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Deliverable D.T1.1.1 Carbon footprint report

Version n. 1

"Sustainable reduction of carbon footprint level in programme AiRports", Podgorica, Montenegro – Reference no: 492-2022-2

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Contents

Introduction

This report is prepared with goal to calculate carbon footprint of Airport Podgorica in 2019.

Airports of Montenegro (APM) is a state-owned operator of Montenegro's international civil airports. APM owns and operates Montenegro's the only two international civilian airports in the tourism hub of Tivat on the Adriatic coast and in the capital Podgorica. APM aims to:

- provide high quality service while maximising the commercial potential of the airports
- implement cost-effective and low carbon technology to improve connectivity
- achieve recognition of sustainability and environmental goals, including international building certification.

Airport of Podgorica has 471 employes (99 are employees of Direction of APM). The number of passengers is around 1,3 million and it is expected to rise in the following years.

The location and disposition of airport are presented in following figures.

All methodological aspects of carbon footprint calculation are addressed in the following chapters.

1. Airport's carbon management policies

This document and Low carbon plan are the first analytic and strategic documents targeting carbon management in company Airport Podgorica. The goal is to estimate carbon footprint, map all sources and design measures in order to reduce carbon footprint at first and achieve carbon neutrality as the ultimate goal in the following years.

It is expected that Airport Podgorica will increase the amount of passengers on annual basis, and it is planned to achieve that without increase in carbon footprint.

Airport Carbon Accreditation is the first step in this process.

The methodology for carbon footprint calculation is prepared as a separate document that accompanies this document.

This document is prepared as a draft using the 2019 as the reference year. It is planned that after adoption of the corresponding inventory, the inventories for 2017 and 2018 are prepared since there are available data.

2. Data collection

The following data are collected as an information basis for creation of GHG Invertory:

- Total annual electricity consumption (for period 2017-2021)
- Total annual consumption of diesel for ground support equipment and fleet vehicles (for period 2017-2021)
- Total annual consumption of petrol for ground support equipment and fleet vehicles (for period 2017-2021)
- Total annual consumption of diesel for emergency power generators (for period 2017-2021)
- Amount of waste in 2019
- Number of LTO cycles on annual basis per aircraft type (for period 2017-2021)
- Survey conducted on employees regarding the manner they travel (journey home-airport).

The selected reference year is 2019 as a most representative year prior to Covid pandemic and general energy crisis caused by global politics.

The mentioned data are organized per scope in the following tables.

*Table **Error! No text of specified style in document.**.1 The data collected regarding Scope 1 emissions*

Activity	Description	Activity intensity
On-site Electricity Generation - emergency power	Total diesel consumption [liters/year]	1,624
Ground Support Equipment (GSE) and fleet vehicles	Total diesel consumption [liters/year]	76,795.34
Ground Support Equipment (GSE) and fleet vehicles	Total petrol consumption [liters/year]	486.09

*Table **Error! No text of specified style in document.**.2 The data collected regarding Scope 2 emissions*

Activity	Description	Activity intensity
Off-site Electricity Generation	Electricity purchased from the electricity supplier [MWh/year]	4,071

*Table **Error! No text of specified style in document.**.3 The data collected regarding Scope 3 emissions*

Activity	Description	Activity intensity
Aircraft main engines	Aircraft main engines: LTO, taxiing and APU [kg of jet fuel]	6,616,339.72
Staff vehicle trip (journey home-airport)	Estimation of consumed diesel on annual basis according to the conducted survey [liters]	111,055.96
Passenger trip (journey home-airport)	Estimation of emissions per passenger [number of passengers per year]	1,297,365
Waste disposed of off-site	Off-site waste treatment from airport sources [kg]	8,500

The data from *Table **Error! No text of specified style in document.**.3* regarding the jet fuel used by aircraft main engines is calculated according to the methodology for carbon footprint calculation and LTO data from the following table.

*Table **Error! No text of specified style in document.**.4 Data about landing and takeoff cycles per aircraft type in 2019*

Aircraft type	Annual number of LTO
737-800	16
A319	970
A320	1,334
A321	174
ALOUETTE	2
AN72	8
AT72	378
AT75	682
ATR	2
ATR72	188
B412	4
B462	6
B733	802
B734	8
B735	104
B737	9
B737-300	82
B737-400	2
B737-500	4
B737-700	20
B737-800	1,422
B737-900	52
B738	940
B739	26
B752	12
B757-200	6
C17	2
C172	1
CRJ	4
CRJ2	6
CRJ7	26
CRJ9	326
CRJ900	66
D328	2
DH4	6
DH8	264
DH8D	52
E145	10

Aircraft type	Annual number of LTO
E170	840
E190	162
E195	2,855
F100	1,305
F2TH	2
MD83	2
SB20	16
SU95	8
TOTAL	**13,208**

After communication with the airport staff, according to their experience, the average taxi time is 10 min, and the average APU time is 20 min.

The data regarding amount of fuel used by staff to travel from home to airport is estimated using the information collected from the survey and some approximations based on the total vehicle fleet in Montenegro:

- The most dominant fuel used by passenger vehicles in Montenegro is diesel (over 85 %)
- The average age of passenger vehicles in Montenegro is 15 years
- The average diesel consumption per 100 km is 7 liters.

The results of survey conducted on airport staff regarding the way of transport from home to airport they use are presented in the following figure.

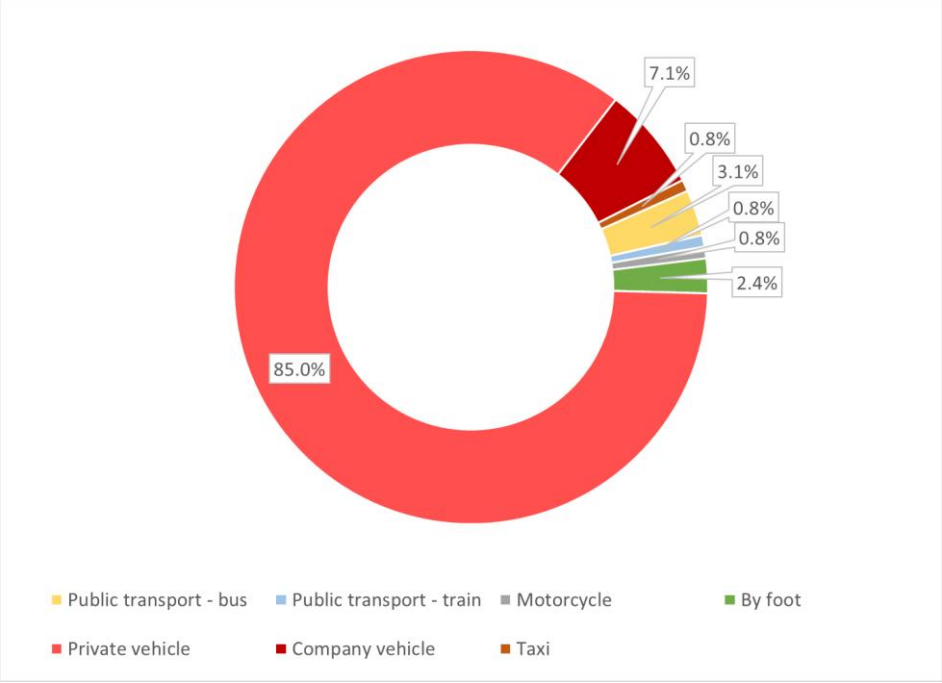

*Figure **Error! No text of specified style in document.**.1 Types of transport used by staff to travel from home to airport*

The majority of interviewed staff is the only passenger in their private vehicle (75 %), and the average distance from home to airport is 10 km (one way trip). These data are used to estimate the amount of diesel fuel used by private vehicles of airport staff on annual level to travel from home to airport.

As for the passenger travel from airport to town, the following assumptions are made after communication with airport staff regarding their experience with passengers:

- The average distance from city center is 10 km (*Figure **Error! No text of specified style in document.**.2*)
- 75 % of passengers are using private cars and taxi vehicles for transport
- 50 % is the occupancy of the vehicles
- The same average car characteristics as for airport staff is assumed.

There were no data collected from bus or taxi operators that operate between airport and city center.

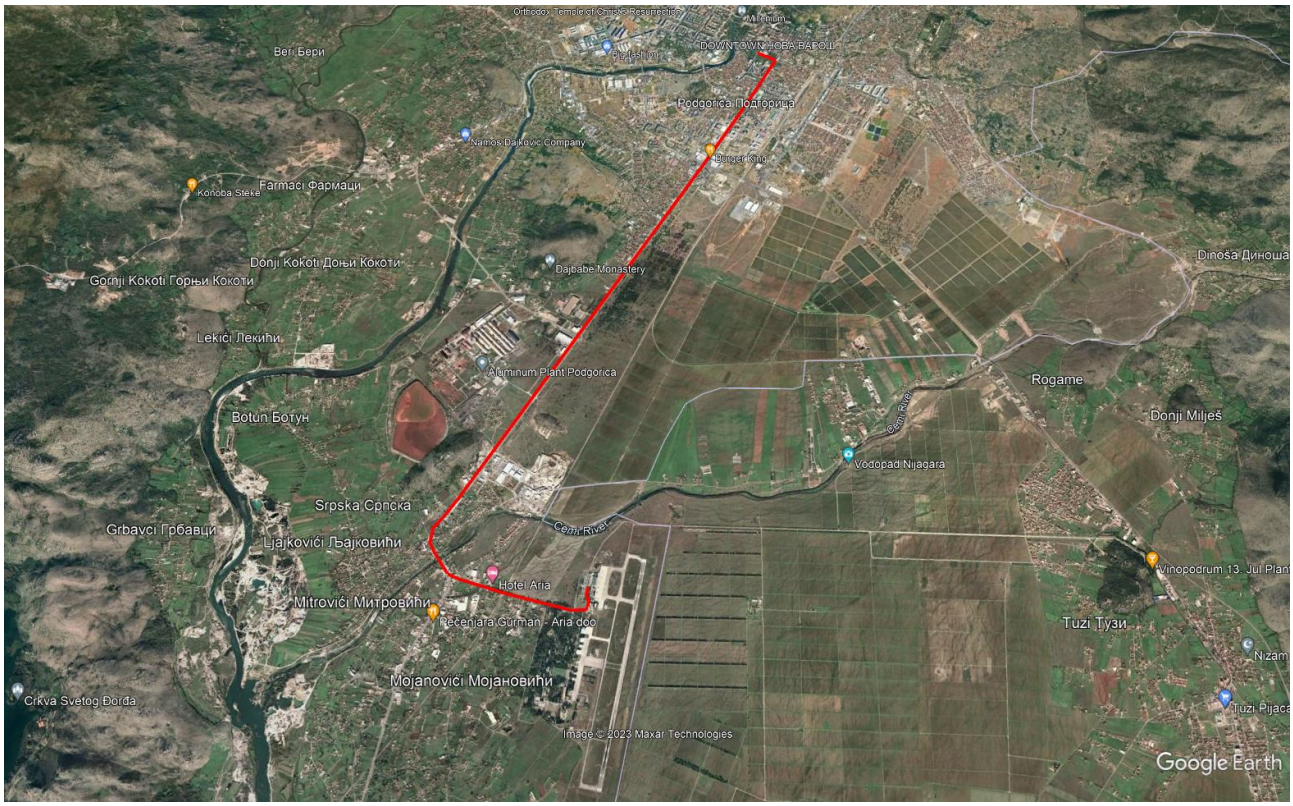

*Figure **Error! No text of specified style in document.**.2 The typical route from Podgorica center to airport*

3. Carbon emissions by source and activity

3.1 Scope 1

The available data are:

- Total annual consumption of diesel for ground support equipment and fleet vehicles
- Total annual consumption of petrol for ground support equipment and fleet vehicles
- Total annual consumption of diesel for emergency power generators.

The corresponding emissions are calculated according the methodology and presented in *Table **Error! No text of specified style in document.**.5*.

*Table **Error! No text of specified style in document.**.5 The amount of GHG emissions for Scope 1*

Activity	GHG emissions [tCO_2]
On-site Electricity Generation - emergency power	4.315
Ground Support Equipment (GSE) and fleet vehicles	204.065
Ground Support Equipment (GSE) and fleet vehicles	1.187
Total	**209.57**

3.2 Scope 2

The available data are:

- Total annual electricity consumption (supplied by the only available electricity supplier in Montenegro).
- There are no district heating services purchased.

The corresponding emissions are calculated according the methodology and presented in *Table **Error! No text of specified style in document.**.6*.

*Table **Error! No text of specified style in document.**.6 The amount of GHG emissions for Scope 2*

Activity	GHG emissions [tCO_2]
Off-site Electricity Generation	1,481.844
Total	**1,481.844**

3.3 Scope 3

The available data are:

- Number of LTO cycles on annual basis per aircraft type
- Survey conducted on employees regarding the manner they travel (journey home-airport)
- Amount of waste.

The corresponding emissions are calculated according the methodology and presented in *Table **Error! No text of specified style in document.**.7*.

*Table **Error! No text of specified style in document.**.7 The amount of GHG emissions for Scope 3*

Activity	GHG emissions [tCO_2]
Aircraft main engines	20,796.373
Staff vehicle trip (journey home-airport)	295.104

Passenger trip (journey home-airport)	2,262.605
Waste disposed of off-site	7.073
Total	**23361.155**

3.4 Total emissions overview

The overview of the total emissions per targeted scopes is presented in *Table* ***Error! No text of specified style in document.****..8*, and the share of emissions per scope with breakdown of scope 3 emissions are presented in *Figure* ***Error! No text of specified style in document.****..3*.

Table ***Error! No text of specified style in document.****..8 Total emissions overview*

Activity	**GHG emissions [tCO_2]**
Scope 1	209.567
Scope 2	1,481.844
Scope 3	23,361.155
Total	**25,052.566**

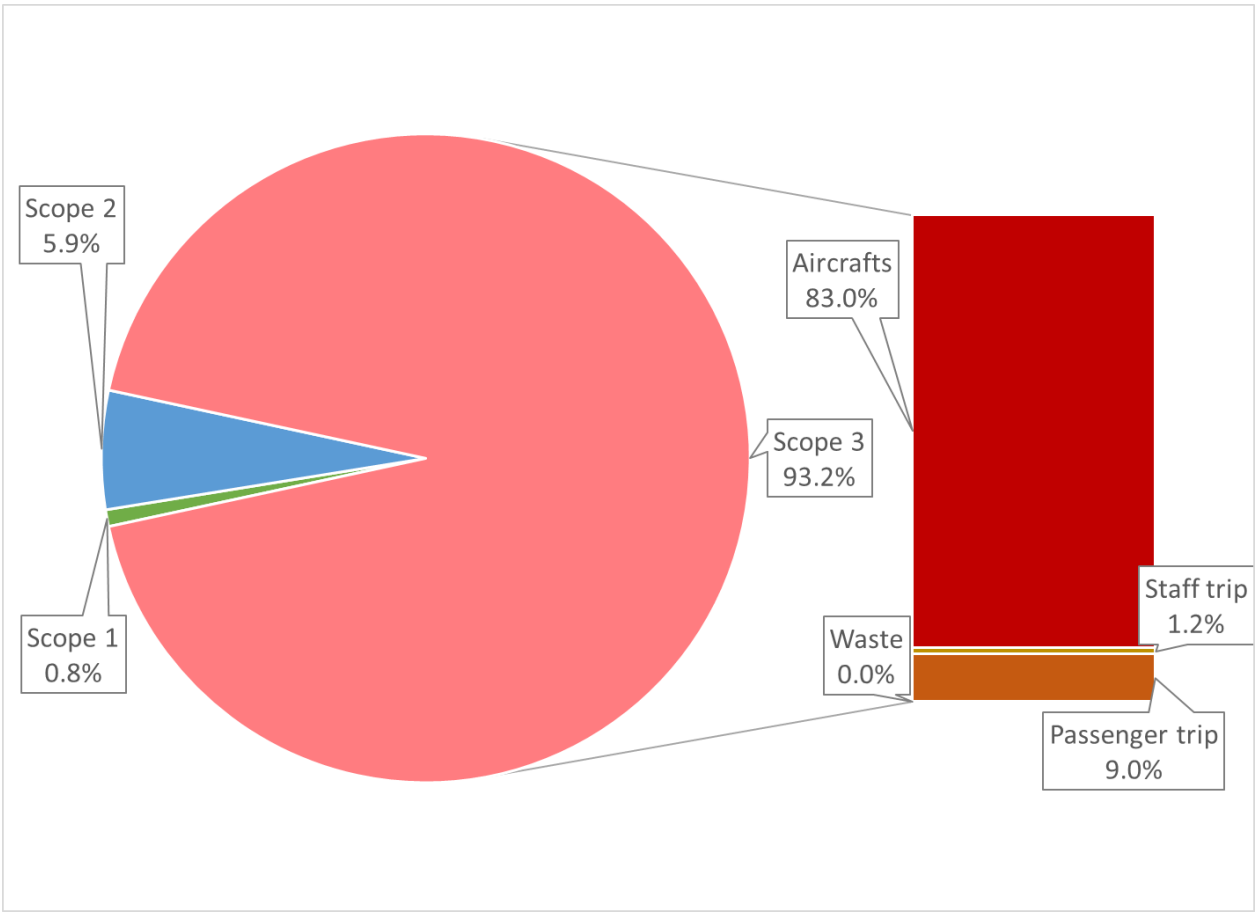

Figure ***Error! No text of specified style in document.****..3 Structure of emissions per scope*

As it can be seen from the previous table and figure, the dominant source of emissions are activities from scope 3 with 93.2 % share in the total GHG emissions. These activities can only partially be impacted by airport.

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