The myclimate Cruise Calculator

myclimate's cruise emissions calculator quantifies the direct and indirect emissions per passenger for a set cruise duration, both while at sea and in port. The emission calculations are based on scientific publications and international statistics from a wide range of cruise lines and cruise ships, including data on capacities, degree of capacity utilised, vessel size and cabin types. It aims to provide users with a simple application, through which they can input a few specifics and obtain a calculated result to raise awareness and lead to offsetting. The resulting emissions per passenger correspond to the amount of CO_2 equivalents that can be offset through myclimate carbon offset projects.

myclimate strives to map the entirety of emissions produced, and in the current version, as well as fuel-related emissions, also includes data on the ship's manufacture, maintenance, disposal, emissions in port, catering, cleaning, refrigerants used, port infrastructure etc. An overview of the methodology can be found in this document.

For a specific and detailed analysis, evaluations and calculations with an adapted dataset, please contact info@myclimate.org. myclimate will be happy to support you within our service order framework.

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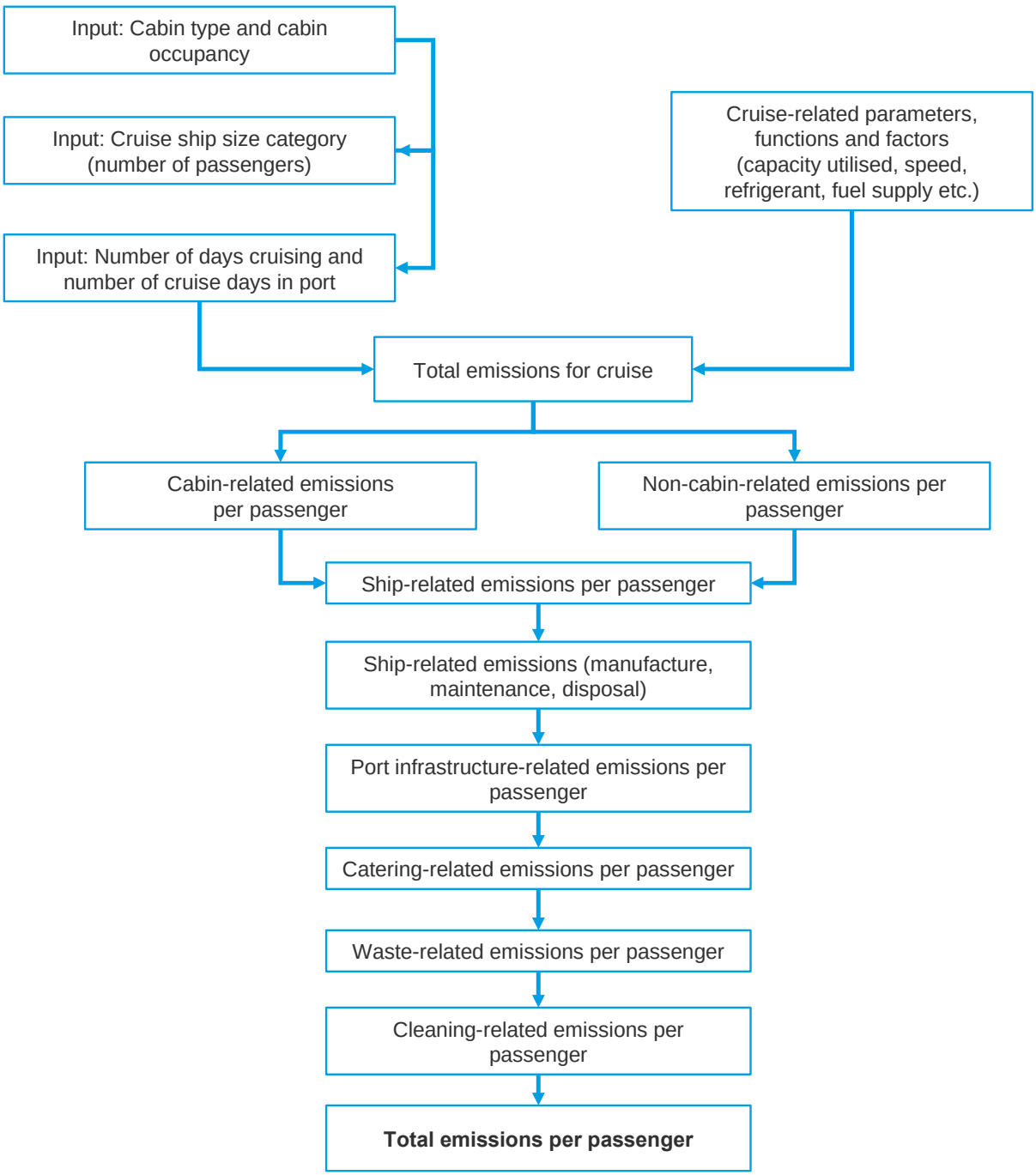
1. Overview of the Calculation Steps

The following diagram illustrates the various steps in the calculation process and the system boundaries of the cruise calculator:



2. Introduction

Most people are aware that cruises create a heavy burden on the environment and produce a particularly high level of CO_2[1] emissions. At the same time, however, despite increasing awareness of climate change, cruises have been extremely popular for years – and their popularity is growing. This trend, and its associated rise in the emissions produced by this sector, must be counteracted urgently. Alongside particulates, nitrogen and sulphur emissions, significant quantities of carbon dioxide (CO_2) are also emitted on cruises. An evaluation of CO_2 emissions for cruise consumers is therefore not only of use to the passengers and the cruise lines, but in terms of a successful climate strategy, also appears relevant to politics and science.

The aim is to provide passengers with an emissions calculator that they can use to estimate the CO_2 emissions produced by their personal cruise. Their enquiry can be made specific and their individual emissions more effectively assessed through the use of variables such as the number of passengers, utilisation of the ship, number of days in port, selected cabin type and level of occupancy.
The user is thus provided with the level of greenhouse gas emissions for their cruise, and their awareness will be raised, and they will have the option to offset their emissions via meaningful carbon offset projects.

Using the same system limits, cruise lines can measure themselves against the average values, and try to achieve significant savings in greenhouse gas emissions.

3. Methodology

General information

The greenhouse gas balance includes the relevant activities, materials, and energy flows that are generated directly or indirectly by one passenger on a cruise. Greenhouse gases generated over the entire life cycle of a cruise ship are also included in the calculation. The datasets used to calculate the climate balance come from ecoinvent 3.6 and the IPCC 2013 (Intergovernmental Panel on Climate Change) evaluation method. This method uses greenhouse gas potential over a 100-year time horizon (GWP 100a).
Climate impact is generally indicated by the unit “kg CO_2e” (kilogram CO_2 equivalent) which adds up the effects of all greenhouse gases. A greenhouse gas balance includes all relevant greenhouse gases and their impact on the climate is expressed in the balance in kg CO_2e. The most common greenhouse gas is carbon dioxide (CO_2), which is produced when fossil fuels are burned. Besides CO_2, other greenhouse gases such as methane (CH_4) and nitrous oxide (N_2O) are emitted during numerous processes.

[1] CO_2 always refers to all greenhouse gases (see CO_2 equivalents, “Methodology” section)

System limit

myclimate strives to illustrate the resulting greenhouse gas emissions as fully as possible. As well as the fuel balance (including upstream emissions and fuel-related waste) this also includes refrigerants, catering, cleaning, waste, port infrastructure, crew, and ship manufacture/maintenance/disposal. Power is responsible for most of the emissions, but also hotel operations, with all the electricity and heat consumption, as well as air conditioning and catering, all produce significant emissions.

Calculation methodology

User input, such as passenger capacity (~ship size), cruise duration, number of days in port, cabin type and level of occupancy, are linked to the background data and calculated using emissions factors. The dataset used is ecoinvent 3.6, the world's largest and most internationally recognised database for eco-inventories and scientific publications, which includes a comprehensive ship database with information from a range of cruise lines. Emissions produced in port and at sea are considered and calculated separately, according to time berthed and average cruising speed. Non-fuel-related emissions (e.g. food, waste, cleaning) produced by a passenger's activities during the cruise are calculated using experiential values and added. The non-fuel-related emissions of the crew members for the duration of the voyage are also considered and added. Because statistical values and also well-thought-out assumptions are sometimes used in individual calculations, an uncertainty margin of 10% is added to the emissions.

For a specific and detailed analysis of your cruise with adapted datasets please contact info@myclimate.org. myclimate will be happy to support you within our service order framework.

4. Data sources

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