Ricardo Energy & Environment

Southampton Airport Carbon Footprint 2020

In accordance with the UK Government's Conversion Factors for Company Reporting

Report for Southampton Airport Limited

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Introduction

All Scope emissions = 4,663 tCO_2e

All emissions are reported in Market-based methodology, unless stated otherwise.

Overall 79% decrease from 2019

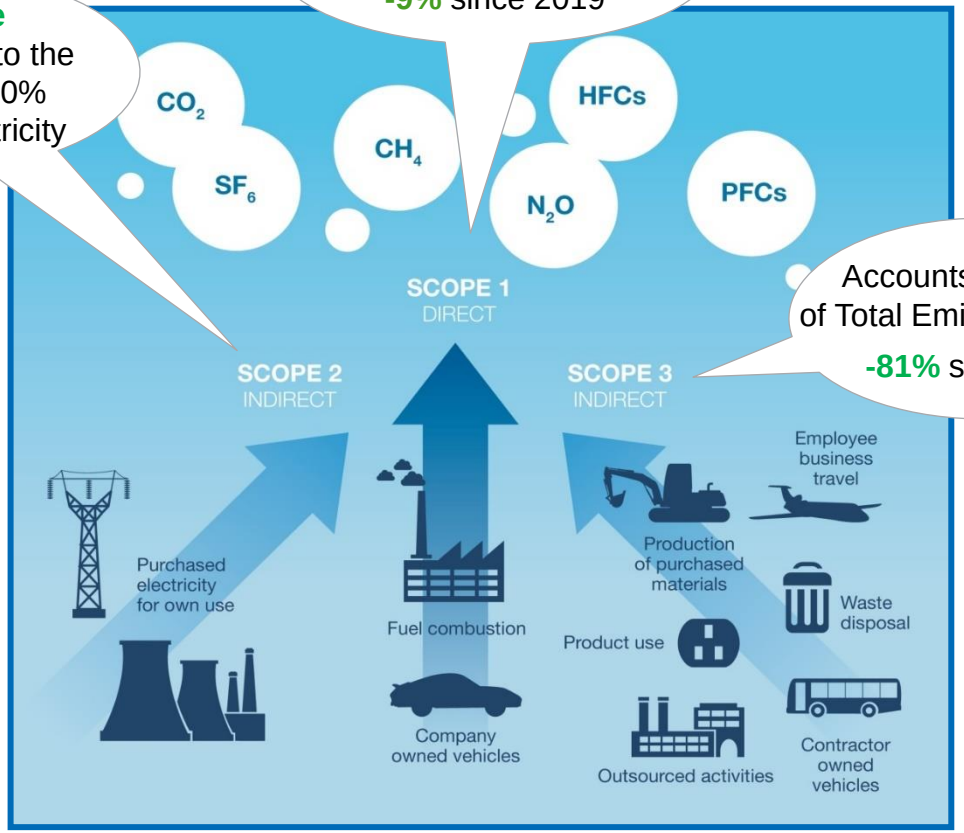
The decrease overall emissions is largely due to the impact of the Covid-19 pandemic, leading to national restrictions on travel and a resultant decrease in passenger numbers.

Number of aircraft movements have decreased by 69.9% since 2019

Passenger numbers have decreased by 83.5% since 2019

0% change since 2019 due to the purchase of 100% renewable electricity

Accounts for 10.6% of Total Emissions in 2020 **-9%** since 2019



Accounts for 89.2% of Total Emissions in 2020 **-81%** since 2019

Scope 1 and Scope 2 emissions have seen an overall decrease of 9% since 2019, despite the inclusion of emissions from glycol based de-icer for the first time.

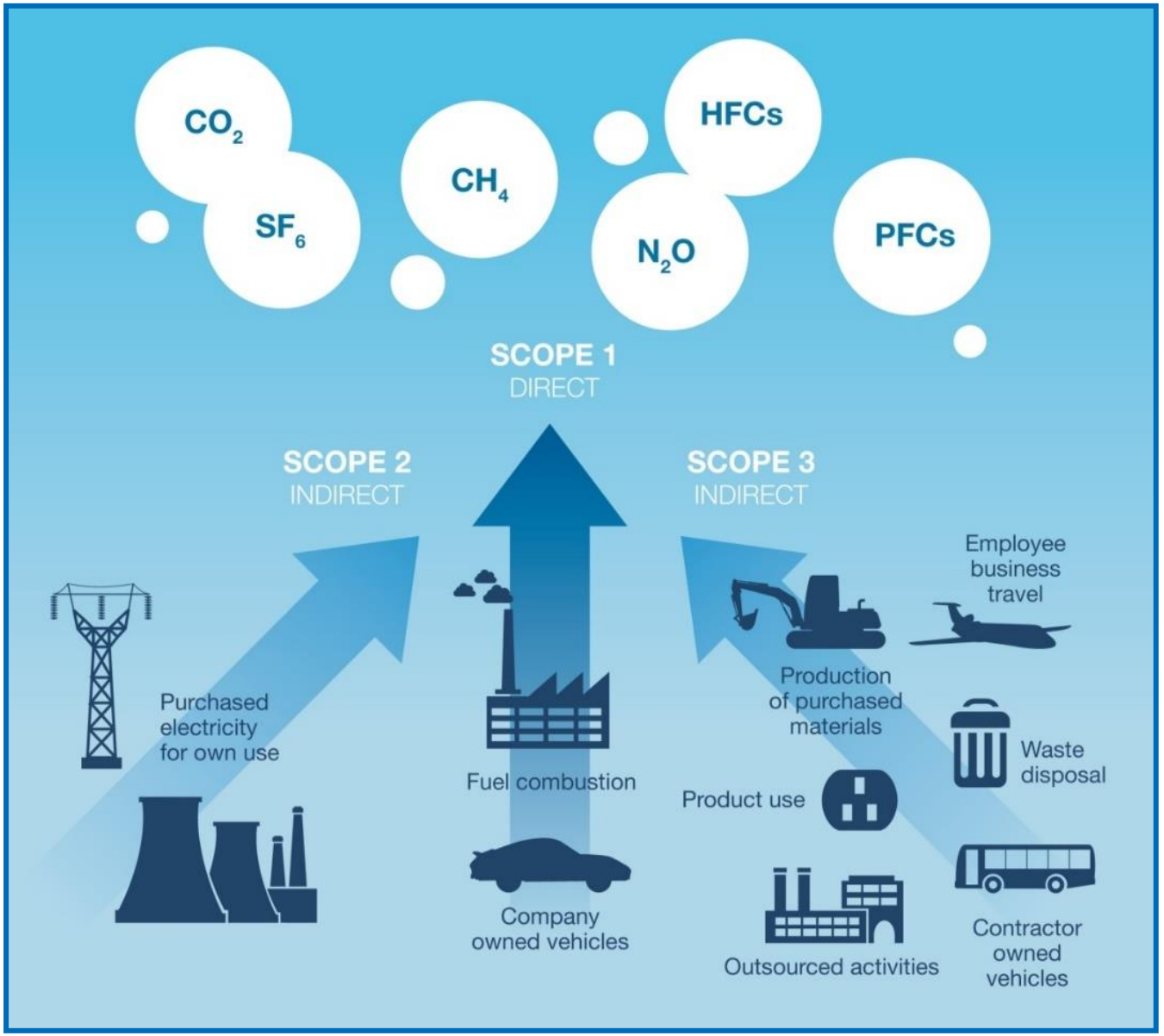
Included Emissions Sources

The following emissions sources are included in the 2020 carbon footprint for Southampton Airport:

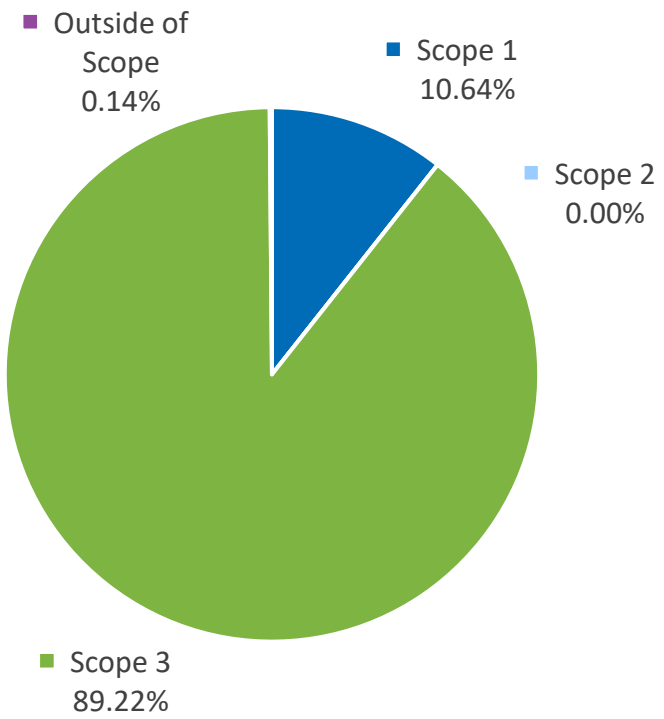
Scope 1: Direct emissions:
- Fuels burnt on site (boilers, generators, airport owned operational vehicles, fire training)
- Refrigerant gas losses
- Airport glycol based de-icer

Scope 2: Indirect emissions:
- Purchased electricity

Scope 3: Indirect emissions:
- 3rd party operational vehicle fuels
- 3rd party glycol based de-icer
- Tenant energy
- Aircraft LTO cycle, APU usage and engine testing
- Business travel
- Water supply and wastewater treatment
- Staff commute
- Passenger surface access
- Waste (disposal and virgin material production)



Key Stats - Carbon Emissions by Scope 2020



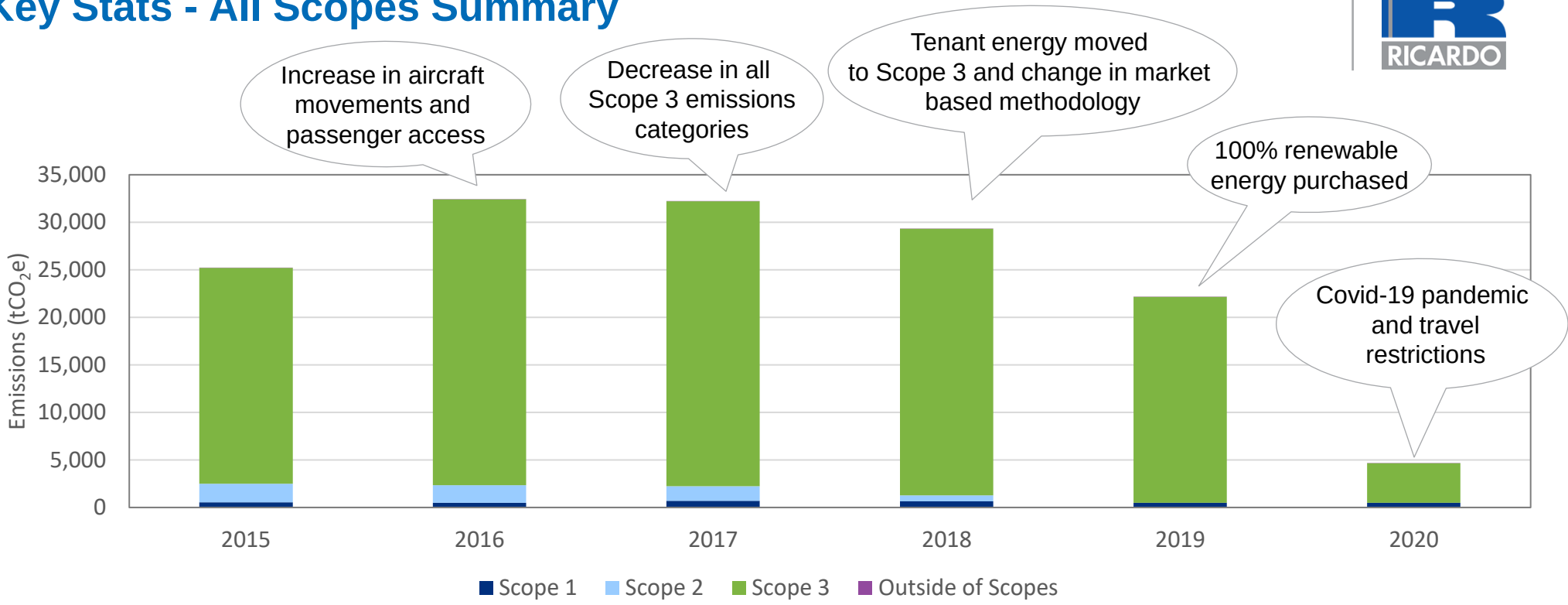
	Total 2020 emissions (tCO_2e)	Percentage
Scope 1	496	10.6%
Scope 2	0	0.0%
Scope 3	4,160	89.2%
Outside of Scope	6	0.14%
Total	**4,663**	**100%**

Scope 1:
Emissions on-site, or an associated process, from the combustion of fossil fuels, e.g. natural gas, oil, LPG and company-owned vehicles.

Scope 2:
Emissions associated with the use of electricity imported from the grid or from a third party supplier of energy in the form of heat or electricity.

Scope 3:
Emissions arising as a direct consequence of the use of goods or services provided by the company. For SOU this would be the operation of Southampton Airport. Sources include aircraft movements, passenger and staff travel to the airport, airside activities, waste disposal, water and business travel.

Key Stats - All Scopes Summary



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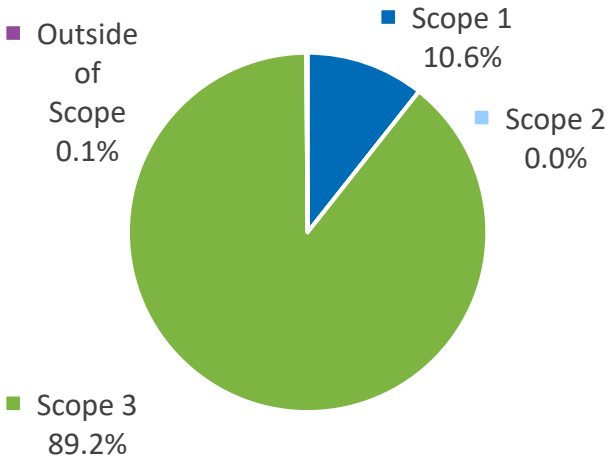
Scope 3	4,160	89.2%
Outside of Scope	6	0.14%
Total	**4,663**	**100%**

Scope 3 emissions have always been the largest contributor to Southampton Airport's carbon footprint. The majority of which are from aircraft activities and passenger access to the airport.

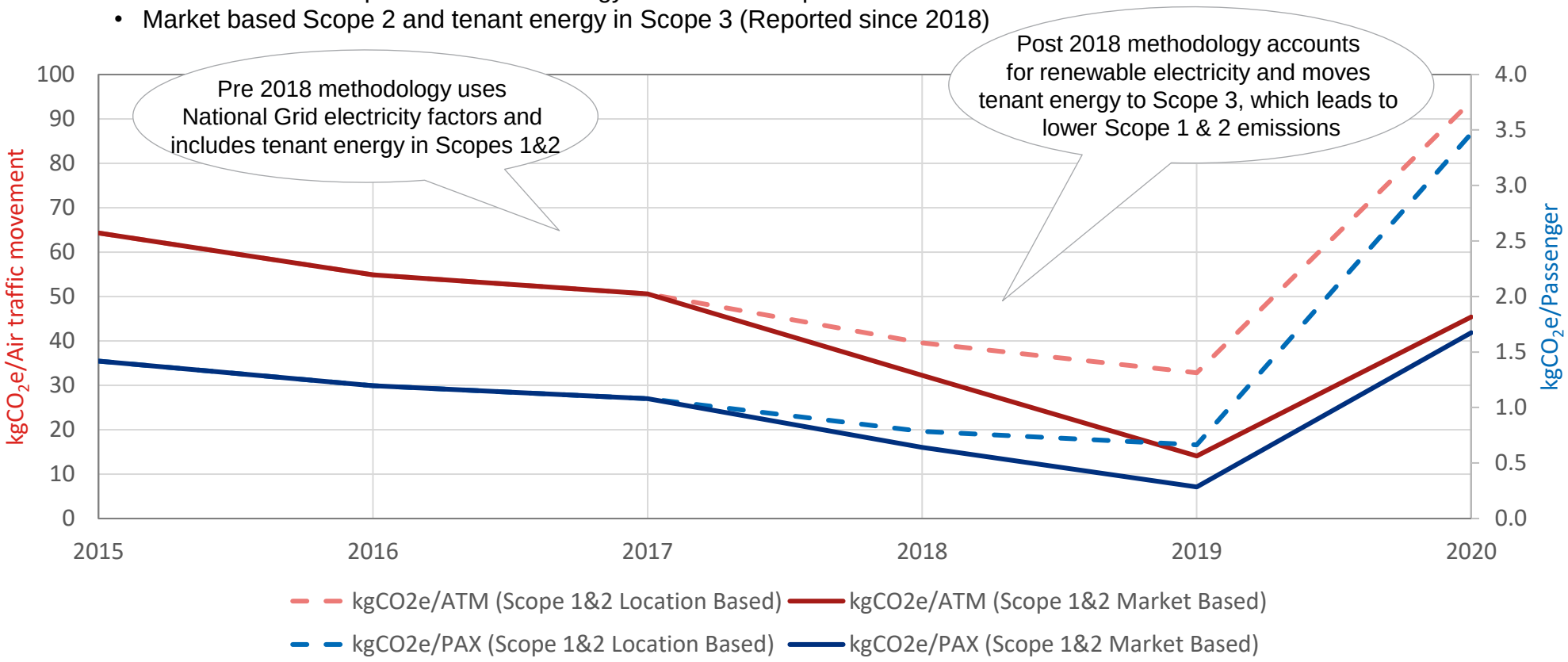


Key Stats - Intensity Metrics comparison over time - 1

Intensity metrics allow comparison over time against other factors that fluctuate and have an impact on the environmental performance of the airports. The two chosen key performance indicators are aircraft movements and passenger numbers.

This chart shows intensity metrics for:

- Location based Scope 2 and tenant energy included in Scopes 1 & 2
- Market based Scope 2 and tenant energy in Scope 3 (Reported since 2018)



There was an increase in market and location based intensity metrics in 2020. This is likely due to the Covid-19 pandemic causing reduced PAX and ATM numbers, yet Southampton Airport had to remain operational for limited travel. For this reason, emissions did not decrease at the same pace as ATM and PAX numbers.

Key Stats - Intensity Metrics comparison over time - 2

The table below shows the figures from the chart on the previous slide for:

- Location based Scope 2 and tenant energy in Scope 3 from 2018
- Market based Scope 2 and tenant energy in Scope 3 from 2018

	2015	2016	2017	2018	2019	2020
ATM	39,137	42,797	44,418	39,764	36,308	10,932
PAX	1,775,076	1,962,321	2,081,680	2,002,767	1,793,744	296,260
% Change in ATM (year-on-year)	N/A	9.4%	3.8%	-10.5%	-8.7%	-69.9%
% Change in PAX (year-on-year)	N/A	10.5%	6.1%	-3.8%	-10.4%	-83.5%
Scope 1 & 2 (tCO_2e) Location Based Tenant energy in Scope 3	2,535	2,359	2,262	1,583	1,227	1,027
$kgCO_2e$/ATM	64.8	55.1	50.9	39.8	33.8	94.0
$kgCO_2e$/PAX	1.4	1.2	1.1	0.8	0.7	3.5
Scope 1 & 2 (tCO_2e) Market Based Tenant energy in Scope 3	N/A*	N/A*	N/A*	1,282	547	496
$kgCO_2e$/ATM	N/A*	N/A*	N/A*	32.3	15.1	45.4
$kgCO_2e$/PAX	N/A*	N/A*	N/A*	0.6	0.3	1.7

* Note that for 2015-2017 no figures for this methodology are available

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Background

AGS Airports Limited, a partnership between Ferrovial and Macquarie Infrastructure and Real Assets (MIRA), owns Southampton International Airport Limited (SOU). The airport operates 365 days per year serving around 1.8 million passengers and handling around 36,000 aircraft movements. AGS Airports employ around 350 full time employees (FTE), of which around 70 are based in Southampton Airport, many of whom commute to the airport by car or public transport. To continue operating in an environmentally responsible manner, it is important for the airport to monitor and manage all its emissions from all operations.

During the reporting year of 2020, national restrictions on travel were implemented in the UK from March onwards in response to the Covid-19 pandemic. This has lead to significant decreases in passenger numbers and resultantly, employee numbers and total aircraft movements for AGS Airports. A number of staff were placed on furlough and there has also been a shift to working from home where possible.

The calculation of the annual carbon footprint will help AGS Airports Limited and the individual airports understand the different areas which contribute to their overall carbon footprint and monitor changes on a yearly basis. This process will help identify improvement opportunities, which will ultimately reduce AGS Airports' carbon footprint and associated costs. In addition, the success of any management strategies previously implemented can be evaluated

Carbon Emissions by Source and Activity 2020 - 1

Southampton Airport's emissions can be broken down by activity as seen in this table.

The main activities that contribute to the footprint are aircraft movements and passenger surface access

Utilities include natural gas and refrigerant usage in the terminal as well as electricity consumption and glycol based de-icer

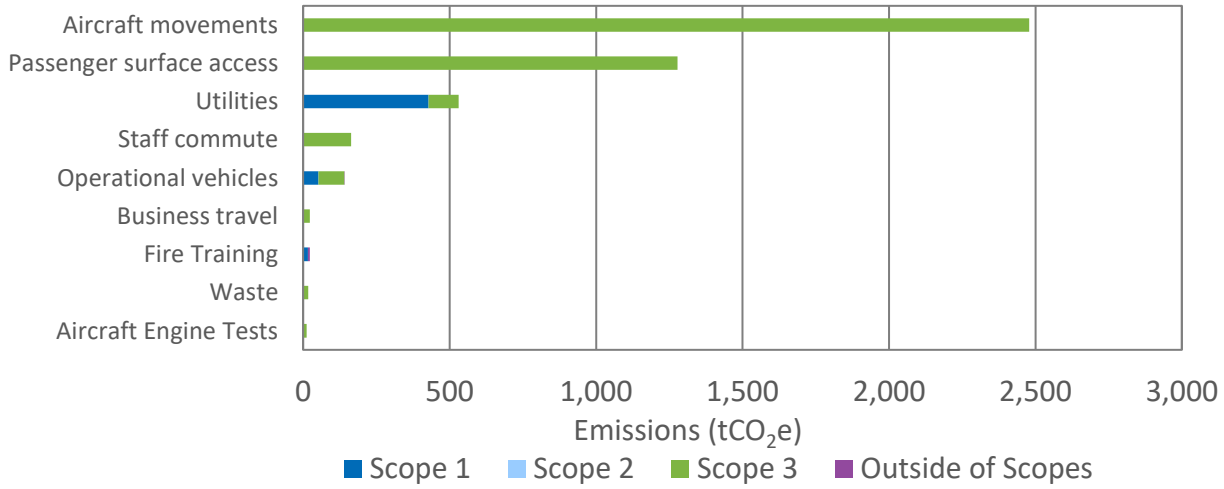
Business travel, fire training, waste and engine testing contribute a small overall percentage of the carbon footprint

Emissions Source	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)	Scope 3 (tCO_2e)	Outside of Scope (tCO_2e)	Total (tCO_2e)	% of Total Emissions
Aircraft movements	0	0	2,478	0	2,478	53.2%
Passenger surface access	0	0	1,278	0	1,278	27.4%
Utilities	428	0	102	0	530	11.4%
Staff commute	0	0	163	0	163	3.5%
Operational vehicles	52	0	89	0	141	3.0%
Business travel	0	0	22	0	22	0.5%
Fire Training	16	0	0	6	23	0.5%
Waste	0	0	16	0	16	0.4%
Aircraft Engine Tests	0	0	12	0	12	0.3%
Total	**496**	**0**	**4,160**	**6**	**4,663**	**100.0%**

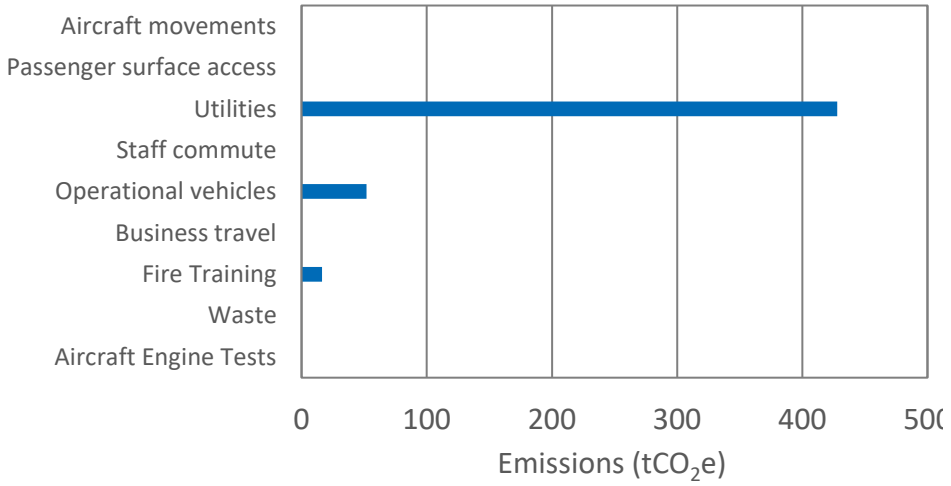
Accounts for the direct carbon dioxide (CO_2) impact of using biofuels in airport vehicles

Carbon Emissions by Source and Activity 2020 - 2

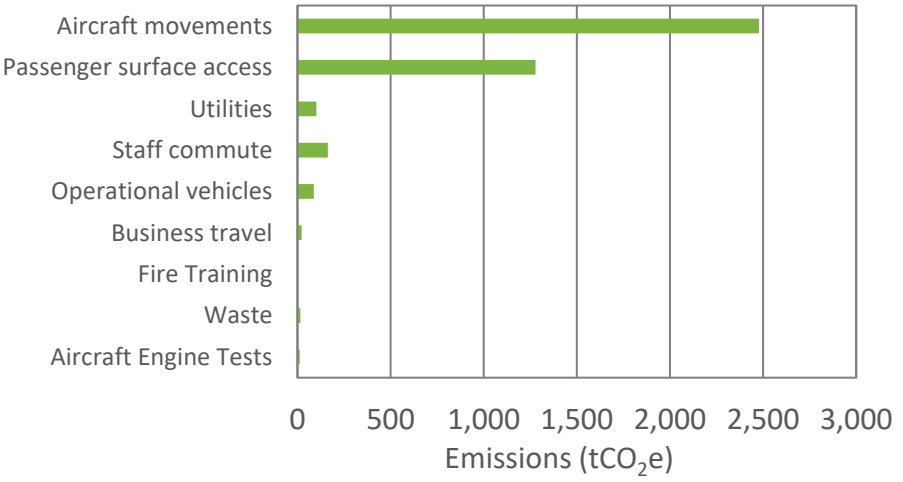
All Scopes carbon emissions split by source/activity



Scopes 1 and 2 carbon emissions split by source/activity

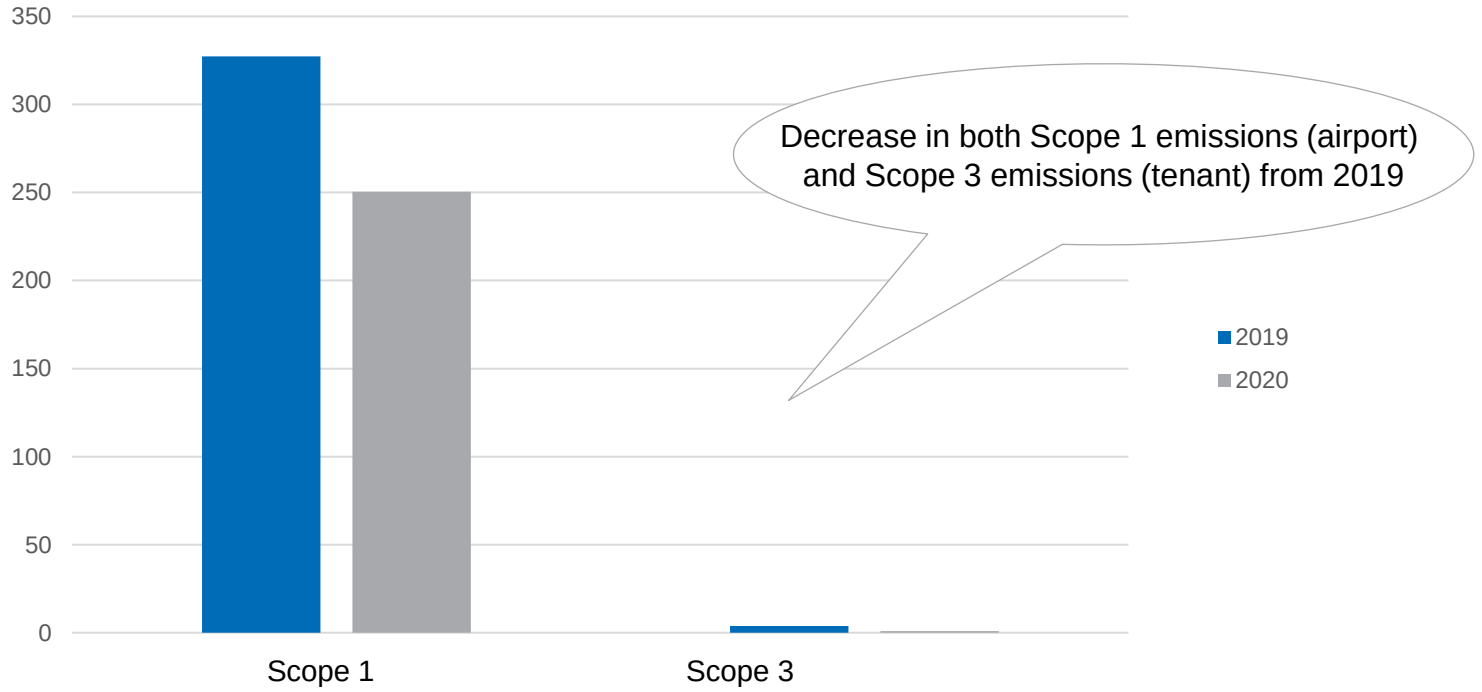


Scope 3 carbon emissions split by source/activity



Tenant Energy

- As tenant energy is out with the control of the airport, this was moved to Scope 3 emissions in 2019, in order to more clearly identify the airports controllable emissions.
  - This decreased the airports Scope 2 emissions but the Total Emissions figure accounts for both airport consumption and tenant consumption.
  - 100% of airport and tenant electricity purchased is renewable and so there are no emissions associated.
- All tenant energy that is contained in Scope 3 is metered data.
- A comparison of emissions from natural gas split by scope 1 and 3 (airport and tenant) can be seen below

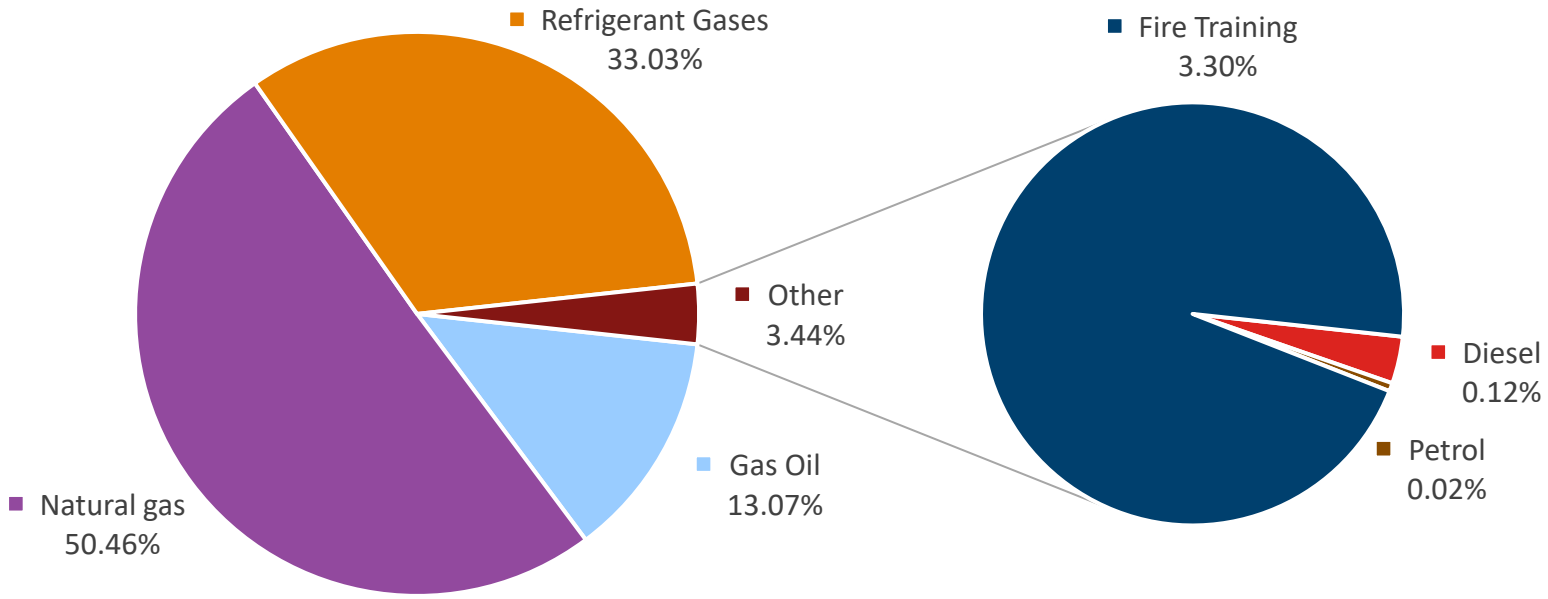


Electricity is not included in the figure above because renewable electricity is purchased and has no associated emissions.

Scope 1 Emissions Sources

Scope 1 =496 tCO_2e (10.6% of Total)

Scope 1 emissions are under the direct control of the airport.



Scope 2: Location and Market Based Emissions

Scope 2 = 0 tCO_2e (0% of Total)

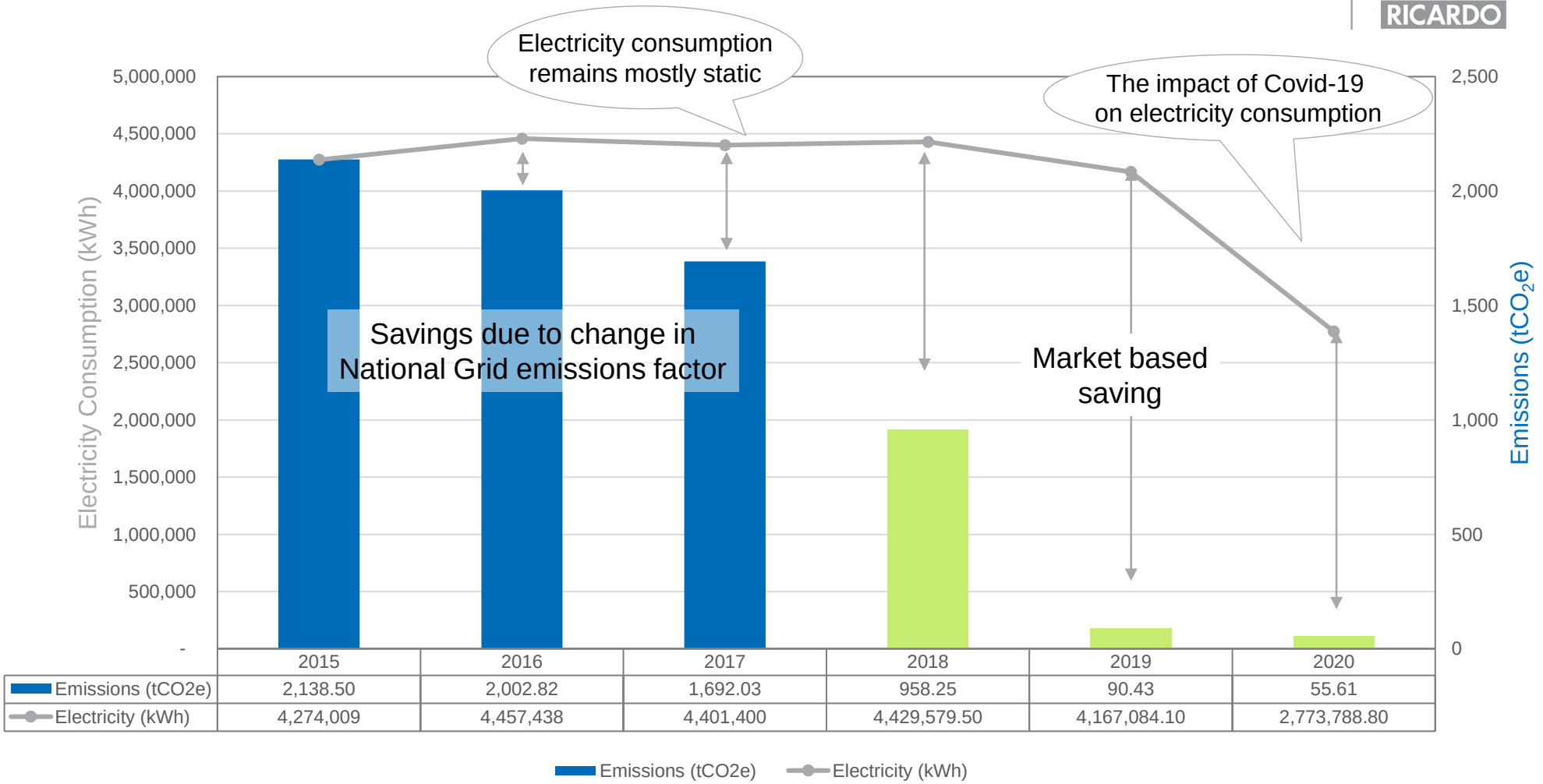
Scope 2 emissions relate to the electricity consumption at the airport. These can be calculated as:

- Location-based method; this reflects the average emissions intensity of macro-scale (regional/national) electricity grids where energy consumption occurs. Companies reporting using this method should use the regional/National Grid average emission factor. In the UK, this would be sourced from the Defra/DECC UK Government conversion factors for Company Reporting.
- Market-based method; this reflects the emissions from the electricity that a company is purchasing. Energy suppliers in the EU are already required, by law, to disclose to consumers the fuel mix and GHG emissions associated with their portfolio or tariffs. This airport selects to purchase energy that is greener than the National Grid average emissions factor. The advantage of procuring energy that is higher in renewable energy sources than that of the National Grid average emissions factor is outlined in the table below.

	Location-based (tCO_2e)	Market-based (tCO_2e)
Airport Electricity Emissions (Scope 2)	531	0

- Here, market-based emissions are zero because the airport purchased 100% green electricity from its energy suppliers. REGO certificates have been provided for electricity consumed between Jan-Mar 2020, and a supplier statement provided for the remainder of 2020 that indicates that the supply is 100% renewable and REGOs will be available in mid-2021.
- The following slide provides an annual comparison of the electricity consumption and relevant emissions at Southampton Airport.

Comparison of Electricity Consumption and Carbon Emissions



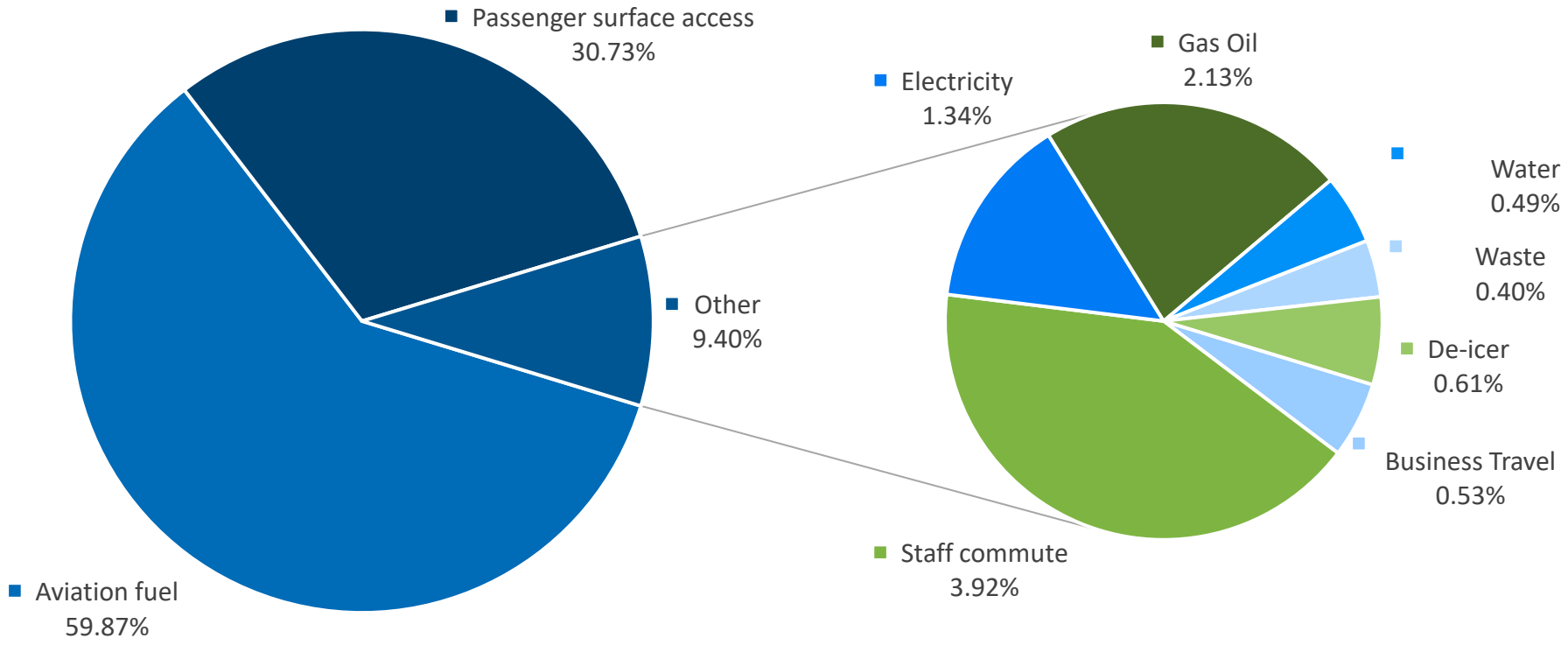
	2015	2016	2017	2018	2019	2020
Emissions (tCO2e)	2,138.50	2,002.82	1,692.03	958.25	90.43	55.61
Electricity (kWh)	4,274,009	4,457,438	4,401,400	4,429,579.50	4,167,084.10	2,773,788.80

There has been a small deviation in total electrical consumption from 2015-2019. The majority of savings in emissions is due to the increase of renewables on the national electrical grid or purchasing electricity that is high in renewable energy (market based savings). From 2019-2020, electricity consumption and the resulting emissions reduced, likely due to the Covid-19 pandemic.

Note: to allow for better comparison to previous years, the figures for electricity emissions above include tenant electricity use, as well as Transmission and Distribution emissions.

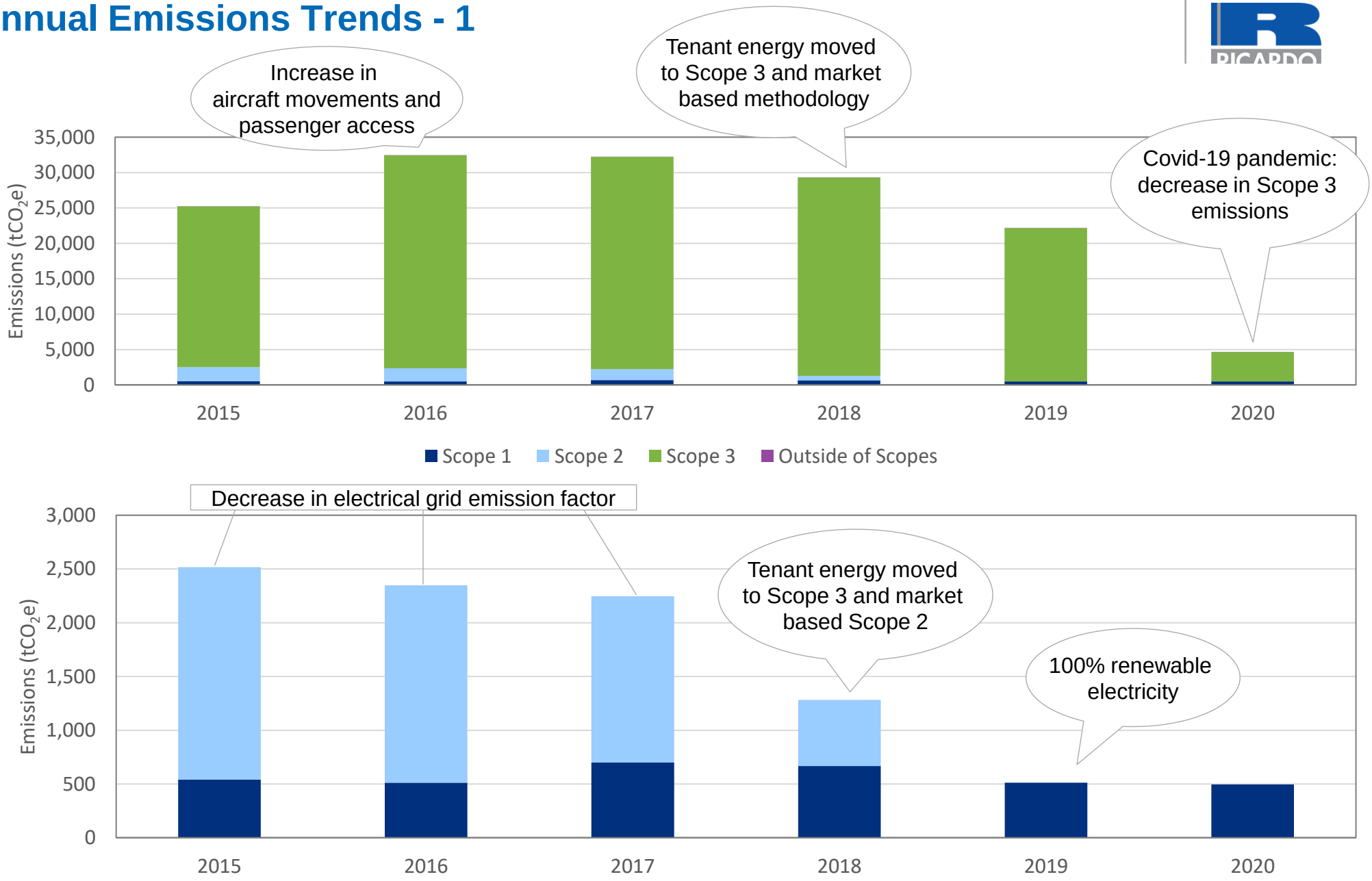
Scope 3 Emissions Sources

Scope 3 = 4,160 tCO_2e (89.2% of Total)



The above figures are reported under market based methodology, therefore the emissions from electricity are from transmission and distribution (T&D) only as 100% of electricity purchased is renewable.

Annual Emissions Trends - 1



Annual Emissions Trends - 2

The table below shows the figures from the charts on the previous slide, as well as the % year-on-year (y-o-y) change of the different emissions scopes.

Emissions by Scope	2015 emissions (tCO_2e)	2016 emissions (tCO_2e)	2017 emissions (tCO_2e)	2018 emissions (tCO_2e)*	2019 emissions (tCO_2e)*	2020 emissions (tCO_2e)*
Scope 1	560	522	715	677	547	496
Scope 2	1,975	1,837	1,547	615	0	0
Scopes 1 and 2	**2,535**	**2,359**	**2,262**	**1,292**	**547**	**496**
Scope 3	22,688	30,069	29,951	28,024	21,650	4,160
Outside of Scopes	36	25	24	20	1	6
Total emissions	**25,259**	**32,453**	**32,237**	**29,337**	**22,198**	**4,663**
Scope 1 % y-o-y change	N/A	-7%	37%	-5%	-19%	-9%
Scope 2 % y-o-y change	N/A	-7%	-16%	-60%	-100%	N/A
Scope 1 & 2 % y-o-y change	**N/A**	**-7%**	**-4%**	**-43%**	**-58%**	**-9%**
Scope 3 % y-o-y change	N/A	33%	0%	-6%	-23%	-81%
Outside of Scopes % y-o-y change	N/A	-32%	-4%	-15%	-96%	628%
Total % y-o-y change	**N/A**	**28%**	**-1%**	**-9%**	**-24%**	**-79%**

* Note that due to changes in methodology, 2015-2017 emission are reported using location based methodology and tenant energy is in Scopes 1 and 2. For 2018-20 emissions are reported using the market based methodology and tenant energy is moved to Scope 3.

Annual Emissions Trends - 3

Changes to footprint methodology in 2019:

- Airport and 3rd party glycol based de-icer included under scope 1 and 3, respectively.
- More accurate £/mile conversion factors were used to convert business travel spend data into mileage
- Outside of scope emissions calculated for wood used in fire training
- Sub-metered FEGP electricity has been moved from scope 1 to tenant electricity under scope 3 for 9 out of 12 months of 2020.

The following sources experienced the largest decrease in emissions from 2019, likely due to the impacts of the Covid-19 pandemic:

- Waste emissions reduced by 97%
- Staff commute emissions reduced by 85%
- Passenger surface access emissions reduced by 84%
- Aircraft movement emissions reduced by 79%

The following sources experienced an increase in emissions from 2019, due to change in methodology:

- Business travel emissions (Scopes 1 & 3) increased by 45%, mainly due to the use of more accurate £/mile conversion factors that were not available previously.
- Utilities emissions increased by 5%, mainly due to the inclusion of emissions from glycol based de-icer for the first time.

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Appendix – Outside of Scope Emissions

As per UK Government GHG Conversion Factors for Company Reporting guidance, Outside of Scope factors should be used to account for the direct carbon dioxide (CO_2) impact of burning biomass and biofuels. The emissions are labelled 'outside of scope' because the Scope 1 impact of these fuels has been determined to be a net '0' (since the fuel source itself absorbs an equivalent amount of CO_2 during the growth phase as the amount of CO_2 released through combustion). As a result, full reporting of any fuel from a biogenic source should have the 'outside of scope' CO_2 value documented to ensure complete accounting for the emissions created.

2020 = **6 tCO_2e** (0.14% of total emissions)

Methodology

The following sections provide a summary of the methodology adopted by Ricardo Energy & Environment to calculate the 2019 carbon footprint for the Airports.

The standard approach to carbon footprinting is to use the Greenhouse Gas (GHG) Protocol Corporate Accounting and Reporting Standard developed by World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI); this sets out a corporate accounting and reporting methodology for GHGs.

Scope 1 emissions are defined as direct GHG emissions arising from sources that are owned or controlled by the company. The emissions result from activities that the company can have direct influence on through its actions. Airports' emissions that are included are: natural gas use, company owned vehicles fuel use, fuel use for business travel, refrigerant gas use (from leaks during maintenance or malfunction), wood pallets and diesel use for fire training, propane combustion and kerosene combustion.

Scope 2 emissions are associated with the use of electricity imported from the grid or from a third-party supplier of energy in the form of heat or electricity. These indirect GHG emissions are due to upstream emissions from the production and delivery of fuel to power stations. Airports can influence the amount of electricity it uses; however, it has little control over the generation of the electricity and these emissions are therefore classed as Scope 2.

Scope 3 emissions are defined as those arising as an indirect consequence of the use of goods or services provided by the company. Airports do have some influence over Scope 3 emissions but the activities are not under its control. Sources included by Airports include aircraft (all aircraft movements up to a height of 1,000m above aerodrome level), employees commuting to the airport, passenger surface access to the airport, airside vehicle activities by third party operators, waste disposal (including production of the virgin materials), water (supply and treatment) and airport business travel.

Methodology

The uncertainties associated with carbon footprint calculations can be broadly categorised into scientific uncertainty and estimation uncertainty. Scientific uncertainty arises when the science of the actual emission and/or removal process is not completely understood. For example GWP values involve significant scientific uncertainty. Estimation uncertainty arises any time GHG emissions are quantified. Estimations have been made within this footprint where areas have uncertainty have arisen.

Business Travel

Accounts data was provided for business travel (Scope 1 & 3). All transport mode data was provided in £ value and converted to distance travelled using the cost/km from Carbon Footprint and Project Register Tool (CFPRT) which can be found at https://sustainablescotlandnetwork.org/resources/carbon-footprint-and-project-register-tool . The CFPRT collates cost data for all forms of public transport across the UK, and is managed and updated by Sustainable Network Scotland and Resource Efficient Scotland.

Passenger Surface Access

Emissions are based on a survey undertaken in 2018, scaled to 2020 SAL passenger numbers. Information was collated on the mode of travel and location of those who answered the survey.

Staff Commute

For staff commute, a 2021 survey completed by airport and third party staff was utilised to reflect staff commute before and during the Covid-19 pandemic. There were 31 complete responses from airport staff, and so final data was scaled up to the total FTE averages of 94 pre pandemic and 66 during the pandemic. There were also 18 responses for third party employees, which was scaled up to the full 225 active third party passes. The survey respondents provided information on their modes of transport, distance travelled to work and number of days worked per week. The survey included questions on these before and during the Covid-19 pandemic, including time on furlough. An assumption was made that the first 12 weeks of the year were unaffected by the pandemic and the following 40 weeks were. It was assumed that no commute was made during time spend on furlough.

Methodology

De-icer

We have calculated de-icer emissions using the emissions factors provided in the latest version of the ACERT tool from the Airport Carbon Accreditation scheme. This includes the emissions from glycol based de-icer only, under ACA methodology. Where diluted glycol was used (e.g. 50:50 glycol to water), the dilution rate has been taken into account in calculations to ensure only the amount of undiluted glycol was considered.

Engine Tests

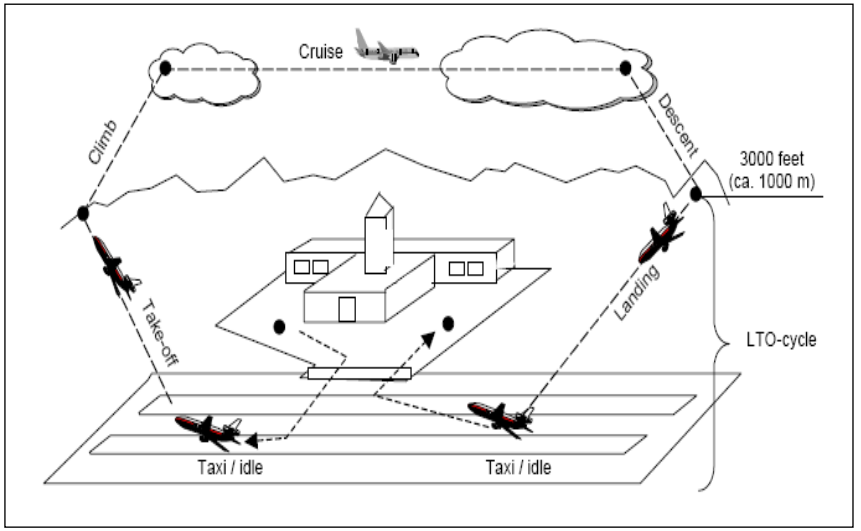
To calculate the emissions from engine testing at Southampton airport, a similar process was carried out to identify the engine type as per the LTO cycle detailed below. Other assumptions used for the calculations are:

1. Only one engine was tested
2. High power testing occurred for 10% of the full test time

Aircraft Movements

Data provided by Southampton airport included the following information for each aircraft movement in 2020: Carrier, Aircraft registration, aircraft IATA code, aircraft ICAO code, engine type, Arriving/departing, and date of movement.

This data is used to identify the number and type of engines that each aircraft has, and the fuel burn per second at each stage of the landing take-off cycle (shown below) can be referenced from the latest version of the ICAO databank.



Methodology – changes in 2020

New methodology approach for 2020 includes:

- Airport and 3rd party glycol based de-icer included under scope 1 and 3, respectively.
- More accurate £/mile conversion factors were used to convert business travel spend data into mileage
- Outside of scope emissions calculated for wood used in fire training
- Sub-metered FEGP electricity has been moved from scope 1 to tenant electricity under scope 3 for 9 out of 12 months of 2020.

Location v Market Based

Market-based method: As all of the 2,773,789 kWh of electricity consumption was supplied to Southampton Airport by a single supplier. Southampton Airport contacted the supplier and asked for the details of the fuel mix. The following breakdown was provided for the year-ending 31st March 2020 (Source of Electricity, Percentage):

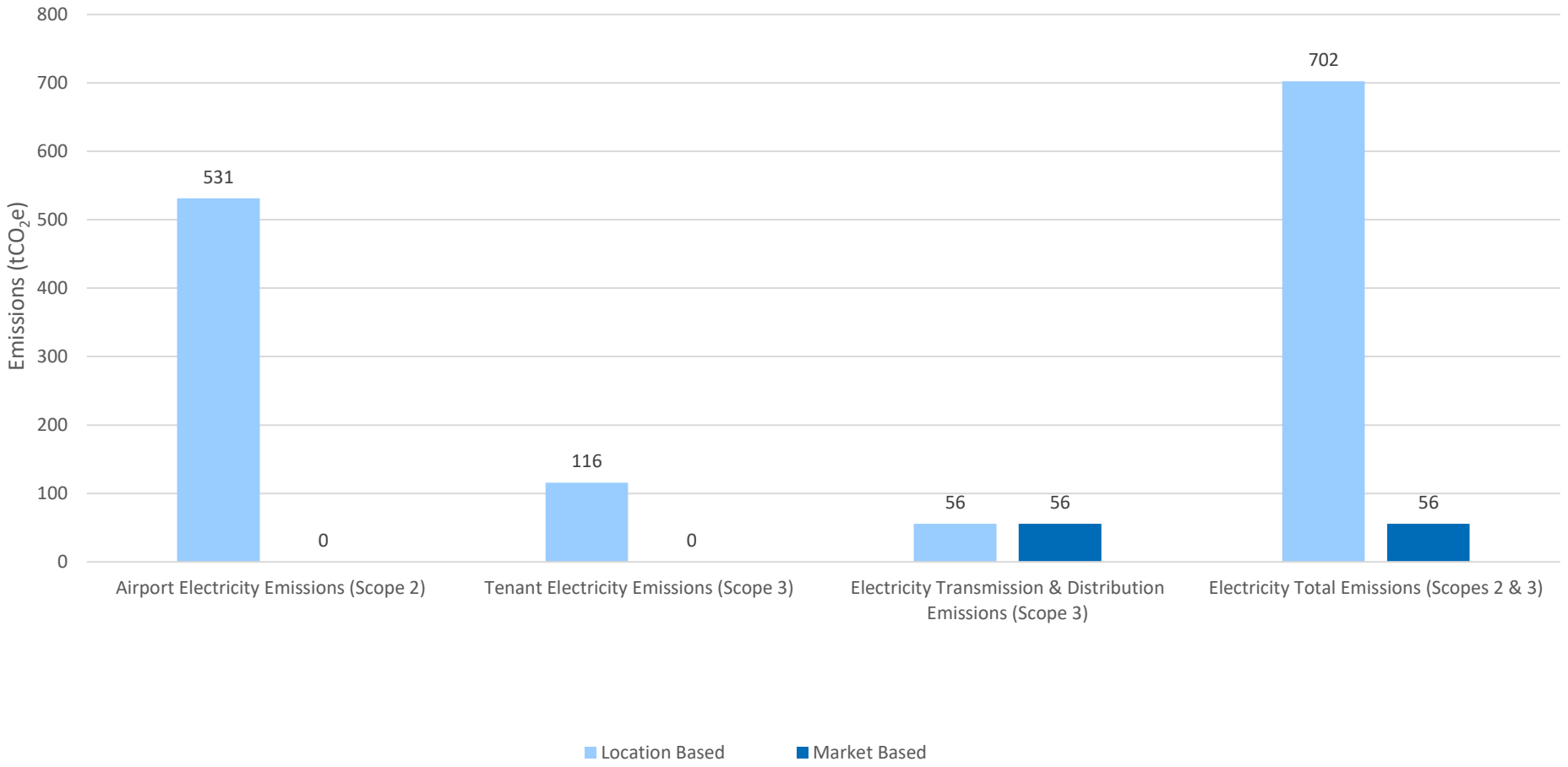
- Renewables: **100%**

REGO certificates have been provided for electricity consumed between Jan-Mar 2020, and a supplier statement provided for the remainder of 2020 that indicates that the supply is 100% renewable and REGOs will be available in mid-2021.

The weighted emission factor was provided as 0 gCO_2/kWh (or 0 $kgCO_2$/kWh). Multiplying the electricity consumption of 2,773,789 kWh by the emission factor of 0 $kgCO_2$/kWh calculates the emissions as 0 tCO_2e.

Location vs Market Based Emissions 2020

Scope 2 and 3 emissions due to electricity consumption (airport and tenant), calculated using either the location or market based emissions factors.



Location Based Electricity Emissions Historical Comparison

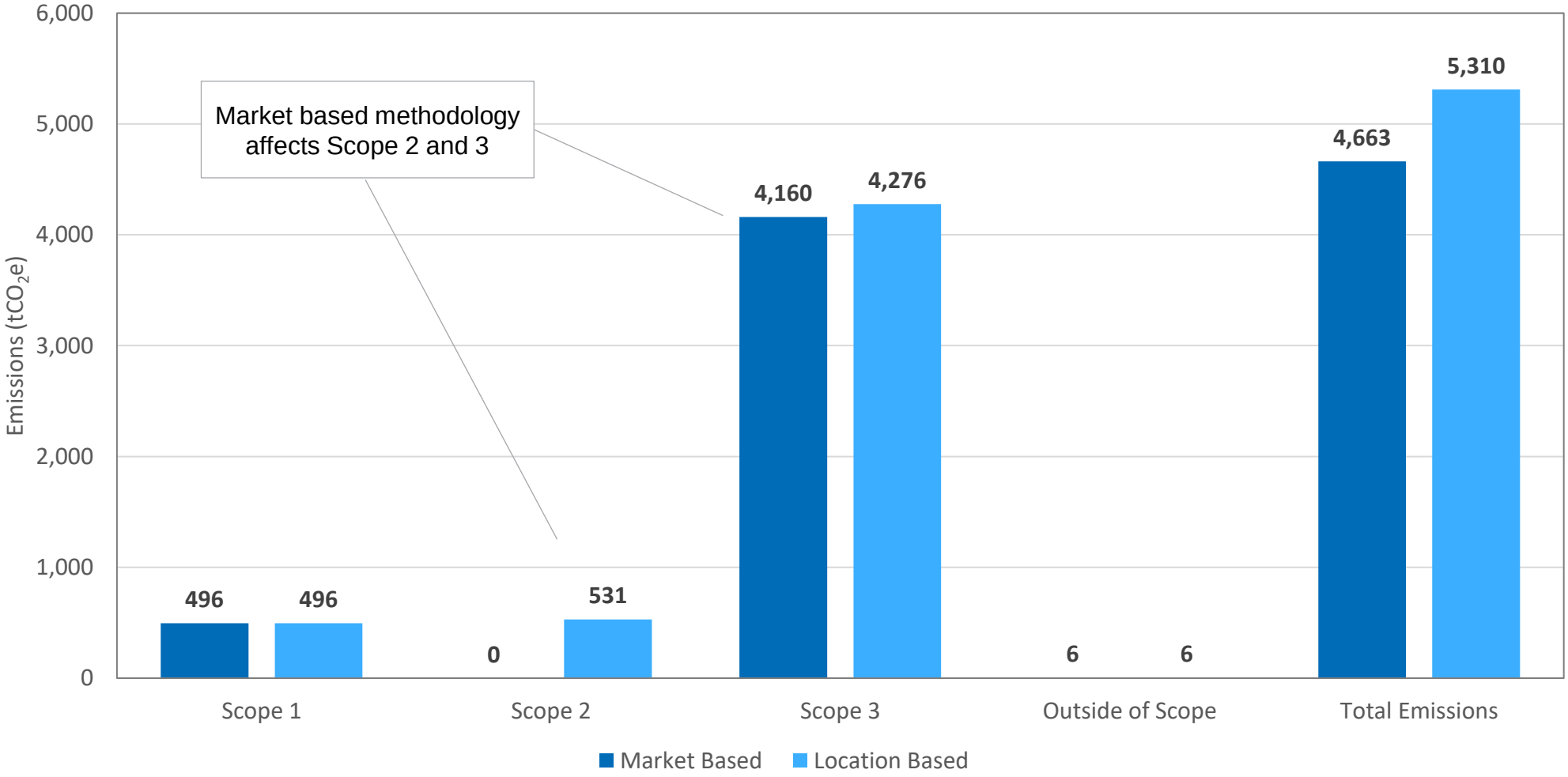
To allow for a fair comparison to previous years, the figures for electricity emissions below include tenant electricity use (classified as Scope 3 in 2019 methodology).

	2017 (Location Based)	2018 (Location Based)	2018 (Market Based)	2019 (Location Based)	2019 (Market Based)	2020 (Location Based)	2020 (Market Based)
Electricity (Scope 2 and 3) $kgCO_2e/kWh$ Airport (Scope 2) + Tenants (Scope 3)	0.35156	0.28307	0.19220	0.25560	0	0.23314	0
Electricity T&D* losses (Scope 3) $kgCO_2e/kWh$	0.03287	0.02413	0.02413	0.02170	0.02170	0.02005	0.02005
Electricity usage (kWh) total Airport + Tenants	4,401,400	4,429,580	4,429,580	4,167,084	4,167,084	2,773,789	2,773,789
Electricity (Scope 2 and 3) emissions tCO_2e Airport + Tenants	1,547	1,254	851	1,065	0	647	0
Electricity T&D* losses (Scope 3) emissions tCO_2e	145	107	107	90	90	56	56
Total electricity (Scope 2 and 3) emissions tCO_2e Airport + Tenants	**1,692**	**1,361**	**958**	**1,156**	**90**	**702**	**56**

*T&D = transmission and distribution

Location vs Market Based Emissions 2020: All Scopes

Emissions totals by scope calculated using either the location or market based emissions factors. Tenant energy is included in Scope 3.



Historical Emissions Trends

The table below shows emissions figures where for all years Scope 2 emissions are reported using the location based methodology and tenant energy is included in Scopes 1&2 for 2015-17 and in Scope 3 from 2018-20.

Emissions by Scope	2015 emissions (tCO_2e)	2016 emissions (tCO_2e)	2017 emissions (tCO_2e)	2018 emissions (tCO_2e)	2019 emissions (tCO_2e)	2020 emissions (tCO_2e)
Scope 1	560	522	715	677	547	496
Scope 2	1,975	1,837	1,547	906	680	531
Scopes 1 and 2	**2,535**	**2,359**	**2,262**	**1,583**	**1,227**	**1,027**
Scope 3	22,688	30,069	29,951	28,136	22,035	4,276
Outside of Scopes	36	25	24	20	1	6
Total emissions	**25,259**	**32,453**	**32,237**	**29,740**	**23,263**	**5,310**
Scope 1 % y-o-y change	N/A	-7%	37%	-5%	-19%	-9%
Scope 2 % y-o-y change	N/A	-7%	-16%	-41%	-25%	-22%
Scope 1 & 2 % y-o-y change	**N/A**	**-7%**	**-4%**	**-30%**	**-22%**	**-16%**
Scope 3 % y-o-y change	N/A	33%	0%	-6%	-22%	-81%
Outside of Scopes % y-o-y change	N/A	-32%	-4%	-15%	-96%	628%
Total % y-o-y change	**N/A**	**28%**	**-1%**	**-8%**	**-22%**	**-77%**

Glossary

Term	Definition
Arisings	Materials forming the secondary or waste products of industrial operations.
ATM	Air traffic movements – an aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure is counted as two movements.
Carbon dioxide equivalent (CO_2e)	The carbon dioxide equivalent (CO_2e) allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO_2. CO_2e is calculated by multiplying the emissions of each of the six greenhouse gases by its 100-year global warming potential (GWP).
Carbon footprint	A carbon footprint measures the total greenhouse gas emissions caused directly and indirectly by a person, organisation, event or product. A carbon footprint is measured in tonnes of carbon dioxide equivalent (tCO_2e).
Degree days	A unit used to determine the heating or cooling requirements of buildings, representing a fall or increase of one degree below a specified average outdoor temperature for one day.
Emission factor	An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.
GHG	Greenhouse gas – a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, and ozone.
Outside of Scope	All fuels with biogenic content (e.g. 'Diesel and petrol (average biofuel blend)') should have the 'Outside of Scope' emissions reported to ensure a complete picture of an organisations' emissions are created. The emissions are labelled 'Outside of Scope' because the Scope 1 impact of these fuels has been determined to be a net '0' (since the fuel source itself absorbs an equivalent amount of CO_2 during the growth phase as the that CO_2 is released through combustion).
PAX	Number of passengers.