

NAPLES INTERNATIONAL AIRPORT AND AIRPORT CARBON ACCREDITATION (ACA)

GIULIA ATTANASIO
Naples International Airport, Italy

ABSTRACT

Climate change is one of today's most relevant themes and an absolute priority in all human activities. The first step in contrasting climate change was advanced in 1994 with the United Nations Framework Convention on Climate Change (UNFCCC). The IPCC (Intergovernmental Panel on Climate Change) has calculated that aviation's total CO₂ emissions account for 2% of global emissions, and aviation is responsible for 12% of CO₂ emissions from all transport sources. The Aviation industry is strongly committed to the effort to reduce CO₂ emissions. In 2008, leaders from all sectors of the aviation industry signed the world's first global transport sector climate agreement. Three main ambitious goals of carbon emission reduction in next few years were identified, and a wide variety of activities have been planned to cap carbon emissions from aviation at 2020 levels. In October 2016, the International Civil Aviation Organization (ICAO) adopted the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) whereby airlines and other operators will offset any growth in CO₂ emissions above 2020 levels. As regards to airport emissions, the Airport Council International adopted the Airport Carbon Accreditation (ACA), that is an independent, voluntary, common framework which airports may adopt for measuring, reporting and reducing carbon emissions, with the ultimate goal of becoming carbon neutral. Naples International Airport joined the ACA in 2012 and is currently certified at Level 3/Optimization. The airport has mapped all of its carbon emission sources and has estimated the emissions on a yearly base. Thanks to the adoption of a Quality, Safety and Environmental Policy, the implementation of a specific Carbon Management Plan and a Stakeholders Engagement Plan, the Airport was able to attain a decreasing trend of carbon emissions and step closer to the ultimate target of becoming carbon-neutral.

Keywords: climate change, CO₂, carbon emissions, aviation, reduction, certification, sustainable growth, offsetting, stakeholder, neutrality.

1 INTRODUCTION

Nowadays climate change has to be considered an absolute priority in all human activities, as it has been widely and scientifically proven that emissions of greenhouse gases are driving the temperature of our planet to never-before recorded levels.

The first step to a safer future was taken in 1994 with the United Nations Framework Convention on Climate Change (UNFCCC), which individuated its ultimate objective as: *stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate system.*

This initial step, together with all the following ones, has been advanced with the aim of implementing actions to reduce environmental impact resulting from anthropic and industrial activities.

The aviation industry is deeply committed to this effort, thanks to the adoption of different means and instruments, some of which are described below.

Strategic measures can be divided into three different categories: the first is related to regulations issued by international agencies and governmental bodies; the second concerns approaches based on market mechanisms aimed at keeping emission levels within certain limits through the creation of economic and financial incentives and disincentives (i.e. Emissions Trading) and, the third category is related to all voluntary measures taken to reduce or limit the impact on the environment.



The Airport Carbon Accreditation (ACA) programme, the instrument airports have chosen to become carbon-neutral is detailed in this study and belongs to this last category of measures.

2 CLIMATE CHANGE AND AVIATION COMMITMENT

Air transport is an essential connector of the modern world, bringing together people and business. Over 3.3 billion passengers a year, a third of world trade by value and half of all international tourists, travel by air.

Furthermore, from an environmental point of view, the IPCC (Intergovernmental Panel on Climate Change) has calculated that aviation's total CO₂ emissions account for 2% of the impact of global emissions on climate change.

For example, worldwide flights produced 781 million tonnes of CO₂ in 2015, while human activities globally produced over 36 billion tonnes of CO₂.

If we consider the totality of emissions related to the entire transport industry, we find that aviation is responsible for only 12% of CO₂ emissions from all transport sources, while the emissions from road transport represent the 74% of total transport emissions.

In this complex scenario the commitment of aviation industry to reducing its emissions is quite strong, as it is an essential condition for developing its operations and allowing them grow in a sustainable manner.

So, in 2008, leaders from all sectors of the aviation industry (airlines, airports, air navigation service providers and manufacturers) gathered together and presented the world's first global transport sector climate action framework and signed a Declaration of commitment to take action on climate change. It consisted of a global climate action plan containing a set of the three following ambitious goals and implemented initiatives to meet them [1].

1. From 2009 until 2020: improve aircraft efficiency by an average 1.5% per year

The aviation industry identified an important means of reaching this goal with the introduction of new technology and the replacement of older aircraft in its fleets with newer, more efficient models.

2. From 2020: Capping growth in aviation emissions

The aviation sector chose to cap its net emissions at the 2020 level. From this point on, any emissions the aviation industry is unable to reduce through operational, technological or infrastructure measures, or by using sustainable alternative fuels, will need to be offset by market-based measures.

3. By 2050: halving net emissions based on 2005 levels

This is the most ambitious goal. In fact, even if passengers and cargo numbers grow in a continuous and significant manner, the goal is to reduce net carbon emissions from aviation in 2050 to half of what they were in 2005.

Advanced technologies and sustainable fuels in addition to improvements in the efficiency of infrastructure and operations are the means by which these goals may be reached. After 2020, the aviation industry will see larger emissions reduction results thanks to new aviation technologies and biofuel despite the growth in passenger numbers and cargo. It has been estimated that the average flight today produces around half the CO₂ that the same flight would have produced in 1990, thanks to the combined factors of new technology and improved operations.



2.1 Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

In October 2016, the member states of the International Civil Aviation Organization made the historic decision to adopt a global market-based measure for aviation emissions. This scheme, the Carbon Offsetting and Reduction Scheme for International Aviation – so called CORSIA – is the culmination of many years of work at ICAO, with the support of the industry.

The CORSIA agreement will allow aviation to achieve its shared goal of carbon-neutral growth as of 2020. It is a global offsetting scheme, whereby airlines and other operators will offset any growth in CO₂ emissions above 2020 levels. This means that aviation's net CO₂ emissions will be stabilized while other emissions reduction measures are pursued.

CORSIA only applies to international flights. Domestic emissions fall under the purview of another UN agency, the UNFCCC, and are covered by the Paris Agreement.

Although nearly all 191 states represented at ICAO agreed to the introduction of CORSIA, the scheme will not cover all states and operators from the outset. While the aviation industry had always been in favour of a mandatory global scheme, it was decided that the timeline would be divided into three sections – two initial, voluntary phases (2021–2023 and 2024–2026) and a mandatory phase that would enter into effect as of 2027.

Rules regulating the monitoring, reporting and verification (MRV) of CO₂ emissions are still under discussion in ICAO's technical working groups and are due to be adopted by the ICAO Council by 2018. At any rate, the activities necessary to join CORSIA require airlines to monitor fuel use, submit the data to national authorities, and for governments and ICAO to work together to inform airlines of the number of offset credits they need to purchase.

2.2 Airport Carbon Accreditation (ACA)

Airports represent a specific part of the aviation industry; their emissions are related to airport facilities management, ground handler servicing activities, passenger assistance, baggage handling, cargo services, aircraft landing and take-off and so on. All these activities entail CO₂ emissions that have to be estimated and managed or influenced by airport authority.

In June 2008, the annual assembly of ACI EUROPE adopted a landmark resolution on Climate Change when its member airports committed to reduce carbon emissions from their operations, with the ultimate goal of becoming carbon neutral. One year later, at the 2009 annual assembly, ACI EUROPE launched Airport Carbon Accreditation (ACA), allowing the assessment and recognition of participating airports' efforts to manage and reduce their CO₂ emissions.

Airport Carbon Accreditation (ACA) represents an independent, voluntary, common framework which all airports may adopt, in spite of their diversity in terms of traffic and operations with the ultimate goal of becoming carbon neutral.[2]

In November 2011, Airport Carbon Accreditation was extended to airports in the Asia-Pacific region, in cooperation with ACI Asia-Pacific. The programme was also extended to the African region of ACI in June 2013. In September 2014, Airport Carbon Accreditation took off in North America and went global in November of 2014 with its extension to airports in Latin America and the Caribbean.

Airports applying to become accredited have their carbon footprints independently verified in accordance with ISO14064 (Greenhouse Gas Accounting).

Airport Carbon Accreditation covers the direct and indirect carbon emissions due to the airport operational activities (regarding to scope 1, 2 and 3 emissions) and may be achieved



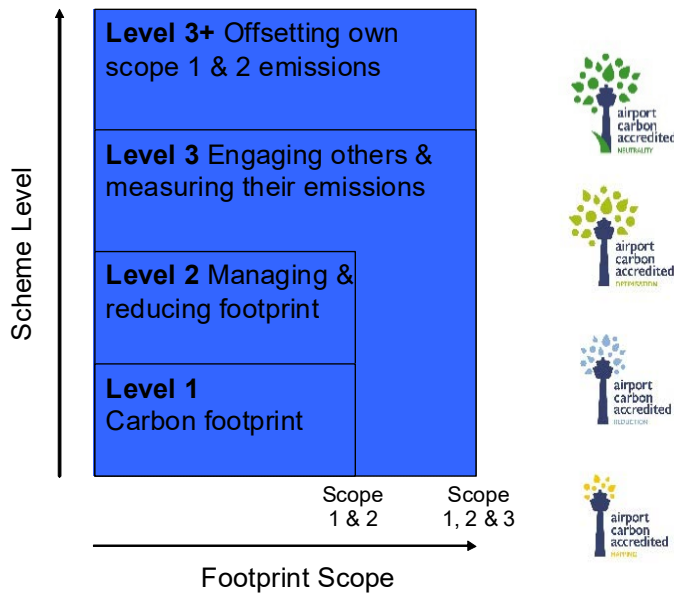


Figure 1: Certification scheme.

in one of four steps of certification, listed below, which represent the steps of a gradual and complex roadmap leading airports to carbon neutrality:

- **Level 1 – MAPPING:** Verified carbon footprint of emissions under an airport's direct control (GHG Protocol scope 1 and 2 emission sources) and the adoption of a formalized policy commitment to emission reductions have to be set out.
- **Level 2 – REDUCTION:** In addition to Level 1 requirements, airports have to develop a carbon management plan, with the adoption of a specific emission reduction target. Airports also have to demonstrate on-going reductions in carbon emissions from sources under their direct control as opposed to a three-year rolling average of emissions.
- **Level 3 – OPTIMIZATION:** In addition to Level 2 requirements, airports have to elaborate a stakeholder engagement plan and extend the airport carbon footprint to include all Scope 3 emissions that an airport can guide and influence.
- **Level 3+ – NEUTRALITY:** In addition to the requirements of Level 3, airports have to offset the remaining CO₂ emissions under the airport's direct control that cannot be further reduced.

Fig. 1 outlines the programme certification scheme.

ACA is a management system specifically related to CO₂ emissions, which helps to guide and support airport environmental management through a process of continuous improvement and partnership with its airport stakeholders [3].

ACA is based on these three key features:

- An ambitious reduction commitment: accredited airports have to demonstrate reductions in the emissions under their direct control (scope 1 and 2 emissions every

year, as the airports renew their accreditation, the reductions have to be shown against the average emissions of the 3 previous years). This mechanism is aimed at continuous improvement in carbon emission management thanks to the adoption of a specific company strategy.

- **Stakeholders engagement:** Even if CO₂ emissions related to airport activities are not completely under the direct control of airport authority, according to the provisions of certification, airports are encouraged to influence stakeholders. So, as of Level 3, accredited airports have to demonstrate that they engage with their stakeholders in their reduction targets – including airlines, air navigation service providers, as well as ground handlers, retailers, etc. – by influencing and supporting them in reducing their emissions.
- **Independence:** certification is independent of the airport community and programme ownership. Additionally, all applications must also be assessed by an independent third-party verifier.

Thanks to all these favourable aspects, ACA has been characterized by a growing number of airports joining the programme and making a constant effort to reduce carbon emissions. In May 2017 the programme reached its 8th year (16th May 2016–15th May 2017). While the collective carbon footprint of the accredited airports has increased from 4,708,606 tonnes of CO₂ in Year 7 to 5,996,379 tonnes of CO₂ in Year 8, reflecting the growth in programme participation and thus the amount of emissions covered, the efforts of accredited airports worldwide have attained a reduction of 202,184 tonnes of CO₂ as opposed to the average emissions of the three previous years.[4]

Thanks to these important results, some 18 months after the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC), ACI EUROPE members have agreed to double the number of carbon neutral airports in Europe from their initial target of 50 airports by 2030 to 100.

Currently, more than 200 airports participate in the certification programme.

The graph of Fig. 2 shows the distribution of world accredited airports over the years and highlights a gradual but constantly growing interest and participation of airports year by year. Whereas coverage of air passenger traffic in year 8, which is also growing, is detailed in Table 1.

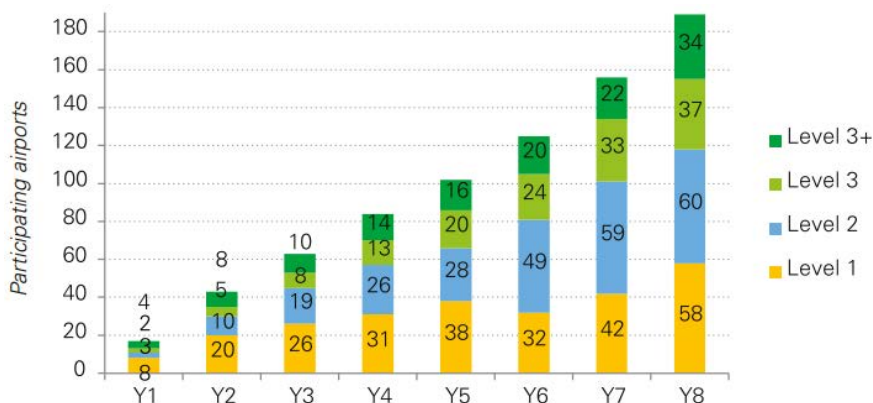


Figure 2: ACA accredited airports.

Table 1: Percentage of air passenger traffic per year.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Percentage of global air traffic	6.3%	12.7%	16.7%	21.5%	22.5%	27.5%	31.3%	38.1%

3 NAPLES INTERNATIONAL AIRPORT AND CO₂ EMISSIONS

3.1 The airport

Naples International Airport is managed by Gesac spa. In 2003 it was the first Italian airport to be privatized.

The entire airport covers a total area of 233 hectares and is characterized by the following main features:

- one 2,628-meter-long runway with a capacity of 30 movements/h and an Apron with 30 stands for aircraft stops;
- the terminal, which extends over an area of about 40,000 m² with 36 shops, 56 check-in desks, 19 departure gates and 7 baggage belts.
- 7 parking areas with over 2,000 parking spaces.

The airport connections have grown considerably during recent years and the airport now manages 14 domestic flights, 77 international and over 50 charter destinations and hosts 34 Italian and foreign airlines.

In 2017, Naples Airport handled just under 8.58 million passengers, with 74,043 aircraft movements and an increase of some 27% in passengers as opposed to 2016. Thus, in 2017, the airport's growth rate was three times the European and Italian average.

Also, in consideration of the fact that Naples Airport is located near to the city, it has adopted plans and investments that lead the growth on a sustainable path. Sustainability and energy efficiency are priorities in Naples International Airport's strategy of growth. So in addition to other activities aimed at reducing the environmental impact of aerodrome operations, Gesac has also adopted policies and activity plans to reduce airport carbon emissions

3.2 Airport Carbon Accreditation

In 2012, Naples International Airport chose to voluntarily join the Airport Carbon Accreditation programme and reached Level 1, Mapping certification. Therefore, having embarked upon a course of action which has developed over the years, the airport is currently certified at Level 3 Optimization.

3.2.1 Carbon footprint

A carbon footprint is a measure which, in equivalent tons of CO₂, expresses the total emissions of greenhouse gases directly or indirectly related to a specific emissive source.

According to the terms of Airport Carbon Accreditation, carbon footprints are defined and calculated based on the Greenhouse Gas Protocol (GHG Protocol) published by the World Business Council for Sustainable Development and the World Resources Institute. The program uses the approach expressed in the GHG Protocol classifying sources of emissions into three categories or Scopes (Scope 1, Scope 2 and Scope 3) adapted to the airport sector

and taking into account the emissions which an airport can directly control, those which can be guided through effective partnerships, and those which may only be influenced [5]. To reach or confirm Level 1 of ACA accreditation, Naples International Airport has defined the operational boundaries of its emission sources in order to measure Scope 1 and Scope 2 categories.

As GE.S.A.C S.p.A. holds the entire share of the airport; within the airport boundaries there are assets that GE.S.A.C S.p.A. can directly control, while others that can only be influenced. So mapping has been conducted through the operational control approach, which is particularly suited to a situation in which a company accounts for 100% of the GHG emissions from company-controlled operations.

After having defined the boundaries of the operations under the direct control of GE.S.A.C., emissions were subsequently identified and quantified. These emissions were then linked to specific operations and classified as direct or indirect as reported below:

- **SCOPE 1 Emissions:** Direct emissions from sources owned or directly controlled by GE.S.A.C S.p.A.. Here we have considered the emissions coming from the combustion of natural gas, from the internal fleet, from the combustion of oil for heating and for the use of electric generators.
- **SCOPE 2 Emissions:** include indirect emissions from the electric consumption of GE.S.A.C S.p.A for the reference year. The calculation of CO₂ emissions from electric consumption has been developed following a Location Based approach (and a Market based approach from Level 3 onwards).

The quantification of emissions has been developed on a yearly basis.

According to ACA guidelines, from Level 2 onwards Gesac adopted a Carbon Management Plan, containing all projects and activities being planned to reach a specified reduction target. Naples International Airport set the ambitious target of reducing CO₂ emissions/passenger/ year by 15% between 2014 (1.42 kg CO₂/passenger) and 2019 (1.21 kg CO₂/passenger).

Emissions arising from activities in Naples International Airport in 2016 directly under control of GE.S.A.C S.p.A., the Airport management company, are summarized in Table 2.

The analysis of the contributions of each activity to the overall CO₂ emissions shows that the electricity sector, indirect emission source according to the GHG protocol, contributes to more than 97% of the total carbon footprint. Contributions from the remaining emission sources are therefore lower in relative terms.

As a result of these considerations and evaluations, the airport identified the most important factors influencing carbon emissions and a priority action plan to reach its reduction target.

As regards to Scope 2 emissions, related to electric consumption, a Location Based approach (as specified in the ACA Guidance Document) DEFRA CO₂ Emission Factor were utilized [6].

Table 2: Summary of overall CO₂ emissions – 2016.

Activity	Scope	GHG emission [kgCO ₂]
Gas consumption	Scope 1	91,719
Car fleet	Scope 1	41,196
Oil consumption	Scope 1	60,791
Electricity	Scope 2	8,480,699
Total		8,674,405



Emissions within Scope 1, 2 and 3 have been also been estimated using through the use of a specific spreadsheet, ACERT, provided by ACI [7].

Significant investments have been carried out and planned in the field of electric energy consumption, regarding, by way of example, the lighting systems, ventilation systems control and the replacement of devices with more efficient ones. Additionally, plans call for the realization of a trigeneration plant which will lead to a significant reduction of energy consumption; it has been estimated that, thanks to this important project, the carbon emissions will be reduced by about 900 tonnes of CO₂ per year.

Scope 2 emission trends are shown in Fig. 3 which illustrates a reduction in the 2016 emissions levels as compared with the average of previous three years, thanks to efforts in reducing electricity consumption and improving energy efficiency.

With the aim of comparing annual performances and establishing a useful benchmark with other airports, a specific indicator was chosen, that is expressed in kg CO₂ per passenger.

Table 3 shows the total CO₂ emissions over a four-year period and the related specific emission that is expressed in kg CO₂ per passenger.

The reported data highlights a reduction in the total of last year's emissions. Using the period 2013–2016 as reference, it is possible to observe that overall emissions in 2016 amounted to 8,674,405 kg of CO₂, that is very close to the minimum recorded (8,487,798 in 2014) in this reference period. Comparing the emissions of the previous year, 2015, a reduction of 4.12% was recorded.

Moreover, the “Emissions on Passenger ratio” parameter meets the ACA requirements of emissions reduction as opposed to the three-year rolling average.

In 2016, Naples Airport attained Level 3/ Optimization certification (referred to 2015). From this level onward, airports are required to also calculate emissions which are a consequence of airport activities but are produced by sources not owned and/or controlled by the airport authority itself (Scope 3 emissions).

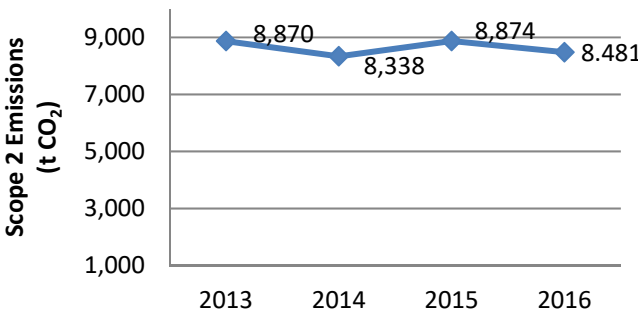


Figure 3: CO₂ Scope 2 emissions.

Table 3: CO₂ emissions per passenger 2013–2016.

	GHG emission [kgCO ₂]/passengers			
	2013	2014	2015	2016
CO ₂ emissions	8,996,559	8,487,798	9,046,857	8,674,405
CO ₂ /passenger	1.65	1.42	1.47	1.28

Despite the impossibility to directly control these emissions, the airport is expected to guide or influence them.

So as of 2015 (the year of Level 3 certification) and on a yearly basis, the calculation of Scope 3 emissions have also taken the following sources of emissions into consideration:

- Airside vehicles, machinery, Ground Service Equipment (GSE);
- Aircraft activities: Landing and Take Off movements (LTO);
- Staff Business Travel;
- Surface access to Airport.

Despite the fact that these sources are not under the airport authority's direct control a strong point of ACA lies precisely in the role assigned to airport authorities which allows them to guide and influence airport operators and companies. With this objective in mind, all Airport Authority Stake holders were identified, and a specific Stakeholders Engagement plan was elaborated.

Table 4 illustrates the emissions related to all individuated sources in reference to 2016 activities at the airport. The analysis of the Scope 3 emissions highlights that the contribution to Carbon Footprint of Aircraft Activity, with 80.94% of CO₂ emission of the total of Scope 3 emissions. Another important activity which contributes significantly to the carbon footprint related to Surface Access, with the 17.61% of CO₂ emission of the Scope 3 total.

These results of selected priority areas are the basis of the Stakeholders Engagement Plan adopted by Gesac.

Within the overall Carbon Footprint, the various contributing sources are illustrated in Fig. 4. Among the activities directly controlled by GE.S.A.C S.p.A. (Scope 1 and Scope 2), electric consumption was the largest contributor whereas, when considering all sources, including Scope 3, the largest share is related to Aircraft activity.

Within this complex scenario and with the aim of guiding and influencing its stakeholders, last year Gesac implemented a Stakeholders Engagement Plan, including all projects and activities aimed at reducing CO₂ emissions under stakeholder management. These activities include the launch of an environmental awareness campaign aimed at energy consumption reduction, sustainable mobility and waste management, the replacement of most of the vehicles and equipment currently operating at the airport with electric ones and also encouraging the airport staff to use public transport and alternative solutions rather than private cars.

Table 4: Scope 3 emissions– 2016.

Scope 3 Emissions – 2016			
Activity	Scope	Emissions [tonne CO ₂]	%
Airside vehicles, machinery, GSE	Scope 3	1,194.6	1.39%
Aircraft activity	Scope 3	69,640.6	80.94%
Staff business travel	Scope 3	50.6	0.06%
Surface access	Scope 3	15,149.5	17.61%
Total Scope 3		86,035.3	100.00%

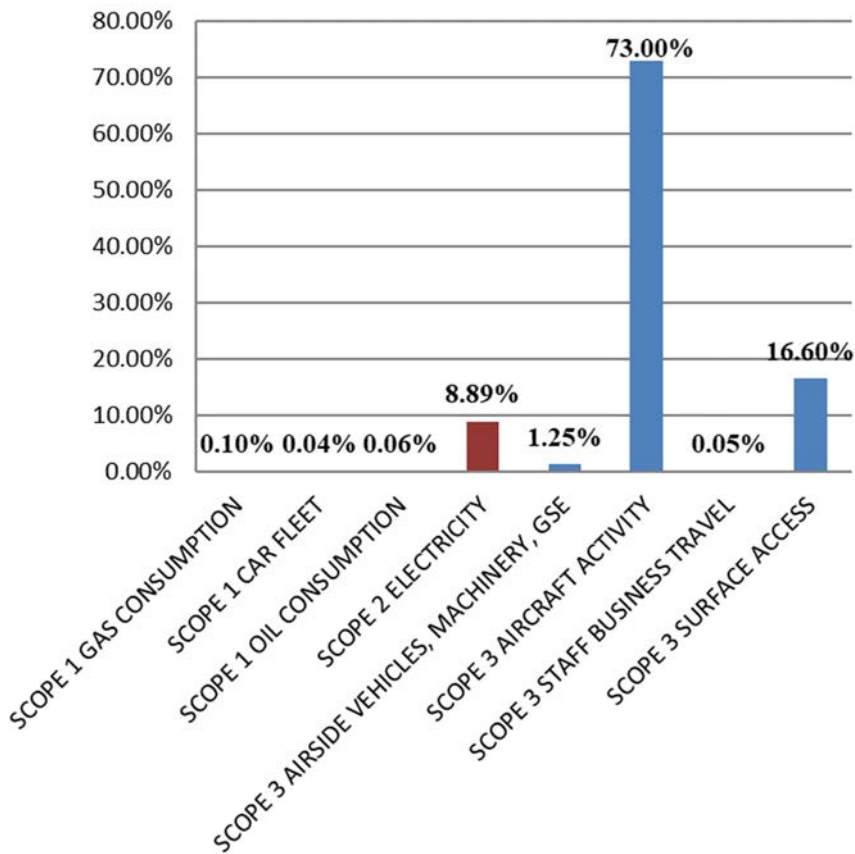


Figure 4: Shares of Scope 1, 2, and 3 CO₂ emissions.

REFERENCES

- [1] 18th ACI Europe Assembly: Resolution - European Airports Joining Forces to Fight Climate Changes, Paris, 19 June 2008.
- [2] Airports Council International - Guidance Manual: Airport Greenhouse Gas Emissions Management - ACI World Environment Standing Committee 1st Edition, November 2009.
- [3] ACA Guidance Document Issue 10 Sept 2016.
- [4] Airport Carbon Accreditation – Annual Report 2016 – 2017.
- [5] Greenhouse Gas Protocol (GHG Protocol), www.ghgprotocol.org.
- [6] Department for Environment Food & Rural Affairs – Greenhouse Gas Conversion Factor Repository - DEFRA's overseas electricity factor, Italy, Years 2014, 2013, 2012, www.ukconversionfactorscarbonsmart.co.uk.
- [7] www.aci.aero/About-ACI/Priorities/Environment/ACERT.

