

GREEN TRANSITION STRATEGY



SeaGoingGreen

FINAL REPORT

CLIENT: BOAT BIKE TOURS

NOVEMBER
2020

MAGNIFIQUE II



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FOREWORD

International tourist arrivals increased by 4% in 2019, reaching the 1.5 billion mark ahead of forecasts for 2020, validating the resilience and leadership of the sector.

The tourism sector continues to be one of the most powerful drivers of economic growth and international development. Although, as a result of this tourism boom, an increased pressure has been put on natural resources and biodiversity, fueling tensions between visitors and their hosts over where the responsibility lies.

The marine environment has long been one of the most attractive settings for tourism. Visitors who interact with marine environments enjoy a wide spectrum of experiences including scuba diving, snorkeling, sailing, beach activities, and fishing. Even if visitors do not directly interact with a local marine environment through these activities, its quality is intrinsic to the destination's larger identity.

With the increased popularity of marine based excursions and direct contact with nature, we have seen a rise in the trend of responsible tourism and sustainable practices.

Preventing the degradation of the local environments has never been more relevant. As many as >90% of the world's coral reefs are expected to die by 2050 according to a prediction by experts, which means that there is no time to lose to prevent outcomes such as these.

Imagine diving in the great barrier reef - without the reef. Tourism may cause harm, but it doesn't have to.

Tourism has the potential to be a catalyst for the sustainable use of the natural environment, the conservation of marine environments and the raising of environmental awareness.

Working towards reaching milestones such as becoming plastic-free and CO2 neutrality will not only differentiate your brand, but elevate the image of Boat Bike Tours for increased revenue and name recognition. Communicating to guests that you are lowering your impact while giving back to local communities and the environment is important in showing your dedication as a sustainability leader in the tourism sector.

Not only can this attract eco-conscious guests and lead to re-occurring bookings, but it can also expand your reach to different target markets. Studies show that travelers overwhelmingly prefer companies that incorporate green practices into their operations, which encourages tourism customers to pay more for services from a company with a sustainable brand identity (especially Millennials and Generation Z).

Businesses looking to integrate green practices into their operations will gain a competitive advantage and a head start compared to their competition, which makes businesses stand out.

In the spirit of this, Boat Bike Tours has requested this Green Transition Strategy proposal from Sea Going Green to be designed for the purpose of incorporating and operationalizing the value of sustainability via alternatives to energy, fuel, waste-water and single-use plastics to further build credibility and legitimacy of your commitment to [#GoGreenForTheBigBlue](#).



THE IMPACT OF COVID-19 ON BOAT BIKE TOURS' 2020 SEASON

In March 2020, the tourism industry came to a halt. The coronavirus (COVID-19) swiftly led to restrictions being put in place around the world, stopping the estimated 1.5 billion tourism arrivals from reaching their destinations as effortlessly as before. For the cruising industry, COVID also took its toll. In the Netherlands specifically, the ebb and flow of restrictions on tourism from June onward allowed for Europeans to join tours which was welcomed by cruising businesses as they shifted towards a domestic (EU) tourism strategy. Boat Bike Tours was able to offer a shortened summer season with condensed offerings to travellers. Negative travel advice issued by the governments of Germany and Belgium ended the season early with cancellations running through the end of the month effectively ending the season in September. **The 2020 season ran 153 weeks (2020 weeks) in total, with a total of 4403 (2020 pax) amount of pax which is 71 % less than last years total pax which was 15,206 (2019 pax) over 421 (2019 weeks) total weeks.**

In response to COVID-19, Boat Bike Tour's operations were overhauled under their new Corona Protocol. The protocol was created based on guidelines from the EU-Commission document (13-05-2020 / C(2020) 3251 final) "COVID-19 EU Guidance for the progressive resumption of tourism services and for health protocols in hospitality establishments". These adaptations, put into place in cooperation with the Dutch Government, added precautions to ensure that health and safety measures were prioritized for the well-being of guests on board and while cycling. Measures were implemented specifically per ship and in line with regulations from the ships' port of departure and route through other countries.

Operational changes included measures for guests including a pre-boarding questionnaire and free cancellation for guests to decrease the risk of virus transmission on board. Face masks (disposable) were supplied on board to be used by guests. For staff, extra hygienic care was prioritized to keep communal surfaces like door handles and devices clean. The advice for 1.5 meters distance was enforced from the ships' embarking to restaurant etiquette including when cycling. Plastic gloves and other single use items including face masks were made mandatory for chefs and kitchen workers, which were instructed to be changed frequently. Hand sanitizer and disinfectant soap were widely available. Instructions on health and safety protocol were discussed regularly on board. Table service over buffets, pre-selections for meals and bar self-service were introduced for additional safety. Throughout the journey, guests were asked for feedback on improvements and other suggested measures to ensure that guest expectations were met. Boat Bike Tour's full coronavirus protocol can be found [here](#).

Even with the restrictions and challenges posed by the coronavirus pandemic, Boat Bike Tours was able to provide memorable experiences for guests thanks to the hard work from captains and crew, who worked tirelessly to make the season possible. While it is unknown how the pandemic will impact travel and tourism for the 2021 season, Boat Bike Tours will continue its sustainability journey and mission to strive to become CO2 neutral by measuring the fleet's impact over the 2020 season. Insights gained will be used to create sustainability milestones for the upcoming season.

SCOPE

BOAT BIKE TOURS THE NETHERLANDS 2020



Location: The Netherlands

BBT Office: 22 Employees

PASSENGER NUMBER, SAILING WEEKS IN
TOTAL AND CAPACITY FOR BBT PER SHIP

Ship Name	Weeks in Total	Total Number of Guests	Capacity
Zwaantje	0	0	20
Allure	0	0	20
Gandalf	0	0	20
Fiep	0	0	20
Magnifique 2	2	54	37
Fleur	3	28	20
Lena Maria	3	45	24
Flora	4	55	20
Magnifique	9	179	35
Sarah	10	105	20
Wapen fan Fryslan	10	147	36
Fluvius	11	230	44
De Holland	11	686	71
De Amsterdam	11	989	112
Elizabeth	12	171	35
Magnifique 3	12	197	40
Mare fan Fryslan	13	302	41
Magnifique 4	14	215	36
Leafde fan Fryslan	14	314	25
De Nassau	14	686	68
Total:	153	4403	744

METHODOLOGY - ACTIVITY BASED CARBON FOOTPRINT ASSESSMENT



The Sea Going Green "Green Transition Strategy" including the Environmental Impact Assessment Carbon Emission Calculation has been modelled based on the World Resources Institute / World Business Council for Sustainable Development (WRI/WBCSD) Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition. Our methodology for the Environmental Impact Assessment includes an activity based carbon footprint of which materials have been used by the BBT Office (2019) and the entire fleet.

All figures and analyses were based directly on data given from Boat Bike Tours and the ship owners or skippers. Please take into account that the more data provided, the more accurate your footprint calculation will be. The carbon footprint can be defined as: "a measure of the exclusive total amount of CO₂ emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product" (Wiedmann & Minx, 2008).

Please note that our final calculations do not include any CO₂ emissions from flights that were taken to travel to the port of departure, in this case: Amsterdam. With this accounted for, individual estimates for guests' footprints would be considerably higher, especially for trans-Atlantic guests. The average long-haul flight produces **2,000** kg of CO₂ per round trip.

Filimonau, Dickinson, and Robbins (2014) conducted a study about the carbon impact of short-haul tourism and they support the idea that within tourism, transportation generates the largest carbon footprint. They concluded that the most significant carbon savings for a trip can be achieved by switching from air and car-based travel to train and coach journeys. Peeters and Schouten (2006) worked on the ecological footprint of inbound tourism and transport to Amsterdam. They also conclude that the main part of the environmental pressure of inbound tourism originates from transport (**70%**) and accommodation as well (**21%**) (Filimonau et al., 2014 Gössling, 2013; Rico et al., 2019).



METHODOLOGY - ACTIVITY BASED CARBON FOOTPRINT ASSESSMENT

Although transport is recognized as the highest contributor to the carbon footprint of tourism, many other tourism related activities also contribute significantly to tourism greenhouse gas emissions because of their high energy intensity. In particular, these are accommodation and leisure related activities. When considering tourist accommodation, there are factors that take place on the same premises such as heating, and air-conditioning of the rooms, water-use, laundry and so on that must be taken in to account (Michailidou, Vlachokostas, Moussiopoulos, & Maleka, 2015). Therefore, we focus on such activity based footprints. The activity based carbon calculation methodology is an analytical method to quantify flows, stocks of materials and substances in a defined system, in this case during the BBT 2019 season.



PRODUCT CARBON FOOTPRINT LIFE
CYCLE
SOURCE: ACF NETWORK

The emission coefficients that we used for this method are pre- and post production since it is important to consider the entire life cycle of materials and products for tourism activity categories. Products, for instance, hold different carbon intensities.

For example, vegetable production in Europe is more carbon intensive than vegetable production in Asia, as Europe uses more carbon intensive means of production, such as artificially heated greenhouses. Cereal production in Asia is more carbon intensive than cereal production in Europe due to the difference in the type of cereal grown: rice on average has higher impact factors than wheat. Activities might involve services or infrastructures belonging to the public sector, so our calculations only account for the corresponding part of the impact allocated to tourism use. Our emission coefficients include all CO₂ emitted before the concerning material for a tourism activity can be made and after it is used, making them the most comprehensive CO₂ factors to be used for calculations. This calculation framework includes the 'direct' emissions from the obtaining of the raw materials needed for the activity or system. These are also known as pre-production emissions.



METHODOLOGY - ACTIVITY BASED CARBON FOOTPRINT ASSESSMENT

Additionally, the framework includes 'indirect' post production phases, such as emissions from the management of the generated waste. The indirect carbon footprint thus arises from the non-use phases of a product or service life cycle; it is also embodied in the capital goods and infrastructure necessary to extract, transport and refine raw materials, manufacture a product or service, deliver it to a final user, regularly maintain and finally dispose of it (Frischknecht et al., 2007; Lenzen et al., 2003). Thus, within the carbon factors that are used for the calculations in this report, both direct and indirect (pre- and post production) emissions are included.

Carbon footprint calculation serves as an assessment tool in terms of greenhouse gas emissions and then, it serves to manage and reduce these emissions.

After calculating the carbon footprint, its detailing helps to identify weaknesses - areas of high emissions that can be eliminated or improved. Thus, the carbon footprint can be perceived as an indicator of sustainable development (Radu et al., 2013; Rico et al., 2019).

OPERATIONAL BOUNDARIES & LIMITATIONS

Due to challenges in data collection posed by the impact of COVID-19 on BBT's 2020 season, our approach was modified to provide the best estimates of the environmental impact from the 2020 season.

The data provided in this report was collected from questionnaires and ship visits from the previous 2019 season and calculated by the number of weeks sailed and/or the amount of passengers on board in 2020.

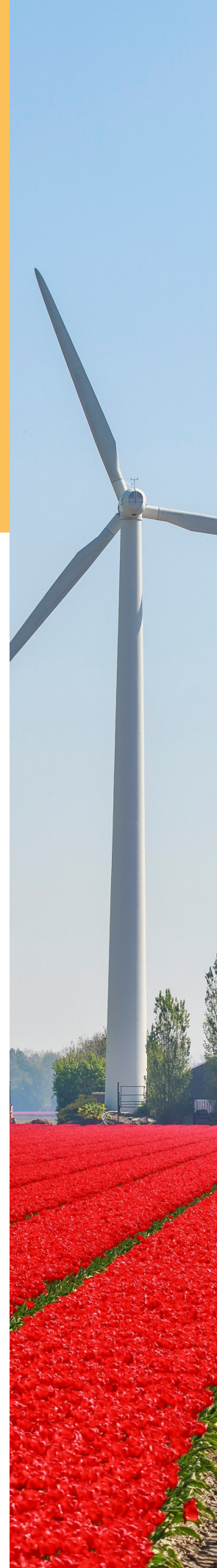
Calculations for fuel, energy and water are constant not reflecting the pax, but rather weeks sailed. Variables including food consumption, plastic usage and laundry have been calculated per pax.

Due to the fact that the 2020 sailing season was challenging and affected by COVID-19, not all boats in the fleet were able to sail. The following boats were not part of the fleet that sailed in the 2020 season: Allure, Zwaantje, Gandalf and Fiep.

CARBON FOOTPRINT ANALYSIS & ASSESSMENT

Enables us to **identify & evaluate** the impact and pressures of current operations on the (marine) environment, **analyze** current emissions and practices and set objectives accordingly.

- Which areas of the business emit the most carbon emissions
- Which materials are the most carbon intensive
- Analyze data from stocklists provided by Boat Bike Tours
- Calculate 2020 emissions of the fleet using extrapolated data



CARBON FOOTPRINT ANALYSIS & ASSESSMENT

- Conduct a carbon footprint assessment for 2020 by extrapolating 2019 data.
- Analyze the carbon footprints for the boats that sailed during the 2020 season and the office, highlighting where the largest and smallest impacts were.



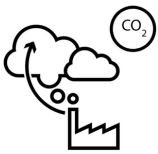
DELIVERABLE



CARBON FOOTPRINT ANALYSIS

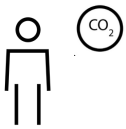
BBT OFFICE

TOTAL CO2 EMISSIONS IN
2020 FOR THE BBT OFFICE:



55,231 KG

CO2 FOOTPRINT FOR A BBT
OFFICE EMPLOYEE IN 2020:

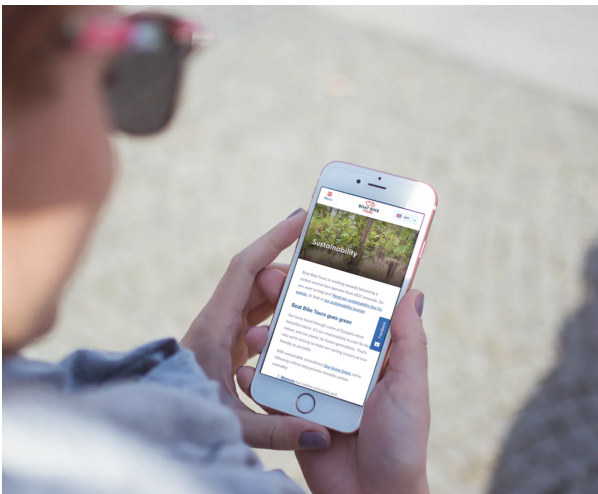


2,510 KG

NUMBER OF CO2 PRODUCED BY BBT
OFFICE'S A4 PAPER USAGE:



455.6 KG



The calculations for the carbon footprint of the BBT office were based on **12** months and **22** employees. The number of working days varied per person per month. From the data gathered in February and March, averages were made and used to calculate the footprint of the remaining months.

These estimates included the calculation of travel to and from the office by employees with specific modes of transport taken into account. Modes of transport varied from (hybrid) cars running on diesel and regular gas, public transport, scooters and cycling. The total emissions of all travel using these modes of transport were **13,694.80** kg, which is a significantly lower number than **2018** emissions (**38,774.8** kg) and **2019** emissions (**47,229.5** kg). However, the number of employees was lower in **2018** compared to **2019** and in **2020** lower compared to **2019**.

The average CO2 emissions for travel to and from the office per employee amounted to **1,762.5** kg (**2018**) and **1,689.3** (**2019**): a decrease of **4.16%**. The aforementioned numbers do not include business flights, which generated **2,086** kg of CO2 emissions.

BBT OFFICE CARBON EMISSION CALCULATIONS



FIGURE 1: BBT OFFICE

Material	Kg of CO2
Total water use	8.94
Energy use	31803.55
Plastics	330.35
Paper	6224.91
Employee travel	13694.80
Business flights	2086.00
Office supplies and promotion materials	1082.78
Total	55231.33

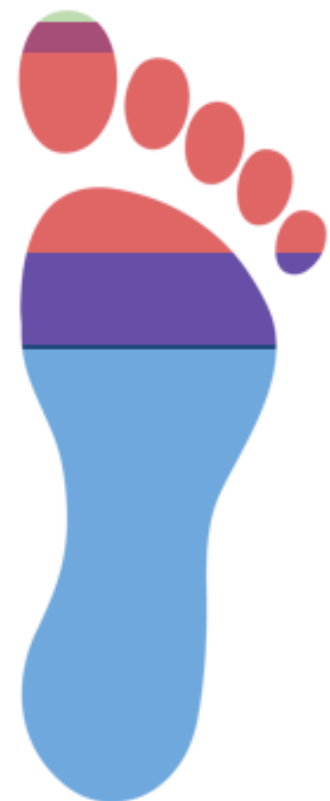
Per employee:	2510.51
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BBT OFFICE EMISSIONS 2020

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020

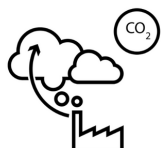
 **- 71,140 KG**

- 1.96% ■ Office supplies and promotion materials
- 3.78% ■ Business flights
- 24.80% ■ Employee travel to/from office
- 11.27% ■ Paper
- 0.60% ■ Plastics
- 57.58% ■ Energy use
- 0.02% ■ Water use



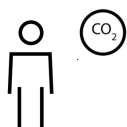
DE AMSTERDAM

TOTAL CO2 EMISSIONS IN 2020 FOR DE AMSTERDAM:



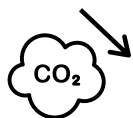
347,028 KG

CO2 FOOTPRINT FOR A DE AMSTERDAM PASSENGER IN 2020



351 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



- 596,246 KG

De Amsterdam is by far the biggest ship sailing for BBT. In the season of 2020, it carried a total of **989** passengers in **11** weeks. The total emissions generated over the 2020 season was **347,028 kg**. The average footprint per passenger in **2018** was **303 kg**, **312 kg** in 2019 and **351 kg** in **2020**. This increase is due to a much lower number of passengers resulting in a higher average per person (**3480** in 2018, **3021** in 2019 and **989** passengers in 2020).



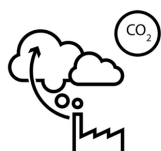
FIGURE 3: DE AMSTERDAM

Material	Kg of CO2
Fuel	275.663.8
Total water use	241.6
Energy use	3.261.5
Laundry	5.503.6
Plastics	1.767.5
Paper	762.4
Glass	155.7
Food & beverages	59.671.6
Other materials	0.0
Total	347027.77
Per Passenger:	350.89

- 79.4 % Fuel
- 0.1 % Total water use
- 0.9 % Energy use
- 1.6 % Laundry
- 0.5 % Plastics
- 0.2 % Paper
- 0.0 % Glass
- 17.2 % Food & Beverages
- 0.0 % Other materials

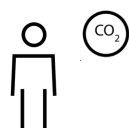
ELIZABETH

TOTAL CO2 EMISSIONS IN 2020 FOR ELIZABETH



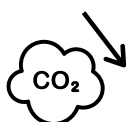
32,663 KG

CO2 FOOTPRINT FOR AN ELIZABETH PASSENGER IN 2020



191 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



- 4,849.5 KG

The three-mast clipper, Elizabeth, cruised for **12** weeks with a total of **171** passengers in the season of 2020. The total footprint generated by Elizabeth for the 2020 season was **32,663** kg. The average passenger footprint was **160** kg in 2019 and **191** kg in 2020.

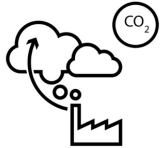


FIGURE 4: ELIZABETH

Material	Kg of CO2
Fuel	17,538.9
Total water use	122.0
Energy use	1,841.0
Laundry	523.7
Plastics	96.2
Paper	21.9
Glass	40.1
Food & beverages	12,479.4
Other materials	0.0
Total	32663.20
Per Passenger:	191.01

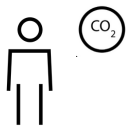
- 53.7% Fuel
- 0.4% Total water use
- 5.6% Energy use
- 1.6% Laundry
- 0.3% Plastics
- 0.1% Paper
- 0.1% Glass
- 38.2% Food & Beverages
- 0.0% Other materials

TOTAL CO2 EMISSIONS IN 2020 FOR FLEUR



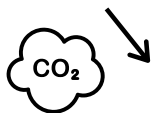
9,344 KG

CO2 FOOTPRINT FOR A FLEUR PASSENGER IN 2020



334 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



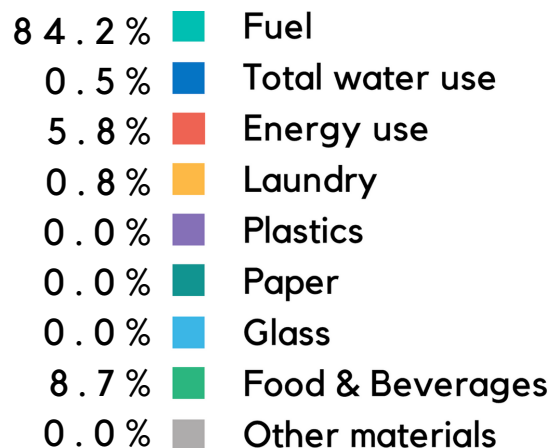
- 70,848 KG

In 2020, the passenger barge Fleur cruised **3** weeks and had **28** passengers on board. The total emissions for Fleur in 2020 were **9,344** kg. The average footprint for a Fleur passenger was **159** kg in 2019 and **334** kg in 2020.



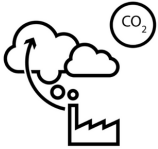
FIGURE 6: FLEUR

Material	Kg of CO2
Fuel	7.872.3
Total water use	44.5
Energy use	541.1
Laundry	71.0
Plastics	0.0
Paper	2.1
Glass	0.0
Food & beverages	813.2
Other materials	0.0
Total	9344.26
Per Passenger:	333.72



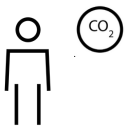
FLORA

TOTAL CO2 EMISSIONS IN 2020 FOR FLORA



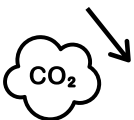
8,756 KG

CO2 FOOTPRINT FOR A FLORA PASSENGER IN 2020



159 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



- 25,131 KG

The river barge, Flora, cruised the fresh waters for **4** weeks last season. **55** passengers were carried for BBT. Flora's overall CO2 footprint for the 2020 season was **8,756** kg. The average footprint per passenger was **160** kg in 2019 and **159** kg in 2020.



FIGURE 7: FLORA

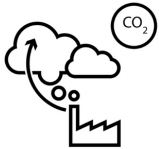
Material	Kg of CO2
Fuel	6.682.8
Total water use	44.7
Energy use	565.9
Laundry	98.6
Plastics	0.0
Paper	0.0
Glass	0.0
Food & beverages	1.364.2
Other materials	0.0
Total	8756.12
Per Passenger:	159.20

- 76.3% Fuel
- 0.5% Total water use
- 6.5% Energy use
- 1.1% Laundry
- 0.0% Plastics
- 0.0% Paper
- 0.0% Glass
- 15.6% Food & Beverages
- 0.0% Other materials

FLUVIUS

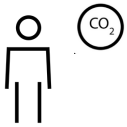


TOTAL CO2 EMISSIONS IN 2020 FOR FLUVIUS



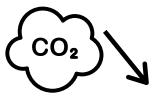
49,480 KG

CO2 FOOTPRINT FOR A FLUVIUS PASSENGER IN 2020



215 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



- 99,034 KG

The luxury river cruise barge, Fluvius, sailed for **11** weeks in the season of 2020 with an amount of **230** guests. The total footprint for Fluvius in 2020 was **49,480** kg. The average footprint per passenger on board the Fluvius was **151** kg in 2019 and **215** kg in 2020.



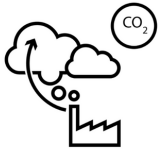
FIGURE 8: FLUVIUS

Material	Kg of CO2
Fuel	29.608.3
Total water use	170.7
Energy use	8.545.6
Laundry	1.099.1
Plastics	5.6
Paper	124.0
Glass	0.9
Food & beverages	9.926.1
Other materials	0.0
Total	49480.27
Per Passenger:	215.13

- 59.8% Fuel
- 0.3% Total water use
- 17.3% Energy use
- 2.2% Laundry
- 0.0% Plastics
- 0.3% Paper
- 0.0% Glass
- 20.1% Food & Beverages
- 0.0% Other materials

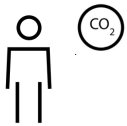
DE HOLLAND

TOTAL CO2 EMISSIONS IN
2020 FOR DE HOLLAND



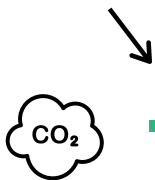
217,601 KG

CO2 FOOTPRINT FOR A DE
HOLLAND PASSENGER IN 2020



317 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 321,655 KG

Last season, De Holland sailed **11** weeks with a total number of **686** passengers. The overall footprint for De Holland over the 2020 season was **217,601** kg. The average footprint per passenger of De Holland was **307** kg in 2019 and **317** kg in 2020.



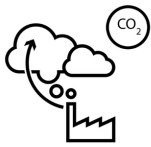
FIGURE 10: DE HOLLAND

Material	Kg of CO2
Fuel	154.478.3
Total water use	340.0
Energy use	13.886.1
Laundry	4.569.6
Plastics	2.000.5
Paper	550.4
Glass	386.0
Food & beverages	41.390.0
Other materials	0.0
Total	217600.85
Per Passenger:	317.20

- 71.0 % ■ Fuel
- 0.2 % ■ Total water use
- 6.4 % ■ Energy use
- 2.1 % ■ Laundry
- 0.9 % ■ Plastics
- 0.3 % ■ Paper
- 0.2 % ■ Glass
- 19.0 % ■ Food & Beverages
- 0.0 % ■ Other materials

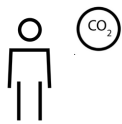
LEAFDE FAN FRYSLÂN

TOTAL CO2 EMISSIONS IN 2020
FOR LEAFDE FAN FRYSLÂN



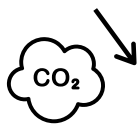
46,770 KG

CO2 FOOTPRINT FOR A LEAFDE
FAN FRYSLÂN PASSENGER IN 2020



149 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 44,014 KG

The three-mast barquentine, Leafde fan Fryslân, sailed for **14** weeks with a total of **314** passengers in 2020. Leafde fan Fryslân had a total CO2 footprint of **46,770** kg for the 2020 season. The average CO2 footprint per passenger was **175** kg in 2019 and **149** kg in 2020.



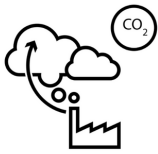
FIGURE 11: LEAFDE FAN FRYSLÂN

Material	Kg of CO2
Fuel	24.225.0
Total water use	118.8
Energy use	2.107.1
Laundry	1.545.5
Plastics	289.2
Paper	148.2171156
Glass	3.0
Food & beverages	18.333.3
Other materials	0.0
Total	46770.11
Per Passenger:	148.95

- 51.8 % Fuel
- 0.3 % Total water use
- 4.5 % Energy use
- 3.3 % Laundry
- 0.6 % Plastics
- 0.3 % Paper
- 0.0 % Glass
- 39.2 % Food & Beverages
- 0.0 % Other materials

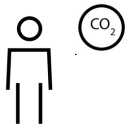
LENA MARIA

TOTAL CO2 EMISSIONS IN
2020 FOR LENA MARIA



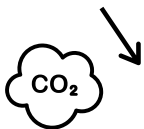
10,813 KG

CO2 FOOTPRINT FOR A LENA
MARIA PASSENGER IN 2020



240 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 94,125 KG

In the season of 2020, the Lena Maria sailed **3** weeks with **45** guests for BBT. The total footprint of Lena Maria over the 2020 season was **10,813** kg. The average footprint per passenger was **192** kg in 2019 and **240** kg in 2020.

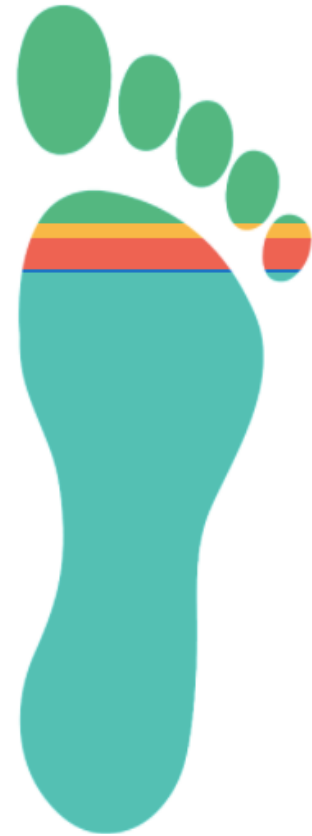
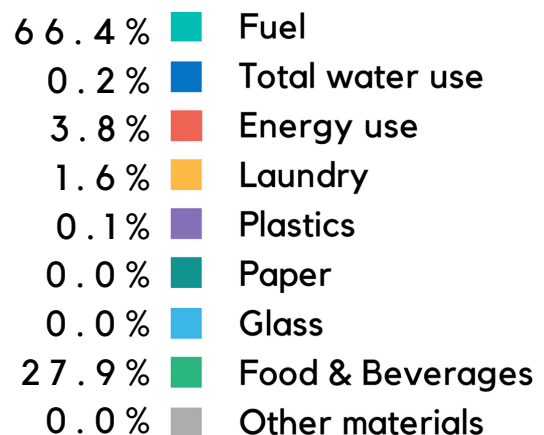


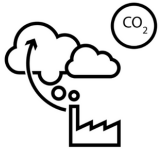
FIGURE 12: LENA MARIA

Material	Kg of CO2
Fuel	7.177.8
Total water use	22.8
Energy use	409.1
Laundry	174.7
Plastics	7.3
Paper	0.0
Glass	0.7
Food & beverages	3.020.3
Other materials	0.0
Total	10812.79
Per Passenger:	240.28



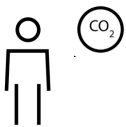
MAGNIFIQUE

TOTAL CO2 EMISSIONS IN
2020 FOR MAGNIFIQUE



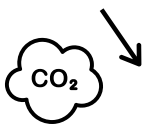
78,098 KG

CO2 FOOTPRINT FOR A
MAGNIFIQUE PASSENGER IN 2020



436 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 203,386 KG

The Magnifique carried **179** passengers for BBT in its 2020 season which lasted **9** weeks. The overall footprint from Magnifique for the 2020 season was **78,098** kg. The average passenger footprint on Magnifique was **269** kg in 2019 and **436** kg in 2020.



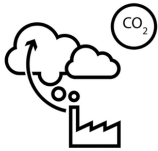
FIGURE 13: MAGNIFIQUE

Material	Kg of CO2
Fuel	47,759.1
Total water use	5.856
Energy use	18,936.0
Laundry	485.54
Plastics	38.70
Paper	61.00
Glass	11.28
Food & beverages	10800.02
Other materials	0.0
Total	78097.50
Per Passenger:	436.30

- 61.2 % Fuel
- 0.0 % Total water use
- 24.2 % Energy use
- 0.6 % Laundry
- 0.0 % Plastics
- 0.1 % Paper
- 0.0 % Glass
- 13.8 % Food & Beverages
- 0.0 % Other materials

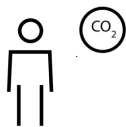
MAGNIFIQUE II

TOTAL CO2 EMISSIONS IN 2020 FOR MAGNIFIQUE II



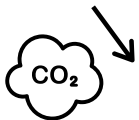
11,515 KG

CO2 FOOTPRINT FOR A MAGNIFIQUE II PASSENGER IN 2020



213 KG

AMOUNT OF CO2 DECREASED FROM 2019 TO 2020



- 173,845 KG

During the 2020 season, the Magnifique II welcomed **54** guests on board in **2** weeks for BBT. The overall footprint for Magnifique II was **11,515** kg. The average footprint for a passenger on board the ship was **183** kg in 2019 and **213** kg in 2020.



FIGURE 14: MAGNIFIQUE II

Material	Kg of CO2
Fuel	7.752.0
Total water use	68.3
Energy use	300.6
Laundry	297.7
Plastics	59.4
Paper	6.9
Glass	45.1
Food & beverages	2.985.0
Other materials	0.0
Total	11515.07
Per Passenger:	213.242

- 67.3 % ■ Fuel
- 0.6 % ■ Total water use
- 2.6 % ■ Energy use
- 2.6 % ■ Laundry
- 0.5 % ■ Plastics
- 0.1 % ■ Paper
- 0.4 % ■ Glass
- 25.9 % ■ Food & Beverages
- 0.0 % ■ Other materials

MAGNIFIQUE III

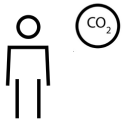


TOTAL CO₂ EMISSIONS IN 2020 FOR MAGNIFIQUE III



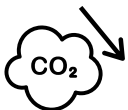
61,038 KG

CO₂ FOOTPRINT FOR A MAGNIFIQUE III PASSENGER IN 2020



310 KG

AMOUNT OF CO₂ DECREASED FROM 2019 TO 2020



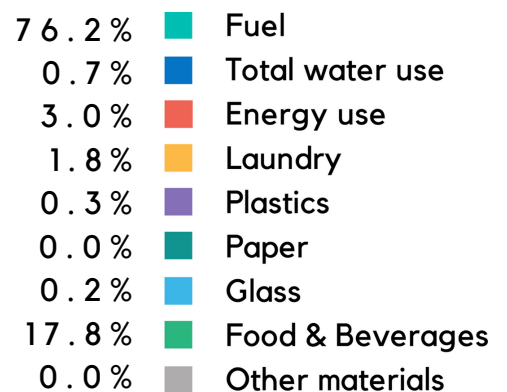
- 133,967 KG

The Magnifique III sailed **12** weeks for BBT with a total of **197** passengers in 2020. The overall footprint for Magnifique III in 2020 was **61,038** kg. The average footprint for a Magnifique III passenger in 2018 was **228.67** kg, in 2019 **158** kg and in 2020 it was **310** kg.



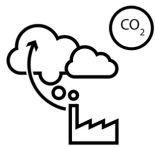
FIGURE 15: MAGNIFIQUE III

Material	Kg of CO ₂
Fuel	46.512.0
Total water use	409.9
Energy use	1.803.4
Laundry	1.086.0
Plastics	176.5
Paper	26.0
Glass	134.7
Food & beverages	10.889.7
Other materials	0.0
Total	61038.19
Per Passenger:	309.84



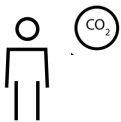
MAGNIFIQUE IV

TOTAL CO2 EMISSIONS IN 2020 FOR MAGNIFIQUE IV



70,360.1 KG

CO2 FOOTPRINT FOR A MAGNIFIQUE IV PASSENGER IN 2020



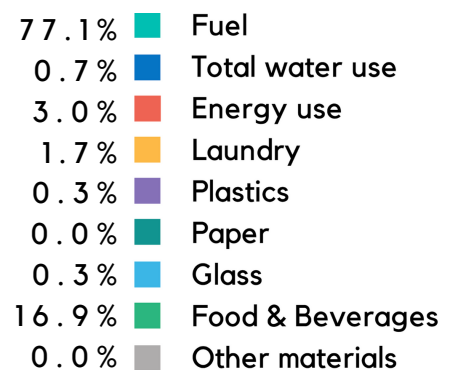
327 KG

The Magnifique IV sailed **14** weeks for BBT with a total of **215** passengers in 2020. The overall footprint for Magnifique IV in 2020 was **70360.12** kg. The average passenger footprint on Magnifique IV was **327** kg.



FIGURE 15: MAGNIFIQUE IV

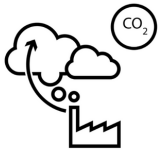
Material	Kg of CO2
Fuel	54.264.0
Total water use	478.2
Energy use	2.104.0
Laundry	1.185.2
Plastics	236.6
Paper	27.6
Glass	179.7
Food & beverages	11.884.7
Other materials	0.0
Total	70360.12
Per Passenger:	327.256



MARE FAN FRYSLÂN

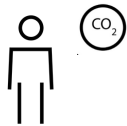


TOTAL CO2 EMISSIONS IN
2020 FOR MARE FAN FRYSLÂN



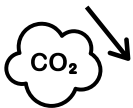
39,742 KG

CO2 FOOTPRINT FOR A MARE
FAN FRYSLÂN PASSENGER IN
2020



132 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



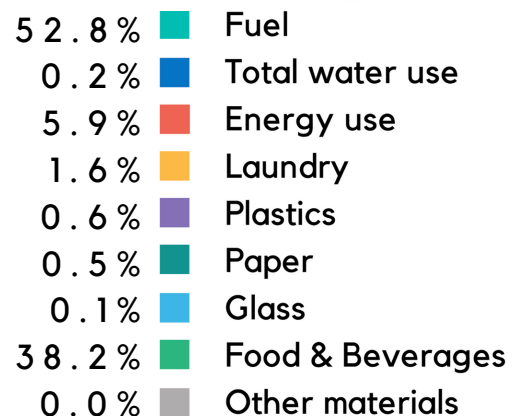
- 36,804 KG

The three-mast sailing ship, Mare fan Fryslân, sailed for **13** weeks with a total of **302** passengers. Mare fan Fryslân's overall CO2 footprint in 2020 was **39,742** kg. The average footprint per passenger was **172** kg in 2019 and **132** kg in 2020.



FIGURE 16: MARE FAN FRYSLÂN

Material	Kg of CO2
Fuel	20.995.0
Total water use	97.9
Energy use	2.348.2
Laundry	630.1
Plastics	235.6
Paper	211.5
Glass	32.3
Food & beverages	15.191.2
Other materials	0.0
Total	39742.03
Per Passenger:	131.60



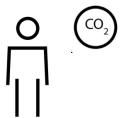
DE NASSAU

TOTAL CO2 EMISSIONS IN
2020 FOR DE NASSAU



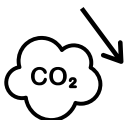
307,412 KG

CO2 FOOTPRINT FOR A DE
NASSAU PASSENGER IN 2020



448 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 108,330 KG

FIGURE 17: DE NASSAU

Material	Kg of CO2
Fuel	251.222.2
Total water use	455.5
Energy use	5.334.3
Laundry	4.682.0
Plastics	2.299.0
Paper	571.9
Glass	1.457.1
Food & beverages	41.390.0
Other materials	0.0
Total	307411.93
Per Passenger:	448.12

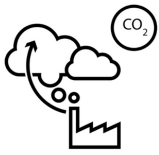
In the season of 2020, De Nassau welcomed **686** passengers on board within **14** weeks. De Nassau's total CO2 footprint for the 2020 season was a colossal **307,412** kg. The average footprint of a De Nassau passenger was **358** kg in 2019 and **488** kg in 2020.



- 81.7 % ■ Fuel
- 0.1 % ■ Total water use
- 1.7 % ■ Energy use
- 1.5 % ■ Laundry
- 0.7 % ■ Plastics
- 0.2 % ■ Paper
- 0.5 % ■ Glass
- 13.5 % ■ Food & Beverages
- 0.0 % ■ Other materials

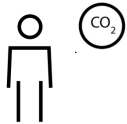
SARAH

TOTAL CO2 EMISSIONS IN
2020 FOR SARAH



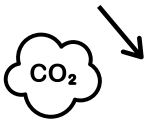
36,674 KG

CO2 FOOTPRINT FOR A SARAH
PASSENGER IN 2020



349 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 85,420 KG

The Sarah sailed **10** weeks for BBT in 2020 and had **105** passengers on board. The total footprint for Sarah over the 2020 season was **36,674** kg. The average CO2 contribution per passenger was **266** kg in 2019 and **349** kg in 2020.



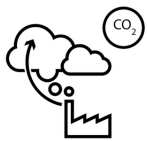
FIGURE 18: SARAH

Material	Kg of CO2
Fuel	27.844.8
Total water use	210.8
Energy use	1.415.0
Laundry	245.5
Plastics	35.0
Paper	88.0
Glass	0.0
Food & beverages	6.834.8
Other materials	0.0
Total	36673.90
Per Passenger:	349.28

- 75.9% Fuel
- 0.6% Total water use
- 3.9% Energy use
- 0.7% Laundry
- 0.1% Plastics
- 0.2% Paper
- 0.0% Glass
- 18.6% Food & Beverages
- 0.0% Other materials

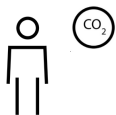
WAPEN FAN FRYSLÂN

TOTAL CO2 EMISSIONS IN 2020
FOR WAPEN FAN FRYSLÂN



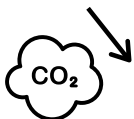
56,509 KG

CO2 FOOTPRINT FOR A WAPEN
FAN FRYSLÂN PASSENGER IN
2020



384 KG

AMOUNT OF CO2 DECREASED
FROM 2019 TO 2020



- 41,755 KG

FIGURE 19: WAPEN FAN FRYSLÂN

Material	Kg of CO2
Fuel	43.066.7
Total water use	244.0
Energy use	2.630.0
Laundry	707.4
Plastics	164.7
Paper	79.9
Glass	3.1
Food & beverages	9.612.7
Other materials	0.0
Total	56508.55
Per Passenger:	384.41

Of the **10** weeks that the sailing ship Wapen fan Fryslân sailed in 2020, with a number of **147** passengers. The total footprint for Wapen fan Fryslân over the 2020 season was **56,509** kg. The average footprint for Wapen fan Fryslân was **164** kg in 2019 and **348** kg in 2020.



- 75.9 % Fuel
- 0.6 % Total water use
- 3.9 % Energy use
- 0.7 % Laundry
- 0.1 % Plastics
- 0.2 % Paper
- 0.0 % Glass
- 18.6 % Food & Beverages
- 0.0 % Other materials

FINAL FIGURES CARBON EMISSION CALCULATIONS

FIGURE 21

Total CO2 emissions in 2020 for BBT Office & Fleet.

Material	Kg of CO2
Fuel	995,531.00
Total water use	3,083.90
Energy use	96,029.10
Laundry	22905.24
Plastics	7742.2
Paper	8,906.72
Glass	2449.68
Food & beverages	256,586.22
Other materials	0.00
Employee travel	13,694.80
Business flights	2,086.00
Office supplies and promotion	1,082.80
Total	1,410,097.66

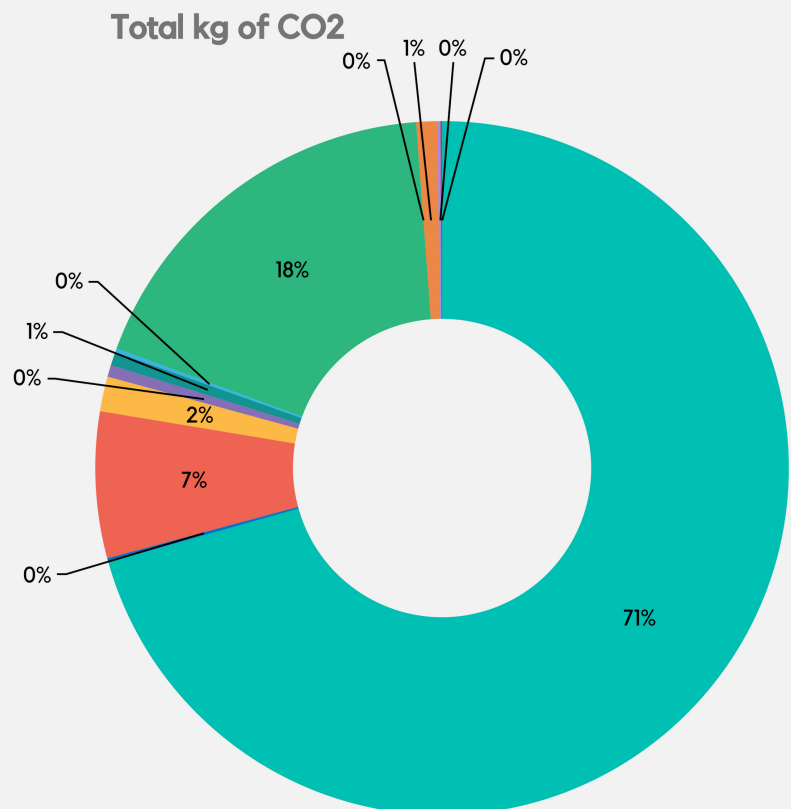
TOTAL CO2 EMISSIONS IN 2020 FOR BBT OFFICE & FLEET



1,410,097.66 KG

- Fuel
- Total water use
- Energy use
- Laundry
- Plastics
- Paper
- Glass
- Food & beverages
- Other materials
- Employee travel
- Business flights
- Office supplies and promotion materials

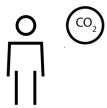
FIGURE 22



DISTRIBUTION OF CATEGORIES

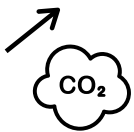
Figure 23 shows that the total amount of CO₂ produced by the fleet is **1,354,456.92 kg**. Including the BBT Office this number is **1,410,097.66 kg**. The average amount of CO₂ per passenger was **303 kg** for the **4403** total passengers on all **16** vessels in 2020 over a total of **153** weeks. As mentioned at the beginning of this report, the CO₂ per passenger does not include flights or transport to the departure location, with this included, the figure would be considerably higher.

AVERAGE CO₂ FOOTPRINT FOR
A BBT PASSENGER IN 2020



303 KG

INCREASE IN CO₂ PER PAX
FROM 2019 TO 2020



± 59.6 KG

The 2019 season had an average carbon footprint per passenger of **243.62 kg** for **15,206** passengers and **421** weeks. The total carbon footprint of the fleet in 2019 was **3,704,521 kg**. The 2019 carbon footprint for both office and fleet was **3,830,868 kg**.

If we look at Figure 24 we can see that the biggest shares of the averages are made up by the carbon emissions pertaining to the usage of fuel and the consumption of food and beverages. These are the categories that have the highest percentages of carbon emissions within each passenger's footprint. A significant proportion of these averages is also contributed by the carbon emissions of energy usage.

This figure shows us that all three sailing ships are within the lower half of the average emissions, and the bigger ships are in the 'top' of average emissions per passenger. The shares of plastic and paper material use are less visible because they account for lower CO₂ emissions compared to fuel i.e., but much more material waste. Production and amount of waste is not visible to display in a chart like this, but it is something to keep in mind.

FIGURE 23

Total CO₂ emissions in 2020 for the fleet.

Material	Kg of CO ₂
Fuel	995,531.00
Total water use	2,665.66
Energy use	64225.5
Laundry	22905.24
Plastics	7411.8
Paper	2681.82
Glass	2449.68
Food & beverages	256,586.22
Other materials	0
Total	1,354,456.92
Per Passenger:	303.22

DISTRIBUTION OF CATEGORIES

Figure 25 shows the total emissions per ship, as compared to Figure 24 that shows the averages per passenger. There are bigger differences in Figure 25 and the material shares out of the total differ too, because each ship has a different number of weeks that it sailed for BBT and a different passenger capacity. We do want to display these total numbers, but note that because of the aforementioned reasons it's difficult to compare the ships to each other. For that purpose, Figure 24 is more suitable.

FIGURE 24

AVERAGE KG OF CO2 PER PAX

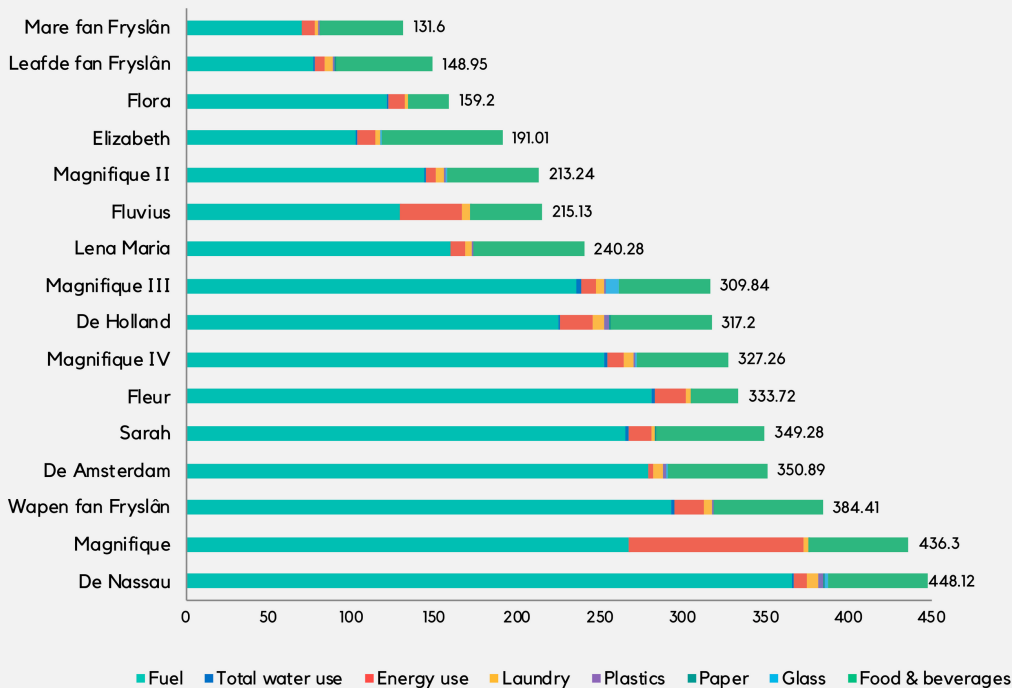
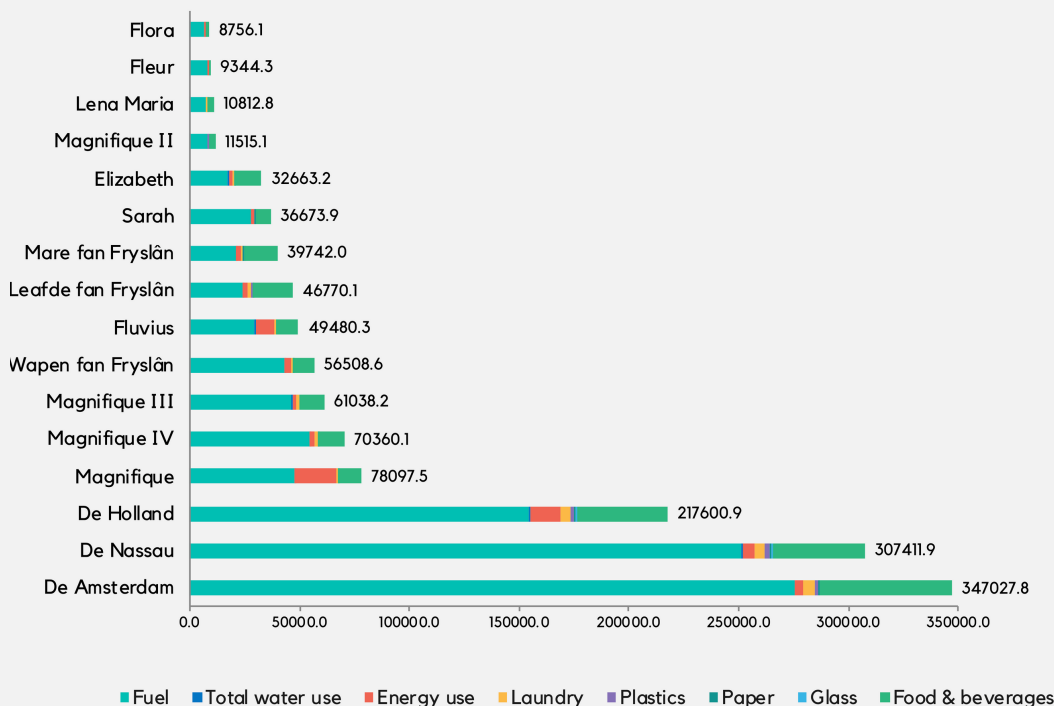


FIGURE 25

TOTAL KG OF CO2 PER CATEGORY



SUMMARY OF KEY FINDINGS



As we used 2019 data to extrapolate the 2020 data for the fleet, conclusions are similar to last years totals. Unsurprisingly, marine gas oil (MGO) was the overall biggest contributor of CO2 emissions for the BBT fleet (**74%**) followed by food and beverages (**19%**) offered on board to guests. Energy use was the third biggest contributor (**5%**). Laundry had a smaller impact on the footprint due to the lower capacity of the 2020 season (**1.7%**) Real time data is needed to make more accurate summaries and to provide a tailor-made plan for future CO2 savings.



16 boats sailed during the 2020 season. The total number of passengers in the 2020 season was **4403**. In total, the fleet had a carbon footprint of **1,354,456.92** kg. The average carbon footprint of a Boat Bike Tours passenger during the 2020 season was **303** kg.



During the 2020 season, there were less employees working from the office on a weekly basis. Therefore, water use was estimated to be the smallest contributor to the footprint (**0.02%**). The biggest contributor to the office's footprint was energy use (**58%**). Second in line was employee travel to and from the office (**25%**). The third biggest contributor was paper (**11%**). Due to the COVID-19 measures, there were less business flights (**4%**) than in 2019. Office supplies and promotion materials only made up about **2%** of the energy and plastic **0.6%**.



EXCLUDED DATA FOR BBT OFFICE & FLEET

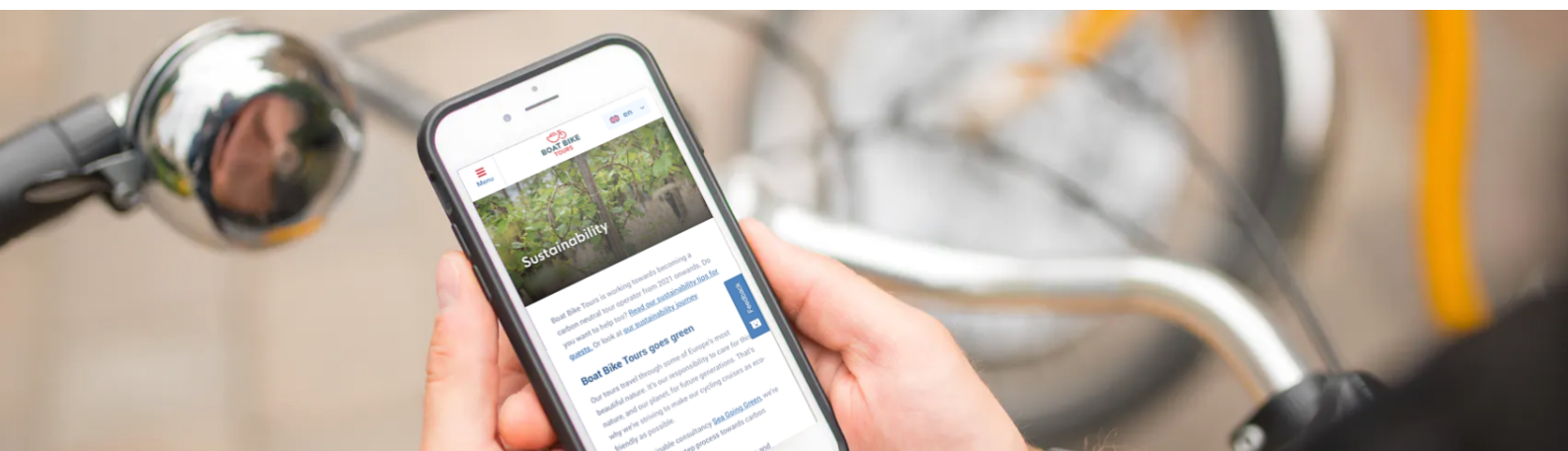
The items listed below are items that are not included in the CO2 calculations because they have significantly limited shares in the total CO2 emissions of the entity that emits them, and no recent and reliable CO2 emissions factors were available for the items concerned.

Office

- Rubber bands
- Single use cleansing wipes
- Disinfecting gel and disinfecting sprays
- Toilet discs
- Laminating plastic
- Vinyl gloves
- Punched pockets / plastic document bags
- Plastic covers for maps on steering wheels of bikes
- Paper roll for disinfecting

River cruise vessels

For all boats, purchased furniture is not included in the CO2 calculations. To keep all footprints comparable, they are excluded. Furniture purchasing patterns are very different since some ships have longer seasons and thus furniture is used more intensively, having an impact on the lifetime. Other owners purchase second hand furniture. Therefore, it is difficult to incorporate such differences in footprint calculations that are needed for baseline measurements.



ASSUMPTIONS

During the CO2 calculation process certain standardized numbers have been used in order to fill in the gaps/missing data. These numbers have been based on assumptions of usages of the ships. This list sums up what assumptions have been made in the process, and which should be explained/noted in the disclaimer of the BBT report.

Office

COVID-19 had many impacts on the entire tourism industry and the functioning of tour operators. Boat Bike Tours had to adjust their internal and external practices in order to keep going. One of these adaptations was a decrease in the number of days that employees worked from the office. In order to calculate the footprint of the office for the whole 2020 season, the average number of days employees were at the office was used. Moreover, approximately 65% of some of the materials, such as bin bags and toilet paper, were used by Boat Bike Tours as they share the office building with other companies who utilize some of the same facilities. In order to calculate the office's 2020 emissions, energy use required an estimate of BBT's 2020 energy consumption. Therefore, 2019 numbers were used.

Survey averages

Within the ship questionnaires that were sent out to all the ship owners, there were questions about water and electricity use and the kilos of laundry that displayed images containing average numbers per type of ship, e.g. small, medium and large ships. The averages that were used for the images in the surveys have been based on the pilot projects in 2018, where the Fiep was classified as small, the Magnifique III as medium and De Amsterdam as large. The total footprint we calculated during the pilot was for BBT and other hotel guests the pilot ships have, so these figures were not just the BBT's guests' footprint, but the questions in the survey were applicable to the total footprint.

Grey electricity

When the ships have not specified what electricity they use, it's assumed that they use grey electricity as only 18% of electricity in the Netherlands is green. The CO2 coefficients for grey electricity have been used. When specified that green energy is used, this will be calculated accordingly.

Electricity use is unknown for a number of ships. If this were the case, the electricity use was estimated based upon the number of guests and weeks that the ship sailed and their capacity, taking into account similar sized ships with comparable operations.

Laundry

During the pilot project that was done for BBT, it was noticed that a lot of ship owners outsource parts of their laundry, and that it would be hard for them to gather information on the usage of water and electricity ascribed to doing laundry, depending on the laundry service provider. Therefore, a standardized number was calculated based upon a literature study that looked into typical laundry usages and emissions within tourism services. Laundry calculations are based upon a study conducted by Filimonau et al. (2011). This standardized number is per kilo of laundry. According to Filimonau et al. (2011) the average hotel room uses 4 pieces of linen (2 bed sheets, a pillow cover and a towel) per guest night, which amounts to 1.75 kg of CO2 emissions. The aforementioned research has shown that 1 kg of laundry equals 4 pieces of linen. Our towel calculations are based upon the average weight of a hotel towel, namely 400 grams.

A guest night of a hotel room that is being used by 2 persons, equals 8 pieces of linen (4 bed sheets, 2 pillow covers and 2 towels). A bed linen change for a 2 person room, excluding towels, amounts to 6 pieces. If bed sheets are not changed during the week, it is assumed that the laundry per 2 person room excluding towels amounts to 6 pieces (3 pieces per passenger).

Fuel

Regarding the sailing ships that were built by the same builder, namely the Leafde fan Fryslân, Mare fan Fryslân and Wapen fan Fryslân, the most accurate data was received for the Wapen fan Fryslân. Therefore, the data that was lacking for the other two ships was settled to that of the Wapen fan Fryslân, as theirs was the most reliable for these specific types of ships.

Waste water

When the ships don't have separate blackwater and greywater tanks, the conversion factor for wastewater is used, as this is a combination of the two. When the ships do have separate tanks, the same factor is being used since a separate established factor for blackwater and greywater individually is unknown. When ships only provide data for a black water or grey water tank, it is assumed that only the tank that the data is provided for is present on the ship.

If the volume of the black water tank is unknown, average measures are used in calculating the amount of wastewater. A toilet flushes 4L of water on average per flush and 0.5 liters of fecal matter, and people use a toilet 4 times a day. This means one toilet in a 2 person cabin produces 4.5 liters times 8 flushes equals 36 liters of black water a day.

One shower a day per person amounts to about 50 liters of water. However, in a hotel guests tend to use more. It can be assumed that all guests take a shower once a day (after cycling) and some of them additionally shower in the morning as well as at night.

Our standardized assumptions are 18 liters of black water per person per day and 60 liters of grey water per person per day. If all drinking water goes into one tank, the average of 2 liters of drinking water per person per day is taken out.

Packaging vs. content of products

Our scope and method for CO2 coefficients is activity based and quantifies flows, stocks of materials and substances. Therefore the calculations for individual ship consumption products that were not part of the standardization only consider the packaging materials and not the contents. For example, this concerns beer, wine and breakfast packaging as the food and beverage consumption is standardized. If there was no specific carbon coefficient for the production of an item, the carbon coefficient is calculated based on the weight of the material that the product is made of.

Food

The standardization of the food for each ship is based on the pilot projects in 2018 as gathering information about exact food and beverage consumption of every ship turned out to be difficult. Furthermore, the standards provided by research proved to be very accurate and showed hardly any difference to the actual data provided by ship owners.

The standardization coefficient for the meat & fish is calculated based upon the assumption that on 'meat days' either beef, chicken, pork, lamb or fish will be consumed. The average CO2 emission is calculated per passenger per day and/or per week. For meat consumption, this amounts to 2,5 kilos of CO2 emissions per person per day that meat is served. The CO2 emissions for non-alcoholic and non-soda drinks (including milk, coffee, tea & fruit juice) are 1 kilos per passenger per week. The CO2 emissions for alcoholic drinks and soda are 2,8 kilos per passenger per week. Finally, for all other food the standardized CO2 emissions are 35 kilos per passenger per week.

The weight of a breakfast spread single-use plastic package, such as for jam, peanut butter or hazelnut spread, is assumed to be 2 grams based on a producer's specifications.

The only exception is the Fiep, which has the same amount of passengers as last year so we used food numbers from last year instead of the standard as the pilot data from the Fiep is more comparable.

Alcohol & Soft drinks

The standardized alcohol calculations are based on 1 alcoholic beverage per person per night assuming that the average stay is 7 nights. Assumed is that some people don't drink, and that some people drink more than 1 alcoholic beverage, making this equal. Next to that, we have estimated one glass of soft drink per person on average too (7 beers and 7 soft drinks or 7 wines and 7 soft drinks per person per trip).

Biofuel emissions

The CO₂ emissions during use of 100% biofuel are set to zero due to the short-cycle nature of the carbon in these fuels. Although CO₂ is released, it does not contribute to the strengthening of the greenhouse effect. The emissions during the production of the fuel arise from the processing of waste oil and transport. A well-known type of fuel in this category is, for example, HVO (Hydrotreated Vegetable Oil) based on used cooking oils.

There are many developments in the biofuel market and taking into account the lack of recent scientific research in this area, there is reasonable doubt about the accuracy of the emission factors as they are now published. These values are considered as provisional/indicative and might be subject to a (possibly strong) change in the future.

ASSUMPTIONS

Amount of plastic wrap

For the Fluvius, the number of rolls of plastic wrap was not known and is therefore based on comparable passenger numbers of other ships.

Wine bottles

Wine bottles get crushed, so they can't be re-used by their suppliers. Therefore they are calculated with CO2 coefficients for normal glass material, not glass material that is recycled like beer bottles.

Soap bottles

Lena Maria didn't fill out the amount of soap bottles, so this number is estimated based on other ships with the same capacity and passenger numbers.

Breakfast packages

If ships did not know the amount that guests used, we estimated 2 per person per day.

Beer bottles

Without numbers we used an estimate based on other ships, which was usually around 1.5 bottles per passenger in total (this concerns the material of the beer bottles; glass that is being recycled).

Materials

The amount of material used for cardboard boxes was estimated based on boxes with a size of 50x40x30 cm.

2020 data extrapolated from 2019 data

Moreover, in order to extrapolate the data for 2020 for the boats that sailed during the 2020 season, the data for 2019 was used. As Magnifique IV sailed for the first time this season, the 2019 data of Magnifique II, a similar ship, was used.

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