

Annual inventory of Council’s emissions Financial Year 2021/22

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Part 1: Overview

Purpose:

As part of the operational plan, OP Activity 3.4.3.2 states “Prepare Annual Emissions Inventory to determine progress towards 2025 Net Zero Emissions Target”. This report provides a detailed annual inventory of Council’s emissions from its operations in FY2021/22, including Scopes 1, 2 and 3. In the FY2021/22 emissions report, the full known boundary of Council’s emissions will be included, this is introducing scope 3 emissions that were not previously calculated.

Key findings are:

- 1) Overall Council emissions were down 808 t CO₂-e, or 5.4%, on the previous year FY2020/21.
- 2) In FY2021/22 there was significant disruption to Council’s operations due to the continued impact of Covid-19 and two major weather events, this has affected the emissions results.
- 3) New 100% renewable electricity contracts were put in place.
- 4) 3.8% reduction in general electricity consumption.
- 5) 6.1% reduction in streetlight electricity usage.
- 6) 1% decrease in fuel emissions.
- 7) 8.2% natural decline in landfill fugitive emissions.
- 8) 11% decrease in reported wastewater fugitive emissions, despite just a 1.75% decrease in flow. The main reason for the emissions drop is due to the recalculation of Bangalow STP emissions.
- 9) Community infrastructure construction was up by 678 t CO₂-e or 34%. Construction emissions figures were included for the first time in the report but were significantly higher than the previous year’s calculations, due to weather events in the Shire and the need for infrastructure repairs.

Summary

Council experienced a 7.5% reduction in scope 1 & 2 emission sources, that have been traditionally reported on, compared to the previous year. The emission reductions were across all six of Council’s emission sources, this is because of targeted emission reduction programmes, but also one-off events such as Covid 19 restrictions and 2 extreme weather incidents.

Scope 3 emissions were calculated for the first time in FY2020/21. These were not included in the Council emission report FY2020/21, due to timing, but have been used in the FY2021/22 report as a benchmark for variances from last year. Overall, the scope 3 emissions this year were down by 1.3%, however, the Community infrastructure construction materials were up by 684 tCO₂-e.

The total net emissions, including all scopes, for Council operations was 14,190 tCO₂-e for FY2021/22, this was a decrease of 808 tCO₂-e (5.4%) over the FY2020/21 figure of 14,998 tCO₂-e.

Table 1 shows the total emissions within Council’s operational boundary. Years FY2015/16 to FY2019/20 includes six identified emission sources as the emissions boundary. Years FY2020/21 & FY2021/22 include scopes 1,2 and 3, the complete boundary, calculated using Climate Active methodology.

Table 1 – Total actual and net emissions since baseline year FY2015/16

Financial Year	Actual Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)
2015/16	21,389	21,389
2016/17	20,701	20,701
2017/18	19,122	19,122
2018/19	18,325	15,700
2019/20	16,442	11,618
2020/21* (All scopes)	19,810	14,998
2021/22* (All scopes)	18,805	14,190

*FY2020/21 & 2021/22 emissions (tCO2e) include ALL identified scopes (1,2 & 3)

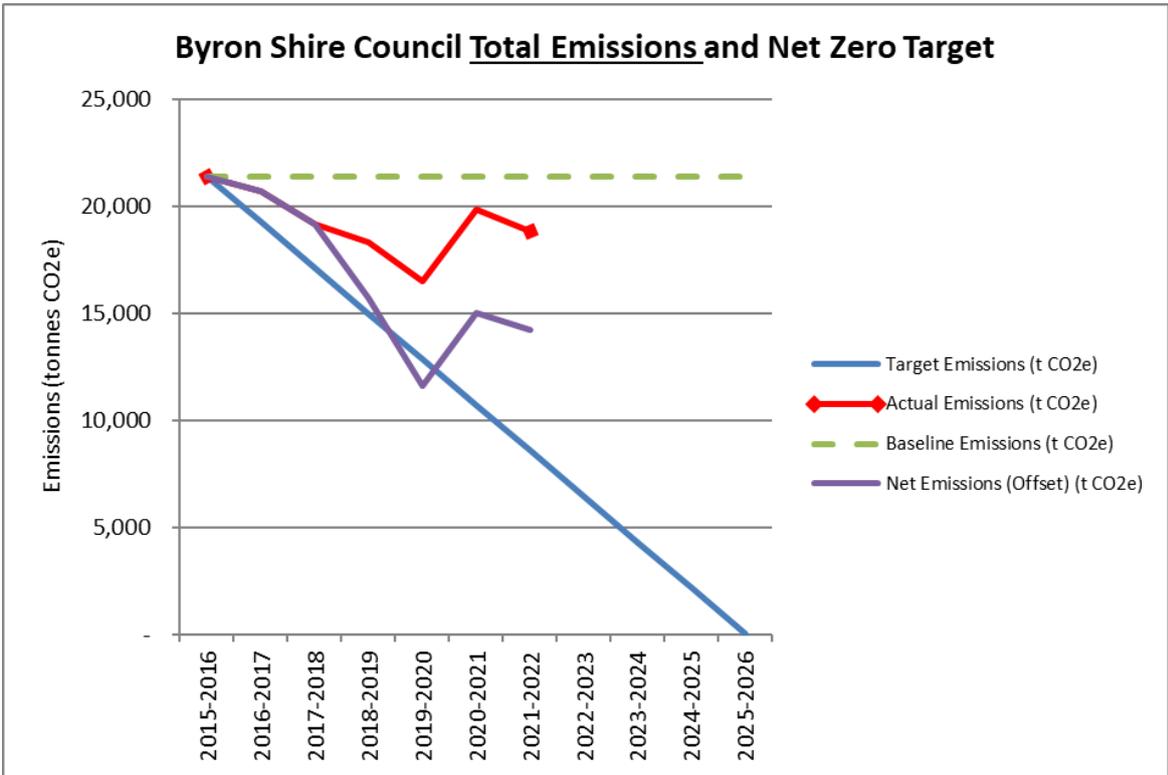


Figure 1 – FY2021/22 Total Council emissions tracking towards 2025 target (note – all scopes included from FY2020/21).

Background

Emissions calculation methodology

Byron Shire Council emissions calculations have been undertaken using the National Greenhouse Gas and Energy Reporting (NGER) methodology. In this report Council has included 26 new emission sources, consisting of mainly scope 3 emissions and one scope 1 emission source.

The emissions calculations have been undertaken by consultants, 100% Renewables, using the Council derived emissions and incorporated Climate Active methodology to produce the final emissions boundary result for FY2021/22. The Climate Active Carbon Neutral Standard, formerly called the National Carbon Offset Standard, was developed in accordance with the general principles of:

- The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard developed by the World Business Council for Sustainable Development (GHG Protocol);
- GHG Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard. This inventory measures greenhouse gases in carbon dioxide equivalence (CO₂-e) and includes all seven greenhouse gases covered by the Kyoto Protocol – carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃), as well as hydrochlorofluorocarbons (HCFCs) covered by the Montreal Protocol (where applicable).

Scopes

To help differentiate between different emissions sources, emissions are classified into the following scopes according to the GHG Protocol – Corporate Standard:

- Scope 1 emissions include all direct greenhouse gas emissions from sources that are within the Council’s control boundary. These could be emissions from fuel use, refrigerants, and on-site electricity generation.
- Scope 2 emissions include purchased electricity, heat, cooling and steam (i.e., energy produced outside the Council’s control boundary but used within the organisation).
- Scope 3 emissions are all indirect emissions that occur because of the activities of the organisation but occur from sources outside the Council’s control boundary.

Historically Council has reported its annual emissions inventory across scopes 1, 2 and some 3. All relevant scope 3 emissions will need to be included in Council’s boundary by FY2025/26 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 *Net Zero Emissions Action Plan 2025*.

FY2021/22 is the first year that Byron Shire Council has produced an emissions report with the full known boundary of scope 1, 2 and 3 emissions that are Climate Active-compliant. The emission sources and scopes are listed below in table 2.

Required scope 3 emission sources under Climate Active

Under Climate Active, organisations must include scope 1 and 2 as well as relevant scope 3 emission sources in their boundary. Categories of scope 3 emissions sources that need to be considered are as follows:

1. Purchased goods and services
2. Capital goods
3. Fuel- and energy-related activities (not included in scope 1 or scope 2)
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Upstream leased assets
9. Downstream transportation and distribution
10. Processing and use of sold products
11. End-of-life treatment of sold products
12. Downstream leased assets
13. Franchises
14. Investments

The emission sources identified by 100% Renewables and Council are as follows:

Table 2 – Council emission sources and scopes

Emission Source	Scope(s)
LPG stationary	1 and 3
Diesel stationary	1 and 3
Diesel – fleet	1 and 3
Petrol – fleet	1 and 3
Ethanol – fleet	1 and 3
Refrigerants	1
Wastewater	1
Closed landfill	1
Electricity	2 and 3
Streetlighting	2 and 3
Scope 3 facilities	3
Water	3
Employee commute	3
Working from home	3
Paper	3
IT equipment	3
IT software	3
Postage and couriers	3
PopCar	3
Waste	3
Telecommunications	3
Cleaning supplies	3
Cleaning services	3
Professional services	3
Stationery	3
Asphalt	3
Air travel	3
Concrete	3
Other road-building material other than asphalt	3
Machinery and vehicle repairs	3
Equipment hire	3
Clothing	3
Air travel	Uplift applied
Business accommodation	Uplift applied
Office equipment	Uplift applied
Food and catering	Uplift applied

Emissions for FY2021/22

Table 3 documents the full emissions boundary for FY2021/22 and breaks down the emissions by source and scope.

Table 3 - FY2021/22 emissions boundary

Emission source	Activity data	Unit	Scope 1 (t CO2-e)	Scope 2 (t CO2-e)	Scope 3 (t CO2-e)	Total (t CO2-e)
Closed landfill	6,950	t CO2-e	6,950			6,950
LPG stationary	18	kL	29		2	30
Fleet - Diesel	402	kL	1,093		56	1,148
Fleet - Petrol	89	kL	205		11	216
Fleet - Ethanol	6	kL	0.05		0.46	0.51
Wastewater	886	t CO2-e	886			886
Refrigerants	8	kg	0.50			0.50
Electricity	5,157,374	kWh		-	-	-
Streetlighting	685,432	kWh		-	-	-
Asphalt (RPQ)	4,754,028	\$			1,024	1,024
Asphalt (Boral)	303,680	\$			126	126
Employee commute	3,134,648	km			732	732
Other road-building matls	2,791,806	\$			602	602
Equipment hire	2,080,967	\$			502	502
Waste from Council ops	372	tonnes			484	484
Concrete	388,555	\$			416	416
Food and catering	231	t CO2-e			231	231
Office equipment	177	t CO2-e			177	177
IT software	1,121,602	\$			156	156
IT equipment	1,027,083	\$			140	140
Water	95	t CO2-e			95	95
Professional services	618,281	\$			64	64
Telecommunications	358,600	\$			56	56
Postage and couriers	99,000	\$			36	36
Cleaning	270,000	\$			30	30
Green waste	13	tonnes			21	21
Stationery	75,900	\$			20	20
Machine & vehicle repairs	73,171	\$			15	15
Air travel	12	t CO2-e			12	12
Working from home	4	t CO2-e			4	4
Business accommodation	4	t CO2-e			4	4
Clothing	51,773	\$			5	5
Paper	3,910	kg			9	9
Recycled waste	55	tonnes			-	-
PopCar	0	km			-	-
TOTAL:			9,162	-	5,027	14,190

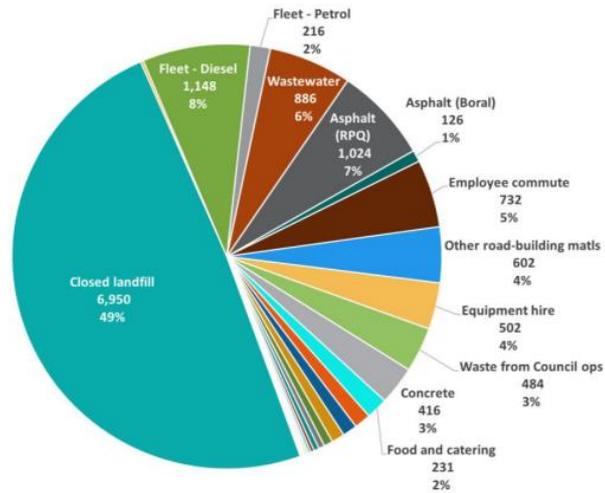


Figure 2 - The detailed contribution of emission sources to the inventory

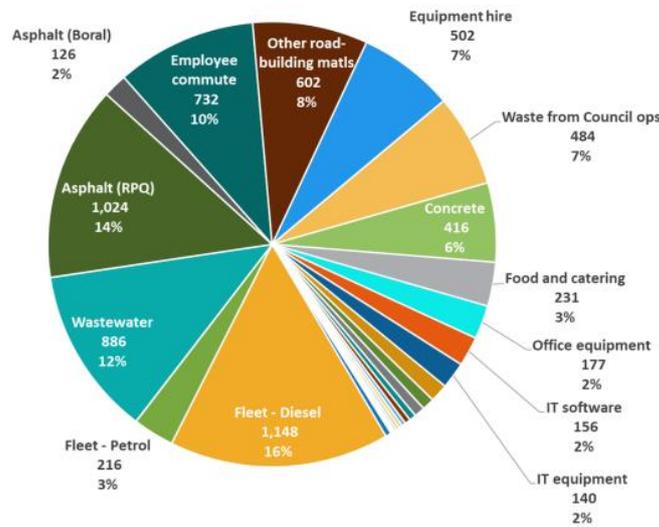


Figure 3 - The detailed contribution of emission sources to the inventory, excluding emissions from the closed landfill

Table 4 below highlights the top 10 changes by source, comparing FY2020/21 and FY2021/22. As can be seen in the table, the largest changes are associated with community infrastructure construction, this is explained further in the document.

Table 4 - Top 10 increase in emissions by source from FY2020/21– FY2021/22

Emission source	FY 2021 (t CO2-e)	FY 2022 (t CO2-e)	Year on year change (t CO2-e)	Scope	Δ (%)	Rank
Asphalt (RPQ)	751	1,024	274	3	36%	1
Other road-building mats	391	602	211	3	54%	2
Equipment hire	355	502	147	3	41%	3
Employee commute	669	732	63	3	9%	4
Concrete	363	416	53	3	15%	5
Fleet - Diesel	1,119	1,148	30	1 + 3	3%	6
IT software	144	156	12	3	8%	7
Telecommunications	46	56	10	3	22%	8
IT equipment	131	140	9	3	7%	9
Paper	1	9	8	3	865%	10

Part 2: Emissions sectors

Sector: Fossil fuels

Emission source: Bottled Gas

Bottled gas usage decreased by 8% compared to the previous year. 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 5 - Bottled Gas Sector Scope 1 Emissions since baseline year FY2015/16

Financial Year	Emissions (tCO2e)	LPG (kL)	Cost (\$)
2015/16	41	27	\$17,913
2016/17	39	25	\$14,931
2017/18	36	23	\$12,342
2018/19	36	23	\$14,972
2019/20	27	18	\$10,235
2020/21	31	20	\$14,032
2021/22	29	18	\$21,476

Emission source: Fleet

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 (39% of total fuel use) and from purchases of bulk fuel delivered to the depot and landfill facilities (61% of total fuel use).

This year Council has experienced a 1.8% decrease in total fuel usage compared to the previous year, resulting in a 1% decrease in emissions. The bulk diesel use increased by 25KL (9%), primarily due to the increased capital works and flood recovery efforts. As diesel has higher emissions per litre compared to petrol, the emissions remained similar to last year. Council has adopted the Climate Active calculation methodology for FY2021/22 and so the reported emissions are slightly higher than the calculation method used by Council previously. This is due to Climate Active including the related Scope 3 emissions, the delivery of the fuel, in the final calculations. For this report FY2020/21 emission figures were recalculated using Climate Action methodology and shown in the tables below to give a benchmark for this year. Fleet fuel usage (Star card) was lower than FY2020/21 by 34KL (15%), this is mainly due to the travel restrictions caused by the need of Council workers to work from home during flood events and Covid lockdowns.

There was a 9% increase in the total cost of fuel for the Council in FY2021/22. The increases are primarily due to the higher world demand of fuel, post the Covid travel restrictions, and current international market influences, such as the war in Ukraine.

An investigation of the Council’s fleet sector has been recommended, in order to implement significant emissions reductions and meet the net zero target. A current activity is included in the FY2021/22 Operational Plan, 5.3.2.3, “Investigate development of an Electric Vehicle transition plan for Council’s vehicle fleet”. This plan will identify key areas to be addressed when developing the strategy and find opportunities to reduce emissions and develop a low emission vehicle plan.

Table 6 - Fleet Sector Scope 1 Emissions since baseline year FY2015/16

Financial Year	Emissions (tCO2e)	Fuel (kL)	Cost (\$)
2015/16	1,279	482	\$482,922
2016/17	1,128	427	\$438,480
2017/18	1,134	435	\$523,606
2018/19	1,171	452	\$633,308
2019/20	1,230	474	\$613,329
2020/21	1,379*	506	\$715,819
2021/22	1,365*	497	\$781,084

*FY2020/21 & 2021/22 emissions (tCO2e) include Scopes 1 & 3

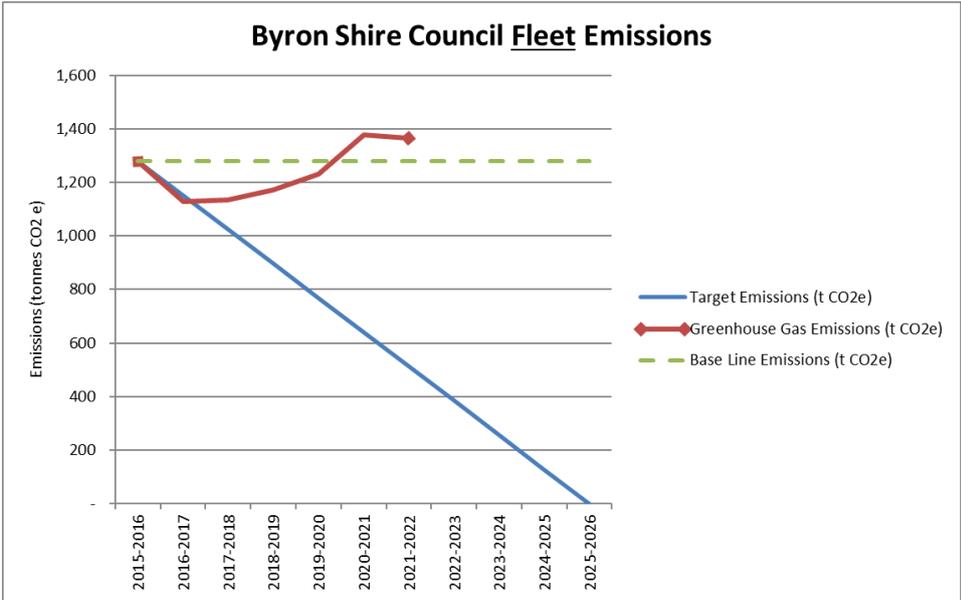


Figure 4 - Fleet Sector Scope 1 & 3 Emissions

Sector: Electricity

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 decreased by 3.8% compared to the previous year.

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.

When calculating the emissions for Council's electricity, there are 2 points to consider:

1. The electricity purchased is 100% renewable, this is purchased from a renewable source and the Large Generation Certificates (LGC's) associated with the generation of the electricity are surrendered when the electricity is supplied to BSC. This means all emissions are offset and be classed as carbon neutral.
2. The actual electricity in the grid in NSW only comprises of 21% renewable power for FY2021/22, this is calculated by the Clean Energy Regulator. Although 100% renewable power is purchased the actual electricity supplied to Council is 79% fossil fuel.

While Council may have achieved its renewable energy target, the best solution is to always avoid the use of electricity in the first place or reduce current consumption. Current and future projects within the Action Plan and Operational Plan will continue to seek to minimise Council's carbon profile.

In February and March 2022, two major weather events hit the Byron Shire Council area. Very high rainfalls caused widespread flooding and damage to infrastructure such as bridges, roads, and buildings. Due to these significant events, the electricity usage varied from the previous years and so can be problematic when trying to understand patterns in usage and overall trends.

Key points to note in the electricity usage:

- Pumps associated with the sewage treatment plants had a higher workload due to the increased volumes of water into the plants including stormwater.
- Pumps at the waste recovery facility were required to pump higher volumes of leachate due to the increased rain.
- The occupation profile of Council buildings changed during, and immediately after, the rain events. Some sites were shut or had reduced usage during this time and others had increased usage to aid flood recovery, such as the community buildings.

Another key aspect that affected Council's electricity usage was the continued impact of the Covid-19 pandemic. NSW State mandated restrictions varied throughout the year, but they affected travel, workplace attendance and Council operations. A primary affect was less electricity usage in:

- Caravan Parks
- Sports facilities
- Pools
- Administration buildings
- Depots

Table 7 shows Council’s general electricity emissions since baseline year FY2015/16. Figure 5 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 6 shows Council’s electricity usage by asset type (kWh and percentage of total). This excludes streetlighting.

Table 7 - General Electricity Sector Scope 2 Emissions since baseline year 2015/16

Financial Year	Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)	Electricity (MWh)	Cost (\$)
2015/16	4,755	4,755	5,661	\$1,147,944
2016/17	4,791	4,791	5,772	\$1,191,475
2017/18	4,674	4,674	5,700	\$1,257,905
2018/19	4,554	2,250	5,623	\$1,291,102
2019/20	4,208	14	5,195	\$1,238,488
2020/21	4,235	0	5,360	\$1,264,789
2021/22	4,074	0	5,157	\$1,248,775

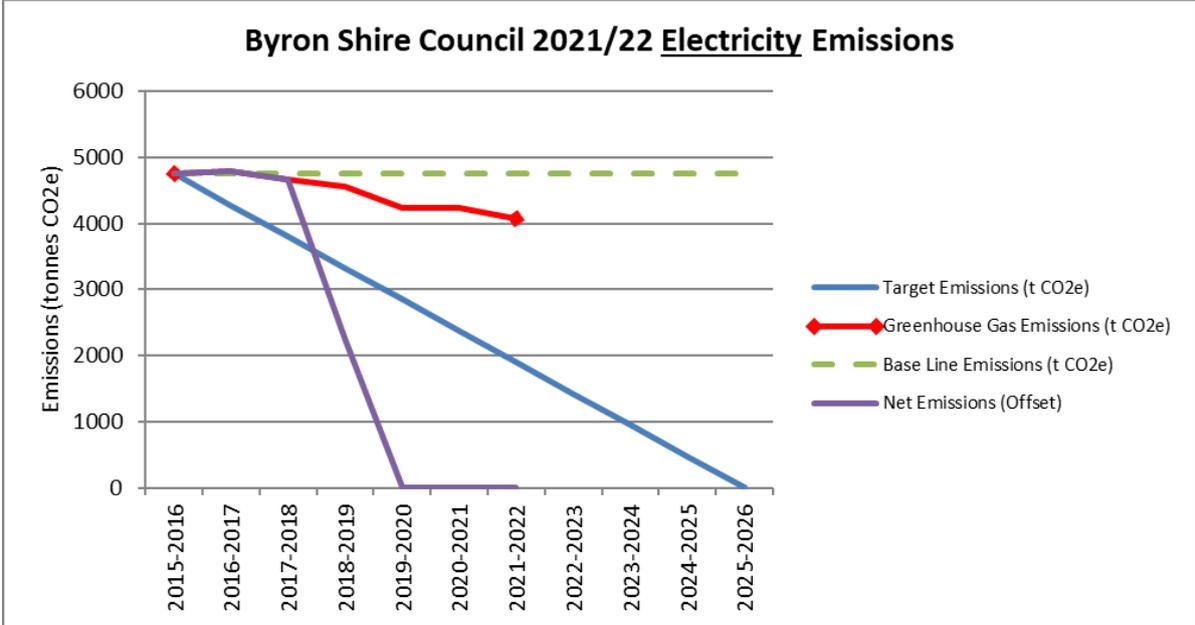


Figure 5 - General Electricity Sector Scope 2 Emissions (Offset and Actual)

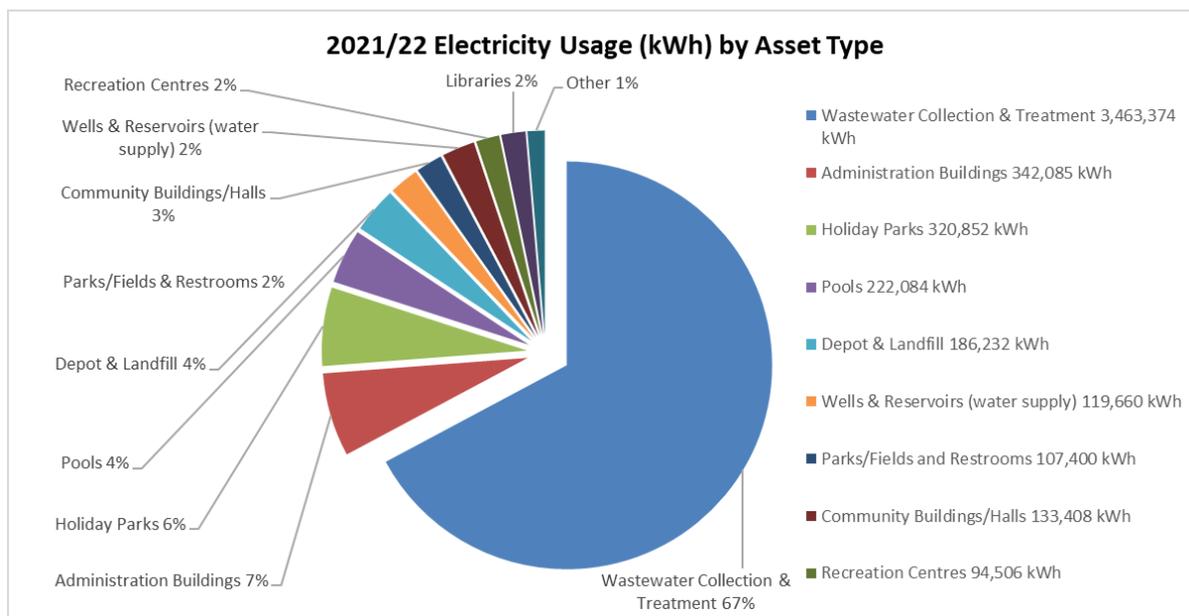


Figure 6 - FY2021/22 Electricity Usage (kWh) by Asset type

Of Council’s assets, wastewater collection and treatment use 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). The work undertaken on this program has helped to continue the decrease in electricity usage.

Although the Sewerage Treatment Plants (STP’s) were challenged during the flood events, the overall energy usage was lower by 94MW (2.66%) compared to the previous year.

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 7% from FY2020/21 – FY2021/22, likely due to many staff working from home part-time for the full financial year due to COVID-19 and the weather events. 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 of the building (Action Plan Action A4; OP Activity 3.2.1.11).

Emission source: Streetlight Electricity

Streetlight energy use reduced 6.1%, from 730MWh to 685MWh, this is mainly due to the replacement program of the lamps. When an older lamp fails and is replaced by an LED lamp, an energy saving is made. For example, a 42W compact fluoro lamp (CFL) is typically being replaced by a 17W LED lamp, which consumes less than half the energy.

Although the total energy consumed for streetlighting reduced for FY2021/22, the cost increased by 5.5%. This increase was due to a new electricity contract that took effect in May 2022. Market prices for electricity have increased dramatically in Australia during 2022 and this has been reflected in the pricing. It should be noted that if the contract was signed a couple of months later the increase in pricing would have been significantly higher.

Council’s electricity supply contractor Essential Energy has a bulk LED upgrade planned for the Shire in early 2023. This project supports Action A3 in the Action Plan, and will further reduce Council’s electricity emissions.

Net electricity emissions for FY2021/22 are zero due to the retailer contracts with Iberdrola and Origin being 100% carbon neutral. This is shown by the purple line in Figure 7.

Table 8 - Streetlight Electricity Sector Scope 2 Emissions since baseline year FY2015/16

Financial Year	Emissions (tCO2e)	Net Emissions (tCO2e)	Electricity (MWh)	Cost (\$)	Number of streetlights
2015/16	636	636	757	\$314,425	1,890
2016/17	635	635	765	\$336,809	1,897
2017/18	633	633	772	\$315,504	1,922
2018/19	633	314	782	\$355,420	1,941
2019/20	630	0	778	\$307,320	1,973
2020/21	577	0	730	\$308,146	2,009
2021/22	541	0	685	\$326,188	2,013

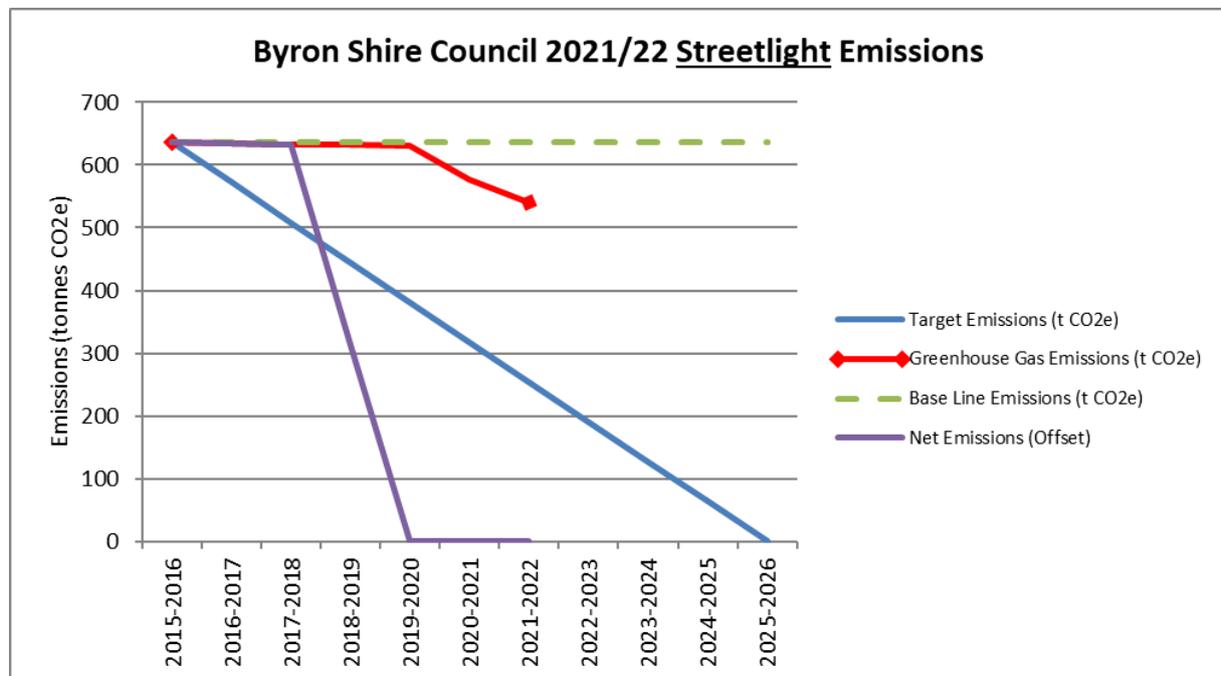


Figure 7- Streetlight Electricity Sector Scope 2 Emissions (Offset and Actual)

Solar Generation

Council has invested in solar photovoltaic (PV) generation since 2013 and has over 600kW of installed PV, generating approximately 738 MWh per year. This generation equates to 12.5% of the FY2021/22 Council’s annual usage and a total of 92MWh is also fed back into the grid each year, resulting in a total of 583 tCo2-e avoided. Council’s solar photovoltaic (PV) generation is greater than its yearly streetlighting electricity consumption.

Table 9 - PV installation and generation for FY2021/22

For Period from 1/7/2021-30/6/2022	Size (kW)	Install Year	(MWh)	(tCO2e- /year avoided)	Total Solar Generation kWh	Feed back to grid (kWh)	Solar Used on Site (kWh)
Byron STP	152	2019	204	161	204300	10530	193770
Byron STP (Old System)	52	2015	36	29	36200	3000	36200
Brunswick Valley STP	99	2019	129	102	129100	5200	123900
Mullumbimby Admin Building Carpark	99	2019	120	95	120174	7000	113174
Byron Bay Library	60	2017	86	68	86200	22520	63680
Bangalow STP	51	2019	64	51	64200	2090	62110
Cavanbah Centre	25	2015	34	26	33500	5180	28320
Resource Recovery Centre - 2	15	2019	18	14	17600	7650	9950
Sandhills Childcare Centre	13	2017	15	12	15200	6710	8490
Mullumbimby Drill Hall	12	2016	10	8	10300	8620	1680
Mullumbimby Neighbourhood Centre	10	2017	10	8	9800	6270	3530
Durrumbul Hall	8	2012	7	5	6500	5240	1260
Mullumbimby Civic Hall	5	2013	5	4	4840	2420	2420
TOTAL	600		738	583	737914	92430	648484

Sector: Waste Fugitive Emissions - Landfill

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 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 FY2020/21 – FY2021/22 was 8.2%.

The methane gas flare currently generates Australian Carbon Credit Units (ACCU's) under the Federal Emissions Reduction Fund, and Council is contractually obliged to sell these offsets until its requirements are met. This means that Council cannot count the total 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 FY2021/22 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).

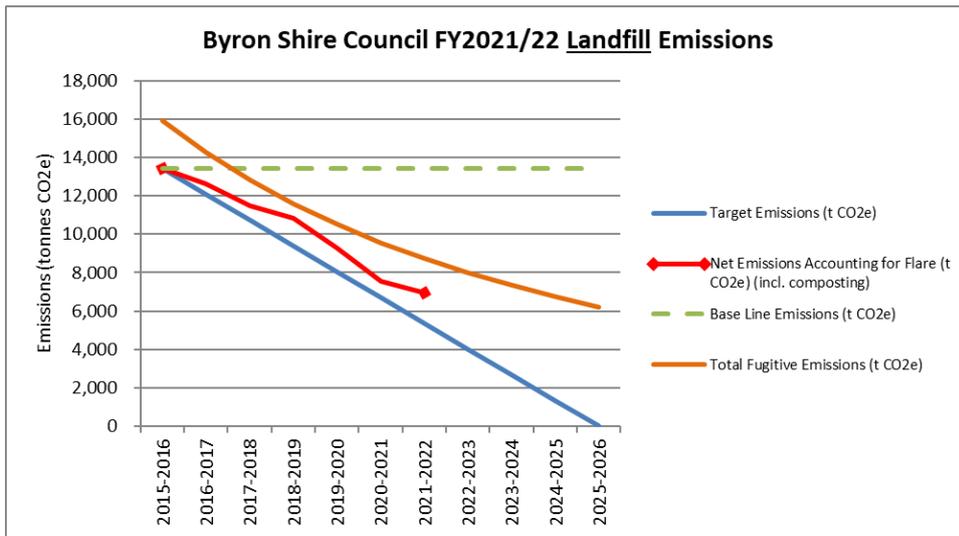
Council commenced composting at the Myocum Resource Recovery Centre in 2019. The composting operations added an extra 164 tCO₂e to the waste sector in FY2021/22 due to small pockets of anaerobic decomposition in the compost pile. Both the composting and fugitive emissions of the Myocum landfill are considered scope 1 emissions.

Table 10 - Waste Sector Scope 1 Emissions since baseline year FY2015/16

Financial Year	Total Emissions (tCO ₂ e)	Total Flare (tCO ₂ e)	ACCU's Sold (tCO ₂ e)	Composting (tCO ₂ e)	Net Emissions* (tCO ₂ e)
2015/16	15,931	5,241	2,729	0	13,419
2016/17	14,283	3,539	1,903	0	12,647
2017/18	12,852	3,097	1,723	0	11,478
2018/19	11,607	2,372	1,440	166	10,841
2019/20	10,519	2,382	1,025	140	9,302
2020/21	9,564	2,138	0	142	7,568
2021/22	8,724	1,938	0	164	6,950

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

Figure 8 - Waste Sector Scope 1 Emissions



Sector: Wastewater Fugitive Emissions

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 two major rain events in 2022 the annual flow was lower than last year, although significantly higher than the previous 5 years. The FY2021/22 fugitive wastewater emissions declined by 108 tonnes, or almost 11%, compared to the previous year.

Total annual flow decreased by 71,668ML, or 1.75%. Flows to the Bangalow, Byron 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.

It should be noted that, while total emissions went down in FY2021/22, they will continue to fluctuate across years as the Shire experiences varying conditions (drought and rain) and different operational aspects (like reduced or increased biosolids inventories land application).

A major change compared to last year’s emissions was at the Bangalow STP. The NGER sludge management basis was changed to "managed aerobic" for the Bangalow STP, this was to reflect the operators' clarification of the sludge dewatering process directly from the bioreactor. This accounts for the ~90% emissions reductions drop for Bangalow STP.

Effluent quality from STPs, including chemical oxygen demand (COD) reduction and denitrification, has remained generally of high quality, with low concentrations of COD and nitrogen (as nitrate) discharges. Other GHG emissions for STPs generally reflect the kL/year flows and the calculated tonnes of biosolids land applied, effluent quality, and recycled water use.

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.

Table 11 - Wastewater Sector Scope 1 Emissions since baseline year FY2015/16

Financial Year	Emissions (tCO2e)	Flow (ML)
2015/16	1,264	3,255
2016/17	1,387	3,542
2017/18	1,162	3,349
2018/19	1,094	3,327
2019/20	1,046	3,507
2020/21	994	4,112
2021/22	886	4,040

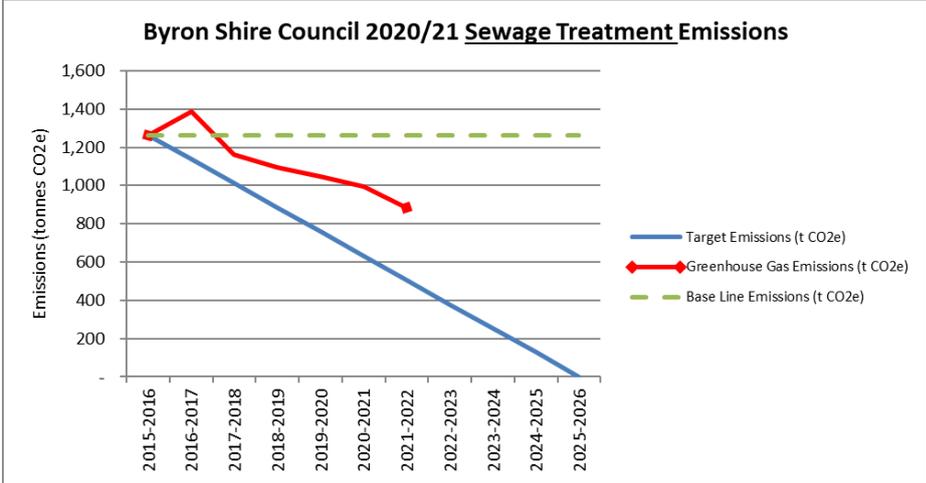


Figure 9 - Wastewater Sector Scope 1 Emissions

Sector: Community Infrastructure - Construction

FY2021/22 is the first year that the community infrastructure figures have been added to the emissions boundary, as scope 3 emissions. This sector includes construction materials, such as asphalt, concrete and other building materials, as well as equipment hire. Due to flood damage in February and March 2022, essential repairs and construction of roads, bridges and infrastructure was needed. These works will continue through FY2022/23 and are well beyond budgeted amounts. In June 2022 the FY2020/21 scope 3 emissions were calculated but not published with the main emissions report, so Council has two years’ worth of results to compare.

Table 12 - Community Infrastructure, Construction

Community Investment - Construction	Volume (tonnes)	Cost (\$, inc. GST)	Emissions (tCO2e)	Change in emissions over previous year
Asphalt				
2020/21	Approx. 12,000	\$3,804,391	883	
2021/22	Approx. 15,000	\$5,563,479	1150	30.24%
Concrete				
2020/21		\$338,642	363	
2021/22		\$388,555	416	14.60%
Other road-building materials				
2020/21		\$1,814,224	391	
2021/22		\$2,791,806	602	53.96%
Equipment hire				
2020/21		\$1,472,997	355	
2021/22		\$2,080,967	502	41.41%

Asphalt

This is a high emissions material, and the use has increased in FY2021/22 due to the damage of community infrastructure in the weather events. The asphalt figure consists of the asphalt procured from RPQ and a bonding emulsion that is sourced from Boral. Initially the emissions were calculated using the monetary value through the Climate Active methodology, after reviewing the results it has been decided to investigate the emissions using production figures. Future carbon reduction strategies will need to focus on using a lower embodied energy products which are being introduced into the market.

Concrete, other road-building materials, and Equipment Hire

All construction materials and works equipment that is used to repair and maintain community infrastructure has seen an increase compared to last year. This is due to the need to repair and replace infrastructure because of the March and April weather events.

Sector: Employees

Employee commute

The emissions for the employee commute were determined through an online survey that approximately 25% of the employees completed. The survey was based on 364 full time employees for FY2020/21. Under the Climate Active methodology, the survey results are valid for 2 years and was amended to cater for an increase of employees to 398 for FY2021/22.

Table 13 - Employee commute

Method of transport	km	Emissions (tCO2e) FY2020/21	Emissions (tCO2e) FY2021/22	Change in emissions over previous year
Employees		364	398	
Petrol - large car	277056			
Petrol - medium car	705952			
Petrol - small car	984048			
Diesel - large car	615264			
Diesel - medium car	176384			
Diesel - small car	74880			
Hybrid	32864			
Walk	416			
		669	732	9.42%

Working from home

Working from home contributes only 4 tCO2e to Council’s emissions, as employees use electricity for computers, the internet, lighting and generally require office infrastructure to perform their duties. This is calculated on the number of employees multiplied by a factor.

Sector Council: Corporate Governance and Services

Included in the scope 1 & 3 emissions is a number of emission sources from Council, these account for approx. 6.25% of Councils emissions. Refrigerants used in topping up gases in the air-conditioning systems is a measured value. Most other emissions sources have the tonnes of carbon dioxide equivalent (tCO2 e) calculated by using the financial values to purchase the services together with the Climate Active methodology. Office equipment, food and catering, air travel and business accommodation are calculated by using the overall Council emission results and multiplying it by a Climate Active uplift value.

- Paper
- IT equipment
- IT software
- Postage and couriers
- Office equipment *
- Food and catering *
- Telecommunications
- Entertainment
- Advertising
- Cleaning
- Clothing
- Stationery
- Legal fees
- Air Travel *
- Business accommodation*
- Popcar – Car share service
- Machine & vehicle repairs
- Refrigerants
- Education

*= Climate Active uplift factor applied

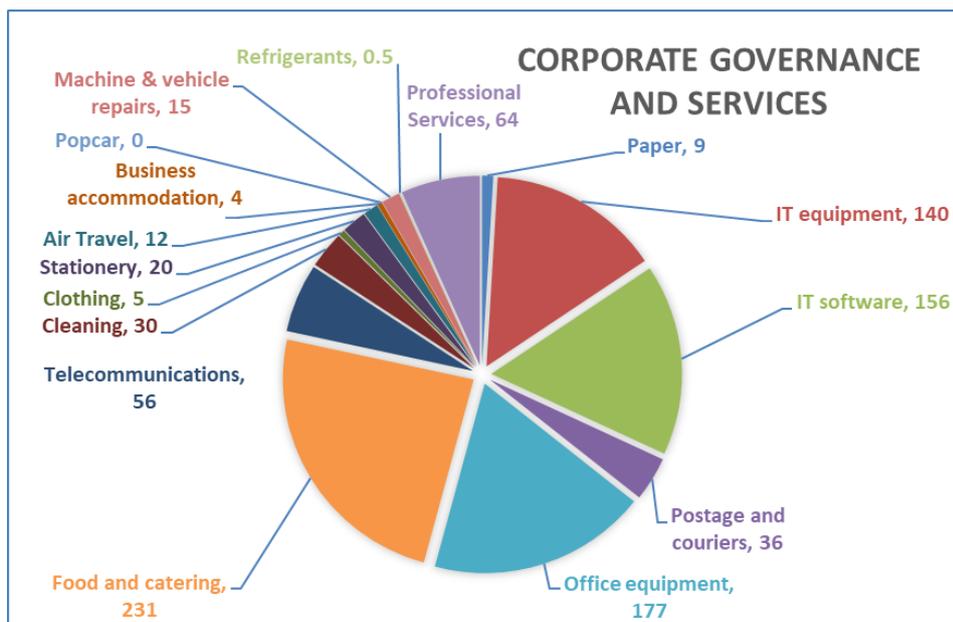


Figure 10 - Breakdown of corporate governance and services

Waste Collection Service

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 FY2021/22 financial year 644 VCU's were purchased for Council.

Water Supplied to Council Assets

Council purchases water from Rous Country Council and supplies its own water from the Lavery Gap Weir. All associated emissions from the water supplied from the Lavery Gap Weir are accounted for in previous scope 1 and 2 emissions outlined earlier in this report. The water supplied by Rous Country Council has emissions related to its collection, transfer and treatment, mainly due to the electricity associated with it.

For the FY2021/22, water usage increased by 9.7ML to 45.80 megalitres (ML), up 27% on the previous year. Emissions were also up this year with 95 tCO₂-e created to supply Council assets, this is up 25% on the emissions on the previous year. Table 15 outlines the emissions for water use on Council assets in each suburb.

Table 14 - Water supplied to Council Assets FY2021/22

Row Labels	ML	Emissions (tCO ₂ e)
BANGALOW	1.74	3.61
BILLINUDGEL	0.00	0.00
BRUNSWICK HEADS	2.12	4.40
BYRON BAY	28.78	59.67
MULLUMBIMBY	4.38	9.08
NEW BRIGHTON	0.65	1.36
OCEAN SHORES	1.12	2.31
SOUTH GOLDEN BEACH	0.29	0.60
SUFFOLK PARK	6.72	13.94
Grand Total	45.80	94.96

Part 3 – Recommendations

Preparing the report for FY2021/22 has highlighted some areas that could be addressed to improve the collection of data and the decision making around the Council's emissions. Areas that need to be investigated include:

- Additional clauses in contracts requiring suppliers to report on emissions related to goods and services supplied to Council, this will improve speed in collecting, and accuracy, of the data.
- Further investigation needs to take place to ensure the full boundary is identified, areas such as chemical usage and transport could increase Council's emissions profile. FY2021/22 is the first year that the full emission profile has been calculated and so further emission sources could be identified.
- Financial reporting should be more readily accessible to the Sustainability team and even custom reports prepared for the emission data gathering to improve speed and accuracy.
- The employee commute figures were based on a survey in early 2022 that had a response of approximately 25%. As the employee commute contributes 5.2% of the Council's emissions it is recommended that a new survey is conducted mid-year 2023 and the results used for the emissions boundary results FY2022/23.
- A shadow carbon price should be investigated, when making decisions on materials, services, or infrastructure the carbon emission implications should be reviewed as part of the decision-making process.

Glossary of terms and abbreviations

Term	Definition
Activity data	Source data from an emissions generating activity, such as fuel usage and electricity consumption, used to determine greenhouse gas emissions through multiplication by an Emissions Factor.
Australian Government Department of Climate Change, Energy, the Environment and Water	The Department assesses claims of carbon neutrality and provides certified organisations, products, services or events with access to the Climate Active certification trademark. The certification trademark can be used for promoting products or services to consumers, showcasing an organisation's action to address climate change or for other marketing purposes.
Australian Carbon Credit Unit (ACCU)	An emissions unit issued under the Carbon Credits (Carbon Farming Initiative) Act 2011.
Annex 1 countries	Defined in the International Climate Change Convention as those countries taking on emissions reduction obligations: Australia; Austria; Belgium; Belarus; Bulgaria; Canada; Croatia; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Iceland; Ireland; Italy; Japan; Latvia; Liechtenstein; Lithuania; Luxembourg; Monaco; Netherlands; New Zealand; Norway; Poland; Portugal; Romania; Russian Federation; Slovakia; Slovenia; Spain; Sweden; Switzerland; Ukraine; United Kingdom; USA.
Baseline	A hypothetical scenario for what GHG emissions, removals or storage would have been in the absence of greenhouse gas (GHG) project activities.
Boundaries	GHG accounting and reporting boundaries can have several dimensions, i.e. organisational, operational, geographic, business unit, and target boundaries. The inventory boundary determines which emissions are accounted for and reported.
Carbon account	A measure of the carbon dioxide equivalent emissions attributable to an activity. A carbon account can relate to the emissions of an individual, household, organisation, product, service, event, building or precinct. This can also be referred to as a carbon footprint or emissions inventory.
Carbon dioxide equivalent (CO ₂ -e)	A standard measure that takes account of the global warming potential of different greenhouse gases and expresses the effect in a common unit.
Carbon neutral	A situation where the net emissions associated with an activity are equal to zero because emissions have been reduced and offset units cancelled to fully account for all emissions.
Carbon Neutral Program	Businesses that wish to have their carbon neutral status certified and recognised need to participate in the Carbon Neutral Program, administered by the Department of Industry, Science, Energy and Resources.
Carbon sink	A natural or man-made reservoir, such as a forest, that stores carbon.
Certified Emissions Reductions (CERs)	A unit of emission reduction generated by a CDM project. CERs are tradable commodities that can be used by Annex 1 countries to meet their commitments under the Kyoto Protocol.
Clean Development Mechanism (CDM)	A mechanism established by Article 12 of the Kyoto Protocol for project-based emission reduction activities in developing countries.
Climate Active Carbon Neutral Standard	A standard for making carbon neutral claims which sets rules for measuring, reducing, validating and reporting emissions. The standard is available for organisations, products and services, buildings, precincts and events. It is administered by the Department of Industry, Science, Energy and Resources.
Direct GHG emissions	Emissions from sources that are owned or controlled by the reporting company.
ECF	Energy Content Factor
Emission factor (EF)	Emissions Factors refer to numeric values that specify the kilograms of CO ₂ -e emissions per unit of activity.

Term	Definition
Eligible offset unit	An offset unit that has been deemed to meet the Climate Active Carbon Neutral Standard's offsets integrity principles.
Embedded/embodied/cradle-to-gate emissions	Cradle-to-gate emissions include all emissions that occur in the life cycle of purchased products, up to the point of receipt by the reporting company (excluding emissions from sources that are owned or controlled by the reporting company).
Emissions	The release of GHG into the atmosphere.
Emissions abatement or carbon abatement	Either the removal of one or more greenhouse gases from the atmosphere or the avoidance of emissions of one or more greenhouse gases.
Emission Reduction Unit (ERU)	A unit of emission reduction generated by a Joint Implementation (JI) project. ERUs are tradable commodities which can be used by Annex 1 countries to help them meet their commitment under the Kyoto Protocol.
Emissions - Downstream	Emissions that are emitted after a product or service leaves the company's control/ownership.
Emissions - Upstream	Emissions from the purchased materials, products and services that flow into the company
Greenhouse gases (GHG)	The atmospheric gases responsible for causing global warming and climate change. The Kyoto Protocol lists six greenhouse gases – carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur -hexafluoride (SF ₆) – with the addition of nitrogen trifluoride (NF ₃) from the beginning of the protocol's second commitment period.
GreenPower®	A voluntary government-accredited program that enables an electricity provider to purchase renewable energy on a buyer's behalf. GreenPower® guarantees that the renewable electricity from energy suppliers meets stringent environmental standards and is additional to Australia's Renewable Energy Target.
Gold Standard	A standard and logo certification mark program for non-governmental emission reductions projects in the Clean Development Mechanism (CDM), the Voluntary Carbon Market and other climate and development interventions.
Indirect GHG emissions	Emissions that are a consequence of the operations of the reporting company, but occur at sources owned or controlled by another company.
Inventory	A quantified list of an organisation's GHG emissions and sources.
Kyoto Protocol	The Kyoto Protocol operationalises the United Nations Framework Convention on Climate Change by committing industrialised countries to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual targets.
National Carbon Offset Standard	The previous name of the Climate Active Carbon Neutral Certification Standard.
National Greenhouse and Energy Reporting System (NGER)	Introduced in 2007 to require large emitting organisations to report their scope 1 and scope 2 greenhouse gas emissions and energy consumption and production. More info here .
Offsetting	The activity of cancelling offset units.
Offset unit	Represents reductions of GHG or removals of GHG from the atmosphere by sinks, relative to a business-as-usual baseline. Offset units are tradeable and can be used to negate (or offset) all or part of another entity's emissions.
Operation	A generic term used to denote any kind of business, irrespective of its organisational, governance, or legal structures. An operation can be a facility, subsidiary, affiliated company or other form of joint venture.
Outsourcing	The contracting-out of activities to other businesses.

Term	Definition
Public Disclosure Summary	A report or document prepared by the submitting organisation and submitted to the Department to be certified as carbon neutral under the Climate Active standard and eligible to use the certification trademark.
REDD+	Reducing emissions from deforestation and forest degradation. These carbon offset projects encourage developing countries to reduce emissions and enhance removals of greenhouse gases through a variety of forest management options.
Relevance	Ensuring that the carbon account of a subject appropriately reflects the emissions of that subject and meets the expectations of users and stakeholders.
Relevance test	Qualitative test for determining whether certain emissions sources are or are not considered relevant.
Removal Units (RMUs)	An emission unit issued by a Kyoto Protocol country on the basis of land use, land-use change and forestry activities under article 3.3 or 3.4 of the Kyoto Protocol.
Reporting	Presenting data to internal management and external users such as regulators, shareholders, the general public or specific stakeholder groups.
Scope	The categorising of emissions sources into direct and indirect sources. See individual definitions for scope 1, scope 2, and scope 3 emissions.
Scope 1 emissions	The release of GHG into the atmosphere is a direct result of activities occurring within a responsible entity's control (or geographic boundary).
Scope 2 emissions	The release of GHG into the atmosphere from the consumption of electricity, heating, cooling or steam that is generated outside of a responsible entity's control (or geographic boundary).
Scope 3 emissions	Greenhouse gases are emitted as a consequence of a responsible entity's activities but emitted outside the responsible entity's control (or geographic boundary).
Sequestration	The removal of atmospheric carbon dioxide, either through biological processes (e.g. photosynthesis in plants and trees) or geological processes (e.g. storage of carbon dioxide in underground reservoirs).
True-up	The calculation to determine if additional eligible offset units must be purchased after the measurement of a post-event carbon account.
Uplift factor	A factor is used to increase the estimated emissions from an activity, usually by a risk-adjusted proportion or percentage, and mitigate the risk of emissions being underestimated in the carbon account.
Value chain emissions	An organisation's scope 1, 2, and 3 emissions as defined by the GHG Protocol accounting standard.
Verification	An independent assessment of the reliability (considering completeness and accuracy) of a GHG inventory.
Verified Carbon Standard (VCS)	Verra or VCS, formerly the Voluntary Carbon Standard, is a standard for certifying carbon emissions reductions. VCS is administered by Verra, a not-for-profit.
Verified Carbon Units (VCUs)	An emission unit issued by the Verified Carbon Standard (VCS). Each VCU represents a reduction or removal of 1 t CO ₂ -e achieved by a project.
Vintage	Refers to the date of issuance of an offset unit.
Voluntary Emissions Reductions (VERs)	An emission unit issued by the Gold Standard. VERs are a reduction in GHG from a project that is independently audited (i.e., verified) against a third-party certification standard. Each verified emission reduction represents 1 t CO ₂ -e.
Zero emissions	Zero emissions, or absolute zero, refers to zero greenhouse gas emissions. In contrast with net zero emissions, absolute zero is achieved without the use of offsetting to balance emissions.

