Carbon Neutral Strategy & Action Plan
2014/15-2020/21

A clean, green and sustainable community

2040 MAROONDAH

Maroondah City Council

Solar hot water and solar panels were part of the sustainable design elements at the Ringwood Multipurpose Sports Pavilion.

Front page: The image was created from the leaves of Eucalyptus obliqua - Messmate and the seed pods are Allocasuarina littoralis, which grow in Wombolano Park.

This strategy was adopted by Council on 20 July 2015

DATE	VERSION	REVIEWER

Clean, green and sustainable

1. Executive summary

It is vital to act swiftly on climate change now and over the next 15 years.

Significant actions to reduce greenhouse gases in the short term will also be important to reduce the long term impacts of climate change. Council is committed to addressing the global issue of climate change and began this work officially in 1998. It recognises the local contribution to be made and this Strategy provides direction on managing and reducing Council's corporate greenhouse gas emissions.

In 2008, Council set a corporate goal of achieving carbon neutrality by 2020. This Strategy provides principles and actions for carbon management that maps a path to carbon neutrality. It values energy reductions and offsetting growth in greenhouse gas emissions to create a future where Council operations and services are delivered with a reduced carbon impact.

In the baseline year of 2010/11, Council's total corporate greenhouse gas emissions were 16,463 tonnes CO_2-e (before offsets). It is estimated that this will increase by 35% to 22,321 tonnes CO_2-e in 2020/21. The majority of this growth is due to the addition of significant infrastructure to 2016 – being Realm and Aquanation. This highlights the need to be able to improve services and facilities and have low carbon considerations and commitment in decision making to be able to offset this growth. It is acknowledged that to 2020/21 proposed resources will not offset this growth entirely. Therefore, a reduction target that does not include Aquanation has been set. This is to reduce emissions by 20% below 2010/11 levels (excluding Ringwood Aquatic Centre), by 2020/21 (excluding Aquanation). This will reduce estimated growth by 15%. Substantial mitigation work will need to continue beyond 2020/21, with the intention of setting a 20% reduction target for 2025/26 that includes all emissions from the inventory.

Energy efficiency is a cost effective activity for reducing carbon, due to the financial savings. Over time these actions can provide funds to be reinvested in additional mitigation actions. The actions within this Strategy also aim to make Council more resilient to the impacts of rising energy and fuel costs. They seek to create more efficient buildings with improved amenity, acknowledge other environmental and social benefits of reducing emissions and build Council staff knowledge and expertise in carbon management which can be shared with the community.

2. Introduction

The Climate Commission, (now the Climate Council), described 2011-2020 as the 'Critical Decade' for taking action to reduce greenhouse gas emissions and the impacts of climate change.

Latest reports from the Intergovernmental Panel on Climate Change (IPCC) show that the impacts of climate change are already occurring and that accelerated action to reduce emissions is required over the next 15 years.

Maroondah City Council commenced addressing its impact on climate change in 1998, when it joined the ICLEI Cities for Climate Protection program. Through program participation, a corporate greenhouse gas reduction goal was set in 2001. This goal was to cut emissions by 20% below 1995 levels by 2010, which was to keep emissions at no higher than 10,472 tonnes CO_2-e. In 2008, encouraged by the community, Council set a subsequent goal to achieve carbon neutrality by 2020. Carbon neutral is defined in the Federal Government's National Carbon Offset Standard (NCOS) as when the services and operations of an organisation result in zero net emissions because they have acted to reduce their emissions through efficiencies and renewable energy generation and lastly purchased offsets for the remainder. Council is also part of the Eastern Alliance for Greenhouse Action (EAGA). Established in 2008, it seeks to work collaboratively to reduce emissions across the region.

Council acknowledges its responsibility to continue to act on this significant issue and reduce the carbon intensity of its operations. This provides the additional benefits of reducing exposure to energy costs, infrastructure improvements, addressing oil depletion and the co-benefits carbon reductions can have in regard to health and other environmental issues. Although this strategy addresses climate change mitigation, it recognises the need to be aware of actions' impacts and overlaps with climate change adaptation. A climate change adaptation strategy is currently being developed as a separate but complimentary body of work.

This strategy seeks to achieve a planned, systematic and supported approach to carbon management by fostering collaboration and ownership of its principles and actions across Council departments. It also aims to embed low carbon considerations into decision making processes. It recognises the importance of early action and the long life of assets and infrastructure. In particular, that without consideration, could lead to 'locking in' inefficiencies that may be expensive or difficult to change. The actions within this strategy are priority actions that provide a roadmap to 2020/21. Actions are focused on energy efficiency with significant estimated greenhouse and cost savings. The strategy will be refreshed annually as actions evolve and more expertise is gained.

Employees attended the Climate Change Roadshow to hear about the latest climate change science from the CSIRO and Bureau of Meteorology.

A reduction target has been set to guide action and provide an indicator for the level of abatement we are aiming for before offsetting remaining emissions in 2020/21. In setting this target regard was given to the resources that will be available for mitigation, as well as estimated emission growth to 2020/21. As a result of the emission growth anticipated from Aquanation, an emission target has been set that excludes Ringwood Aquatic Centre from the baseline year and Aquanation from the target year. The target is to reduce emissions by 20% (no more than 11,698 tonnes CO_2-e) below 2010/11 levels (14,622 tonnes CO_2-e) by 2020/21*. The carbon neutral target however applies to the whole inventory. Significant mitigation work will need to continue beyond 2020/21, with the intention of setting a target of 20% below 2010/11 levels by 2025/26 including the complete inventory.

The strategy begins with an overview of the latest climate science and of Council's emission profile. This is followed by detail on each of the sub-sectors that make up Council's greenhouse gas emissions and associated actions. Lastly it provides an overview of future directions for offsetting of emissions and funding models for abatement actions.

**The feasibility of the reduction targets is dependent on availability of funding and resources.*

2.1 What does the climate science tell us?

Challenges and impacts of climate change are economic, environmental and social – and require ethical considerations.

Messages from the latest scientific assessment highlight that effective and serious action taken in the short term will lessen impacts, challenges and costs in the long term.

The IPCC provide an assessment of the current climate change literature to present a comprehensive understanding of climate change and its impacts. Its most recent reports, released over 2013 and 2014, provide even more certainty that human activities have been responsible for most of the global warming that has occurred since 1950.

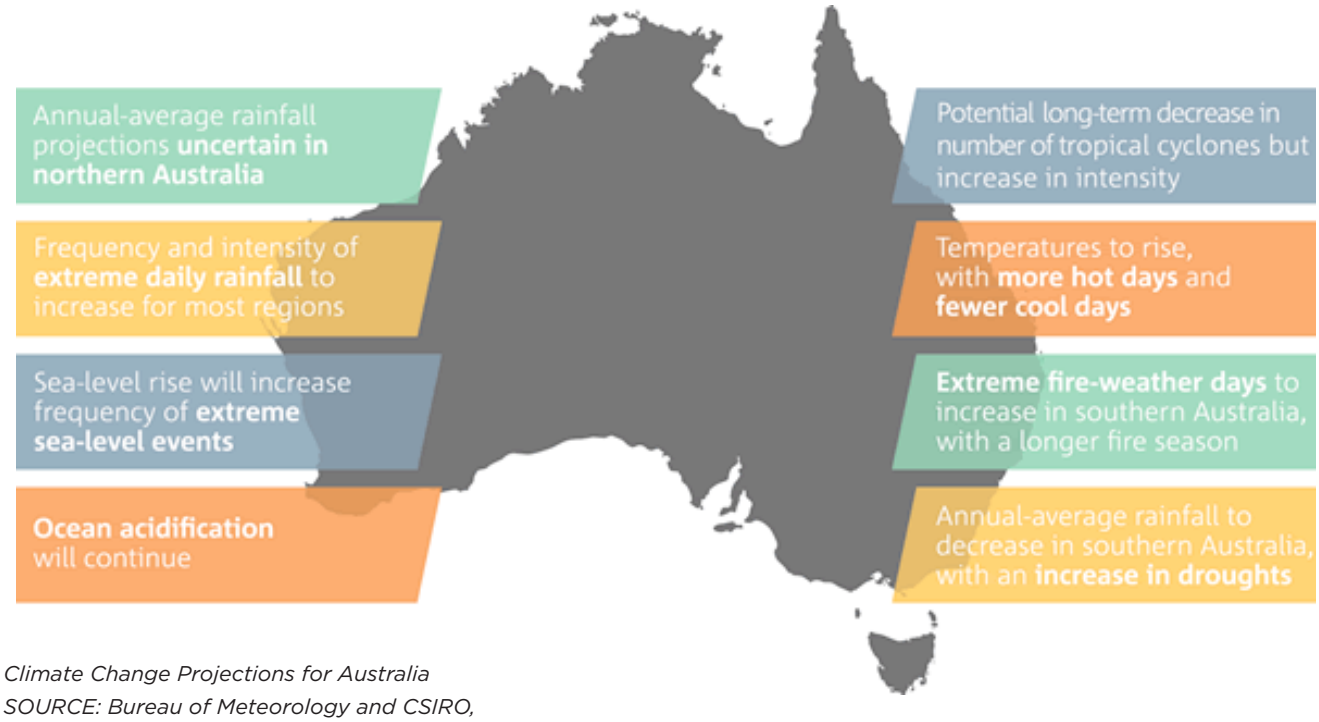
Greenhouse gas emissions are released into the atmosphere from the burning of fossil fuels (oil, coal and natural gas), waste disposal, land clearing and agricultural and industrial processes. This has significantly increased the level of carbon dioxide in the atmosphere since 1750, with emissions continuing to grow each year. It has led to a warming of the oceans and atmosphere and changes in the global water cycle, diminishing snow and ice and resulted in a rise in global sea levels.[1]

The last 3 decades have been the warmest since 1850, with each decade warmer than the previous one. In Australia, there has been an average temperature increase of 0.9°C since 1910, with the 2014 State of the Climate Report indicating that temperatures will continue to rise into the future.[2]

To keep temperature increases to a global goal of no more than 2°C to 2100, compared to pre-industrial levels, would require cooperative international effort. There would need to be significant changes to our energy systems by 2050, including the substantial growth of zero and low carbon energy sources. In 2011, over half of the allocation of carbon emissions that would keep us to a 2°C increase had already been used[3]. Under Australia's current emission pattern, keeping within the allocation would require Australia to reduce its emissions by 55% by 2050. If this was changed to an equal global emission share per capita, it would require a reduction of 90% by 2050.

It is expected, that without additional measures internationally to reduce greenhouse gas emissions, above what is currently planned, global temperatures are projected to rise above 2°C in 2100. This increase in emissions will be largely due to economic and population growth.

Some of the impacts of climate change are already locked in, due to past emissions, and the risks they pose will need to be addressed through adaptation. Council is developing a separate strategy to identify and address these climate change risks and opportunities. The risks will have diverse impacts including on the built environment, infrastructure, natural systems, health, agriculture and water resources. The severity of these impacts to 2100 will depend on the global effort to drastically reduce greenhouse gas emissions.



Climate Change Projections for Australia
SOURCE: Bureau of Meteorology and CSIRO, www.bom.gov.au/state-of-the-climate/

The objective of the United Nations Framework Convention on Climate Change (an international forum to address climate change) illustrates a desired approach to addressing climate change on a global level:

"The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."[4]

1. IPCC, www.ipcc.ch
2. Bureau of Meteorology, www.bom.gov.au
3. Department of the Environment, www.climatechange.gov.au
4. UNFCC, unfcc.int

2.2 What is our approach?

Strategic Direction

The development of this strategy was informed by a number of sources including Council's key strategic documents (refer to chart 1), future municipal considerations and input from staff stakeholders.

Detail of strategic direction and input to this strategy are set out below.

Maroondah 2040: Our future together

- 4.11 - Strive to become a carbon neutral Council by implementing energy efficient initiatives and embracing clean energy solutions
- 4.12 - Mitigate and adapt to the effects and impacts of climate change
- 4.2 - Provide leadership and adopt sustainable innovative approaches to limit consumption, prevent litter, reduce waste to landfill and encourage reuse and recycling of resources
- 4.14 - Support, educate and build the capacity of our community to make more environmentally sustainable lifestyle choices
- 4.15 - Work in partnership to reduce greenhouse gas emissions and support the community in adapting to a post peak oil environment
- 4.16 - Be responsive and adaptive to new environmental opportunities and threats as they occur, building resilience and capacity within the community
- 5.6 - Advocate for and encourage the use of sustainable transport by enhancing local access to public transport, supporting behaviour change initiatives and enhancing the pedestrian and cycling network, including the provision of on-road bicycle lanes
- 5.8 - Work in partnership to ensure sustainable transport options and public transport connections are considered in the design of new developments and public spaces
- 6.4 - Facilitate, lead and educate the community in the use of environmentally sustainable design across all forms of infrastructure to limit carbon emissions and reduce resource consumption

CHART ONE: Maroondah Integrated Planning Framework.

- 6.11 - Ensure the management of infrastructure and prioritisation of capital works considers demographic change, the impacts of climate change, and accessibility for all ages and abilities

Council Plan 2013 – 2017

Natural Environment

- Develop a Carbon Neutral Strategy to inform Council's response to a new carbon economy

Sustainability Strategy 2009

4. Energy

To be carbon neutral by 2020 by:

- Conserving energy and using energy efficiently
- Increasing the use of renewable energy
- Offseting carbon emissions

IMAGE ONE: Conversations about carbon - key messages.

Informing our Strategy

Future challenges, relevant to planning for carbon neutrality, were identified in the *Maroondah 2040 Research Report.* These challenges include:

- Encouraging staff to choose active and public transport options, in an area that is more readily accessible by car.
- Managing emission increases with likely growth in Council service provision due to growth in population to 2021.
- Incorporating energy efficiency into Council's current building stock, with the challenge of limited funding available for upgrades and
- Identifying the social, environmental and economic risks of climate change.

Consultation for the development of *Maroondah 2040: Our future together* with the community and Council staff identified a desire for Council leadership and innovation in sustainability and a move away from fossil fuel reliance and towards renewable and sustainable energy sources.

Council staff, who are key stakeholders in corporate climate change work, were consulted on carbon management, image 1 shows some of the key messages that emerged from these conversations.

IMAGE 2: Council's carbon neutral steering committees for each sub-sector

Who is responsible for greenhouse gas reductions and ensuring that it 'happens'? also emerged from these conversations and highlighted the need to identify the strengths and weaknesses of the current approach to carbon management. Of particular importance is communicating responsibilities and direction on energy management and a need for a high level of engagement and importance placed on emissions reduction. These considerations informed the following framework to guide carbon management at Council:

- Planning, decision making, implementation, monitoring and reporting using a cross-Council approach via the establishment of Carbon Neutral (CN) Steering Committees (refer to image 2). These Committees have helped design this strategy and create a shared vision for each sub-sector. In order to enable this approach, investigation is needed into training and support required. This approach, along with relevant actions included in Service Area Plans, will also help embed the carbon management actions across Council.
- Focusing on avoiding and reducing emissions and replacing high carbon energy sources with low carbon and renewable sources. In the past, Council sought to implement actions across all four action types of the carbon reduction hierarchy (see image 3). Although all of these will be needed to achieve carbon neutrality, the aim is to achieve substantial emission reductions ahead of offsets. This is through process changes and establishing triggers for embedding carbon management considerations across Council and achieving long term financial savings. Refer to chart 2 for a summary of the approach to implementing this strategy.
- Collaborating with external experts in the field and learning from and working with other Councils, in particular through the EAGA and its projects.

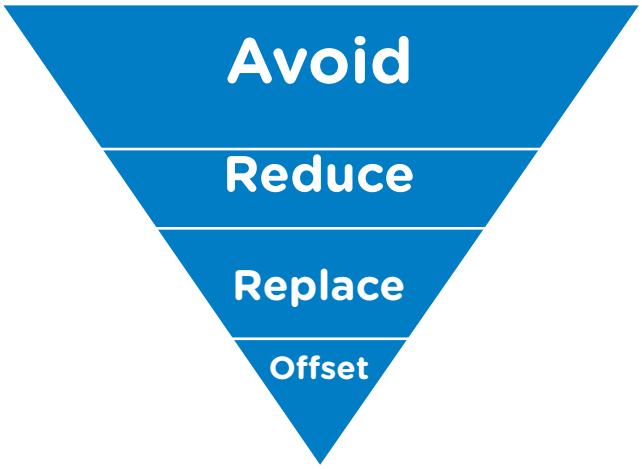


IMAGE 3: Carbon reduction hierarchy

Actions

AP1. Hold Climate Change Road show to raise staff awareness about the latest climate change science and impacts.

AP2. Identify training and information needs for staff involved in carbon management.

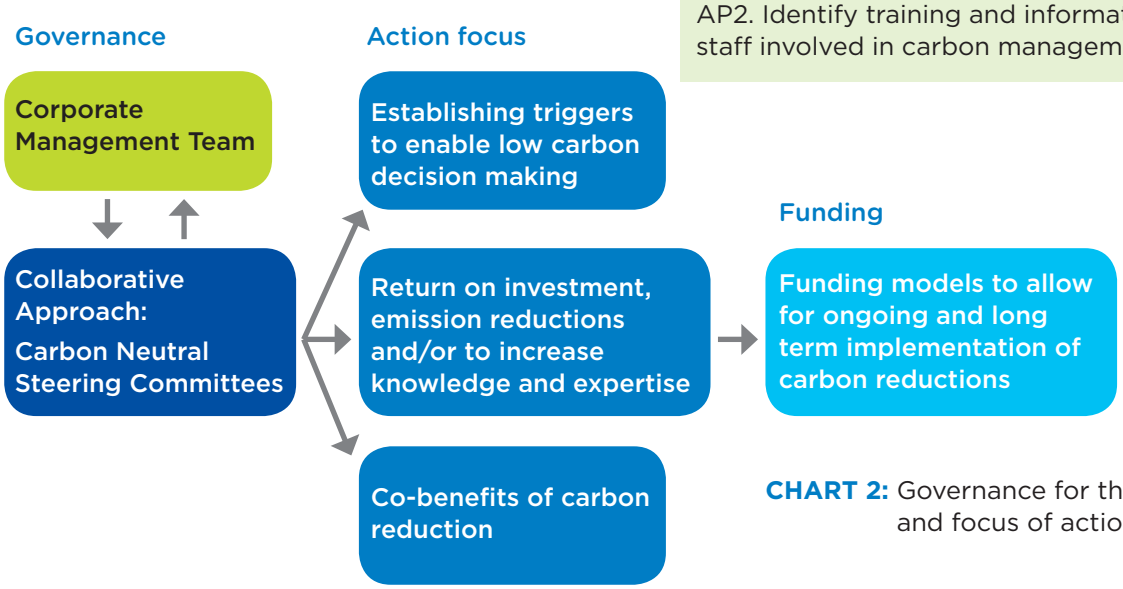
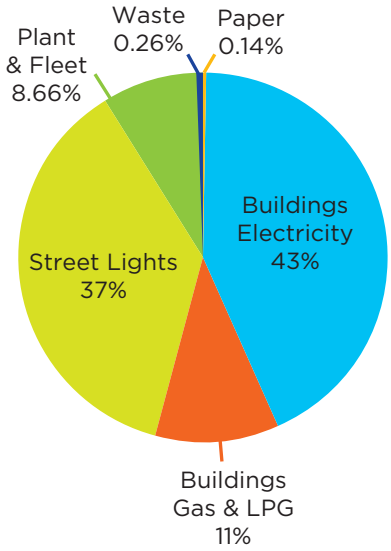


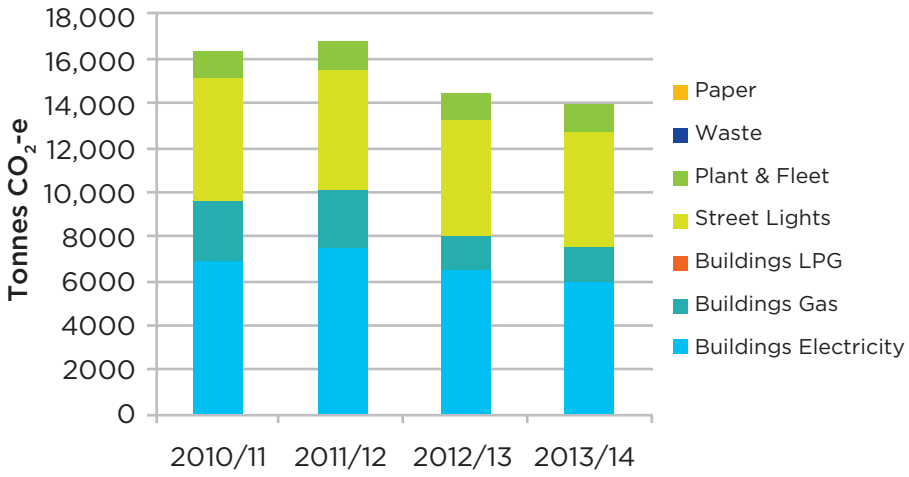
CHART 2: Governance for the Strategy and focus of actions

2.3 What are Council's carbon emissions?

In 2013/14 the majority of Council's greenhouse gas emissions are from gas and electricity used in buildings (54%), followed by street lights (37%), plant and fleet (9%) and office paper and waste (together less than 1%) (refer to graph 1). Detail of each subsectors' contribution since 2010/11 is shown in graph 2.



GRAPH 1: Share of greenhouse gas emissions by sub-sector 2012/13



GRAPH 2: Emission breakdown by sub-sector since baseline year

Total greenhouse gas emissions in 2013/14 were 14,129 tonnes CO_2-e and 13,136 tonnes CO_2-e after offsets are deducted (refer to table 1). These offsets are Greenfleet offsets for most fuel use. The 14% decrease in total emissions in 2013/14, compared to 2010/11, is mainly due to the demolition of the Ringwood Aquatic Centre.

TABLE 1: Emissions with and without offsets since baseline year

Year	Total emissions Tonnes CO_2-e	% Change from Baseline Year	Offsets Tonnes CO_2-e	Net emissions Tonnes CO_2-e
2010/11	16,463	-	4008	12,455
2011/12	16,950	+3%	4624	12,326
2012/13	14,550	-12%	4298	10,252
2013/14	14,129	-14%	993	13,136

In 2013/14 approximately 0.4% of electricity used for buildings was from locally generated solar power. Solar panels have been installed at Dorset Golf (generating 9% of its electricity use), Ringwood City Offices (generating 1.2% of its electricity use), Ringwood Multipurpose Sports Pavilion (generating 10% of its electricity use), Yarrunga Community Centre (% generated not available), Keystone Hall (not yet connected) and Croydon Tennis Club (% generated not available).

2.4 What have we already done?

Council has implemented a number of abatement actions over time.

The following examples are some of the most recent.

Croydon Civic Car Park Lighting Project

10 tonnes CO_2-e saved

During the first half of 2014, flood mitigation works in Croydon, also involved changes to the car park area, including lighting. Previously, the area was lit with 9, 150W high pressure sodium lamps. These were replaced with 34, 32W compact fluorescent lamps. Although there are now an additional 25 lamps, the lighting as a whole uses 20% less energy and greenhouse gas emissions. This is a saving of almost $500 in electricity costs per year and 46% fewer watts required per car park space.

If the high pressure sodium lamps were used for this project, this would have resulted in 10 tonnes CO_2-e more than the energy efficient option and $2500 more in annual energy costs.

This highlights the significant opportunity for energy efficiency in projects to prevent an increase in assets resulting in higher emissions

LED Downlight Retrofit

10 tonnes CO_2-e saved

In early 2014, 61 power hungry halogen downlights in the foyer and Customer Service area at the Ringwood City Offices were replaced with LED lights. The LED lights use 80% less energy than the halogen lamps.

This project has not only resulted in a more uniform and crisp lighting of the area, but is estimated to annually reduce greenhouse gas emissions by 10 tonnes CO_2-e and energy savings of $2000.

In addition, LEDs have a much longer life than the halogen lights by 47,500 hours. This will result in maintenance savings as the halogen lights last one year while the LEDs have an estimated life of almost 20 years.

Payroll Goes Green

50kg CO_2-e saved

In May 2013, Council sought to reduce the number of payslips and copies of That's Maroondah that were distributed in hard copy to staff.

Although hard copies are necessary for some staff, the aim was to reduce paper use by raising awareness about the electronic format for those who could swap to this option.

As a result, by May 2014 the number of hardcopies were reduced by 40% when 97 staff opted to swap to the electronic versions. Annually this reduces office paper use by 12 reams and greenhouse gas emissions by 50kg CO_2-e.

In addition, it reduces the time needed to print and distribute the hard copies.

3. Scope

This Carbon Neutral Strategy provides a framework for Council to reduce energy use and greenhouse gas emissions associated with Council's services and operations.

It includes the electricity and gas used in its buildings, fuel used by fleet vehicles and plant, electricity used for outdoor lights and street lights, waste generated by Council staff and use of office paper.

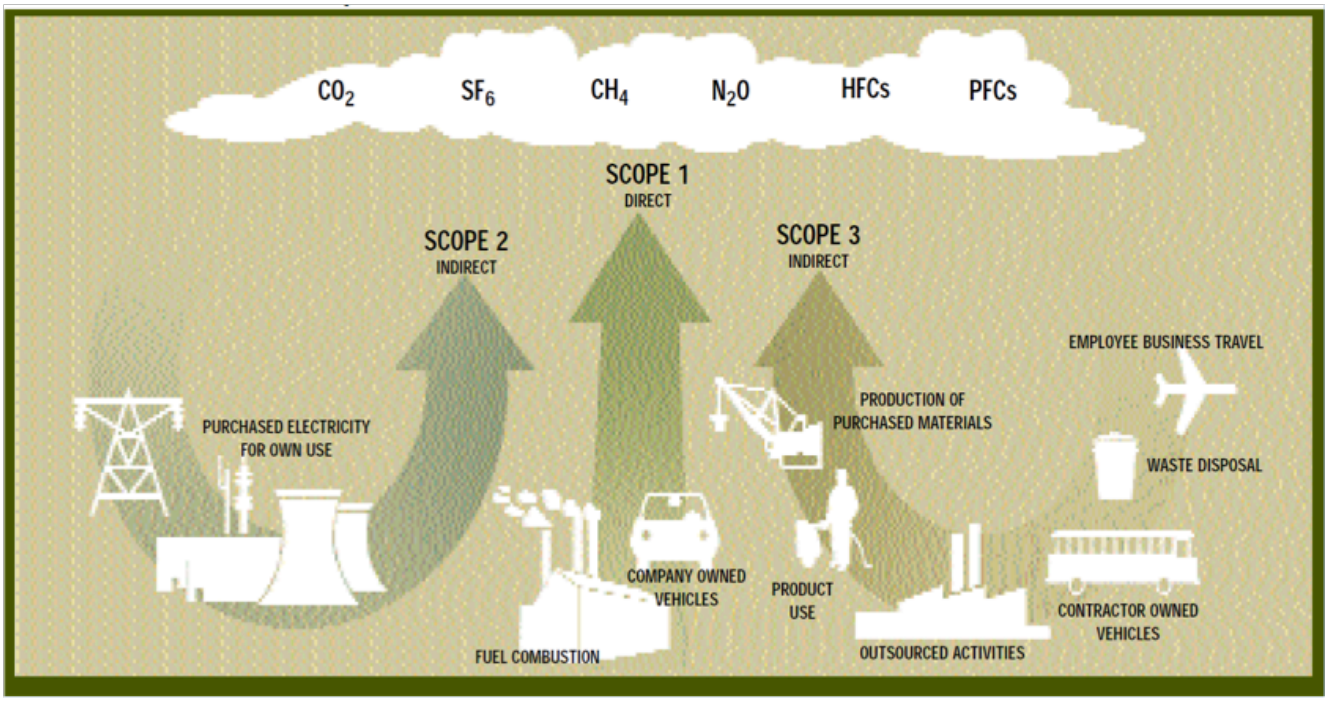


IMAGE 4: Emission scopes.
SOURCE: The Greenhouse Gas Protocol, www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf

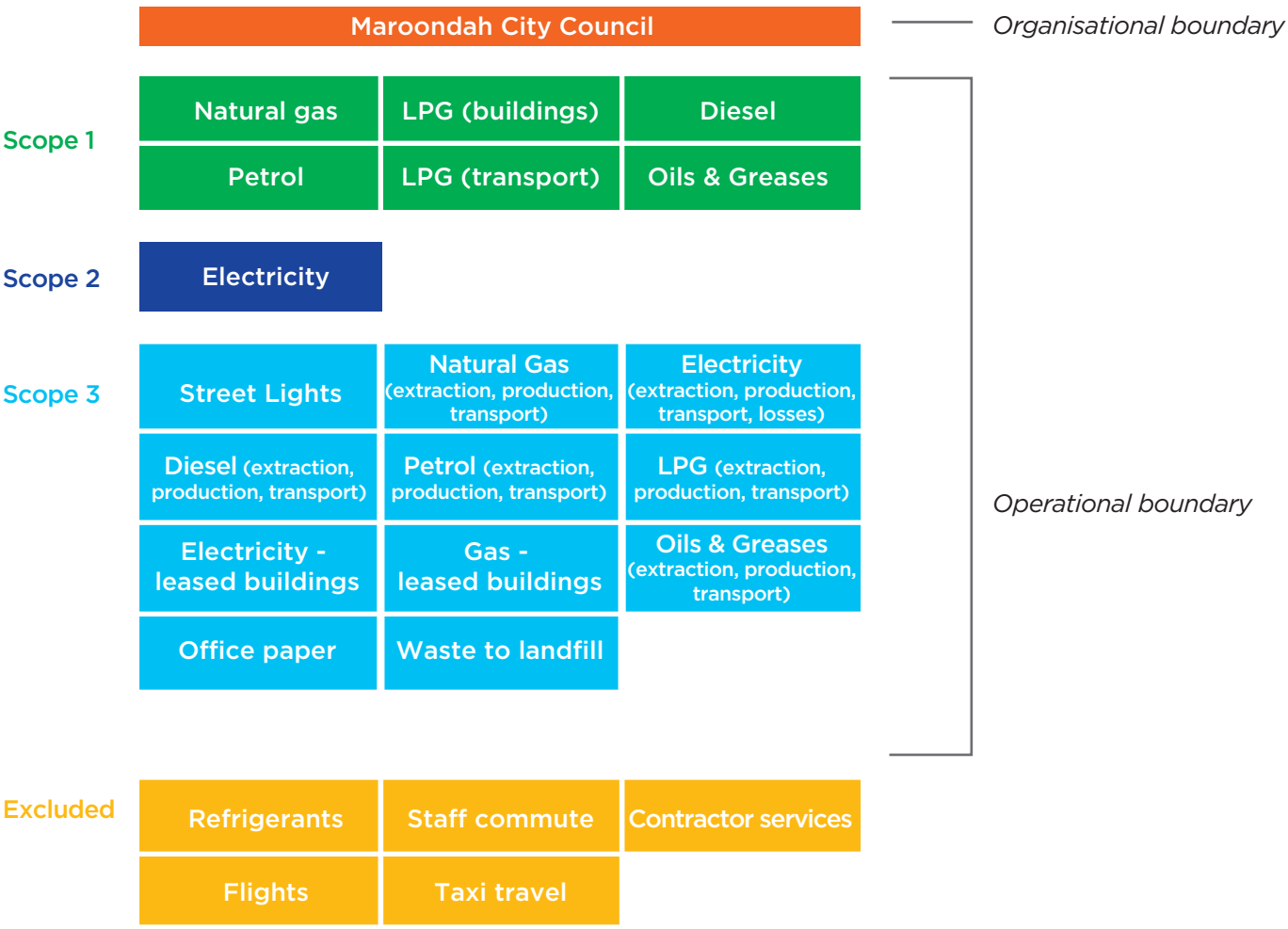
The greenhouse gas emissions that are covered by this strategy are those resulting from the use of energy and fuel and not the whole of life cycle emissions of creating and maintaining infrastructure and products. In 2011, Council reset its greenhouse inventory baseline year to 2010/11. The methodology used is the Greenhouse Gas Protocol, developed by the World Business Council for Sustainable Development, with consideration to the National Greenhouse and Energy Reporting (NGERs) framework and the National Carbon Offset Standard (NCOS).

Greenhouse gas emissions have been calculated by assessing Council's scope 1, 2 and 3 emissions (refer to image 4). Scope 1 emissions result from activities over which Council has direct control and are produced directly from that activity, (such as from use of natural gas in buildings and diesel in trucks). Scope 2 is for the use of the electricity that Council purchases for operations and equipment under its control. While scope 3 relates to greenhouse gas emissions from Council activities for which Council does not have direct control and are off-site (such as the impact of disposal of

waste generated by staff but deposited in a landfill run by a third party). There are additional scope 3 emissions that should be considered for addition in future years – such as the emissions from delivery of Council services but implemented by contractors. At this stage, the inventory has been constructed giving consideration to the activities over which Council has more ability to directly influence (refer to chart 3 for what has been included and excluded in Council's greenhouse gas inventory).

Setting out a clear direction and commitment to reducing greenhouse gas emissions will allow Council to work towards its goal and engage with the community on this issue. For example, through its community engagement work and future work on the Planning Scheme review, this will seek to encourage greater consideration and structure for assessment of sustainable design in the built form.

CHART 3: Breakdown of Maroondah corporate emission sources by scope



4. Carbon Neutral Certification

In the lead up to 2020, Council will need to consider whether to seek official carbon neutral certification.

The National Carbon Offset Standard (NCOS) was introduced in July 2010. It provides a standard for organisations who want to voluntarily become carbon neutral and make their carbon neutral claim official by becoming certified under the NCOS Carbon Neutral Program.

There are currently four Australian Councils who have become certified under the standard. These are the City of Melbourne, City of Sydney, City of Yarra and Moreland City Council. Consideration of the opportunities, resources and costs of becoming certified would be required from Maroondah in the lead up to 2020.

Some of the benefits of certification are the credibility of the claim due to the review of Council's carbon management work by a third party and use of official logo. To also be considered is the need to firstly focus resources on establishing and implementing an energy saving program to achieve positive outcomes.

An overview of the steps involved in NCOS certification is shown in chart 4.

CHART 4: Steps for carbon neutral certification under the NCOS program

Prepare an application package

Use the guidance templates to prepare a:
- carbon footprint
- emissions management plan
- Public disclosure summary (PDS)

Have the pack independently audited

Once the application package has been audited:
- sign the Administration Agreement and trade mark licence
- pay an annual certification fee

Certification

Submit your application package and then:
- receive your certification and trade mark
- consider early purchase and cancellation of offsets

Ongoing certification - managing emissions and reporting

Measure and reduce emissions
Purchase and cancel offsets
Pay annual fee

Revise EMP and PDS
Submit annual report
Audit every second year

Certification remains valid for five years provided you meet the management and reporting obligations.

SOURCE: Department of the Environment, www.environment.gov.au

5. Our Carbon Management Roadmap

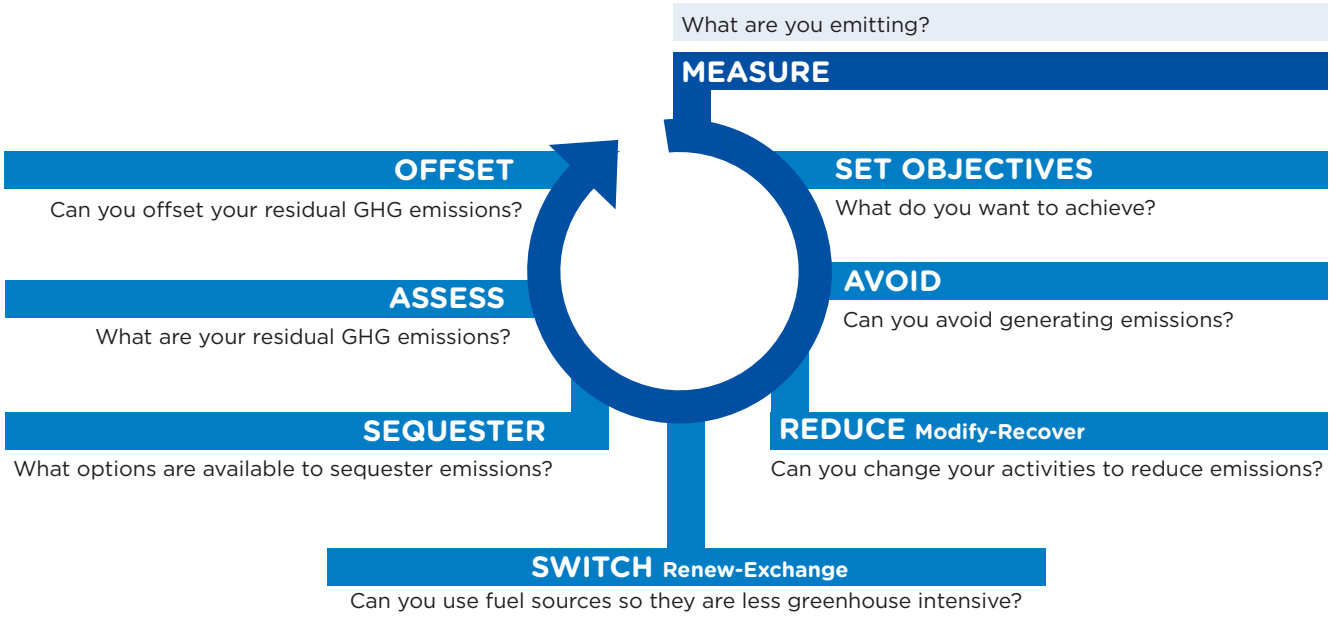
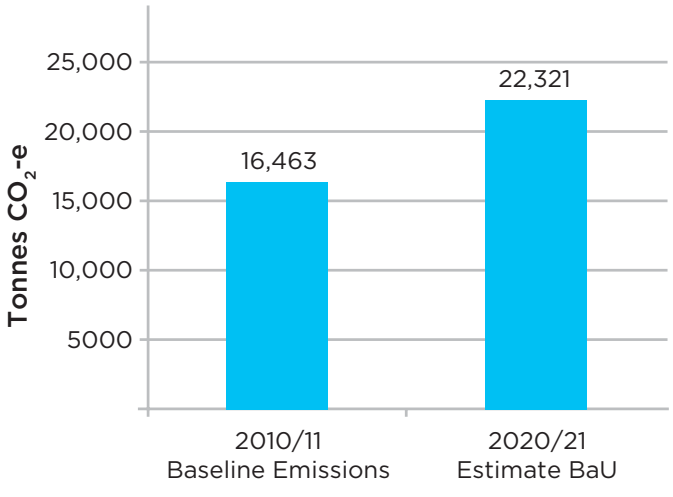


CHART 5: Carbon management principles

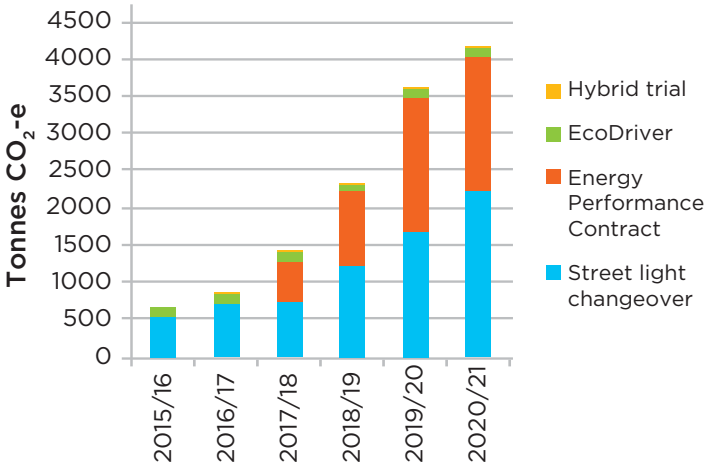
SOURCE: EPA Victoria, www.epa.vic.gov.au

The Environment Protection Authority's (EPA) carbon management principles (refer to chart 5) provide a process for a carbon reduction program and is built upon continual review and improvement. These steps will guide Council's carbon management.

By measuring current emissions, estimating what emissions could be in 2020/21 and assessing carbon reduction options a roadmap has been created that shows greenhouse gas reductions that could result from actions in this strategy. It also estimates the emissions that will remain without further abatement and will need to be offset in 2020/21. These details are provided below.



GRAPH 3: Estimated emissions to 2020 compared to baseline

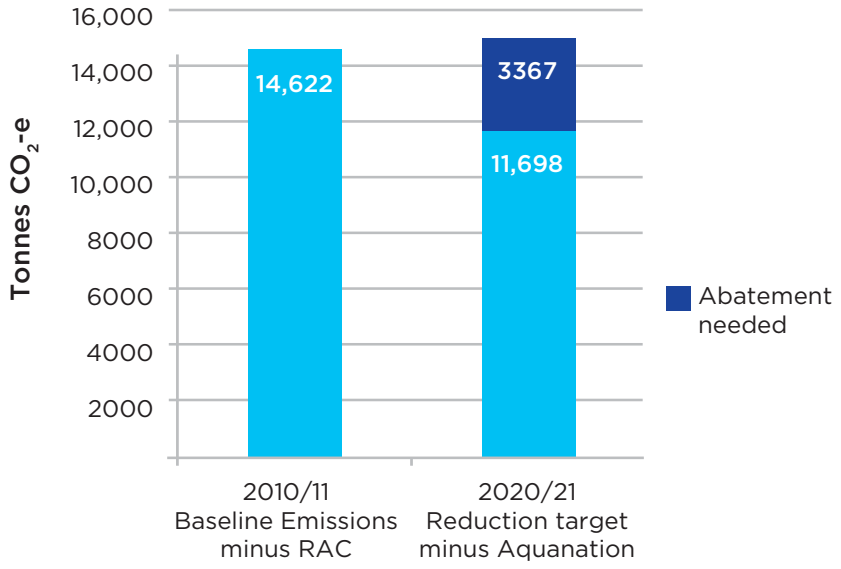


GRAPH 4: Estimated abatement potential to 2020/21

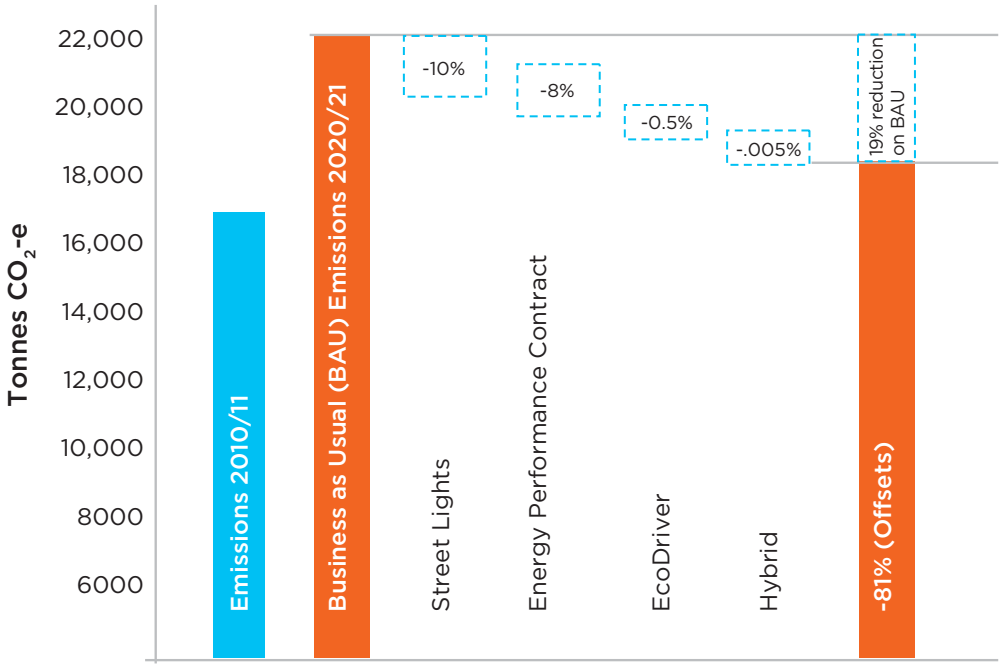
It is estimated, that under a business as usual (BaU) scenario, by 2020/21 corporate greenhouse gas emissions will increase by 35% to 22,321 tonnes CO_2-e compared to the baseline year of 2010/11 (refer to graph 3). The main drivers for this expected change are the addition of two new major facilities, Realm, but predominantly due to Aquanation (both larger floor space than the centres they are replacing) and an associated increase in staff numbers.

It is acknowledged that with estimated resources this projected future growth is unlikely to be fully offset by 2020/21, however could be achieved beyond that to 2025/26. As a result an emissions reduction target of 20% below 2010/11 levels (not including Ringwood Aquatic) by 2020/21 (not including Aquanation) is set (see graph 5), with further investigation to secure further resources and achieve additional abatement, including renewable, to 2020/21. This target will limit total growth to 15% above the total 2010/11 levels in 2020/21 instead of 35% without abatement actions. The proposed actions include significant energy efficiency projects for the top three emitting sub-sectors. These are an energy efficiency retrofit program for buildings (estimated 1830 tonnes of abatement), the energy efficiency change over program for street lights (estimated 2244 tonnes of abatement) and the EcoDriver program to reduce fuel consumption for vehicles and trucks (estimated 112 tonnes of abatement). Graph 4 indicates how these projects could be rolled out over time to 2020/21.
It is estimated that this would leave 81% of emissions (18,133 tonnes) to be offset (refer to graph 6). The amount to offset could be reduced by increasing mitigation actions in the lead up to 2020/21.

GRAPH 5:
Reduction target minus Aquanation



GRAPH 6:
Pathway to carbon neutral



6. Buildings

Council's energy saving LED project in the foyer at the Ringwood Civic offices.

What we want to achieve by 2020

Significant improvements to the energy efficiency and greenhouse impact of our existing buildings have been achieved, particularly for our large energy users. This has lowered operational and maintenance costs, aided building management and created learning opportunities. These buildings have an enhanced indoor environment and meet the needs and expectations of our communities and staff. Our new buildings achieve a high sustainability standard and reduced lifecycle impacts.

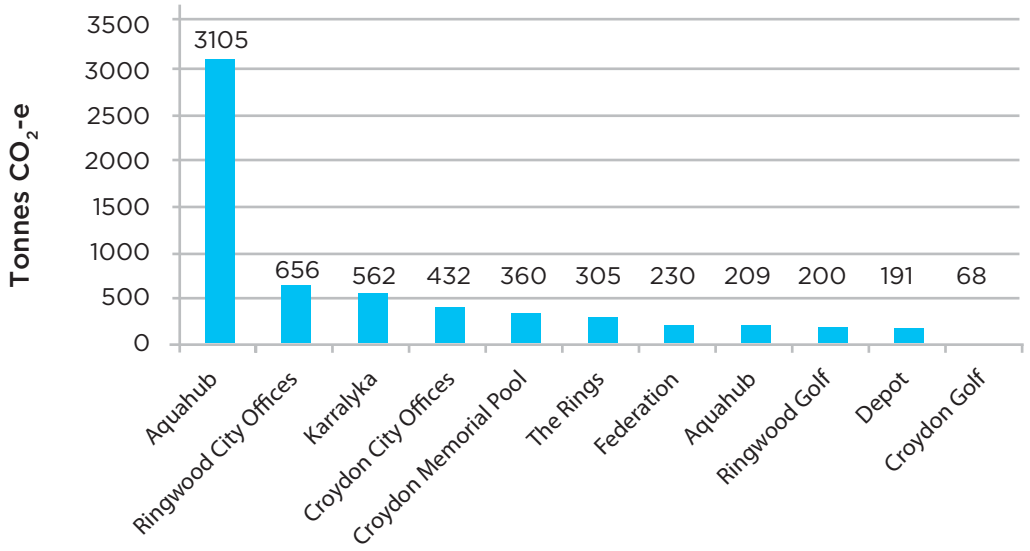
We will achieve this by

- Avoiding energy wastage and improving the energy efficiency of buildings through a targeted energy management program.
- Creating energy efficient buildings by incorporating best practice energy efficiency measures in any plans and works undertaken as part of Council's annual capital works facility improvement program.
- Working collaboratively with community groups, across Council departments and with external partners to meet our goals and to share and consolidate building assets.

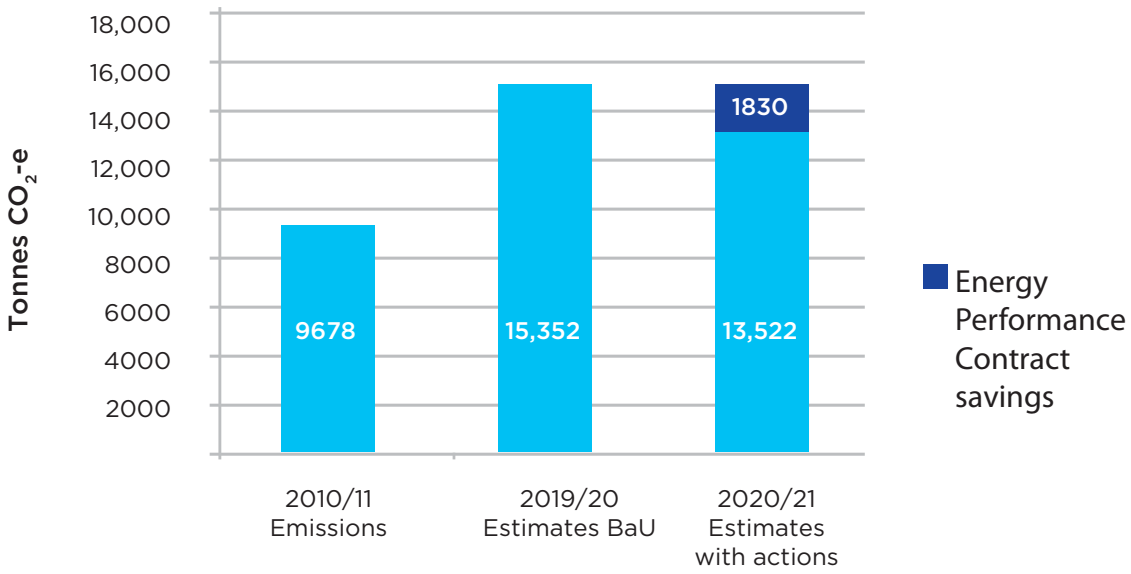
Background

The use of gas and electricity in Council buildings is the largest contributor to corporate greenhouse gas emissions (7637 tonnes CO_2-e in 2013/14). Together they account for 54% of total emissions. Although gas use has remained steady and electricity usage increased by almost 5% since 2010/11, (these exclude Ringwood Aquatic Centre), energy costs for buildings have risen by an average of 20% during this time. The past approach to reducing energy use in buildings has been by conducting energy audits in high energy using buildings and then choosing actions to implement based on available funds and suitability of actions. Although these actions have assisted with reducing greenhouse gas emissions, the opportunity for much greater savings is available through a holistic approach to energy efficiency sought in future actions.

Current & future greenhouse gas emissions



GRAPH 7: Emissions from Council's high energy using buildings 2012/13



GRAPH 8: Current and future building emissions estimates and savings

Approximately 80% of the greenhouse gas emissions from gas and electricity use in buildings are from 11 Council facilities. These include Maroondah leisure facilities, administration buildings, Croydon Library, Karralyka and Federation Estate (refer to graph 7). The biggest change in emissions from the top energy using buildings was a 25% increase in these emissions in 2008/09, due to the expansion of Aquahub.

From 2010/11 to 2012/13, there was an average increase in emissions of 3% for these buildings (excluding Ringwood Aquatic Centre and the Ringwood Library). The most significant change in emissions from buildings to 2020/21 is expected from the addition of Aquanation and the Realm and result in growth of 80% (7743 tonnes) in building emissions compared to 2010/11 (refer to graph 8).

Actions

Key directions informing actions for buildings from Maroondah 2040: Our future together

- 4.11 Strive to become a carbon neutral Council by implementing energy efficient initiatives and embracing clean energy solutions
- 6.4 Facilitate, lead and educate the community in the use of environmentally sustainable design across all forms of infrastructure to limit carbon emissions and reduce resource consumption
- 6.11 Ensure the management of infrastructure and prioritisation of capital works considers demographic change, the impacts of climate change, and accessibility for all ages and abilities.

Significant savings can be achieved by implementing energy efficiency measures across a range of existing buildings. This is through an Energy Performance Contract (EPC) (refer to graph 8). This has many benefits compared to a traditional model, including being more streamlined, having guaranteed energy savings and a thorough monitoring and verification process. It could reduce building emissions by almost 12% to 2020/21 compared to business as usual. For new buildings and renovations, an ESD policy and guideline will set the standard to ensure that these have a high environmental performance. Cross-Council collaboration on an energy management program and consolidation of building assets and sharing of these resources amongst community groups is part of the long term vision for managing buildings and reducing their greenhouse impact. Local renewable energy has continued to reduce in cost. Options for Maroondah will be investigated.

Reduce

R1. Continue to investigate the potential of reducing energy use in buildings through an Energy Performance Contract as part of a joint EAGA project, or independently.

R2. Implement the Ringwood City Offices heating, ventilation and air conditioning system and building management system replacement.

R3. Continue to install energy efficient appliances, equipment and fixtures as part of Council's annual capital works facility improvement program.

R4. Ensure Green Star equivalent is achieved for Realm.

R5. Develop an ESD policy and guidelines for Council buildings to provide an environmental standard for new buildings and renovations.

R6. Continue to investigate the establishment of a green IT program, including a printer consolidation project.

R7. Investigate the development of an 'energy saving behaviour change' program for building users.

Replace

RE1. Investigate a business case for renewable energy generation potential of the municipality.

7. Street Lights

What we want to achieve by 2020

Significant greenhouse gas and cost savings have been achieved for street lights on residential streets by replacing 83% of them with energy efficient alternatives. Council's outdoor lights are mostly energy efficient lamps and have reduced operating and maintenance costs. We have a shared vision for lighting provision that is informed by technological and environmental considerations and addresses safety aspects in its design.

We will achieve this by

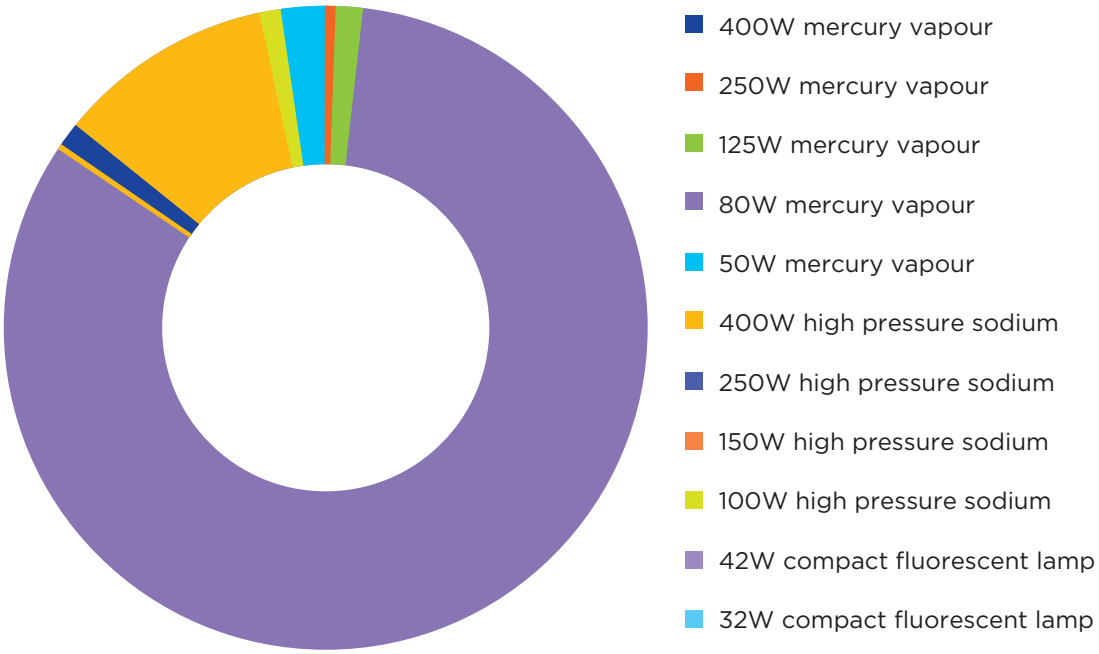
- Working collaboratively across relevant Council departments to implement the street light energy efficiency bulk change project.
- Developing public lighting policy and guidelines that consider the needs of road users, pedestrians, users of open space, community groups, greenhouse and environmental impacts and technology choices.
- Enhancing our knowledge and expertise by trialling emerging energy efficient lighting technologies for Council's outdoor lights.

Background

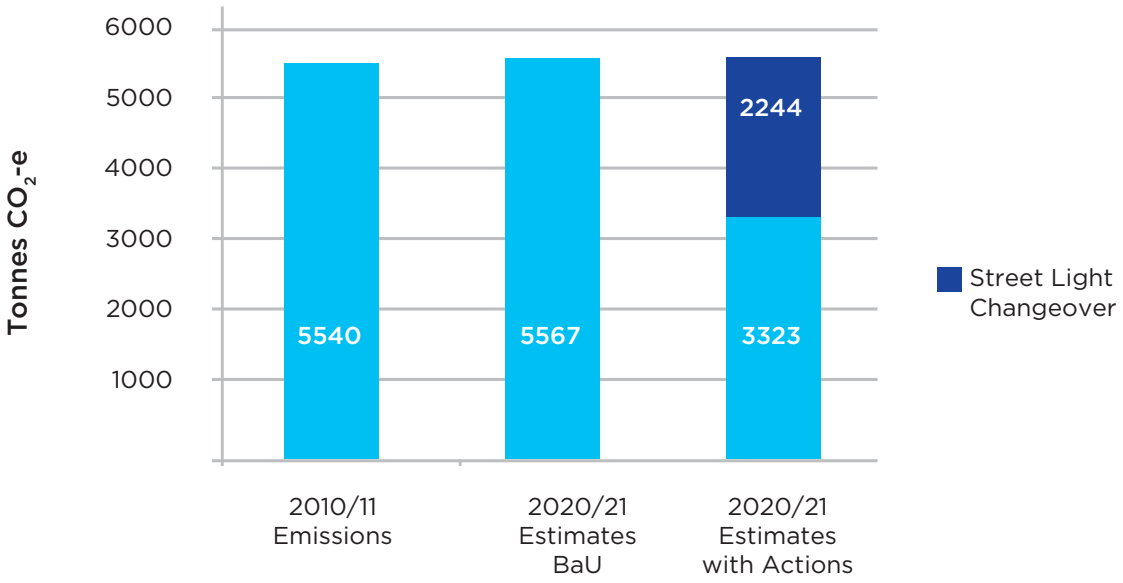
The biggest opportunity for greenhouse gas reductions from public lighting are the 6804 street lights on residential streets that are paid in full by Council and operated and maintained by the electricity distributor. There is an energy efficient option available for 83% (5698 lights) of these, which are mostly 80W mercury vapour lamps (refer to graph 9). A project is underway to replace a third of these lights with lamps that are 77% more energy efficient. Council's outdoor lighting includes lighting in parks, reserves, car parks, path lighting, traffic lights and sporting oval lights. These are installed by Council with sporting oval lights installed by sporting clubs, but remain Council assets.

Council's Energy Efficient Street Light Project involves collaboration across many Council areas.

Current & future greenhouse gas emissions



GRAPH 9: Types of street lights on residential streets



GRAPH 10: Current & future street light emission estimates & savings

Greenhouse gas emissions from street lights on residential streets are not expected to increase significantly to 2020 due to very limited growth of new housing areas. Additional outdoor lighting is planned for some areas to improve amenity, such as a new shared path connecting Reilly Street and Greenwood Avenue and likely increases to car park lighting associated with new builds such as Aquanation and Norwood Kindergarten. This highlights the importance of being able to make these improvements and offset growth in energy by choosing energy efficient options.

Actions

Key directions informing actions for street lights from Maroondah 2040: Our future together

- 1.1 Work in partnership to address community safety issues, with a focus on activity centres, public spaces, roads and public transport
- 4.11 Strive to become a carbon neutral Council by implementing energy efficient initiatives and embracing clean energy solutions.

The energy efficiency street light project will replace mercury vapour lamps with light emitting diode lamps (LEDs). This will result in substantial energy and cost savings with a 40% emission reduction for streetlights to 2020/21 compared to 2010/11 (refer to graph 10). Outdoor lighting projects will also be informed by the collaborative creation of a street lighting policy and guidelines. This will set out and allow a consistent approach to Council's lighting of outdoor spaces in the future.

Reduce

R1. Continue to implement phase 1 of the street light energy efficiency program (achieving 33% of the residential street light changeover target).

R2. Plan for and implement phase 2 of the street light energy efficiency program (achieving 67% of the residential street light changeover target).

R3. Develop outdoor and street lighting policy and guidelines.

R4. Map non-standard (decorative) street lights to determine energy efficiency options.

R5. Map off-street outdoor lighting assets to identify energy efficiency options and add to asset register.

R6. Investigate options to provide support for sports clubs to install energy efficient outdoor lighting.

New LED street lights save 77 per cent more energy than the previous mercury vapour lights.

8. Plant & Fleet

Employees undertook EcoDriver training to learn how to drive more fuel efficiently in our fleet vehicles.

What we want to achieve by 2020

Our plant and fleet have a reduced operational greenhouse impact through purchasing choices that consider environmental criteria, regular maintenance and fuel efficient driving. We encourage alternative transport modes and alternatives to travel for staff business trips.

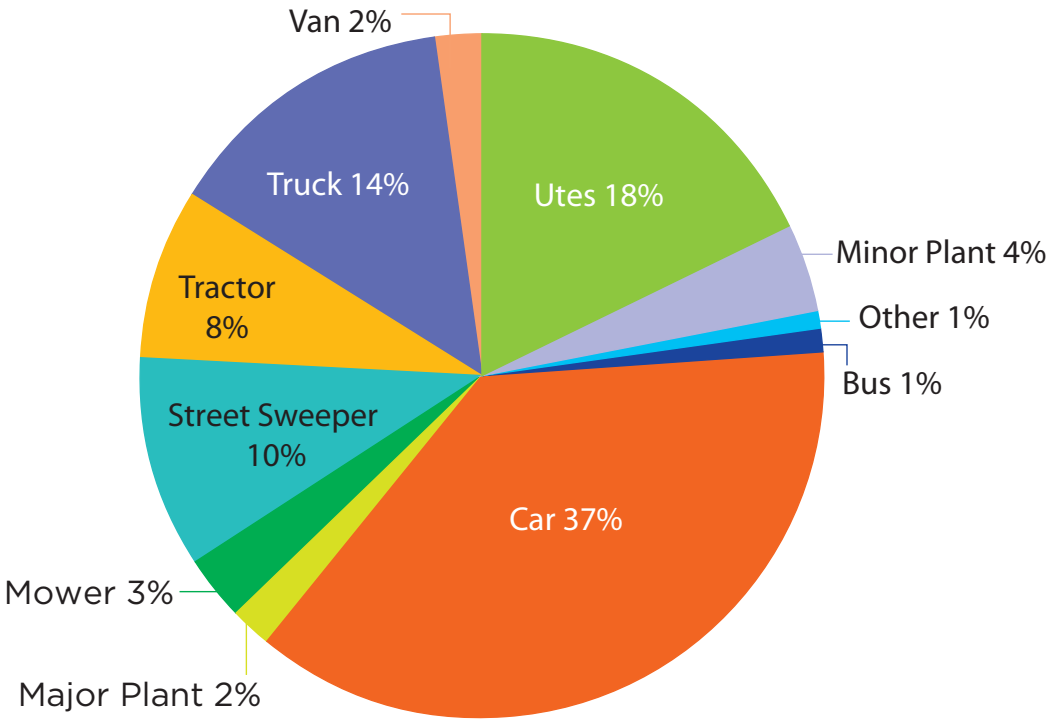
We will achieve this by

- Encouraging fuel efficient vehicle choices through guidelines in the Motor Vehicle Policy.
- Offering travel avoidance and diverse transport options when there are communication technologies, public transport and cycling choices available.
- Implementing actions with financial, environmental and health and wellbeing benefits and/or are useful for trialling low carbon options.

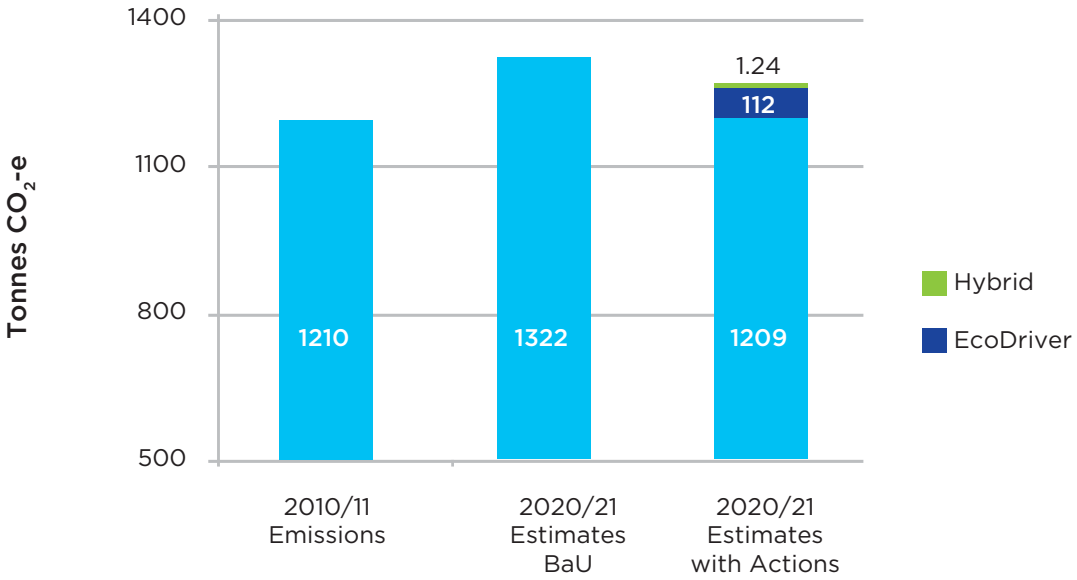
Background

The vehicle fleet includes tool of trade vehicles and vehicles which are part of the pool for Council staff to be able to conduct site visits and attend meetings. Travelling within Maroondah via non-car based transport for staff business travel is not common and staff rely heavily on pool vehicles. Actions to reduce greenhouse gas emissions from this sector acknowledge the limits of the public transport network and alternative transport options but seek to grow the use of these options where practical, as well as embracing the alternatives to travel that are available due to communication technologies.

Current & future greenhouse gas emissions



GRAPH 11: Plant & fleet emission breakdown 2012/13



GRAPH 12: Current & future plant & fleet emission estimates & savings

Almost 80% of the emissions from plant and fleet are from the combustion of fuel from the use of cars, utes, trucks and street sweepers (refer to graph 11). There have not been significant changes to vehicle numbers since 2010 and greenhouse gas emissions from this sub-sector have remained at a similar level during this time. It is estimated that emissions to 2020/21 from plant and fleet may increase by 9% due to a growth in equivalent full time (EFT) staff to 2017. With potential for additional future growth in emission from the procurement of vehicles and plant that are less efficient than the current mix, an increase in service demand due to population growth in Maroondah and an ageing population to 2020. The growth in fuel consumption and associated emissions could be increased further by travel time extensions caused by the progressive decrease in efficiency of the road network from increased traffic congestion.

Actions

Key directions informing actions for plant & fleet from Maroondah 2040: Our future together:

- 4.15 Work in partnership to reduce greenhouse gas emissions and support the community in adapting to a post peak oil environment
- 5.6 Advocate for and encourage the use of sustainable transport by enhancing local access to public transport, supporting behaviour change initiatives and enhancing the pedestrian and cycling network, including the provision of on-road bicycle lanes
- 5.8 Work in partnership to ensure sustainable transport options and public transport connections are considered in the design of new developments and public spaces.

Actions for this sub-sector target the vehicle groups with the highest emissions. The plant and fleet actions for which savings are able to be calculated are for the EcoDriver training (recommended to be implemented each year to 2020/21) and the hybrid trial (assumption: to result in at least 1 hybrid to be kept in the fleet to 2020). Estimates suggest that these actions would offset expected growth in emissions to 2020/21 due to an increase in car trips associated with additional staff (refer to graph 12). Opportunities in this subsector, besides avoiding travel, are to choose the most fuel efficient vehicles for the task, as well as the least greenhouse gas emissions per kilometre travelled and to investigate and prepare for new technologies, such as electric vehicles.

Avoid

A1. Publicise safe and amenable walking routes and destinations around Croydon and Ringwood Offices by using the Walkscore website.*

A2. Encourage employee to use teleconferencing functions on Council phones with an awareness campaign.*

Reduce

R1. Trial hybrid passenger vehicle, to assess performance and then consider expansion of hybrids as a greater proportion of the fleet.

R2. Provide Myki cards for employees to borrow for work commuting.*

R3. Update Council's travel and vehicle usage policy to endorse and encourage more efficient and sustainable business transport practices.*

R4. Delivery EcoDriver Program for fleet vehicle owners across the organisation.*

R5. Establish an online fleet vehicle booking system that allows staff to view vehicle bookings to arrange car pooling to meetings.*

R6. Assess more efficient truck options at replacement if higher efficiency than current is available.

R7. Establish energy efficiency criteria for evaluation of plant purchases.

R8. Provide information about responsibilities for owners and drivers of Council vehicles at induction.

Replace

RE1. Investigate inclusion of electric vehicles in Council's fleet.

Offset

O1. Continue to purchase Greenfleet offsets and review once offsets policy has been established.

Monitoring & reporting

M1. Conduct an employee travel survey to monitor changes in employee travel behaviour.*

*Actions from Staff Green Travel Plan

9. Waste

Recycling everyday items, such as paper, not only reduces the amount of waste that ends up in landfill, it will also reduce our greenhouse gas emissions.

What we want to achieve by 2020

A workplace culture has been created that minimises the lifecycle impacts of waste. It recognises that waste avoidance is an essential approach to carbon reduction that also reduces costs and resource use. Maroondah values and encourages behaviour that leads to waste being diverted from landfill.

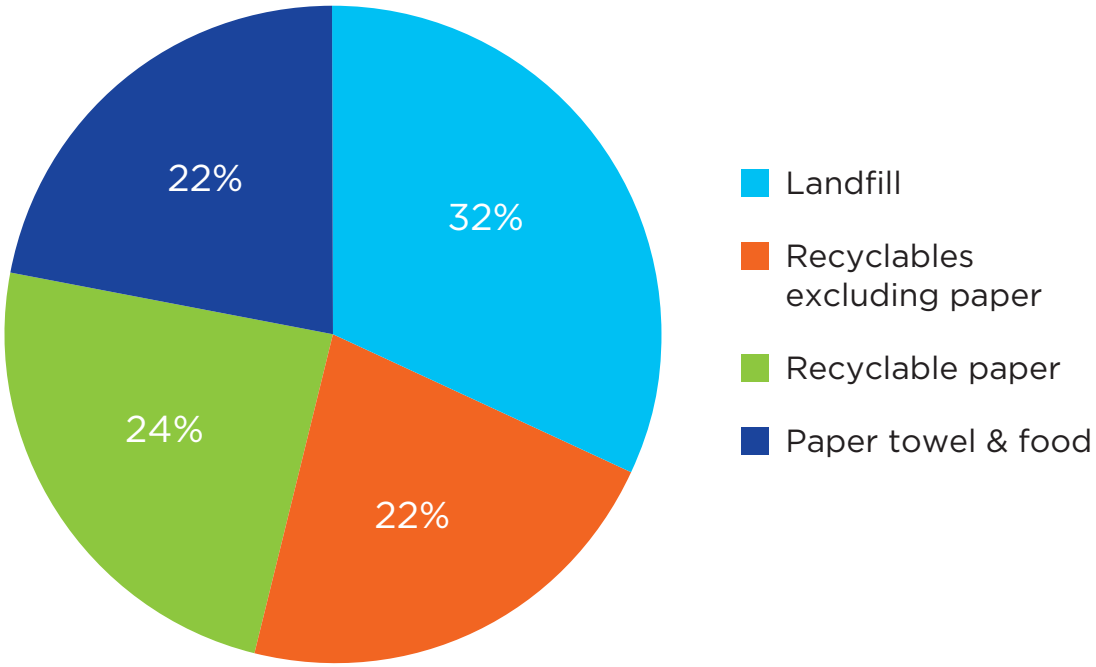
We will achieve this by

- Promoting options that re-value waste as a resource to change disposal patterns.
- Sharing knowledge to encourage a common understanding across Council about the costs and impacts of waste.
- Promoting a staff led approach to waste minimisation.

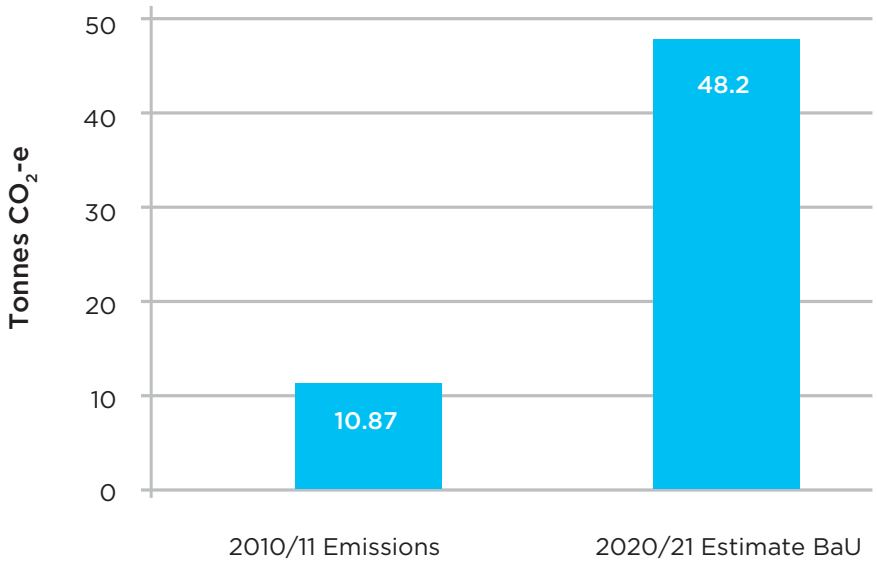
Background

Audit results of waste generated by Council staff (refer to graph 13), indicate that much of what is going to landfill can be diverted via the current recycling system and with food waste diversion. Council has a food composting system at only one of its facilities – the Ringwood City Offices. Although in future Council will be investigating options to divert food waste from residential bins, this will not include commercial (or Council) premises. A large and important component of reducing waste to landfill is via awareness and education campaigns, as individual behaviour has a large influence on what is diverted.

Current & future greenhouse gas emissions



GRAPH 13: Croydon & Ringwood City Offices waste audit results 2013 - % by weight



GRAPH 14: Current & future waste emissions estimates

Organic material that ends up in landfill produces methane, a potent greenhouse gas, as it breaks down. Greenhouse gas emissions for this section are calculated from waste audits conducted at the Croydon and Ringwood City Offices and average emissions per EFT extrapolated to the organisation's total EFT.

Due to an estimated increase in staff numbers, without any reduction actions, emissions from waste are expected to increase by 77% to 2020/21 (refer to graph 14).

Actions

Key directions informing actions for waste from Maroondah 2040: Our future together

- 4.2 Provide leadership and adopt sustainable innovative approaches to limit consumption, prevent litter, reduce waste to landfill and encourage reuse and recycling of resources.

An effective long term approach to reduce emissions from waste is to encourage waste avoidance. This is by supporting and encouraging staff to design their own approach to waste minimisation and provide information about correct recycling practices. This is the focus of the waste actions, followed by expanding Council's infrastructure options to reduce waste sent to landfill. Council did participate in the Waste Wise program, however the accreditation program has ceased to exist. This has reduced the assistance with minimising waste and actions in this section are the key ones that could be implemented if resources are available. Co-benefits of reducing waste to landfill include supporting the recycling industry, reducing pressure on landfills and making better use of resources through conscious reuse. It is difficult to estimate the potential greenhouse gas savings from these actions due to their voluntary nature, however as they are implemented this will become more apparent.

Avoid

A1. Develop a staff awareness campaign to avoid and reduce food waste.

A2. Establish a 'waste avoidance' champion group to decrease waste to landfill.

Reduce

R1. Investigate availability of recycling infrastructure for staff at Council facilities and install where needed if feasible.

R2. Investigate composting of food waste at Council sites with high volumes of food waste.

R3. Continue awareness raising program to increase recycling rate at Council facilities.

Monitoring & reporting

M1. Continue annual waste audits at the Croydon and Ringwood City Offices.

10. Paper

What we want to achieve by 2020

We have reduced office paper use per EFT by accepting alternative work practices, assessing opportunities to avoid paper use and using electronic storage and devices. Our office paper is from ethical sources and has a reduced environmental impact in its production and disposal.

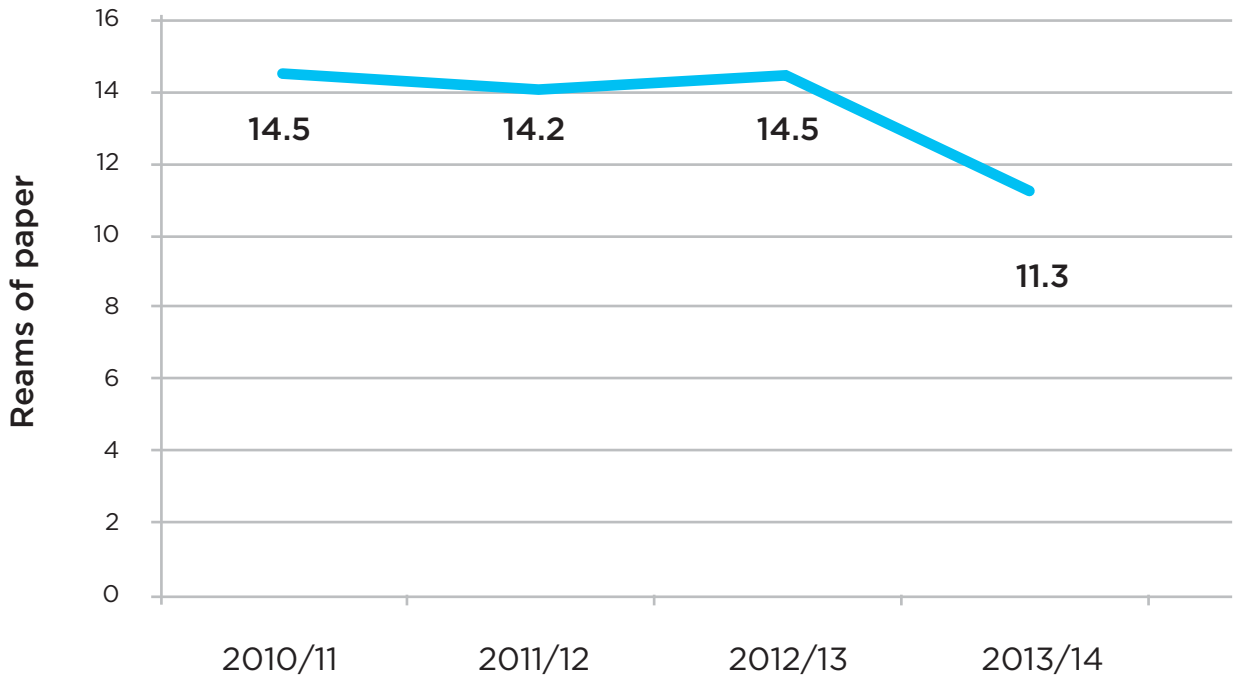
We will achieve this by

- Recognising and addressing office paper's whole of life cycle impacts.
- Proving infrastructure and information that allow for opportunities to avoid paper use.

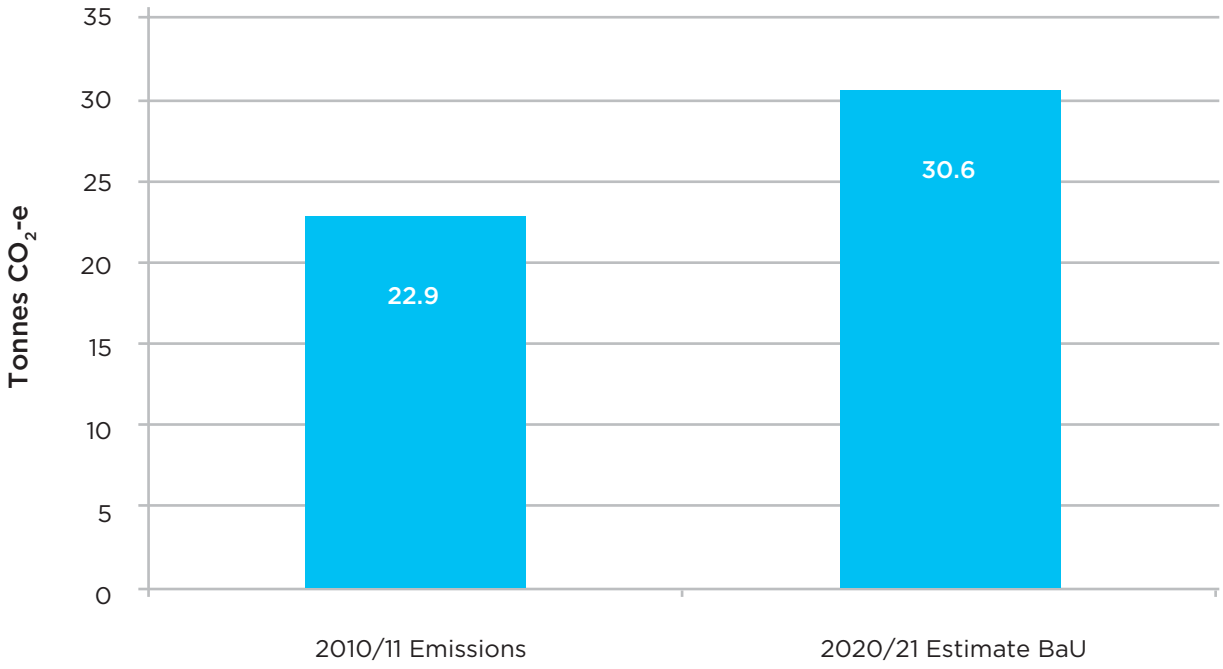
Background

In 2013/14, 5296 reams of office paper were used by Council. The majority of this use was white A4 paper (87%), followed by coloured paper (6%) and Council letterhead (5%). The greenhouse gas emissions associated with paper use are from the impact of obtaining the fibre, pulping, paper making and transport to market of the product. There are additional considerations for choosing paper including the type of bleaching used, ethical sources of timber products and fibre type.

Current & future greenhouse gas emissions



GRAPH 15: Reams of paper used per EFT



GRAPH 16: Current & future paper emissions estimates

Greenhouse gas emissions from office paper use and reams of paper per EFT had remained consistent since 2010/11 to 2012/13 (refer to graph 15). While in 2013/14 there was a drop of approximately 20%. This may be due to an increase in use of electronic technology and may be a significant factor in continuing to reduce emissions. It is estimated that without any actions to reduce emissions from paper, an increase in staff numbers will result in growth of paper use emissions by 33% to 2020/21 compared to 2010/11 (refer to graph 16).

Actions

Key directions informing actions for paper from Maroondah 2040: Our future together

- 4.2 Provide leadership and adopt sustainable innovative approaches to limit consumption, prevent litter, reduce waste to landfill and encourage reuse and recycling of resources.

Avoid

A1. Raise awareness about Council's electronic templates for letters, reports and information bulletins.

Reduce

R1: Create a checklist to guide paper purchases informed by position on pulp source, certification, offsets and source of manufacture.

R2. Encourage double sided paper use by providing collection trays and signage at print stations.

One ream of paper creates almost 4kg of greenhouse gases – double sided printing and reusing single sided paper can help cut your paper use emissions – avoiding paper use will reduce them further still

11. Offsets

Offsets are created from activities that avoid or reduce greenhouse gas emission, or remove carbon from the atmosphere, such as from energy efficiency and renewable energy projects or forest planting. To achieve carbon neutrality, offsets are purchased to 'cancel out' the remaining emissions that are produced from Council's activities after actions to avoid and reduce emissions have been implemented. Energy avoidance and efficiency are the focus of this strategy and to be implemented ahead of offsets, this also reduces the cost that would be required for offsetting in the future (refer to image 3).

It is important to ensure offsets are certified to increase the certainty that the offsets are achieving credible emission reductions. To assist with this credibility the NCOS specifies that eligible offsets for carbon neutral claims must be verified by particular schemes. The standard requires that offsets meet a number of principles to ensure they are robust and credible. These principles are: that they are additional to what would have happened without the purchase of the offset and additional to Australia's international emission targets; that the emission reduction is permanent; that a robust methodology was used to calculate emission reductions; that information about the project is publically accessible; that the project does not result in an increase in emissions elsewhere; that a project's emission reductions are independently audited; and offsets are listed on a registry that is accessible to the public.

For over 10 years Council has purchased Green Fleet offsets for all of the fuel purchased on BP fuel cards. These offsets are for the planting of native trees around Australia. Council also previously purchased 50% GreenPower for streetlights and 10% for Council buildings. Since 2013/14, GreenPower funds have been diverted to the street light energy efficiency project to focus on firstly achieving energy and cost savings ahead of purchasing offsets.

The key action for this section is to develop an offsets policy which will set out the key principles to guide future offset purchases. This is to address and prioritise the variety of projects, locations, co-benefits and costs. For example, projects can be located overseas or in Australia, such as landfill gas capture projects in Australia that prevent the more powerful greenhouse gas, methane, being emitted into the atmosphere; fuel efficient domestic stoves project in Zambia that require less wood fuel and has associated health benefits due to better indoor air quality and creates local jobs; a project to avoid deforestation in Brazil with biodiversity benefits and which utilises sustainable forest management practices.

An allocation for purchasing offsets to achieve carbon neutral from 2020/21 has been included in the Long Term Financial Plan.

Actions

O1. Develop an offsets policy to guide future offset activity and purchases.

12. Funding of the Strategy

Abatement action taken early results in greater savings over time and reduces the rise in operational costs. To enable actions to be implemented to further reduce emissions above what has been proposed in this Strategy funds are required in addition to what has been currently allocated.

Funding for past corporate carbon reduction projects has generally been from Council's annual capital works program, operational budgets and has included some grant funding. It seems unlikely, in the near future, that there will be significant grants available to Councils from the Federal Government, but there may be opportunities from the State Government. Preliminary analysis of the Federal Government's Emission Reduction Fund by the Victorian Greenhouse Alliances suggests that it will not likely be a viable option for Councils due to the low price offer for emission reductions compared to the high project costs for Local Governments. This highlights the need to explore other funding options. Some of these options are described below.

A Revolving Energy Fund uses the savings from projects that reduce energy and associated maintenance costs and reinvests these funds into more sustainability projects.

It can fund, or part fund energy saving projects, however this type of fund does not have to be limited to energy and could include water saving and other sustainability projects.

Maroondah has established a Revolving Energy Fund which includes the funds that were previously spent on GreenPower and instead now committed to energy efficiency. A standard operating procedure has been developed for the GreenPower component. An action in this strategy is to develop a standard operating procedure for the Fund as a whole. This will create an agreement on how savings from energy efficiency projects will be calculated, how financial savings will be shared and what portion will be reinvested into new projects.

This could provide an additional funding stream and assist with medium to long term planning for energy reduction projects, especially if run in parallel with a long term capital works plan.

Another funding option is offered by Council's current energy retailer. AGL offers on-bill payment for energy efficiency projects for Procurement Australia customers. This is for projects that AGL Energy Services implement with a minimum project value of $10,000. Payments are included on energy bills over 6 to 12 months. Interest is not charged for this option.

An EPC involves an Energy Service Contract Provider delivering the whole suite of actions for the assessment and delivery of energy efficiency retrofits in buildings. This is a more streamlined approach compared to the traditional model, as the whole process from audit to implementation to monitoring and verification is with one provider. An EPC model includes guaranteed energy savings. In the instance where a loan is taken, this model allows for EPC loan repayments to be made from energy savings from the project.

The Clean Energy Finance Corporation (CEFC) provides financing options for low carbon projects and is a fund established via federal legislation. It can offer Councils Energy Loans via a co-financing agreement with a major bank. As the CEFC aim to make it easier to get finance for energy efficiency and renewable projects financing could be structured more closely to paybacks and "below market interest rates".

Actions

F1. Compile standard operating procedure for the Revolving Energy Fund.

F2. Assess alternative funding options for projects such as through the CEFC, AGL and leasing schemes.

*R1. Continue to investigate the potential of reducing energy use in buildings through an Energy Performance Contract as part of a joint EAGA project, or independently.

**This action is included in the Buildings section.*

13. Data Management & Reporting

Data is an essential component of the carbon neutral strategy, as it provides an understanding of how Council is tracking towards its goal and the details of energy use and emissions generated within each subsector.

In particular, accurate data provides a trend of emissions and costs over time, helps to identify opportunities for action and aids communication and sharing of knowledge about what influences energy and fuel use.

It is especially important to provide information and reporting that will be useful to stakeholders, particularly those implementing actions. This is to provide an indication about the effectiveness of actions.

The sub-sector with the largest and most complex data to capture is buildings. It also provides the greatest opportunity for improvements. These improvements are in streamlining the data capture and recording process as well as capturing billing errors and anomalies. This will not only create more accurate data, but could provide financial savings when incorrect billing is identified.

In addition to the data for compiling the corporate emission profile, a data system for capturing abatement actions could be formalised. Important in this monitoring process is that the method chosen is transparent, replicable and agreed upon by stakeholders to provide a more detailed understanding about the impact of actions. Evidence indicates that programs with robust monitoring and verification achieve better outcomes.

Actions

DM&R1. Investigate the information required by the Steering Committees to further understanding of emission profiles and to identify savings and track efficiency of actions.

DM&R2. Create a communications plan for reporting and providing information about the carbon neutral work.

DM&R3. Investigate a framework for monitoring and reporting estimated energy and emission savings for projects run in-house.

DM&R4. Investigate options for data management systems for carbon inventories as part of the EAGA utilities management project.

DM&R5. Report annually on progress of implementing actions from the Carbon Neutral Strategy.

Battery storage for solar PV is a new opportunity to capture and utilise renewable energy.

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
APPROACH					
AP1. Hold Climate Change Road show to raise staff awareness about the latest climate change science and impacts.	Provide staff with the opportunity to inquire about climate change related issues and hear about Council's climate change work.	Integrated Planning		**1** 2 3 4 5 6 7	C
AP2. Identify training and information needs for staff involved in carbon management.	Increase staff knowledge and expertise to improve carbon management.	Carbon Neutral Steering Committees	HR	**1 2 3 4 5 6 7**	NC
BUILDINGS					
R1. Continue to investigate the potential of reducing energy use in buildings through an Energy Performance Contract as part of a joint EAGA project, or independently.	To provide a holistic and efficient process to improve energy efficiency and building maintenance with guaranteed energy savings.	Assets, Integrated Planning	Carbon Neutral Buildings Steering Committee	**1 2** 3 4 5 6 7	C
R2. Implement the Ringwood City Offices heating, ventilation and air conditioning system and building management system replacement.	To improve the air flow temperature control and management of the HVAC system.	Assets	Integrated Planning	**1 2** 3 4 5 6 7	NC
R3. Continue to install energy efficient appliances, equipment and fixtures as part of Council's annual capital works facility improvement program.	To ensure that energy efficient options are chosen to minimise emissions growth.	Assets	Integrated Planning	**1 2 3 4 5 6 7**	C
R4. Continue to encourage and advocate for Green Star certification for the Realm.	To trial the Green Star process, reduce the potential greenhouse gas emissions from the building's operations and seek improvements in Indoor Environment Quality.	Business & Development	Integrated Planning	**1 2** 3 4 5 6 7	C
R5. Develop an ESD policy and guidelines for Council buildings to provide an environmental standard for new buildings and renovations.	To identify the cost and energy savings of adopting environmental building standards and to provide a joint understanding at the planning and design phase of projects.	Assets, Integrated Planning	Carbon Neutral Buildings Steering Committee	1 **2** 3 4 5 6 7	NC

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
BUILDINGS					
R6. Continue to investigate the delivery of a green IT program, including a printer consolidation project.	Understand Council's energy use attributable to IT equipment to enable action planning and to identify improvements. With printer consolidation to reduce energy and paper use.	IT, Governance, Integrated Planning		**1 2** 3 4 5 6 7	C
R7. Investigate the development of an energy saving behaviour change program for building users.	To identify the energy avoidance opportunities available and investigate methods of program delivery.	Carbon Neutral Buildings Steering Committee		1 **2 3** 4 5 6 7	NC
RE1. Investigate a business case for renewable energy generation potential of the municipality.	To identify the large scale opportunities for renewable energy infrastructure to offset the energy used by council	Assets, Integrated Planning	Leisure, Finance, Carbon Neutral Buildings Steering Committee	1 2 3 **4 5** 6 7	NC
STREET LIGHTS					
R1. Continue to implement phase 1 of the street light energy efficiency program.	Consider a long term approach to reduce energy and maintenance charges for street lights on residential streets and identify opportunities for safety improvements.	Engineering & Building Services, Integrated Planning	Carbon Neutral Street lights Steering Committee	**1 2** 3 4 5 6 7	C
R2. Plan for and implement phase 2 of the street light energy efficiency program.	Consider a long term approach to reduce energy and maintenance charges for street lights on residential streets and identify opportunities for safety improvements.	Engineering & Building Services, Integrated Planning	Carbon Neutral Street lights Steering Committee	1 **2 3 4 5 6 7**	NC
R3. Develop outdoor and street lighting policy and guidelines.	Provide consistent direction and a holistic approach to lighting design and operation.	Engineering & Building Services, Integrated Planning	Carbon Neutral Street lights Steering Committee	1 **2** 3 4 5 6 7	NC
R4. Map non-standard (decorative) street lights to determine energy efficiency options.	To achieve a more efficient process by incorporating this into the energy efficiency street light project.	Engineering & Building Services, Operations, Assets, Integrated Planning		1 2 **3** 4 5 6 7	NC

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
STREET LIGHTS					
R5. Map off-street outdoor lighting assets to identify energy efficiency options.	To improve the energy efficiency of current lighting assets and assess against street lighting policy and guidelines.	Carbon Neutral Street lights Steering Committee		1 2 3 4 **5** 6 7	NC
R6. Investigate options to provide support for sports clubs to install energy efficient outdoor lighting.	To reduce the barrier of higher upfront cost of some energy efficient options. To raise awareness about Council's commitment to energy efficiency for its assets.	Leisure, Culture and Youth		1 2 3 4 **5** 6 7	NC
PLANT & FLEET					
A1. Publicise safe and amenable walking routes and destinations around Croydon and Ringwood Offices by using the Walkscore website.	Increase number of staff walking at lunchtime and avoiding car use.	Integrated Planning	Human Resources	**1 2** 3 4 5 6 7	NC
A2. Encourage employee to use teleconferencing functions on Council phones with an awareness campaign.	Reduction in vehicle trips made between Council workplaces by employees.	IT, Integrated Planning	Communications & Marketing	1 **2** 3 4 5 6 7	NC
R1. Trial hybrid passenger vehicle to assess performance and then consider expansion of hybrid as a greater proportion of the fleet.	Understanding of fuel saving potential and acceptance as a fleet vehicle	Operations	Integrated Planning	1 **2** 3 4 5 6 7	NC
R2. Provide Myki cards for employees to borrow for work commuting.	Reduction in fleet use by expanding current HR Myki system.	Integrated Planning	HR; Finance; Customer Service	1 **2** 3 4 5 6 7	C
R3. Update Council's travel and vehicle usage policy to endorse and encourage more efficient and sustainable business transport practices.	Reduce the likelihood of the fleet becoming less efficient over time. Encourage EcoDriver behaviours	Integrated Planning	Operations, HR	1 2 3 **4 5** 6 7	C
R4. Delivery EcoDriver Program for fleet vehicle owners across the organisation.	Reduce fuel use and driver stress.	Integrated Planning	Operations	**1 2 3** 4 5 6 7	C

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
PLANT & FLEET					
R5. Establish an online fleet vehicle booking system that allows staff to view vehicle bookings to arrange car pooling to meetings.	Reduce number of sole occupant vehicles.	Integrated Planning	IT	1 2 3 **4** 5 6 7	NC
R6. Assess more efficient truck options at replacement if higher efficiency than current is available.	Continue to improve the fuel efficiency of the truck fleet with potential air quality improvements.	Operations		**1 2 3 4 5 6 7**	NC
R7. Establish energy efficiency criteria for evaluation of plant purchases.	Environmental criteria to aid decision making and reduce fuel use	Operations, Golf		1 **2** 3 4 5 6 7	NC
R8. Provide information about responsibilities for owners and drivers of Council vehicles at induction.	Reduce maintenance costs and raise awareness about efficient vehicle use.	Operations	Integrated Planning, HR	1 2 **3** 4 5 6 7	NC
RE1. Investigate inclusion of electric vehicles in Council's fleet.	Understand costs and benefits of inclusion of electric vehicles in fleet.	Operations, Integrated Planning		1 2 **3** 4 5 6 7	NC
O1. Continue to purchase Greenfleet offsets and review once offsets policy has been established.	Continue to support well established offset process and program.	Operations		**1 2 3 4** 5 6 7	C
M1. Conduct an employee travel survey to monitor changes in employee travel behaviour.	Assess effectiveness of actions to reduce emissions.	Integrated Planning		**1** 2 3 **4** 5 6 7	C
WASTE					
A1. Develop a staff awareness campaign to avoid and reduce food waste.	To encourage the reduction of food waste creation as a first preference ahead of introducing systems to divert food waste from landfill.	Waste Management,	Integrated Planning	1 **2** 3 4 5 6 7	NC
A2. Establish a 'waste avoidance' champion group to decrease waste to landfill.	To encourage ownership of waste reduction and build knowledge and awareness to improve practices.	Waste Management,	Integrated Planning	1 2 **3** 4 5 6 7	NC

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
WASTE					
R1. Investigate availability of recycling infrastructure for staff at Council facilities and install where needed if feasible.	To ensure community and staff using Council buildings have a recycling option.	Waste Management,	Integrated Planning	1 **2** 3 4 5 6 7	C
R2. Investigate composting of food waste at Council sites with high volumes of food waste.	To emphasise that waste is a resource and simple changes in behaviour can save costs and reduce resources going to landfill.	Waste Management,	Integrated Planning	1 2 **3** 4 5 6 7	C
R3. Continue awareness raising program to increase recycling rate at Council facilities.	To emphasise that waste is a resource and simple changes in behaviour can save costs and reduce resources going to landfill.	Waste Management,	Integrated Planning	1 **2** 3 4 5 6 7	C
M1. Continue annual waste audits at the Croydon and Ringwood City Offices.	Assess the effectiveness of waste reduction actions and inform future priority actions.	Integrated Planning		**1 2 3 4 5 6 7**	C
PAPER					
A1. Raise awareness about Council's electronic templates for letters, reports and information bulletins.	Reduce the quantity of printed material.	Communications & Marketing		**1 2 3 4 5 6 7**	C
R1. Create a checklist to guide paper purchases informed by position on pulp source, certification and source of manufacture.	Simplified paper selection process.	Governance, Integrated Planning		1 **2** 3 4 5 6 7	NC
R2. Encourage double sided paper use by providing collection trays and signage at print stations.	Visual prompt to remind staff of the paper reduction goal.	Integrated Planning		**1 2 3 4 5 6 7**	C
OFFSETS					
O1. Develop an offsets policy to guide future offset activity and purchases.	Provide a sound framework that reflects Council's support for furthering low carbon projects/ technologies/ communities.	Integrated Planning	Finance	1 2 3 4 **5** 6 7	NC

14. Action Plan

ACTION	AIM & BENEFITS	LEAD	SUPPORT	TIMEFRAME*	STATUS**
FUNDS					
F1. Compile standard operating procedure for the Revolving Energy Fund.	To enable the planned implementation of energy efficiency projects and diversify funding sources.	Finance, Assets, Integrated Planning		**1** 2 3 4 5 6 7	C
F2. Assess alternative funding options for projects such as through the CEFC, AGL and leasing schemes.	To accelerate implementation of abatement actions.	Finance, Integrated Planning		**1 2 3 4 5 6 7**	NC
DATA MANAGEMENT & REPORTING					
DM&R1. Investigate the information required by the Steering Committees to further understanding of emission profiles and to identify savings and track efficiency of actions.	To provide meaningful and useful data.	Integrated Planning	Carbon Neutral Steering Committees	**1** 2 3 4 5 6 7	NC
DM&R2. Create a communications plan for reporting and providing information about the carbon neutral work.	Assist with a structured approach to raising awareness about carbon management and to be able to reach staff not directly working on carbon management.	Integrated Planning	Communications & Marketing	1 **2** 3 4 5 6 7	NC
DM&R3. Investigate a framework for monitoring and reporting estimated energy and emission savings for projects run in-house.	To utilise a method that has support of stakeholders to determine effectiveness of action implementation.	Integrated Planning	Carbon Neutral Steering Committees	1 2 **3** 4 5 6 7	NC
DM&R4. Investigate options for data management systems for carbon inventories as part of the EAGA utilities management project.	To streamline the data capture and reporting process.	Integrated Planning	Finance, IT	1 **2** 3 4 5 6 7	NC
DM&R5. Report annually on progress on implementing actions from the Carbon Neutral Strategy.	To identify possible barriers to action implementation, track progress and assist with project planning.	Integrated Planning	Carbon Neutral Steering Committees	**1 2 3 4 5 6 7**	NC

Employees at the Ride to Work Day breakfast at HE Parker Reserve, Heathmont.

**Timeframe refers to the years of action implementation – year 1 = 2014/15, year 2 = 2015/16, year 3 = 2016/17, year 4 = 2017/18, year 5 = 2018/19, year 6 = 2019/20, year 7 = 2020/21*

***Status refers to whether action implementation has commenced (C) or not yet commenced (NC)*

Glossary

Climate change mitigation – actions that avoid or reduce the production of greenhouse gas emissions, such as via renewable energy, energy efficiency and behaviour change.

Climate change adaptation – actions that are taken to reduce the impacts of actual or expected changes in climate and to use any opportunities these changes may present.

Greenhouse gases – the 6 major greenhouse gases are water vapour, carbon dioxide (CO2), methane (CH4) (these 3 are naturally in the atmosphere), nitrous oxide (N2O), hydro fluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) (these last 3 are synthetic).

CO_2-e – to make measuring of greenhouse gases consistent, greenhouse gas emissions are all converted to a carbon dioxide equivalent.

Carbon – can be used as shorthand to mean greenhouse gases.

Carbon neutral – when an organisation or product's net greenhouse gas emissions are zero. This is achieved by measuring and reducing emissions and then buying offsets equivalent to the remaining emissions.

Carbon zero - when greenhouse gases are reduced to zero via actions without the purchase of offsets.

Offsets – created from activities that reduce or remove greenhouse gases from the atmosphere that would not have occurred without the offset program.

Scope 1 emissions – Greenhouse gas emissions that result directly from activities at a facility.

Scope 2 emissions – Greenhouse gas emissions that result from the generation of electricity, heating, cooling or steam that is used at a facility.

Scope 3 emissions – Greenhouse gas emissions that result from the activities of a facility but emitted by another facility.

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Appendix 1

Assumptions used for pathway to carbon neutral

General assumptions:

- No change in emission factors
- No other significant changes to Council infrastructure besides the addition of Aquanation and the Realm (note that projected emissions for these two buildings are best estimates and will need to be reviewed once buildings are operational).

Emissions to 2020/21

	Year	Tonnes CO_2-e
Baseline	2010/11	16,463
Baseline (excluding Ringwood Aquatic Centre)	2010/11	14,622
20% reduction target (excluding Aquanation)	2020/21	11,698
Target year estimates (excluding Aquanation)	2020/21	15,065
Abatement required to meet 20% reduction target		3367
Business as Usual estimate	2020/21	22,321

Estimated abatement and net emissions in 2020/21 that would remain for offsetting without further action to what is currently proposed.

Action	Estimated abatement/ offsets tonnes CO_2-e	% of 2019/20 estimates
Energy Performance Contract	1830	8.2%
Street light energy efficiency program	2244	10.1%
EcoDriver	112	0.5%
Hybrid trial	1.12	0.005%
Offsets	18,134	81.2%
Total	22,321	100%


HV INSULATED
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Appendix 2

Assumptions and Data

Buildings

Total energy use and emissions from buildings.

Year	Electricity kWh	Gas GJ	LPG GJ	Total emissions tonnes CO_2-e
2010/11	5,057,277	49,657	37	9678
2011/12	5,582,810	46,500	34	10,167
2012/13	4,837,763	27,364	25	7998
2013/14	4,587,926	27,787	11	7637

Street Lights

Total energy use and emissions from street lights on residential streets.

Year	Electricity kWh	Total emissions tonnes CO_2-e
2010/11	4,043,957	5540
2011/12	4,041,802	5496
2012/13	3,961,887	5309
2013/14	3,918,243	5211

Plant & Fleet

Plant & Fleet Type	Number 2010/11	Number 2011/12	Number 2012/13
Car	73	80	77
Bus	3	3	3
Bob Cat	1	1	1
Backhoe/Loader	2	3	3
Van	8	8	8
Ute	34	34	37
Truck	18	18	18
Tractor	12	12	11
Street Sweeper	3	3	3
Roller	4	4	4
Mower	27	27	27
Misc	11	9	11
Forklift	1	3	3
Excavator	1	1	1
Chipper	1	1	2
Blower	1	1	1
Aerator	0	0	1
Transporter	5	4	4
Sprayer	3	5	5
Rough Cutter	0	1	1
Rake	1	1	1

Buildings

Total energy use and emissions from buildings.

Year	Fuel Total Litres	Fuel GJ	GHG tonnes CO_2-e	EFT	Energy GJ p/EFT	GHG tonnes p/EFT
2010/11	451,905	16,409	1210	428.38	38.30	2.82
2011/12	456,313	16,726	1238	417.22	40.08	2.96
2012/13	437,554	16,180	1202	413.10	39.16	2.90
2013/14	443,241	16,441	1223	467.90	35.13	2.61

Waste

Results from waste audit at the Croydon and Ringwood City Offices 2013/14						
Waste to landfill		Combined average kg per EFT/day	Emission Factor	Total kg p/yr P/EFT	Total kg p/yr for all EFT	Total tonnes CO_2-e p/yr
General waste		0.0727	1.2	18.55	8023.79	9.63
Recyclables	Co-mingled recyclables (excluding Paper)	0.0492	0	12.56	5432.49	0.00
	Co-mingled recyclables - paper products	0.0588	2.5	14.99	6484.13	16.21
Compostables	Food waste	0.0207	1.6	5.29	2288.75	3.66
	Paper towel	0.0283	2.5	7.22	3121.14	7.80
	Total	**0.2298**		**58.60**	**25,350.29**	**37.30**

EFT Actual and Estimates to 2020

Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
EFT	428.38	417.22	413.10	467.9	478.6	548.6	558.5	558.5	558.5	558.5

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