2022/23 Annual emissions inventory of Council's corporate emissions profile and progress update

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Part 1: Overview

Purpose

As part of Council's 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 inventory of Council's greenhouse gas (GHG) emissions from its operations in FY2022/23, including Scopes 1, 2 and 3.

FY23 is the second year that that Council has produced an annual GHG emissions report inclusive of scopes 1, 2 and 3, i.e., Council's full Climate Active-compliant emissions boundary. Previous emissions reports were done in-house and identified six scope 1 and 2 emission sources. In FY22 with the assistance of consultant 100% Renewables Council added another 26 scope 3 emission sources (these additional sources were also retrospectively added to FY21 as a benchmark for variances).

An alternative consultant, Pangolin Associates, was used to compile the FY23 boundary. Pangolin's boundary identification and calculation methods are different to those of Council and 100% Renewables. Pangolin identified 17 emissions categories and 51 relevant items/services within those categories, 46 of which are scope 3 or have a scope 3 component (not all items/services had emissions associated with them and some were a further disaggregation of previously identified sources). The change in consultant and resulting change in source identification and calculation has partially contributed to a significant increase in emissions in FY23.

Key findings are:

1) Council is not on track for meeting its ambitious 2025 Net Zero Emissions Target.
2) Overall, Council emissions increased by 12,611.8 tCO2e or 88.9%, compared to the previous year FY22.
3) The overall increase is largely due to an increase in scope 3 Construction and Repair Services of 10,592 tCO2e, or 1,716.8%. A change in calculation methods, data accuracy improvements plus significantly increased post-flood construction and repair works all explain this significant increase.
4) As of 1 January 2022, Council achieved its goal of sourcing 100% of its operational energy from renewable energy sources (five years ahead of the 2027 target). Small sites (40% of load) were certified GreenPower, and large sites (60% of load) were supplied by the Collector Windfarm in Cullerin, NSW.
5) 18% decrease in general electricity sector actual emissions, due to a 4% reduction in kWh consumption plus the lowering of the NSW state wide emissions factor for grid purchased electricity.
6) 23% decrease in streetlight electricity actual emissions due to a bulk LED light upgrade plus the revised NSW emissions factor for grid purchased electricity.
7) 24% increase in fuel emissions, due to 5% increase in usage plus application of a different emissions calculation methodology.
8) 7% natural decline in landfill fugitive emissions.
9) 22% decrease in wastewater fugitive emissions, due to a 17% decrease in flow.
10) Scope 3 emissions calculations were undertaken by a different consultant than in FY22. The resulting change in data collection, categorisation and calculation methods means that full year-on-year comparisons are not meaningful.

Summary

The total net emissions for Council operations (including scopes 1, 2 & 3) in FY23 was 26,802 tCO2-e. This was an increase of 12,611 tCO2-e, or 88.9% compared to the previous year (14,190 tCO2-e). The increase was predominantly due to an increase in scope 3 Construction and Repair Services

emissions. Council's electricity was 100% carbon neutral in FY23, so fluctuations in actual emissions in the general electricity and streetlighting sectors did not have an impact on the increase.

Scope 3 emissions were calculated for the first time in FY21. These were not included in the FY21 annual emissions report due to timing but were used in the FY22 report as a benchmark for variances from the previous year. Consultant 100% Renewables undertook the calculations for FY21 and FY22.

An alternative consultant, Pangolin Associates, was engaged to compile the FY23 boundary. Pangolin's calculation approach is different to that of 100% Renewables', and this has contributed in part to the significant increase in emissions in FY23. Pangolin applied different calculation methods to transport and stationary fuel, and there were changes to the collection, categorisation and calculation of scope 3 data and emissions. Scope 3 categories can be calculated by multiple different methods, with data varying in granularity and accessibility. Ongoing improvements to Council's scope 3 data collection processes across the organisation will continue to improve the respective data quality and is a high priority for FY24. Once consistent and accurate scope 3 data collection methods are in place, and consistent categorisation and calculation methods are settled, comparison across years will become meaningful.

Table 1 shows the total actual and net emissions within Council's operational boundary. FY16 to FY20 included six identified scope 1 and 2 emission sources. FY21 & FY22 included scopes 1,2 and 3 (the complete boundary) calculated using Climate Active methodology by consultant 100% Renewables. FY23 includes the complete boundary as calculated by consultant Pangolin Associates.

Table 1 – Total actual and net emissions since baseline year FY16

Financial Year	Actual Emissions (tCO2e)	Net Emissions (Offset) (tCO2e)
2016	21,389	21,389
2017	20,701	20,701
2018	19,122	19,122
2019	18,325	15,700
2020	16,442	11,618
2021* (all scopes)	19,810	14,998
2022* (all scopes)	18,176	14,190
2023* (all scopes)	30,086	26,802

*All identified scopes (1, 2 & 3) included from FY21 onwards

Figure 1 shows how Council is tracking towards the 2025 net zero target.

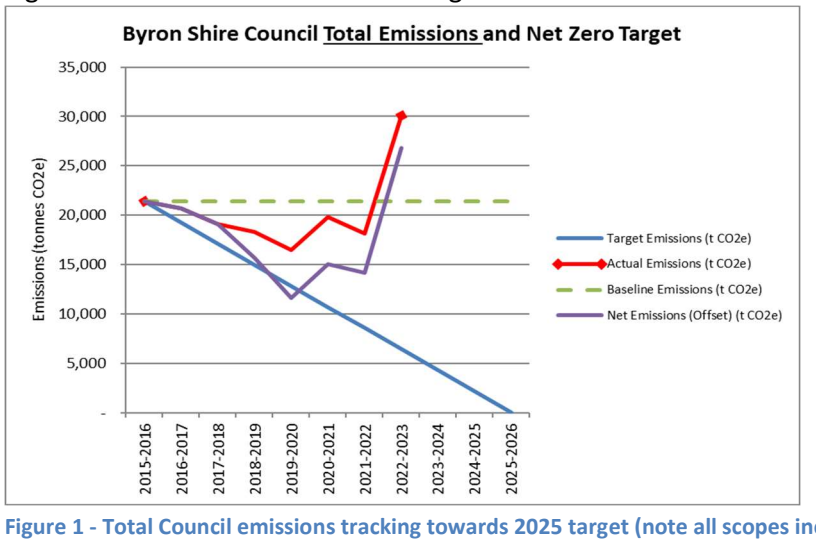

Figure 1 - Total Council emissions tracking towards 2025 target (note all scopes included from FY21)

Background

Emissions calculation methodology

Council's emissions calculations have been undertaken by consultant Pangolin Associates in accordance with the industry best practice principles of:

- National Greenhouse and Energy Reporting (NGER) methodology.
- ISO 14064-1 and -3 Greenhouse Gases.
- Climate Active Carbon Neutral Standard (formerly NCOS (National Carbon Offset Standard)).
- Greenhouse Gas Protocol – a Corporate Accounting and Reporting Standard developed by the World Business Council for Sustainable Development (GHG Protocol).

This inventory measures greenhouse gases in carbon dioxide equivalence (CO2-e) and includes all seven greenhouse gases covered by the United Nations 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).

Council staff supplied the raw data and Pangolin applied the above methodologies to produce the final emissions boundary result for FY23.

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 (e.g., fuel use, refrigerants, onsite electricity generation etc.).
- **Scope 2** emissions include the energy produced outside the Council's control boundary but used within the organisation (e.g., all grid electricity used in buildings, pumps etc.).
- **Scope 3** emissions are all indirect emissions (other than scope 2 emissions) that that occur because of the activities of the organisation, but from sources outside the Council's control boundary (e.g., embodied emissions in the manufacture of paper used at Council).

Required emission sources under Climate Active Carbon Neutral Standard

Under Climate Active, organisations must include scope 1 and 2 as well as relevant scope 3 emission sources in their boundary.

Defining Council's emissions boundary in accordance with the Climate Active guidelines is a measure under Action D5 in Council's Net Zero Emissions Action Plan 2025. The relevant emission categories, items/ services and scopes identified by Pangolin Associates and Council are listed alphabetically in Table 2.

Table 2 - Relevant emission categories and scopes

Emission category	Item / service	Scope(s)
Advertising & Marketing Services	Advertising services	3
Business Travel	Flights	3
Business Travel	Hotels	3
Construction & Repair Services	Construction	3
Construction & Repair Services	Repair and maintenance	3
Construction & Repair Services	Vehicle repairs	3
Electricity	Controlled Electricity	2
Electricty	Streetlight Electricity	2
Employees	Working From Home	3
Employees	Employee Commute - Car	3
Employees	Employee Commute - Walk/Run	3
Employees	Employee Commute - Bus	3
Employees	Employee Commute - Cycle	3
Employees	Employee commute	3
Employees	Clothing	3
Food & Beverage	Food and beverage services	3
ICT Equipment	Computer, Mobile Phones & Peripherals	3
ICT Services	Software	3
ICT Services	Computer and technical services	3
ICT Services	Telecommunications	3
Office Supplies & Services	Cleaning	3
Office Supplies & Services	Stationery	3
Office Supplies & Services	Paper	3
Office Supplies & Services	Furniture	3
Office Supplies & Services	Office supplies & services	3
Postage, Courier & Logistics	Postage	3
Postage, Courier & Logistics	Courier	3
Postage, Courier & Logistics	Road freight	3
Products, Materials & Equipment	Asphalt	3
Products, Materials & Equipment	Industrial machinery and equipment	3
Products, Materials & Equipment	Motor vehicle parts	3
Products, Materials & Equipment	Concrete	3
Products, Materials & Equipment	Asphalt (RPQ)	3
Products, Materials & Equipment	Concrete and cement	3
Products, Materials & Equipment	Asphalt (Boral)	3
Professional Services	Engineering services	3
Professional Services	Legal services	3
Professional Services	Insurance	3
Professional Services	Banking	3
Professional Services	Other Professional Services	3
Stationary Fuels	Controlled LPG	1 and 3
Synthetic Greenhouse Gases	Controlled Refrigerants	1
Transport Fuels	Controlled Diesel	1 and 3
Transport Fuels	Controlled E10	1 and 3
Transport Fuels	Controlled Petrol	1 and 3
Waste	Landfill	3
Waste	Waste Fugitive Emissions - Composting & Closed Landfill	1
Waste	Organic waste	3
Waste	Recycling	3
Water & Wastewater	Water	3
Water & Wastewater	Wastewater Fugitive Emissions - Collection & treatment	1

FY23 emissions boundary

Table 3 documents the GHG emissions boundary for FY23 alphabetically by emission category and scope. FY22 emissions are included for comparison purposes. Note that the FY22 raw activity data and emissions calculations were collected and undertaken by a different consultant. Differences in categorisation and methodology mean comparisons of some categories are meaningless.

Table 3 - FY23 emissions boundary by category and scope, including FY22 data for comparison purposes.

Emission category	FY22 Emissions (t CO2-e)	FY23 Emissions (t CO2-e)	Contribution to total (%)	Scope 1 (t CO2-e)	Scope 2 (t CO2-e)	Scope 3 (t CO2-e)	Change on previous year	% Change on previous year
Advertising & Marketing Services	0.0	12.5	0.05%			12.5	12.5	n/a
Business Travel	16.0	0.0	0.00%			0.0	-16.0	-100%
Construction & Repair Services	617.0	11,209.6	41.82%			11,209.6	10,592.6	1717%
Electricity	0.0	0.0	0.00%		~		0.0	n/a
Employees	741.0	1,003.0	3.74%			1,003.0	262.0	35%
Food & Beverage	231.0	0.0	0.00%			0.0	-231.0	-100%
ICT Equipment	140.0	0.0	0.00%			0.0	-140.0	-100%
ICT Services	212.0	383.6	1.43%			383.6	171.6	81%
Office Supplies & Services	236.0	64.5	0.24%			64.5	-171.5	-73%
Postage, Courier & Logistics	36.0	33.6	0.13%			33.6	-2.4	-7%
Products, Materials & Equipment	2,068.0	4,360.9	16.27%			4,360.9	2,292.9	111%
Professional Services	64.0	189.7	0.71%			189.7	125.7	196%
Stationary Fuels	29.5	50.1	0.19%	37.6		12.5	20.6	70%
Synthetic Greenhouse Gases	0.5	10.4	0.04%	10.4			9.9	1973%
Transport Fuels	1,365.3	1,693.6	6.32%	1,358.8		334.9	328.3	24%
Waste	7,453.0	6,960.2	25.97%	6,477.0		483.2	-492.8	-7%
Water & Wastewater	981.0	830.4	3.10%	696.0		134.4	-150.6	-15%
	14,190.3	**26,802.2**	**100.00%**	**8,579.7**	**0.0**	**18,222.5**	**12,611.8**	**89%**

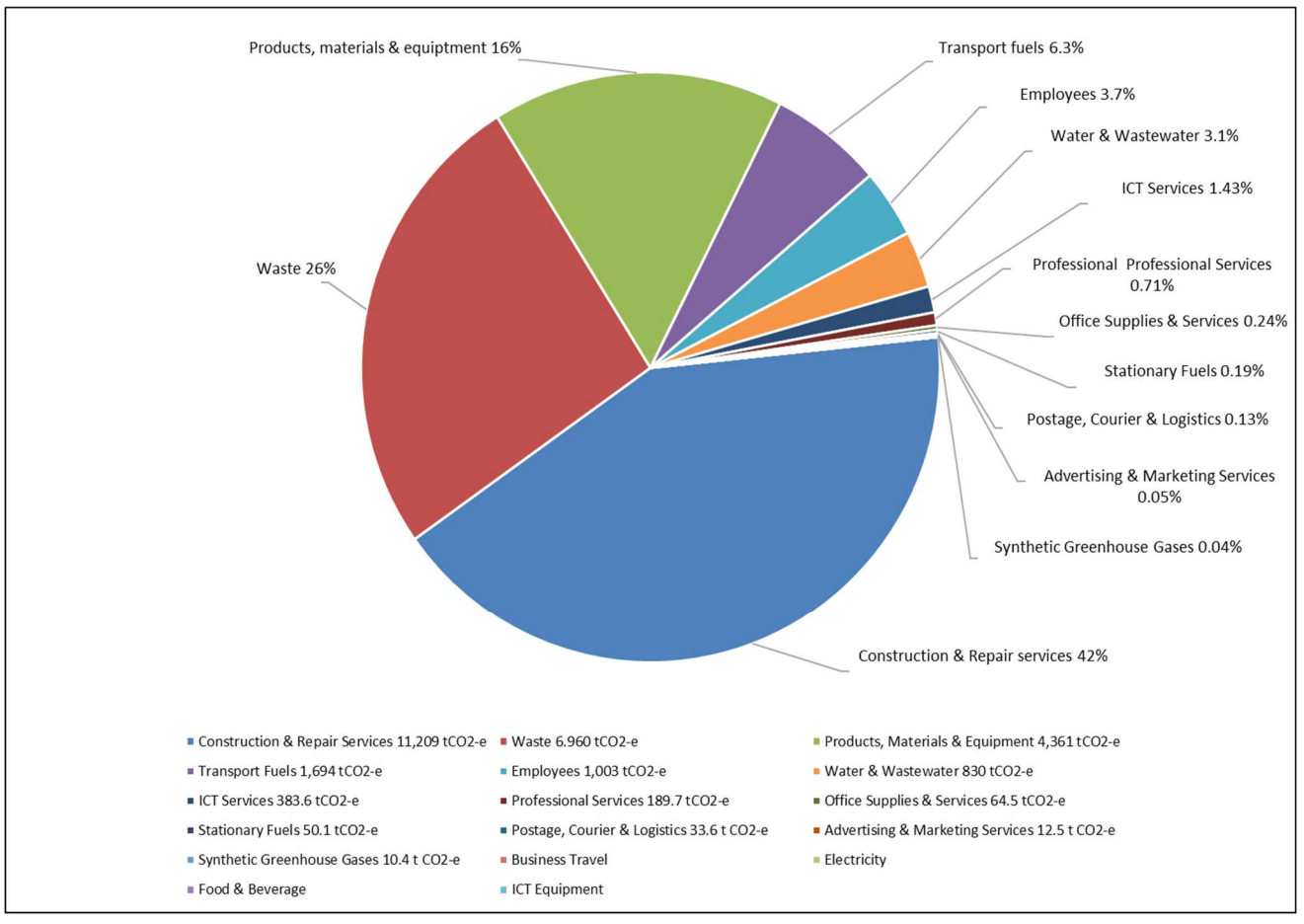

Figure 2 - Contribution of emission categories to the FY23 inventory.

Table 4 breaks the emission categories down by item / service and includes activity data and units of measurement. Items are listed in order of emissions intensity. FY22 data is included for comparison purposes, however, please note that the FY22 activity data was compiled by a different consultant and data sources and units of measurement changed for many items. This has rendered year-on-year comparisons of many items meaningless. Staff aim to ensure consistency of data sources and units of measurement between FY23 and FY24 onwards to ensure future comparisons are relevant.

Table 4 - FY23 emission categories, items/services, activity data and units of measurement

Emission category	Item / service	FY22 Activity Data	FY23 Activity Data	Unit	Total (t CO2-e)
Construction & Repair Services	Construction	2,791,806	20,250,110	AUD	10,761.7
Waste	Waste Fugitive Emissions - Composting & Closed Landfill	6,950,000	6,477,000	kgCO2-e	6,477.0
Products, Materials & Equipment	Asphalt	0	10,591,450	AUD?	2,118.3
Products, Materials & Equipment	Industrial machinery and equipment	2,080,967	9,360,194	AUD	1,828.4
Transport Fuels	Controlled Diesel	15,517	15,735	GJ	1,380.1
Employees	Employee Commute - Car	0	4,494,891	km	973.5
Water & Wastewater	Wastewater Fugitive Emissions - Collection & treatment	886,000	696,000	kgCO2-e	696.0
Waste	Landfill	372	372	t	483.2
Construction & Repair Services	Repair and maintenance	0	2,459,259	AUD	447.9
Products, Materials & Equipment	Motor vehicle parts	0	823,341	AUD	226.2
ICT Services	Software	1,121,602	1,214,000	AUD	198.1
Products, Materials & Equipment	Concrete	0	452	m3	188.0
Transport Fuels	Controlled E10	199	2,268	GJ	177.7
ICT Services	Computer and technical services	0	1,026,755	AUD	142.4
Transport Fuels	Controlled Petrol	3,044	1,602	GJ	135.9
Water & Wastewater	Water	95	71,710	kL	134.4
Professional Services	Engineering services	0	614,794	AUD	85.3
Professional Services	Legal services	0	394,000	AUD	51.0
Professional Services	Insurance	0	1,358,000	AUD	50.4
Stationary Fuels	Controlled LPG	463	620	GJ	50.1
ICT Services	Telecommunications	358,600	277,000	AUD	43.1
Office Supplies & Services	Cleaning	270,000	356,000	AUD	39.0
Employees	Working From Home	4	90	FTE	24.1
Postage, Courier & Logistics	Postage	99,000	87,000	AUD	20.6
Office Supplies & Services	Stationery	75,900	74,000	AUD	19.1
Advertising & Marketing Services	Advertising services	0	104,000	AUD	12.5
Synthetic Greenhouse Gases	Controlled Refrigerants	8	5	kg	10.4
Postage, Courier & Logistics	Road freight	0	8,707	AUD	9.4
Employees	Employee Commute - Bus	0	43,031	km	5.5
Office Supplies & Services	Paper	3,910	2,162	kg	5.0
Postage, Courier & Logistics	Courier	0	15,686	AUD	3.6
Professional Services	Banking	0	130,000	AUD	3.0
Office Supplies & Services	Furniture	0	8,000	AUD	1.4
Office Supplies & Services	Office supplies & services	177	0	AUD	0.0
Products, Materials & Equipment	Asphalt (RPQ)	4,754,028	0	AUD	0.0
Products, Materials & Equipment	Concrete and cement	388,555	0	AUD	0.0
Products, Materials & Equipment	Asphalt (Boral)	303,680	0	kg	0.0
Food & Beverage	Food and beverage services	231	0	AUD	0.0
ICT Equipment	Computer, Mobile Phones & Peripherals	1,027,083	0	AUD	0.0
Employees	Employee Commute - Cycle	0	1,437	km	0.0
Employees	Employee commute	3,134,648	0	AUD	0.0
Employees	Clothing	51,773	0	AUD	0.0
Employees	Employee Commute - Walk/Run	0	1,672	km	0.0
Business Travel	Flights	12	0	passenger/km	0.0
Business Travel	Hotels	4	0	room/night	0.0
Professional Services	Other professional services	618,281	0	AUD	0.0
Waste	Recycling	13,000	68	t	0.0
Waste	Organic waste	55	0	AUD	0.0
Construction & Repair Services	Vehicle repairs	73,171	0	AUD	0.0
Electricity	Controlled Electricity	5,045,575	4,829,952	kWh	0.0
Electricty	Streetlight Electricity	612,295	612,295	kWh	0.0
					26,802

Part 2: Emissions categories

Category: Stationary fuels (bottled gas)

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. Supplier Elgas has recently introduced an opt-in carbon neutral LPG plan that staff will ensure Council selects from FY24 onwards.

The minimal nature of emissions from bottled gas compared to other categories (0.2% of total emissions in FY23) 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.

Bottled gas usage increased by 31% (5,768L) compared to the previous year. There was a 70% (20.6 tCO2e) increase in emissions due to the increased usage plus a different calculation method applied by consultant Pangolin. Gas consumption was lower in FY20, FY21 and FY22 due to the travel bans and childcare centre shutdowns from COVID-19, plus decreased visitor patronage after the flooding events in early 2022. Consumption has returned to the average prior to FY20.

Table 5 - Bottled Gas 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	$14,032
2022	29	18	$21,476
2023	50	24	$31,203

Category: Transport fuels

Emissions relating to the transport fuels category 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 Ampol Star card system for passenger vehicles (41% of total fuel use) and from purchases of bulk fuel delivered to the depot and landfill facilities (59% of total fuel use). Emissions from transport fuel account for 6.3% of Council's FY23 emissions.

This year Council has experienced a 5% (27KL) increase in total fuel usage compared to the previous year. There was a 24% (328 tCO2e) increase in emissions due to the increased usage plus a different calculation method applied by consultant Pangolin. Bulk diesel use did not change significantly (it increased by just 1%, or 4KL). It should be noted that bulk diesel use increased by 25KL (9%) from FY21 to FY22, primarily due to increased capital works for flood recovery efforts. The FY23 figure represents a continuation of this higher-than-historical level trend as flood recovery work continues. Fleet fuel usage (Star card) was higher than the previous year by 23KL (12%), mainly due to the easing of travel restrictions that caused Council workers to work from home during flood events and COVID-19 lockdowns.

There was a 13% ($92,686) increase in the total cost of fuel for the Council in FY23. The higher increase in cost compared to consumption is primarily due to the higher world demand of fuel, post the COVID-19 travel restrictions, and current international market influences, such as the war in Ukraine.

An investigation of the Council's fleet has been recommended, in order to implement significant emissions reductions. A current activity is included in the FY2023/24 Operational Plan, 5.3.2.3, "Develop an Electric Vehicle transition plan for Council's vehicle fleet". This plan will identify key areas to be addressed and find opportunities to reduce emissions and adopt a low emission fleet.

Table 6 - Fleet 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
2022	1,365	496	$721,370
2023	1,694	532	$814,056

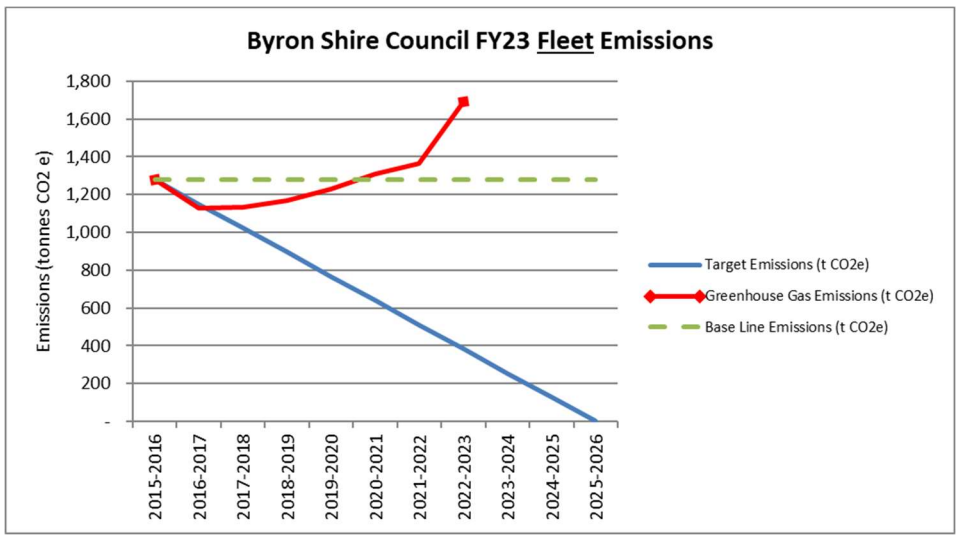

Figure 3 - Fleet Emissions since baseline year 2015/16

Category: Electricity

Note that while there were zero emissions from electricity in FY23 due to Council's electricity (general and streetlighting) being 100% carbon offset, emissions are still calculated for this category in this section of the report so staff can monitor year-on-year trends.

General 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 4% (216 MWh) compared to the previous year, mostly due to efficiency upgrades to wastewater treatment assets as well as the Council Chambers not being used during FY23 due to flood damage. There was a decrease in emissions of 18% (702 tCO2e) is due to the decreased consumption plus the lowering of the NSW emissions factor for grid purchased electricity due to more renewable energy being on the NSW network generally.

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. From 1 January 2022 until 1 January 2024, Council had a contract with electricity retailer Iberdrola to source approximately 60% of its total operational electricity needs (for Council's large sites) from

Collector Wind Farm in Cullerin, NSW. The remainder of Council's electricity needs (for small sites) for that time period were 100% certified GreenPower with retailer Origin.

Despite a decrease in kWh consumption, cost increased by 1% ($6,975). The market price for electricity has increased dramatically in Australia in recent years and this was reflected in the pricing of the contracts with Iberdrola and Origin.

When calculating the emissions for Council's electricity, there are two 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 to the Renewable Energy Certificate Registry (REC Registry) when the electricity is supplied to Council. This means all emissions are offset and can be classed as carbon neutral.
2. The actual electricity in the grid in NSW only comprises of 32% renewable power for FY23, this is calculated by the Clean Energy Regulator. Therefore although 100% renewable power is purchased and therefore our electricity consumption is directly correlated to renewable energy generation, the actual electricity supplied to all users in accessing grid power remains 68% fossil fuel.

While Council may have achieved its renewable energy target, the most efficient, controllable and often best financial approach is to always avoid use of grid 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 while maximising the realisation of co-benefits such as greater long-term cost control and lowering operational costs.

Table 7 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 7 - General Electricity Emissions (actual and offset) 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
2022	3,986	0	5,046	$1,248,775
2023	3,284	0	4,830	$1,255,750

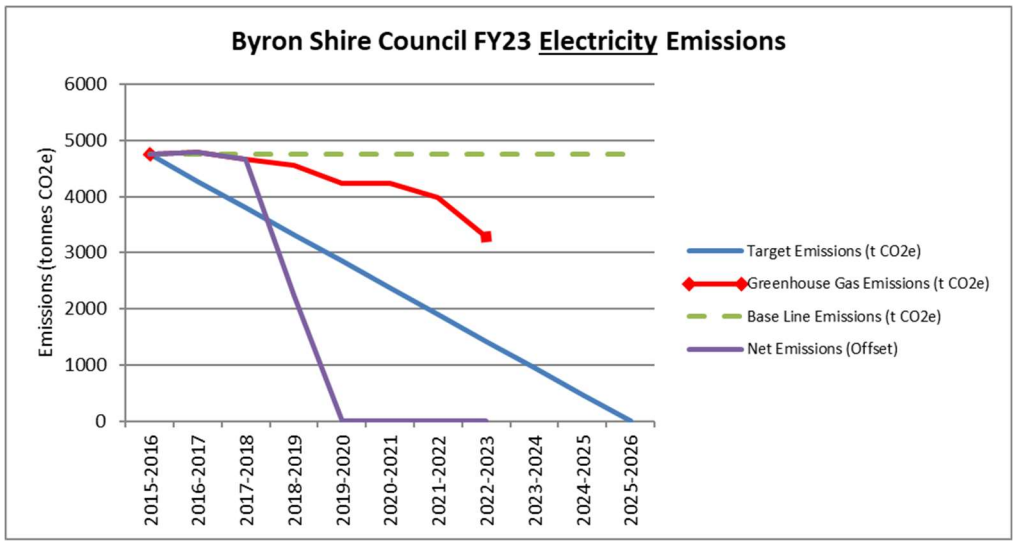

Figure 4 - General Electricity Emissions (actual and offset) since baseline year 2015/16

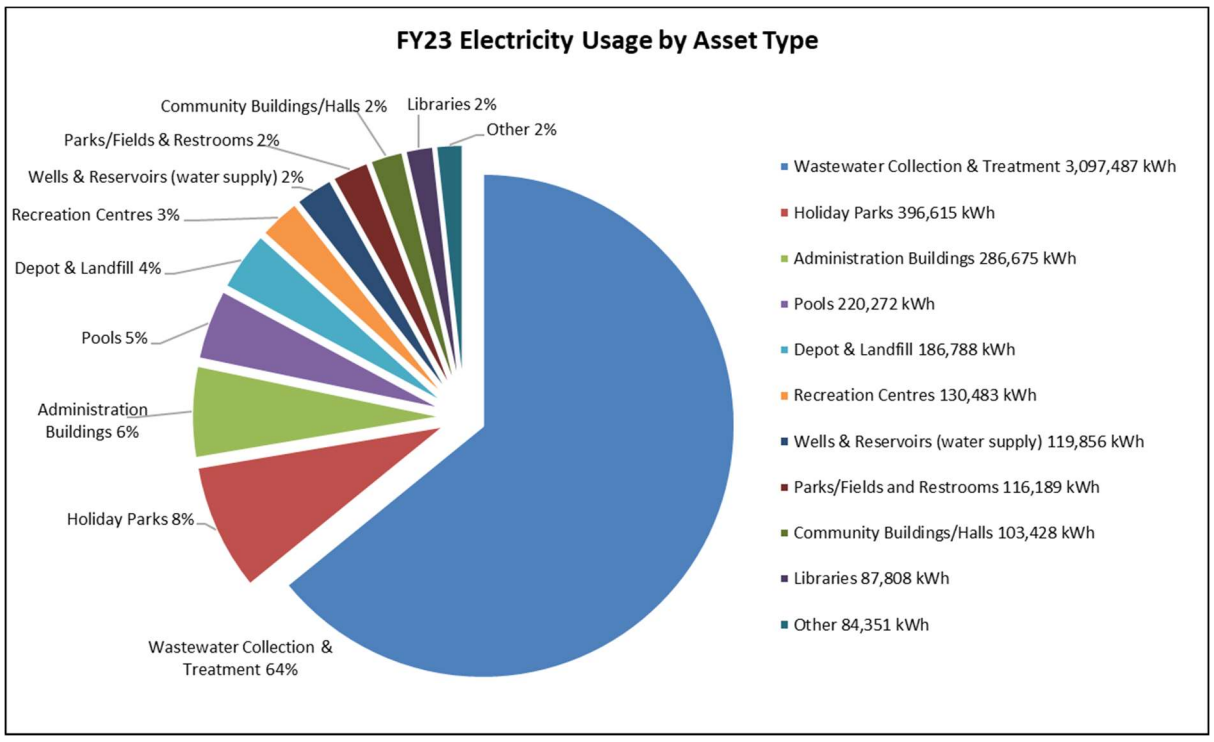

Figure 5 - FY23 Electricity Usage (kWh) by Asset type

Of Council's assets, wastewater collection and treatment use the largest amount of electricity (64%). Consumption decreased by 8% (272 MWh) in FY23 due to efficiency upgrades to wastewater treatment assets, including an upgrade to the Kiah Close sewer pump station (one of the largest in the Shire) in Ocean Shores in May 2022, and the ongoing replacement of blowers with turbo-blowers at the Byron Bay STP.

The Utilities Team will continue to implement further efficiency measures where possible. In addition, 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 5.3.3.1).

The second largest electricity user is Holiday Parks (8%). There was a 24% (76,335 kWh) increase in kWh consumption at Council's two parks in FY23, First Sun Holiday Park in Byron Bay and Suffolk Beachfront Holiday Park. Consumption was lower in FY20, FY21 and FY22 due to the COVID-19 travel bans, plus decreased visitor patronage after the flooding events in early 2022. Consumption has returned to the average prior to FY20.

The third largest electricity user is Council's Administration Building at Mullumbimby (6%). Electricity usage decreased by 16% (55,081 kWh) in FY23 due to the Council Chambers being out of commission for the entire financial year (the Chambers were damaged by flooding in February 2022 and repairs were not complete until September 2023). 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 FY19. Additional 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) and applying for grant funding to install rooftop solar PV.

Streetlight Electricity

Streetlight energy use reduced by 11% (73 MWh), despite 23 new streetlights being added in the Shire. There was a 23% (125 tCO2e) decrease in emissions due to the decline in consumption coupled with the lowering of the NSW emissions factor for grid purchased electricity due to more renewable energy being on the NSW network generally.

The reduction in consumption is attributable to the bulk LED upgrade in the Shire undertaken by Council's electricity supply contractor Essential Energy. A total of 1,858 lights have now been upgraded to LEDs, with 81 lights still outstanding to be upgraded in FY24. This project supports Action A3 in the Action Plan.

Despite a decrease in kWh consumption, cost increased by 20% ($65,273) due to a new streetlight electricity contract with Iberdrola that took effect in May 2022. Market prices for electricity have increased dramatically in Australia during 2022/23 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.

Net emissions for FY23 are zero due to the retailer contract with Iberdrola being 100% carbon neutral. This is shown by the purple line in Figure 6.

Table 8 - Streetlight Electricity Emissions (actual and offset) 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
2022	541	0	685	$326,188	2,013
2023	416	0	612	$391,461	2,036

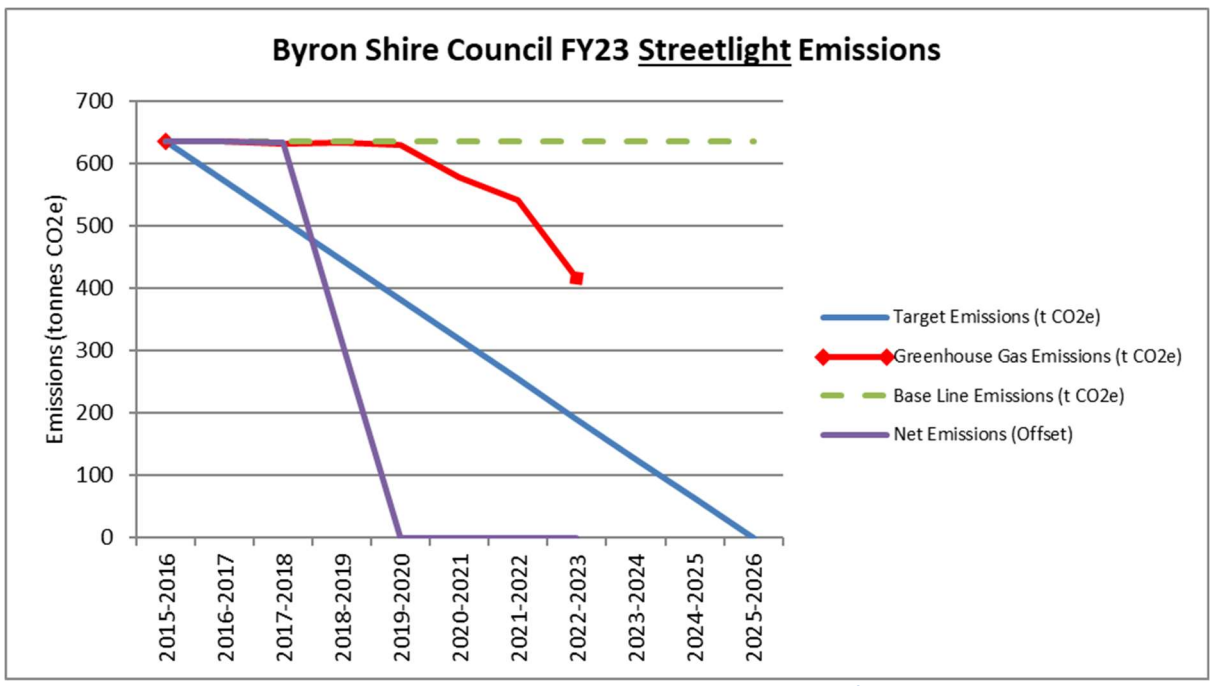

Figure 6 - Streetlight Electricity Emissions (actual and offset) since baseline year 2015/16

Solar Generation

Council has invested in photovoltaic (PV) generation since 2013 and has over 600kW of PV installed, generating approximately 776 MWh per year. This generation equates to approximately 14% of Council's annual electricity usage in FY23. An additional 70 MWh was also fed back into the grid in this period, resulting in a total of 636 tC02e- avoided in FY23. Council's solar PV generation is greater than its yearly streetlighting electricity consumption.

Table 9 - FY23 Solar Generation from Council Assets

For Period from 1/7/2022-30/6/2023	Install Year	Size (kW)	(tC02e- /year) Avoided	Total Solar Generation (kWh)	Feed Back to Grid (kWh)	Solar Used on Site (kWh)
Byron STP	2019	152	175	213,413	9,442	203,971
Byron STP (Old System)	2015	52	29	35,000	3,000	31,000
Brunswick Valley STP	2019	99	109	132,779	5,498	127,281
Mullumbimby Admin Building Carpark	2019	99	108	132,270	1,119	121,080
Byron Bay Library	2017	60	74	89,700	20,700	69,000
Bangalow STP	2019	51	55	67,479	3,591	63,888
Cavanbah Centre	2015	25	32	39,086	1,394	37,692
Resource Recovery Centre - 2	2019	15	15	18,400	7,000	11,400
Sandhills Childcare Centre	2017	13	12	14,581	-	19,586
Mullumbimby Drill Hall	2016	12	8	9,500	6,800	2,700
Mullumbimby Neighbourhood Centre	2017	10	8	9,600	4,000	5,600
Durrumbul Hall	2012	8	4	5,400	4,500	900
Mullumbimby Civic Hall	2013	5	4	4,900	3,300	1,600
Brunswick Valley Community Centre	2010	5	3	4,000	-	4,000
TOTAL		605	636	776,108	70,344	699,698

Category: Waste

Waste Fugitive Emissions - Composting and Closed Landfill

Byron Shire Council's closed landfill emits fugitive emissions from the legacy waste buried within and accounts for 24% of Council's FY23 emissions. 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 natural decrease from FY22 – FY23 was 8% (741 tCO2e).

Prior to 2021, the methane gas flare generated Australian Carbon Credit Units (ACCU's), and Council was contractually obliged to sell those offsets until its requirements were met. This meant that Council could not count all of the reduction associated with the methane gas flare for its own reduction efforts. In light of the net zero target and the declining levels of methane, staff 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 would benefit Council's own carbon footprint (Action C6 in the Action Plan). It was determined that the business case for ACCUs was no longer viable and in March 2023 Council's ACCU contract with the Clean Energy Regulator was completed. The flared gas is now counted as a full reduction (1,787 tCO2e in FY23).

The Resource Recovery Team continues to work on projects to improve the landfill site and reduce emissions, including a Leachate Management System Upgrade, Stormwater Plan and Capping of the Southern Landfill in 2025 (dry season).

Council commenced composting at the Myocum Resource Recovery Centre in 2019. The composting operations added an extra 251 tonnes of carbon emissions to the waste sector in FY23 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 Fugitive Emissions (landfill) 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
2022	8,724	1,938	0	164	6,950
2023	7,983	1,787	0	251	6,447

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

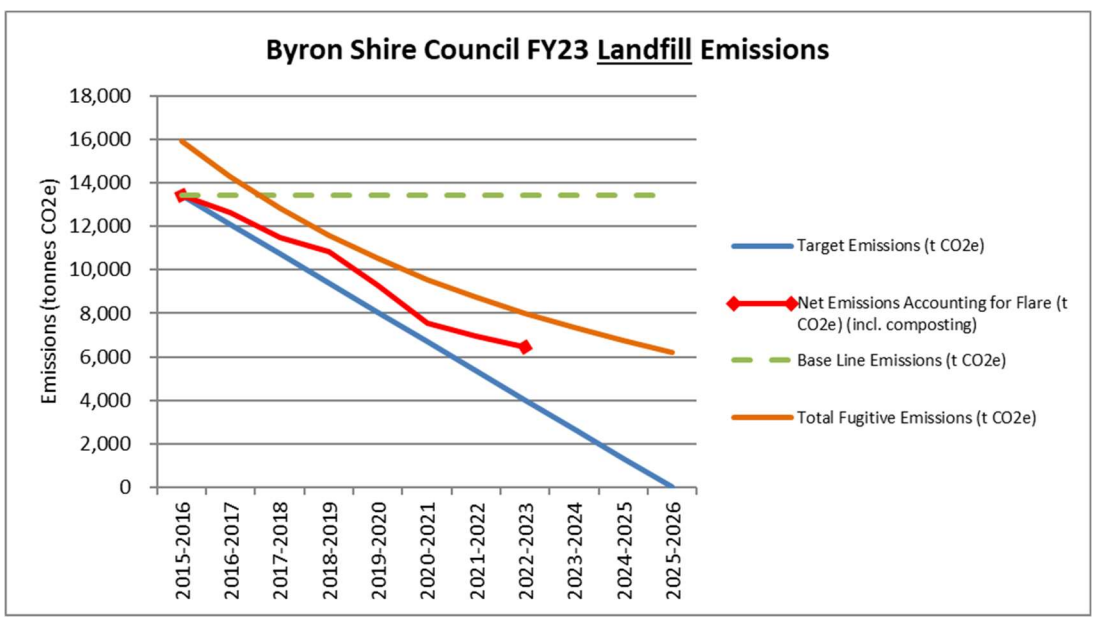

Figure 7 - Waste Sector Landfill Fugitive Emissions since baseline year 2015/16

Landfill, organic waste & recycling

Council contracts its waste collection service for general waste (landfill), recycling and food & garden organics to Solo Resource Recovery. These activities account for 2% of Council's FY23 emissions. There was a 0.3t decrease in landfill waste from FY22 (372t) to FY23 (371.7t), and emissions were

basically on par year-on-year (483 tCO2e in FY23). There were no emissions from recycling or food & garden organics because the emissions factor for those activities is zero.

Solo transports landfill to a facility in Willowbank (QLD), recycling to a facility in Chinderah (NSW) and food & garden organics to a facility in Yatala (QLD). As part of its 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). 692 VCU's were purchased for Council for FY23.

Category: Water & Wastewater

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. This activity accounts for 3% of Council's FY23 emissions.

Wastewater fugitive emissions declined by 22% in FY23. Total annual flow decreased by 701ML, or 17%. Flows to the Byron Bay, Brunswick Valley and Ocean Shores plants decreased, due to the drier conditions during FY23 and lower visitor numbers post-COVID-19. Bangalow STP saw a significant increase in flow of 112 ML.

Approximately 2,000 tonnes of biosolids were stockpiled at the Brunswick Valley STP and the Ocean Shores STP from October 2021 to September 2022 due to the unprecedented wet periods. These inventories are not exact, and it does not appear that all excess sludge was removed for land application in FY23. Inventories will be inspected again in FY24 to gauge the status of this issue. Thus, for FY23, the 2017-21 average "tonnes biosolids produced/kL of sewage treated" were used to calculate biosolids production for the NGER calculations. The calculated values are consistent with trends from previous years.

The Byron Bay STP inlet works underwent rehabilitation in FY23, and sewage primary and secondary solids were diverted to the inlet overflow pond for a period; however, it is not clear whether this activity has affected NGER calculations for the period.

The Bangalow STP inlet flow meters will be inspected and re-calibrated since the flowrates recorded for FY23 appear outside of accountable flows. The Bangalow town site has undergone significant growth; however, that is not deemed sufficient to account for these elevated FY23 flowrates.

It should be noted that, while total emissions went down in FY23, 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 11 -Wastewater Fugitive 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
2022	886	4,041
2023	695	3,340

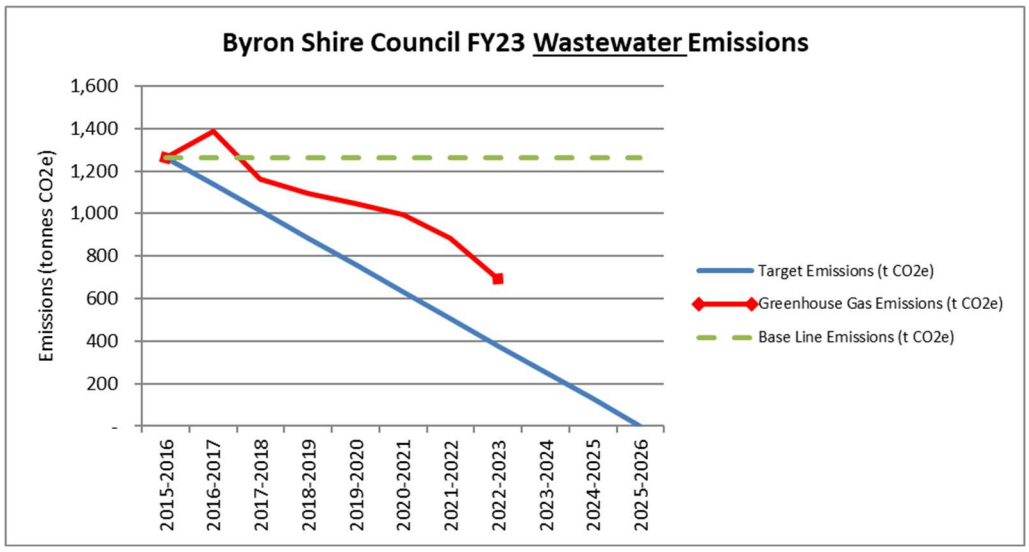

Figure 8 - Wastewater Sector Fugitive Emissions since baseline year 2015/16

Water

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 under “wells & reservoirs” in the general electricity emissions category outlined earlier in this report.

The water supplied by Rous County Council has emissions related to its collection, transfer and treatment, mainly due to the electricity associated with it. In FY23, water usage increased by 26ML, or 57% on the previous year. Emissions increased by 39 tCO2-e, or 41%. Table 12 outlines the emissions for water use on Council assets in each suburb for FY22 and FY23. Emissions from water account for 1% of Council’s FY23 emissions.

Table 12 - Water supplied to Council suburbs FY22 & FY23

Suburb	FY22 (ML)	FY23 (ML)
BANGALOW	1.7	2.4
BILLINUDGEL	0.0	0.0
BRUNSWICK HEADS	2.1	6.6
BYRON BAY	28.8	36.5
MULLUMBIMBY	4.4	12.3
NEW BRIGHTON	0.7	0.4
OCEAN SHORES	1.1	4.5
SOUTH GOLDEN BEACH	0.3	0.2
SUFFOLK PARK	6.7	8.8
	45.8	**71.7**

Category: Construction & Repair Services

This category includes scope 3 emissions from construction, repair & maintenance and vehicle repairs and accounts for 41.8% of Council's FY23 emissions. There was a 1,716% increase in this category in FY23, which was mostly due to a $17.5 million increase in expenditure on construction – see table 13 below.

Table 13 – Construction & Repair Services FY22 and FY23 activity data

Item/Service	FY2022 Activity	FY2023 Activity	Unit	Change on Previous Year Activity	% Change on Previous Year Activity	FY2022 Emissions (tCO_2-e)	FY2023 Emissions (tCO_2-e)	Change on Previous Year Emissions	% Change on Previous Year Emissions
Construction	2,791,806	20,250,110	AUD	17,458,304	625%	602	10,762	10,160	1688%
Repair & maintenance	0	2,459,259	AUD	2,459,259	n/a	0	448	448	n/a
Vehicle repairs	73,171	0	AUD	-73,171	-100%	15	0	-15	-100%

There are two reasons for the changes:

1. **Increased post-flood construction:** Due to flood damage in February and March 2022, essential repairs and construction of roads, bridges and infrastructure was needed. These works have continued through FY23 and are well beyond budgeted amounts.

2. **Potential overestimation due to using expenditure-based data:** Pangolin has used expenditure-based calculations (input/output method) to determine the emissions for these activities. Financial data is readily available from Council's general ledger and provides a simple and efficient way to calculate emissions.

   However, as a top-down approach, these emission factors are inherently less accurate than using activity-based data (expressed in mass, units purchased etc.) and may be an overestimation of actual emissions. Multiple general ledger job numbers align with these items/services, and multiple purchases can be allocated to a job number (e.g., staff found one job number that included purchases such as construction materials, hire equipment, plant and vehicles, subcontractor salaries, plus items such as catering, uniforms, sunscreen, and lip balm). In addition, items that are listed against particular a job number (e.g., "vehicle repairs") one year might be listed against a similar but different one (e.g., "repair and maintenance") the next year, which complicates year-on-year comparisons further. Disaggregating the items in each job number would be unnecessarily onerous on staff.

   Going forward, it would be preferable to use activity-based data to provide a more accurate picture of emissions. Sourcing this data will be time-consuming and complex and will be a long-term project for staff to undertake. Staff will investigate sourcing activity data from key suppliers and aim to build itemised EOFY (end of financial year) reports into contracts.

Category: Products, Materials & Equipment

This category includes construction materials (asphalt, concrete, cement, and other building materials), machinery & equipment hire and motor vehicle parts and accounts for 16.3% of Council's FY23 emissions. There was an increase of 111% between FY22 and FY23 in this category, due mostly to a $5.5 million increase in expenditure on asphalt and a $7 million increase in expenditure on industrial machinery & equipment – see table 14 below.

Table 14 – Products, Materials & Equipment FY22 and FY23 activity data

Item/Service	FY2022 Activity	FY2023 Activity	Unit	Change on Previous Year Activity	% Change on Previous Year Activity	FY2022 Emissions (tCO_2-e)	FY2023 Emissions (tCO_2-e)	Change on Previous Year Emissions	% Change on Previous Year Emissions
Asphalt	0	10,591,450	AUD	10,591,450	n/a	0	2,118	2,118	n/a
Asphalt (RPQ)	4,754,028	0	AUD	-4,754,028	-100%	1,024	0	-1,024	-100%
Concrete	0	452	m3	452	n/a	0	188	188	n/a
Industrial machinery and equipment	2,080,967	9,360,194	AUD	7,279,227	350%	502	1,828	1,326	264%
Concrete and cement	388,555	0	AUD	-388,555	-100%	416	0	-416	-100%
Asphalt (Boral)	303,680	0	kg	-303,680	-100%	126	0	-126	-100%
Motor vehicle parts	0	823,341	AUD	823,341	n/a	0	226	226	n/a

Like the Construction & Repair Services category above, there are two reasons for the changes:

1. **Increased post-flood construction:** Due to flood damage in February and March 2022, essential repairs and construction of roads, bridges and infrastructure was needed. These works have continued through FY23 and are well beyond budgeted amounts.

2. **Potential overestimation due to using expenditure-based data:** (see Construction & Repair Services category above for explanation).

Asphalt and concrete are high emissions materials, and future carbon reduction strategies will need to focus on using lower embodied energy products as they are introduced into the market.

Category: Employees

Employee commute

A comprehensive survey of all staff was conducted by Pangolin Associates in FY23 to determine normal commuting behaviour and working from home habits. Respondents answered questions asking them to characterise a typical working week, including the days worked from home, and the mode and distance travelled when working from the office. An adjustment factor was applied to account for reduced commuting due to mandated working from home periods.

The key survey details are:

- Number of full-time employees (FTE) = 403
- Response rate = 21%
- Average Emissions Intensity = 0.216 kgCO2-e/km (total emissions/total kilometres)

Emissions from employee commute account for 3.6% of Council's FY23 emissions. Emissions increased by 247 tCO2e or 34% in FY23, from 732 tCO2e in FY22 to 979 tCO2e in FY23. The FY22 data is based on an online survey and subsequent calculations conducted by consultant 100% Renewables. Pangolin's survey data and calculation methodology is different to that of 100% Renewables', and as such the year-on-year comparison isn't entirely meaningful.

Working from home

Employees working from home use electricity for computers, the internet, lighting and generally require office infrastructure to perform their duties. This activity accounts for 0.1% of Council's FY23 emissions. Emissions from employees working from home increased by 20.1 tCO2e or 503% in FY23, from 4 tCO2e in FY22 to 24.1 tCO2e in FY23. As explained above, the FY22 data is based on an online survey and subsequent calculations conducted by consultant 100% Renewables. Pangolin's survey data and calculation methodology is different to that of 100% Renewables', and as such the year-on-year comparison isn't entirely meaningful.

Category grouping: Corporate Governance and Services

Corporate Governance and Services encapsulates eight scope 3 emission categories:

- Advertising & Marketing Services
- Business Travel (flights and hotels)
- Food & Beverage
- ICT Equipment
- ICT Services
- Office Supplies & Services
- Postage, Courier & Logistics
- Professional Services (banking, engineering services, insurance, legal services and more)

These categories are expenditure-based and account for 684 tCO2e or 2.6% of Council's FY23 emissions. The tonnes of carbon dioxide equivalent (tCO2e) for these categories were calculated by Pangolin Associates using the input/output method and may be an overestimation of actual emissions from third-party services and equipment usage. As a top-down approach, these emission factors are inherently less accurate than a process-based co-efficient, however do provide for a conservative and more accessible methodology.

Council was unable to capture its business travel data accurately this year (air and ground travel, accommodation). Associated emissions were therefore not quantified as part of this assessment. A data management plan is being put in place by staff to improve the data collection process in the future.

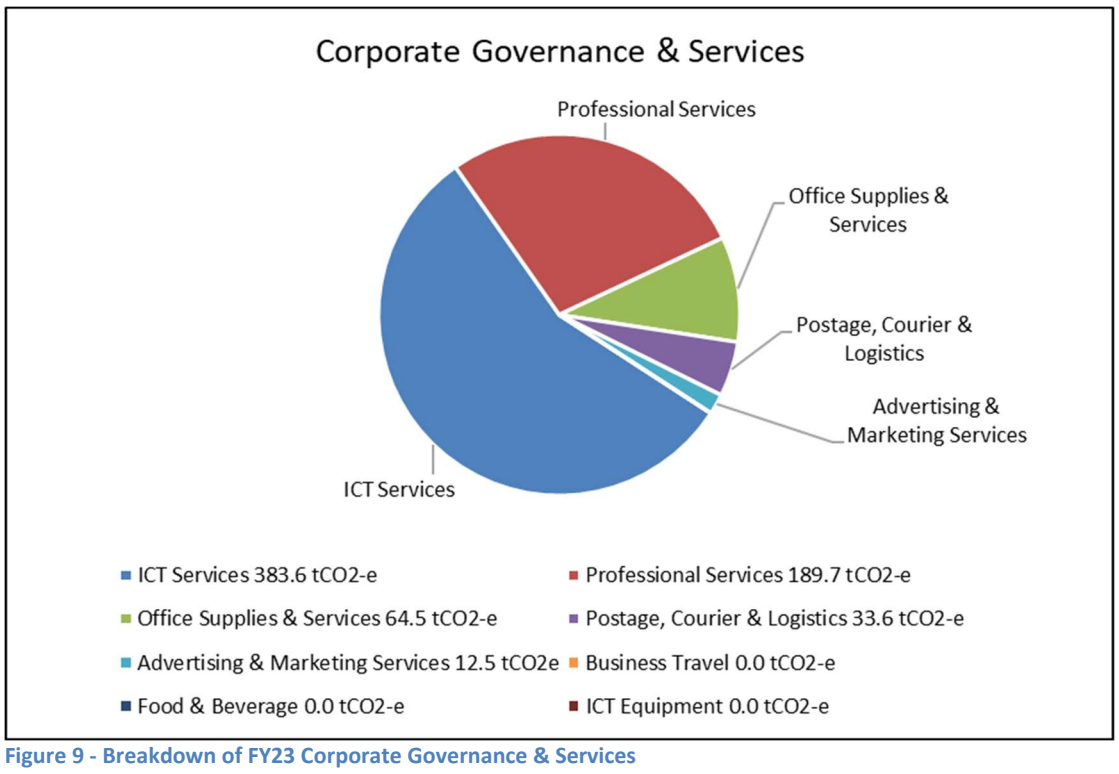

Figure 9 - Breakdown of FY23 Corporate Governance & Services

Category: Synthetic Greenhouse gases

Council uses refrigerants (synthetic greenhouse gases) to top up gases in the heating, ventilation, and air conditioning (HVAC) systems. Emissions from this activity account for 0.04% of Council's FY23 emissions. Usage decreased by 3kg in FY23 (FY22 recorded 8kg and FY23 recorded 5kg). However, emissions increased by 9.9 tCO2e, or 1973% (FY22 recorded 0.5 tCO2e and FY23 recorded 10.4 tCO2e).

To calculate the emissions associated with refrigeration and HVAC use, global warming values from the Intercontinental Panel on Climate Change's (IPCC) Assessment Report 6 (AR6) have been used. These are a more up-to-date dataset of Global Warming Protocols that supersede, and differ slightly

from, those listed in the IPCC AR4. This change in calculation method accounts for the increase in emissions.

Leaked synthetic gases were estimated based on equipment type, gas type as well as quantity of the refrigerants in the equipment itself.

Part 3 – Recommendations

Preparing the report for FY23 has highlighted several areas that could be addressed to improve the collection of data and the decision making around Council's emissions:

- FY23 is the second year that scope 3 emissions have been included. A different consultant was used to calculate the boundary in FY23, and due to different data collection and emissions calculations methodologies some of the year-on-year emissions comparisons are not meaningful. It is recommended that the same method used in FY23 be used in FY24 to ensure consistency.
- Further investigation needs to take place to ensure the full emissions boundary is identified. Areas such as chemical usage could increase Council's emissions profile.
- Expenditure-based calculations were used for several emissions categories. Activity-based calculations would be preferable. It is recommended that staff investigate sourcing activity data from key suppliers and aim to build itemised EOFY reports into contracts. For categories that will remain expenditure-based, custom financial reports or improvements / consistency in the categorisation of job numbers in the general ledger should improve the speed and accuracy of emissions calculations.
- The employee commute figures were based on a survey with a response rate of approximately 21%. Pangolin has indicated that a response rate of 30% would be ideal for accuracy. Given that employee commute accounted for 3.7% of Council's FY23 emissions, it is recommended that the FY24 survey include more incentives for staff to complete it.
- A shadow carbon price could be investigated. When making decisions on materials, services, or infrastructure the carbon emission implications should be reviewed as part of the decision-making process.