS - Roof - STC	Gloucester Library and VIC	Installing 16 kW solar PV and 20 kWh of storage to meet 100% of demand	Building Assets	$34,100
Behind the meter solar	Solar PV - Roof - STC	Forster Tuncurry Community Centre + Health Clinic	Install ~30kW of solar on the sloped north-facing roof to supply the community + senior citizens centres	Building Assets	$30,000
Energy efficiency	Lighting		Upgrade all lights at the centres to LED, including controls where warranted	Building Assets	$22,914
Energy efficiency	HVAC	Gloucester Senior Citizens	Remove remaining electric bar heaters and draw on split system AC only	Building Assets	
Behind the meter solar	Solar PV + BESS - Roof - STC		Install 8 kW of solar PV and 10 kWh of battery storage to meet 100% of demand	Building Assets	$17,000
Energy efficiency	Lighting	Gloucester Administration	Upgrade linear fluorescent lighting to LED	Building Assets	$26,361
Behind the meter solar	Solar PV - Roof - STC	Darawank WPS	Install 17.4 kW of solar PV on the west-facing roof of the WPS	Water Services	$17,400
Behind the meter solar	Solar PV - Roof - STC		Install 34.8 kW of solar PV on the east and west-facing roofs of the WPS	Water Services	$34,800

Appendix E: Long-term mitigation plan for Council operations

TABLE 9: MIDCOAST COUNCIL LONG TERM MITIGATION PLAN FOR COUNCIL OPERATIONS

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Buying clean energy	Electricity Procurement	Whole-of-Council	Develop a plan for successive electricity procurement cycles that integrates sourcing of renewables and periodic analysis of the market for renewables to inform procurement plans.	Sustainability / Procurement	Staff time and/or consulting advice
Buying clean energy – Mid-scale	Solar PV - Ground - LGC	Nabiac WTP	Investigate the feasibility to develop a 1.98 MW E-W 5B mid-scale solar farm on the grounds of the WTP	Water Services	Feasibility costs + $3,562,110
Buying clean energy – Mid-scale	Solar PV - Ground - LGC	Tuncurry Landfill	Investigate the feasibility to develop a 5 MW mid-scale solar PV system on the capped section of the landfill. Feed into grid via the HV line running through the site	Waste	Feasibility costs + $9,022,590
Sustainable transport	Fleet	Whole-of-Council	Progress with the implementation of EV vehicles and EV infrastructure in Council's fleet.	Fleet	Cost premium between petrol / hybrid and EV
Sustainable transport	Fleet		Keep a watch on new developments in vehicle technologies, including fuels (e.g. Hydrogen) and heavy vehicles and plant.	Fleet	Staff time
Waste management	Strategy		Continue to track waste emissions and the impact of abatement measures	Waste	Staff time
Carbon sequestration	Strategy		Continue to track tree canopy and wetlands restoration impacts in terms of estimated carbon sequestration	Natural resources / Sustainability	Staff time
Carbon offsets	Value chain emissions		Track and report on value chain emissions as part of Strategy and emissions updates / reporting	Sustainability	Staff time

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Sustainable Procurement	Services and Equipment Purchasing		Continue to deliver internal engagement and training to encourage the specification of sustainability in all Council buying decisions.	Sustainability / Procurement	Staff time
Sustainable Procurement	Services and Equipment Purchasing		Continue to develop / update specifications and evaluation criteria for services and equipment / products that Council purchases to include Council's sustainability requirements.	Sustainability / Procurement	Staff time
Behind the meter solar	Solar PV - Roof - LGC	Manning Aquatic and Leisure Centre	Install 150 kW of solar PV on the roof of MALC (expansion to prior-installed system)	Building Assets	$224,550
Behind the meter solar	Solar PV - Roof - LGC		Install 333 kW of solar PV on the roof of MALC to maximise the solar capacity on the roof (alternative option)	Building Assets	$499,950
Energy efficiency	Lighting	Manning Entertainment Centre	Install LED stage lighting to replace around 100 older lights	Building Assets	$350,000
Behind the meter solar	Solar PV + BESS - Roof - LGC	Taree Depot	Install an additional 215 kW of solar PV on the vehicle shed and other roofs, together with an estimated 300 kWh of battery storage for future vehicle charging	Building Assets	$591,150
Behind the meter solar	Solar PV - Roof - LGC	Bootawa WPS	Install an additional 143 kW of solar PV on the clear water reservoir	Water Services	$215,100
Behind the meter solar	Solar PV - Roof - LGC	Bootawa WTP	Install 431 kW rooftop solar on all WTP roofs except old plant building and green storage sheds (excludes PS2B roof) (expansion up to this size if 99 kW is already installed)	Water Services	$646,650
Behind the meter solar	Solar PV - Ground - LGC	Hallidays Point STP	Install 200 kW solar PV ground mount system at the southwestern corner	Water Services	$359,820
Behind the meter solar	Solar PV + BESS - Roof - LGC	Great Lakes Aquatic and Leisure Centre	Install 288 kW solar PV system that would cover the GLAC roofs with 200 kWh of battery storage.	Building Assets	$613,200

Category	Sub-category	Site	Abatement option	Responsibility	Cost or resources required
Behind the meter solar	Solar PV + BESS - Carport - LGC		Install an additional 323 kW carport solar PV system with 400 kWh of battery storage, potentially integrated with EV charging for patrons.	Building Assets	$1,426,230
Behind the meter solar	Solar PV + BESS - Roof - LGC	Tuncurry Depot	In the long term consider using the depot for larger-scale solar to charge electric vehicles, with arrays on all roofs. Potentially 153 kW of solar PV can be installed on the roofs with 150 kWh of battery storage.	Building Assets	$365,100
Behind the meter solar	Solar PV + BESS - Roof - STC	Gloucester Depot	Maximise solar PV to meet 100% of demand with a suitably sized battery. Potentially 28 kW of solar PV can be installed on the roof with 30 kWh of battery storage	Building Assets	$55,100
Behind the meter solar	Solar PV - Roof - STC	Kolodong WPS/RES	Install 90.5 kW of additional solar PV next to the existing solar PV arrays on the south western reservoir. All other reservoir tanks are surrounded by large trees.	Water Services	$180,500

Appendix F: Adaptation short-term, medium-term and long-term plans

TABLE 10: MIDCOAST COUNCIL SHORT, MEDIUM AND LONG TERM ADAPTATION ACTION PLAN

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAINFALL	**R006**	Changes in the average annual rainfall may negatively impact businessesthat are reliant on water supply (compounded during peak tourism seasons) placing in higher demand on Council service levels and resources	Water restrictions Drought Mgt Committee (investigation of expansion of bore fields; consider alternative water supplies; desalination; existing use analysis) Communication Strategy	Extreme	Water restriction specific communication strategy Behavioural education to change attitude from water usage to water saving Update Drought Management Plan. Full Integrated Water Cycle Management (IWCM) review		Increased waterstorage. Aquifer recharge	Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAINFALL	**R008**	Changes in the average annual rainfall may result in lack of water supply and water quality for the community (compounded during peak tourism seasons)placing in higher demand on Council service levels and resources	Drinking Water Quality Mgt System Critical Control Points Operational Philosophy (operational procedures) MOU - NSW Health Communication Strategy Water restrictions Drought mgt committee (expansion of borefields; consider alternative water supplies; desal; water carting; existing use analysis; long term capital works planning and delivery)	Extreme			Develop climate independent water sources (dams, desalination, aquifer recharge)	Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAINFALL	R001	Changes in the annual rainfall level may cause a change in the ecosystem thatmay result in the loss of trees, plant and animal species within the physical and natural environment	Community Spaces Vegetation Management Operational Plan Asset Management Plan for natural areas (under development) Draft Biodiversity Framework & Greening Strategy	High	Adopt and implement GreeningStrategy	Corridor creation - refugia and pathways		Environmental Management & Protection
					Finalise Asset Management Plan Adopt and implement Biodiversity Framework Catchment Mgt Plans			Liveable Communities Water Services
	R002	Changes in the annual rainfall level may negatively impact the functionality of Council's recreational facilities, particularly Council's parks and reserves,causing an increased demand on Council's financial and other resourcesto maintain such facilities	Recycled water on some fields Reduced field use Investigation of alternative water sources for recreational facilities Use alternative recreationalsurfaces Recreational Needs Analysis, Strategy and Plan (under development)	High	Refer to current controls.		Use alternative recreational surfaces (>10 years)	Liveable Communities Water Services
					Investigate the introduction of flexible hours as more mowing is required when it's raininga lot. Staff may do less during winter and more during growing season. Ensure Council's long- term financial stability. Make sure that financial resources are available.	Revisit mix of permanent staff versus contractors.		Corporate Services & Community Spaces

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAINFALL	**R003**	Changes in the annual rainfall level may cause variations in the environmental flows negatively impacting water-dependent ecosystems	Cease to pump for drinking water supply Investigations in trophic fish species and requirements for sustained growth during reduced rainfall periods Partnership projects with DPI Fisheries	High	Refer to current controls.			Environmental Management & Protection Water Services
RAINFALL	**R004**	Changes in the average annual rainfall level may result in an increased success of weed and pest species resulting in the threat to or loss of plant andanimal species within the natural environment, placingin higher demand on Councilresources to manage the impact	Weed Management Program Bush regeneration program on public reserves Participation in regional weed committee	High	Plant surveys and monitoring of threatened species			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAINFALL	**R007**	Changes in the average annual rainfall may result in an increased cost for asset maintenance and construction,as well as decreased quality, as water is essential to theseactivities may increase in cost and may have to be carted from greater distances than at present	Deferring maintenance programs where water is required (e.g. grading) Sourcing alternative watersupplies (bore, recycled, etc.) Internal operational responses (e.g. prioritisation of programs depending on criticality)	High	Seek approval for use of recycled water for roadworks program		Sealing gravelroad network	Infrastructure & Assets
					Deferring maintenance programs where water is required (e.g. grading) Internal operational responses (e.g. prioritisation of programsdepending on criticality)	Sourcing alternative water supplies (bore, recycled, etc.) - embed into BAU		Liveable Communities Water Services
FIRE WEATHER	**F012**	Increased number of FFDI days may increase the risk of damage to Council assets and infrastructure negatively impacting Council's service levels to the community	Pollution Incident Response Mgt Planfor waste centre Waste Mgt Contracts incl emergency response and business continuity plans (BCP) Asset Mg Plans, EMPLAN, IWCM	Extreme	Maintain APZs (Asset Protection Zones)			Infrastructure & Assets
					Increase team awarenessof BCP. Implement Disaster Management plan explaining steps required	Education around fire-resistant trees. Contingency water supply capacity, i.e. Taree supplied fromNabiac.		Community Spaces Recreation & Trades

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
			Operating Procedures Identification of critical assets for continued service delivery and response prioritisation through Emergency Operating Centre MCC Business Continuity Plan Insurance		if BCP implemented, i.e. internal and external comms Identify critical assets aspart of Asset Management Plan. Ensure future construction meets appropriate Bushfire Attack Level requirements.			
FIRE WEATHER	**F001**	Increased number of FFDI days may cause increased safety risks within the community, resulting in increased injuries or loss of life, and / or ongoing trauma, higher demand on emergency response and Council resources for recovery efforts and maintenance of community resilience	LEMO EMPLAN Bushfire controls and mapping (RFS and Council) Hazard reduction Bushfire Risk Mgt Committee	High	Review fast-track bushfire response assessment and inspection team processes to update Council response and capability framework and process			Land Use Planning & Development

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
FIRE WEATHER	**F002**	Increased number of FFDI days may cause changes to the natural environment resulting in an increased risk to ecosystems	Bushfire controls and mapping (RFS and Council) Hazard reduction Bushfire trails Bushfire management plans	High	Cultural burning regimes Vulnerability assessmentto prioritise assets to protect Fire history for natural areas Rainforest & coastal wetland mapping			Environmental Management & Protection
					Appoint internal resourceto address identified risks	Hazard reduction Bushfire trails Bushfire management plans -revised and implemented		Community Services

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
FIRE WEATHER	**F004**	Increased number of FFDI days may cause loss/damage to private property including residential and businesses due to fire, fallen trees, accidents due to smoke reducing visibility levels	Bushfire controls and mapping (RFS and Council) EMPLAN Management of public land Insurance	High	Update bushfire mappingand embody regular review Ensure our practices (assessment and strategic planning) are in keeping with current state policy			Land Use Planning & Development
FIRE WEATHER	**F005**	Increased number of FFDI days may cause an increased strain on Council's resources due to staff having to be involved in supporting emergency services during and after the fire events	MCC Business Continuity Plan LEMO Adhoc emergency response with agencies EMPLAN	High	Make sure that staff are aware and trained in the Business Continuity Plan	Develop climate emergency plan about staff deployment and restperiods as staff may not be able to come to work. Make sure that staffare aware and trainedin the Business Continuity Plan. Make sure that staffare familiar with andhave the ability to operate under State Emergency Agencies.		Corporate Services

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
FIRE WEATHER	**F008**	Increased number of FFDI days will cause an increase in water pollution due to sediment and fire debris entering waterways which may threaten ecosystems	Education and awareness for staff Community education on decreased water quality / clarity	High	Riparian revegetation and programs for private landholders Coastal Management Program			Environmental Management & Protection
FIRE WEATHER	**F009**	Increased number of FFDI days may degrade ecosystems and increase the cost of associated Council resources to manage the impact	Land management contracts Environmental special rate Bushfire controls and mapping (RFS and Council) Hazard reduction Bushfire trails	High	Identifying vulnerable assets and adopting management strategies	Bushfire management plans - revised and implemented Asset management plans - revised and implemented		Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
FIRE WEATHER	**F011**	Increased number of FFDI days may result in an inability to deliver critical services to the high risk, vulnerable and isolated members of the community	Education in emergency preparedness MCC Business Continuity Plan	High	Ensure practical emergency exercise is carried out Update BCP			Liveable Communities
FIRE WEATHER	**F013**	Increased number of FFDI days may cause a risk of contamination on private and public land	Contaminated land policy OSSM Development Assessment Framework Asbestos register SEPP55 - Remediation of Contaminated Land	High	Continue to review and implement contamination policy Ensure timely response to inspection to fire-affected properties to identify potential sources of contamination			Land Use Planning & Development
SEA LEVEL RISE	**SLR003**	An increase in sea level could cause loss/damage to adjoining Council infrastructure negatively affecting Council's ability to provide services to the community and businesses (relates to transport assets; community and recreation	Asset Management Plan Development controls Coastal Management Program	Extreme	Review BCP for changes due to Yalawanyi Ganya office move. Increase team awareness of BCP. Implement Disaster Management plan	Retrofit mitigation into existing buildingbased on Asset Management Plans and LTFP (Long TermFinancial Plan)		Community Spaces Recreation & Trades

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
		facilities; water and sewer assets, public onsite sewage management systems)	Floodplain Management Program Jimmy's Beach Sand Transfer Infrastructure Design specifications for new infrastructure IWCMs Inspection and renewal programs OSSM Development Assessment Framework Probabilistic Hazard Modelling(Old Bar ManningPoint area under development) SEPP-Infrastructure		explaining steps requiredif BCP implemented, i.e. internal and external comms. Identify critical assets aspart of Asset Management Plan. Ensure future construction meets appropriate flood level requirements.			
					Asset Management Plan Development controls Coastal Management Program Floodplain Management Program Jimmy's Beach Sand Transfer Infrastructure Design specifications fornew infrastructure IWCMs			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
					Inspection and renewal programs OSSM Development Assessment Framework Probabilistic Hazard Modelling (Old Bar Manning Point area underdevelopment) SEPP-Infrastructure			
					Give consideration to development 'caps' where infrastructure is likely to fail in the medium term due to sea-level rise and associated impacts.			Land Use Planning & Development
							Planned retreating of infrastructure Understanding and stabilising source of beach erosion.	Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
SEA LEVEL RISE	**SLR001**	An increase in sea level may cause loss/changes to key ecosystems, negatively impacting on tree, plant and animal species, which could reduce ecosystem services such as nutrient and sediment removal, etc. from wetland, salt marsh and littoral rainforest areas	Coastal Management Program Coastal wetland and littoral rainforest mapping Coastal Wetlands Strategy Asset Management Plans	High	Bush regeneration program Identifying areas for retreat for wetlands and rainforest Implement Coastal Management Program (CMP)			Environmental Management & Protection
SEA LEVEL RISE	**SLR002**	An increase in sea level rise could cause loss/damage to coastal nature reserves (conservation spaces incl. foreshore vegetation); beaches; public recreational sites (passive and active); public recreational facilities; scenic amenity and public accesses, resulting in negative impacts on recreational activities, surf lifesaving activities, local economy and tourism	Coastal Management Program Condition assessments of natural infrastructure Economic development plans	High	Implement CMP		Review CMP	Liveable Communities
					Strategic planning and development to be involved in review of ED plans.			Land Use Planning & Development
							Appropriate placement of infrastructure	Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
SEA LEVEL RISE	**SLR004**	An increase in sea level may cause changes to private and public land use due to erosion, re-alignment of shores, increased flooding, inundation, wave overtopping events and salinisation, negatively affecting landholders, residents and businesses	Notifications on planning certificates LEP & DCP development controls Coastal Management SEPP Coastal Management Program	High	Refer to current controls.			Environmental Management & Protection
					Policy which provides clear direction as to how coastal recession is to be considered in assessmentof development applications. Need to identify reasonable and acceptable emergency management measures. Consider zones and landuse within areas at risk.	Identify relocationareas for persons displaced by sea- level rise.	Commence implementatio nof relocation strategies	Land Use Planning & Development
SEA LEVEL RISE	**SLR005**	An increase in sea level may negatively impact water quality due to the salinisation (salt wedge) and inundation of coastal freshwaters / salt marshes and mangroves resulting in damage/loss to the natural Environment	Coastal Management Program	High	Research with NRM agencies Review and update entrance opening strategy			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
SEA LEVEL RISE	**SLR006**	Uncertainty in decision making around coastal planning and development relating to sea-level rise and coastal processes resulting in legal liability or damage to reputation	LEP & DCP development controls Coastal Mgt SEPP Coastal Mgt Program Planning Certs Insurance Land use planning Notification on Planning Certs	High	Engage with relevant State agencies to define responsibilities. Consider development 'caps' where infrastructureis likely to fail in the medium term due to sea-level rise.			Land Use Planning & Development
S	**SLR009**	Sea level rise inundation results in failure of private onsite sewage management systems leading to potential pollution and negative impacts on public health, with increased costs to Council	Onsite DAF DCP / LEP Flood Management Plan OSSM (OnsiteSewerage Management) Development Assessment Framework	High	Refer to current controls. Strategic planning - engage with water services on unsewered villages risk priority prog Finalise implementation of onsite DAF within DCP			Environmental Management & Protection Land Use Planning & Development

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
SEA LEVEL RISE	**SLR010**	Increase in sea level may impact on Tuncurry Waste Management Centre resulting in leachate into estuaries, contamination of water table and contamination of private land	Leachate monitoring program	High	Capping of landfill (underway)			Environmental Management & Protection
RAIN INTENSITY and SEVERE STORM	**RI001**	An increase in the number of extreme rainfall/storm events may cause loss/damage to Council's natural and built assets and infrastructure negatively impacting Council's ability todeliver services to the general and business community	Asset Management Plans Design and construction specifications Emergency response (adhoc) EMPLAN IWCM Insurance Floodplain Management Plan Drinking-Water Quality Management system	Extreme	Review restraints on Yalawanyi Ganya and implement mitigationplan Link to BCP Link to Disaster Management Plan Create Flood Response Plan Holistic QA system to link everything together	Implement Asset upgrades to relieveseverity and likelihood of loss/damage		Community Spaces Recreation & Trades
					Revegetation of canopy gaps to increase resilienceof forest areas			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
	RI001		Critical Control Points Operational philosophy (operational procedures) Long term capital works planning and delivery Identification of critical assets for continued service delivery and response prioritisation through Emergency Operating Centre(EOC) Tree Management Policy and Procedure on Public Land					

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE STORM	**RI002**	An increase in the number of extreme rainfall/storm events may cause loss/damage to public and private property and servicesdue to fallen trees, accidentsdue to intense rain periods, etc., which could result in public safety issues	Tree Management Policy and Procedure on Public Land Operations - emergency response call-outs Water & Sewer - emergency response - customer requests	Extreme	Implementation of Council Tree ManagementTeam Coordination of assets and requests into Councilasset management system			Community Spaces Recreation & Trades
					Emergency Response Plan - Identification of infrastructure criticality. Alternate power sources availability.	Designs for new assets to consider AR&R 2019 rainfall quantity and methodology.		Infrastructure & Assets
RAIN INTENSITY and SEVERE STORM	**RI003**	An increase in the number of extreme rainfall/storm events may cause increased rates of erosion resulting in surface runoff and stormwater pollution, affecting the natural and physical environment	Riverbank management plan LEP / DCP Sediment and erosion controls during works Catchment Prog MOU with Local Land Services Limited extractionof turbid water	High	Revise Manning Riverbank Management Study Refer to current controls.			Environmental Management & Protection
					Embed appropriate safeguards within development assessmentto ensure water quality, detention and erosion is appropriately addressed.			Land Use Planning & Development

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE	**RI005**	An increase in the number of extreme rainfall/storm events may impact the quality of water catchments due to surface runoff and sewer overflows entering the stormwater system and affecting creeks, wildlife and the natural environment	Asset Mgt Plans IWCM Internal operating procedures Riverbank Management Plan LEP / DCP Sediment and erosion controls during works Catchment Mgt Program MOU with LLS Drinking-Water Quality Mgt system Critical Control Points Operational Philosophy / procedures	High	Sewer overflow - smoke testing, avoid infiltration. Ensuring sediment and erosion control at worksites.			Infrastructure & Assets
					Refer to current controls.			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE STORM	**RI006**	An increase in the number of extreme rainfall/storm events may cause an increased strain on Council's resources due to staff havingto be involved in supporting emergency services during and after the storm events	MCC Business Continuity Plan LEMO Adhoc emergency response with agencies EMPLAN	High	PPE availability Increase ability to work remotely Increase ability to access assets after hours	Develop climate emergency plan for staff Deployment and rest periods as staff may not be able to come to work. Make sure that staff are aware and trained in the Business Continuity Plan. Make sure that staff are familiar with and have the ability to operate under State Emergency Agencies.		Community Spaces Recreation & Trades
					Refer to current controls.			Environmental Management & Protection
					Resource plan - staff, spare parts, generators,etc available for responding to events.			Infrastructure & Assets
					Ensure there is flexibility in the budget for changing work conditions. Review the effectivenessof on-call arrangements,e.g., roads and water people who are rosteredon call in case of after-hours.			Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	
	RI007	An increase in the number of extreme rainfall/storm events may increase the risk of loss/ damage to public utility services causing power outages/ interruptions to Council buildings and services (air-conditioning, communications, equipment, IT, lighting, etc.) negatively impacting Council's ability to maintain service levels and staff safety	Backup generators for some essentialservices MCC Business Continuity Plan EMPLAN SWMS / Risk Assessment	High	Rollout Generator program to significant community assets Upgrade assets to incorporate solar and storage where appropriate	Investing in generators or generator capable connection.		Community Spaces Recreation &Trades
					Implementation of the Business Continuity Plan (BCP). Amendments and revisions to the BCP as needed.	Implement and perform major review ofBCP Train staff in BCP		Corporate Services
					Planning guidelines require consideration of emergency managementfor community (public and private) facilities Renewals/modifications to incorporate emergency management/facilities capacity			Land Use Planning & Development

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE STORM	**RI009**	An increase in the number of extreme rainfall/storm events may result in a breachof the sewerage reticulation network and capacity of pumping stations causing the discharge of raw sewer leading to public health and safety issues, environmental issues and damage to private property	Design and construction specifications Generators Internal operating procedures Inspections and monitoring Renewal programs Drinking-Water Quality Management Plan Operational Philosophy (operational procedures)	High	Inflow infiltration investigation (e.g. target behavioural change programs) Asset inspections such as manholes Smoke testing Identification and rectification of defects (allsewer assets that let water in from degradation)	Fix identified issues		Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE STORM	**RI010**	An increase in the number of extreme rainfall/storm events may result in stormwater infrastructure having insufficient capacity to cope with the water flowsleading to public health and safety issues, environmental issues and damage to private property	Design and construction standards Asset Management Plan Stormwater Management Plans Insurance Floodplain Management Plan	High	Undertake studies, esp. for the former Greater Taree area (many ageing systems)			Infrastructure & Assets
RAIN INTENSITY and SEVERE STORM	**RI014**	An increased number of extreme rainfall/storm events may increase mosquito vector activity across the LGA, potentially increasing the number of mosquito-related diseases circulating within the community	PPE Maintenance of drainage and stormwater easements Scheduled cleaningof stormwater system Collaboration with NSW Health Education campaigns / mediareleases	High	Refer to current controls.			Environmental Management & Protection
					Education program.			Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE STORM	**RI015**	An increased number of extreme rainfall/storm events may lead to increasedfailures of OSSM, resulting inan increase in polluted surface waters entering drainage channels and stormwater easements etc.	OSSM Development Assessment Framework Environmental monitoring in sensitive catchments	High	Refer to current controls.			Environmental Management & Protection
RAIN INTENSITY and SEVERE STORM	**RI016**	An increase in the number of extreme rainfall/storm events may result in polluted/contaminated runoff (that may contain disease-causing pathogens), entering local waterways. This is likely to increase the risk and frequency of closures of aquaculture areas, agriculture and local industry and negatively impact the local economy and tourism	Reactive responseto complaints Use of delegated authority to issue Prevention and Clean-up Notices Trained and experienced staff	High	Refer to current controls.			Environmental Management & Protection

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
RAIN INTENSITY and SEVERE	**RI017**	An increase in the number of extreme rainfall/storm events may impact Council's Waste Management Centres, resulting in leachate overflow into the environment (e.g. estuaries),contamination of water tableand private land, non- compliance with EPA licence,public health issues and service delivery interruptions	Critical Control Points Operational Philosophy (operational procedures) Long term capital works planning and delivery Planned maintenance and inspection programs Pollution Incident Response Management Plan Leachate Monitoring Program Compliance with Environmental Protection Licence conditions and audits	High	Refer to current controls.			Environmental Management and Protection
						Investigate and implement improvements to capacity of leachateponds.		Infrastructure and Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
			Waste Mgt Contracts, including emergency response and business continuity plans MCC Business Continuity Plan Insurance					
TEMPERATURE	**T006**	Increased average annual temperature may increase the occurrence of algal blooms and other water-borne micro-organisms causing a reduction in water quality and a risk to public safety	Algal Management Plan Compliance EP&AAct Community Notification and Education Operational Philosophy - e.g. Water Storage (Bootawa Dam)	High	WSUD guidelines and policy Monitoring water quality across the catchment Inclusion of WSUD in capital works program Manage riparian zone	Increased capacity ofaquifer extraction.	Aeration of water upstreamof Bootawa / Gloucester / Stroud intake	Infrastructure & Assets
					Water monitoring Update urban stormwater management plans			Environmental Management & Protection
					Community Notification and Education			Water Services

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
TEMPERATURE	**T007**	Increased average annual temperature may lead to increased water consumption on both privateand public land placing in higher demand on Council service levels and resources	Community education and awareness programs Water efficiency initiatives - i.e. water restrictions Alternative water sources Long term capital works planning and delivery	High	Refer to current controls.	Investigate and implement alternative watersources	Long term capital works planning anddelivery	Water Services
HOT DAYS	**HD001**	Increased number of hot days above 35 degrees couldcause an increased risk of heatstroke, mental health issues, possible death and general safety issues within the vulnerable community resulting in increased stress on social and public health services	Community education Providing cool facilities (e.g. Library) EMPLAN Water stations in some public spaces Draft Greening Strategy	High	Adopt & implement GreeningStrategy Ensure publicly accessible buildings have A/C or are designed to benefit from passive solar design principles	Community education EMPLAN		Liveable Communities

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
HOT DAYS	**HD005**	Increased number of hot days above 35 degrees may result in higher energy usagewithin Council buildings and facilities causing an increase in Council's greenhouse gas emissions and affecting Council's carbon footprint	Monitor energy consumption and audits (Azility data) Existing energy efficiencies measures Timers on air conditioning / control of temperatures Consideration in new building designs and building renewals LED lighting opportunities in sports fields and buildings Climate Change Policy and Adaptation / Mitigation Strategy (under development)	High	Refer to current controls.	Increase the weighting/criticality of passive solar design and energy efficiency into new public building infrastructure		Liveable Communities
					Renewable Power Purchase Agreement Investigation into renewables Adoption of plans Flexible working hours to reduce AC usage Retrofitting buildings more sustainable; Green walls; shading; insulation(could be part of buildingmanagement plan)			Environmental Management & Protection
					Solar installation on existing Council buildings Shading of western walls Sealing of buildings	Solar orientation of buildings -regulations (DCP) Cross ventilation requirements -regulations (DCP)		Infrastructure & Assets

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
					Asset management plansto incorporate efficiency upgrades New buildings to include efficiency measures Prioritise future scope of works based on criticality, usage and outcomes Educate users on efficient energy usage	Implement a capital works program forsignificant efficiency upgrades		
					Flexible working hours to lower air-conditioning energy demand. Fit adaptation into funding strategy. Make sure that IT equipment procurement follows sustainable purchasing guidelines. Encourage community groups to incorporate energy efficiency principles within retrofits or extensions.			Corporate Services
							Incorporate energy efficiencyin the specification for new community facilities.	Community Services

	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
HOT DAYS	**HD006**	Increased number of hot days above 35 degrees couldcause reduced productivity and workplace health and safety issues for Council staff, volunteers and contractors	WHS System JSAs, toolbox meetings Sun-safe Policy Supervisor Consultation Forms Education Building design and construction controls	High	Flexible working arrangements so that staff can work when it'scooler.	Develop extreme heat procedure. Revisit contractor engagement to see ifthey have their own policies in place. Extreme heat procedure for volunteers		Corporate Services
HOT DAYS	**HD008**	Increased number of hot days may lead to increased water consumption on both private and public land placing in higher demand on Council service levels and resources	Community education and awareness Water efficiency initiatives - i.e. water restrictions Alternative water sources IWCM Long term capital works	High	Education for self water sources, water tanks.	Recycled water - irrigation Stormwater harvesting	Recycling water -to potable source	Infrastructure & Assets
					Community education and awareness programs Water efficiency initiatives - i.e. water restrictions	Investigate alternatewater sources	Alternative water sources Long term capital works planning anddelivery	Liveable Communities Water Services

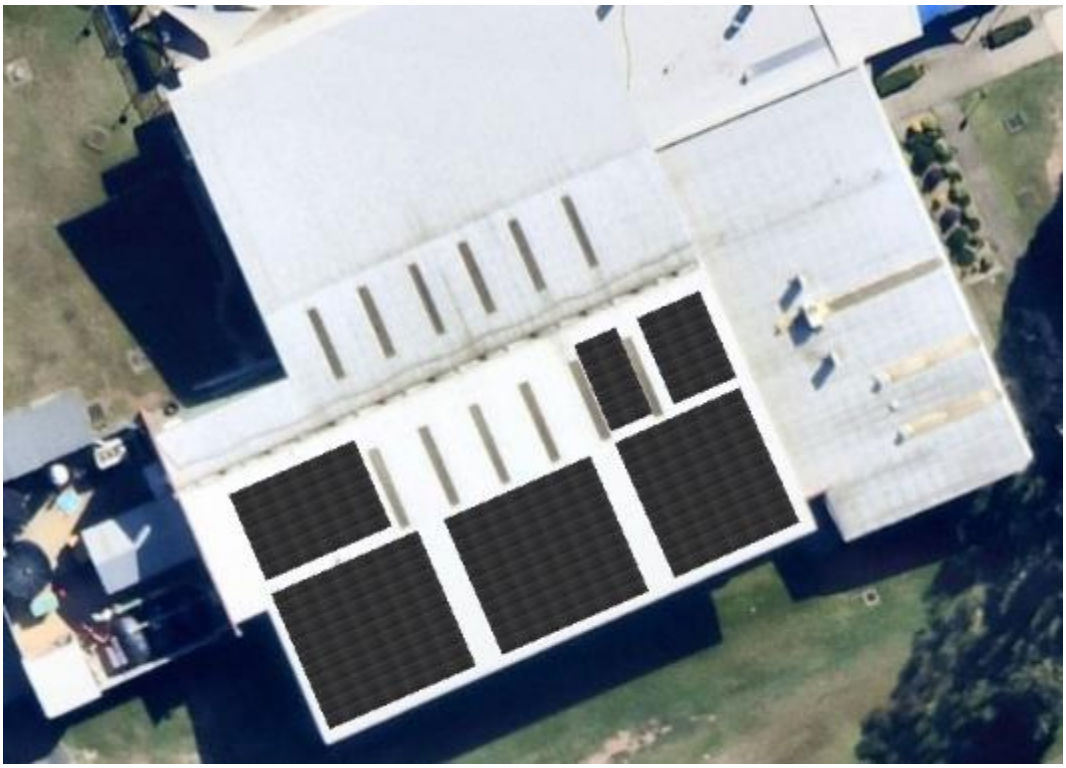
	Risk ID	Risk statement	Current controls	Rating	Short-term adaptation action(s)	Medium-term adaptation action(s)	Long-term adaptation action(s)	Responsibility
WIND	**WCI1**	An increase in average daily wind speed could cause increased damage to water and sewer built assets as a result of falling limbs and trees caused by droughts, fire and storms leading to disruptions to service delivery	Generators Vegetation clearing around pump stations and treatment plant Manual control Structural design in accordance with AS wind code, etc. MCC Business Continuity Plan	High	Planting appropriate treesfor shelter.			Water Services
WIND	**WCI2**	An increase in average daily wind speed could impact electrical and telecommunications supply which would affect SCADA and communication controls between water and sewer assets	Generators Vegetation clearing around pump stations and treatment plant Manual control Structural design in accordance with AS wind code, etc. MCC Business Continuity Plan	High		Consider and develop redundancy systems.		Water Services

Appendix G: Solar PV potential locations

Council-owned sites

Manning Aquatic and Leisure Centre – 25 kW – Short-term option - Roof-mounted solar PV

Manning Aquatic and Leisure Centre – 99.5 kW – Medium-term option – Roof-mounted solar PV



Manning Aquatic and Leisure Centre – 149.7 kW – Long-term option 1 – Roof-mounted solar PV

Manning Aquatic and Leisure Centre – 333.3 kW – Long-term option 2 – Roof-mounted solar PV

Manning Entertainment Centre – 25.1 kW – Medium-term option 1 – Roof-mounted solar PV on new building

Manning Entertainment Centre – 50.9 kW – Medium-term option 2 – Roof-mounted solar PV on new building

Taree Visitor Information Centre – 10.1 kW – Medium-term option – Roof-mounted solar PV

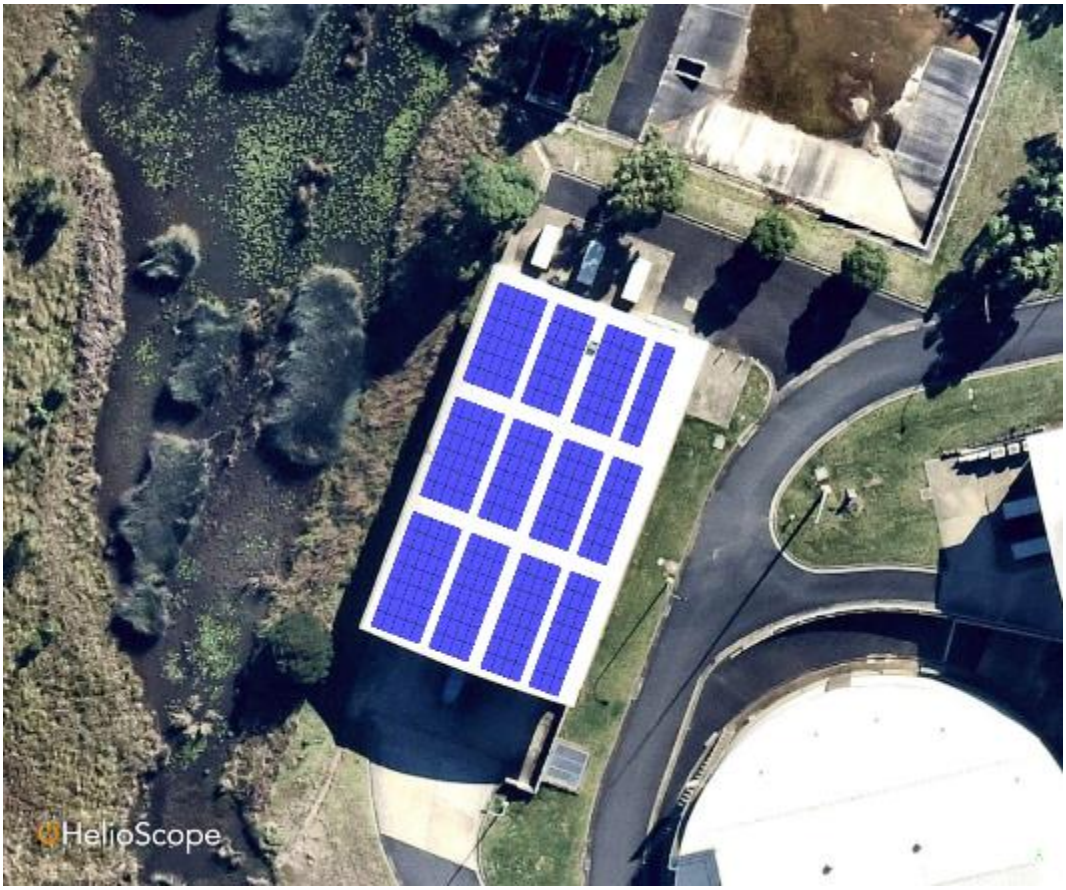
Manning Regional Art Gallery – 15.7 kW – Medium-term option – Roof-mounted solar PV

Taree Depot – 36.9 kW – Short-term option – Roof-mounted solar PV

Taree Depot – 214.1 kW – Long-term option – Roof-mounted solar PV

Taree Library – 25.1 kW – Medium-term option – Roof-mounted solar PV

Bootawa WPS – 99.8 kW – Medium-term option 1 – Roof-mounted solar PV



Bootawa WPS – 143.4 kW – Long-term option – Roof-mounted solar PV

Bootawa WTP – 99.8 kW – Medium-term option – Roof-mounted solar PV

Bootawa WTP – 431.1 kW – Long-term option – Roof-mounted solar PV

Dawson STP –98.8 kW – Medium-term option 1 – Ground-mounted solar PV

Dawson STP – 199.9 kW – Medium-term option 2 – Ground-mounted solar PV

Lansdowne STP – 10.1 kW – Short-term option – Roof-mounted solar PV

Hallidays Point STP – 50.6 kW – Short-term option – Roof-mounted solar PV

Hallidays Point STP – Additional 39.5 kW – Medium-term option 1 – Ground-mounted solar PV

Hallidays Point STP – 90.1 kW – Medium-term option 2 – Ground-mounted solar PV

Hallidays Point STP – 90.1 kW – Long-term option – Ground-mounted solar PV

Old Bar STP – 50.6 kW – Medium-term option 1 – Ground-mounted solar PV

Old Bar STP – 99.5 kW – Medium-term option 2 – Ground-mounted solar PV

Nabiac WTP – 98.5 kW – Short-term option – Roof-mounted solar PV

Great Lakes Aquatic and Leisure Centre – 80 kW – Short-term option 1 – Roof-mounted solar PV

Great Lakes Aquatic and Leisure Centre – 119.9 kW – Short-term option 2 – Roof-mounted solar PV

Great Lakes Aquatic and Leisure Centre – 288.8 kW – Long-term option 1 – Roof-mounted solar PV

Great Lakes Aquatic and Leisure Centre – Additional 323.1 kW – Long-term option 2 – Carport solar PV

Hawks Nest STP – 74.7 kW – Short-term option – Roof-mounted solar PV

Hawks Nest STP – 99.8 kW – Medium-term option – Roof-mounted solar PV

Stroud WTP – 45 kW – Medium-term option – Ground-mounted solar PV

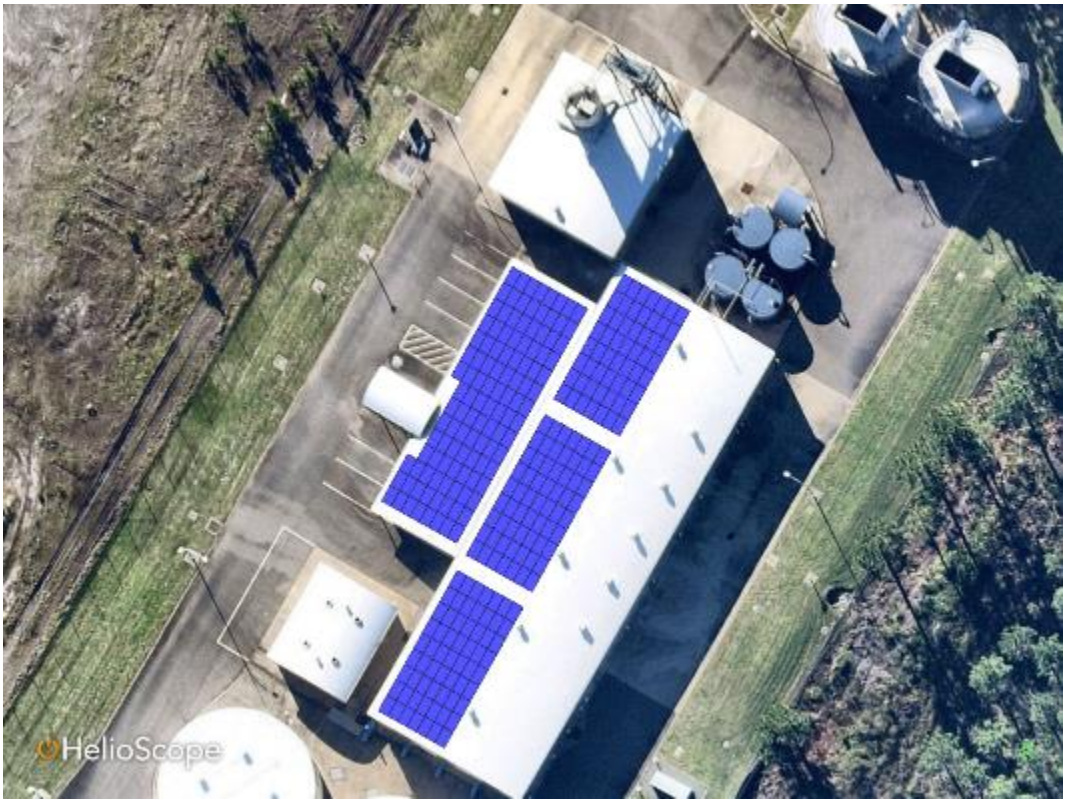
Stroud STP –21.1 kW – Short-term option – Roof-mounted solar PV

Stroud STP – 49.8 kW – Medium-term option – Ground-mounted solar PV

Stroud Admin and Library – 6.7 kW – Medium-term option – Roof-mounted solar PV

Tea Gardens WTP – 50.3 kW – Short-term option – Roof-mounted solar PV

Tea Gardens WTP – 99.5 kW – Medium-term option – Roof-mounted solar PV



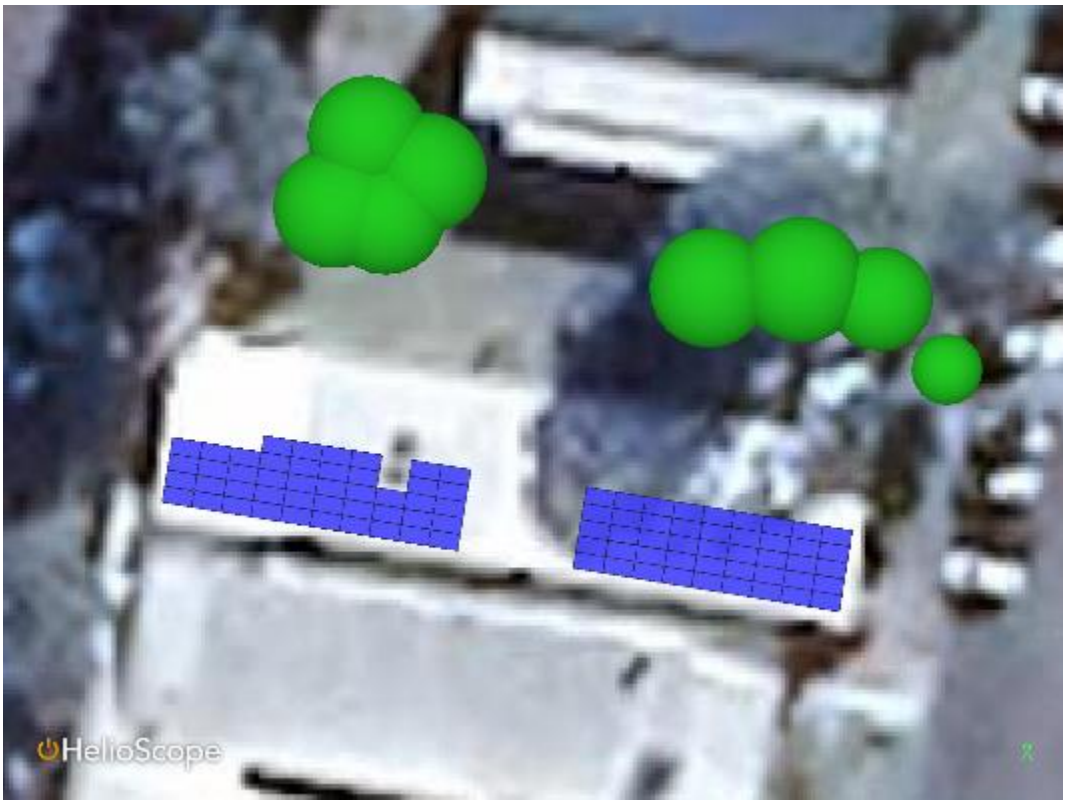
Gloucester Library and VIC – 10.1 kW – Short-term option – Roof-mounted solar PV

Gloucester Library and VIC – 16.1 kW – Medium-term option – Roof-mounted solar PV

Tuncurry RTP – 50.3 kW – Short-term option 1 – Roof-mounted solar PV

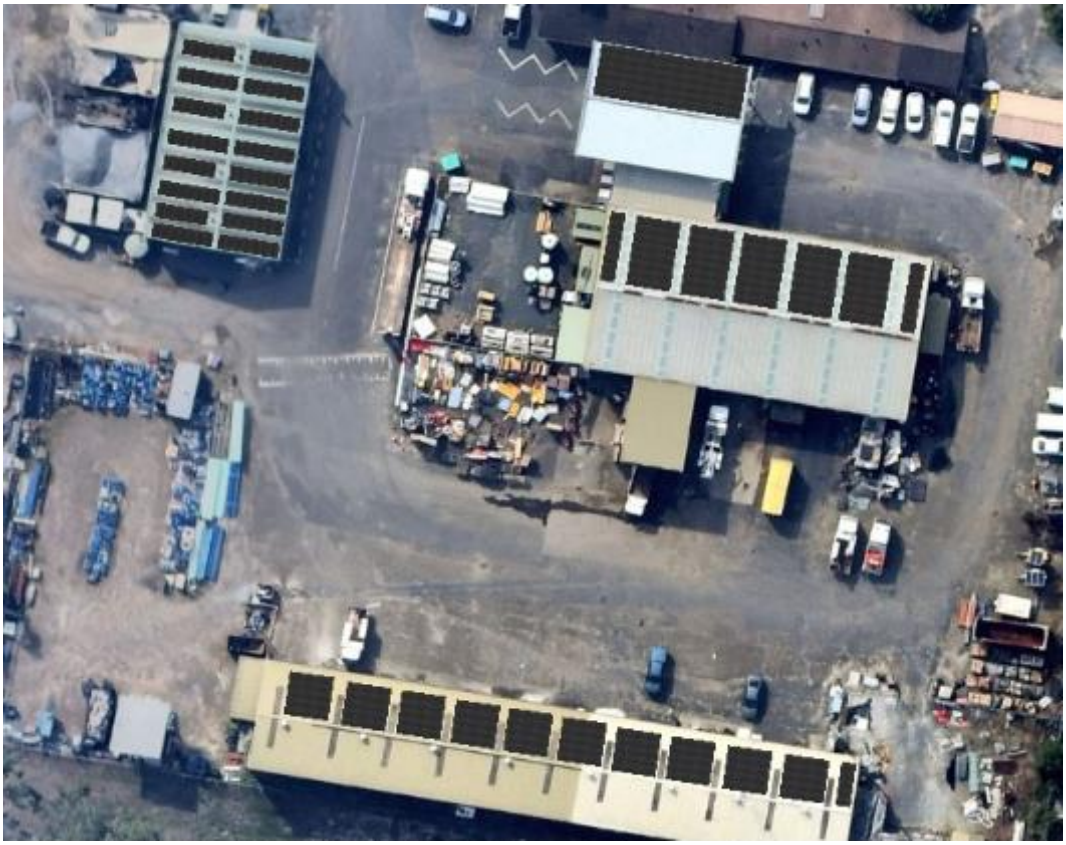
Tuncurry RTP – 78.4 kW – Short-term option 2 – Roof-mounted solar PV

Forster Tuncurry Community Centre + Health Clinic – 30 kW – Medium-term option – Roof-mounted solar PV



Tuncurry Depot – 16.1 kW – Short-term option – Roof-mounted solar PV

Tuncurry Depot – 153.4 kW – Long-term option – Roof-mounted solar PV



Gloucester Depot – 10.1 kW – Short-term option – Roof-mounted solar PV

Gloucester Depot – 28.1 kW – Long-term option – Roof-mounted solar PV

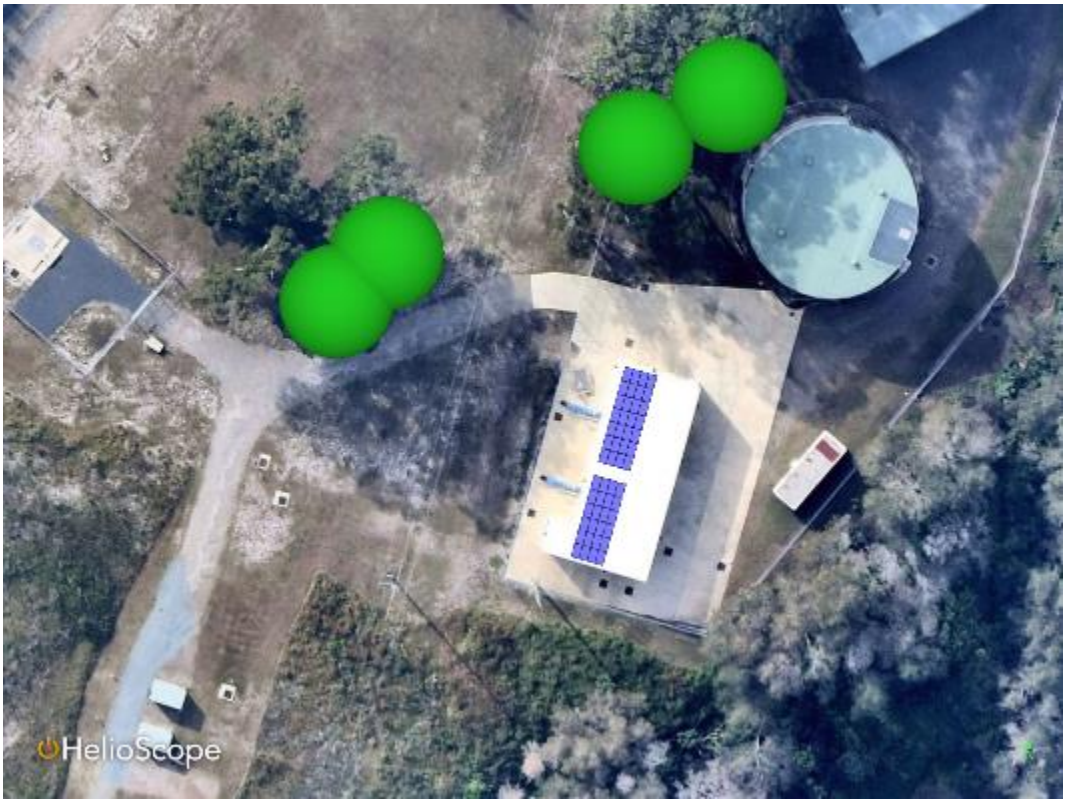
Harrington SPS-09 – 8 kW – Short-term option – Roof-mounted solar PV

Gloucester Senior Citizens – 5 kW – Short-term option – Roof-mounted solar PV

Gloucester Senior Citizens – 8 kW – Medium-term option – Roof-mounted solar PV

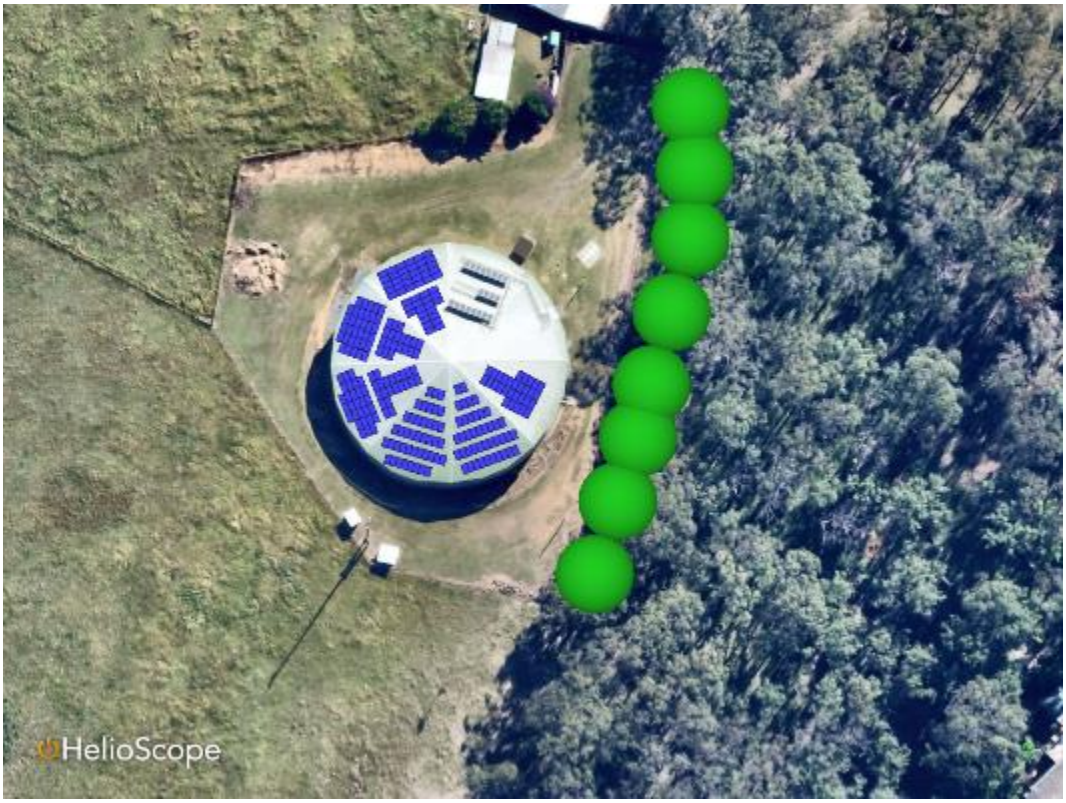
Bulahdelah STP – 37.9 kW – Short-term option – Roof-mounted solar PV

Darawank WPS – 17.4 kW – Medium-term option 1 – Roof-mounted solar PV

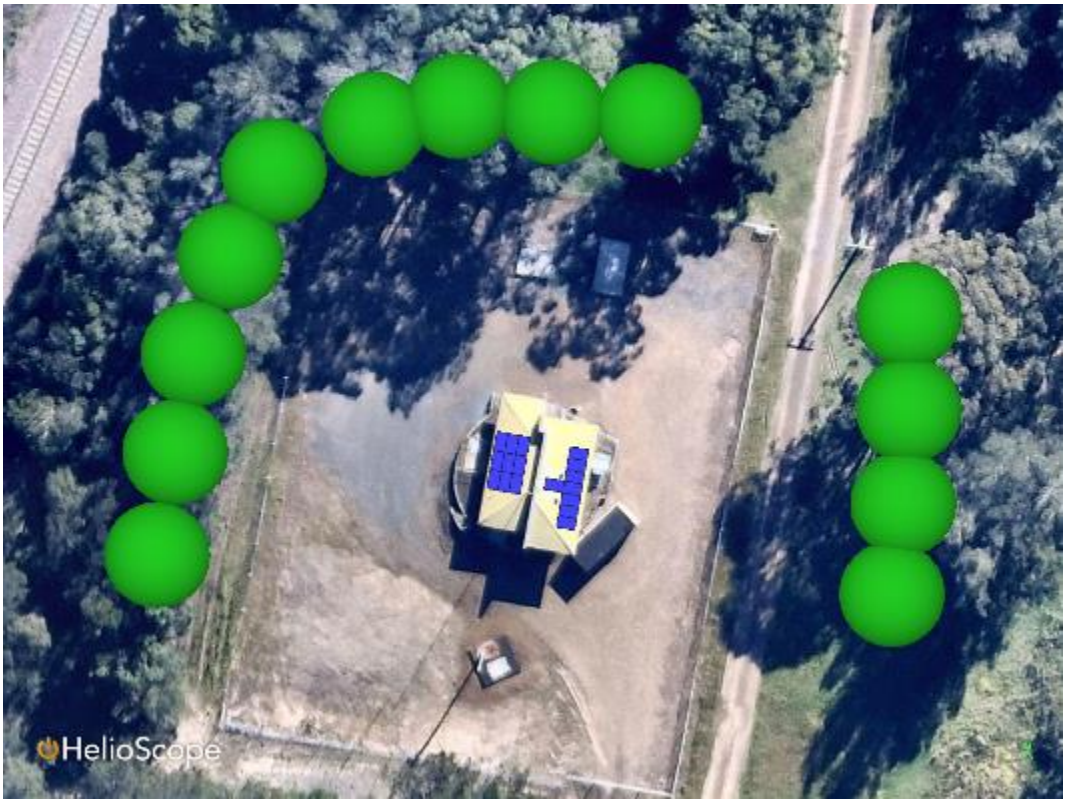


Darawank WPS – 34.8 kW – Medium-term option 2 – Roof-mounted solar PV

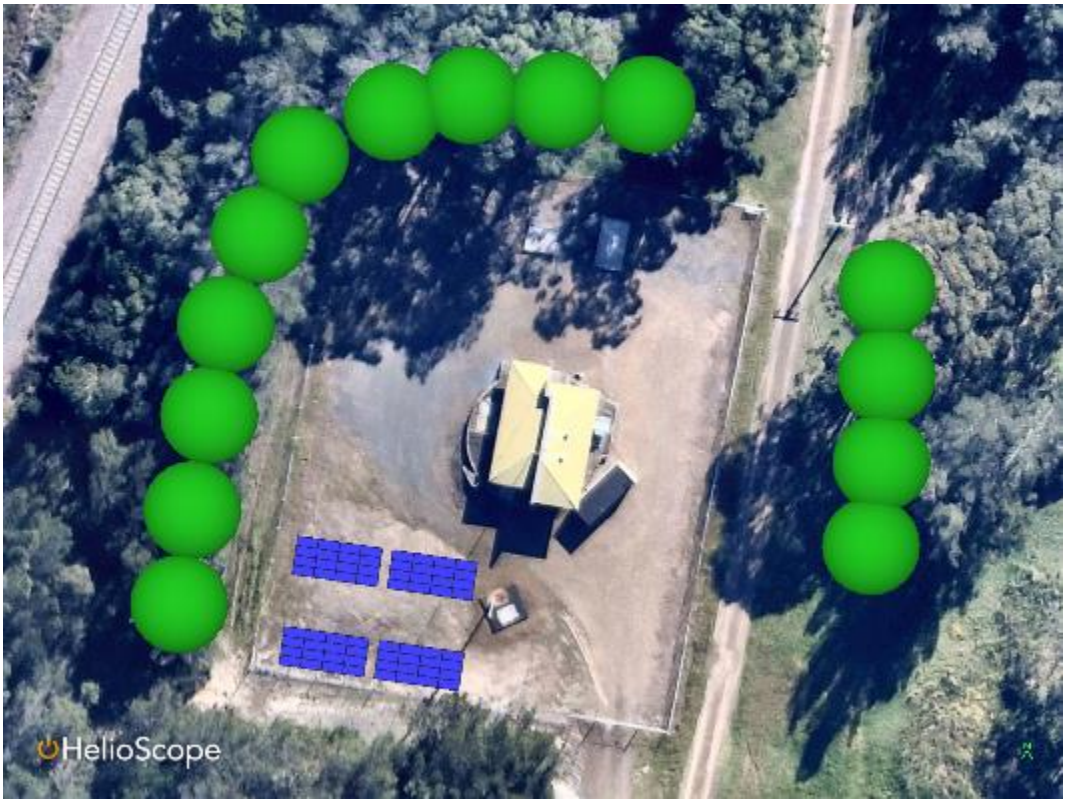
Kolodong WPS/RES – 90.5 kW – Long-term option – Roof-mounted solar PV



Lawson Crescent SPS-06 – 5.76 kW – Short-term option 1 – Roof-mounted solar PV



Lawson Crescent SPS-06 – 25.3 kW – Short-term option 2 – Post-mounted solar PV



Manning Point STP – 18.1 kW – Short-term option 1 – Roof-mounted solar PV

Manning Point STP – 36.5 kW – Short-term option 2 – Roof-mounted solar PV

Coopernook STP – 8.04 kW – Short-term option – Roof-mounted solar PV

Tea Gardens SPS-09/13 – 20.1 kW – Short-term option 1 – Roof-mounted solar PV

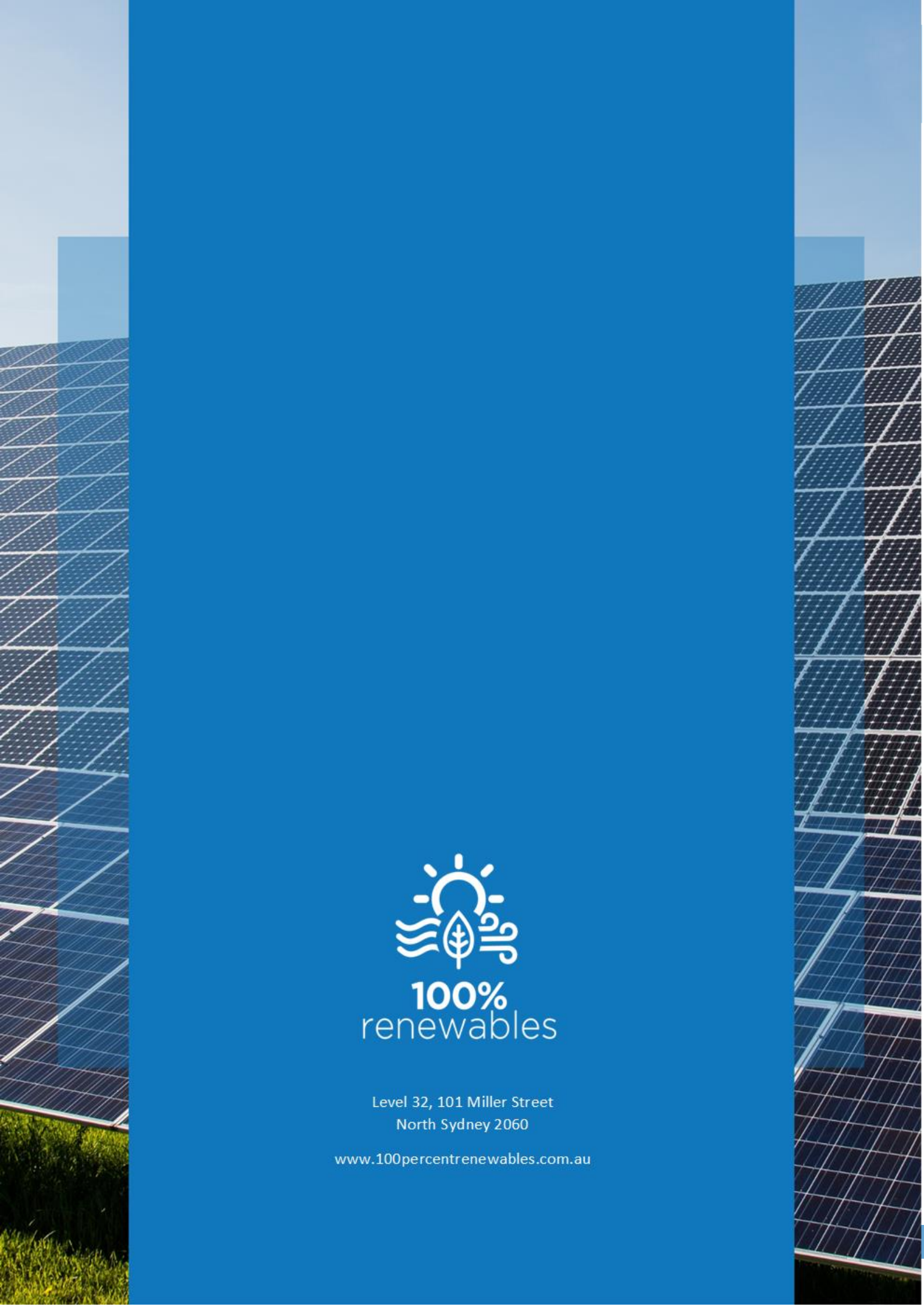
Tea Gardens SPS-09/13 – 25.5 kW – Short-term option 2 – Roof-mounted solar PV

Wingham Library – 10 kW – Short-term option – Roof-mounted solar PV

Midscale solar

Tuncurry Landfill – 5 MW – Long-term option – East west facing ground-mounted solar farm

Nabiac WTP – 1.98 MW – Long-term option – East-west facing ground-mounted solar farm



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