AIRPORTS COUNCIL INTERNATIONAL

ACERT

AIRPORT CARBON AND EMISSIONS REPORTING TOOL

ACERT VERSION 7 USER MANUAL (ENG)



Airports Council International (ACI) World advances the collective interests and acts as the voice of the world's airports and the communities they serve and promotes professional excellence in airport management and operations.

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TABLE OF CONTENTS

1. Introduction 3
2. Greenhouse Gas Inventory Backgrounds 3
3. Airport Carbon Emission Reporting Tool (ACERT) 5
   3.1 General Setup of the Tool 5
   3.2 Getting ready to use ACERT 6
   3.3 Compiling the Emission Inventory: “Input” 7
   3.4 Getting the Emission Report: “Output” 16
4. Airport Carbon Accreditation 17
5. Aircraft Calculation Methodology (LTO) 20
6. Unit Converter 21
7. Frequently Asked Questions 22
8. ACI Software License Agreement 23

1. INTRODUCTION

Airport Council International (ACI) is providing an Airport Carbon Emission Reporting Tool (ACERT) to assist airports worldwide to identify, quantify and manage their greenhouse gas emissions.

This document here is the User Manual for the current ACERT version and is intended to support the use of the Excel application.

The manual provides a brief introduction to greenhouse gas inventory compilation and then describes the tool and its application in detail.

2. GREENHOUSE GAS INVENTORY BACKGROUNDS

Compile a greenhouse gas emission inventory to:

- Know the airport carbon sources, their magnitude and relevance
- Identify opportunities to reduce life cycle costs by reducing fossil fuels
- Demonstrate the responsibility of airports towards climate change
- Comply with the requirements of a program like *Airport Carbon Accreditation*

All emission sources of a company and its activities are divided into scopes. According to the Greenhouse Gas Protocol, the company claims responsibility for emissions from Scopes 1 and 2, whereas Scope 3 emissions are upstream or downstream sources in conjunction with the company's activities (figure 1).

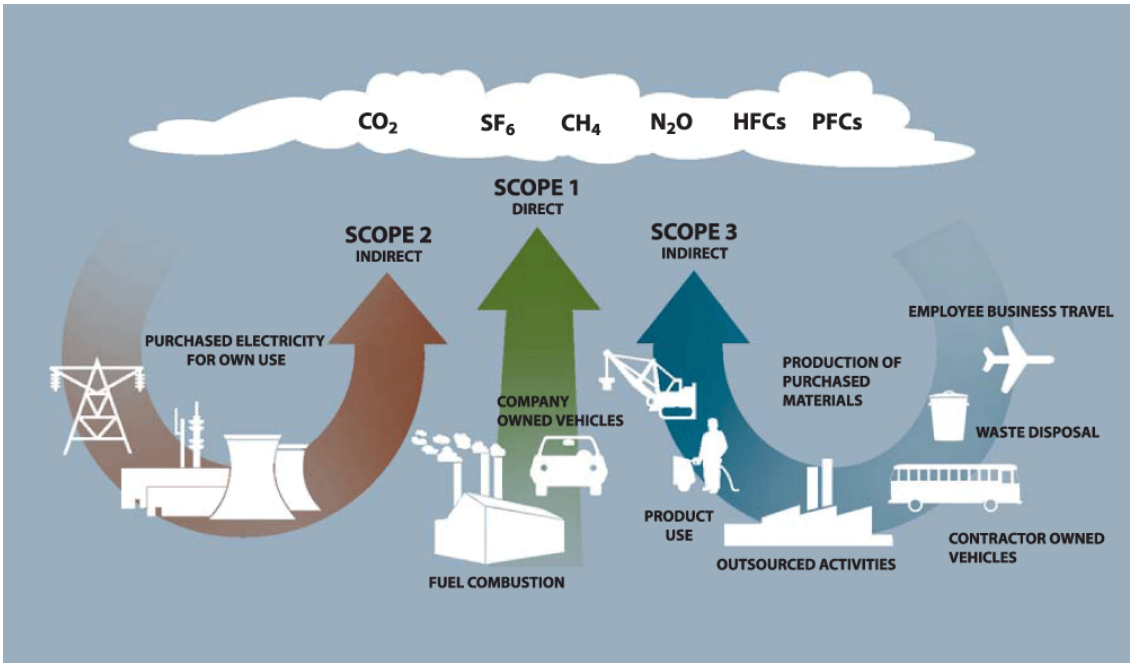


Figure 1: Illustration of emission Scopes 1, 2 and 3 (Source: World Resources Institute)

Table1 lists the various airport activities and their attribution to the scopes.

SCOPE	DESCRIPTION	AIRPORTS EXAMPLES
1	Airport operator owned or leased emission sources (fossil and other).	Vehicle and machinery fuels, boiler house, furnaces, emergency generators, fire practice, surface de-icing, processes, even own aircraft.
2	Airport operator purchased and self-used electricity, heat or steam emissions.	Electricity from city utilities, heat from a power plant.
3	Indirect upstream and downstream emissions associated with the airport operator and the airport platform.	Procurement of goods and services, capital assets. Aircraft (main engine, APU), GSE, engine tests, de-icing, landside access traffic, staff business trips, third party emissions (e.g. boilers, refrigeration, generators, construction).

Table 1: Airport activities and Scopes

Some practicalities on emission inventory developments:

- GHG emission inventories can be simple or advanced – it depends on purpose, knowledge, and available efforts.
- An annual update is highly recommended and yields valuable timelines.
- Completeness comes before accuracy. For reasons of credibility all sources need to be included, even if only initial assumptions are available.
- A GHG inventory covers more than just carbon (CO_2); but CO_2 in itself is a good start (the Kyoto Protocol covers 7 greenhouse gases).
- Calculations are simple – the challenge is getting accurate operation data.

3. AIRPORT CARBON EMISSION REPORTING TOOL (ACERT)

3.1 GENERAL SETUP OF THE TOOL

ACERT is an Excel based tool for the calculation of greenhouse gases from airports and its activities. It consists of several sheets (cf. Figure 2).

As illustrated in Figure 2, ACERT already provides many default emission factors for the various airport sources. However, the tool is flexible as to allow the input of user-defined or more accurate information.

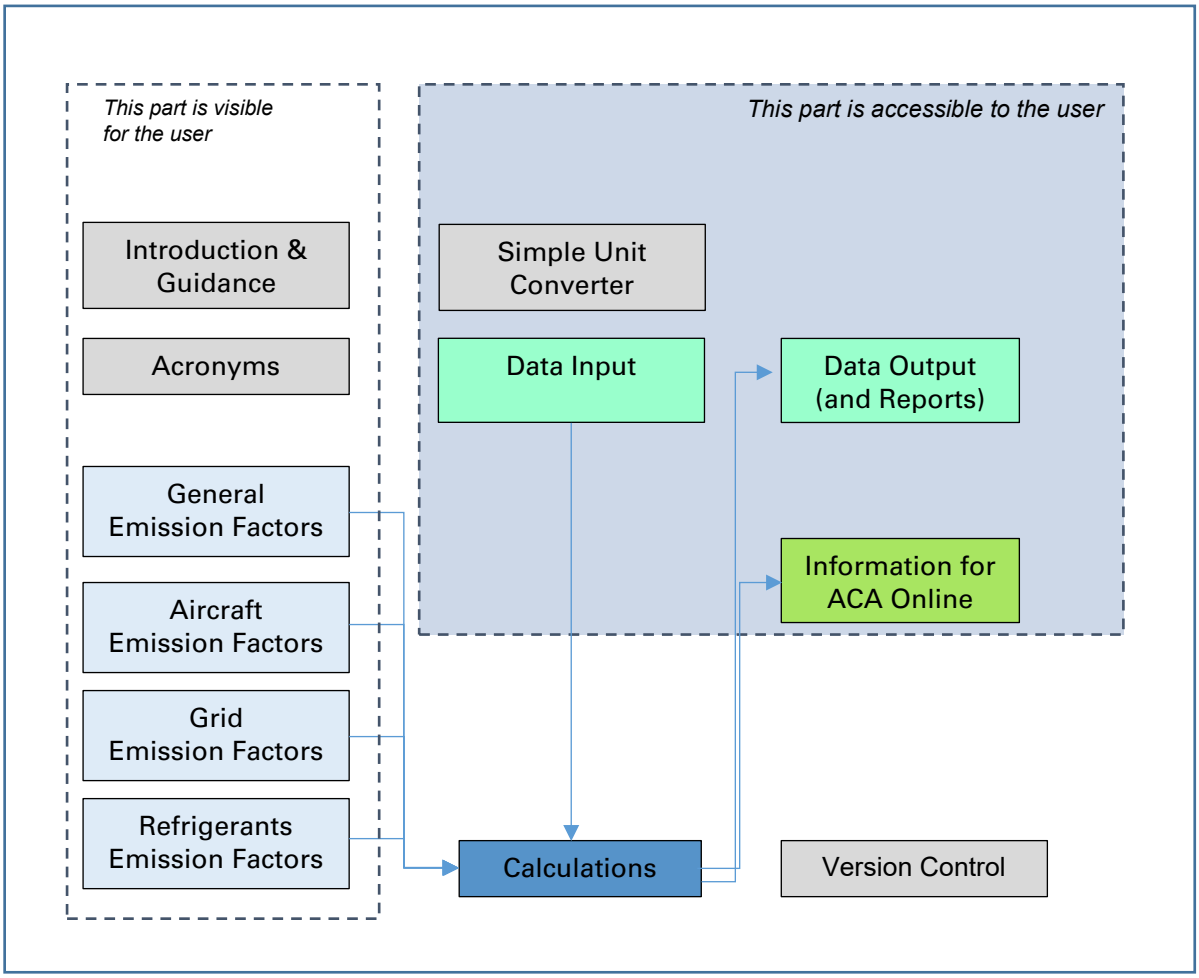


Figure 2: ACERT tool elements

3.2 GETTING READY TO USE ACERT

Hardware and software requirements:

- Personal computer
- Microsoft Excel™ version 2010 or higher

Software installation:

- Save the Excel-file in any location on the computer or server as deemed appropriate.
- It is recommended to keep a clean copy of the original document and to create a new name for your current work.
- If your copy contains some example data, make sure you delete them before using ACERT.
- When using ACERT, make sure you can see columns A-K on your screen (scale the screen accordingly).
- There are no macros embedded.

Airport operational data preparation:

- Minimum (e.g., for Airport Carbon Accreditation Levels 1 and 2):
  - Vehicle fuel: diesel, gasoline, CNG, biofuels: amount for own use.
  - Stationary sources (boilers, generators): CNG, fuel oil, diesel, coal, other burnables (wood, propane, etc.) for own use.
  - Electricity/external heat: amount purchased for own use.
- Total annual amount is needed (maybe comprised of monthly/quarterly data).
- Check units (must all be metric): if needed, convert separately; unit conversions are plenty on the web (particularly for energy) and a simple unit converter is in ACERT.
- Check for completeness: all sources need to be covered.

How to treat earlier inventories or ACERT versions:

- GHG emission inventories from previous versions cannot be imported into any new versions. If a new inventory with the same data should be calculated, the data has to be entered manually.
- If a new version of ACERT becomes available, it is not generally recommended to recalculate older inventories. Emission factors may have evolved and have become more recent or accurate, as more scientific knowledge becomes available. Usually, differences are small.
- If you calculate certain emission sources outside ACERT, you can insert these results in the “Output” and crosscheck the additions.

3.3 COMPILING THE EMISSION INVENTORY: "INPUT"

How to access any drop-down menu:

- Click on the cell that requires input from a list
- On the right side, a little arrow pointing downwards pops up:



- Click on that arrow: the list with the available selection pops up
- Select your answer and press Enter.

Important:

ⓘ Enter data in white cells. Greyed out sections can still be used and emissions are fully calculated.

ⓘ Make sure you can see columns A through K.

ⓘ Unit system: metric (e.g., meters, liters, kg): if necessary, convert your data first (use converter if needed).

Warning:

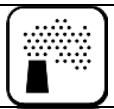
- If percentages don't sum up to be 100% or when other input may be erroneous, a warning message will appear. You may still continue, but results may be inaccurate.
- Do not overwrite drop-down cells, as this may corrupt the Excel application and calculations.

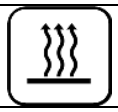
Calculation Explanations

- ACERT is designed to be suitable for Airport Carbon Accreditation Levels 1, 2, 3 and 3+ (after version 3.0) and Levels 1-5 (after version 7.0). The minimum input requirements for all levels are indicated.
- ACERT uses a combination of "simple" and "advanced" calculation methods (See ICAO Doc 9889, the Airport Air Quality Manual)
- CO_2 equivalent (CO_{2e}) for CH_4 and N_2O are calculated using Global Warming Potential (GWP) factors as indicated in "EF General".
- Traffic unit (TU) = 1 PAX movement or 100 kg cargo arriving or departing.
- Input and calculations are done in international standard units (metric system).

Scopes 1 and 2

SECTION	INSTRUCTIONS
	**Instructions:** 1. Enter the consumption, activity or quantity rate in the white cells (Level-dependent); make sure to use the correct unit (as there is not always a choice); a unit converter is available in a separate sheet. Consult the Airport Carbon Accreditation Application Manual to determine which sources are mandatory for which Level. 2. Insert 'your own emission factor' if available and preferred; if you don't know or if you want to use the default, leave this cell empty ('your own EF' always overwrites 'default EF'). Your own emission factor may be more accurate than a default value. 3. You can overwrite the activity/consumption default unit "litre" with a more suitable unit (e.g. gallon); in this case, the default emission value shall no longer be used. 4. For additional sources, you have to insert both the amount/activity and the emission factor (white cells only). 5. For any free lines, insert activity, amount and your own EF (no default provided). You cannot add extra lines - combine if needed with weighted emission factors. 6. If certain activities are not applicable, just skip them. 7. Completness comes before high accuracy. Use surrogates or approximations if needed. 8. Save your draft inventory regularly. Note: with a few exceptions, this model calculates CO_2e.
	• Drop-down selections: “Country/Region”, “First month of the year”, “ACA Level” • Country/Region may also specify State, Province, Territory or Electricity Grid Region as detailed in the sheet “EF Grid”. <u>This cell specifies the ACI region and the applicable national grid default emission factor.</u> • Cargo: make sure to use metric tons.
	• Select the ACA level you wish to use ACERT for. • This information is used for the "ACA Online" and "Output"-sheet
	If you have previous carbon inventory information, you may enter it here (voluntary); this data will only be used to create a historic chart in the Output sheet. Check the correct years.
	Annual fuels used for electricity and heat generation (buildings or heating plant) by the Airport Operator. ⓘ Do not include electricity purchased; combine data where necessary; only the total is used for further calculation. ⓘ If you produce electricity alongside heat (e.g. in a CHP), the fuel should be included in this table 1.2. All those emissions are counted as Scope 1 for the airport operator (even if sold to tenants). ⓘ Sum up various buildings/heating as deemed necessary (only over the same carburant). ⓘ Add other carburants like pellets, coke, biogas, etc; The fuel unit (l or kg or any other) must match the EF unit used.

	Fuel used for Stationary Emergency Power Generation Units by Airport Operator. ⓘ The fuel unit (l or kg or any other) must match the EF unit used.
 	Fuel used for fire training (if service rendered by Airport Operator). ⓘ Fuels for fire vehicles are included in section 1.1. ⓘ The fuel unit (l or kg or any other) must match the EF unit used. CO_2-extinguisher used for training or firefighting systems
	Refrigerants used by Airport Operator ⓘ Refrigerants can be from chillers, air handling units, fire suppression systems. Enter the use (new, disposal, leakage) of refrigerant chosen from list for lines 1-3 or enter your own in line 4. ⓘ Do not use your installed stock. ⓘ GWP = Greenhouse Warming Potential
	Solid Waste Treatment, if done by the Airport Operator. ⓘ Municipal waste is from offices, restaurants, terminals, aircraft cabins; industrial waste is from all airport and aircraft maintenance activities; wood and plant from greenfield maintenance. Results do not include the transportation of the waste. Include this in 1.1 or 3.1.2A, 3.11.2A (airport or third party) or 9. ⓘ No landfill at directly by airport operator assumed.
	Waste Water (Sewage) Treatment, if done by the Airport Operator. ⓘ Enter Amount of treated waste water (m^3); if unknown, leave empty and choose: ⓘ Default Option: Input the % of waste water treated in airport controlled facilities. Calculation is based on persons at airport (pax, staff, visitors) ⓘ Choose to include this or not (mandatory for Levels 4/4+). Recommended to always include.
	De-icing chemicals for aircraft and surface de-icing if applied by the Airport Operator. ⓘ Select the type of de-icing chemical from the list or enter your own.
	Other relevant airport processes with emitting substances, performed by the Airport Operator.
	Electricity Purchased from 3rd Party (external supplier, can be on-site/off-site). ⓘ Data should be available from electricity bills. If you buy energy attributes, you have to report by the market-based method. This includes any self-produced renewable electricity if looped back through the grid. ⓘ Tenant usage should be metered and usually invoiced. If so, emissions become Scope 3, if not, they remain Scope 2. ⓘ If you purchase renewable energy offsets (or credits) enter them in Annex 1 below (even if the cells are greyed out). ⓘ The Emissions Factor (EF) ist used to calculate CO2 from off-site electricity production. Check with your power company. ⓘ The hierarchy in the use of the electricity EF is: "your own emission factor" and select whether this is "Market-based" or "Location-based". If not available (=leave blank) then "Default" is taken. This country/area default is used in any case for electric train emissions.

	ⓘ PA=Purchase Agreement, GO=Guarantee of Origin, CO=Certificate of Origin.
	Heat (or steam) purchased from 3rd party (external supplier, can be on-site/off-site). ⓘ Data should be available from heating bills. Fuel purchased by the airport operator to produce heat itself is contained in Step 3 (do not include here). ⓘ If the airport purchases heat from an on-site tenant, then that counts as "external supplier". ⓘ Else ask off-site heat provider for composition and use defaults.
Additional Information on Energy (not relevant for Scope 1+2 inventory, but for Scope 3 and for energy balance sheet calculation)	
	Self-produced Electricity On-site (information not used for carbon inventory at Levels 1 & 2). ⓘ Data should be available from invoices to tenants and based on metered data. ⓘ All renewable energy production (heat or electricity) is considered emission-free in their Scope 1. ⓘ Airport generated heat sold to tenants is for energy information purposes only. Emissions will still fully be in Scope 1 for the airport, while also in Scope 3 for the tenant.
	Self-produced heat energy onsite (e.g., CHP).

Scope 3

Section	Instructions
	**Instructions:** 1. Enter the consumption, activity rate or item(s); make sure to use the correct unit (if there is no choice); a unit converter for some units is available in a separate sheet. Insert 'your own emission factor' if available and preferred; if you don't know or if you want to use the default, leave empty ('your own emission factor' always overwrites 'default emission factor'). 2. For any free lines, specify activity, amount, and your own EF (no default provided). You cannot add extra lines - combine if needed (with weighted EF) 3. If certain activities are not applicable, just skip them. 4. Save your draft inventory regularly. Note: with a few exceptions, this model calculates CO_2e.
	Goods and Commodities ⓘ Typical commodities can be selected in the first 6 lines; ⓘ Add others (from "EF General" with default EF) or add your own relevant products with your emission factor.
	Vehicle/machinery related procured services. ⓘ Typical services may include Parking Shuttles, Gardening, Guidance service airside, etc. ⓘ Electricity for electric vehicles should be included in Section 2.1.

	ⓘ For biofuel blends, add non-biofuel portions to the fuel entries above. ⓘ For Hybrids, add the fossil fuel to the respective category (e.g., gasoline, diesel). ⓘ Emission factors can be chosen from sheet 'EF General'. ⓘ
	Fuel used for fire training (if service is rendered by contractor/third party, e.g., city). ⓘ The fuel unit (l or kg or any other) must match the EF unit used. ⓘ Fuel for fire vehicles
	CO_2-extinguisher used for training or firefighting systems
	On-site construction activities (rendered by third parties for airport operator). ⓘ Work directly done by airport operator itself is reported under Scope 1. ⓘ Work handed to contractor (construction company) is reported under Scope 3; this only becomes mandatory information under ACA Level >4/4+. ⓘ LDE = Litres Diesel-Equivalent
	Maintenance, repairs and overhaul, incl. cleaning and horticultural services for airport operator. ⓘ Typical services may include maintenance of buildings and installation, repairs of buildings and installations, overhaul of systems, cleaning and horticultural service rendered by third party for the airport operator.
	Financial, legal, or similar services for airport operator.
	Capital Goods. ⓘ Capital goods are final products that have an extended life and are used by the company to manufacture a product, provide a service, or sell, store, and deliver merchandise. In financial accounting, capital goods are treated as fixed assets or as plant, property, and equipment (PP&E). Examples of capital goods include equipment, machinery, buildings, facilities, and vehicles. ⓘ Buildings: The unit to be used is m2 floor surface
	"Well-to-Tank" emissions from energy sources reported under Scopes 1 and 2. ⓘ Quantities are automatically transferred from Input further up ⓘ System boundary: Only emissions from your own Scope 1 and 2 sources are includes as "WTT", not from Scope 3 (your supply chain). ⓘ If you choose your own emission factor, check the proper unit required. ⓘ If you don't want to include this category, enter 0 as your own emission factor.
	• Indirect "well-to-grid" emissions from Scope 2 electricity • Transmission & distribution losses
	Solid Waste Processing done by the external Contractor. ⓘ Municipal waste is from offices, restaurants, terminals, aircraft cabins; industrial waste is from all airport and aircraft maintenance activities; wood and plant from greenfield maintenance. Results do not include the transportation of the waste. Include this in 2.1 (airport or third party) or 9.
	Waste Water (Sewage) Treatment done by the external Contractor (e.g. municipal sewage treatment plant). ⓘ Enter Amount of treated waste water (m^3); if unknown, leave empty and choose:

	ⓘ Default Option: Input the % of waste water treated in airport controlled facilities. Calculation is based on persons at airport per day (pax, staff, visitors) ⓘ Choose to include this or not (mandatory for Levels 4/4+). It is recommended to always include.
	Airport Operator Staff Business Travel. ⓘ Include business related trips only, no staff commuting. ⓘ Include rental cars, but not vehicles owned/refueled by airport, do not include fuel recorded under Step 2. ⓘ Rail: Travel and return (1 return trip) = 2 segments ⓘ Rail: Traction mode is assumed 100% electric, if not, use alternative option. ⓘ Rail: This emission factor would be per passenger-km on a train (reflecting traction mode of electric or diesel) ⓘ Air: Travel and return (1 return trip) = 2 segments ⓘ Business/First is 1.5x Economy Class. ⓘ Air: Alternative Method for Corporate Air Travel: For greater accuracy, use the ICAO Carbon Calculator for all air travel. Available online at www.icao.int, "Carbon Calculator". Requires the origin and destination airports for each segment. Add up and enter total CO2. ⓘ Sea: Travel and return (1 return trip) = 2 segments ⓘ Sea: Propulsion is assumed 100% maritime diesel; if not, use alternative option. ⓘ Sea: This emission factor would be per passenger-km on a ferry, reflecting the propulsion mode of diesel or alternative.
	Airport operator staff commuting: ⓘ 1 commute = 2 ways (to work and back home) ⓘ Number of commuting employees (by head count) is likely higher than the number of FTE due to part-time staff. ⓘ For number of relevant days, consider vacation, sick days, business trips and home office of all staff on average. ⓘ Estimate the share of each vehicle mode for the staff commuting; total must 100%. ⓘ Estimate the average single trip length (e.g., home to office) for each commute mode. ⓘ Estimate the fuel option distribution within each vehicle category. ⓘ If trips are a combination of vehicle modes, chose the largest portion of the trip. ⓘ Emission factors are taken from Landside Traffic (3.11.3C). Change there if needed.
	Home Office (Teleworking, Remote Work, etc.). ⓘ Estimate percentage of staff that is able to work from home, the number of days per month (discount weekends, sick days, vacation, part time) and hours per day (should not exceed 14). ⓘ Estimate percentage of homes that will need heating during the heating season assumed to be 6 months (Oct-Mar in Northern hemisphere, @5kWh) and percentage of homes that need cooling during summer season, assumed to be 4 months (Jun-Sep in Northern hemisphere, @3.5 kWh).). Country default grid factor used. ⓘ Assuming 100% of home offices need IT and some lighting (@150W/h).
Aircraft related emissions	
	ⓘ Aircraft emissions are calculated for LTO perimeter only, for APU usage, full flight (one direction) and aircraft engine run-ups: ⓘ If you choose the "LTO Emissions" approach (possible only up to ACA Level 3/3+), complete the following sections: - 3.11.1A: non-fossil fuel; - 3.11.1B: Aircraft LTO movements by aircraft type - 3.11.1C: Average taxi-times

	- 3.11.1E: APU - 3.11.1F: Engine run-ups, with either Option 1 OR Option 2 ⓘ If you choose the "Aircraft Cruise" (full flight) option (mandatory for ACA Level 4, 4+, 5), complete the following sections: - 3.11.1A: non-fossil fuels - 3.11.1D: Either Option 1 with fuel uplift OR Option 2 with separate calculations (that would have to include APU) - 3.11.1F: Optionally, if separate emission calculation does not include run-ups; chose either Option 1 OR Option 2.
	Select your aircraft calculation perimeter: 1. LTO 2. Full Flight (one way only) ⓘ The use of non-fossil fuels for aircraft will be applied to all aircraft emissions: full flight, LTO, APU, run-ups. ⓘ Direct emissions from non-fossil fuels are 0; residual emissions relate to the life-cycle and would thus be under Scope 3 (Scope 3 of a scope 3 source will be outside the boundary).
	Aircraft LTO Emissions. ⓘ 1 landing and 1 take-off (LTO) = 2 movements. ⓘ for aircraft not listed, use a similarly sized substitute. ⓘ The numbers sum of movements and declared movements should match as closely as possible. Continue to input more aircraft movements to reduce difference.
	Average Aircraft Taxi Time (in+out). ⓘ Sum up taxi-in and taxi-out times for each category.
	Aircraft Cruise (Origin to Destination). ⓘ If aircraft are tankering (uploading more fuel than they actually burn on average, e.g., for return flights), enter a percentage here (must be negative number to subtract from uplift). ⓘ Apply the one-way or the 50:50 route split and enter directly the CO2e emissions. Default = leave empty (then Option 1 is used).
	Aircraft APU. ⓘ If only part of the aircraft use APU and others not, determine overall weighted average. Include time at gate and taxiing (if needed). ⓘ Check if fixed ground power/GPU or PCA is available; consider accordingly.
	Aircraft Maintenance. ⓘ Only choose this section for the "full flight" option if the fuel required is not already included in the uplifted fuel.
Other Scope 3 emission sources	
	Fuel used in vehicles, including airside transport, maintenance machinery, ground service equipment (GSE), etc. ⓘ Electricity for electric vehicles should be included in Section 2.1. ⓘ For biofuel blends, add non-biofuel portions to the fuel entries above. ⓘ For Hybrids, add the fossil fuel to the respective category (e.g. gasoline, diesel). ⓘ The fuel unit is automatically used for the emission factor unit.
	Annual carburant used for electricity and heat generation (buildings or heating plant of tenant/partner). ⓘ Do not include electricity purchased; combine data where necessary; only the total is used for further calculation.

	ⓘ If you produce electricity alongside heat (CHP), the fuel should be included in this table 3.1. All those emissions are counted as Scope 1 for the airport operator (even if sold to tenants). ⓘ Sum up various buildings/heating as deemed necessary (only over the same carburant). ⓘ Add other carburants like pellets, coke, biogas, etc.
	Fuel used for Stationary Emergency Power Generation Units (by tenants/partners).
	De-icing chemicals for aircraft and surface de-icing if applied by tenants/partners. ⓘ Select the type of de-icing chemical from the list or enter your own.
	Refrigerants used by tenants/partners. ⓘ Refrigerants can be from chillers, air handling units, fire suppression systems. Enter the use (new, disposal, leakage) of refrigerant chosen from list for lines 1-3 or enter your own in line 4.
	Other relevant airport processes with emitting substances, performed by tenants/partners.
	Public Landside Access: ⓘ There are 2 options for entering ground traffic data: • Ground traffic will be estimated, and emissions calculated ➔ recommended option. • Detailed ground traffic survey for the emissions calculations ➔ best option Vehicle fuel options and emissions factors; you have to estimate the fuel shares at a minimum. ⓘ Estimate the fuel option distribution within each vehicle category (total must always be 100% within the category). ⓘ If trips are a combination of vehicles types, chose the largest portion of the trip. ⓘ this fuel share here is only used for public access to the airport; staff commuting has a different fuel option available (under 3.7).
	Option: Input Approximate Ground Transport Activity Data Here • Fill in white boxes. Leave default answer if you do not know. If data not available, make best judgement estimate of percentages or leave default sample data. • This section covers 4 user groups: airport tenant staff, airport visitors, passengers and cargo/road feeder service. • Non-public traffic (motorbike, cars) are calculated by passenger-kilometers; public transportation (shuttles, busses, trains, ferry) are also calculated by person-kilometer; cargo is calculated by vehicle-km. • Estimate the share of each vehicle type for the tenant staff and visitors (and passengers); total must 100%. • Estimate the average single trip length (e.g. home to airport) for each vehicle type. • Cargo delivery includes goods, supplies, commodities for the airport as well as airfreight / cargo for aircraft and RFS. For daily trips, include the weekends (7 days per week).
	Option: Input Detailed Traffic Survey Data here (other than airport operator staff). ⓘ Enter user category-total in person-km (or vehicle-km for cargo) per year. ⓘ If user categories are not specified, enter total under "passengers".

	Downstream leased assets: Electricity bought from airport operator or from external supplier ⓘ Amount of electricity bought from airport operator may be equal to amount resold by airport to 3rd party, but not necessarily. ⓘ Emission factor electricity: Your own may be supplied from airport as the supplier; else use country/area default. ⓘ Emission factor heat: take your own or use the default which is the one from the airport operator.
	Downstream leased assets: Heat/steam bought from airport operator or from external supplier
	Franchises by airport operator: ⓘ A franchise is a business whereby the owner licenses its operations—along with its products, branding, and knowledge—in exchange for a franchise fee. This has to be defined on a case-by-case basis for an airport application and reported if applicable.

Annex 1: Carbon Offset Reduction

SECTION	INSTRUCTIONS
	ⓘ Emissions to be offset are emissions from Scope 1, Scope 2 and (voluntarily) from Scope 3. ⓘ Data can be entered and are calculated even for Levels without offsetting requirements. ⓘ Residual emissions are the same for reduction and removal. You can combine reductions and removals.

Annex 2: Carbon Offset Removals

SECTION	INSTRUCTIONS
	ⓘ Emissions to be offset are emissions from Scope 1, Scope 2 and (voluntarily) from Scope 3. ⓘ Data can be entered and are calculated even for Levels without offsetting requirements. ⓘ Residual emissions are the same for reduction and removal. You can combine reductions and removals.

3.4 GETTING THE EMISSION REPORT: "OUTPUT"

ACERT "Output" provides two sets of results:

- One-page summary with the airport information, operational data, inventory summary data and a set of key performance indicators with charts.
- One-page detailed emission inventory which comprises all emissions for which operational data has been entered and a summary of selected assumptions.

[Adjust the margins accordingly]

Note:

- Caution: the result tables are not write-protected; data can be modified, copied and extracted for further analysis.
- Page 1 may omit the presentation of certain results, depending on the chosen level of *Airport Carbon Accreditation.* I.e., if you chose Level 2, but added information on activities of sources required for Level 3, the emissions will be calculated and displayed in the detailed inventory, but not in the KPI. This is necessary to maintain the integrity of the scopes if you enter data very selectively.

List of Key Performance Indicators and their definitions:

Indicator	Unit	Definition
Airport Operator Carbon Intensity	(t CO_{2e}/FTE)	Scopes 1 and 2, divided by the Full time equivalent (full time staff): The FTE is often used by companies, as it describes the size of the company.
Airport Carbon Intensity (Scopes 1+2)	(kg CO_{2e}/pax)	Scopes 1 and 2, divided by the passengers: the number of passengers is sometimes used as a KPI. Not comparable to other airports.
Airport Carbon Intensity (Scopes 1+2)	(kg CO_{2e}/TU)	Scopes 1 and 2, divided by the traffic units (pax+100kg cargo): this is the standard intensity KPI. Not comparable to other airports.
Airport Carbon Intensity (Scopes 1-3)	(kg CO_{2e}/TU)	Scopes 1, 2, 3, divided by the traffic units (pax+100kg cargo): same, but including Scope 3 sources.
Air Traffic Carbon Intensity	(kg CO_{2e}/TU)	Aircraft engine & APU (Scope 3), divided by traffic units: just to describe the relative aircraft contribution.
Share of Airport Operator on total Emissions	%	Scopes 1+2 on Total, before Off-setting: what's the share of the airport operator on the total.
Airport Intermodality Carbon Intensity	(kg CO_{2e}/TU)	All airport emissions without LTO and all ground access, per TU: this is a special KPI that can later be used for the "total air trip calculator".

Table 3: Key Performance Indicators

4. AIRPORT CARBON ACCREDITATION

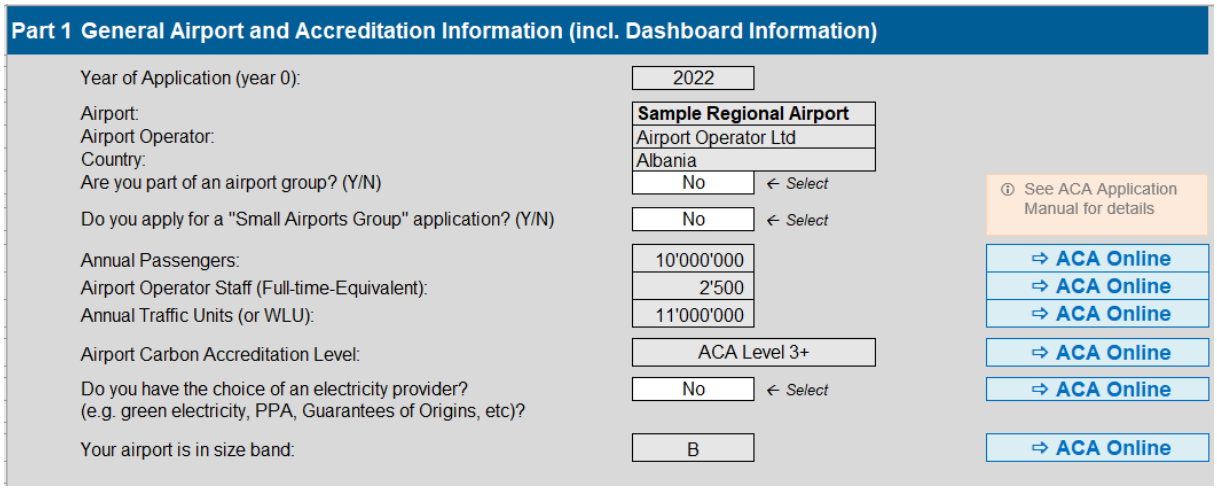
ACERT provides support in preparing the required data for the Airport Carbon Accreditation Online system. The relevant data is extracted from the result table and additional information requested from the user (mostly by selection menus).

- There is no automatic data transfer into ACA-Online possible and data and information has to be transferred manually:

  ⇨ ACA Online

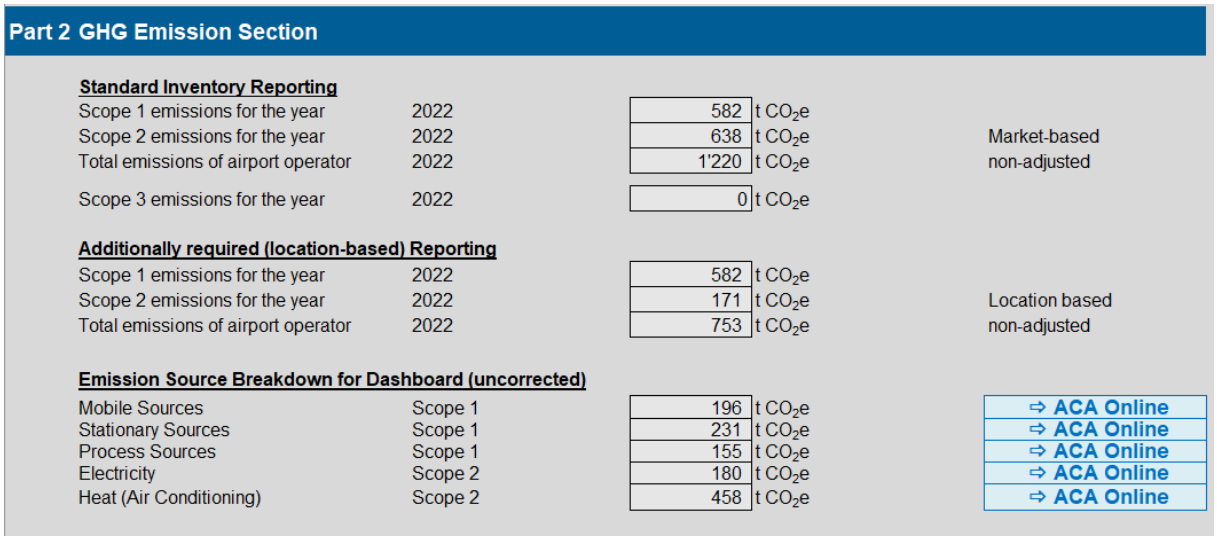
- Only white cells can be modified,
- Special calculation (e.g., historic information, investments, divestments) are not covered by ACERT.
- Climate adjustments and relative benchmark calculations can be made in ACERT, Part 3.

Part 1: Airport and Accreditation Information (incl. Dashboard Information)



Part 1 General Airport and Accreditation Information (incl. Dashboard Information)			
Year of Application (year 0):	2022		
Airport:	**Sample Regional Airport**		
Airport Operator:	Airport Operator Ltd		
Country:	Albania		
Are you part of an airport group? (Y/N)	No	← Select	ⓘ See ACA Application Manual for details
Do you apply for a "Small Airports Group" application? (Y/N)	No	← Select	
Annual Passengers:	10'000'000		⇨ ACA Online
Airport Operator Staff (Full-time-Equivalent):	2'500		⇨ ACA Online
Annual Traffic Units (or WLU):	11'000'000		⇨ ACA Online
Airport Carbon Accreditation Level:	ACA Level 3+		⇨ ACA Online
Do you have the choice of an electricity provider? (e.g. green electricity, PPA, Guarantees of Origins, etc)?	No	← Select	⇨ ACA Online
Your airport is in size band:	B		⇨ ACA Online

Part 2: Carbon Footprint Section (incl. Dashboard Information)



Part 2 GHG Emission Section				
Standard Inventory Reporting				
Scope 1 emissions for the year	2022	582	t CO_2e	
Scope 2 emissions for the year	2022	638	t CO_2e	Market-based
Total emissions of airport operator	2022	1'220	t CO_2e	non-adjusted
Scope 3 emissions for the year	2022	0	t CO_2e	
Additionally required (location-based) Reporting				
Scope 1 emissions for the year	2022	582	t CO_2e	
Scope 2 emissions for the year	2022	171	t CO_2e	Location based
Total emissions of airport operator	2022	753	t CO_2e	non-adjusted
Emission Source Breakdown for Dashboard (uncorrected)				
Mobile Sources	Scope 1	196	t CO_2e	⇨ ACA Online
Stationary Sources	Scope 1	231	t CO_2e	⇨ ACA Online
Process Sources	Scope 1	155	t CO_2e	⇨ ACA Online
Electricity	Scope 2	180	t CO_2e	⇨ ACA Online
Heat (Air Conditioning)	Scope 2	458	t CO_2e	⇨ ACA Online

Part 3: Emission Reduction Section

Climate adjustments

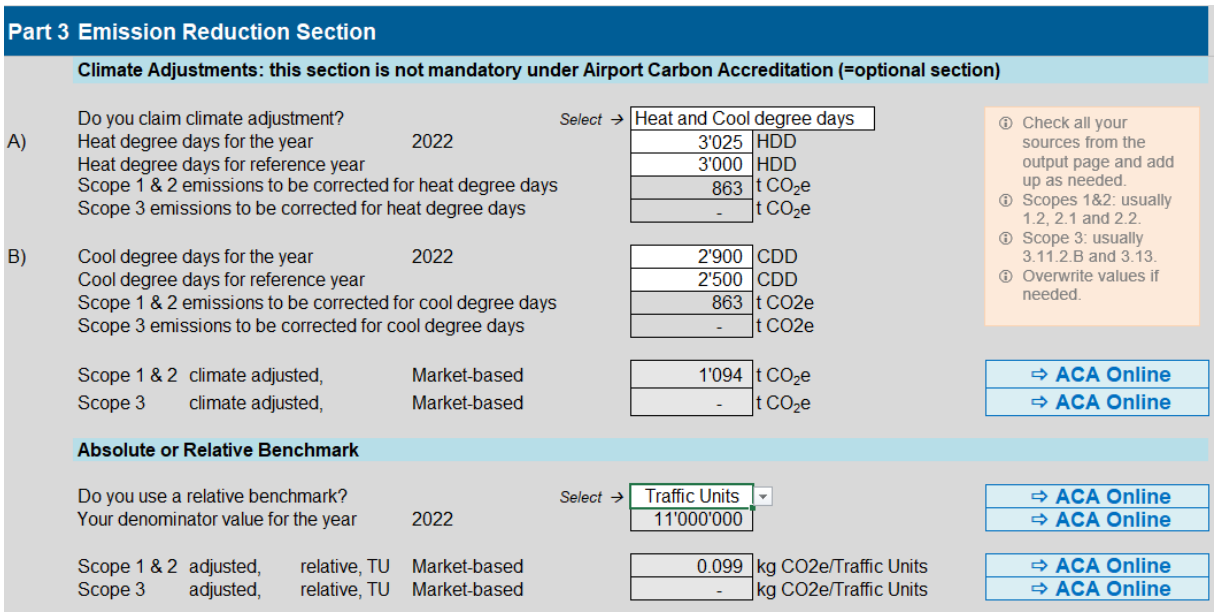
Climate adjustments are often made to set the required heating/cooling demand of a specific year in relation to a period of years ("reference year"). This will then be an adjustment factor to account for an unusual hot or cold year[1].

The adjustment should only be applied for sources that are directly in relation to heating and cooling purposes of airport infrastructure. The HDD or CDD number can be obtained from the energy provider or derived by way of calculation programs that can commonly be found on the internet.

- Check all your sources from the output page and add up accordingly: Heat production and/or purchased heat
- Climate adjustments can be selected as:
  - None
  - Heat and Cool degree days
  - Heat degree days
  - Cool degree days

Absolute or Relative Benchmarks

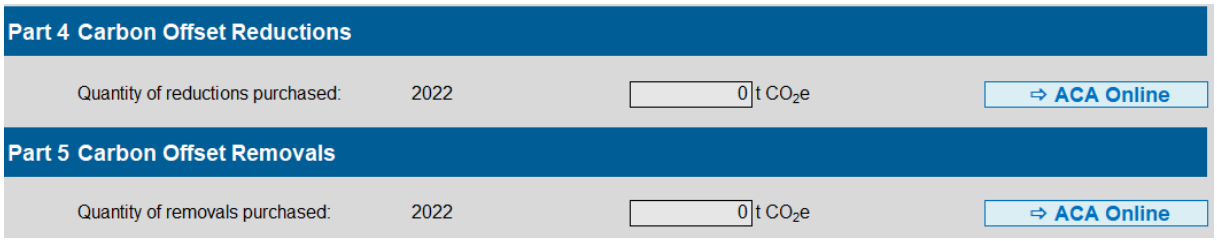
- The following relative benchmarks can be chosen:
  - None
  - Traffic Units: Sum of passengers and cargo/mail (in 100kg equivalent)
  - Passengers: Simple number of annual passengers



Refer to the Airport Carbon Accreditation Guidance Document for more information.

[1] Degree days are essentially a simplified representation of outside air-temperature data. They are widely used in the energy industry for calculations relating to the effect of outside air temperature on building energy consumption.
"*Heating degree days*", or "*HDD*", are a measure of how much (in degrees), and for how long (in days), outside air temperature was *lower* than a specific "*base temperature*" (or "*balance point*"). They are used for calculations relating to the energy consumption required to *heat* buildings.
"*Cooling degree days*", or "*CDD*", are a measure of how much (in degrees), and for how long (in days), outside air temperature was *higher* than a specific base temperature. They are used for calculations relating to the energy consumption required to *cool* buildings. (Source: http://www.degreedays.net/)

Parts 4 and 5: Offsets



5. AIRCRAFT CALCULATION METHODOLOGY (LTO)

The emission calculation methodology is according to ICAO Doc 9889: Airport Air Quality Manual (table 3-A1-2, colored cells).

Key parameters	Simple approach		Advanced approach		Sophisticated approach
Fleet (aircraft/engine combinations)	Identification of aircraft group types (e.g. all B737 or all A319/320/321)		Identification of aircraft and representative engine types (e.g. all A320 with 50% V2525 and 50% CFM56-5B5P)		Actual aircraft type/subtype and engine combinations (by tail number and engine UID or similar)
Movements	Number of aircraft movements by aircraft type (according to look-up table), as defined in "fleet"		Number of aircraft movements by aircraft-engine combinations as defined in "fleet"		Number of aircraft movements by aircraft tail number
Emissions calculation	Option A UNFCC look-up table (no calculation)	Option B Spreadsheet calculation	Performance-based calculation, potentially reflecting additional parameters like forward speed, altitude, ambient conditions (model-dependent)		Performance-based with actual engine data (P3/T3) and including ambient conditions
Thrust levels	Option A N/A	Option B Rated thrust	Option A Average airport and/or aircraft-group-specific reduced thrust rate	Option B Performance model calculated rated reduced thrust	Actual thrust provided by the air carrier
TIM		Option B ICAO certification LTO	Option A Modified times in mode (airport-specific average or actual for one or several modes)	Option B Performance model calculated TIM	Movement-based actual values for all modes
Fuel flow		Option B ICAO certification data bank values	Option A Derived from ICAO EEDB with thrust-to-fuel flow conversion model	Option B Derived from ICAO EEDB with performance model	Refined values using actual performance and operational data derived from the air carrier
EI	Option A UNFCC LTO emissions mass by aircraft type	Option B ICAO certification data bank values	Option A Derived from ICAO EEDB and thrust level through BFFM2 curve-fitting method	Option B Derived from ICAO EEDB through BFFM2 curve-fitting method	Refined values using actual performance and operational data derived from the air carrier
Start-up emissions	Not considered		Consider including — see 6.53 to 6.59		Consider including — see 6.53 to 6.59
Engine deterioration	Do not consider — see 6.44 to 6.52		Do not consider — see 6.44 to 6.52		Do not consider — see 6.44 to 6.52

Figure 3: Aircraft emission calculation flow chart

6. UNIT CONVERTER

This unit converter provides several commonly used conversions from the US to the metric system. If a specific conversion is not provided, it is recommended to search the internet for an appropriate support.

The converted values are not directly inserted in any "Input"-cells. The data has to be entered manually.

Simple unit converter Version 6.0

(simply enter starting value in white cell)

1. Typical US units to metric units

15	US gallon	56.78	litres	for diesel, gasoline, petrol, kerosene, other fuels
10	square feet	0.93	m^2	surface
10	cubic feet	0.28	m^3	volume
100'000	Btu	0.11	GJ	energy (British thermal unit)
1	US therms	0.11	GJ	energy
1.0	GGE (CNG)	2.56	kilograms CNG	energy
1	miles	1.61	km	for vehicle-distance or general distances
23	miles per gallon	10.23	Liter/100 km	for vehicle consumption
1	(short) tons	0.91	(metric tons)	mass
1.0	pounds	0.45	kilograms	solid combustibles, waste

2. Specific energy converters

For any kind of energy conversion, please visit:
http://www.onlineconversion.com/energy.htm or:
http://m.convert-me.com/en/convert/energy/

3. Specific volume converters

http://www.aqua-calc.com/calculate/volume-to-weight

If you can't find your conversion, search the internet for other options.

7. FREQUENTLY ASKED QUESTIONS

Can I use ACERT to calculate only some specific sources?	Of course, ACERT can be used to calculate all the sources individually and use the results for any purposes.
How can I calculate other emission sources than what are currently considered in ACERT?	You may always do emission calculations outside of ACERT using other tools and methods and then combine the results from all of them outside ACERT. For this, you can mark and copy the inventory table from the "Output"-sheet to a different destination and modify.
Why is ACERT only covering CO_2, CH_4 and N_2O or even CO_2 only?	Of the seven Kyoto-Protocol-regulated GHG, only CO_2, CH_4 and N_2O are relevant in aviation, and CO_2 itself is pre-dominant. It's sufficient to cover those substances. Also, quite often there are no emission factors available.
Can I still use an older version of ACERT (e.g., Version 4.x)?	Any older version of ACERT can still be used. However, since emission factors may have evolved and other options have become available, it is recommended to check for and use the newest version available.
I 'm using a different ACERT version to recalculate an older inventory and get different results. How can that happen?	Different version may likely contain different default emission factors or further developed calculation algorithms. A direct comparison between version is thus not possible.
I noticed the grid emission factor is several years old. Are there any new ones available?	Could be. You may check with your national authority or electricity provider for a more up-to-date value and insert in step 4.1b. But you can use the ACERT default value in the absence of a more recent one.
The country of my airport is not listed in the drop-down list. What options do I have?	You should select the appropriate "Other ..." for your region. You may also obtain a specific grid emission factor from your national authority or provider and insert this value directly in Step 4.1b. This value will then be used for your airport.
Why do electricity emissions do not include methane and NOx?	The electricity factors from the grid actually don't specify which pollutants are being used; the source we're using only says g CO_{2e}/kWh, whatever the "e" then means.
I have a refrigerant substance not listed. How can I account for it?	It might likely be a substance that is banned in certain areas of the world. You can nevertheless enter it in the last line, but you have to provide the specific GWP factor for it.
For staff business travel, I have two options to calculate flight emissions: by trip duration or by the ICAO calculator. Which one should I use?	Both options can be used and yield comparable results. The ICAO Carbon Calculator is likely more accurate, but less suitable for larger numbers of flights or missing information on individual flights.
I get wrong results on the output page or error messages (DIV/0, VALUE=? etc.). What is wrong?	You may have overwritten a cell that contained a selection (drop down menu) or has a pre-assigned value (a reference) with a value of your own choice. Make sure you only modify editable cells.

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