

# Emissions Reduction Plan

2017-2021



## Glossary of terms and acronyms:

BAU	Business As Usual
CCP	Cities for Climate Protection
CNG	Compressed Natural Gas
CO <sub>2</sub> e	Equivalent tonnes of Carbon Dioxide
CSP	Community Strategic Plan
ERP	Emissions Reduction Plan
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
IWCMS	Integrated Water Cycle Management Strategy
kL	Kilolitre is a unit of measurement equal to 1,000 litres.
kWh	Kilowatt hours is a unit of energy equal to 1000 watt hours or 3.6 mega joules.
LED	Light Emitting Diode
LPG	Low Pressure Gas
ML	Mega litre. 1 ML= 1,000kL
MWh	Megawatt hours. 1MWh = 1,000 kWh
NGERs	National Greenhouse and Emissions Reporting Act
RET	Large-scale Renewable Energy Target
PV	Photo-voltaic
UNFCC	United Nations Framework Convention on Climate Change

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## 1. Executive Summary

The 2017-2021 Eurobodalla Emissions Reduction Plan sets out Council's strategy to minimise the greenhouse gas emissions from Council operations. It builds on the work done in the previous editions of the plan over the period 2007-2017. The outcomes achieved over the past ten years has demonstrated that emission reductions can deliver both strong environmental and economic benefits.

Climate change has the potential to affect every aspect of our lives, from the health and integrity of natural systems, to economic prosperity and community health and well-being. Responding effectively to climate change involves both reducing greenhouse gas emissions (mitigation) and being ready to adapt to climate change impacts as they occur (adaptation).

The content of the new draft plan is principally focussed on emission reduction activities. A dedicated climate change adaptation plan will be developed separately and is one of the key actions in this plan. This will enable the draft Emissions Reduction Plan to focus on more targeted actions related to emissions and as such is appropriately to be titled the Emissions Reduction Plan (ERP).

Key actions for Council to reduce emissions include continued efforts in energy efficiency, renewable energy, reducing methane pollution from landfill, decarbonising the fleet and developing an Adaptation Strategy. Council will also keep a firm focus on emerging technologies and will be investigating a number of new opportunities.

Council is ready to capitalise on any opportunities that prove to be technically and economically feasible.

The emission reduction actions and achievements to date have demonstrated that there is a strong business case for action. Completed actions have generated significant energy cost savings totalling over \$1m per year. New actions will continue to be prioritised based on the economic benefits to Council and new project approvals will depend on a viable business case proving a positive return on investment.

Council is on track to meet its commitment to reduce emissions by 25% by 2020. A new corporate energy emissions reduction target of 80% by 2030 has been established. An additional target will be to source 100% of Council's electricity from renewable energy by 2030. Council recognises that there will be challenges in reaching these targets due to future increases in Council services and assets and their corresponding emissions. It will also depend upon other factors including the policies implemented by the NSW and Australian Governments, the trends and opportunities presented by clean technology and the energy market, and the internal decisions made by Council.

Council will continue working on a range of strategies and implement a number of new actions detailed in this plan. Steps to support the community in responding to the issues of climate change are also outlined in the Plan. Committing to a strong target places Council in a good position to continue focusing on improving efficiencies and delivering energy and cost savings.



## 2. Background

### 2.1 International

The issue of climate change has been on the international agenda since The United Nations Conference on Environment and Development in Rio de Janeiro in 1992. Since this time, climate change has increasingly dominated international environmental negotiations, and is now widely recognised as the most serious environmental issue of our time. It is an issue that will require a high degree of international cooperation to resolve.

An historic global climate agreement was agreed under the United Nations Framework Convention on Climate Change (UNFCCC) at the 21st Conference of the Parties (COP21) in Paris (30 November to 12 December 2015). The Paris Agreement sets in place a durable and dynamic framework for all countries to take climate action from 2020, building on existing international efforts in the period up to 2020. Key outcomes include:

- A global goal to hold average temperature increase to well below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels.
- All countries to set mitigation targets from 2020 and review targets every five years to build ambition over time, informed by a global stock take.
- Robust transparency and accountability rules to provide confidence in countries' actions and track progress towards targets.
- Promoting action to adapt and build resilience to climate impacts.
- Financial, technological and capacity building support to help developing countries implement the Agreement.

The Paris Agreement entered into force on 4 November 2016 and has now become legally binding for the 133 nations that have ratified

it (as of 7 March 2017). The commitment of these nations accounts for about 82% of international carbon emissions.

### 2.2 Australia

Australia has committed to reducing greenhouse gas emissions by 26-28% below 2005 levels by 2030. The Australian Government plans to meet the interim 5% reduction by 2020 target through their Direct Action policies. At the core of this policy is the Emissions Reduction Fund which provides incentives for emission reduction activities across the Australian economy.

The Australian Government ratified the Paris Agreement in November 2016. The agreement's review and ratchet mechanism means that Australia's interim emissions reduction targets are likely to become more ambitious over time.

The Renewable Energy Target (RET) is an Australian Government scheme designed to reduce the greenhouse gas emissions in the electricity sector. The target for large-scale renewable generation of 33,000 GWh in 2020 will mean that about 23.5% of Australia's electricity generation in 2020 will be from renewable sources.

The *National Energy Productivity Plan 2015-2030* was developed by Council of Australian Governments. It outlines a framework and plan to accelerate improvement to deliver a 40% improvement in Australia's energy productivity. Key activities that will provide direct benefits to Eurobodalla include improving vehicle emission standards, improving residential and commercial buildings energy efficiency and accelerating energy market reforms and innovative new technologies.

Other key national programs include the Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation

(CEFC). ARENA provide grant funding to accelerate renewable energy solutions in Australia. The CEFC invests commercially, through the provision of loans, into renewable energy, energy efficiency and low emissions technologies.

## 2.3 New South Wales

The New South Wales Government endorses the Paris Agreement and has committed to achieving zero net emissions by 2050. This objective is intended to give confidence and certainty to industry and attract low carbon investment and innovation across NSW.

The NSW Government is developing a Climate Change Fund Strategic Plan in 2017. This will provide funding and support for advanced energy technologies and solutions, energy efficiency and climate change adaptation.

The NSW Energy Saving Scheme is one of the key strategies that reduces electricity consumption in NSW by creating financial incentives for organisations to invest in energy savings projects. In past and current projects Council has generated energy saving certificates by installing, improving or replacing energy savings equipment.

## 2.4 Eurobodalla Shire Council

Eurobodalla Shire Council has been actively addressing climate change for many years. Two consecutive Greenhouse Action Plans have been implemented from 2007 to 2017.

The Eurobodalla Community Strategic Plan (CSP) is the key guiding document for Council and was developed after extensive community consultation. A number of outcomes and strategies in the CSP are addressed through the implementation of the Emissions Reduction Plan. The main links are:

- 3. Protected and valued natural environment
  - 3.1 Respond to our changing environment and build resilience to natural hazards

- 3.2 Value, protect and enhance our natural environment and assets
- 3.4 Develop community awareness of environmental opportunities, issues and impacts

## 4. Sustainable living

- 4.1 Maximise the efficient use and reuse of our water resources
- 4.2 Targeted reduction of waste with an emphasis on resource recovery and waste minimisation
- 4.3 Support and encourage sustainable choices and lifestyles
- 4.4 Work together to reduce our environmental footprint and develop a clean energy future

## 9. Innovative and proactive leadership

- 9.1 Provide strong leadership and work in partnership to strategically plan for the future and progress towards the community vision
- 9.2 Ensure financial sustainability and support the organisation in achieving efficient ongoing operations
- 9.3 Leverage our skills, knowledge and systems to continually improve and innovate

Council has previously committed to an emissions reduction target of 25% by 2020 and is on track to achieve this. A new target has been established to reduce Council energy emissions from the 2005-06 baseline by 80% by 2030. An additional, supporting target has also been established to source 100% of Council's electricity from renewable energy by 2030.

## 2.5 The Eurobodalla community

A 2016 survey of local residents showed that the local community is generally concerned about climate change. Some relevant results included:



- Advice from Council on '*sustainability, renewable energy and climate change*' was valued as relatively important to 84% of people
- 73% of people said that, in general, they are concerned about the environment.
- Climate change was the environmental issue that worried them the most
- 97% of people surveyed already have some energy saving items installed at home
- 26% of those surveyed had solar panels. This rose to 40% and 45% for the 55-64 and 75+ age brackets.
- A local Eurobodalla chapter of the international climate change advocacy group "350.org" was established in 2015.
- The South coast Health and Sustainability Alliance (SHASA) was formed in 2015 and has been active in supporting the take up of more renewable energy.
- Narooma Rotary ran a Renewable Energy Expo in 2016 with about 1,000 attendees.
- Several community climate change rallies and events have been attended by hundreds of people.

There has been a growing community interest in climate change and renewable energy in Eurobodalla.



### 3. Council greenhouse gas emissions inventory

#### Background terms:

For the purpose of greenhouse gas reporting, GHG emissions are categorised into Scope 1, Scope 2 and Scope 3 emissions. The *National Greenhouse Emissions Reporting (NGER) Act 2007* refers to the mandatory reporting of emissions from Scope 1 and 2, whereas Scope 3 is voluntary. Eurobodalla Shire Council does not meet the thresholds that trigger mandatory reporting under NGERs. However, emissions reporting has been aligned with this methodology in the interests of consistency and best practice.

Definitions for each Scope and Council emissions from these areas are outlined below.

#### Scope 1 Emissions:

The direct emissions from an activity undertaken or controlled by the company.

- Council managed landfill sites
- Fugitive emissions from Sewer Treatment Plants
- Bottled gas direct emissions
- Fleet fuel (ULP, E10 and diesel) direct emissions

#### Scope 2 Emissions:

The emissions arising from electricity, heating, cooling or steam consumed by the company.

- Electricity use from all Council owned facilities

#### Scope 3 Emissions:

The emissions generated as a consequence of the activities of the company which occur outside of the facility.

- Transmission and distribution emissions from Council electricity use
- Extraction and supply emissions associated with fuel used for Council vehicles and bottled gas

- Electricity used by street lighting assets which are owned by Essential Energy

More information on the methodology used for calculating emissions is provided in Appendix 1.

#### 3.1 Corporate emissions profile

Council's emissions are summarised in Table 1.

2015-16 Council GHG emissions inventory	
Scope 1	2015-16 tCO <sub>2</sub> e
Fuel (ULP, Diesel)	2,635
Bottled gas	128
Waste: landfill methane emissions	20,014
Sewer: fugitive methane emissions	990
SUBTOTAL	23,766
Scope 2	
Electricity	7,020
SUBTOTAL	7,020
Scope 3	
Electricity transmission and distribution losses	1,003
Fuel production and transport	147
Street lighting (electricity)	1,473
SUBTOTAL	2,623
<b>TOTAL</b>	<b>33,409</b>

*Table 1 Council 2015-16 Greenhouse Gas Emissions Inventory*

An analysis of Council's GHG emissions by the type of activity is revealing. As illustrated in Figure 1 it highlights the large contribution made by the methane emissions from landfill waste. This is, in part, due to the fact that methane is a powerful greenhouse gas and has 25 times the global warming potential of carbon dioxide and the fact that Council processes a large volume of waste from the wider community.

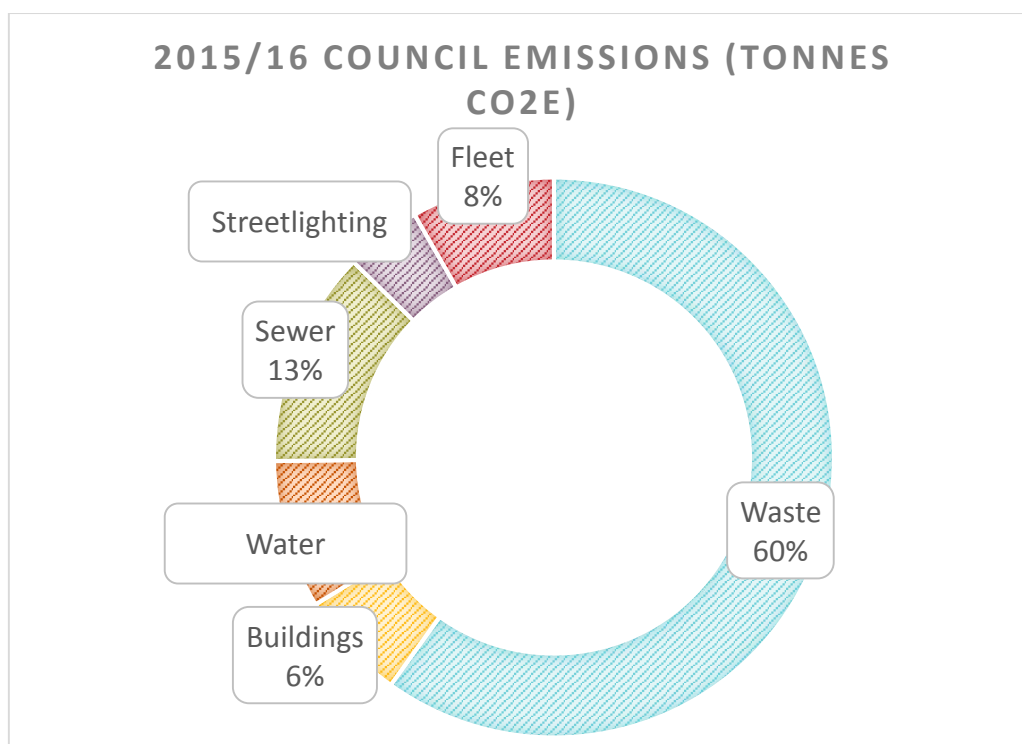


Figure 1 Council GHG Emissions Breakup (2015-16)

Analysis of the energy costs associated with Council's emissions intensive activities in Table 2 highlights the large costs associated with these activities. Fuel costs have a disproportionately high share of the overall energy costs given their relatively small

contribution to Council's greenhouse gas (GHG) emissions. Energy costs clearly represent a large operating cost to Council and efforts to reduce the exposure to increased energy costs are essential.

Sector	GHG tCO <sub>2</sub> -e	% GHG	Energy cost* \$	Energy \$ %
Buildings	2,105	6%	\$571,658	19%
Water	2,869	9%	\$445,353	15%
Sewer	4,176	13%	\$673,700	23%
Fuel	2,771	8%	\$1,060,503	36%
Street lighting	1,473	4%	\$200,889	7%
Waste - landfill	20,014	60%	\$11,138	0%
<b>TOTAL</b>	<b>33,409</b>		<b>\$2,963,241</b>	

Table 2 Emissions Costs by Activity Type (2015-16)

\* Energy costs includes electricity, gas, fuel (diesel, ULP, E10 and LPG)

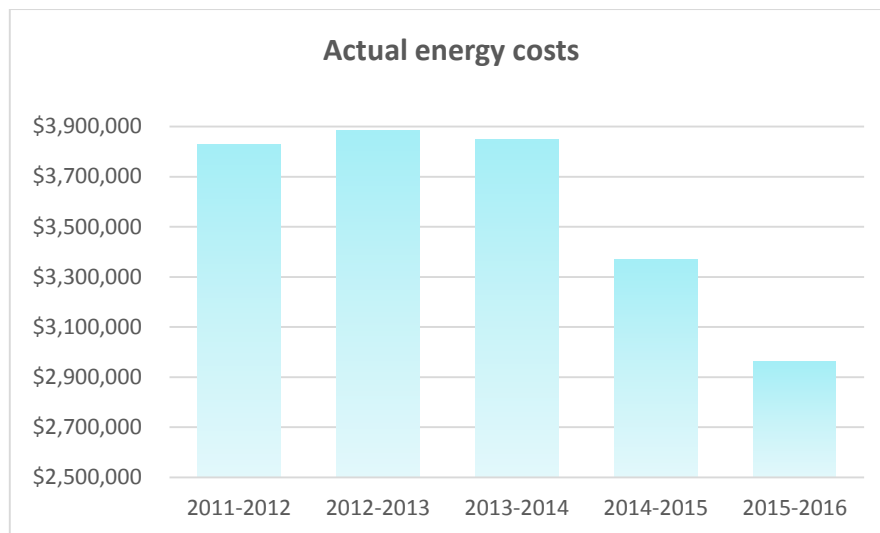


Figure 2 Council energy costs over time

As shown in Figure 2, energy costs have declined considerably since 2013-14. This is due to a decline in energy usage, improved energy management strategies and a reduction in the costs of energy. Refer to Section 4.1 or Appendix 2 for more details on actions completed to date. Total energy costs to Council have declined by over \$900,000 in 2015-16 compared to their peak in 2012-13. Energy costs would have been significantly higher again if energy management activities had not been completed.

Council first quantified its greenhouse gas emissions with reliable data in 2005-2006.

This is referred to as Council's baseline that is used for comparative purposes to determine if emissions are increasing or decreasing. Figure 3 shows Council's greenhouse gas emissions history since 2005-06. The blue part of the graph shows actual Council emissions. The orange part shows what emissions would have been if no reduction activities had been completed by Council. By including this in the chart, it shows what emissions would have been if all the energy efficiency, renewable energy and carbon offset projects had not been completed in a 'Business As Usual' scenario.

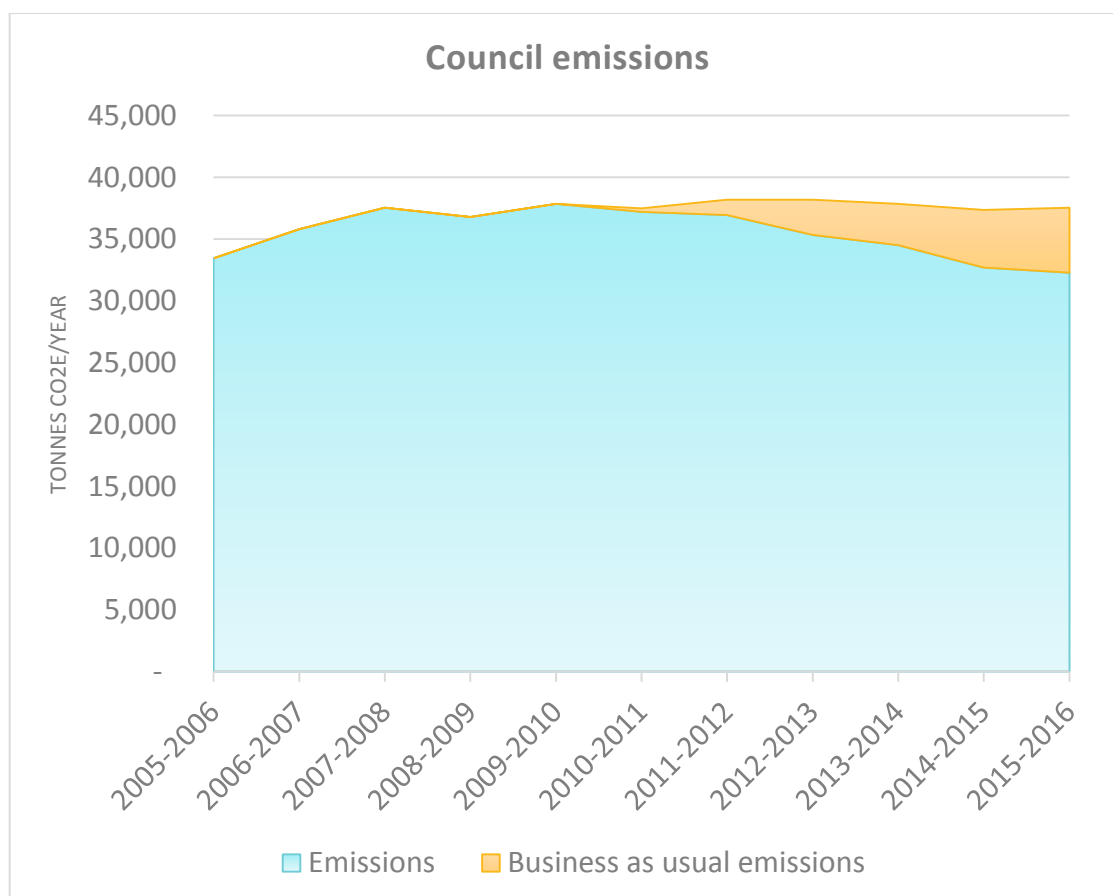


Figure 3

Council greenhouse gas emissions history

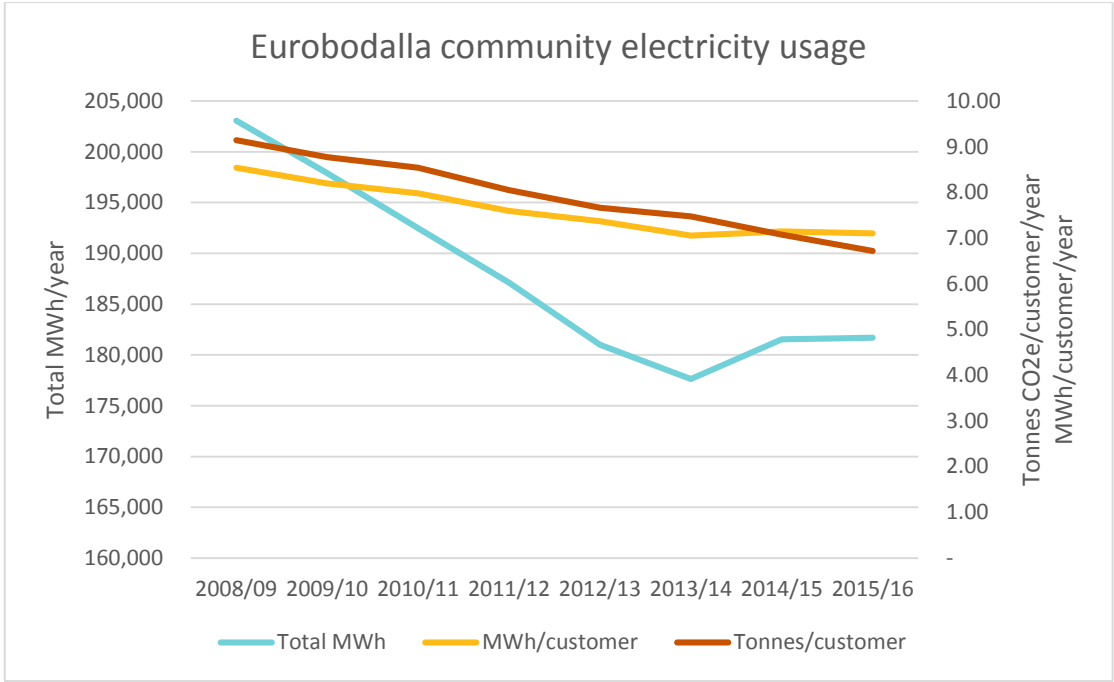
Total emissions for 2015-16 are down 3.4% compared to the 2005-06 baseline. This equates to a 16% reduction compared to the business as usual scenario.

### 3.2 Community emissions

Council continues to support the reduction of community emissions through a number of strategies outlined in Section 6.1. Although Council has limited resources or capacity to influence community efforts to address climate change, it can provide support through education programmes, through the delivery of the Local Environment Plan and in the structure of some community services such as waste, recycling, water and sewer.

Community electricity emissions are displayed in Figure 4. This shows a significant reduction in electricity usage over time (17%) demonstrating the impact that energy efficiency and solar power systems have had in reducing energy usage. Emissions per customer have declined by 27% compared to 2008-09 due to this reduction in electricity usage combined with a decarbonising electricity supply.

Other sources of community emissions such as bottled gas, transport and agricultural emissions have not been compiled.



**Figure 4** Eurobodalla community electricity usage per customer has declined by 17% since 08-09<sup>1</sup>



<sup>1</sup> Essential Energy (2017)



## 4. Progress to date

### 4.1 Climate change activities completed to date

Council has completed a large number of activities and projects aimed at reducing greenhouse gas emissions. These actions are summarised in Appendix 2.



The 2007-2012 Greenhouse Action Plan resulted in:

- 85% of the actions implemented
- the continued development of cycle and foot paths and promotion of sustainable transport options.
- three solar power systems installed on community buildings
- numerous energy and water efficiency measures
- 62% of Council's light vehicle fleet were four cylinder vehicles, up from 26% in 2006
- many resources recovered, reused, recycled and diverted from landfill
- Sustaining Our Towns (2010-2012) sustainability programs for residential, business and community groups
- Business Treading Lightly (2008-2010) sustainable business program
- an energy efficient street lighting upgrade reducing street lighting energy consumption by 25%.

## Greenhouse Action Plan

2012-2017



The 2012-2017 Greenhouse Action Plan resulted in:

- 100% of actions progressing
- saving over \$1m and 5,100 tonnes of CO<sub>2</sub>e per year
- compared to the 2005-06 baseline, building emissions are down 36%
- street lighting emissions are down 14% before the bulk LED upgrade
- over 15km of shared pathways and footpaths built
- total of 1,240 water rebates issued
- starting an Energy Performance Contract on Council's 23 largest sites
- winning the 2015 Local Government NSW Excellence in the Environment Award for accomplishments in sustainability and environmental management
- over 630kW of solar power installed across 25 facilities
- the Community Building Sustainability project saved 553 tonnes of CO<sub>2</sub>, 7,359,000 litres of water and over \$159,000 per year at over 50 community buildings
- a successful aggregated bid in the Emissions Reduction Fund to reduce methane emissions at Waste Management Facilities.

The total costs for the works completed to date is approximately \$2m. This does not include the Council staff costs in managing the delivery of these projects.

Projects to be completed in 2017 include:

- an Energy Performance Contract on the 23 largest Council sites. This is a competitive energy auditing process which will reduce energy use by 12% at target sites. This will save over 729 tonnes of CO<sub>2</sub> and \$155,000 per year, with an Internal Rate of return of 15%.
- LED street lighting will be installed on local roads in Eurobodalla in 2017 which could save over 450 tonnes of CO<sub>2</sub> and \$200,000 per year in energy and maintenance costs, with a simple payback period of less than five years.
- a landfill methane gas capture and flaring project will save an estimated 5,000 equivalent tonnes of CO<sub>2</sub> per year at Surf Beach landfill, and an estimated 3,500 equivalent tonnes of CO<sub>2</sub> per year at Brou landfill.



*Figure 5 Solar power installation at Kianga Sewage Treatment Plant*

## 5. Greenhouse gas emission reductions

### 5.1 Emission reduction opportunities

A number of emerging trends and developments in clean energy technologies and policies offer the potential for emissions reductions in the coming years.

The *National Energy Productivity Plan 2015-2030*, developed by the Council of Australian Governments aims to improve the country's energy productivity by 40%. A number of activities within this plan will help deliver emission reductions for Council. Of particular relevance will be higher vehicle emissions standards, higher appliance energy efficiency standards and accelerating energy market reforms and innovative new technologies.

The growth in clean technology markets, improving economies of scale leading to

declining costs, will also drive the deployment and mainstreaming of new opportunities.

The cumulative effect of a wide range of emission reduction opportunities becoming more viable will enable more ambitious greenhouse gas reduction targets to be achievable in the years ahead.

#### 5.1.1 Higher vehicle emission standards

Improving vehicle efficiency through a higher fuel efficiency standard would deliver real benefits to Council as vehicles are upgraded. As shown in Figure 6 the Australian Government's draft proposed vehicle emissions standards suggests target of 105g/km, phased in from 2020 to 2025, which would broadly align Australia with the EU targets for 2020-21 and the overall US target for 2025. This will deliver cost and emissions savings to Council's fleet as vehicles are upgraded.

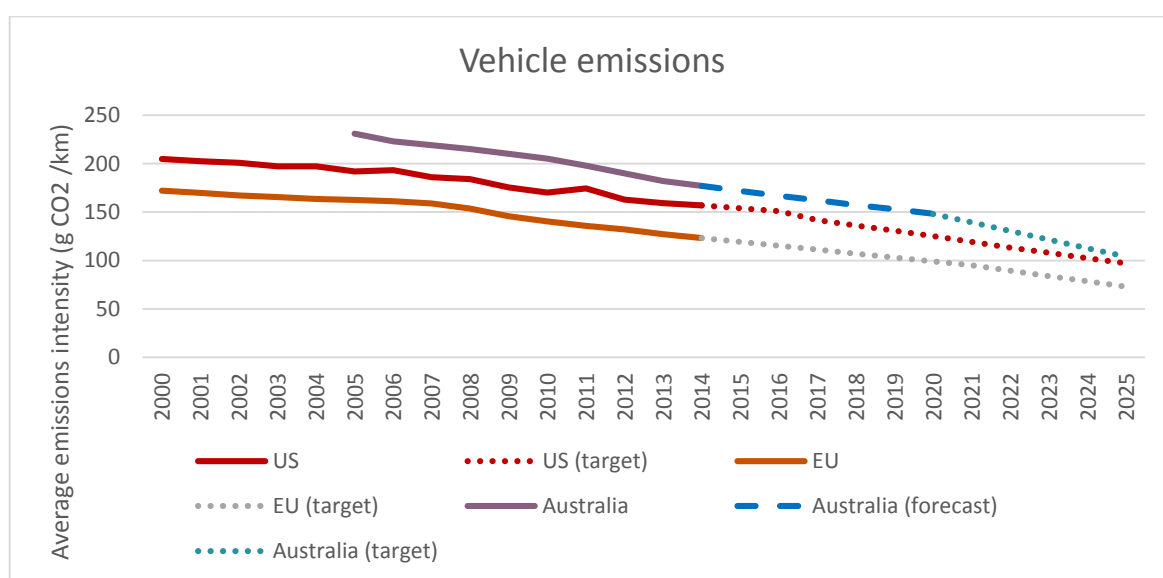


Figure 6 Vehicle emission standards targets<sup>23</sup>

<sup>2</sup> Climate Change Authority (2016) *Towards a climate policy toolkit: special review on Australia's climate goals and policies*, Special Report Three – Charts.

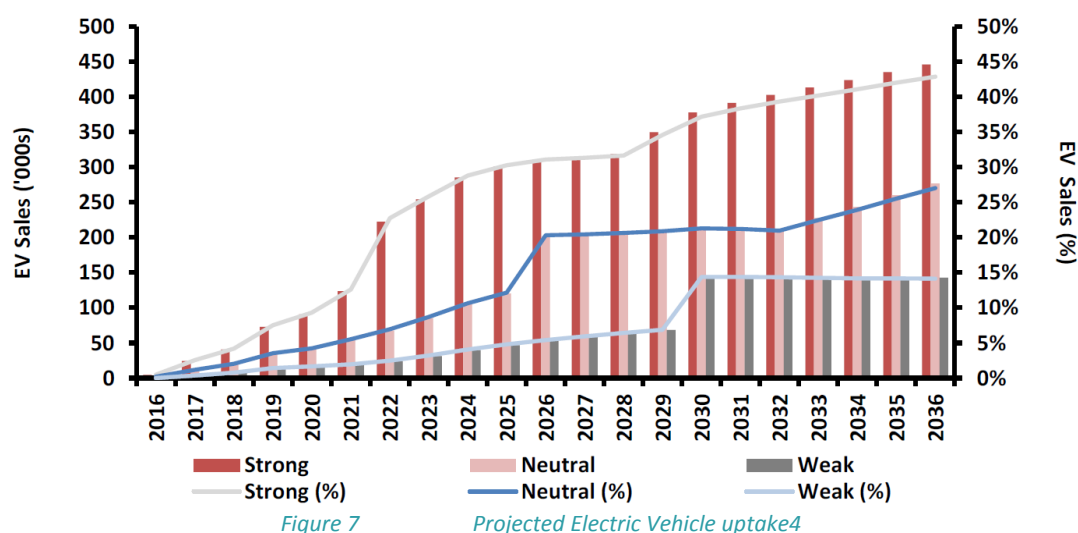
<sup>3</sup> Department of Infrastructure and Regional Development (2016) *Vehicle emissions standards for cleaner air – Draft Regulation Impact Statement*. <https://infrastructure.gov.au/roads/environment/forum/index.aspx>

### 5.1.2 Electric vehicles

Electric vehicles will become a rapidly growing segment of the car market. Combined with a low-carbon electricity grid they offer the potential to significantly reduce transport emissions. Electric vehicles can also offer Council reduced risk from volatile fuel costs

and greater security through reduced reliance on imported fuels.

As shown in Figure 7, electric vehicles are predicted to comprise 29%-45% of new vehicle sales by 2036 in a neutral or strong uptake scenario.



### 5.1.3 Battery storage

Rapidly reducing costs for battery storage presents opportunities for energy management and renewable energy. Batteries can help reduce demand charges through 'peak shaving', increase the level of solar power self-consumption, provide back up, or stand-alone power and improve 'time of use' power management. On a larger scale there are many other applications as well for electricity network operators and distributors.

The Australian Energy Market Operator expects a steady uptake in battery storage by 2021 driven by rising energy costs and declining battery costs.<sup>5</sup>

A 2015 literature review of electric vehicle battery packs identified the current and predicted costs of battery packs, as shown in Figure 8.<sup>6</sup> Since then price reductions for battery packs have already exceeded the most optimistic predictions.

<sup>4</sup>Australian Energy Market Operator (2016) *AEMO Insights, Electric Vehicles*, [https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning\\_and\\_Forecasting/NEFR/2016/AEMO-insights\\_EV\\_24-Aug.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/AEMO-insights_EV_24-Aug.pdf) (sourced 22/2/17)

<sup>5</sup> Swift, D. (2016) Market Trends and Outlook in Australia's Electricity Markets, [https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security\\_and\\_Reliability/ACES\\_Presentation.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/ACES_Presentation.pdf)

<sup>6</sup> Nykvist, B. & Nilsson, M (2015) *Rapidly falling costs of battery packs for electric vehicles*, Nature Climate Change 5 (329-332).



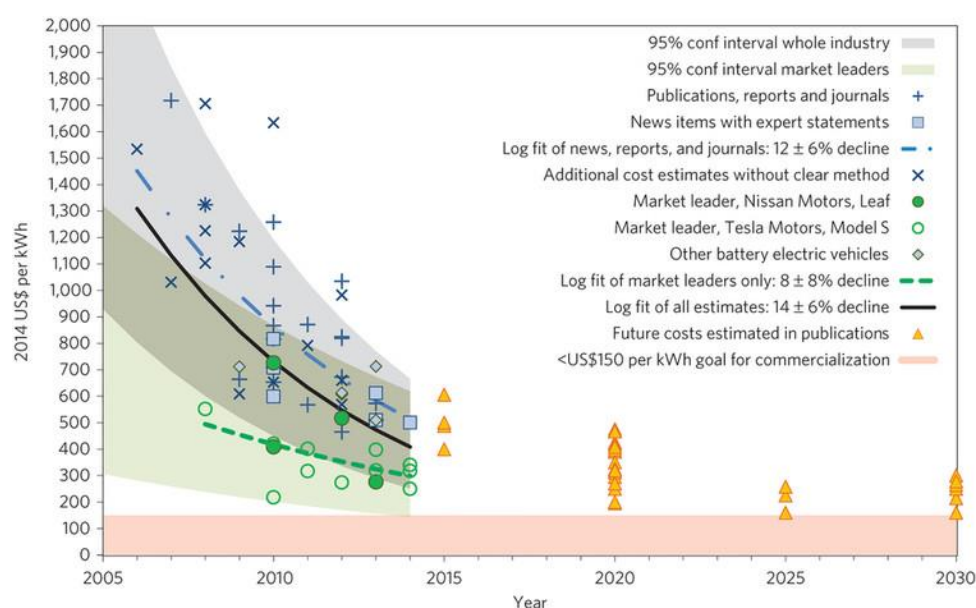


Figure 8 Cost predictions for electric vehicle battery packs are already out of date

#### 5.1.4 Energy efficiency standards

The Equipment Energy Efficiency (E3) program is a cross jurisdictional program through which the Australian Government, states and territories, and the New Zealand Government collaborate to deliver a single, integrated program on energy efficiency standards and energy labelling for equipment and appliances.<sup>7</sup>

It enforces minimum energy performance standards on a range of appliances. This helps to ensure that, over time, as appliances are replaced, they will use less power and deliver incremental savings to Council.

#### 5.1.5 Methane

The Surf Beach and Brou landfill sites will begin extracting methane from decaying organic waste in 2017. This will be flared and converted into carbon dioxide (CO<sub>2</sub>) in the short term. Burning the methane reduces the global warming potential of the gas by 25 times, and results in substantial emission reductions. If there is a sufficiently reliable volume of methane, there may be opportunities to generate electricity. This

would be classified as renewable energy and qualify for generating extra revenue through the sale of Large-scale Generation Certificates.

If there is an insufficient quantity of methane for electricity generation there may be opportunities to use the waste heat from the methane flare for other purposes. This could include evaporating the leachate from the landfill sites or drying out bio-solids from the nearby Surf Beach Sewage Treatment Plant (STP). Both of these options could result in cost savings to Council.

In conjunction with this activity Council is also investigating the technical and economic feasibility of a bio-gas plant at the Surf Beach Sewage Treatment Plant (STP), which is located next to the Surf Beach landfill site. This may be able to harvest additional methane from the STP and then use the landfill methane in a combined power generation plant.

#### 5.1.6 Energy costs

Wholesale electricity prices are expected to remain above \$80 per megawatt hour (MWh) at least until 2020<sup>8</sup>. This is significantly higher

<sup>7</sup> <http://www.energyrating.gov.au/>

<sup>8</sup> Australian Stock Exchange, (accessed 7/3/17) Quarterly base futures prices,

than the current retail rate that Council currently pays. When Council's current electricity contract expires in 2018 it anticipates a large rise in base energy prices. These rising future costs in the electricity market will mean higher energy costs to Council, but it will also make some opportunities more economically viable to implement.

#### 5.1.7 New energy trading models

A number of opportunities are emerging in the way renewable or battery stored energy is transacted and accounted for in the electricity network. Examples include 'peer to peer trading' which would allow homes and businesses to sell excess solar power to neighbours and peers rather than selling back into the grid. 'Local generation credits' or reduced network charges, would place a value on generation that doesn't have a high transmission and distribution cost and is used locally.

These new financial models may be paired with smart energy meters and software that can facilitate these transactions. Software that enables households and businesses to earn high value 'grid credits' by exporting to the grid during times of peak demand is already commercially available.

If these opportunities are realised by the market and energy regulators, they may make the business case for some renewable energy generation and battery storage projects more attractive.

#### 5.1.8 Renewable energy costs

The cost of installing large scale solar power continues to decline. This has been due to improving economies of scale reducing capital

costs, and improved industry capability and experience in installing large scale solar power. As this trend continues, the business case for large scale solar power plants will become increasingly attractive.

Australian Renewable Energy Agency's (ARENA) CEO Ivor Frischknecht said the 2016 funding round for large scale solar power *"clearly demonstrates how quickly large-scale solar PV costs are falling... which has resulted in rising confidence, lower finance costs and a more supportive market for power purchase agreements."*<sup>9</sup>

## 5.2 Forecast emissions

As the population of Eurobodalla grows and requirements for services and facilities increase, emissions associated with these activities may result in an overall increase in Council emissions. The growth in emissions from new or expanding services and infrastructure can be minimised through good planning and through pursuing other emissions reduction opportunities.

Council's future emissions will depend on a range of factors, including the policies implemented by the NSW and Australian Governments, the trends and opportunities presented by clean technology and the energy market, and the internal decisions made by Council.

Greenhouse gas emissions have been modelled for Council's operations until 2030. A number of factors have been considered including:

- The predicted future emissions intensity of the electricity grid<sup>10</sup>

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<http://www.asx.com.au/products/energy-derivatives/australian-electricity.htm>

<sup>9</sup> <https://arena.gov.au/media/project-proposals-show-shrinking-cost-big-solar/>

<sup>10</sup> Australian Government, Department of Environment (2015) *Electricity Generation emissions projections 2014-15*, Chart 3.13 Excel.



- The predicted future growth rate in electricity usage by business<sup>11</sup> which accounts for improvements in energy efficiency, business growth, uptake of solar and batteries.
- The impact of a national vehicle emissions standard scheme<sup>12 13</sup>
- The impact of a 2030 Australian or state renewable energy target
- The impact of a Council renewable energy target
- The growth trend in waste disposed to landfill
- The assumption that all street lights will be switched to LEDs within four years

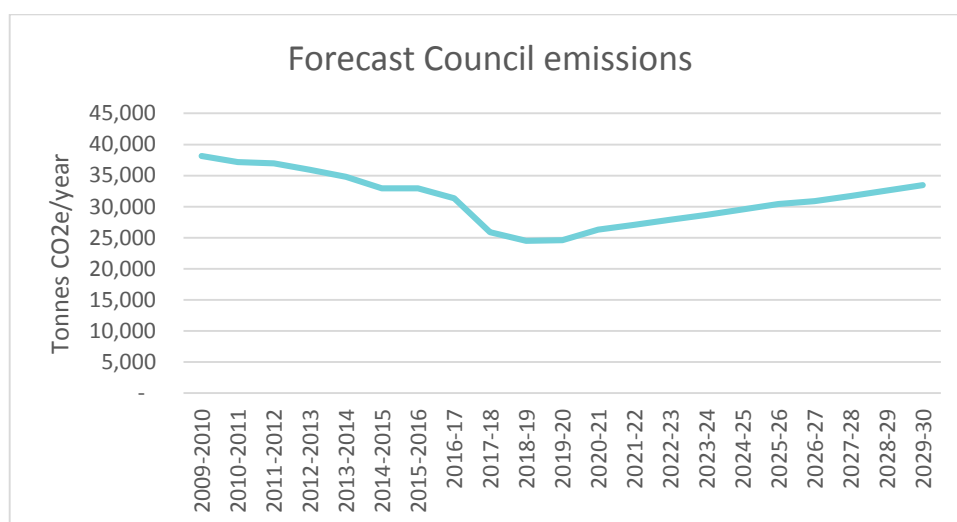


Figure 9 Forecast Council total emissions

Figure 9 shows Council emissions based on current actions with no changes to state or national energy or carbon policies. It shows emissions dipping as the impacts of the energy performance contract, LED street lighting upgrade and methane flaring projects take effect. Then there is a steady rise due to a growing population and the continued trend in waste disposed to landfill per capita.

Council has a limited capacity to influence the behaviour of the community in what is disposed to landfill and sewer, and consequently the methane emissions associated with these activities. Council will

continue to be remain proactive in trying to manage these emissions in managing the treatment of these materials. However, predicting the costs and likelihood of implementing different options for addressing these emissions remains expensive and uncertain. For these reasons additional opportunities to reduce these emissions sources has not been modelled.

Council has a higher capacity to influence and manage the emissions from energy usage. There is also a higher economic incentive to manage these emissions due to the costs and risks associated with energy costs. Reducing

<sup>11</sup> Australian Energy Market Operator (2016) *National Electricity Forecasting Report*, pp20

<sup>12</sup> Department of Infrastructure and Regional Development (Dec 2016) *Improving the efficiency of new light vehicles – Draft Regulatory Impact Statement*, Commonwealth of Australia.

<sup>13</sup> Climate Change authority (Aug 2016) *Towards a Climate Policy Toolkit: Special Review on Australia's Climate Goals and Policies*, Commonwealth of Australia.

these emission sources will reduce operating costs to Council. This includes emissions from fuel, electricity and gas. A range of scenarios has been modelled looking at the impact that various trends and opportunities will have on Council's energy emissions over the coming years.

The scenarios modelled include:

- Current policies: assumes little further interventions beyond current trends.

- Stronger NSW/National policies: assumes that a vehicle emissions standards scheme is introduced in 2020, and that the electricity grid transitions to 50% renewable by 2030.
- 100% ESC renewable energy: builds on the 'stronger policies' scenario but assumes that Council sources 100% renewable energy by 2030.

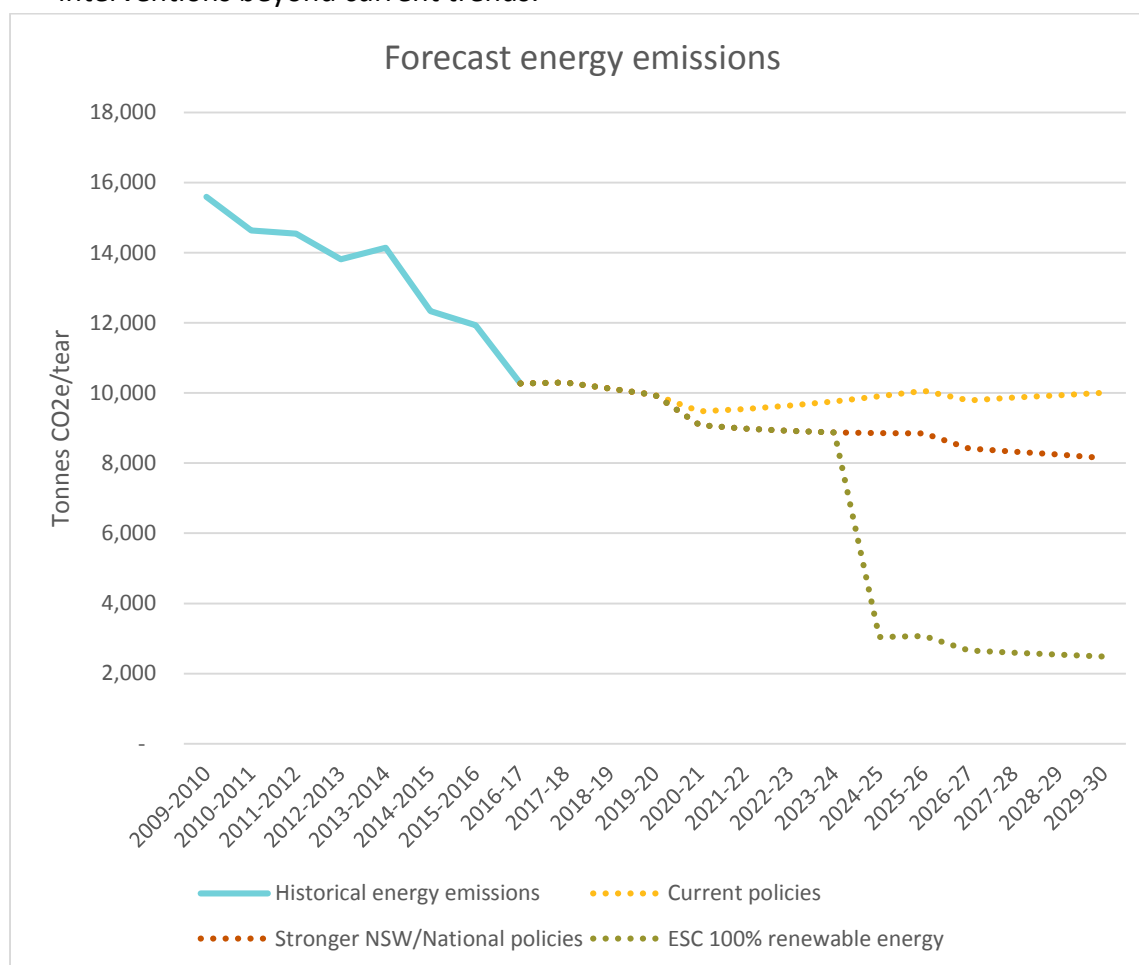


Figure 10

Forecast Council energy emissions

As shown in Figure 10, historical energy emissions have already dropped by over 30% in recent years. This has been the result of various energy management and renewable energy projects, as well as the gradual decarbonisation of the electricity grid. A range of emissions trajectories are possible

depending on number of external factors as well as the opportunities realised by Council.

In the ESC 100% renewable energy scenario we see that a stronger policy setting supporting the introduction of vehicle emissions standards and a cleaner fleet. With the transition to 100% renewable energy,

Council can feasibly reduce its energy emissions by over 80%.

### 5.3 Council emission reduction targets

In the 2012-2017 Greenhouse Action Plan Council committed to a 2020 emissions reduction target.

**CURRENT INTERIM TARGET: *Reduce total Council greenhouse gas emissions from the 2005-06 baseline by 25% by 2020.***

Council remains on track to meet this target. Some key projects in 2017 including the

methane capture and flaring project at the two landfill sites, the energy performance contract and LED street lighting upgrade, will result in substantial cost reductions. In addition, progress towards the renewable energy target will result in a cleaner electricity supply and extra emission reductions for Council.

Figure 11 shows Council's expected greenhouse gas emissions in 2020 (in blue) due to the impact of upcoming emission reduction projects. A 25% emissions reduction is expected to be achieved by 2020. The red part of the graph shows what emissions would have been, in a 'business as usual' scenario, if no action had been taken.

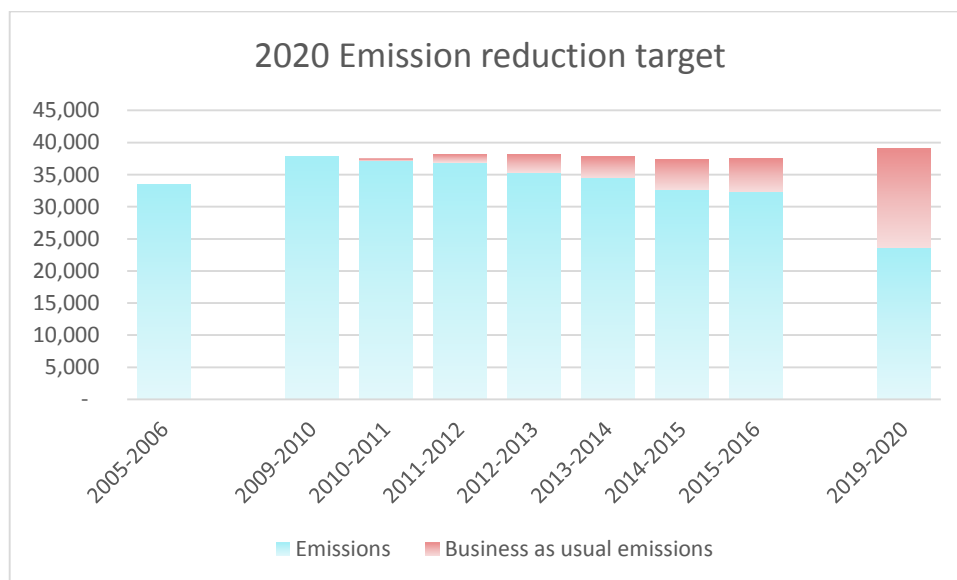


Figure 11 Emissions reduction target

Having an emissions reduction target has helped Council to attract grant funding and generate positive results in working towards a goal. The draft Emissions Reduction Plan will operate beyond the current target year of 2020. Therefore a new target will be adopted as part of the plan.

**NEW TARGET: *Reduce Council energy greenhouse gas emissions from the 2005-06 baseline by 80% by 2030.***

Greenhouse gas emissions have been modelled for Council's operations until 2030 and demonstrate that it is possible to reduce energy emissions significantly. A new target has been established to reduce Council energy emissions from the 2005-06 baseline by 80% by 2030. This represents an ambitious, yet realistic goal that would make a significant contribution towards addressing climate change.

This target includes all the emissions from fleet, street lighting, gas and electricity. It does not include methane emissions from sewer or landfill. Methane emissions from these sources are a significant proportion of Council's emissions. However, as a large part of these emissions are from old 'legacy' waste that has been deposited over the life of the landfills and because they are generated by a growing community population, they can be very difficult to manage and reduce. Council will continue to work on reducing emissions from these sources, but they have been excluded from the emissions reduction targets.

Achieving this target can be realised by improving the efficiency of the fleet, continued energy management programs and transitioning to 100% renewable energy. There is sufficient evidence to suggest that this will be achievable in this timeframe.

As shown in Figure 10 and 12 it is possible to achieve an 80% reduction in energy related greenhouse gas emissions by 2030. This will depend upon improvements in fleet efficiency driven by a national vehicle emissions

standard. If the development of electric vehicles accelerates then there may be opportunities for greater cuts to fleet. Street lighting energy usage will be greatly reduced by LED upgrades and ultimately powered by renewable energy. It would also depend upon Council being able to source or generate 100% of its electricity from renewable energy. There is a level of uncertainty regarding whether this will be feasible. Though, as discussed in section 5.1 there is also considerable cause for optimism, and time for emerging opportunities to develop into practical and viable solutions before 2030.

An 80% energy emissions reduction target by 2030 represents a responsible and necessary contribution towards minimising the threats associated with climate change. It demonstrates strong leadership by addressing climate and energy needs now rather than leaving it for future generations. Committing to a strong target places Council in a good position to continue focusing on improving efficiencies and delivering energy, cost savings and accessing potential grant funds.

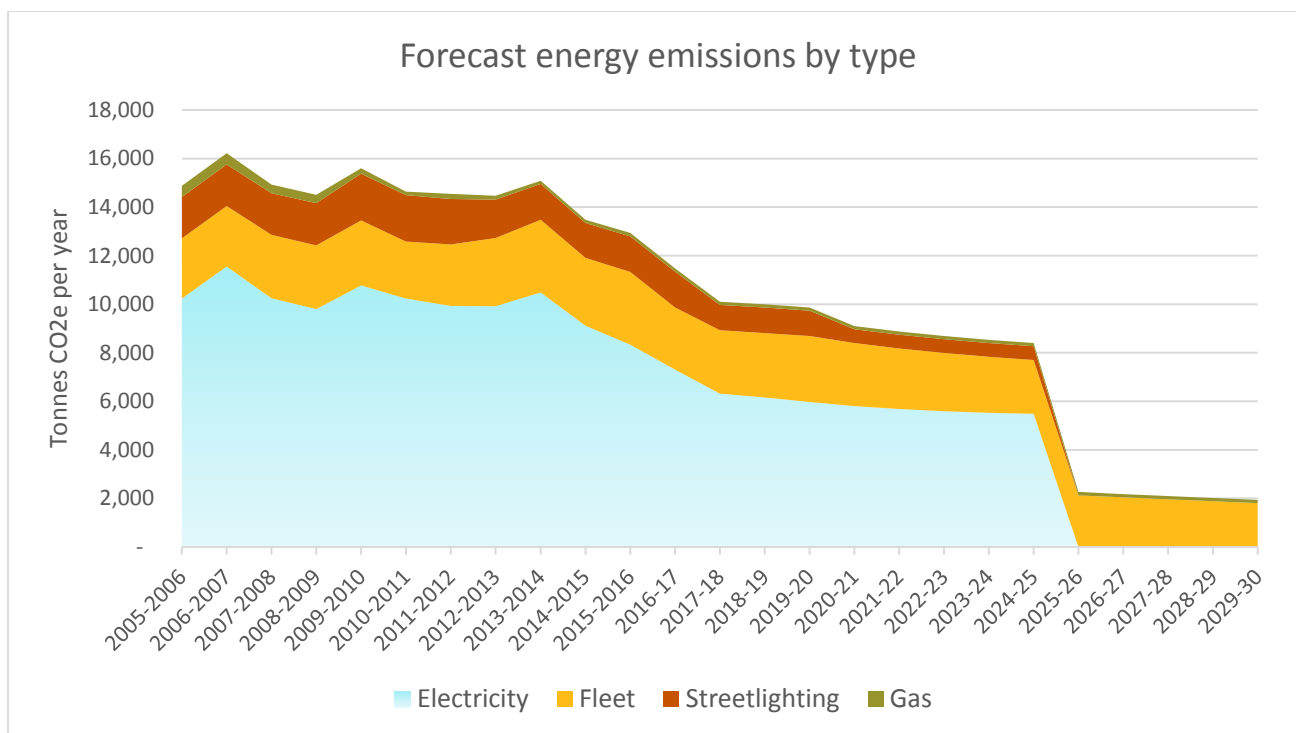


Figure 12

Forecast emissions can be reduced by over 80% by 2030

**NEW TARGET: Source 100% of Council's electricity from renewable energy by 2030.**

A critical part of reaching this target relies on sourcing 100% of Council's electricity from renewable energy sources. As outlined in

section 6.6 there are a number of ways that this goal could be achieved. These options will be investigated as part of this plan and ample time has been allowed to pursue this goal. Only viable options, that demonstrate a positive economic return to Council, will be implemented.





## 6. Emissions Reduction Plan

The content of this Emissions Reduction Plan have been developed with input from Eurobodalla Shire Council staff, Councillors and the community. The actions have been prioritised and are practical and realistic with the potential to achieve tangible results. They are grouped into the following categories:

- Community
- Energy Management
  - Buildings
  - Street lighting
  - Water and Sewer
- Fleet
- Leadership
- Planning
- Renewable Energy
- Waste

Actions have been categorised as 'core' or 'new' activities. Core actions are those that Council has been doing for some time and will continue to do into the foreseeable future. These actions will continue to be progressed and integrated into the routine operations of Council.

Core actions have been included in this plan to document the breadth of activities that Council completes that are related to reducing emissions. These actions will not be reported on during the life of the plan unless there are significant changes or developments.

New actions that have been identified will be progressed and reported on throughout the life of this action plan.

The current ERP contains fewer concrete projects than the previous GAP. There are more actions that involve investigation rather than implementation. Many actions that were identified in the previous GAP have now been completed such as a mass roll out of solar power and energy efficiency lighting upgrades. Council recognises that we are continually cycling through the continuous improvement Plan–Do–Check–Act cycle, and new business cases need to be proven before some new opportunities and projects can proceed.

Council will not pre-empt the findings of any investigations and will not commit to implement actions without a viable business case. However, should investigations prove fruitful and viable opportunities are confirmed, the ERP outlines a process whereby these opportunities can be realised.

### 6.1 Community

Council has a role and responsibility in facilitating the community response to the issues associated with climate change. Council also manages the network of roads, footpaths and cycle paths in the Shire and is well placed to support community efforts to reduce reliance on emissions intensive transport. We continue to deliver a number of core actions to support the community in reducing their emissions. In addition to these actions, Council is also very active in reducing the emissions generated from waste disposed to landfill by the community. These actions are documented in the Waste section of the plan.

Number	Core action
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C.1	Assist in providing climate change education and engagement programs in partnership with community, and government organisations. Support and encourage climate change programs for residents, businesses, the community and staff. Where community groups or state or Australian Government programs provide such programs Council may assist in promoting and facilitating uptake of the program. If opportunities arise, Council may be in a position to deliver such programs.
C.2	Facilitate the development of emerging sustainable businesses and sectors in Eurobodalla. This could include: support for emerging sectors; facilitation of training or workshops; business incentives; support for establishment of community renewable energy ventures.
C.3	Support the development of local community renewable energy generation initiatives where they are deemed appropriate and feasible.
C.4	Support efforts to preserve and increase local carbon farming activities. This may involve supporting work by landholders and community groups to preserve existing bushland and plant more trees. Support and education may be provided to landholders interested in participating in other carbon farming initiatives that reduce on farm methane and nitrous oxide emissions or increase carbon stored in soil. These activities maintain and increase the amount of carbon stored in the environment.
C.5	Council will encourage the community to adopt sustainable technologies by raising awareness about the availability of rebates and incentives offered by Local, NSW and Australian Governments or by community organisations.
C.6	Continue to advocate for and support improved public transport linkages. Public transport can be a more efficient means of travel and can reduce transport emissions.
C.7	Continue to develop an integrated network of bike lanes and shared paths as outlined in the 2017 Shared Pathway Strategy. Opportunities for grant funding will be investigated to increase the roll out of shared pathways. Community groups will be supported in their fundraising and building of pathways.
C.8	Continue to support the development of local health services to reduce need to travel. Council will work actively to advocate and lobby for the provision of local services. This includes health and other services that many Eurobodalla Residents currently travel out of the Shire to access many specific services.
C.9	Promote the use of shared pathways to residents and visitors to the Shire.

Table 3 Core community actions

## 6.2 Energy management

The maxim *'If you can't measure it, you can't manage it'* is very applicable to managing energy. Energy management includes implementing actions to reduce energy usage or energy demand as well as the monitoring, measurement and verification of energy and various saving measures.

The principle of energy efficiency presumes that the same service can be provided but with less energy, i.e. more efficiently. Embedding the principles of energy efficiency and energy management in Council processes helps ensure services are delivered more efficiently.

A large number of energy efficiency measures have already been completed or identified. Some actions have recently commenced and will be completed during the implementation period of the 2017-2021 ERP. Key examples include an LED street lighting upgrade, the Energy Performance Contract rolling out energy conservation measures at 15 of Council's largest sites. These identified measures will result in saving 1,150 tCO<sub>2</sub>e/year. Additional measures, not identified in this plan, will become available during the period of the ERP due to a number of factors:

- Existing technologies may become more cost-effective and practical to implement. Improving economies of scale will decrease costs. Rising electricity prices will improve the return on investment and make more opportunities cost-effective.
- Incentives driven by the NSW Energy Saving Scheme or other government programs may also improve the cost-effectiveness of energy efficiency actions.
- New and emerging technologies will generate additional energy efficiency opportunities that are not available now.
- The *National Energy Productivity Plan 2015-2030* will raise the bar on energy efficiency in new buildings and light vehicles.
- The *Greenhouse and Energy Minimum Standards (GEMS) Act 2012* regulates the advancement and extension of Minimum Energy Performance Standards for many appliances used by Council. Inefficient products will be phased out and more efficient standards will be introduced during the life of the ERP. As Council routinely replaces old and broken appliances efficiencies in energy usage will be gained.

As shown on Table 4 a number of strategies are employed by Council to continually improve energy management outcomes:

Number	Core action
EM.1	Maintain and monitor an energy and emissions data management system for Council's greenhouse gas emissions. This data will inform decision making and help track progress on individual projects and towards corporate targets.
EM.2	Integrate energy and water efficient design and features into planned and other future Council developments. The development or renovation of Council infrastructure will take into account the lifetime costs of the asset and prioritise energy, water and resource efficient design.
EM.3	Continue to investigate and review new energy efficiency and energy management opportunities. The feasibility of each opportunity will be assessed.
EM.4	Implement energy efficiency upgrades that have a viable business case within an agreed timeframe. Once cost-effective energy efficiency measures have been identified and confirmed they will be implemented in a timely fashion.
EM.5	Monitor and report on large increases in energy consumption at least monthly for large accounts and quarterly for all other accounts. Explanations for large (>\$1,000/quarter) energy consumption anomalies or where energy use increases significantly (>20%) will be reviewed by facility managers and through the Sustainability Matrix Group.

EM.6	Engage and educate Council staff on sustainability in the workplace. Examples may include: energy conservation at work, staff inductions, sustainable procurement training, and eco-driving practices.
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Table 4 Core energy management actions

Two new energy management actions will be delivered for the plan that include works on both Water, Sewer and Buildings facilities.

<b>No:</b>	<b>New action</b>	<b>Description</b>
1	Implement identified energy and water conservation measures from the Energy Performance Contract at Council's largest energy using sites by June 2018.	An Energy Performance Contract has been entered into which investigated energy and water conservation measures at Council's 23 largest sites. The cost effective opportunities will be implemented saving an estimated 729 tonnes of CO <sub>2</sub> e per year.
2	Conduct annual measurement and verification of projects completed from the Energy Performance Contract (EPC).	The savings from completed EPC projects will be measured and verified on an annual basis.

Table 5 New general energy management actions

### 6.2.1 Energy management – buildings

Council owns and manages over 100 facilities or buildings ranging in size from electrical barbecues in parks, through to public toilets, sports pavilions, community halls and large

facilities such as libraries, the Narooma Swimming Pool, the Moruya Works Depot and the Moruya Administration Building. All of these facilities use energy which contributes to Council's overall greenhouse gas emissions.

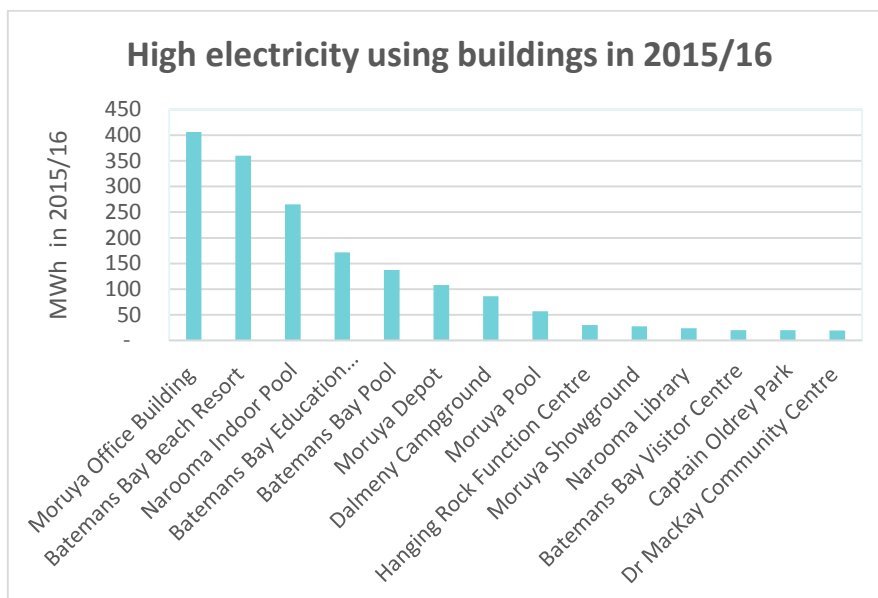


Figure 13

High electricity using Council buildings

The 2012-2017 Greenhouse Action Plan established a target for reducing Council's emissions from buildings by 25% by 2020, from the 2005-06 baseline. As shown in Figure 14 this target has already been

achieved, with building emissions down by over 35% by 2015-16. As a result of this reduction in emissions over \$300,000 in energy costs at buildings is saved per year.

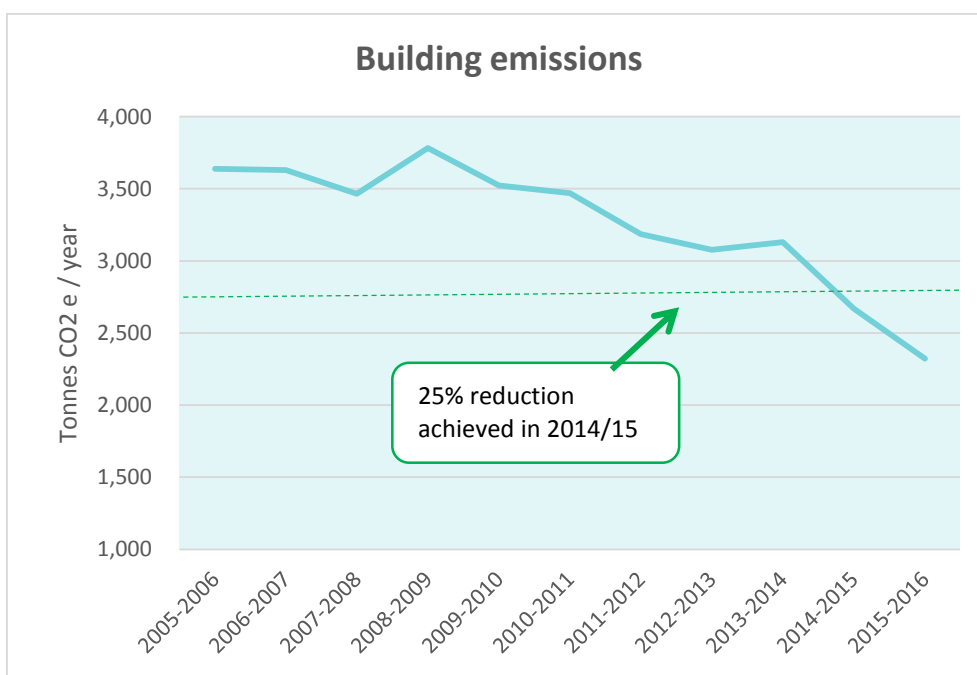


Figure 14

Emissions from Council buildings

This is a result of a number of actions including:

- Energy efficient lighting upgrades
- Solar hot water heaters installed at 14 buildings
- Pool blankets, shower times and solar heating at three pools

- Energy efficient air-conditioning and motor upgrades
- 220kW of solar power installed at 17 buildings

A number of strategies are employed to minimise emissions from buildings. These include:

<b>Number</b>	<b>Core action</b>
B.1	Replace electric hot water systems at the end of their natural life with solar hot water systems on sites where practical. Where peak hot water demand is low and a good solar aspect is available solar hot water systems will be installed on Council facilities. If not practical other energy efficient hot water systems will be used (such as instant gas or heat pump).
B.2	Continue to implement and replenish projects from and to the Revolving Energy Reserve. Where budgetary savings result from energy saving projects a proportion (20%) of the savings will be allocated to the Revolving Energy Reserve. New energy saving projects with a viable business case approved by the Sustainability Matrix Group can be allocated a budget from this fund.
B.3	Encourage users of Council facilities to be aware of, measure and report and reduce emissions from the occupation and operation of these facilities.
B.4	Continue to transition to paperless systems, for example with web-enabled forms, electronic and in-field forms and applications.

Table 6 Core Building Energy Efficiency Actions

Some new actions will be introduced through the new Plan. These include:

<b>Number</b>	<b>New action</b>	<b>Description</b>
3	All new electrical equipment must be better than the market average energy star rating.	Appliances and equipment in the following categories with energy star ratings must be above market average. This will be reviewed annually. For example: <ul style="list-style-type: none"> <li>• fridge/freezers – 3 stars</li> <li>• air conditioners – 3.5 stars</li> <li>• washing machines – 3 stars</li> <li>• dishwashers – 3 stars</li> <li>• TV/computer monitors – 3 stars</li> </ul>
4	All new water-using appliances, shower heads, taps and toilets purchased by Council must be better than the market average Water Efficiency Labelling Scheme (WELS) star rating by product type.	Appliances and equipment in the following categories with star ratings under the Water Efficiency Labelling Scheme (WELS) must have at least the following star ratings: <ul style="list-style-type: none"> <li>• showerheads – 3 stars</li> <li>• toilets and urinals – 4 stars (desirable)</li> <li>• washing machines – 4.5 stars</li> <li>• dishwashers – 4 stars</li> <li>• taps and flow controllers – 4.5 stars.</li> </ul>



5	Formalise a process for incorporating sustainable designs, products and materials into Council managed buildings and construction projects.	This will result in establishing a set of minimum standards for new buildings, renovations and infrastructure projects. This will help to ensure whole of life costs and sustainability are considered and included at the design stage of a project.
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*Table 7 New building energy management actions*

### 6.2.2 Energy management – street lighting

In the Eurobodalla Shire street lighting services are maintained by the electricity network provider Essential Energy.

Eurobodalla Shire Council pays an operations and maintenance charge to the network provider for this service. Council also pays for the electricity for street lighting from an energy retailer. Street lighting is an essential

service that helps improve the safety of roads and other public spaces. A bulk energy efficient LED upgrade is due to be completed in mid-2017 involving the installation of over 2,650 LEDs across all minor roads in Eurobodalla. This is expected to result in a 39% decrease in street lighting energy use compared to the 2005-06 baseline. All new street lights installed are required to be the most efficient available at the time.

<b>Number</b>	<b>New action</b>	<b>Description</b>
6	Upgrade all street lighting to LED by June 2021.	The recent LED upgrade was only conducted on residential roads. Essential Energy, the network provider, are still conducting trials on LEDs for main roads and have not approved them for wide scale use in Eurobodalla yet. These trials are expected to be completed in the near future which will enable all remaining street lights to be upgraded to LED. This is expected to save 390 tonnes of CO <sub>2</sub> e/yr.
7	Investigate the opportunities presented by smart controls for street lights.	Smart controls that are connected to street lights can enable lights to be dimmed up or down in response to a range of inputs. Lights can be remotely monitored to enable early failure detection. They may also act as the enabling platform for 'smart cities' by transmitting community wide data and establishing connectivity with other devices in the public domain.

Table 8 New street lighting energy management actions



### 6.2.3 Energy management – water and sewer

Water and Sewer is an essential service managed by Council that must respond to growing demands, variable weather patterns and fluctuating water inflows. The region does not have a large upstream water storage and therefore cannot rely on gravity to deliver water around the region. For this reason the water and sewer system is quite energy intensive as it relies on pumping to move water and sewer around the Shire. Water and sewer operations account for about two thirds of Council's total electricity usage.

Significant efforts have already been made to improve energy management and reduce emissions across water and sewer services. For example, Figure 15 compares the actual energy costs for water infrastructure (water treatment, pumps and reservoirs) with a 'business as usual' scenario which demonstrates what costs would have been if no energy management or renewable energy actions had been taken. Energy usage in 2015-16 was more than 30% lower than 2006-07 largely due to comprehensive energy management practices and large solar power installations. This is in spite of the fact that two new energy intensive water treatment plants were brought online during this same period.

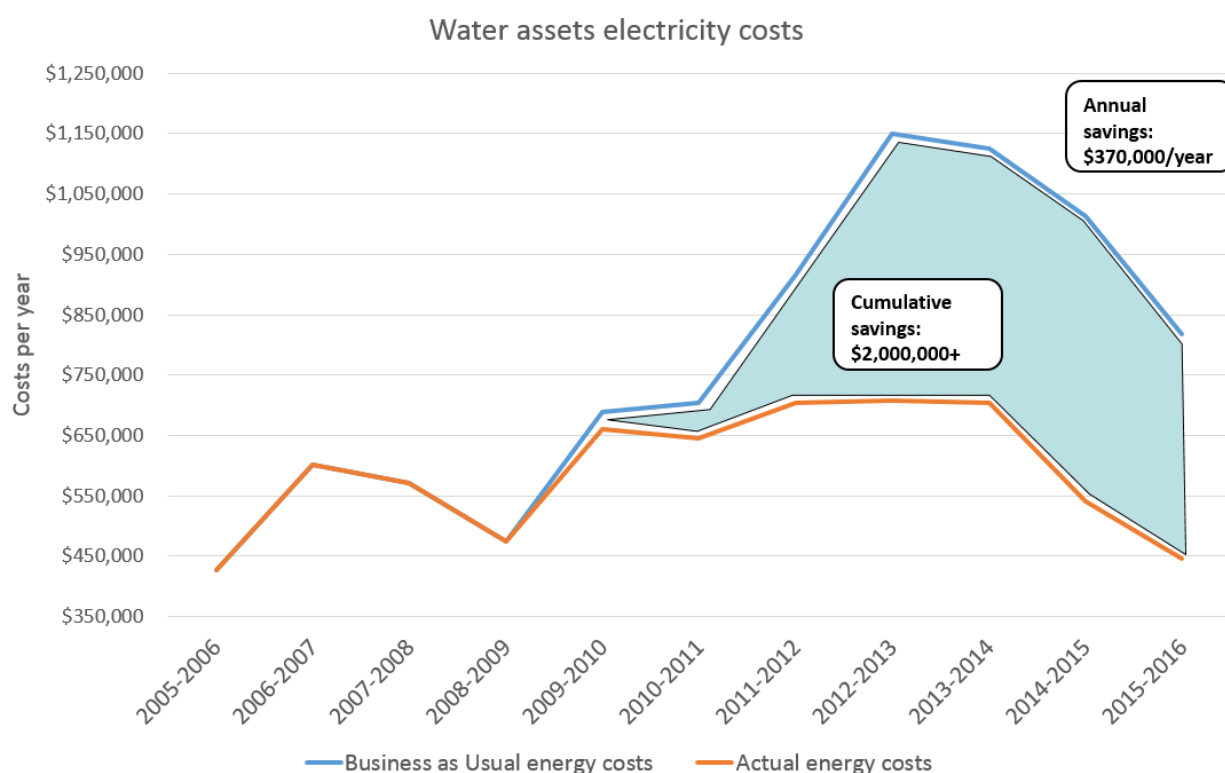


Figure 15 Water assets electricity costs

Reducing the demand for water also reduces the emissions from water and sewer transport and treatment. Significant reductions in water use have already been achieved in Eurobodalla. Water use per property in the Eurobodalla Shire is currently benchmarked as among the most water efficient in the State with many households

and businesses implementing water conservation measures. This is partly due to a strong water conservation program as well as a reflection of the high number of largely vacant holiday homes in Eurobodalla. Efforts will be maintained into the future through continued water demand management practices.

In addition to the general energy management actions, two other actions will continue to run which will contribute to

reducing the emissions from water and sewer services.

<b>Number</b>	<b>Core Action</b>
W + S.1	Continue sewer relining program to prevent stormwater and groundwater flowing into sewer pipes. Relining sewer pipes reduces pumping and treatment requirements and therefore emissions.
W + S.2	Continue to deliver water conservation programs including the: <ul style="list-style-type: none"> <li>- water rebates or incentives schemes</li> <li>- water conservation program for large business water users</li> <li>- water conservation education programs.</li> </ul> Reducing demand for water reduces the emissions from water transport and treatment.

*Table 9 Core water and sewer actions*

Several new actions will also be delivered during the life of the Plan.

<b>Number</b>	<b>New action</b>	<b>Description</b>
8	Develop a water demand management plan by June 2020.	This plan will include drought management and water conservation strategies that Council will implement in order to manage pressures on a secure water supply. Reducing demand for water reduces the emissions from water transport and treatment.
9	Develop a mains water leak detection program by June 2021.	This will include annual reporting on water losses and an ongoing program for identifying and fixing leaks in the water mains water delivery system. This will reduce emissions through reduced pumping and treatment requirements. A smart metering pilot program will be rolled out in 2017 that will be able to monitor leaks and residential demand.
10	Investigate opportunities to operate a biogas plant and reduce biosolids volume at the Surf Beach sewage treatment works by June 2018.	As part of the Energy Performance Contract these additional opportunities will be investigated. A biogas plant has the potential to generate renewable energy onsite and reduce the volume of bio-solids generated.
11	Monitor and report on key performance indicators for demand management and energy efficiency for Water and Sewer services.	On a yearly basis water usage per connection (kL/connection) will be monitored, as will energy use per ML (kWh/ML) of water treated and of sewer treated. This will be reviewed, benchmarked and analysed to determine progress towards improving operational performance.

*Table 10 New water and sewer energy management actions*

### 6.3 Fleet

Council's fleet includes passenger vehicles, as well as light commercial vehicles, trucks and heavy roadwork machinery. Road travel is essential for undertaking many Council duties

in a large Shire that covers 3,400 square kilometres.

A number of actions are taken in order to ensure the efficient selection and operation of Council's fleet. These are detailed in Table 11.

<b>Number</b>	<b>Core Action</b>
F.1	Prioritise low emissions and fuel-efficiency when purchasing vehicles. Whole of life costs including fuel efficiency, are evaluated and weighted along with greenhouse gas emissions when selecting fit for purpose vehicles.
F.2	Implement driver education and awareness programs for fuel efficient driving to Council staff.
F.3	Make suitable technologies available for non-travel meeting options (telephone and video conferencing) at Council offices. This can eliminate the time, costs and emissions associated with travelling to meetings.
F.4	Specify low-emissions vehicle standards for all vehicle and plant tenders. EURO5 or above standards will be specified for truck and heavy vehicle tenders.
F.5	Continue to investigate and trial the use of low emissions technology vehicles and fuels. This could include: hybrid vehicles; Bio-fuels; CNG/LPG; Electric.
F.6	Continue to review the leaseback vehicle fees and structure to incentivise staff to select fuel-efficient vehicles. Continue to review the allocation of vehicles to each position as they become vacated, including "to-from" vehicles.
F.7	Continue to offset the emissions from the leaseback vehicle fleet.
F.8	Only assign large vehicles or four wheel drives to staff as a "tool of trade" if required by the job, or if there is a business case supported by a Director.
F.9	Review the allocation of vehicles to each position as they become vacated. This may help to rationalise the number of vehicles in the fleet.

Table 11 Core fleet actions

Some new actions will be initiated during the new Plan.

<b>Number</b>	<b>New action</b>	<b>Description</b>
12	Work with stakeholders to facilitate electric car charging infrastructure.	This will consider partnerships with charging companies, car companies or other sponsors to establish electric vehicle charging stations. Future infrastructure and policy requirements in support of the growth of the electric vehicle market will also be considered.
13	Investigate utilising GPS tracking on Council's fleet to improve fleet efficiency and driver safety.	GPS tracking can improve driver safety. Research has shown that it can also result in a reduction to fuel usage through improved eco and safe driving techniques and reduced engine idling.

Table 12 New fleet actions

## 6.4 Leadership

A key platform of this strategy is creating and building the capacity, awareness and commitment to energy management and the reduction of greenhouse gas emissions within Council and community. Council has an

opportunity and a responsibility to be a leader in the community by demonstrating and advocating for clean energy technologies, sustainable practices and reducing emissions.

<b>Number</b>	<b>Core Action</b>
L.1	Where possible existing resources and budgets will be used to implement priority actions of the Emissions Reduction Plan. Priority actions that cannot be funded within existing budgets will be reviewed annually and budgeted subject to review by Council.
L.2	Opportunities for securing external funding will be actively investigated. A range of avenues may be considered, including grant funding; power purchase agreements; energy performance contracts; public-private partnerships and the Build Own Operate Transfer model.
L.3	Maintain the Sustainability Matrix Group with representation from all divisions with at least quarterly meetings which will oversee progress towards the implementation of the Emissions Reduction Plan.
L.4	Promote the work that Council and the community are undertaking to reduce emissions. Continue to promote the region as a 'green' and 'unspoilt' destination.
L.5	Continue to work with other agencies including councils, universities and community organisations to network, learn and share information on low carbon strategies.

Table 13 Core leadership Actions

In February 2017 Council resolved to transition away from investment in the fossil fuel industry. This will become a new action that will be implemented and reported on during the new Plan.

<b>Number</b>	<b>New action</b>	<b>Description</b>
14	Council will give preference to investing with financial institutions that do not invest in, or finance, the fossil fuel industry.	This will be implemented where: a) Council's investment is compliant with its 'Investment Policy'. b) The investment rate of interest is comparable to other similar investments that may be on offer to Council at the time of investment.

Table 14 New leadership actions



## 6.5 Planning

The physical effects of climate change are expected to have real and serious implications for land use planning. It is essential that Council is well prepared to anticipate and manage the likely impacts of climate change on the region. With this in mind Council will be developing a dedicated Climate Change

Adaptation Strategy in the near future. This will assess all the climate change risks and adaptation strategies required for Eurobodalla in detail.

This section also includes actions on integrating and planning for the Emissions Reduction Plan in Council's operations.

<b>Number</b>	<b>Core Action</b>
P.1	Review Emissions Reduction Plan actions annually and integrate into the Delivery Plan, Operational plan and work plans.
P.2	Continue to make information available on sustainable design and construction to people building new houses.
P.3	Continue planning for urban consolidation within existing settlements. Eurobodalla's land use planning strategies will continue to focus new development in and around existing town and village centres which will help reduce expansion and sprawl. This reduces the resources (roads, street lighting, water and sewer) and emissions needed to service these areas and helps minimise transport emissions.
P.4	Align relevant Policies, Reports and Codes of Practice and contracts with the Emissions Reduction Plan and targets.
P.5	Ensure new subdivisions feature energy efficient street lighting, consideration for sustainable transport and climate change. Council will work with developers to ensure all new subdivisions will: <ul style="list-style-type: none"> <li>- install the most energy efficient street lights available for each road type</li> <li>- have collector roads in subdivisions that are wide enough for buses to use</li> <li>- have shared pathways to support pedestrian and cycle traffic</li> </ul>

Table 15 Core planning actions

One key new action will include:

<b>Number</b>	<b>New action</b>	<b>Description</b>
15	Develop a Council Climate Adaptation Strategy by June 2020.	<p>A detailed Adaptation Strategy will be developed that considers Council's response to climate change. This will include:</p> <ol style="list-style-type: none"> <li>1. Analysis of risk from key climate change hazards: heat, bushfire, flood, coastal hazards, sea level rise.</li> <li>2. Impact of these hazards on infrastructure, natural environment, built assets and health.</li> <li>3. Analysis of response pathways and adaptation strategies.</li> <li>4. Overview of financial impacts on Council of the hazards and adaptation strategies.</li> <li>5. Develop a structured policy and planning responses.</li> <li>6. Refine adaptation strategies for further financial analysis prior to implementation.</li> </ol>

Table 16 New planning actions

## 6.6 Renewable Energy

Renewable energy will play a key role in the transition to a low carbon economy. Council is committed to supporting the use of suitable renewable energy technologies. Council already has over 630kW of solar photovoltaic panels installed across 25 facilities.

**Interim target: 25% of electricity used by Council facilities will be sourced from renewable energy by 2020.**

Council has already committed to ensuring 25% of electricity used by Council is sourced from renewable energy sources. The solar power installations already installed will enable Council to comfortably reach this target. Looking beyond 2020 Council aims to continue increasing the use of renewable energy.

The Australian Government has committed to ensuring that 23% of Australia's electricity supply will come from renewable sources by 2020 through the Renewable Energy Target. That means that by 2020, 23% of the energy Council purchases from an energy retailer will come from renewable sources such as wind or solar power. This will reduce the emissions intensity of all activities that use electricity.

**Long term target: 100% of electricity used by Council facilities will be sourced from renewable energy by 2030.**

Core actions that will continue during the Plan include:

<i>Number</i>	<i>Core Action</i>
R.1	Support the development of local community renewable energy generation initiatives where they are deemed appropriate and feasible.
R.2	Install proven, economically and technically feasible renewable energy technologies that have a positive business case for Council.
R.3	Investigate emerging clean energy technologies. This may involve partnering with universities or businesses to help pilot emerging clean technologies. For example, tidal power at Malabar Weir, peer-to-peer electricity trading and local network credits.
R.4	If further emission reductions are necessary to meet targets, Council will investigate the purchase of certified Green Power, carbon offsets or a renewable energy Power Purchase Agreement.

*Table 17 Core renewable energy actions*

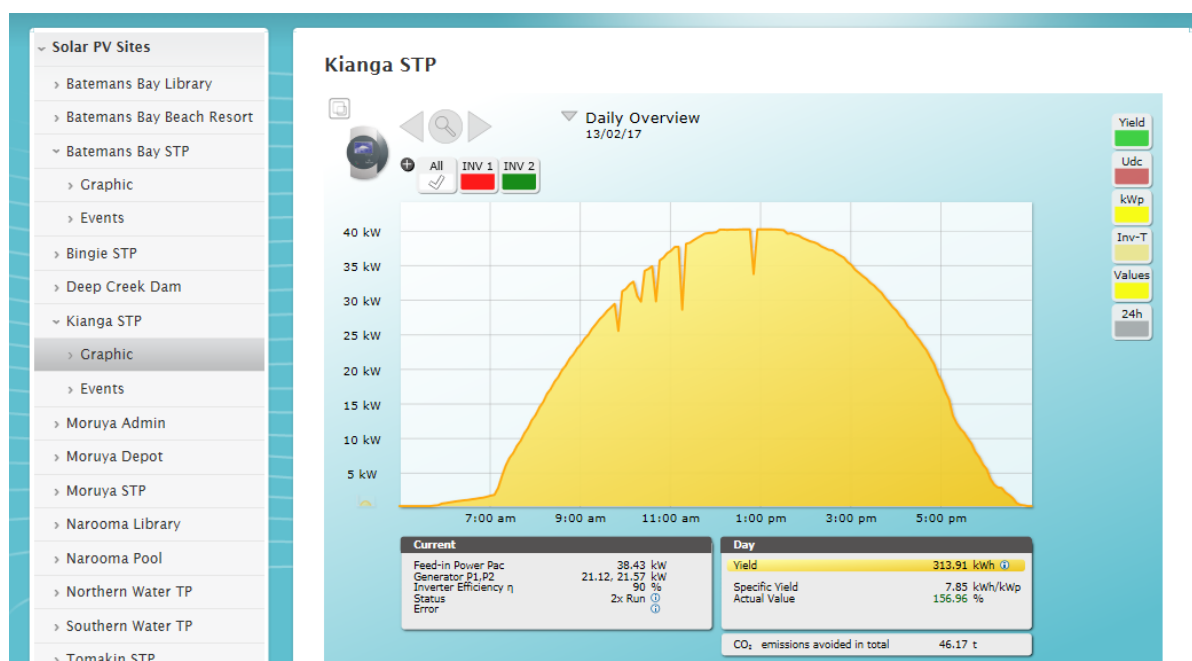


Figure 16 Example of current solar power generation data

Figure 16 shows an example of the solar power output on one day at the Kianga Sewage Treatment Plant. New actions to be completed will include:

Number	Action	Description
16	Investigate opportunities to maximise the benefits of the renewable energy generated by Council.	Work collaboratively with Essential Energy and energy retailers to pilot, implement or advocate for new ways of trading and valuing renewable energy. For example, peer to peer trading, higher feed-in-tariffs, local generation credits, or virtual net metering. These strategies may also help improve the viability of additional renewable energy generation for Council.
17	Investigate the costs and benefits of working towards a corporate target of 100% renewable energy by 2030.	This will consider the technical and economic feasibility of Council operations being powered from 100% renewable energy. This will consider the costs and benefits of different options including: Council as the owner and operator, a renewable energy Power Purchase Agreement, a public-private partnership, the costs and benefits of collaboration with other councils and siting a renewable power plant locally or remotely.
18	Investigate opportunities to use battery storage technologies in conjunction with the renewable energy Council has installed.	This will consider, for example, opportunities for managing peak demand onsite and offsite, generating 'grid credits', storing and shifting energy loads within a site, and taking small sites off the grid.
19	Complete a feasibility study of implementing a large scale solar farm.	This will consider the technical and economic feasibility of a solar farm, including: the optimal size; location opportunities and constraints; grid connection opportunities and constraints; revenue options; financing options; etc.

Table 18 New renewable energy actions

## 6.7 Waste

Council manages the waste from all sectors within the Shire. Council operates two landfill sites: Brou Landfill and Surf Beach Landfill, as well as the Moruya Transfer Station.

Contractors for the residential waste collection service also operate the Moruya Materials Recycling Facility (MRF). The methane emissions associated with the breakdown of organic materials in landfill sites are a significant contribution to Council's GHG emissions inventory. Much of these

emissions come from the old 'legacy' waste that has been deposited over the life of the landfill, while some is generated by newly deposited organic waste as it breaks down. Methane has 25 times the Global Warming Potential of CO<sub>2</sub>.

A number of strategies are employed to minimise methane emissions from landfill. These include:

<b>Number</b>	<b>Core action</b>
W.1	Waste and recycling education will continue to promote waste avoidance, help increase recycling rates, reduce contamination levels, and increase home composting.
W.2	Investigate and support methods to divert household or commercial organic waste from landfill.
W.3	Where cost effective, construction and demolition waste will be recovered from the waste stream and used on site and if possible in suitable projects off site.
W.4	Methane recovery and destruction infrastructure will be installed at Surf Beach and Brou landfill sites. By flaring the methane the gas is converted to CO <sub>2</sub> , reducing its global warming potential by 25 times.

Table 19 Core waste Actions

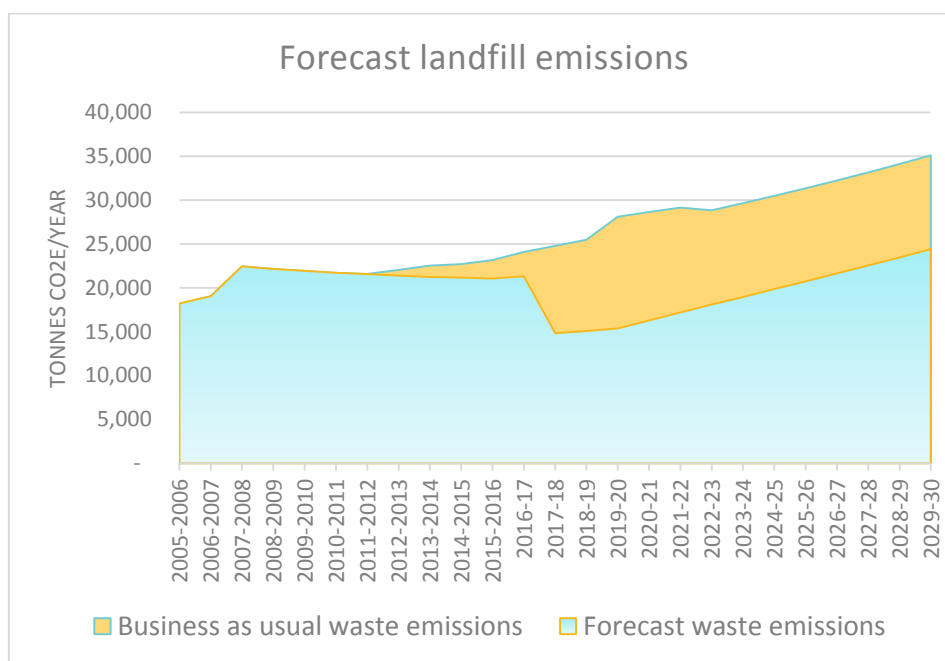


Figure 17 Forecast landfill emissions

Figure 17 shows historical landfill emissions over time and forecast emissions. Business as usual emissions shows what emissions would be if steps had not been taken to remove organics from landfill and extract methane at Brou and Surf Beach landfill sites. The cumulative effect of these measures will save

150,000 tonnes of CO<sub>2</sub> during the period shown in Figure 17.<sup>14</sup>

Table 20 highlights other new strategies that will support the reduction of waste GHG emissions over the life of the ERP.

<b>Number</b>	<b>Core action</b>	<b>Comments</b>
20	Investigate opportunities for generating electricity from methane gas extraction by June 2019.	Depending on the quality and quantity of methane extracted from the landfill sites it may be possible to generate electricity from the gas. This would be considered a form of renewable energy and be able to help offset Council's electricity usage or be exported to the grid.
21	Investigate opportunities for utilising the waste heat produced from landfill gas flare by June 2019.	If the quantity of methane produced at the landfill sites proves to be too low for electricity generation then opportunities for utilising the waste heat from the landfill gas flare will be investigated. For example, opportunities may include using the heat to assist in managing leachate or treatment processes at the Surf Beach sewage treatment works.

*Table 20 New waste actions*

<sup>14</sup> See appendix 1 for details on the methodology used in this emissions modelling.

## 7. Implementing the Emissions Reduction Plan

### 7.1 Resourcing and funding

Resourcing adequate staff and funds is critical to delivering on ERP actions. It will be important for Council to prioritise and allocate adequate funding and human resources to ensure the progression of these actions. In many cases existing operational budgets will be able to cover the costs associated with the Plan. Other actions, however, will require additional financial support if Council's goals of mitigating climate change and capitalising on associated opportunities are to be achieved.

A number of actions involve investigating the feasibility of new opportunities. Should a viable business case be developed for these projects a budget will be sought. Funding for newly identified projects will be dependent on the budget required but preference will be given, in order of priority to using:

1. Grant funding (if available)
2. Existing operational budgets

3. The Revolving Energy Reserve
4. Council budgets

The Revolving Energy Reserve is a restricted internal fund of Council. It has been seed funded from a percentage of the budget savings from completed projects. This fund is dedicated to funding additional energy and water saving projects. Funded projects must demonstrate a sound business case as well as environmental benefits to qualify for funding.

The actions contained in the Emissions Reduction Plan will be spread over a number of years and will need to be budgeted for accordingly. Strategic planning for implementation over the coming years including the prioritisation of actions will help to ensure that measurable progress is achieved.

All the 'Core' actions will be delivered using existing budgets. Many of the 'New' actions will also be delivered via existing operational budgets or integrated into future capital projects. Where a budget is required for a 'New' action it has been itemised in Table 21.

Number	Action	Timing	Resource requirements
19	Complete a feasibility study of implementing a large scale solar farm. Pre-feasibility involves a Council led review of the technical and economic aspects of the project to justify continued exploration. The feasibility study would require independent analysis as well as network connection studies.	Pre-feasibility 2017-18 Feasibility 2018-19	Nil \$50- 100,000
6	Upgrade all street lighting to LEDs by June 2021.	2020-21	\$400,000
1	Implement identified energy and water conservation measures from the Energy Performance Contract.	2017-18	\$840,000*
2	Conduct annual measurement and verification of projects completed from the Energy Performance Contract (EPC).	2018 to 2025	\$170,000*
20 21	Investigate opportunities from methane gas extraction for generating electricity or to utilise waste heat.	2018-19	\$30-60,000

Table 21 Resource requirements

\* These items have a budget allocated already.



## 7.2 Monitoring and evaluation

Achieving the actions and targets identified in this Plan will require centralised coordination, as well as regular monitoring, measuring and reporting. The Sustainability Matrix Group is a Council staff group with representation from all divisions and key emissions intensive asset managers. This group will oversee the implementation and progress of the Emissions Reduction Plan.

Frequent and routine data collection and monitoring is essential to the informed management of Council's emissions intensive activities. Progress towards the implementation of relevant ERP actions will be reviewed and reported on annually. Subject to the progress, or lack of progress, made towards various ERP actions revisions may be required. Progress towards the emissions reduction targets will also be reviewed quarterly and reported on annually.

The Plan will be reviewed in its entirety in 2021 and updated or replaced with a new Plan at that time.

## 7.3 Risk management

The Emissions Reduction Plan attempts to outline a path towards reducing Council managed emissions. There are some events that are beyond the control of Council that may affect the outcomes of the ERP. Some of the key risk factors are outlined in Table 22.

Risks will be monitored and evaluated by Council throughout the life of the project and reported and discussed at Sustainability Matrix Group meetings. These meetings will discuss all aspects of risk management including:

- ensuring that controls are effective and efficient;
- obtaining further information to improve risk assessment;
- analysing and learning lessons from events, changes, trends, successes and failures;
- detecting changes in the risk context, including changes to risk criteria and the risk itself; and
- identifying emerging risks.

### 7.3.1 Risk register

Cause of risk	Impacts	Likelihood/ Consequence	Risk evaluation	Treatment
<b>Stakeholders</b>				
Change of Council during project which may have different priorities.	Plan may suffer from lack of support.	Unlikely/ Minor	Low	The new Plan has been synchronized with the Council term. Council will be briefed and involved in developing and approving the plan.
Community groups lobby against the plan.	Plan is delayed due to lobbying. Loss to Council reputation.	Unlikely/ Minor	Low	Council to ensure community informed of, and involved in the plan, the need for the plan and the positive outcomes that it will deliver.
Community members lobby that the plan does not go far enough.	Plan is delayed due to lobbying. Loss to Council reputation.	Unlikely/ Minor	Low	As above. The technical and financial constraints of the plan will also be conveyed to the community.

Cause of risk	Impacts	Likelihood/ Consequence	Risk evaluation	Treatment
Poor communication between internal Council staff results in lack of support for the Plan.	Key actions remain unimplemented.	Possible/ Serious	High	Key staff to be involved in developing and implementing the actions. Progress will be reviewed frequently across divisions of Council.
Negative media about Plan and projects.	Reduced positive community impact	Unlikely/ Minor	Low	Plan Manager to ensure media involved early in project, maintain good relationships with media. Communicate objectives and success stories of the plan.
<b>Economic</b>				
Implementation of project runs over budget or over time.	Reduced Council capacity to deliver other projects or services.	Unlikely/ Very serious	High	Develop clear guidelines for managing funding and deliverables. Use of lump sum consultant contracts and competitive tenders for works.
Costs to reach targets are too high.	Targets are not met. Or targets are met but expenses incurred result in reduced Council capacity to deliver other projects or services.	Possible/ Moderate	High	At the expense of not reaching the targets, only technically and financially viable projects will be implemented. Targets selected are achievable and should be reviewed if required.
Insufficient funds are available to implement cost-effective measures.	Savings opportunities are not realised. Targets not achieved.	Unlikely / Minor	Medium	When a sound business case has been demonstrated a budget will be sought, through internal funds, loan funding or grant funding.
<b>Project Management</b>				
New infrastructure is not compliant with Australian Standards which may result in reduced efficiency, productivity gains.	Potential health and safety hazard for building occupants (e.g. fire hazard, poor lighting quality affects health of site users etc.)	Possible/Serious	High	Project managers to ensure a detailed design review and certification is conducted as part of the tender design process (as per the Project Implementation Plan). Project managers to ensure adequate testing of equipment/technology post installation according to Australian Standards.
Workplace Health and Safety (WH&S) practices not adhered to resulting in injury	Loss of project momentum, loss of staff and loss of staff income.	Possible/Serious	High	Project manager is to ensure implementation of Council WH&S procedures.
Project stalls/loses momentum and work not completed to schedule.	Project falls behind schedule, runs over-time.	Possible/Moderate	High	Project managers to regularly communicate and follow up with all parties.

Cause of risk	Impacts	Likelihood/ Consequence	Risk evaluation	Treatment
Contractors do not deliver works as specified.	Poor quality installations that do not meet standards or site specific requirements.	Unlikely/Serious	Medium	Project Manager to liaise closely with Contractor. Contractors will be required to meet deliverables as per contract agreements.
Lack of necessary support for staff and excessive workloads. Key staff member (Project manager or Steering Group Member) leaves position.	Project stalls, falls behind schedule and goes over budget.	Unlikely/Serious	Medium	Project Steering Group to maintain support for project team Appoint two project managers to share workload and ensure continuity for larger projects.
Installed equipment/ infrastructure underperforms. Upgrades do not achieve the desired energy and greenhouse savings.	Reduced net energy efficiency, reduced positive demonstration value.	Unlikely/Moderate	Medium	Project manager to monitor energy consumption and equipment use as per Project Plan to allow early detection of poor performance.
<b>External factors</b>				
State and National policies do not support actions and targets.	Some predicted emission reductions do not eventuate or are not viable without the right policy settings.	Possible / Minor	Medium	At the expense of not reaching the targets, only technically and financially viable projects will be implemented. Targets selected are achievable and should be reviewed.
High barriers remain to a large scale renewable plant such as network connections or cost.	Emissions reduction target will be less attainable.	Possible/ Serious	High	Other options can be investigated that will contribute towards the target.
Developments in clean energy solutions do not materialise.	Some emission reduction opportunities may remain unviable.	Possible / Serious	High	The target year allows ample time for technologies to mature and commercialise.
Resources associated with implementing ERP are withdrawn.	Parts of ERP will not be implemented. Failure to achieve targets and cost savings.	Unlikely / Serious	Medium	Resourcing needs for ERP is clearly justified and reviewed frequently.
Accelerated increase in population and the services required.	Increased facilities and services to meet community needs.	Possible / Serious	High	Planning for sustainable settlements, facilities and service delivery. New facilities and services will be designed in light of the ERP. Contingencies will be planned for.

Table 22 Risk management matrix

## Appendix 1 Emissions inventory methodology

Where possible emissions reporting has been aligned with the *National Greenhouse and Energy Reporting (NGER) Act 2007* and its subordinate regulations and determinations which are complemented by an international standard (ISO 14064) and its accompanying Australian equivalent (AS ISO 14064 – 2006 parts 1 to 3).

The emissions factors (factors applied to the physical quantities, such as energy consumed, to provide the quantity of actual emissions generated) provided by the National Greenhouse Accounts Factors workbook (July 2015) have been used for this inventory. For electricity, bottled gas, fuel (Unleaded Petrol, E10, Diesel and Liquefied Petroleum Gas), and street lighting emissions data verified independently by Planet Footprint was used based on the 2016-17 Quarter 2 Reports. Electricity emissions and fuel emissions are calculated for both Scope 2 and 3 emissions using data supplied by independent environmental scorekeeper Planet Footprint.

The emissions from the landfill sites have been developed using the 2015-16 NGER Solid Waste Emissions Calculator published by the

Clean Energy Regulator. This is a different methodology compared to what was used in the last plan. This provides an estimate of the legacy and new methane emissions from the landfill sites based on historical waste volume and composition data and modelling future waste composition and methane capture scenarios in the future. In order to remain consistent this methodology has been applied to Council's historical emissions data. As a result this has resulted in a change to the baseline emissions that have previously been reported upon.

The sewage treatment plant emissions were calculated using the Greenhouse Gas Calculator supplied by the NSW Office of Water.

A number of assets that are not within the operational control of Council have been excluded from the emissions inventory. This includes sites such as Rural Fire Stations and buildings leased from Council.

Emissions that have been excluded include Scope 1 refrigerant hydrofluorocarbons (HFCs) due to the difficulties in measuring these emissions. The remainder of Council's Scope 3 emissions has also been excluded including business travel, consumables and contractors' emissions.

## Appendix 2 Actions taken to date

This table itemises all the actions outlined in Section 4.

Table 23 Completed actions

<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Use of recycled effluent by golf courses and road works. Moruya, Catalina and Tuross Head golf Course, Moruya High Agriculture Section, Hanging Rock sports facilities and Council road works utilise treated effluent from the Sewage Treatment Plants.	Utilising a by-product of Sewage Treatment Plants avoids additional emissions that would be generated if fresh water was pumped and treated. It also reduces pressure on natural systems, thereby acting as an adaptation strategy.	1985 - Ongoing
LCD Flat Screen Personal Computer Monitors. Council's computer monitors have been converted from CRT screens to LCD flat screens across the organisation.	This upgrade improves the energy efficiency of computers and lowers radiation risks to users. Each flat screen monitor uses approximately 472 kWh less power per year than a CRT screen.	2001-2005
Installation of variable speed drives on pumps. Variable speed drives and soft starters have been introduced to many pump stations.	This reduces energy demands of water and sewer pumps.	2001 - Ongoing
Turlinjah Reed Bed. The Turlinjah Reed Bed treats sewage from 50 homes in Turlinjah; the treated water is then used for the irrigation of local olive groves.	Reduced pressure on sewage treatment plants reduces demand for running plants at high capacity, thereby saving money and reducing greenhouse emissions.	2002
Sewer relining program. A progressive sewer relining program has been implemented since 2002.	This reduces stormwater ingress to sewer pipes and therefore reduces pumping and treatment demand. This reduces greenhouse emissions through reduced energy use.	2002 - Ongoing
Integrated Water Cycle Management Strategy (IWCMS). The IWCMS outlines an integrated suite of actions to be implemented over the future to reduce demand for fresh water across the Shire. This includes demand management, more efficient use of water resources and water recycling initiatives.	Reduced consumption of fresh water reduces pumping and treatment demand cutting energy use and greenhouse emissions. Reducing pressure on fresh water is also a greenhouse adaptation strategy, as rainfall is expected to decrease and evaporation increase as a result of greenhouse-related climate changes.	2003 - Ongoing

<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Specify energy efficient lighting in new urban development areas. Development Control Plans specify that new urban developments must use energy efficient street lighting that meet Australian Standards.	This reduces electricity costs to Council and associated emissions.	2009
Energy efficient public swimming pools. All three Council pools have pool blankets, solar thermal water heating, heat pump domestic hot water supply, and .shower timers.	Using solar heating systems to heat public pool water reduces emissions by avoiding use of electricity generated by coal-fired power stations. Pool blankets retain water heat overnight, reducing overall heating requirements.	2009-2010
Energy audits of water and sewer infrastructure. A report in 2008 listed some opportunities for reducing power costs through increased efficiency and alternative power supplies for water and sewer operations. Energy audits were also completed on water and sewer infrastructure in 2010.	Water and sewer contributes significantly to Council's emissions. Opportunities have been identified to reduce the emissions and improve the energy efficiency of these operations.	2008-2011
Energy efficient lighting in Council buildings. Energy efficient lighting (LEDs, T5s and CFLs) have been installed in many Council buildings.	Typically energy used for lighting has been reduced by 30-50%. This reduces electricity costs and emissions.	2011-2012
Upgrading Moruya Administration building. Energy efficient T5 lighting has been installed. Power management systems for appliances and lighting have been trialled.	Lighting energy use has been reduced by over 30%.	2011-2012
Energy efficient street lighting. Inefficient Mercury Vapour lamps on minor roads have been replaced with energy efficient compact fluorescents which reduced energy use by about 50%.	This resulted in electricity savings and emission reductions of ~510 tCO <sub>2</sub> e per year	2012
LED street lighting. Over 2,500 street lights on minor roads were upgraded to LEDs.	This saved about 450 tCO <sub>2</sub> e per year and over \$150,000 per year in energy and maintenance costs.	2017
Energy performance contract. An Energy Performance Contract scoped energy efficiency and renewable energy options at Council's 23 largest sites.	This will result in saving over 700 t CO <sub>2</sub> e/year and \$150,000/year.	2017
Air conditioning upgrade. The heating ventilation and air conditioning system for the Moruya administration building was upgraded.	This resulted in savings of about 140 tCO <sub>2</sub> e/year.	2015
'Energy and efficiency fund'. An 'energy and efficiency fund' has been established for the intention of funding cost-effective efficiency measures.	This fund has been able to support the implementation of energy efficiency works in 2011-2012.	2011



<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Solar hot water systems. 15 solar hot water systems have been installed at various community buildings with assistance from grant funding.	This is estimated to save over 50 tCO <sub>2</sub> e per year.	2014
Revolving Energy Reserve. A fund was established with seed funding provided by the savings generated from various sustainability projects.	The reserve will be used to fund future energy and water saving projects.	2016
Energy management. Various strategies have been used to minimise energy costs. These include: competitive energy contracts, reviewing and optimising tariffs, modifying operations to avoid demand charges, and establishing systems to review usage and costs.	This has resulted in saving over \$300,000/year. By avoiding placing demand on the network it reduce emissions in front of the meter.	2012-2017
Use of stand-alone solar photo-voltaics. Photo-voltaics have been used to power remote pumps at reservoirs and for aeration at Deep Creek Dam for many years.	Use of renewable energy technology reduces emissions through avoiding use of electricity generated by coal-fired power stations.	1985 - Ongoing
Solar power. Over 630kW of solar power has been installed across 25 facilities.	This is saving over 950 tCO <sub>2</sub> e/year and over \$170,000/year in energy costs.	2012-2015
Purchase of certified Green Power at sewer pumping stations. Certified Green Power was purchased for 18 Council sewage pump sites from 2001-2005, with \$100,000 allocated to cover additional costs. 2% Green Power was purchased for each of the sites. Visible signs were selected and signs erected to promote the fact that Green Power is purchased.	Certified Green Power funds are invested into the purchase of renewable power by energy retailers. This reduces reliance on power generation using fossil fuels and is carbon neutral.	2001-2005
Leaseback policy gives incentives for smaller cars The leaseback policy provides a financial incentive for staff to take up the option of 4 cylinder (rather than 6 cylinder) vehicles, when leases are up for review.	This policy increased take up of smaller and more efficient vehicles by Council staff from 26% in 2006 to 62% in 2011. This saves money, reduces emissions and sends a positive and visible message to other staff and the community.	2006
Fuel efficiency purchasing criteria. Council fleet purchasing officers and managers use the Australian Government's Green Vehicle Guide ( <a href="http://www.greenvehicleguide.gov.au">www.greenvehicleguide.gov.au</a> ) to inform fleet vehicle purchasing decisions.	Including fuel efficiency as purchasing criteria saves Council money and reduces emissions over equivalent distances travelled.	2006
'Work From Home' Policy. Council has introduced formal 'work from home' opportunities for some staff, where service levels are not detrimentally affected.	Reducing staff need to travel to work will reduce kilometres travelled thereby reducing fuel costs and emissions	2004
Hybrid vehicles. In 2010 the first hybrid passenger vehicle was purchased for use in Council's fleet. In 2017 two hybrid trucks were purchased.	Hybrid vehicles typically consume up to 20% less fuel than an equivalent vehicle in their class.	2010-2017

<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Eco-driving training. Some drivers of high consumption vehicles have been trained in eco-driving techniques that improve fuel efficiency.	This measure is projected to reduce fuel costs and emissions.	2012
Resource recovery from Council works activities. Council works activities aim to utilise and re-use materials where practicable including the recovery of construction and demolition material from the waste stream, and use in Council works.	Resource recovery reduces emissions and costs from resource extraction, processing and transport. It prevents resources going to landfill and potential methane emissions associated with anaerobic digestion.	2007 - Ongoing
Strategic planning for urban consolidation. The Eurobodalla Settlement Strategy identifies urban containment and consolidation around and within existing town centres as the approach to be taken for the region's future development. This approach has been incorporated into the Local Environment Plan.	Urban consolidation around existing town centres reduces the need for additional infrastructure development, transport, operation and maintenance. This has the potential to greatly reduce increases in greenhouse gas emissions generated by future increased population and development.	2005 - Ongoing
Sustainability Matrix Group. The Sustainability Matrix Group is represented by all divisions of Council. Meetings are conducted quarterly to review and prioritise organisational activities to reduce greenhouse gases, energy consumption and progress sustainable objectives.	Sustainability and emissions reduction measures have a formal process to be raised and evaluated by Council.	2008 - Ongoing
Implementation of BASIX. BASIX (Building Sustainability Index) is a NSW Government initiative that ensures new homes are designed and built to use less potable water and produce fewer greenhouse gas emissions by setting energy and water reduction targets for houses and units.	The energy saving target seeks to reduce energy use in residential dwellings by 40%.	Phased in from July 2004 to 1 July 2006.
Council water rebates program. Council runs a rebate program for installation of rainwater tanks (until 2017), front loading washing machines and dual flush toilets by ratepayers who are supplied by Council.	A front loading washing machine is estimated to use up to 60% less water than a top loading machine. Reducing mains water consumption reduces water pumping, treatment and sewage treatment energy.	2005-2017
Water efficient showerhead program. Council ran a water efficient showerhead exchange program whereby ratepayers exchanged old showerheads for new efficient ones at no cost. Over 2,500 water efficient showerheads were distributed. The exchange program was re-introduced in 2015.	Using less hot water reduces greenhouse emissions as less energy is required for reheating	2005-2007, 2015- ongoing

<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Energy efficient light bulb program. Council ran a program providing packs of six energy efficient light bulbs to ratepayers during 2006. During the life of the program 1,000 packs were distributed. The program was discontinued because of increased costs.	Energy efficient light bulbs use 80% less energy than incandescent ones and thereby reduce emissions.	2006
Sustaining Our Towns: sustainability for residents, businesses and the community. Sustaining Our Towns (SOT) was a regional project that provided free energy efficiency education programs to the public including: home and garden sustainability reviews, workshops and community sustainability projects.	Support provided to residents, businesses and communities encourages emissions reductions. The legacy of the projects established by SOT will support local food systems, sustainable business, and reduced emissions in the Shire.	2009-2012
Community Building Sustainability project. This was grant funded project that identified and implemented water and energy efficiency solutions at over 50 community buildings. Education and signage aimed to showcase how these measures could also be done in homes.	The project saved 553 tonnes of CO <sub>2</sub> , 7,359,000 litres of water, and over \$159,000 per year.	2012-2014
Supporting community renewable energy projects. Council provided in kind support and acted as the grant administrator to South coast health and Sustainability Alliance (SHASA) for the Growing Community Energy grant project.	This project developed some new financial models for installing solar power on low income households.	2015-2016
Energy efficiency promotion and education. Information forums were run by Council for community groups about energy and water saving measures in the home in 2008-09. In 2011-12 Council actively promoted the free home energy audits offered by the NSW Government Home Saver and Sustaining Our Towns programmes. Save Power Kits and a range of sustainability books have been displayed prominently in Council libraries in 2011-12.	Providing information and access to resources allows the community to address sustainability in their homes and businesses and reduce their energy costs and emissions.	2008-2012
Business Treading Lightly - sustainable business program. Business Treading Lightly was a regional program that supported local businesses to adopt sustainable practices. Over 120 local businesses received support and advice during the program.	The project helped business save approximately 2,700 tCO <sub>2</sub> e and 45ML of water. It helped secure \$350,000 in grant funds for business sustainability projects and saved participating businesses approximately \$455,000/year in utilities costs in 2010.	2008-2010

<b>Action</b>	<b>Benefits and Rewards</b>	<b>Date implemented</b>
Business energy efficiency. Council has helped organise a number of workshops and events aimed at supporting businesses to save energy.	This supports businesses to reduce their operating costs as well as their emissions.	2010-2017
Community Services transport services. Council's Community Services Division promotes a range of public transport options to the community, working with providers to improve and optimise services. Council also provides some services (eg a Youth Bus and Community Transport for the frail and aged).	Increased use of public transport assists in reducing the number of motor vehicles used in commuting. Reduced volume of greenhouse gas emissions attributable to vehicles	Ongoing
Eurobodalla Bike Plan and Shared Pathways Strategy. The Eurobodalla Bike Plan was released in July 1999 and updated as the Shared Pathways Strategy in 2010. It provides the framework and priorities for construction of footpaths and cycle ways throughout the Shire. Funds have been allocated towards the program in the Management Plan, and funding and other partnerships are sought to supplement allocations on an ongoing basis.	Increased cycling and walking by Eurobodalla Residents reduces trips in vehicles, thereby reducing the volume of greenhouse gas emissions by vehicles.	1999 - Ongoing
Co-mingling recycling introduced. Co-mingled recycling was introduced for most Shire ratepayers in 2001. Co-mingled recycling systems make it easy for residents to recycle and generally increase recycling rates, including paper and cardboard.	Paper in landfill breaks down anaerobically, creating methane. For every tonne of paper that is recycled, approximately 4 tonnes of CO <sub>2</sub> e is saved from entering the atmosphere. Recycled aluminium uses a twentieth of the energy required for processing first generation aluminium.	2001
Kerbside green waste collection. Council introduced a kerbside green waste collection service for most residents in 2005 using the wheelie bin pick up system. A fortnightly bin service was introduced in 2012.	Green waste in landfill breaks down anaerobically creating methane, which is a potent greenhouse gas. Council currently mulches about 2,700 tonnes of green waste per annum.	2005 – Ongoing
Diverting bio-solids to land. Bio-solids are a waste product generated from sewage treatment. Rather than using it as cover on landfill it has been reprocessed to be applied as fertiliser on land.	This prevents bio-solids decaying and generating methane in landfill. It also makes better use of this material as a resource to improve soil fertility.	2012 - ongoing
Methane capture. Methane from decaying organic waste is extracted and flared. Council participated in a successful aggregated bid in the Emissions Reduction Fund to reduce methane emissions at Waste Management Facilities. This converts methane, a very powerful greenhouse gas into CO <sub>2</sub> .	This is expected to save over 8,500 tonnes of CO <sub>2</sub> e per year.	2016-2017

## Appendix 3. New actions

This table itemises all the new actions outlined in Section 6.

Table 24 All new actions

Number	Core action	Description
1	Implement identified energy and water conservation measures from the Energy Performance Contract at Council's largest energy using sites by June 2018.	An Energy Performance Contract has been entered into which investigated energy and water conservation measures at Council's 23 largest sites. The cost effective opportunities will be implemented saving an estimated 729 tonnes of CO <sub>2</sub> e per year.
2	Conduct annual measurement and verification of projects completed from the Energy Performance Contract (EPC).	The savings from completed EPC projects will be measured and verified on an annual basis.
3	All new electrical equipment must be better than the market average energy star rating.	Appliances and equipment in the following categories with energy star ratings must be at least market average. This will be reviewed annually. For example: <ul style="list-style-type: none"> <li>• fridge/freezers – 3 stars</li> <li>• air conditioners – 3.5 stars</li> <li>• washing machines – 3 stars</li> <li>• dishwashers – 3 stars</li> <li>• TV/computer monitors – 3 stars</li> </ul>
4	All new water-using appliances, shower heads, taps and toilets purchased by Council must be better than the average Water Efficiency Labelling Scheme (WELS) star rating by product type.	Appliances and equipment in the following categories with star ratings under the Water Efficiency Labelling Scheme (WELS) must have at least the following star ratings: <ul style="list-style-type: none"> <li>• showerheads – 3 stars</li> <li>• toilets and urinals – 4 stars (desirable)</li> <li>• washing machines – 4.5 stars</li> <li>• dishwashers – 4 stars</li> <li>• taps and flow controllers – 4.5 stars.</li> </ul>
5	Formalise a process for incorporating sustainable designs, products and materials into buildings and construction projects.	This will result in establishing a set of minimum standards for new buildings, renovations and infrastructure projects. This will help to ensure whole of life costs and sustainability are considered and included at the design stage of a project.
6	Upgrade all street lighting to LED by June 2021.	The recent LED upgrade was only conducted on residential roads. Essential Energy, the network provider, are still conducting trials on LEDs for main roads and have not approved them for wide scale use in Eurobodalla yet. These trials are expected to be completed in the near future which will enable all remaining street lights to be upgraded to LED. This is expected to save 390 tonnes of CO <sub>2</sub> e/yr.
7	Investigate the opportunities presented by smart controls for street lights.	Smart controls that are connected to street lights can enable lights to be dimmed up or down in response to a range of inputs. Lights can be remotely monitored to enable early failure detection. They may also act as the enabling platform for 'smart cities' by transmitting community wide data and establishing connectivity with other devices in the public domain.
8	Develop a water demand management plan by June 2020	This plan will include drought management and water conservation strategies that Council will implement in order to manage pressures on a secure water supply. Reducing demand for water reduces the emissions from water transport and treatment.

<b>Number</b>	<b>Core action</b>	<b>Description</b>
9	Develop a mains water leak detection program by June 2021.	This will include annual reporting on water losses and an ongoing program for identifying and fixing leaks in the water mains water delivery system. This will reduce emissions through reduced pumping and treatment requirements. A smart metering pilot program will be rolled out in 2017 that will be able to monitor leaks and residential demand.
10	Investigate opportunities to operate a biogas plant and reduce biosolids volume at the Surf Beach sewage treatment works by June 2018.	As part of the Energy Performance Contract these additional opportunities will be investigated. A biogas plant has the potential to generate renewable energy onsite and reduce the volume of bio-solids generated.
11	Monitor and report on key performance indicators for demand management and energy efficiency for Water and Sewer services.	On a yearly basis water usage per connection (kL/connection) will be monitored, as will energy use per ML (kWh/ML) of water treated and of sewer treated. This will be reviewed, benchmarked and analysed to determine progress towards improving operational performance.
12	Work with stakeholders to facilitate electric car charging infrastructure.	This will consider partnerships with charging companies, car companies or other sponsors to establish electric vehicle charging stations. Future infrastructure and policy requirements in support of the growth of the electric vehicle market will also be considered.
13	Investigate utilising GPS tracking on Council's fleet to improve fleet efficiency and driver safety.	GPS tracking can improve driver safety. Research has shown that it can also result in a reduction to fuel usage through improved eco and safe driving techniques and reduced engine idling.
14	Council will give preference to investing with financial institutions that do not invest in, or finance, the fossil fuel industry.	This will be implemented where: a) Council's investment is compliant with its 'Investment Policy'. b) The investment rate of interest is comparable to other similar investments that may be on offer to Council at the time of investment.
15	Develop a Council Climate Adaptation Strategy by June 2020.	A detailed Adaptation Strategy will be developed that considers Council's response to climate change. This will include: 1. Analysis of risk from key climate change hazards: heat, bushfire, flood, coastal hazards, sea level rise. 2. Impact of these hazards on infrastructure, natural environment, built assets and health. 3. Analysis of response pathways and adaptation strategies. 4. Overview of financial impacts on Council of the hazards and adaptation strategies. 5. Develop a structured policy and planning responses. 6. Refine adaptation strategies for further financial analysis prior to implementation.
16	Investigate opportunities to maximise the benefits of the renewable energy generated by Council.	Work collaboratively with Essential Energy and energy retailers to pilot, implement or advocate for new ways of trading and valuing renewable energy. For example, peer to peer trading, higher feed-in-tariffs, local generation credits, or virtual net metering. These strategies may also help improve the viability of additional renewable energy generation for Council.



<b>Number</b>	<b>Core action</b>	<b>Description</b>
17	Investigate the costs and benefits of working towards a corporate target of 100% renewable energy by 2030.	This will consider the technical and economic feasibility of Council operations being powered from 100% renewable energy. This will consider the costs and benefits of different options including: Council as the owner and operator, a renewable energy Power Purchase Agreement, a public-private partnership, the costs and benefits of collaboration with other councils and siting a renewable power plant locally or remotely.
18	Investigate opportunities to use battery storage technologies in conjunction with the renewable energy Council has installed.	This will consider, for example, opportunities for managing peak demand onsite and offsite, generating 'grid credits', storing and shifting energy loads within a site, and taking small sites off the grid.
19	Complete a feasibility study of implementing a large scale solar farm.	This will consider the technical and economic feasibility of a solar farm, including: the optimal size; location opportunities and constraints; grid connection opportunities and constraints; revenue options; financing options; etc.
20	Investigate opportunities for generating electricity from methane gas extraction by June 2019.	Depending on the quality and quantity of methane extracted from the landfill sites it may be possible to generate electricity from the gas. This would be considered a form of renewable energy and be able to help offset Council's electricity usage or be exported to the grid.
21	Investigate opportunities for utilising the waste heat produced from landfill gas flare by June 2019.	If the quantity of methane produced at the landfill sites proves to be too low for electricity generation then opportunities for utilising the waste heat from the landfill gas flare will be investigated. For example, opportunities may include using the heat to assist in managing leachate or treatment processes at the Surf Beach sewage treatment works.

## Appendix 4. Risk consequence and likelihood table

Consequence (Possible outcomes)						
EFFECT ON:		Insignificant	Minor	Serious	Very Serious	Catastrophic
People:		First Aid Injury	Medical treatment	Lost time injury / hospitalisation	Fatality	Multiple Fatalities
Environment:		Slight effect, no contamination	Minor on site contamination	Major on site contamination + potential for off site	Minor off site contamination	Major off site contamination
Financial cost/Loss		Less than \$1,000	\$1,000 - \$10,000	\$10,001- \$50,000	\$50,001 - \$200,000	More than \$200,000
Council's Image/Reputation		Complaint, no media coverage	Complaint, limited local media coverage	Complaint through Council or significant local media coverage	State-wide media coverage	National media coverage
Legislation/Guidelines			Breach of work instruction	Breach of Guidelines/ Best Practice	Breach of Legislation	
Likelihood	Almost Certain <i>Common, Is expected to occur in most circumstances</i>	M7	H14	E20	E23	E25
	Likely <i>Is known to have occurred. 1 in 10 chance of occurring</i>	M6	M10	H18	E21	E24
	Possible <i>Could occur, 1 in 1,000 chance of occurring</i>	L5	M9	H17	H19	E22
	Unlikely <i>Not likely to occur, 1 in 100,000 chance of occurring</i>	L3	L4	M11	M13	H16
	Rare <i>Practically Impossible, 1 in a 1,000,000 chance of occurring</i>	L1	L2	M8	M12	H15