2020/21 Annual inventory of Council's emissions profile and progress update

Contents

Part 1: Overview

Purpose:

To provide a detailed annual inventory of Council's emissions from its operations in 2020/21, and a progress update on meeting the net zero emissions target by 2025.

Key findings are:

1) Council is on track for meeting target
2) Electricity contract with Powershop (general and streetlight) was 100% carbon offset
3) 1% increase in general electricity sector actual emissions
4) 8.5% reduction in streetlight electricity actual emissions
5) 6.5% increase in fuel emissions
6) 18.5% natural decline in landfill fugitive emissions
7) 5% decrease in wastewater fugitive emissions, despite a 17% increase in flow

Summary

Council experienced a 15% reduction in organisational carbon emissions compared to the previous year. This was predominantly due to the natural decline of landfill gas fugitive emissions. Council's electricity contract was 100% carbon offset in 2020/21, so fluctuations in actual emissions in the general electricity and streetlighting sectors did not have an impact on that reduction. The reduction brings Council on track to meeting the target of net zero emissions so long as this level of electricity offset is maintained in perpetuity. Table 1 and Figure 1 below show how Council is tracking towards the net zero target.

Table 1 – Total actual and net emissions since baseline year 2015/16

Financial Year	Actual Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)	Target (tCO2e)
2016	21,389	21,389	21,389
2017	20,701	20,701	19,250
2018	19,122	19,122	17,111
2019	18,325	15,700	14,972
2020	16,442	11,618	12,833
2021	14,715	9,904	10,695

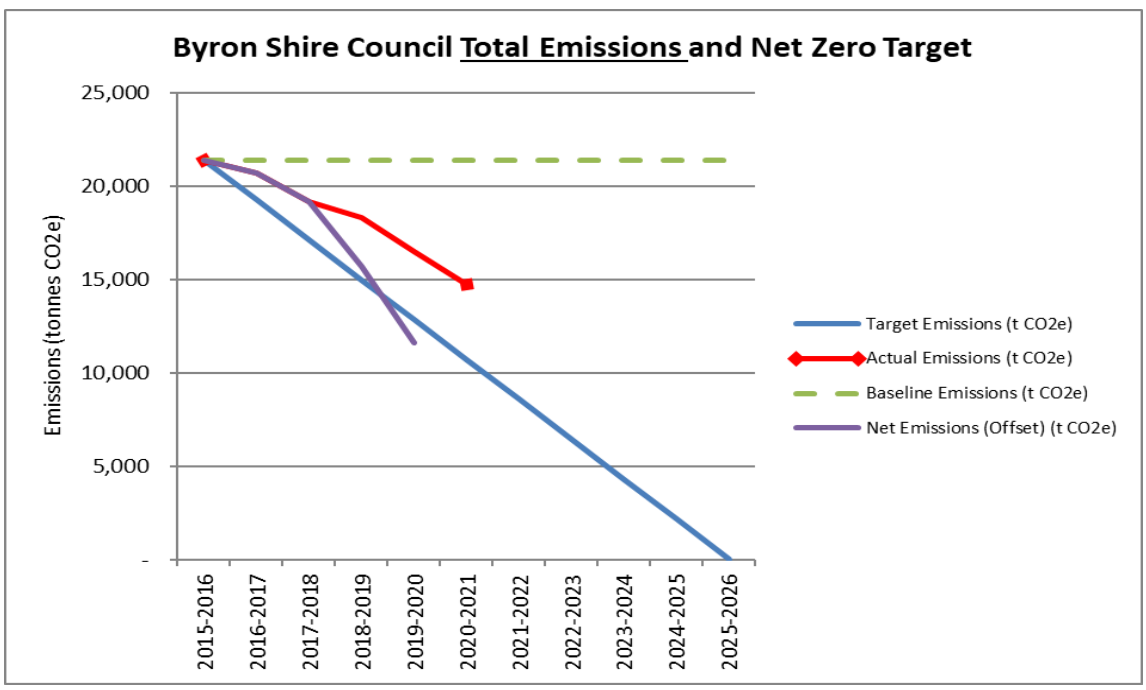

Figure 1 – 2020/21 Total Council emissions tracking towards 2025 target

Background

Scopes

Byron Shire Council uses the National Greenhouse Gas and Energy Reporting (NGER) methodology for its monitoring and reporting of carbon emissions. Historically Council has reported its annual emissions inventory across scopes 1 and 2.

Council introduced a selection of scope 3 emissions in the 2018/19 inventory. Figures from these sources are not currently included in the operational emissions total. No new scope 3 emissions have been included in this 2020/21 inventory. Staff will start reporting on more scope 3 sources in the 2021/22 inventory. Inclusion of scope 3 emissions will be done gradually over time leading up to the Climate Active deadline of 2025/26 and will depend on availability of data.

The NGER framework defines scopes 1, 2 and 3 as:

- **Scope 1** greenhouse gas emissions are the emissions released to the atmosphere as a direct result of an activity, or series of activities at a facility level (e.g. burning of fuel).
- **Scope 2** greenhouse gas emissions are the emissions released to the atmosphere from the indirect consumption of electricity (e.g. all electricity used in buildings, pumps etc.).
- **Scope 3** emissions are indirect greenhouse gas emissions (other than scope 2 emissions) that are generated in the wider economy. They occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business (e.g. embodied emissions in the manufacture of paper used at Council).

Organisational Emissions Sectors

Council's emissions inventory is divided into six organisational sectors as outlined in Figure 2 below. Figure 2 shows what percentage each sector contributed to the 2020/21 total.

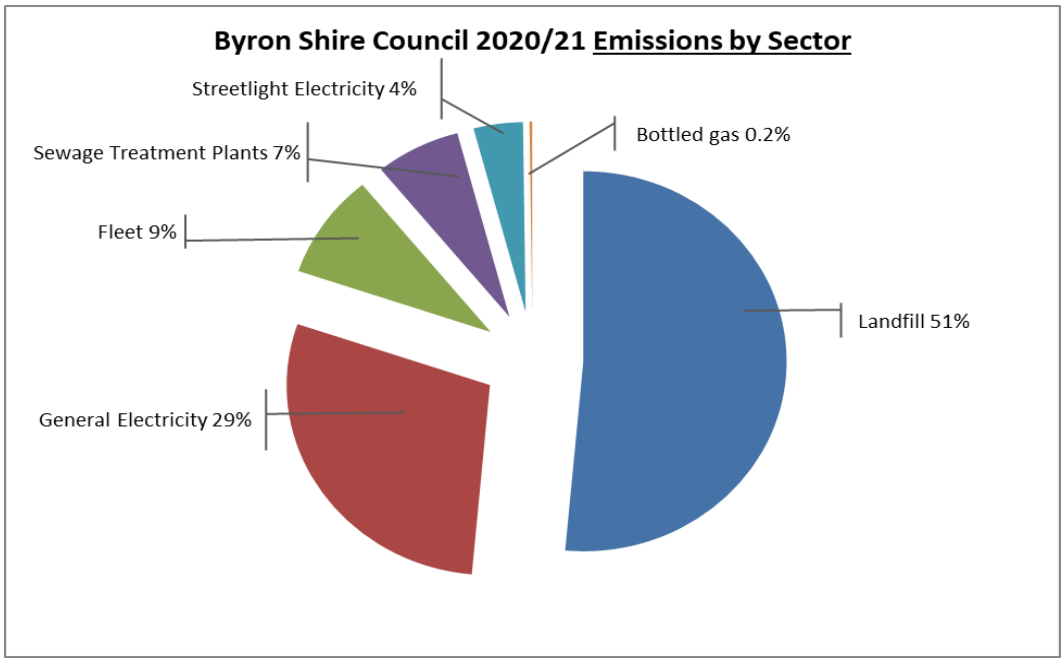

Figure 2 – 2020/21 Emissions by sector as a percentage of the total

Table 2 below shows the changes in each sector compared to the previous year as either an increase or decrease (+/-). It shows the changes both in real terms (Without Offset) as well as the change when offsets are taken into account (With Offset). The changes in each sector are elaborated on in detail in "Part 2: Emissions sectors".

Table 2 - Changes in emissions by sector from 2019/20– 2020/21

Sector	Without Offset (actual emissions) (tCO2e)	With Offset (tCO2e)	
Electricity	27	-14	^
Streetlight Electricity	-53	0	~
Fleet*	81	81	
Bottled Gas*	4	4	
Landfill*	-1,734	-1,734	
Sewage Treatment Plants*	-52	-52	
Total	**-1,727**	**-1,715**	

^ Powershop general electricity emissions were fully offset in both years. In 2019/20, 3 accounts had not yet come across to Powershop due to administrative error, resulting in 14 tCO2e not being offset. The 3 accounts were transferred to Powershop in 2020/21, thus the 14 tCO2e "With Offset" reduction between years.
~Streetlight electricity in both 2019/20 and 2020/21 was fully offset, therefore no change to "With Offset" figure.
*No offsets purchased for these sectors.

Figure 3 below shows the changes in each sector since the baseline year of 2015/16. The changes include offsets purchased for the electricity sectors (general and streetlight).

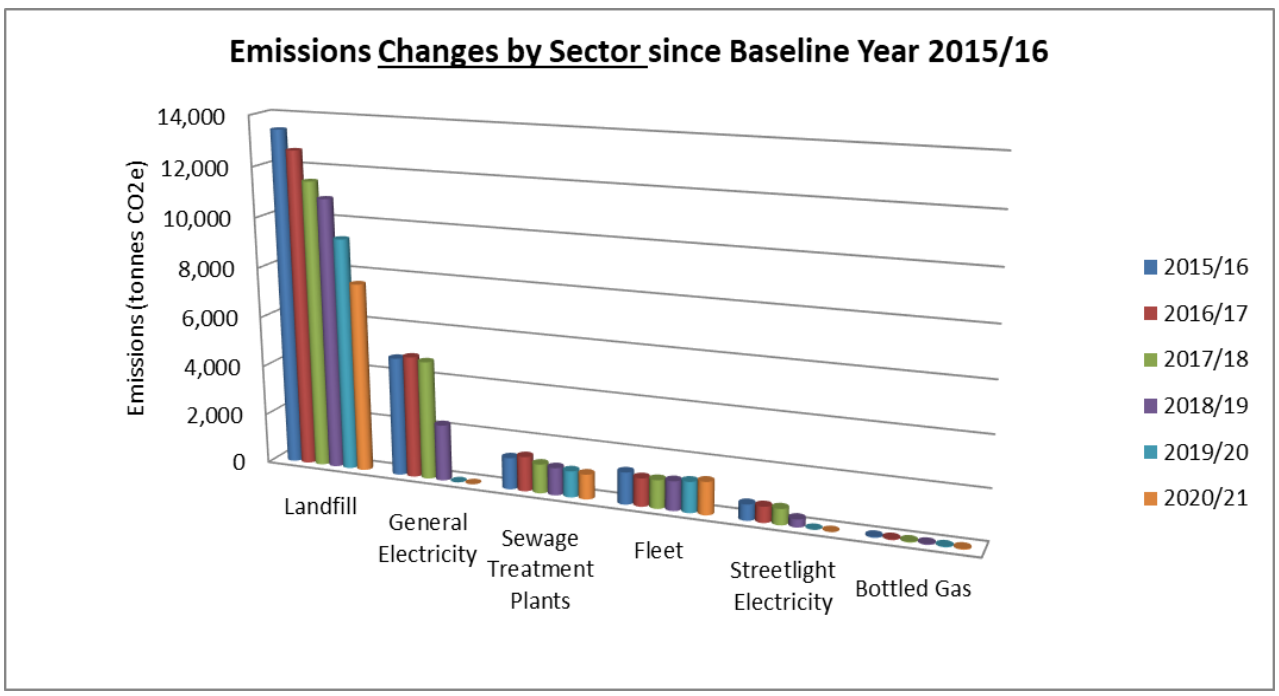

Figure 3 - Emissions changes by sector since baseline year 2015/16

Part 2: Emissions sectors

Sector: General Electricity (scope 2)

The general electricity sector consists of Council's buildings, facilities, pumping infrastructure and sports/public lighting. Data is captured and analysed through a third-party subscription with Azility. This year Council's electricity consumption increased by 3% compared to the previous year. Emissions increased by only 1% due to the lowering of the NSW emissions factor for grid purchased electricity due to more renewable energy being on the NSW network generally.

Council's 2020/21 electricity retailer Powershop supplied 100% carbon offset energy, therefore net emissions for this sector are zero.

As of 1 January 2022, Council achieved the "100% renewables" part of Resolution 17-086 and fulfilled the overarching *Net Zero Emissions Action Plan for Council Operations 2025* Electricity objective to "transition to 100% renewable energy". This is five years ahead of the 2027 target. Until 1 January 2024, Council has a contract with electricity retailer Iberdrola to source approximately 60% of its total operational electricity needs from Collector Wind Farm in Cullerin, NSW. The remainder of Council's electricity needs will be 100% GreenPower. While Council may have achieved this renewable energy target, the best solution is to always avoid use of electricity in the first place or reduce current consumption. Current and future projects within the Action Plan and OP will continue to seek to minimise Council's carbon profile.

The increase in kWh consumption in 2020/21 can be attributed to several different factors:

- Increases at Council's caravan parks and community use buildings (specifically the Cavanbah Centre and Brunswick Valley Community Centre) are due to increased patronage in 2020/21 after several months of COVID-19-related lockdowns in 2019/20.
- There was a significant kWh usage increase (155%) at the Byron Resource Recovery Centre which has been attributed to an undersized and malfunctioning air compressor used to pressurize the leachate and landfill gas pumps for the Southern Landfill. This compressor was very old, inefficient, and not suited to the demands of the system causing it to run constantly. It was replaced in July 2021 to a higher efficiency and higher capacity "screw" compressor which is more suited to the conditions.
- Utilities assets experienced overall increases – Wastewater Collection and Treatment by 2% (significant in terms of kWh) and Wells and Reservoirs (water supply) by 29%. The increases are likely due to increased visitor numbers with the easing of COVID-19 restrictions, and increased precipitation. While electricity consumption may have increased, it should be noted that when the electricity usage of these sites was compared against influent flow, all sewage treatment plants demonstrated improved energy efficiency except for Ocean Shores STP which is scheduled for decommissioning, and all sewage pump stations appeared to be running efficiently except for Kiah Close SPS. Given that this SPS has undergone significant energy efficiency upgrades works but has become less efficient on the kWh/kL metric, the investigation and rectification of this issue is a priority for the Utilities Sustainability program. All Utilities sites will continue to be monitored for energy performance.

Table 3 shows Council's general electricity emissions since baseline year 2015/16. Figure 4 shows both the actual emissions generated from Council's energy use (red line) and the net result having offset the year's electricity (purple line). Figure 5 shows Council's electricity usage by asset type (kWh and percentage of total).

Table 3 –General Electricity Sector Scope 2 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)	Electricity (MWh)	Cost ($)
2016	4,755	4,755	5,661	$1,147,944
2017	4,791	4,791	5,772	$1,191,475
2018	4,674	4,674	5,700	$1,257,905
2019	4,554	2,250	5,623	$1,291,102
2020	4,208	14	5,195	$1,238,488
2021	4,235	0	5,360	$1,264,789

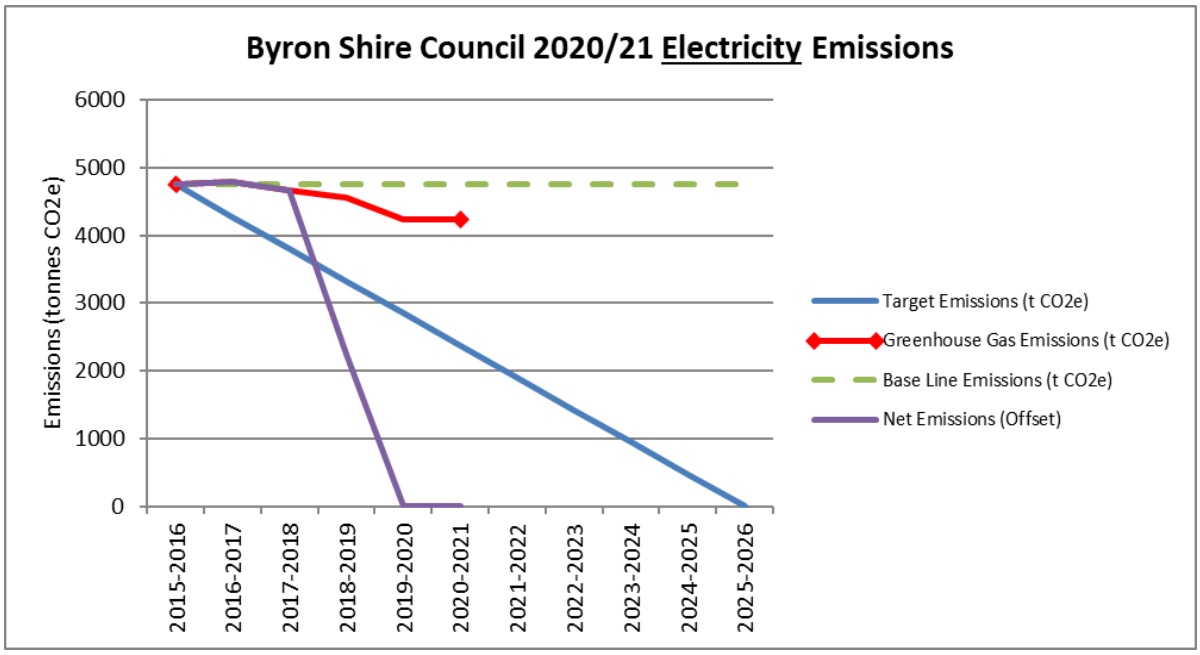

Figure 4 - General Electricity Sector Scope 2 Emissions (Offset and Actual)

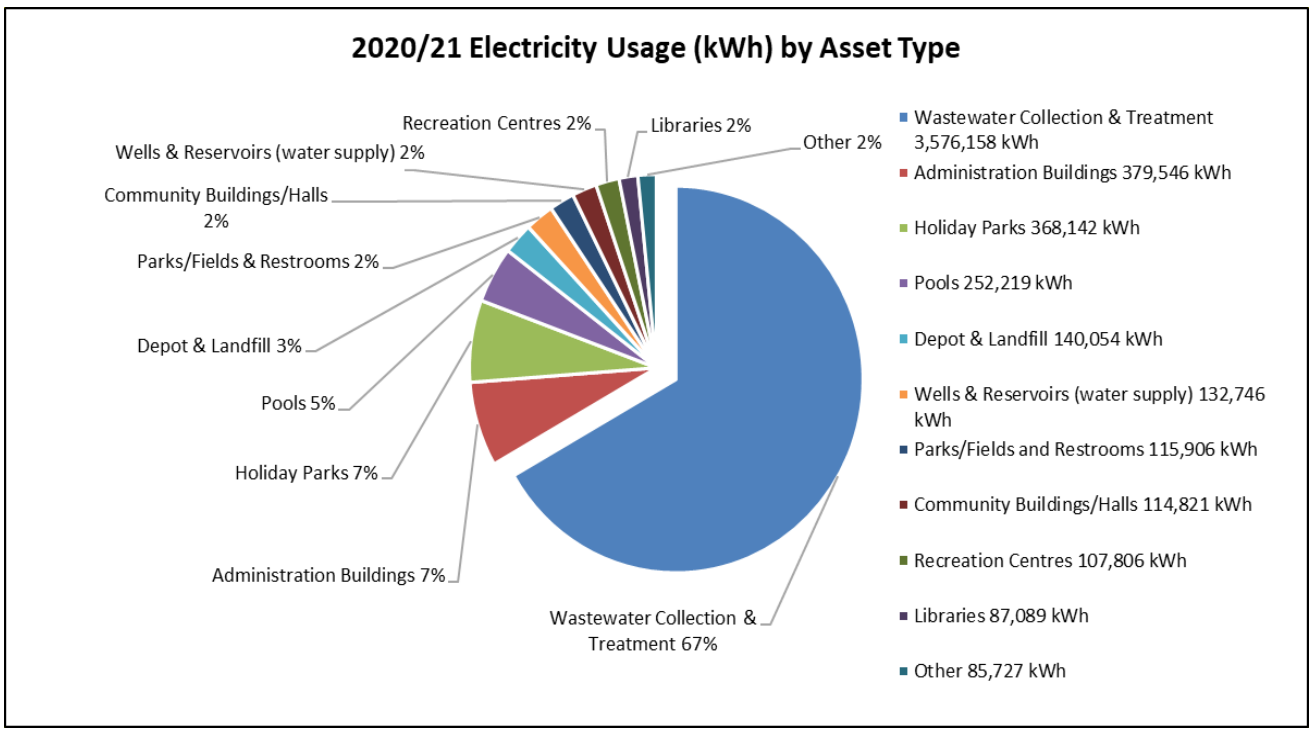

Figure 5 – 2020/21 Electricity Usage (kWh) by Asset type

Of Council's assets, wastewater collection and treatment uses the largest amount of electricity (67%). Council created a new position, Sustainability Officer – Utilities, in April 2021 to focus on

increasing energy efficiency and reducing emissions in the Utilities sector (including assets in the Wastewater Collection & Treatment and Wells & Reservoirs (water supply) areas). Further, Council's proposed bioenergy facility would produce enough electricity to run the Byron Bay Sewage Treatment Plant, with excess electricity sent back to the grid. Council's decision for "Go/No Go" on construction of the facility (subject to State and Federal authorities) links to Action A2 in the Action Plan (OP Activity 3.2.1.5).

The next largest electricity user is Council's Administration Building at Mullumbimby (7%). A 99KW solar PV structure was installed in the carpark of the building in June 2019, which has reduced baseline electricity consumption by approximately 25% since 2018/19. Usage decreased by another 10% from 2019/20 – 2020/21, likely due to many staff working from home part-time for the full financial year due to COVID-19. Further measures must be taken to further reduce kWh consumption for this high energy using asset. The Sustainability Team is working with the Property Maintenance Coordinator to develop a business case for an energy efficiency upgrade at the building (Action Plan Action A4; OP Activity 3.2.1.11).

Sector: Streetlight Electricity (scope 2)

Streetlight energy use reduced 6.2%, from 778MWh to 730MWh, despite 36 new streetlights being added in the Shire. The reduction is attributed to a bulk replacement of 119 older streetlights with LEDs across South Golden Beach and Ocean Shores in May 2020, as well as all spot replacements in the Shire being LEDs.

Despite the decrease in kWh consumption, costs in the streetlight sector stayed on par with the previous year due to an increase in the Streetlight Use of System (SLUOS) charges. SLUOS charges are paid to Essential Energy for operating the streetlight network. A large volume of lights (around 350) were replaced with an LED light under fault conditions (spot replacement) and the lights were subsequently transitioned to a capital recovery tariff in line with the Australian Energy Regulator capital annuity rates.

Council's electricity supply contractor Essential Energy has a bulk LED upgrade planned for the Shire in 2022/23. Council is pursuing a cost benefit analysis of the most cost-effective way to implement the rollout as a matter of priority with Essential Energy. This project supports Action A3 in the Action Plan.

Net emissions for 2020/21 are zero due to the retailer contract with Powershop being 100% carbon neutral. This is shown by the purple line in Figure 6.

Table 4 - Streetlight Electricity Sector Scope 2 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)	Electricity (MWh)	Cost ($)	Number of streetlights
2016	636	636	757	$314,425	1,890
2017	635	635	765	$336,809	1,897
2018	633	633	772	$315,504	1,922
2019	633	314	782	$355,420	1,941
2020	630	0	778	$307,320	1,973
2021	577	0	730	$308,146	2,009

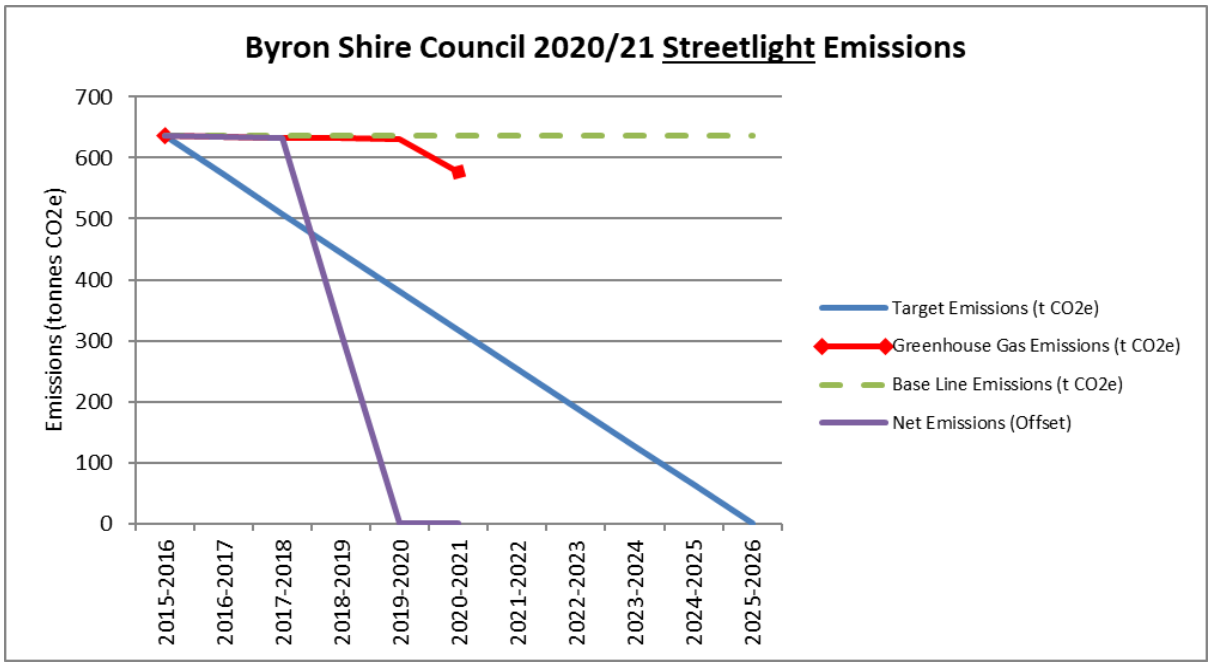

Figure 6- Streetlight Electricity Sector Scope 2 Emissions (Offset and Actual)

Sector: Fleet (scope 1)

Emissions relating to the fleet sector include all fuel used in the light passenger vehicles, heavy plant and equipment as well as petrol operated tools (whipper snippers and generators etc.). Data is sourced from the Caltex Star card system for passenger vehicles (45% of total fuel use) and from purchases of bulk fuel delivered to the depot and landfill (55% of total fuel use).

This year Council has experienced a 7% increase in total fuel usage compared to the previous year, resulting in a 6.5% increase in emissions. This is mainly due to a 27KL (11%) increase in bulk diesel consumption. Increased capital works and flood damage meant that the Works teams hired an additional six diesel utilities, two trucks and at least ten pieces of plant and equipment such as excavators and rollers. The equipment has been hired on a long-term basis and will carry over to the 2021/22 year.

There was a significant 17% increase in cost, which is due to the increase in fuel usage and the increasing price of petrol and diesel. Australian fuel prices fell significantly in early 2020 due to the impact of COVID-19 and the oversupply of crude oil globally, however have been steadily increasing since November 2020.

Council's fleet sector will need to investigate and implement significant changes if progress is to be made towards meeting the net zero emissions target by 2025. A number of actions under *Objective B – Fuel* in the *Net Zero Emissions Action Plan for Council Operations 2025* have been completed or are currently underway and some are included in the 2021/22 Operational Plan, including: Action B1 "investigate new bulk fuel storage and monitoring system to minimise manual data entry" (OP activity 3.2.1.3); Action B2 "develop and deliver Electric Vehicle Charging Station Policy and Procedure" (OP Activity 1.6.3.2); and Action B6 is "review Council's passenger vehicle policies and procedures to encourage Hybrid and Electric Vehicle ownership". For further details on the status of the projects, see the Action Plan Progress Update section in the covering Council report.

Table 5 - Fleet Sector Scope 1 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	Fuel (kL)	Cost ($)
2016	1,279	482	$482,922
2017	1,128	427	$438,480
2018	1,134	435	$523,606
2019	1,171	452	$633,308
2020	1,230	474	$613,329
2021	1,311	505	$715,819

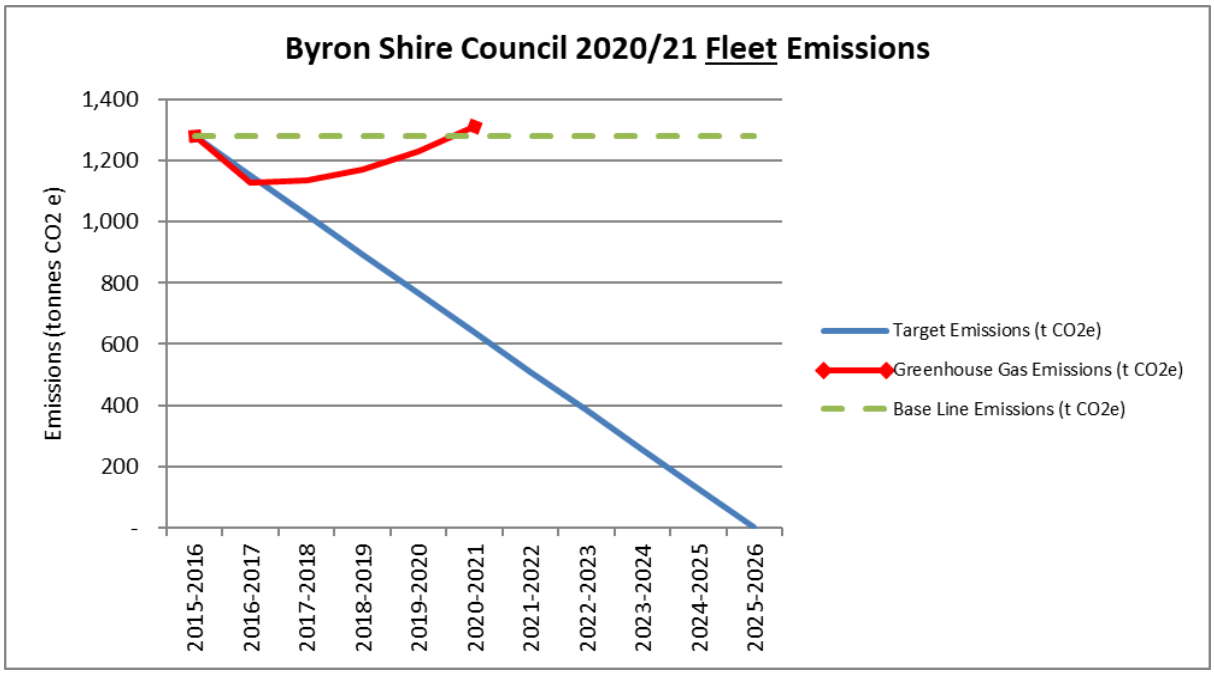

Figure 7 - Fleet Sector Scope 1 Emissions

Sector: Bottled Gas (scope 1)

Bottled gas usage increased by 14% compared to the previous year. Gas consumption in 2019/20 was the lowest since baseline year 2015/16 due to the travel bans and childcare centre shutdowns from COVID-19. The increase of 2,442L in 2020/21 is due to the travel bans and shutdowns easing somewhat. Consumption is still lower than the average prior to 2019/20.

Bottled gas is used at Council's holiday parks and childcare centre for cooking and hot water heating. The hot water heating is a boost system to solar at First Sun Holiday Park and was installed as an efficiency measure taken in 2016. The minimal nature of emissions from bottled gas compared to other sectors does not warrant further action at this stage. It is recommended as assets come to their natural end of life either the most efficient appliance is chosen or transition to induction (electric) cooking is made.

Table 6 - Bottled Gas Sector Scope 1 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	LPG (kL)	Cost ($)
2016	41	27	$17,913
2017	39	25	$14,931
2018	36	23	$12,342
2019	36	23	$14,972
2020	27	18	$10,235
2021	31	20	$12,776

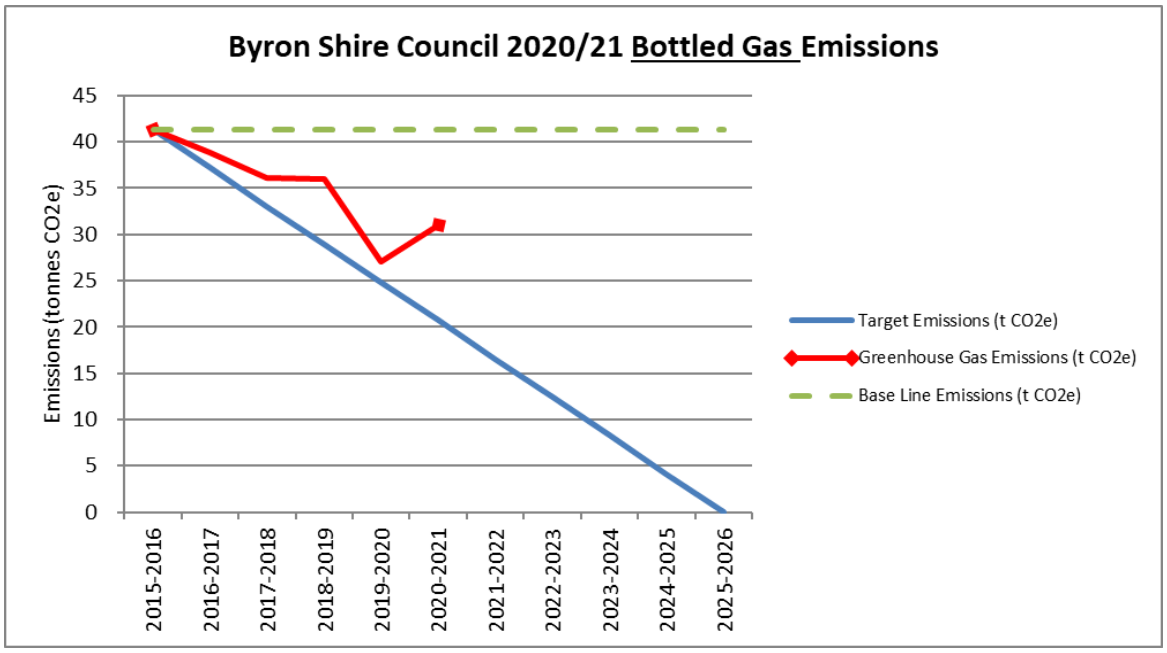

Figure 8 - Bottled Gas Sector Scope 1 Emissions

Sector: Waste Fugitive Emissions (scope 1)

Byron Shire Council's closed landfill emits fugitive emissions from the legacy waste buried within. The methane gas flare captures a portion of gas rising up and converts the methane to carbon dioxide thus reducing the global warming potential of the gas. The fugitive emissions will decline as the waste inside the landfill naturally decomposes. The decrease from 2019/20 – 2020/21 was 19%.

The methane gas flare currently generates Australian Carbon Credit Units (ACCU's), and Council is contractually obliged to sell these offsets until its requirements are met. This means that Council cannot count all of the reduction associated with the methane gas flare for its own reduction efforts. The previous ACCU contract expired in December 2021 with a shortfall in Council's credits. Staff have requested a five-year extension with the Clean Energy Regulator until sufficient ACCUs have been created by the gas flare project to meet contract obligations.

Council did not sell any ACCUs in 2020/21 due to administrative timing and not enough ACCUs being created. In light of the net zero target, staff have engaged a consultant to analyse the future methane gas flare potential and whether Council should sell the associated ACCU's or retire them so that any reductions will benefit Council's own carbon footprint (Action C6 in the Action Plan; OP Activity 3.2.1.4).

Council commenced composting at the Myocum Resource Recovery Centre in 2019. The composting operations added an extra 142 tonnes of carbon emissions to the waste sector in 2020/21 due to small pockets of anaerobic decomposition in the compost pile. Both the composting and fugitive emissions of the Myocum landfill are considered scope 1 emissions.

Table 7 - Waste Sector Scope 1 Emissions since baseline year 2015/16

Financial Year	Total Emissions (tCO2e)	Total Flare (tCO2e)	ACCU's Sold (tCO2e)	Composting (tCO2e)	Net Emissions* (tCO2e)
2016	15,931	5,241	2,729	0	13,419
2017	14,283	3,539	1,903	0	12,647
2018	12,852	3,097	1,723	0	11,478
2019	11,607	2,372	1,440	166	10,841
2020	10,519	2,382	1,025	140	9,302
2021	9,564	2,138	0	142	7,568

*Net Emissions = Total Emissions – Total Flare + ACCU's Sold + Composting

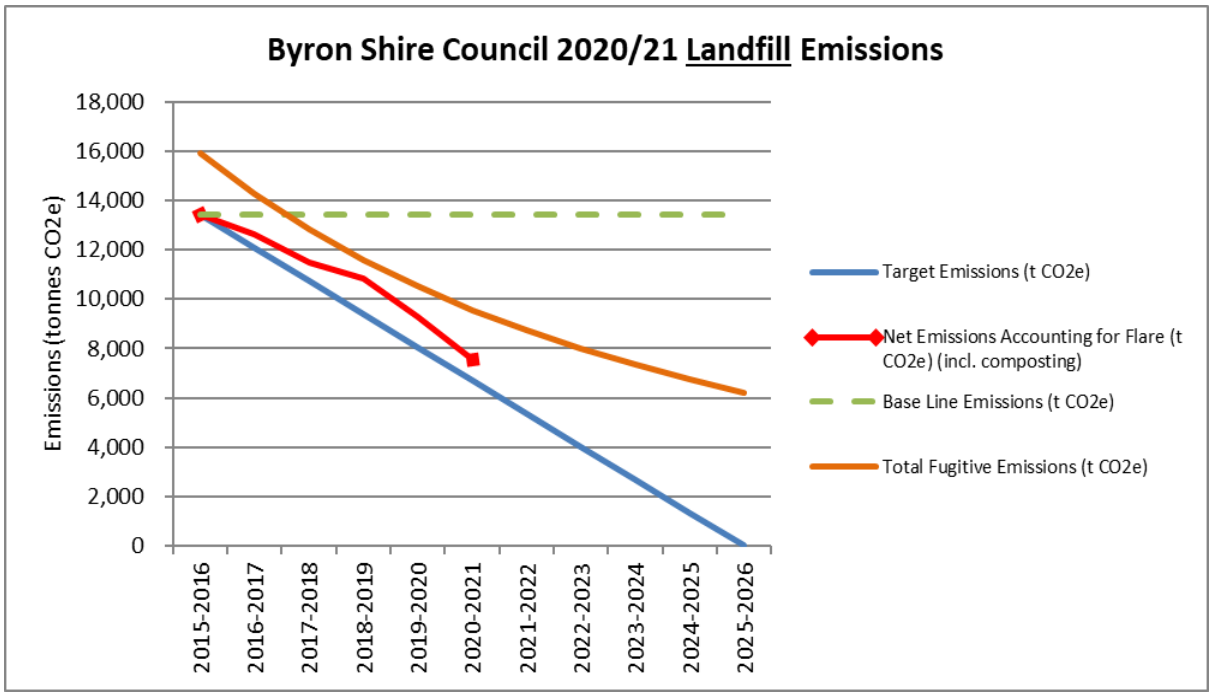

Figure 9 - Waste Sector Scope 1 Emissions

Sector: Wastewater Fugitive Emissions (scope 1)

Fugitive wastewater emissions are created during the processing of wastewater at Council's four sewage treatment plants (STPs) and are greatly affected by rain events due to the potential for inflow and infiltration to the sewer system. Despite an increase in annual flow, the 2020/21 fugitive wastewater emissions declined by 52 tonnes, or 5%, compared to the previous year.

Total annual flow increased by 605ML, or 17%. Flows to the Byron, Bangalow and Brunswick Valley plants increased, likely due to relaxations in COVID-19 travel restrictions and increased precipitation. Ocean Shores STP saw a slight decrease in flow, however there was increased total nitrogen in the effluent which caused an increase in GHG emissions.

Despite the overall increase in flow, emissions declined due to several compounding factors. Three of the four STPs (Byron, Bangalow and Brunswick Valley) experienced a marked reduction in total nitrogen effluent concentrations (improved treatment quality), which explains the GHG emission reductions. This is particularly so at the Byron Bay and Brunswick Valley STPs. The reduction is also a result of reduced biosolids land application from Bangalow and Byron Bay STPs. Significant biosolids tonnage was land applied in June 2020, which reflects the partially uncontrollable nature of this aspect of the process (i.e., inventories must be managed when/as needed and not necessarily subject to dates/financial years).

It should be noted that, while total emissions went down in 2020/21, they will continue to fluctuate across years as the Shire experiences different conditions (drought and rain) and different operational aspects (like reduced or increased biosolids inventories land application).

Whilst solar and energy efficiency projects at the sewage treatment plants continue to drive down electricity emissions, these projects have no effect on the scope 1 fugitive emissions. The major factors that can drive down fugitive emissions are water efficiency measures to reduce wastewater generation, minimising inflow and infiltration, and improving the effectiveness and efficiency of treatment operations. These projects link to Action C5 in the Action Plan, "improve water efficiency within the Shire and maximise use of recycled water and alternative water sources".

Table 8 - Wastewater Sector Scope 1 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	Flow (ML)
2016	1,264	3,255
2017	1,387	3,542
2018	1,162	3,349
2019	1,094	3,327
2020	1,046	3,507
2021	994	4,112

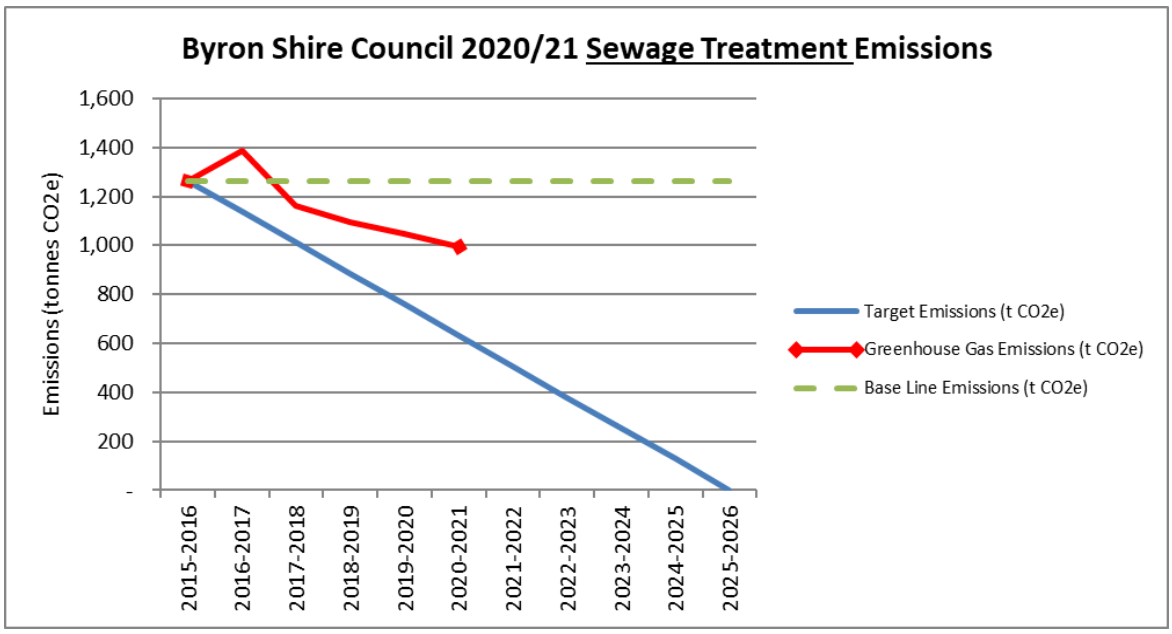

Figure 10 - Wastewater Sector Scope 1 Emissions

Scope 3 Emissions

Scope 3 emissions are emissions associated with the operation of organisations outside of Council's control such as contractors and suppliers. All relevant scope 3 emissions will need to be included in Council's boundary by 2025/26 when we aim to become certified carbon neutral under Climate Active. Defining Council's emissions boundary in accordance with the Climate Active guidelines is a measure under Action D5 in the Action Plan. Staff are currently working with a consultant to define Council's boundary and determine the most efficient way to measure relevant scope 3 emissions. A report on the newly defined Climate Active-compliant boundary will be put to Council this financial year (OP Activity 3.2.1.2).

This is the third year that Byron Shire Council has endeavoured to capture a selection of scope 3 emissions in an ad hoc manner (not Climate Active-compliant). The process has highlighted some simple and minor changes that can be made to reduce the emissions impact of Council's business dealings. The below scope 3 emissions have not been included in Council's 2020/21 emissions boundary (the total operational emissions).

1. Popcar

The "Popcar" car share service began being trialled by Council in September 2019. Council's Executive Team resolved in October 2020 that the share cars are only to be used by Council staff in the event that Council owned vehicles are unavailable. All Council staff are currently able to access Popcar for work purposes through Council's Popcar account, however only staff from the Sustainable Environment and Economy Directorate used the cars in 2020/21.

Usage can be monitored via Council's Popcar membership platform. Table 9 below shows the details of the 31 trips taken by staff in 2020/21. All of Council's 2020/21 Popcar usage was carbon offset.

Table 9 - Popcar usage by staff in 2020/21

Month	Number of trips	Total reservation time (hours)	Total kilometres travelled (kms)	Total cost ($)
July 2020	0	0.0	0	$0.00
August 2020	0	0.0	0	$0.00
September 2020	0	0.0	0	$0.00
October 2020	4	21.0	159	$175.09
November 2020	17	265.0	864	$1,332.04
December 2020	14	75.0	826	$785.96
January 2021	12	52.5	807	$641.67
February 2021	3	18.5	152	$175.12
March 2021	1	11	411	$140.86
April 2021	0	0.0	0	$0.00
May 2021	0	0.0	0	$0.00
June 2021	1	3.0	34	$33.74
2020/21 totals	**31**	**446**	**3094**	**$3,284.48**

2. Waste Collection Service

Byron Shire Council contracts its waste collection service to Solo Resource Recovery. As part of this contract, Solo monitors the fuel use for the collection and transfer of Byron Shire waste and then offsets the associated emissions with international carbon credits (VCU's – Verified Carbon Units). For the 2020/21 financial year 736 tonnes of VCU's were purchased for Byron Shire Council.

3. Water Supplied to Council Assets

Byron Shire Council purchases water from Rous Country Council and supplies its own water from the Laverty Gap Weir. All associated emissions from the water supplied from the Laverty Gap Weir are accounted for in previous scope 1 and 2 emissions outlined earlier in this report. The water supplied by Rous County Council has emissions related to its collection, transfer and treatment.

For the 2020/21 financial year, 69.8 tonnes of emissions were created to supply Council assets with 36.1 megalitres (ML) of water. Table 10 outlines the emissions for water use on Council assets in each suburb.

Table 10 - Water supplied to Council Assets 2020/21

2020/21 Water Use	ML	Emisisons (tCO2e)
Bangalow	3.5	6.8
Billinudgel	0.0	0.0
Brunswick Heads	2.0	3.9
Byron Bay	12.3	23.8
Mullumbimby	3.2	6.2
New Brighton	0.9	1.8
Ocean Shores	6.4	12.4
South Golden Beach	0.5	1.0
Suffolk Park	7.2	13.9
Grand Total	**36.1**	**69.8**