

## This documentation confirms that myclimate verified

- the project:
- the case-study:
- the CO<sub>2</sub>-calculator:

Version / Date: V1, 19.3.2024

of **Twiliner AG**

### in accordance with the following factors:

- Applied emission factors (EFs)
- Calculation method / Calculation steps
- Correctness of the calculations
- Excel functionality and formula references

### Documentation system boundaries:

- Included
  - Vehicle resources and production
  - Fuel-related emissions, including upstream energy provision emissions
  - Operation infrastructure
  - Vehicle maintenance and end-of-life
- Excluded
  - Company operations
  - Product design

### Applied emission factors:

- were collected by the customer autonomously
- are taken from published studies or sources  
Source:
- are taken from up-to-date, freely accessible databases  
Source: Mobitool V3, myclimate flight-emission factor
- are taken from official databases under license  
Source:

and therefore, an overall approximate **uncertainty of 10%** can be assumed. This uncertainty is already included in the results.

### The criteria for the myclimate-Impact-Label «Engaged for Impact» are:

- fulfilled
- not fulfilled\*

\*myclimate Logo: Use is permitted on the verified calculator/document with reference to this document.

**myclimate recommends a review and, if necessary, an update of the underlying data and calculations in the following period: 3 years or after material changes (e.g. means of transport, fuel blend etc.)**

Zürich, 20.03.2024

Location, date

Laura Markwalder

Name, signature



## Annex

### A. General Comments

To account for the below listed weak points and general uncertainties in the calculation, a margin of +10% was added to the final emission result. A margin of +10% on transport emissions is standard procedure for calculations conducted by myclimate.

myclimate recommends that Twiliner always communicate with reduction intervals or statements such as «savings of up to ... %». Using absolute reduction values is always fraught with uncertainty.

myclimate may be contacted for support in communicating the results. myclimate will assess the conditions under which the requested services may be provided.

### B. Weaknesses

The following points and assumptions were identified by myclimate as potential weak spots. They should therefore be handled with caution and adjusted in the foreseeable future, where possible:

- Weighting of the passenger mix:  
The passenger mix has a significant impact on the final emission reduction that may be credited to a shift to travelling with Twiliner AG and is currently solely based on assumptions made by Twiliner AG. Thus, the passenger mix should be verified by passenger surveys once Twiliner AG becomes operational. Twiliner AG already expressed the intent to conduct such surveys.
- Occupancy rate:  
While the occupancy rate does not impact the emissions per vehicle kilometer of a Twiliner AG bus, it significantly impacts the emissions per person kilometer. An occupancy rate of 80% is a rather high estimate and should thus be handled with care. Twiliner AG indicated that while short-term occupancy rates on single routes may be lower, routes with an occupancy rate lower than 55-60% would not be serviced in the mid- to long-term. While it is still a rather progressive estimate, achieving an 80% occupancy is thus plausible.
- Average distance per trip:  
The estimated average distance travelled per trip should be verified and adjusted in the future once Twiliner AG becomes operational. It is recommended to include the distance travelled when communicating the emission savings per trip externally. Another option is to calculate the reduction potential with a more conservative assumption to cover the majority of emissions, i.e. lower mean distance per trip.
- Average fuel consumption per 100km:  
As the average fuel consumption has a significant impact on the final emission savings, the conservative estimate of 31l / 100km, which is based on experience by Twiliner AG, was chosen. The value should be verified in the future.
- Emission factor train:  
The weighting of the Swiss train emission factor was adjusted to account for 10% of the mean in order to accurately reflect the share of distance travelled by Swiss trains on long-distance and/or night trains. The average of Germany, France, Italy and Austria thus make up 90% of the emission factor. Due to restrained data availability, only the emission factors of trains in the previously listed countries were included. An extension to include averages from all serviced countries in the future is recommended.

- Emission factor plane:

The emission factor using a radiative forcing index (RFI) = 3 from myclimate was implemented. The complete documentation for the flight emissions calculation by myclimate can be found at <https://www.myclimate.org/de-ch/informieren/ueber-uns/downloads/flugrechner/>. Further means of communication can be provided if required.

The comparisons are based on economy flights on short and medium-haul distances (340 to 1'100 km). However, it must be considered that business class flights are often used for business travelling in particular. The reduction potential would be higher under these circumstances as flying in business class causes higher emissions.

- Emission factor biodiesel bus:

Due to the restricted availability of 100% biodiesel outside of Switzerland, the remaining 700km, assuming a reach of 1'300km with a full tank (reach of a full tank ranges from 1'000 to 1'600km according to Twiliner AG), were accounted for with conventional diesel-blend. This results in an emission reduction of up to 54% compared to a conventional diesel bus. This scenario should be verified in the near future, as it is central to the emission savings through the use of biodiesel.

It is important to note that the emission reduction potential can be influenced by factors such as feedstock type, production practices, land use change effects, and regional differences in energy sources and agricultural practices. For a more accurate emission calculation, a customer-specific emission factor is recommended.

It should be pointed out that the 100% biodiesel scenario is not yet realisable. However, it should show the reduction potential for the future. Please communicate this fact accordingly.