Ricardo Energy & Environment

HIAL Airports Carbon Footprint 2021

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

Report for HIAL Airports Limited

hia Highlands and Islands Airports Limited
Puirt-adhair na Gàidhealtachd is nan Eilean Earranta

Included Emissions Sources

The following emissions sources are included in the 2021 carbon footprint for HIAL:

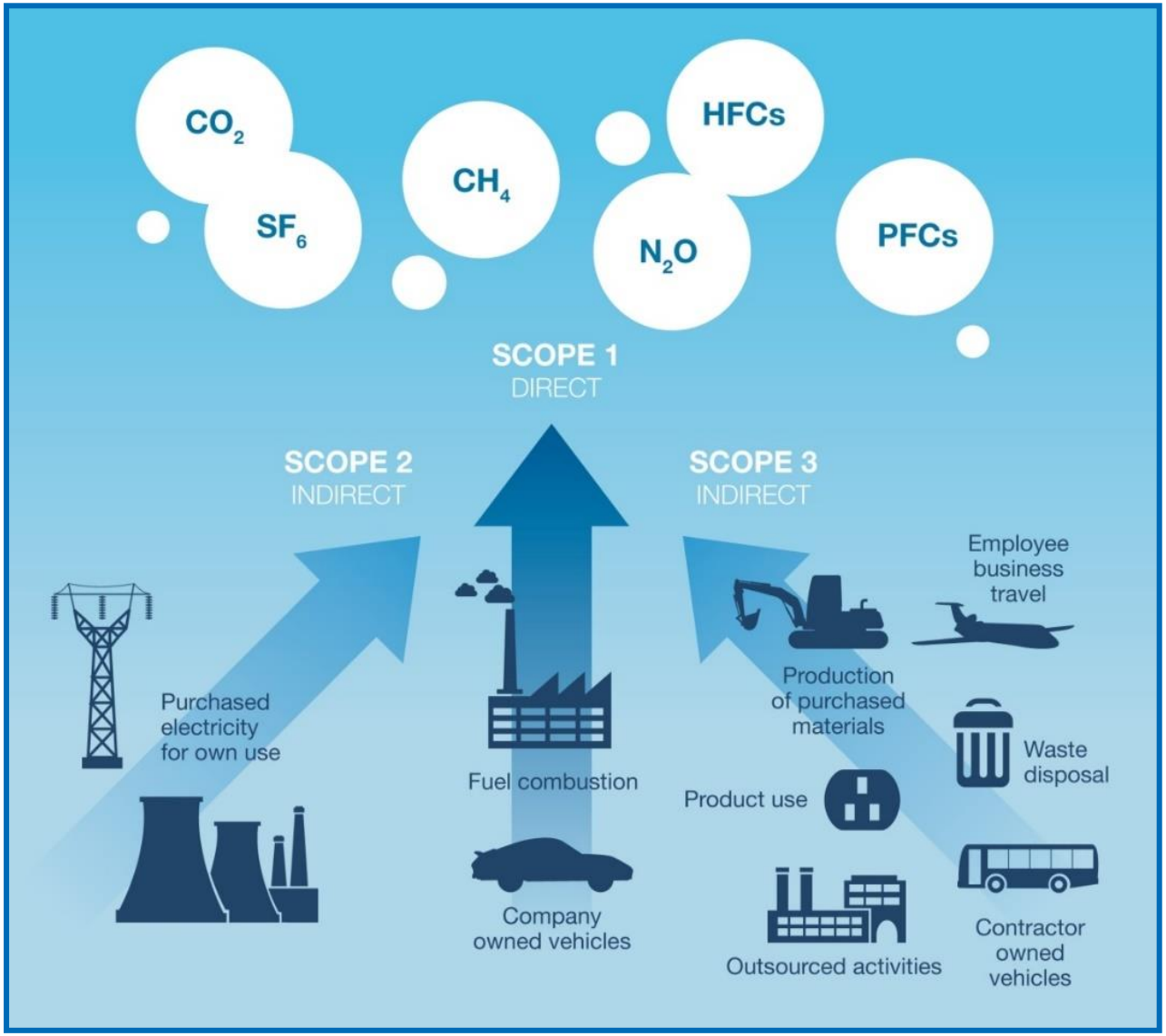
Scope 1: Direct emissions:
- Fuels burnt on site (boilers, generators, operational vehicles, fire training)
- Refrigerant gas losses
- Airport de-icer

Scope 2: Indirect emissions:
- Purchased electricity

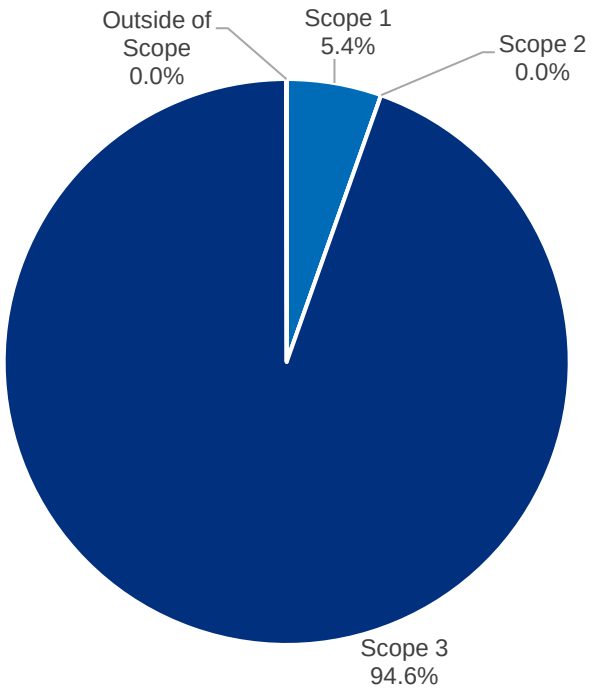
Scope 3: Indirect emissions:
- 3rd party operational vehicle fuels*
- 3rd party de-icer
- Tenant energy**
- Aircraft movements (LTO cycle and CCD)***
- Business travel
- Water supply and wastewater treatment
- Staff commute
- Passenger surface access
- Waste (disposal and virgin material production)

All figures in this report are market based, unless specified otherwise.

*where information was provided by third parties
**where tenants are recharged for energy
***engine testing is included for Inverness airport



Key Stats - Carbon Emissions by Scope 2021



	Total 2021 emissions (tCO_2e)	% of total emissions
Scope 1	2,671.9	5.4%
Scope 2	0.0	0.0%
Scope 3	46,671.5	94.6%
Outside of Scopes	11.8	0.0%
Total	**49,355.2**	**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. Sources include aircraft movements, passenger and staff travel to the airport, airside activities, waste disposal, water and business travel.

Outside of scope emissions:
Outside of scope emissions 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'.

Key Stats- Annual Comparison

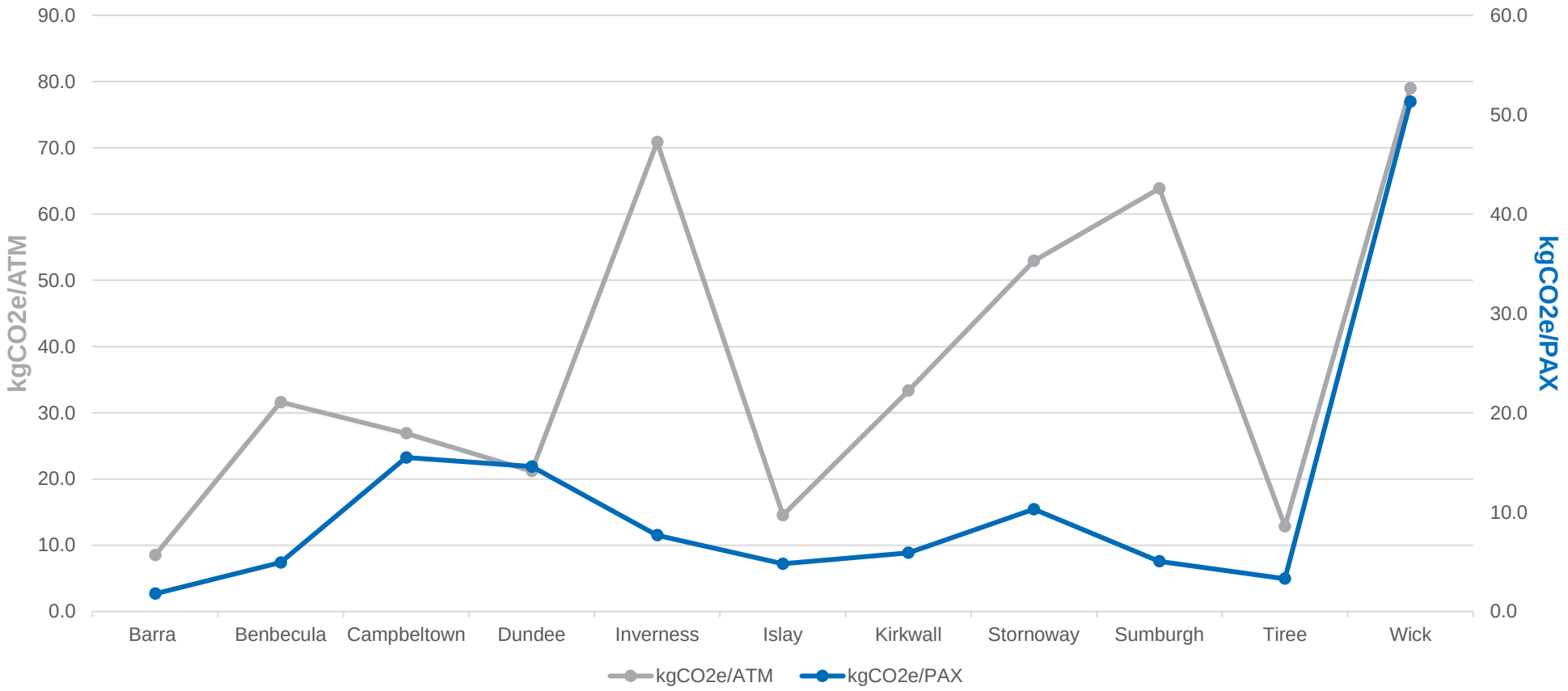
Total Scope 1 and 2 emissions for HIAL showed a small increase of 3.7% from 2020 to 2021 under market based reporting. Despite the COVID pandemic, essential services still needed to run at the HIAL airports and is shown by the increase being in scope 1 only. Electricity consumption decreased from 2020 to 2021 and this is reflected in the location based scope 1 and 2 decreasing by 3.9%.

Scope 3 emissions were most affected by the COVID pandemic due to fewer ATMs and PAX, and show a 58.2% decrease under market based reporting and 63.3% under location based.

	Total 2020 emissions (tCO_2e)	Total 2021 emissions (tCO_2e)	Percentage change
Marked Based			
Scope 1	2,568.2	2,671.9	4.0%
Scope 2	7.6	0.0	- 100.0%
Scope 3	111,638.7	46,671.5	- 58.2%
Total (inc OOS)	114,234.8	49,355.2	- 56.8%
Location Based			
Scope 1	2,568.2	2,671.9	4.0%
Scope 2	2,270.5	1,879.2	- 17.2%
Scope 3	127,478.0	46,752.6	- 63.3%
Total (inc OOS)	132,337.0	51,315.5	- 61.2%

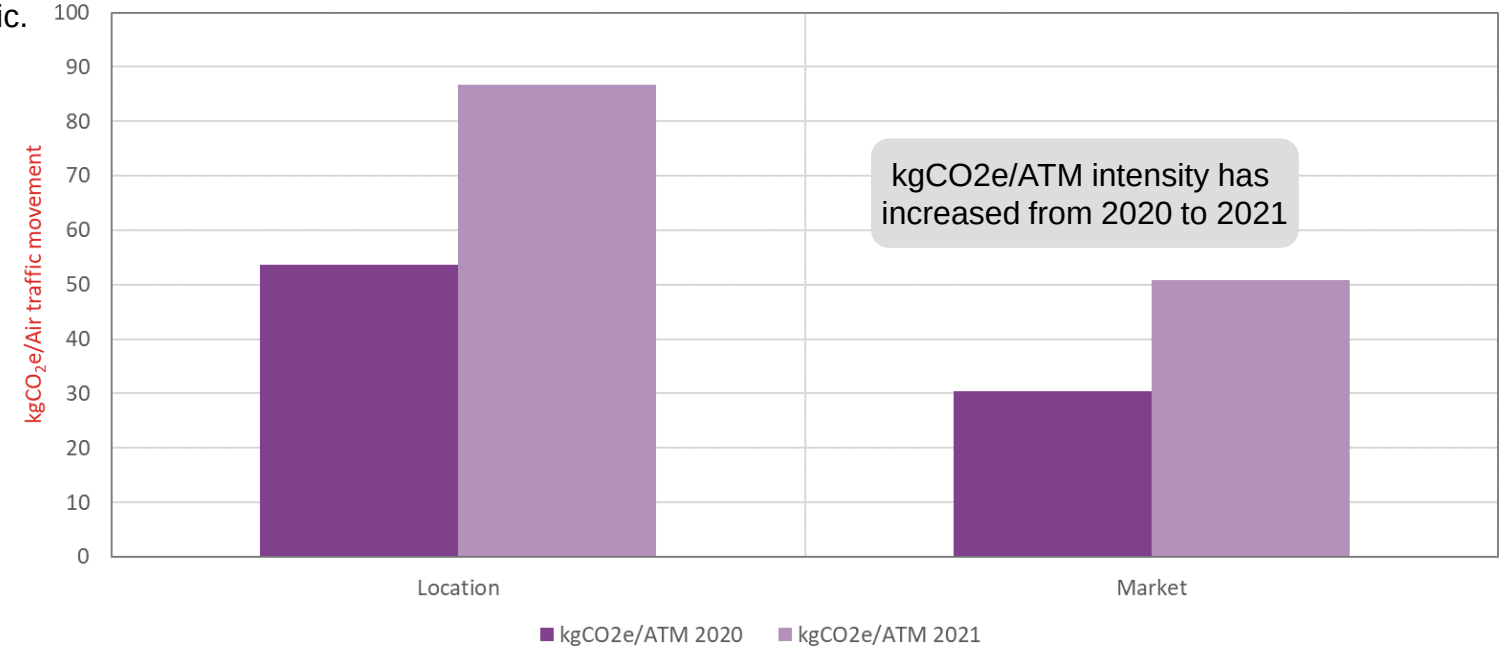
Key Stats - Intensity Metrics (1)

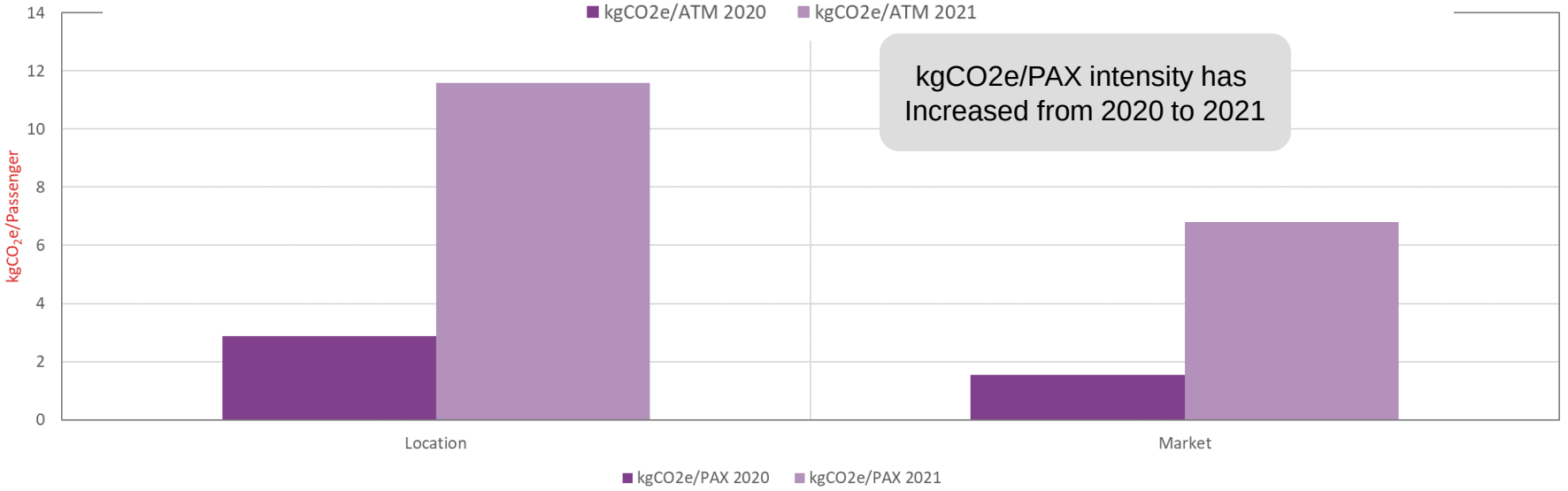
The chart below shows the comparison between the eleven HIAL airports 2021 intensity metrics for the market-based Scope 2 methodology.



Key Stats - Intensity Metrics (2)

The charts below shows the comparison between HIAL's intensity metrics for 2020 and 2021. As both metrics consist of scope 1 and 2 emissions only, there is an increase in intensity as the denominators showed a large decrease due to the COVID pandemic.





Key Stats - Intensity Metrics (3)

The table below shows the 2021 intensity metric figures for each of the eleven HIAL airports for Market vs Location based Scope 1 & 2 emissions

	BRR	BEB	CAL	DND	INV	ILY	KOI	SYY	LSI	TRE	WIC	HIAL
ATM	937	2,358	1,286	3,269	11,938	1,725	9,473	5,085	12,815	1,110	2,490	52,486
PAX	4,471	15,155	2,232	4,751	110,406	5,239	53,526	26,181	162,553	4,333	3,835	392,682
Scope 1&2 (tCO_2e) Location based	64	179	53	152	1,451	129	459	555	1,148	71	290	4,551
$kgCO_2e$/ATM	68.6	76.0	41.1	46.6	121.6	75.0	48.4	109.1	89.5	63.8	116.5	86.7
$kgCO_2e$/PAX	5.4	11.8	23.7	32.0	13.1	24.7	8.6	21.2	7.1	16.4	75.6	11.6
Scope 1&2 (tCO_2e) Market based	8	75	35	69	846	25	316	269	819	14	197	2,672
$kgCO_2e$/ATM	7.2	31.6	26.9	21.2	70.9	14.5	33.3	52.9	63.9	12.8	79.0	50.9
$kgCO_2e$/PAX	1.8	4.9	15.5	14.6	7.7	4.8	5.9	10.3	5.0	3.3	51.3	6.8

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Background

Highlands and Islands Airports Limited (HIAL) is a public corporation owned by the Scottish Ministers and subsidised by the Scottish Government in accordance with Section 34 of the Civil Aviation Act 1982.HIAL operates and manages 11 airports in total; Barra, Benbecula, Campbeltown, Dundee, Inverness, Islay, Kirkwall, Stornoway, Sumburgh, Tiree, and Wick. HIAL airports served 392,682 passengers with a total 52,486 aircraft movements in the 2020/2021 financial year. The figures in this report also include the emissions from HIAL's Head Office in Inverness.

The calculation of the annual carbon footprint will help HIAL and the individual airports to understand the different areas which contribute to their overall carbon footprint and monitor changes on a yearly basis. HIAL has committed to creating a Net Zero Aviation Zone by 2040 and so this process will help to identify improvement opportunities, which will ultimately reduce HIAL Airports' carbon footprint and associated costs. In addition, the carbon footprint will also form the baseline for emission reduction targets, allowing HIAL to measure the success of any management strategies implemented.

Carbon Emissions by Source and Activity 2021

The combined HIAL Airport's emissions for 2021 can be broken down by activity as seen in this table.

Emission Source	Total (tCO_2e)	% of Total Emissions
Aircraft movements	42,035	85%
Passenger surface access	3,429	7%
Staff commute	759	2%
Utilities	2,263	5%
Waste	90	0%
Operational vehicles	558	1%
Business travel	155	0%
Fire Training	65	0%
Aircraft Engine Tests*	2	0%
Total	**114,235**	**100%**

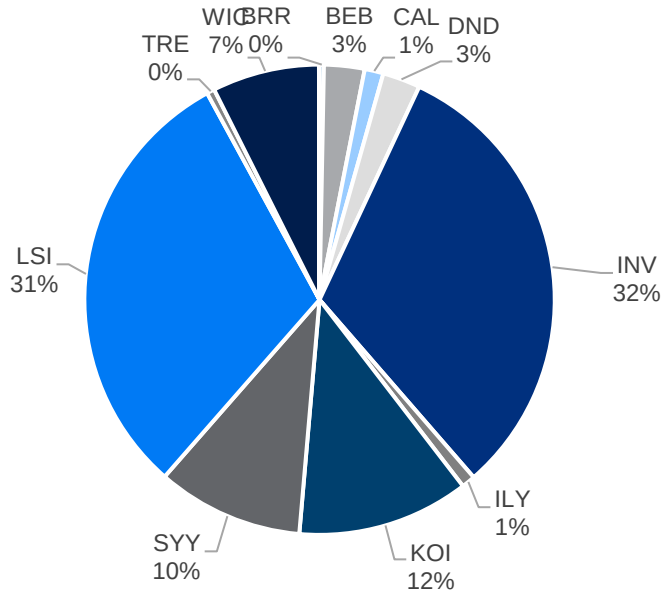
*Inverness airport only

Airport Carbon Emissions by Scope

Scope 1 & 2

2,671.9 tCO_2e

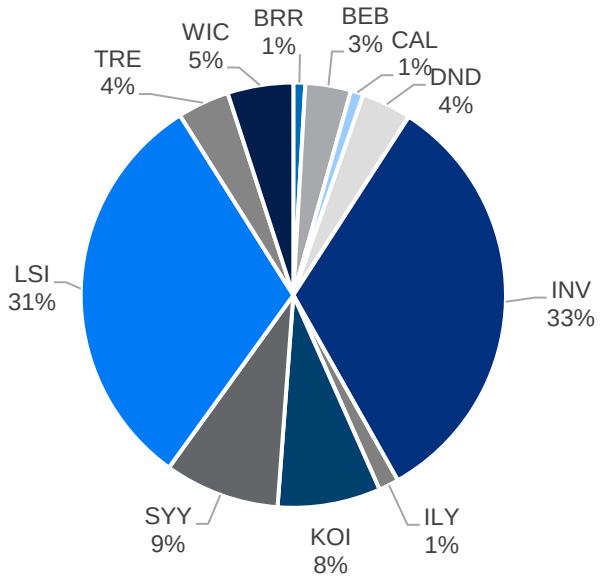
5.4% of Total Emissions



Scope 3

46,671.5 tCO_2e

94.6% of Total Emissions



Scope 2 Location and Market Based Emissions

Scope 2 = 0 tCO_2e (0.0% 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)	1,879.2	0

- Here, market-based emissions are less than location based. This is because the airport purchased all electricity under a 100% renewable electricity tariff. A supplier statement provided for the year April 2020 – March 2021 stated that all electricity purchased is from renewable sources and is supplied by REGO's.

Recommendations for improving your GHG footprint

Recommendation	Benefit
Develop infographic of carbon emissions	Infographics can be used to increase staff awareness of HIAL's carbon footprint and drive internal engagement, or be used to demonstrate to the public the good work being carried out to address the airport's carbon emissions.
Improve data collection processes & accuracy	Devise a uniform data collection process for all airports to accurately track and monitor emissions sources (e.g. fire training fuel use, actual waste generated).
Implement a data collection process for fuels used onsite by third parties	Devise a uniform data collection process for all third parties operating on site to accurately track and monitor emissions sources.
Provide evidence that does not require assumptions	Evidence such as employee commuting surveys that have gaps e.g. have not been populated with responses, should be addressed through data cleaning exercises. For example, surveys could notify the respondent when they have not answered a question correctly. This will result in a more robust data collection process that doesn't require assumptions to be made.
Capture data on passenger surface access	Consider conducting a survey for passenger surface access. At present, emission estimates are based on assumptions for all airports but Inverness.
Provide an auditable trail for consumption figures	At present, some data on consumption of fuels has been provided through email correspondences e.g. fire training, ground support equipment/GSE. To improve the data accuracy and improve the audit trail, this should be provided through invoices, supplier statements, etc. instead.
Provide distance and/or fuel data for business travel rather than just financial costs	At present, cost data is the source of most data provided for business travel which is converted to distance travelled using several assumptions. To improve on emissions calculation accuracy the following data should include: Mode of transport, distance travelled, travel provider, class travelled (flights/trains only).
Improve employee commute survey response rate	HIAL has run the employee commute survey annually, however response rate remains typically <40%, improving the response rate would give greater confidence the disclosed emissions accurately reflect employee's commuting emissions.

Other Environmental Initiatives to be Considered

- Engage third parties and on-site tenants to explore further carbon management opportunities and improve benefits of carbon management measures across the airport site
- Investigate the reduction in operational carbon on local air quality
- Change airside vehicles to electric vehicles in order to optimise use of lower carbon fuels
- Incorporate green procurement policies in all aspects of airport purchasing policy
- Incentivise alternative/ sustainable aviation fuel use by aircraft
- Water management and water treatment
- Resource efficiency for food waste and recycling services
- Site development considerations to reduce environmental impacts

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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.

2021 = **11.8 tCO_2e** (0.0% of total emissions)

Potential Data Sources Improvements

- Standardise data capture techniques across all airports for streamlined and more accurate data collection. Collating the consumption of fuel into one depository will help to avoid double counting.
- Ensure fuel invoices/ fuel consumption records are split out by use (e.g. generators, operational vehicles, business travel) and user (i.e. HIAL direct fuel use or 3rd party use).
- Monitor fire training ground fuel consumption. At present, emissions of some fuel sources at some airports is based on the deliveries of fuel and may potentially be overestimating actual consumption.
- Implement measurement of waste tonnage before being sent for treatment/ disposal. This will mean waste emissions are based on actual amount rather than estimated.

Methodology

The following sections provide a summary of the methodology adopted by Ricardo Energy & Environment to calculate the 2021 carbon footprint for HIAL 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), airport business travel and aircraft engine testing .

Outside of Scope Emissions

As per UK Government GHG Conversion Factors for Company Reporting guidance, Outside of Scope factors have been 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 have included the 'outside of scope' CO_2 value, documented to ensure complete accounting for the emissions created.

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). Fuel volume information was provided for fuel used in some airport owned vehicles. Mileage claims for fuel used in personal vehicles on business travel were accounted for with HIAL's rate of 0.45p/mile. All other business travel 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

Passenger Surface Access emissions were estimated based on a survey conducted by the CAA in 2020. The survey provided the mode of passenger transport and home postcodes of those in the sample. The first part of each postcode was used to calculate the distance travelled to the airport. The distance by road was used as a conservative estimate and Island locations were excluded from the analysis as these passengers would most likely be arriving by air. This was then scaled to the total number of passengers throughout the 19/20 financial year.

Staff Commute

For staff commute, a 2021 survey was completed by each airport and the head office. This was used to scale the survey data to the total staff at each airport. The survey respondents provided information on their modes of transport, distance travelled to work and number of days worked per week. Public statutory holiday was taken into consideration in the calculations. Further details on the methodology for each airport can be seen in their individual carbon footprint reports.

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. Where diluted glycol was used (e.g. 50:50 glycol to water), the dilution rate has been taken into account in calculations.

Engine Tests

To calculate the emissions from engine testing at Inverness 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

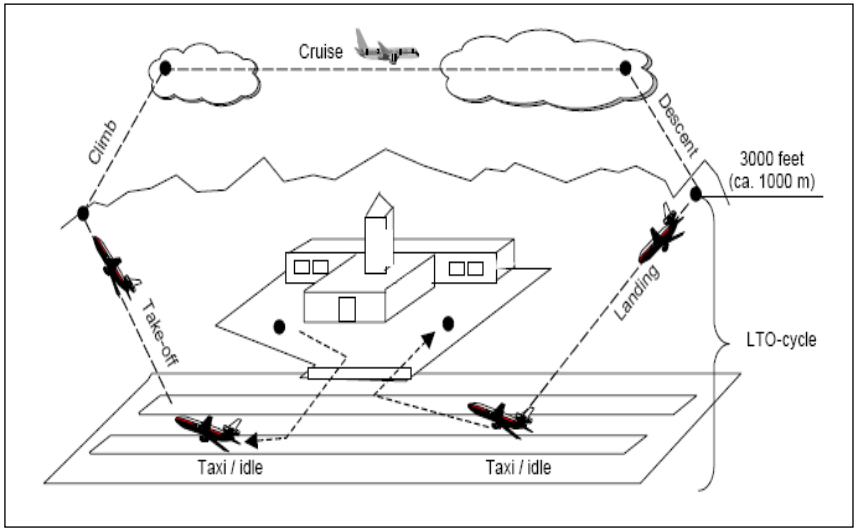
Only Inverness airport collected enough data for the 20/21 FY to estimate emissions from engine testing

Aircraft Movements: Landing Take-off (LTO) cycle

Data provided by HIAL included the following information for each aircraft movement in 2021: Carrier, Aircraft registration, aircraft IATA code, aircraft ICAO code, 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 right) can be referenced from the latest version of the ICAO databank for jet engines, and the FOCA Aircraft Piston Engine database for propeller aircraft.

Emissions are calculated from the fuel consumption per LTO, using the BEIS emissions factor for aviation turbine fuel.



Methodology

Aircraft Movements: Climb, Cruise and Descent (CCD)

The ACA scheme outline three methodologies for the allocation of CCD emissions:

1. **Half way approach**: Where emissions from half of the distance of all flights going to/from the airports is allocated to the reporting airport.
2. **Departing only approach**: Emissions for the full flight distance for departing aircraft are allocated for the reporting airport.
3. **Fuel sales approach**: Emissions for all fuel sold at the airport is allocated to the reporting airport.

Of the three options above, it was decided to utilise the first approach as this is perceived to be the most neutral and comprehensive methodology.

Data provided by HIAL included the following information for each aircraft movement in 2021: Carrier, Aircraft registration, aircraft IATA code, aircraft ICAO code, engine type, Arriving/departing, destination/origin airport, and date of movement.

Flight distance was calculated with the great circle equation, utilising the origin and destination airport latitude and longitude. This flight distance was uplifted by 5.5% to reflect the fact that aircraft do not fly in a perfect straight line from one airport to another. This figure has come from studies carried out by Ricardo Energy and Environment for the UK Department for Transport, and is an update to the commonly used figure of 9%.

Fuel kg/km in-flight for each aircraft type is calculated using data from the EMEP-EEA Fuel Database.

Emissions are calculated from the fuel consumption per flight, using the BEIS emissions factor for aviation turbine fuel.

No non-carbon warming impacts have been taken into account as part of the CCD emissions.

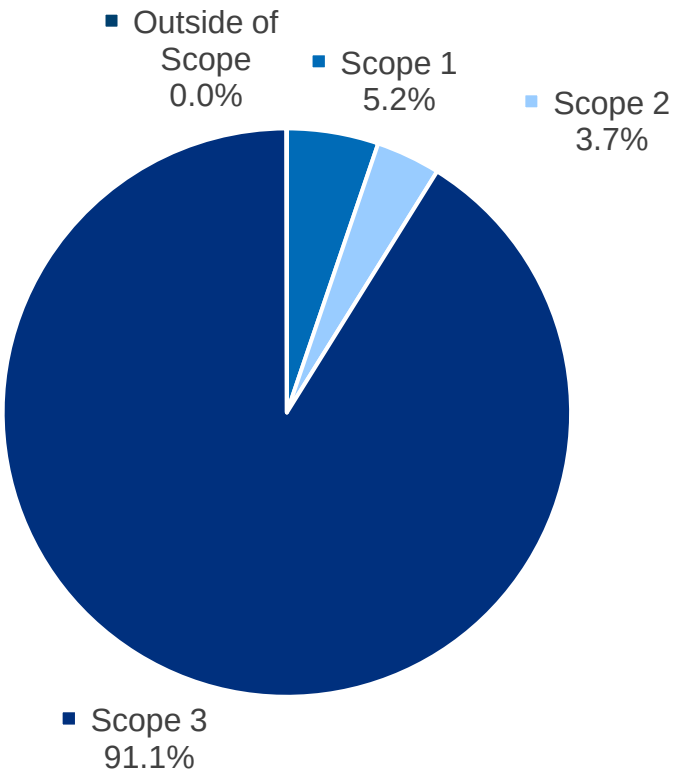
Location v Market Based

Market-based method

In 2021, HIAL's electricity was supplied by EDF.

A supplier statement from EDF has been provided for electricity consumed between Apr 2020 – Mar 2021 that indicates that the supply is 100% renewable. The weighted emission factor provided is 0 gCO_2/kWh.

Carbon Emissions by Scope (location based)



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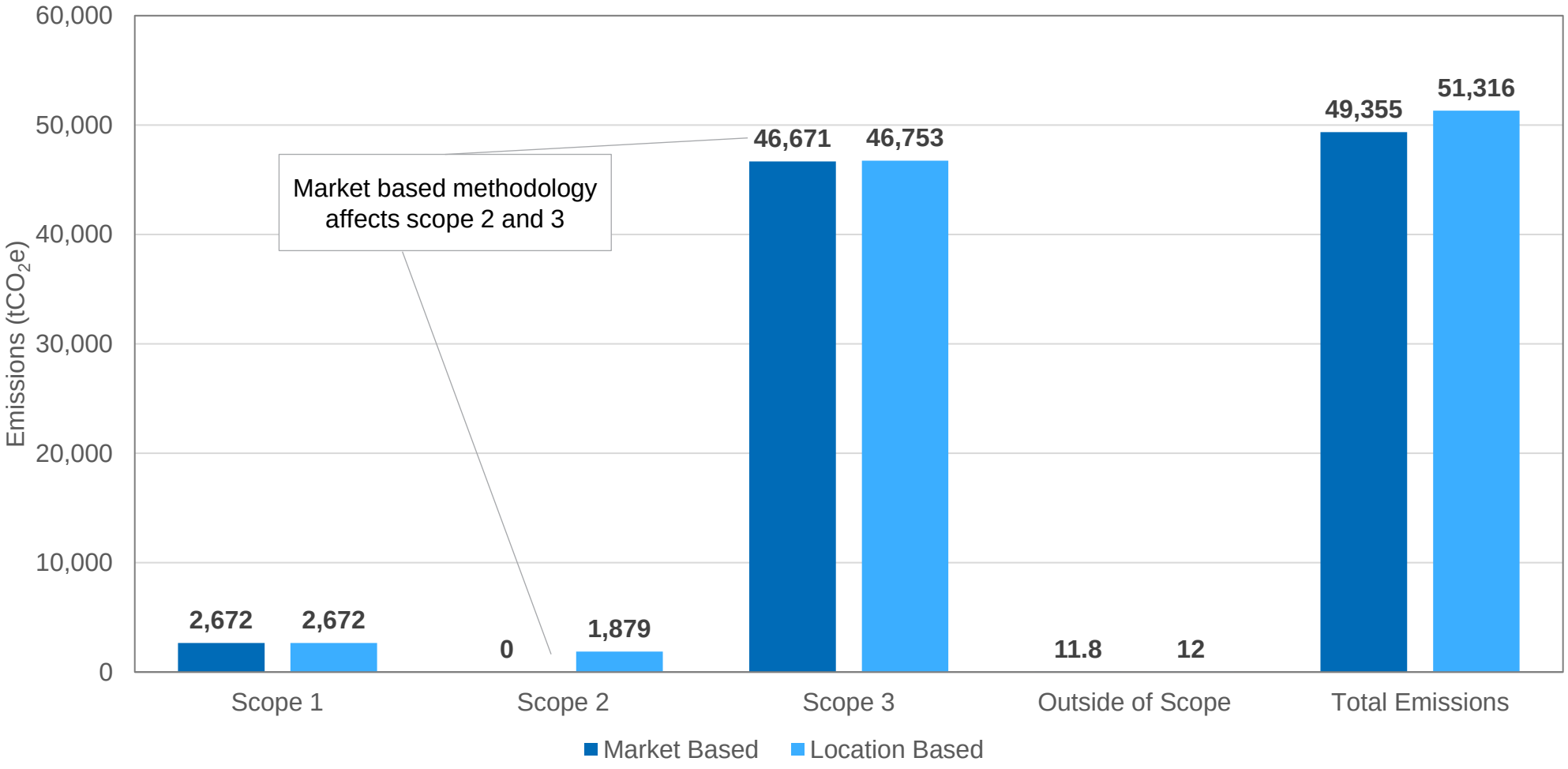
Emissions associated with the use of electricity imported from the grid or from a third party supplier of energy in the form of heat or electricity.

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

Outside of scope emissions:
Outside of scope emissions 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'.

Location vs Market Based Emissions 2021: All Scopes

Emissions totals by scope calculated using either the location or market based emissions factors.



Glossary

Term	Definition
Arisings	Materials forming the secondary or waste products of industrial operations.
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.