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2023 CARBON FOOTPRINT ANALYSIS REPORT

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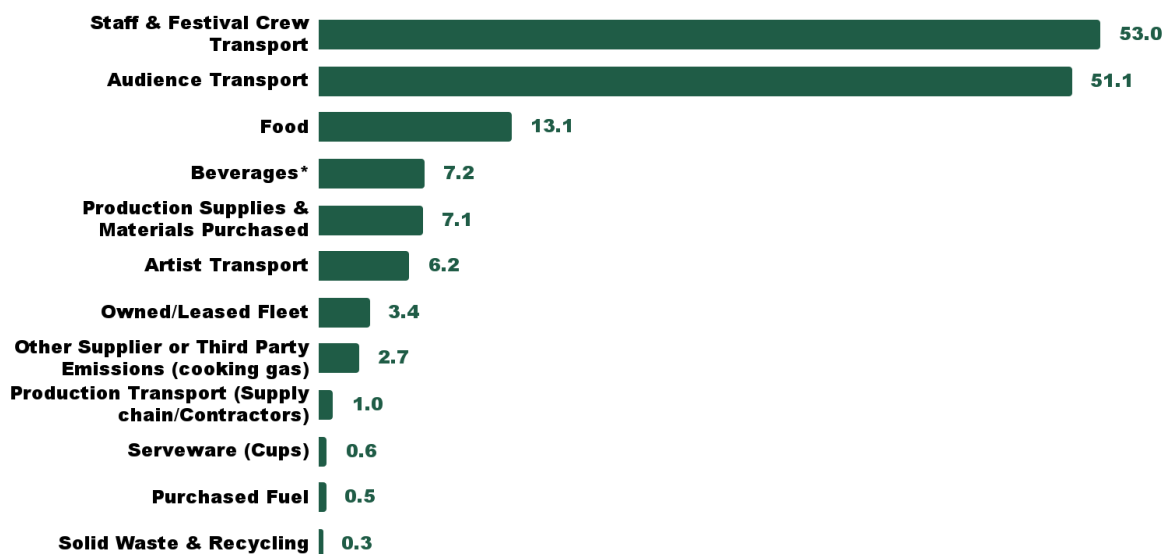
EXECUTIVE SUMMARY - Green Gathering 2023

Optimistic Trout Productions CIC engaged with AGF to assess the carbon footprint of the Green Gathering festival in the 2023 edition.

Although this is not the first year Green Gathering has assessed the carbon impact of its event, significant effort has been made in 2023 to gather as much data as possible related to each activity. This has provided a more comprehensive view of the event's true carbon footprint. Therefore, this year is to be considered as the baseline carbon footprint against which future improvements will be measured.

The festival's 2023 carbon footprint was **146.13 tonnes of CO2 equivalent (t CO2e)**, when considering the list of activities included in the scope:

2023 Event Carbon Footprint by Activities (t CO2e)



The largest portion of the CO₂e emissions generated during the 2023 Festival edition is attributed to Staff Transport, accounting for 36.3% of emissions, followed by Audience Transport at 34.9%. The Events Production activities represent 64.7% of the 2023 carbon footprint, equating to 94.5 t CO₂e.

This year's emissions data will serve as The Green Gathering's baseline carbon footprint against which future improvements should be measured. If The Green Gathering intends to continue monitoring its carbon footprint in future editions of the event, it is recommended to collect the same information as in 2023.

Furthermore, additional data should be gathered for the event's production activities, such as the weight and raw material of all items purchased for festival production. Enhanced engagement with food traders is suggested to improve the quality of data regarding the food served.

Moreover, it is advised to collaborate with suppliers and contractors to obtain precise mileage information by vehicle type and explore low-emissions transport alternatives or fuels.

This comprehensive data collection will provide a more accurate picture of the festival's environmental impact and aid in making informed sustainability decisions.

The carbon footprint detailed in this report is an estimate based on available data. Data included used to develop the carbon footprint is listed in Appendix IV.

2 INTRODUCTION

2.1 Background

About Green Gathering

The Green Gathering is an event dedicated to low-impact living, featuring music, arts, activism, permaculture, and more. It's powered by renewable energy, recycles 90% of its waste, offers both vegan and vegetarian food, and promotes gender diversity among its artists. The festival's organising team is involved in year-round climate and social justice initiatives. This event encourages positive change and provides attendees with the mindset and skills to transform their lives and the world.

About AGF

AGF (A Greener Future) is an award-winning not-for-profit company, dedicated to helping events, festivals, tours and venues to be more sustainable and to reduce environmental impacts. Established in 2005, AGF is internationally recognized for its research, consultancy, and analysis of sustainability strategies, actions, and communications for the live events industry. Its certifications - Greener Festival, Greener Event, Greener Arena, Greener Supplier and Greener Tour - sets the standard for sustainable event management and delivery. AGF's university accredited training is received by sustainability, venue and event professionals around the world, further building a knowledge base within the industry to drive positive impacts.

2.2 Green Gathering Targets

In the ongoing quest for greater sustainability and positive environmental impact, The Green Gathering, including the festival, its production company, and charity, maintains a steadfast commitment to ecological awareness, human rights, biodiversity, and responsible education, technology, and communication. Their overarching mission is to leave a positive legacy and inspire a sense of environmental responsibility among all participants.

As they progress through 2023 and beyond, The Green Gathering has identified critical areas for improvement:

- **Travel Emissions:** The organisation sought to encourage their crew, artists, and attendees to make environmentally conscious travel choices. On-site journeys were confined to those necessary for festival production, and fuel-efficient driving methods were promoted.
- **Sustainable Energy:** Sustainable sources were prioritised for heating and cooking energy whenever possible.
- **Plant-Based and Ethical Food:** Food offerings were exclusively meat- and fish-free, focusing on local, affordable, and ethically-sourced options. The festival is progressively increasing the use of vegan, organic, and fairtrade products while enforcing strict waste reduction rules. All single-use items were fully compostable.
- **Local and Sustainable Beverages:** Alcoholic and non-alcoholic beverages were sourced from local and sustainable producers, with service in sturdy, reusable containers.

- **Waste Reduction:** The Green Gathering actively discouraged disposable items and waste production. They championed reuse, upcycling, and repair. Any remaining waste was composted or recycled where possible, with a strong emphasis on waste sorting and minimization.
- **Information and Education:** Through an array of festival experiences, online platforms, and real-world networks, the Green Gathering provided information, knowledge, and encouragement to inspire current and future generations to become responsible stewards of the environment.

The Green Gathering's commitment extended to making a positive impact within the industry and society at large. To gain deeper insights into their environmental impact and identify opportunities for improvement, they engaged with AGF, specialists in sustainable events, to conduct a comprehensive analysis of their Scope 1, 2, and 3 emissions using the available data. This analysis served as a foundational resource for shaping reduction policies, strategies, and best practices for stakeholder engagement, thereby driving further opportunities for emissions reduction.

2.3 Carbon Footprint Methodology

The methodology used to define carbon footprint scope and boundaries, and for calculating the carbon footprint, is based on the Greenhouse Gas (GHG) Protocol Corporate Standard.

Further information on the methodology is detailed in Appendix I.

Organisation Boundary

The organisational boundary consists of all the operations or activities which Green Gathering's undertake. For the purpose of this report, AGF are measuring all the activities involved in the design, planning, execution and dismantling of Green Gathering, where measurable data is available, and over which [Organisation] has operational control.

Operational Boundary

The operational boundary identifies the sources of emissions activities within the defined organisational boundary and categorises these into direct emissions (sources of emissions which Optimistic Trout Productions CIC owns or has direct control over) and indirect emissions (sources of emissions which are owned or controlled by another company). These emissions sources are categorised into three scopes, further detailed in Section 2.4.

2.4 Activities and Data included in the Carbon Footprint

The activities which have been included or excluded from this carbon footprint are detailed in the table below. The table also notes if data was complete (●), partial or based on assumption (◐) or no data at all (○) had been provided at the time of this report.

Data relating to audience transport, materials purchased and food was based on estimates and assumptions and the resulting emissions calculated for these activities have a higher degree of uncertainty.

No Information was available in 2023 on serveware used or food and beverages served by traders.

Excluded Emissions

No Scope 1 or Scope 2 Emissions have been excluded from this carbon footprint, to the best of our knowledge.

Production and manufacturing-related emissions from hired or reused items are not included within this carbon analysis.

The event did not make use of grid electricity, nor does it own or lease buildings utilising air conditioning or cooling units. Therefore no emissions associated with Refrigerants and Grid Electricity are accounted for in this report.

Accommodations for artists or staff have not been included in the calculations because if they stay, they bring their own campervans or tents.

Further information on the data sources of emissions and excluded activities is included in Appendices V and IV.

Scope	Activity	Description	Data Type
1	Stationary Combustion	Fuel (including Gas, Petrol, kerosene, etc) used or purchased for power generation, heating, cooking and machinery	●
	Mobile Combustion	Fuel used or purchased for owned vehicles (hired cars for staff, trucks, forklifts, etc)	○
	Fugitive Emissions / Refrigerants	Emissions from air conditioning units, HVAC & Refrigerant Gases, other process gases with a high Global Warming Potential (GWP). Generally F-Gases (Fluorinated Gases).	N/A
2	Purchased Electricity	Emissions associated with supply of electricity through the national grid.	●
3	Transmission & Distribution	Emissions associated with the transmission and distribution of electricity, tenant/lease-acquired electricity, or Well to Tank extraction, refining and transportation of purchased fuels.	N/A
	Audience Transport	Emissions associated with the transport of the audience to the event.	●
	Artist and Participant Transport & Accommodation.	Emissions associated with the transport of artists and participants to the event, in vehicles not owned by the reporting organisation.	●
	Staff and Crew Transport & Accommodation.	Emissions associated with the transport of staff and crew to the event, in vehicles not owned by the reporting organisation	●
	Purchased Food, Beverage and Serveware	Emissions associated with the purchased, production and use of food, beverage and serveware items for the event.	●
	Supplier and Contractor Transport	Emissions associated with the transport of purchased goods, in vehicles not owned by the reporting organisation (e.g. transport emissions from supplier and contractor deliveries).	●
	Purchased Construction or Stage Materials	Emissions associated with the production and use of construction and stage materials.	●
	Solid Waste and Recycling	Emissions associated with the processing of solid waste and recycling generated by the organisation or within the organisational boundaries (e.g. waste generated during event build, on event days, or during the year)	●
	Water Use and Wastewater	Emissions associated with the supply of water and disposal/processing of wastewater.	●
	Other Supplier or Third Party Emissions	Emissions associated with other emission generating sources owned or controlled by suppliers, contractors and third parties, excluding transport or vehicle emissions.	●

3 RESULTS

Location Venue:	Piercefield Park, Chepstow	Organisation:	Optimistic Trout Productions CIC
Event Type:	Music Festival	Total Daily Capacity	4,999
Date:	3rd - 6th August	Average attendance per day (Audience)	2,560
Festival Duration (days):	4	Attendance per day (Crew, Artists & Exhibitors)	2,330

3.1 Carbon Footprint

Total Calculated Carbon Footprint

The carbon footprint total for Green Gathering 2023 was **146.13 t CO2e**.

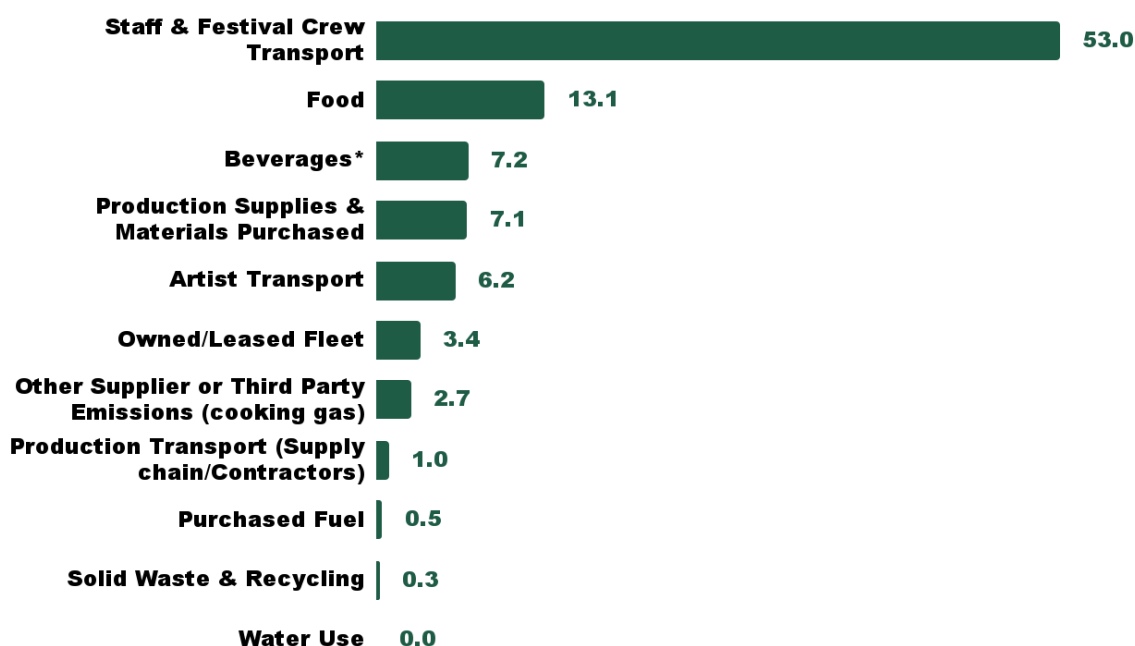
Total Carbon Footprint By Scopes (2023)	tCO2e
Scope 1	3.91
Purchased Fuel	0.48
Owned/Leased Fleet	3.44
Scope 2	0.00
Purchased Electricity	0.00
Scope 3	142.21
Staff & Festival Crew Transport	53.00
Audience Transport	51.06
Food	13.09
Beverages*	7.20
Production Supplies & Materials Purchased	7.09
Artist Transport	6.17
Other Supplier or Third Party Emissions (cooking gas)	2.74
Production Transport (Supply chain/Contractors)	0.98
Serveware (Cups)	0.56
Solid Waste & Recycling	0.27
Water Use	0.04
Wastewater & Sewage	0.01
TOTAL Calculated Emissions	146.13

The largest portion of the CO2e emissions quantified during the 2023 Green Gathering edition are attributed to staff transport (36.3% of emissions) and Audience Transport (34.9%).

Event Production Carbon Footprint

Event Production activities include all activities associated with the set-up, production and running of the event, across all Scopes. The event production footprint does not include audience transport. The Green Gathering's event production activities for which data or estimates were available are detailed in the chart below:

2023 Event Production Carbon Footprint (t CO₂e)



The carbon footprint associated with Event Production was **85.7 t CO₂e**.

Carbon Footprint Total by scopes

2023 Carbon Footprint By Scopes (t CO₂e)



Scope 1 emissions primarily resulted from the combustion of fossil fuels in the Festival's leased fleet and the shuttle bus.

Scope 2 emissions associated with the use of electricity. The Green Gathering did not utilise mains electricity and therefore no Scope 2 emissions are recorded within this footprint.

Scope 3 emissions represent the majority of the carbon footprint, as Scope 3 includes the largest number of activities.

3.2 Scope 1 Emissions

The carbon footprint total for Scope 1 emissions in 2023 was **3.91 t CO₂e**. These emissions were generated via the mobile combustion of fuel.

3.2.1 Stationary Combustion

No stationary combustion sources were used during the festival.

The festival's power was primarily sourced from renewables, including solar, wind, and pedal-generated energy. These sources charged batteries during the event. Green Gathering made use of the back-up generator only for one half-hour check, but the fuel consumption for the generator was not recorded and is likely minimal.

In the event that up to 5 L diesel were used, the resulting stationary combustion emissions would be approximately 14 kg CO₂e.

3.2.2 Mobile Combustion

Vehicles hired by the organisation have been considered under this scope as the selection of the vehicle type and fuel is under the organisation's control. These vehicles include buggies, onsite vehicles, and shuttle buses.

The following amount of fuel have been recorded or estimated for the vehicle types mentioned:

- Buggies: 209.33 L Diesel (estimation based on 157 L last year, plus 30% more for an extra diesel buggy for 2023 edition), and then there's 45 L Petrol for the petrol buggy.
- Telehandler: 203 L Diesel
- Shuttle buses: 624.7 L Diesel
- Onsite vehicles: 16.68 L Petrol

As a result, total calculated emissions resulting from mobile combustion was **3.91 t CO₂e**.

Recommendations	Potential impact ¹
Use alternative vehicle fuel sources such as electric or hybrid.	Reduction in fossil fuel consumption and associated emissions.
Consider changing diesel fueled shuttles by HVO biofuel.	The use of HVO biodiesel for Transport Vehicles could reduce conventional fuel emissions by around 54 % on average, therefore 0.54 t CO ₂ e ² .

¹ Impact reduction based on the 2023 carbon emissions and the assumption that consumption or resource use will remain similar. If consumption or resource use increases in subsequent years, the potential impact may differ.

² This is based on the reported GHG emissions savings from use of HVO (including HVO from rape seed, sunflower, soybean, palm oil, cooking oil, or animal fats) compared to default (diesel) fuel use. Taken from DfT - RTFO Guidance Greenhouse Gas Emissions Methodology and Default Values for Biofuels 2021. Impact reduction based on the 2023 carbon emissions and the assumption that consumption or resource use will remain similar. If consumption or resource use increases in subsequent years, the potential impact may differ.

3.3 Scope 2 Emissions

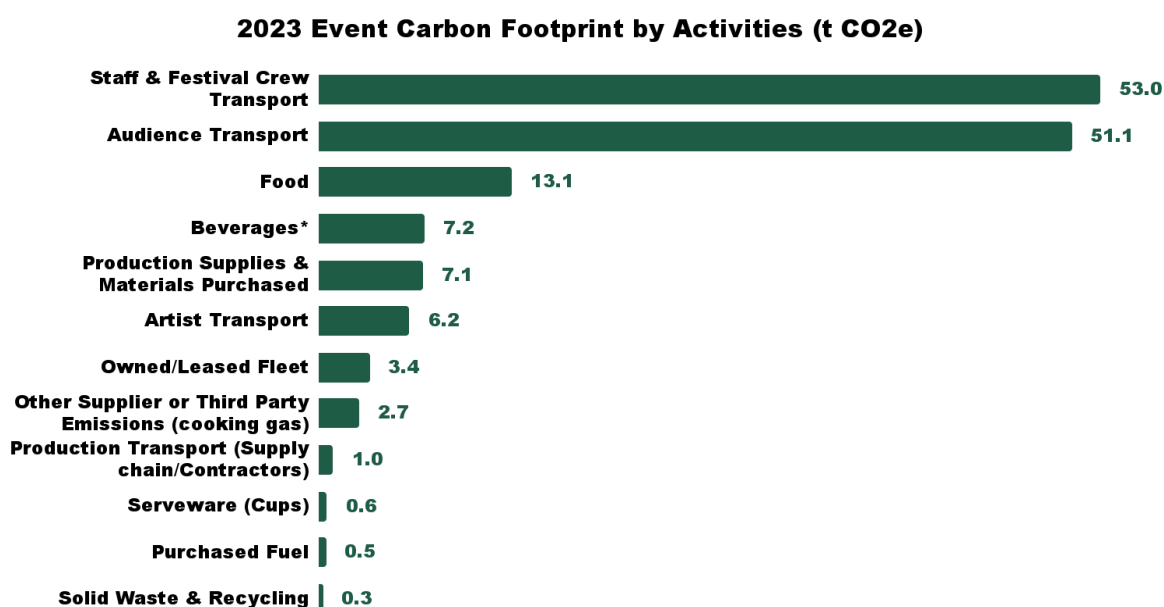
Scope 2 emissions typically relate to the purchase and use of grid electricity. However, Green Gathering is an off-grid festival, and is not connected to the mains electricity grid. Instead, power is predominantly generated through solar power.

In 2023, a total of 514.5 kWh of solar input was recorded.

Therefore, there are no emissions associated with Scope 2 activities, as the festival relies on renewable and off-grid power sources.

3.4 Scope 3 Emissions

Scope 3 emissions include indirect emissions from the organisation's upstream and downstream activities, as well as emissions associated with contractors, waste generation, or water use. For Green Gathering, the carbon footprint for Scope 3 activities in 2023 was 142.2 t CO₂e and includes the following emissions sources:



3.4.1 Staff and Festival Crew Transport

The staff transport data was recorded by Green Gathering using the crew ticketing system (Eventree). The "staff" category included management, crew, volunteers, workshop leaders, stall holders, small infrastructure providers, traders, and anyone who isn't considered public (including almost 500 children) or a performer, totaling 1,837 individuals.

However, there were significant data gaps regarding the distance travelled and the mode of transport used by most individuals. The available data only included ticket options purchased, such as vehicle tickets, and some postcodes, although these postcodes

represented their home address and not necessarily the location they travelled from to reach the event.

Additionally, a small research project was conducted by Green Gathering in collaboration with AGF to gather data on audience vs. crew/artist/trader transport. This data was collected via survey from 106 people (within crew/artist/trader category) and extrapolated to cover the 1,826 individuals categorised as "staff." It's worth noting that this represented only 5% of the total responses, which is below the recommended minimum of 10% for accurate extrapolation.

Combining both data sources³ led to the following breakdown of emissions by vehicle type and their corresponding percentages:

Vehicle type	% Vehicle type	Average distance per vehicle type (km)	kgCO ₂ e	% Emissions
Van	18.72%	309	29943.64	56.50%
Car	24.98%	251	19218.15	36.26%
Train	10.38%	286	1933.96	3.65%
Bus	2.83%	286	1140.10	2.15%
Motorbike	0.67%	509	709.82	1.34%
Walking or Cycling	0.94%	361	0.00	0.00%
Car/Van as passenger	41.53%	308	0.00	0.00%

Based on the provided data and extrapolation, it's estimated that 60% of "staff" members travelled to the event site by car, van, or campervan, accounting for approximately 93% of the total staff travel emissions. Additionally, 13.2% of the audience arrived by train or bus, contributing to approximately 5.8% of the total emissions related to staff transport.

The calculated emissions associated with staff transport for the 2023 Green Gathering edition were estimated to be **52.9 t CO₂e**.

Recommendations	Potential impact
For the next edition of the Green Gathering, consider capturing all staff mileage and mode of transport preferable from the staff ticket system to avoid extrapolating data.	Improved data quality.

3.4.2 Audience Transport

To estimate the carbon footprint of audience transport for The Green Gathering 2023, data was collected from the Ticket Seller dataset. This data provided information on the number of tickets purchased, the buyers' postcodes, and whether they also acquired a parking ticket for a car, van, campervan, or motorbike. This data allowed for the estimation of the number of individuals associated with each vehicle. For those not associated with any of these vehicle types, public transport usage was assumed.

³ Please refer to Appendix V, titled "Data Gathering and Assumptions," for additional details and insights regarding the data collection process and underlying assumptions.

In addition, the research project conducted by GG in collaboration with AGF to gather data on audience vs. crew/artist/trader transport, as mentioned in the staff transport section, was used to gain a better understanding of the modes of transport chosen by the audience, particularly those categorised under "public transport." The survey received 133 responses from individuals within the audience category, and included information about the type of vehicle they used to reach the event.

Combining both data sources⁴ led to the following breakdown of emissions by vehicle type and their corresponding percentages:

Vehicle type	% Vehicle type	Average distance per vehicle type (km)	kgCO ₂ e	% Emissions
Campervan	13.52%	276.9	26734	52.35%
Car	17.50%	254.9	18717	36.65%
Train	9.03%	393.7	3169	6.21%
Bus	3.02%	486.4	2390	4.68%
Motorbike	0.08%	236.5	54	0.11%
Walking or Cycling	1.51%	22.1	0	0.00%
Car/van as a passenger	54.67%	260.7	0	0.00%
Other	0.68%	403.7	Unknown	

Based on the above data, it is estimated that 30% of audience members travelled to the event site by either car, van or campervan accounting for approximately 43% of the total audience travel emissions. Additionally, 11% of the audience arrived by train or bus, contributing to approximately 5% of the total emissions related to audience transport.

Audience members who reported being car or van passengers or who arrived by walking or cycling resulted in no carbon emissions.

Audience Transport emissions for the 2023 edition of the Green Gathering were therefore estimated to be **51 t CO₂e**.

Due to the combination of surveys and assumptions used, there is a higher degree of uncertainty with the emissions calculated above.

Recommendations	Potential impact
For the next edition of the Green Gathering, consider undertaking an audience travel survey post- event to capture more accurate data from a larger sample. The survey should request, at a minimum: - mode of transport used to attend the festival, and - average distance travelled on mode of transport to attend the festival.	Improved data quality.

⁴ Please refer to Appendix V, titled "Data Gathering and Assumptions," for additional details and insights regarding the data collection process and underlying assumptions.

3.4.3 Artist Transport

To estimate the carbon footprint of artist transport for The Green Gathering 2023, data was collected through a survey. Artists were asked about their travel origin and their destinations post-event. It's important to note that the majority of artists were national or local, and all international artists were already on tour within the UK.

In total, 293 artists and performers participated in Green Gathering 2023. This category also included artist family and crew members, resulting in a total of 383 individuals who travelled to the event site within the "Artist" category.

The survey revealed that 186 vehicles, including cars, vans, or campervans, were used by artists, their families (including children), and crew to reach the event site.

The total reported distance covered by these 186 vehicles for a round trip (calculated from postcodes to the event site) was 2,719.5 miles, resulting in an average of 91 miles per vehicle.

While a small number of artists could have potentially used public transport, according to the festival it was a very small number and from short distances. Therefore, the impact can be considered minimal.

The total calculated emissions associated with Artist travel for the 2023 edition was **6.1 t CO₂e**.

Recommendations	Potential impact
For the next edition of the Green Gathering, aim to collect individual data on each artist's mileage and mode of transport, to avoid making assumptions and data extrapolations	Improved data quality

3.4.4 Production supplies and materials purchased

The organisers provided data on merchandise and site build materials purchase for Green Gathering 2023. Only materials purchased new are accounted for in this carbon analysis⁵.

The festival sold stainless steel water bottles, t-shirts, mugs and towels as part of the merchandise and printed 2025 programmes. The delivery of these materials has been included within the Production Transport (Supply chain/Contractors) section.

It's noteworthy that T-Shirts and towels were made from organic cotton, a more sustainable choice. Additionally, the festival programs were printed on recycled paper.

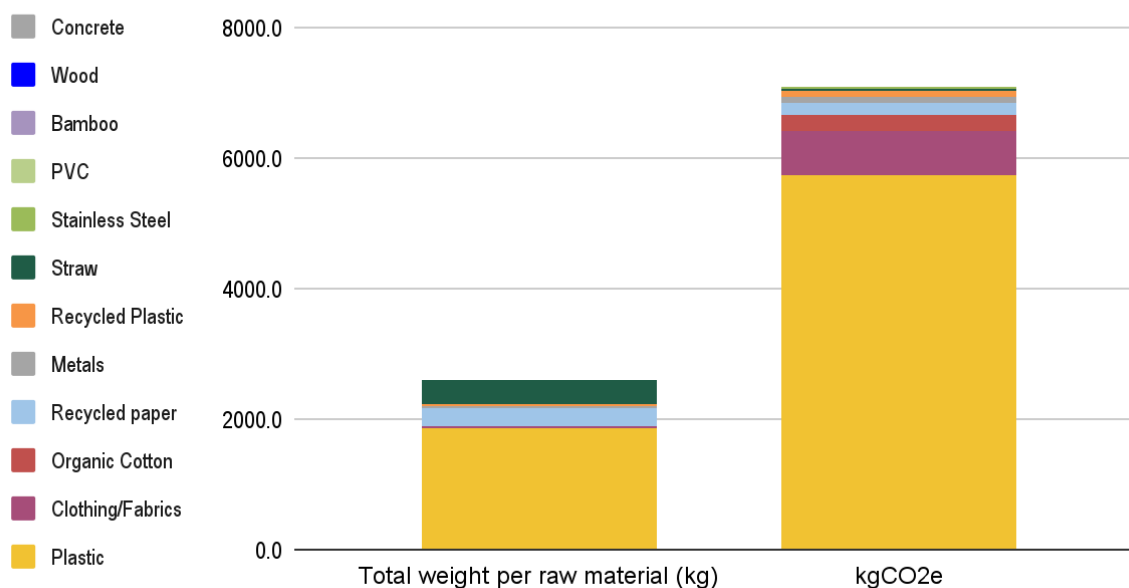
The materials purchased for the 2023 edition are detailed below, and included merchandise, various equipment and supplies, including tools, construction materials, plumbing components, and general festival necessities.

In cases where specific raw material or weight per item information was missing, average values for primarily plastic or metal materials and estimated item weights based on

⁵ The carbon emissions associated with the production of rented or reused materials are excluded.

typical market sizes have been assumed.

Percentage of Raw Materials Purchased by Weight and Associated Emissions



Plastic, accounting for only 15.1% of the materials purchased for the event by weight, is responsible for 70.5% of the emissions. In contrast, straw bales, comprising 81.6% of the weight, only contributed to 13.4% of the emissions, as straw is a low-carbon material.

The carbon footprint associated with the purchase and production of materials purchased for Green Gathering 2023 was **8.12 t CO2e**.

Recommendations	Potential impact
Consider recording comprehensive data on all items purchased for the festival, including details on the primary raw material and the weight per item.	Improved data quality.
Continue sourcing materials made from recycled content and more sustainable options, if reusables options cannot be found	Reduced material purchase-related emissions.

3.4.5 Food, Beverage and Serveware

Food

The Food data for 2023 was collected from caterers such as Linda Kitchen, Main Crew Catering, and the permaculture Kitchen. However, the food served by traders and delivered by Chepstow Fuel Center was not recorded.

Green Gathering recorded a total of 7,911 servings provided by the mentioned caterers. Given the absence of detailed information on the specific ingredients and the weight per serving, we have used an average emission factor for vegetarian servings to estimate emissions.

Additionally, to determine the overall count of meals and food served throughout the 4-day event, we have made the following assumption based on the knowledge of Green Gathering regarding the festival's audience: each attendee had one meal and two savory snacks per day.

Emissions relating to the production of food during the 2023 edition were estimated to be **13.1 t CO₂e**.

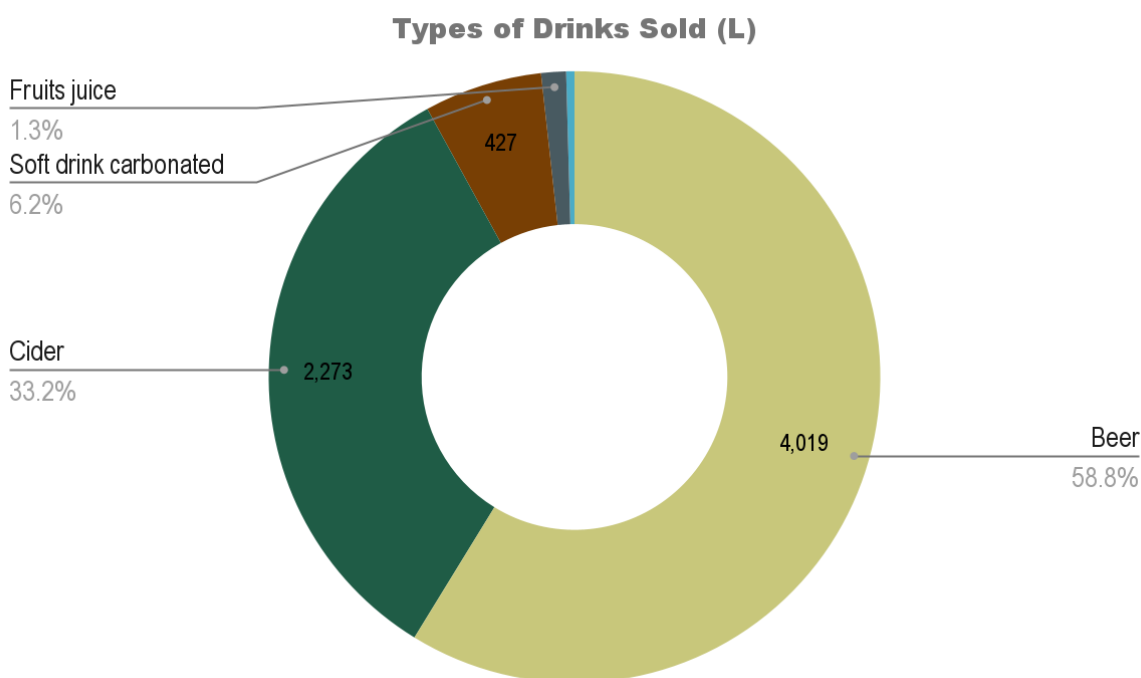
Recommendations	Potential impact
For the next edition of Green Gathering, engage with food vendors, caterers and traders prior to the event taking place to communicate the data that will be requested, allowing them to plan the data collection (raw material or type of dish and average weight per dish or serving).	Improved data quality.
Continue offering food exclusively meat- and fish-free, focusing on local, affordable, and ethically-sourced options	Reduced emissions from the production of food

Beverages (Bars Only)

The Green Gathering kept a record of the number of servings for each type of drink and the volume per serving served. It is worth noting that other drinks sold by caterers or traders were not recorded, so the emissions related to this section are likely to be a conservative estimate.

The breakdown of emissions for each type of beverage is as follows:

Type of Beverage	Litres	kgCO ₂ e	% by volume	% of Emissions
Beer	4,019	4,501	58.77%	62.56%
Cider	2,273	2,409	33.24%	33.49%
Soft drink carbonated	427	179	6.24%	2.49%
Fruits juice	90	70	1.31%	0.97%
Wine	30	35	0.44%	0.49%



Emissions relating to the production of beverages sold by bars during the 2023 Edition were estimated to be **7.19 t CO₂e**.

Recommendations	Potential impact
Record data on beverages sold by traders and caterers to provide a more complete account of beverage emissions.	Improved data quality.

Serveware (Cups)

Green Gathering provided information on specific serveware items used at bars, including pint and half-pint cups, lemonaid, and Ossies Ginger bottles.

Crew catering utilised real crockery and cutlery. Food and tea stalls were encouraged to follow suit. Since 2019, Green Gathering offered a crockery hire service for customers, expanded in 2023 to supply caterers with reusable plates and cutlery. Crock n Rock also added mugs to their crockery offerings, and several caterers had their own reusable serveware.

All bars used reusable glasses with deposits, owned by Green Gathering and stored onsite for future use. However, some were rented in 2023 due to losses, but these will be replaced for 2024.

Only cups purchased for this event were considered in the calculations, and those rented or reused from previous years were not included. If new reusable cups are needed for the next edition to replace losses, they should be factored into the 2024 carbon footprint analysis of the festival.

For the calculation, 2,250 PP half pints, 960 Lemonaid and 140 Ossies Ginger Glass Bottles were taken into account. The weight per cup and bottle was estimated.

Another 2,000 pint cups were hired and 1,085 pint and 285 half pint reusable cups from previous editions were also reused and therefore not included in the calculation.

Unfortunately, data on serveware used by caterers and traders wasn't recorded, likely resulting in a conservative emissions estimate.

The carbon footprint associated with the purchase and production of serveware for bars was **0.55 t CO₂e**.

Overall, the combined Food, Beverages and Serveware related-emissions for the 2023 edition of Green Gathering were therefore estimated to be **11.88 t CO₂e**.

Recommendations	Potential impact
Consider recording data on serveware purchased by traders and caterers	Improved data quality.
Continue prioritising serveware which can be reused, or is made from recycled materials and recyclable, or biodegradable.	Reduced emissions from the production and disposal of materials.

3.4.6 Contractor/Supplier Transport

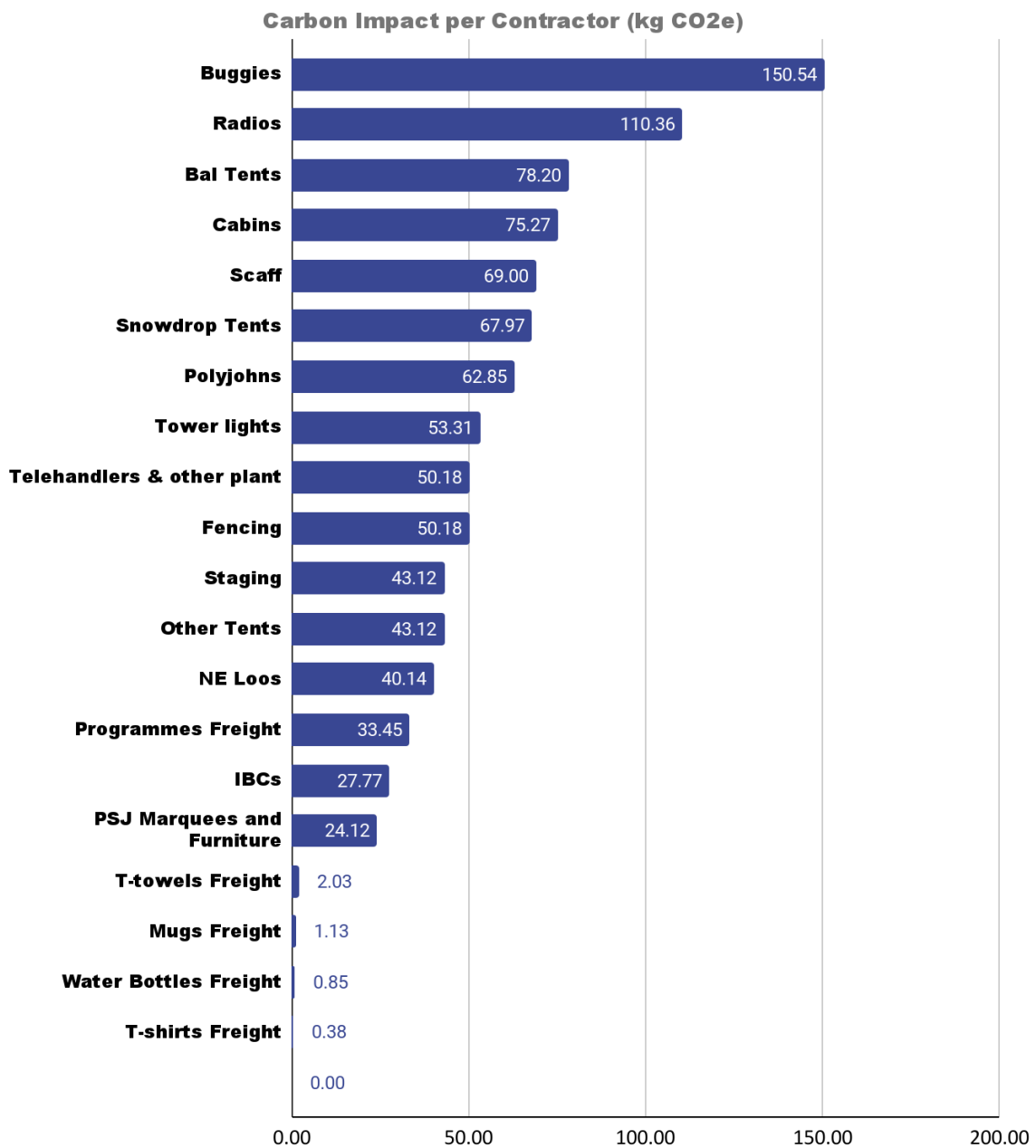
Green Gathering collected data on the types of vehicles and distances travelled to the festival grounds by the 14 contractors that provided services to the festival.

Additional information was provided regarding the weight delivered and mileage for merchandising deliveries.

The breakdown of emissions by vehicle type and their corresponding percentages is detailed below:

Vehicle type	% Vehicle type	Average distance per vehicle type (km)	kgCO ₂ e	% Emissions
Car, Car + Trailer, or small van	45%	243.52	497.65	50.58%
Freight Van	25%	220.48	37.83	3.84%
HGV >18t	30%	76.71	448.47	45.58%

The carbon emissions per Contractor is represented in the graph below:



The carbon footprint associated with supplier and contractor transport in 2023 was estimated to be **0.98 t CO₂e**.

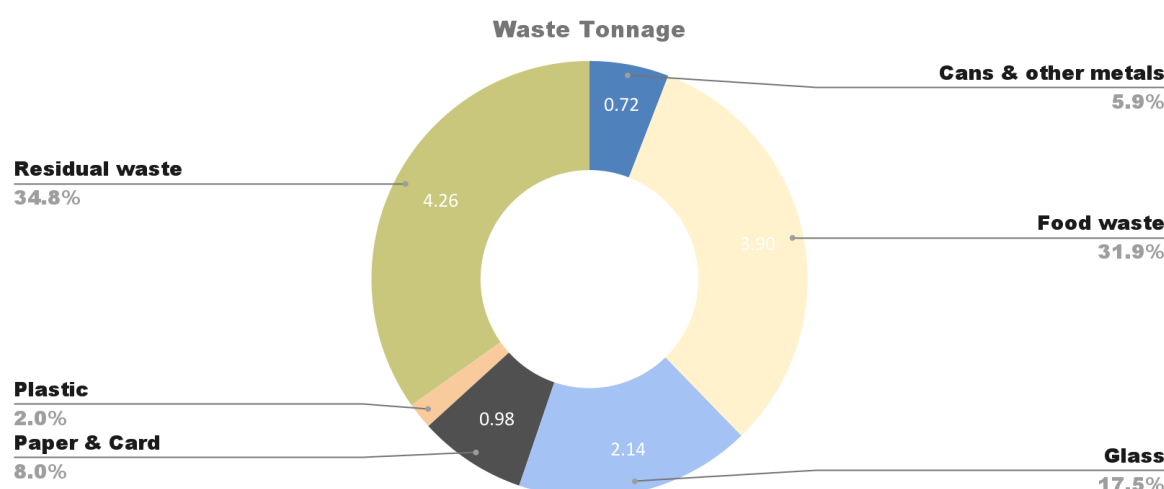
Recommendations	Potential impact
Continue to request travel data from contractors and include supplier, vendor and trader transport for future carbon footprints.	Improved data quality.
Engage with those 2-3 main impactful contractors to explore opportunities for efficient logistics, fuel efficiency improvements, or to reduce overall number of trips.	Reduced transport emissions.

Recommendations	Potential impact
Alternatively, source suppliers and contractors who can provide last mile transport in low-emissions vehicles.	

3.4.7 Solid Waste

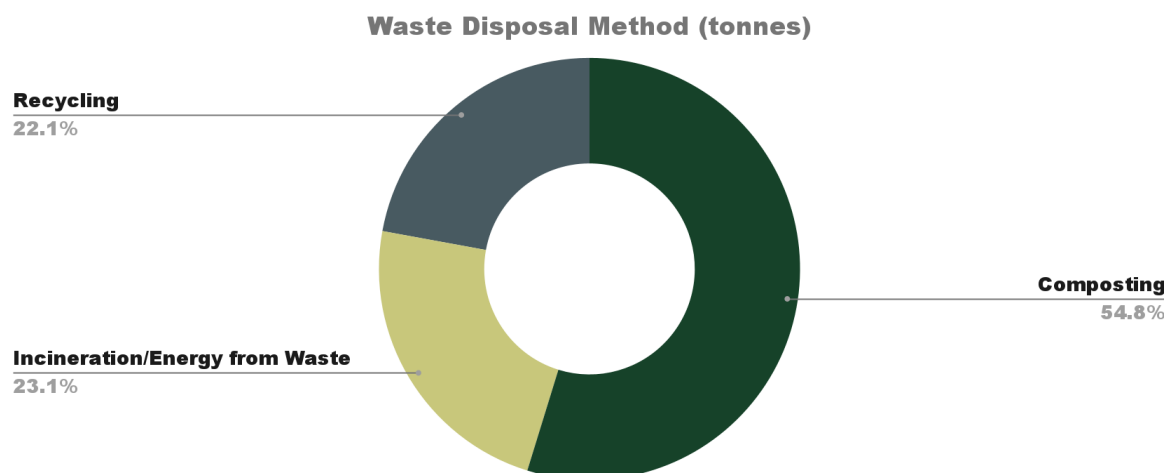
Green Gathering reported a total of 12.37 tonnes of waste generated throughout the event.

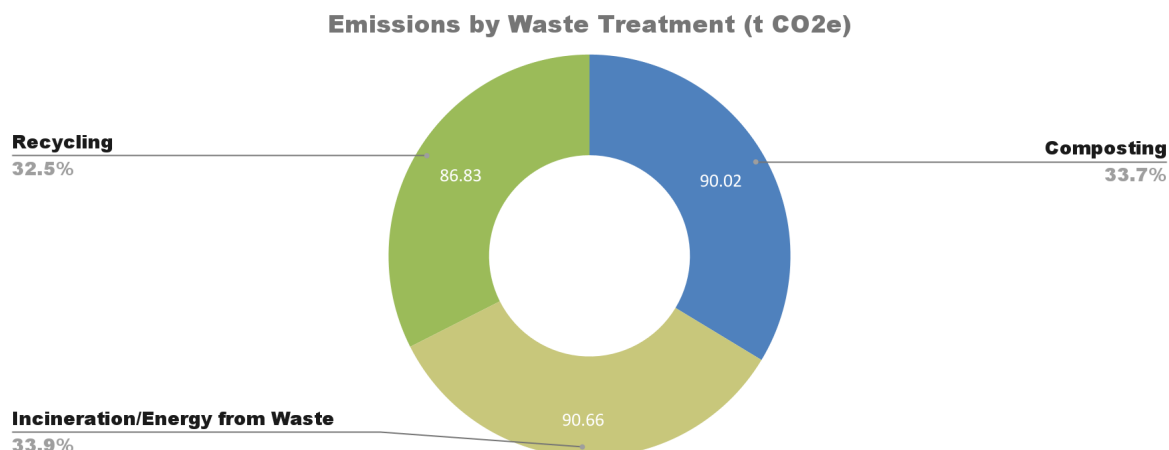
The waste breakdown is detailed in the figure below:



During the festival, waste is carefully sorted into various waste streams, including paper & card, plastic, cans & other metals, and glass. Food waste is separated and composted on-site, later utilised by the permaculture community.

After the festival, Suez Waste Management collects the sorted waste. The portion that cannot be recycled, roughly 35% of the total waste, is sent to the Trident Park energy recovery facility in Cardiff, which holds R1 certification and incinerates waste for energy generation. Solid waste from the compost toilets is managed by Natural Event, where it undergoes composting for agricultural purposes in Somerset.





The carbon impact of the waste treatment was estimated to be **0.21 t CO₂e**.

3.4.8 Other Supplier or 3rd party Emission (Cooking gas)

Green Gathering recorded the use of 915 kg of propane by caterers for cooking purposes. In addition, some caterers employed recycled firewood to heat water.

The carbon impact of these emissions from other supplier or third party sources, such as propane for cooking, was calculated to be **2.74 t CO₂e**.

Recommendations	Potential impact ⁶
Minimise the use of Propane Gas or source lower emission alternatives, such as BioLPG / BioPropane.	Approximately 2.5 t CO ₂ e could have been avoided by utilising a low-emissions alternative to Propane ⁷

3.4.9 Water & Wastewater

Water Use

The Green Gathering sources its water supply from Chepstow Racecourse, the neighbouring site owner and licence holder. A network of blue water pipes is used to distribute the water around the event site.

Green Gathering recorded a total of 231.73 m³ were consumed over the 4 day event.

The carbon emissions associated with the supply of water through the mains network is **0.04 t CO₂e**.

⁶ Impact reduction based on the 2023 carbon emissions and the assumption that consumption or resource use will remain similar. If consumption or resource use increases in subsequent years, the potential impact may differ.

⁷ Based on biopropane reported average carbon footprint of 50 g CO₂e / MJ, resulting in an estimated 0.014 kgCO₂e per kWh, compared to 0.21 kgCO₂e for propane. This assumes that biopropane has a similar Gross CV to propane.

Using: Johnson, E. 2017. A Carbon Footprint of HVO Biopropane. *Biofuels, Bioproducts and Biorefining* published by Society of Chemical Industry and John Wiley & Sons, Ltd.

Sewage and Wastewater

Green Gathering utilises the services of Tip Top and Natural Event for providing toilets and sewage removal from the event site. Greywater is employed in Permaculture activities, while black water is transported offsite by Tip Top waste tank emptying.

The urine collected from Natural Event composting toilets is currently sent to a sewage treatment facility by the Polyjohn loo providers. Solid waste is separately composted for agricultural use in Somerset, as mentioned in the solid waste section of this report.

Moreover, hay-bale-based urinals on site help manage urine, with urine-soaked hay bales being composted at the event location. This approach minimises the need for transport and mainstream sewage disposal.

In total, 35.6 m³ of sewage and 25 m³ of wastewater were collected during the festival.

The carbon footprint associated with wastewater and sewage treatment for Green Gathering 2023 was estimated to be **0.012 t CO₂e**.

It should be noted that whilst water use and wastewater treatment has relatively low CO₂e impact compared with other measurable event factors, it should be taken as an important area for continued monitoring and reduction in its own right as a valuable resource.

3.5 Key Performance Indicators and targets

The 2023 carbon footprint has increased compared to previous years, primarily due to additional activities being recorded and more accurate data. In 2023, the carbon footprint was 1461.3 t CO₂e, whereas it was 31.27 t CO₂e in 2022 and 89 t CO₂e in 2019.

In 2023, substantial efforts were made to gather more comprehensive data regarding each activity, offering a more accurate view of the event's actual carbon footprint. This year's data serves as the baseline carbon footprint against which future improvements will be measured.

It is important to note that as additional or more accurate data is collected, the overall carbon footprint is likely to increase.

Several Key Performance Indicators to monitor performance year on year are suggested below:

Key Performance Indicators 2023	Result	Unit
Carbon Footprint Baseline (All Scopes)	146.1	t CO ₂ e
Carbon Footprint Baseline (Scopes 1 and 2)	3.9	t CO ₂ e
2023 Event Production	94.5	t CO ₂ e
Carbon Footprint Per Person Per Day (pppd)	7	Kg CO₂e
Audience Travel related Emissions pppd	5	Kg CO ₂ e
Staff Travel related Emissions pppd	6	Kg CO ₂ e
Average Travel related Emissions Per Artist/Band	16	Kg CO ₂ e
Travel-related emissions per Contractor	49	Kg CO ₂ e
Emissions per kWh of Energy	0.02	kgCO ₂ e/kWh
Waste related Emissions pppd	0.014	Kg CO ₂ e

By continuously refining data collection and environmental efforts, Green Gathering can gain a more precise understanding of its environmental impact, improve its sustainability initiatives, and take further steps toward reducing its carbon footprint.

RECOMMENDATIONS

4.1 Priority Actions

Recommendations to reduce the Green Gathering's environmental impact have already been made in the Sustainability Assessment Report. As a result, the recommendations in this section will focus on how to improve the measuring and monitoring of emissions associated with these activities, and how to reduce and offset these emissions.

Based upon the carbon footprint analysis completed in this report, the following priority actions are recommended as next steps for Green Gathering:

- o Consider using the carbon footprint detailed in this report as a baseline against which to compare future editions of the festival and against which to monitor the impact of sustainable actions or initiatives.
- o Continue with the data collection processes for the activities included in this carbon assessment report, to provide a comparable assessment in 2023 and following years.
- o Plan for more detailed data collection regarding audience, staff, and artist transport, going beyond parking ticket sales to include transport modes.
- o Collect comprehensive data on food, beverage, not just from bars but also from all traders and food/beverage suppliers. This should include information on ingredients, beverages (weight or volume), and serveware used.
- o Refine the data collection process of material purchased for the festival, ensuring comprehensive information on primary raw materials and item weights is gathered.

4.2 Action Plan

Additional recommendations detailed in Sections 3.2 to 3.4 are summarised in the table below.

Emissions Source	Recommendations	Potential Impact
Scope 1 – Fuel Use	Continue keeping records of fuel use for plant machinery.	Improved data quality
	Use alternative vehicle fuel sources such as electric or hybrid.	Reduction in fossil fuel consumption and associated emissions
Scope 3 – Staff transport	Consider capturing all staff mileage and mode of transport preferable from the staff ticket system to avoid extrapolating data.	Improved data quality

Emissions Source	Recommendations	Potential Impact
Scope 3 – Audience Transport	- Consider undertaking an audience travel survey pre- or post- event to capture more accurate data from a larger sample. The survey should request, at a minimum: - mode of transport used to attend the festival, and - average distance travelled on mode of transport to attend the festival.	Improved data quality
Scope 3 – Artist Transport	Aim to collect individual data on each artist's mileage and mode of transport, to avoid making assumptions and data extrapolations	Improved data quality
Scope 3 – Production supplies and materials purchased	Consider recording comprehensive data on all items purchased for the festival, including details on the primary raw material and the weight per item.	Improved data quality.
	Continue sourcing materials made from recycled content and more sustainable options, if reusables options cannot be found	Reduced material purchase-related emissions
Scope 3 – Food	Engage with food vendors, caterers and traders prior to the event taking place to communicate the data that will be requested, allowing them to plan the data collection (raw material or type of dish and average weight per dish or serving.	Improved data quality
	Continue offering food exclusively meat- and fish-free, focusing on local, affordable, and ethically-sourced options	Reduced emissions from the production of food
Scope 3 – Beverages	Consider recording data on beverages sold by traders and caterers	Improved data quality
Scope 3 – Serveware	Consider recording data on serveware purchased by traders and caterers	Improved data quality
	Continue prioritising serveware which can be reused, or is made from recycled materials and recyclable, or biodegradable.	Reduced emissions from the production and disposal of materials

Emissions Source	Recommendations	Potential Impact
Scope 3 – Contractor/Supplier Transport	Continue to request travel data from contractors and include supplier, vendor and trader transport for future carbon footprints.	Improved data quality.
	- Engage with those 2-3 main impactful contractors to explore opportunities for efficient logistics, fuel efficiency improvements, or to reduce overall number of trips. - Alternatively, source suppliers and contractors who can provide last mile transport in low-emissions vehicles.	Reduced transport emissions.
Scope 3 – Other Supplier or 3rd party Emission (Cooking gas)	Minimise the use of Propane Gas or source lower emission alternatives, such as BioLPG / BioPropane.	Approximately 2.5 t CO ₂ e could have been avoided by utilising a low-emissions alternative to Propane

5 APPENDICES

I. Carbon Footprint Methodology

Consistent with the accounting and reporting principles of the GHG Protocol and ISO 14064.1, the primary methodological guiding principles of this carbon footprint are:

1. Set the scope and organisational boundaries widely to incorporate emissions under the organisation's operational control and/or direct influence
2. Set operational boundaries to account for direct and indirect emissions (Scopes 1, 2 and 3);
3. Set clear inclusion/exclusion criteria to decide what is and is not included in the scope;
4. Identify a consistent, relevant and good quality set of carbon emission factors that are to the extent possible representative of the location and setting of the organisation;

II. Including/excluding criteria

Generally, an emission source has been included if it is relevant and under the organisation's operational control or if organisers can directly influence on the decision processes when it can directly impact associated emissions.

To decide which emission sources are relevant the following criteria have been used:

- Materiality or significance of the emissions of the source with respect to the total emissions of the organisation
- Availability of auditable data (lack of information)
- Relevance for interested third parties (participants, local community, authorities, suppliers, etc.)
- Existence or not of emission reduction potential

III. Calculation Methodology

The quantification methodology employed is based on the corresponding activity data and data sources:

To carry out this study, different calculation procedures have been adapted based on the data available for each of the parameters analysed, although the general methodological basis for calculating the emissions derived from these activities is always the same, consisting of the application of the following formula:

$$\text{Carbon Footprint (t CO}_2\text{)} = \text{Activity Data} \times \text{Emission Factor}$$

Where:

- Activity data = the parameter that defines the activity and that is related to the emission factor (for example, m³ of natural gas)
- Emission factor = amount of CO₂ emitted by each unit of the "activity data" parameter (for example 2.16 kg CO₂ / m³)
- The unit used to expose the results (t CO₂) = representation of the equivalent tonnes of CO₂, the universal unit of measurement that indicates the global warming potential (GWP) of each of the GHGs.

IV. Emission factors

Data gathering covers, in addition to the activity data, the secondary data (conversion factors and emission factors) applicable to them.

These factors have been obtained from reliable and updated published sources. Specifically, the following sources have been used:

- UK Government's [Greenhouse gas reporting: conversion factors](#) (2023)
- Agribalyse Agricultural and Food Database

V. Data Gathering and Assumptions

Activity	Data Type Used	Assumption and Calculation Method
Purchased Fuel	Litre or kg of fuel purchased	No assumptions needed. Emissions calculated by multiplying the EF per type of fuel by total weight/volume purchased
Owned/Leased Fleet	Litres of fuel used	For buggies 209.33 L diesel have been estimated based on 157 L purchased last year + 30% more for an extra diesel buggy this year. Emissions calculated by multiplying the Emission Factor (EF) per type of fuel by total weight/volume used
Fugitive Emissions	N/A	N/A
Electricity	N/A	N/A
Staff Transport	Average distance travelled and reported method of transport used.	Data from 106 survey responses was combined with information from the crew ticketing system database (Eventree) and extrapolated to cover 1,826 individuals (this figure excludes 293 artists and 21 suppliers, as their travel emissions are considered in their respective sections to avoid double counting). The crew ticketing system provided precise data for 1,006 vehicles. After deducting 186 vehicles used by artists (accounted for in another section) and three vehicles used by contractors (also accounted for separately), a total of 817 vehicles was considered as the maximum potential responses from car or van drivers. The difference between the survey extrapolation and the ticket data was attributed to passengers. Emissions calculated by multiplying the EF per type of vehicle by total mileage travelled
Audience transport	Average distance travelled and reported method of transport used.	Data from 133 survey responses plus Ticket Sellers database extrapolated to 2,514 attendees supplemented with data from actual ticket sales. Since we had precise information on the total number of car and vehicle tickets purchased, we utilised these figures as the maximum potential responses for car drivers, van drivers, and motorcyclists. The variance between the survey extrapolation and the

Activity	Data Type Used	Assumption and Calculation Method
		ticket data was presumed to be passengers. For instance, the 870 drivers in the survey responses were adjusted to 440 drivers (the total number of car tickets booked) and 430 passengers. Considering the nature of the event, we assumed that out of the 22 people who came from outside the UK, 18 did not have car or campervan tickets. Instead, they likely used public transport, such as trains or buses, as part of their broader journey in the UK. We assumed an average of 250 round-trip miles travelled by these 18 people via train. We retained and extrapolated the remaining survey responses for other forms of transport like buses and trains. The assumptions involve potential risks. They assume 100% of survey drivers purchased vehicle tickets and may lead to over or underestimations of public transport users. Also, these assumptions exclude individuals who may have arrived from abroad using transport modes other than cars or campervans. Emissions calculated by multiplying the EF per type of vehicle by total mileage travelled.
Artist Transport & Accommodation	Average distance travelled Mode of transport used	Data from 383 individuals related to 101 bands that used 186 vehicles. An average factor has been calculated to be used for “car, van or campervan” as the specific vehicle breakdown was not recorded. Emissions calculated by multiplying the average EF per car, van and campervan estimated, by total mileage travelled.
Production Supplies & Materials Purchased	Types of materials purchased Weight of materials purchased.	Emissions calculated by multiplying the EF per type of raw material by total weight (kg) per type. No EF available for ceramic (mugs). Concrete factors are used as a proxy. No specific EF is available in the BEIS dataset for organic cotton or cotton clothing. EF for 100% cotton clothing used from WikiCarbon No specific EF is available in the BEIS dataset for straw bales. EF for Bale of straw (permanent field) / organic used from ADEME / Agribalyse database.

Activity	Data Type Used	Assumption and Calculation Method
Production Transport (Suppliers / contractors)	Average distance travelled per supplier Method of transport used.	For some of the contractors an average factor has been calculated to be used for either car + trailer, small van or car as the specific vehicle was not recorded. Emissions calculated by multiplying the EF per type of vehicle by total mileage travelled.
Food	number of servings. Vegetarian meals	Since the specific ingredients and the weight per serving were not recorded, an average emission factor per vegetarian serving has been employed to estimate the emissions using Agribalise database. Besides, it has been assumed that each attendee had one meal and two savory snacks per day. Emissions calculated by multiplying the EF calculated per type of meal by total weight (kg) per type.
Beverages	Units of beverages sold and volume assumed per unit	Total litres of each beverage type delivered to site or sold by the bars. No assumptions needed. Emissions calculated by multiplying the EF per type of vehicle by total mileage travelled.
Serveware	Types of materials purchased Weight of materials purchased.	Weight per serveware item based on assumptions: • PP Pint Cup - 43 g • PP half pint cup - 36 g • Glass bottles - 200 g Emissions calculated by multiplying the EF calculated per type of material by total weight (kg) per type.
Waste Generation	Total waste generated in tonnes and waste streams breakdown	No assumptions needed. Emissions calculated by multiplying the EF calculated per waste treatment and waste stream by total weight (kg).
Water and Wastewater	Total cubic metres recorded.	No assumptions needed. Consumption of water and wastewater generation (m3) by the festival reported by the organisation. Estimated from metre readings before and after the event. Waste water volumes based on reported volumes uplifted by wastewater contractor. Emissions calculated by multiplying the EF calculated per waste used and treated (cubic metres).

Activity	Data Type Used	Assumption and Calculation Method
Other Supplier or Third Party Emissions (cooking gas)	Total kg propane used for the kitchen and caterers.	No assumptions needed. Emissions calculated by multiplying the EF per type of fuel by total weight/volume used.



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