EcoSTP2014 Conference

Carbon Footprint Report

Calculated by: innovECO

in partnership with: **Envireco Consulting**

Data Provided by:

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1 INTRODUCTION

This report provides the carbon footprint calculation of the **2nd IWA Specialized International Conference** "Eco-technologies for Wastewater Treatment" (***EcoSTP 2014***), held at the University of Verona, Italy, between 23 and 25 June 2014.

The total participants of the conference were 302, out of which 259 attendants were traveled to Verona from various cities worldwide.

Data was collected for three main emission sources, namely:

1. Travel
2. Accommodation
3. Conference activities which include consumables production, food preparation, field trips and energy consumption.

The travel and accommodation data was collected directly from the participants of the conference, who completed an online questionnaire during their registration prior to the conference. Data were also validated after the conference.

Data regarding conference activities was provided by the University of Verona and included:

- ✓ details regarding food preparation (number of meals, buffets etc),
- ✓ number and type of various consumables that were used during the conference or distributed to the participants (book of abstracts, USB sticks etc),
- ✓ energy consumption of the building where the conference were held, as well as
- ✓ details about the field trips that took place during the conference (number of buses, total distance traveled etc).

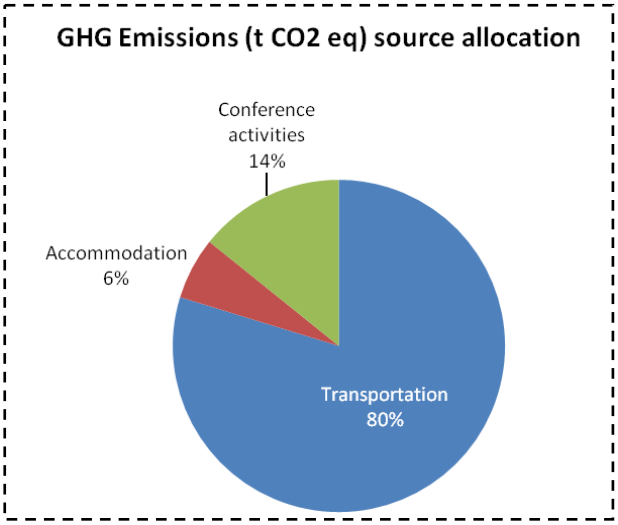
This report will provide an overview of the total emissions, as well as a more in depth analysis of the emissions from all three aforementioned sources.

2 OVERALL EMISSIONS

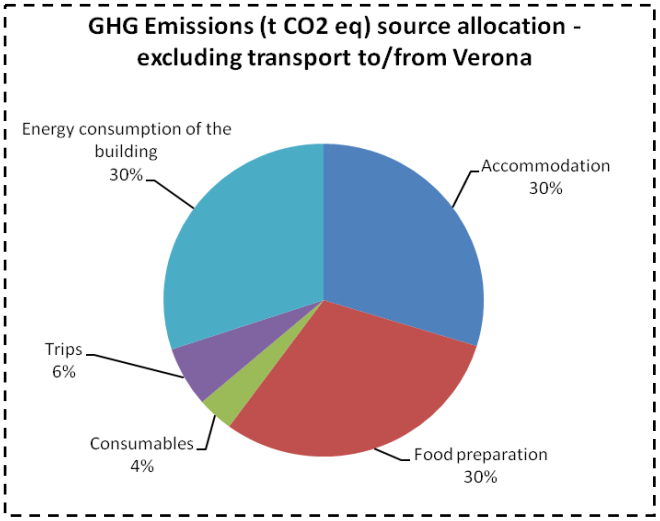
2.1 Summary

In summary, the total carbon emissions associated with the conference were **220,9 t CO_2 equivalent** (CO_2 eq).

The following chart provides the breakdown of the total emissions.



Source	GHG Emissions (t CO2 eq)
Transportation	176,1
Accommodation	13,3
Conference activities	31,5
Sum	**220,9**



In case we exclude transport to and from Verona, we notice a balance among the GHG emissions from energy consumption of the conference venue (30%), accommodation (30%) and food preparation (also around 30%).

Finally, taking into consideration that the total participants of the conference were 302, GHG emissions per participant & day (p-day) was around 244 kg CO_2 eq. / p-day, while if we exclude travel, the emissions were estimated around 49,5 kg CO_2 eq. / p-day.

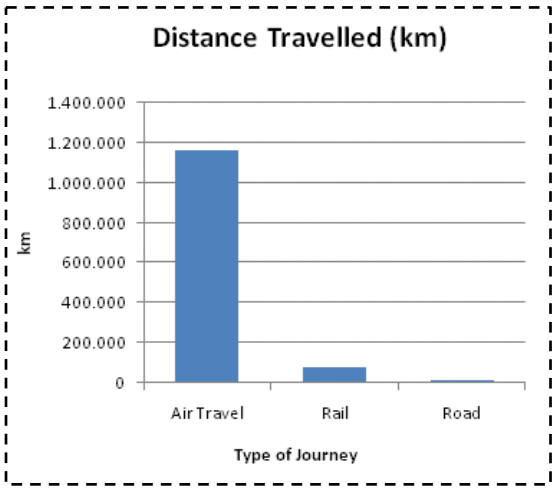
The following sections provide a breakdown analysis of all categories that were taken into account.

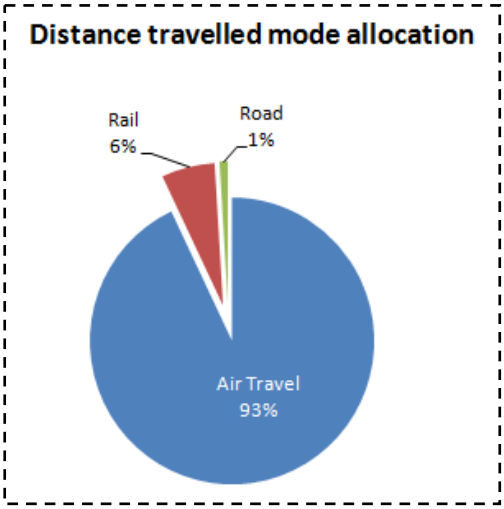
2.2 Travel

Data regarding travel was collected from the registration process, prior to the conference, and then verified after its conclusion, by reporting no-shows and attendants that registered at the conference. Please note that transport between airport, hotels rail stations and the conference premises was not taken into account. **In total, travel makes up around 80% of the total conference emissions (176,1 t CO_2 eq).**

The total distance traveled was calculated 1.253.898 km. 93% of the distance was covered by air travel, 6% by rail and around 1% by road (car).

Type of Journey	Distance (km)
Air Travel	1.166.010
Rail	75.996
Road	11.892
Sum	**1.253.898**

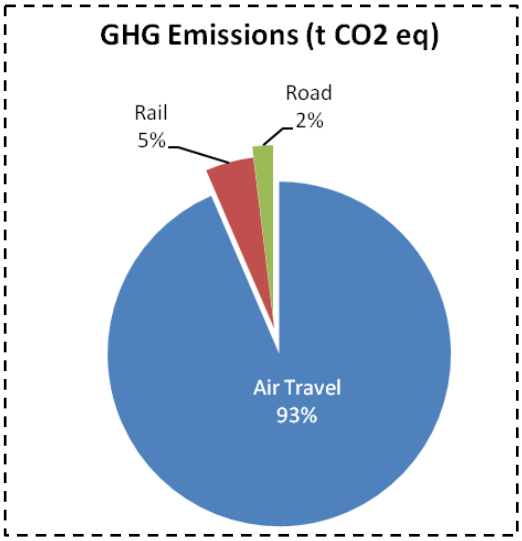




For the emissions calculations, a distance-based method was followed, which involves multiplying vehicle specific emission factors by activity data, i.e. passenger-kilometers travelled (pkm) for each vehicle type.

In terms of GHG emissions, the largest contributor was air travel, with a 93% contribution in the total travel emissions. Rail travel accounted for around 5% of the total travel emissions, and road travel was accountable for the rest 2%.

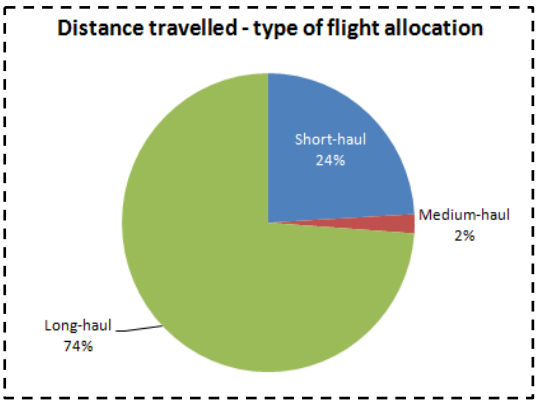
Type of Journey	GHG Emissions (t CO2 eq)
Air Travel	164,7
Rail	8,0
Road	3,4
Sum	**176,1**

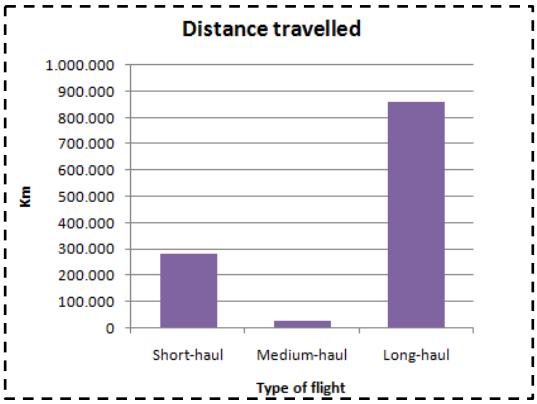


2.2.1 *Air Travel*

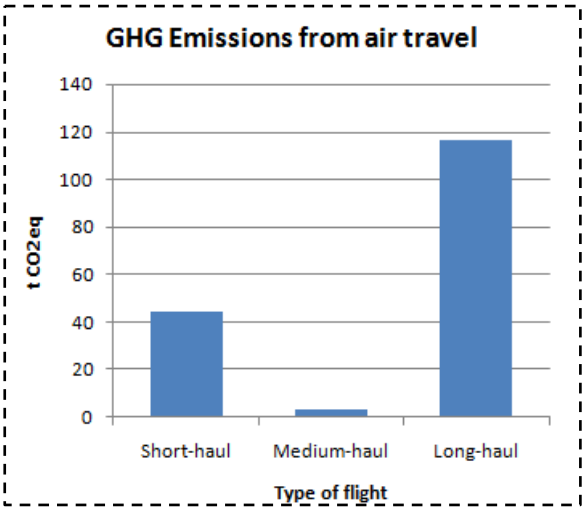
Air Travel was the most popular form of transport used to attend the conference, with 176 people using this mode of transport either alone or in combination with other modes (mainly rail). The total distance traveled was calculated around 1.166.000 km.

In total 132 participants used short-haul flights[1] (which is the most carbon intensive air travel per km), 6 medium-haul flights, and 38 long-haul (the least intensive air travel per km).





Emission factors for short and long-haul flights were sourced from EEA (EEA Report: *Climate for a transport change, 2008*). However, EEA does not provide factor for medium-haul flights, thus an average was assumed.



Type of flight	GHG Emissions (t CO2 eq)
Short-haul	44,5
Medium-haul	3,5
Long-haul	116,7
Sum	**164,7**

[1] *Short haul is a flight covers distance under 2000 miles (one direction). Medium haul flight covers distance between 2000 and 6000 miles, and long haul flight over 6000 miles.*

The relationship between the total distance for each flight type is also projected in the carbon emissions, where long-haul is the largest contributor, followed by short and then medium-haul.

People: 176
Distance travelled: 1.166.000 km
Average distance per person: 6.625 km
GHG emissions: 164,7 t CO_2 eq.
Average GHG emissions per person: 0,94 t CO_2 eq.

2.2.2 Rail Travel

Rail was the second popular form of transport used to attend the conference and despite having 201 people travelling 75.996 km (an average of 378 km per person for round trip journey), the associated carbon emissions were only 7,98 t CO_2 eq.

In general, rail was the least carbon intensive form of travel used to attend the conference. Emission factor for rail travel was also sourced from EEA.

People: 201
Distance travelled: 75.996 km
Average distance per person: 378 km
GHG emissions: 7,98 t CO_2 eq.
Average GHG emissions per person: 0,04 t CO_2 eq.

2.2.3 Road Travel

Road travel involved exclusively car use. In total 45 people travelled 11.842 km, giving an average of 264 km per person. Emission factor for rail travel was also sourced from EEA. The associated GHG emissions were 3,42 t CO_2 eq.

People: 45
Distance travelled: 11.842 km
Average distance per person: 264 km
GHG emissions: 3,42 t CO_2 eq.
Average GHG emissions per person: 0,08 t CO_2 eq.

2.3 Accommodation

Information on the accommodation was collected in an online survey, and extrapolated for all attendees. The majority of people indicated that they were staying in 3 and 4 star hotels.

The calculations of emissions from accommodation were achieved by multiplying the number of participants by length of stay and a hotel dependant emission factor (CO_2 per guest night).

Of the people who stayed in accommodation (259), the majority stayed for three nights (around 65%), around 20% stayed for two nights and the remaining 15% for one night. The average number of overnight stays was 2,5.

Emission factor depends mainly on hotel category. In general, higher levels of hotel services are associated with higher average CO_2 emissions per person. Internationally, more than 80 different accommodation categories can be identified including hotels, hostels, motels, pensions, bed and breakfast etc. In our case (3 and 4 star hotels) an average emission factor for hotels (20,6 kg CO_2 per guest night) was sourced from UNEP (*Climate Change and Tourism - Responding to Global Challenges,* 2008). This includes energy consumption for heating/cooling, cooking, illumination, cleaning etc. Since Verona is characterized by a moderate climate, this average emissions factor is expected to be representative for our case.

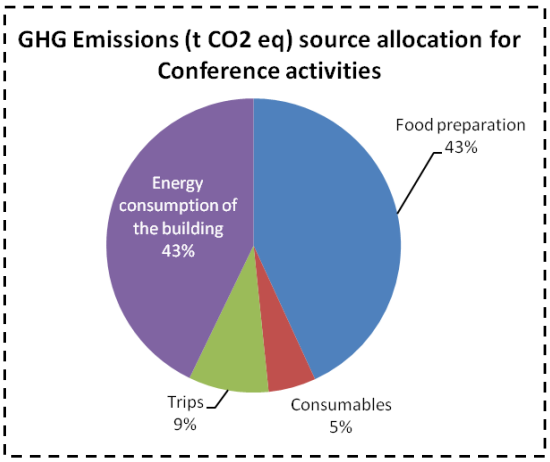
Hotel Stays: 648 nights
Average stay per person: 2,5 nights
GHG emissions: 13,3 t CO_2 eq.
Average GHG emissions per person: 0,052 t CO_2 eq.

2.4 Conference activities

As previously mentioned, emissions sources regarding conference activities included:

- ✓ food preparation,
- ✓ production of various consumables,
- ✓ energy consumption of the building where the conference were held, as well as
- ✓ fuel consumption during field trips that took place during the conference

In terms of GHG emissions, the largest contributor was food preparation and energy consumption with an 86% contribution in total. Trips accounted for around 9% of the emissions, and consumables were accountable for the rest 5%.



Type of activity	GHG Emissions (t CO2 eq)
Food preparation	13,6
Consumables	1,6
Planned trips	2,8
Energy consumption of the building	13,5
Sum	**31,5**

2.4.1 Food preparation

Food service in the conference included coffee breaks (6 in total), lunch breaks (6 in total) and 2 gala dinners for all the participants (302).

The calculations of emissions from food preparation were achieved by multiplying the number of persons attending each event, and a type of food based emission factor (CO_2 per person - meal). Emission factors were adapted from Ximena et. al (2014)[2]. According to the authors, carbon footprint per meal ranges from 2,4 kg CO_2 eq to 3,6 kg CO_2 eq depending on various variables such as type of food and source of energy used. For the purposes of this report, the lower emission factor (2,4 kg CO_2 eq / meal) used in case of coffee breaks, and the higher (3,6 kg CO_2 eq / meal) in case of lunch breaks and dinners.

However, this factor does not include emissions from canned and bottled drinks production, thus an additional average emission factor was used (0,14 kg CO_2 eq / drink), that sourced from Fantin et al. (2014)[3] and includes production, distribution as well as recycling of the packaging[4].

GHG emissions: 13,6 t CO_2 eq.
Average GHG emissions per person: 0,045 t CO_2 eq.

[2] *Ximena C. S. Rivera, Namy Espinoza Orias, Adisa Azapagic (2014) Life cycle environmental impacts of convenience food: Comparison of ready and home-made meals. Journal of Cleaner Production 73, 294, 309*
[3] *Adapted from Fantin V. et al. (2014) A method for improving reliability and relevance of LCA reviews: The case of life-cycle greenhouse gas emissions of tap and bottled water. Science of the Total Environment 476–477 (2014) 228–241.*
[4] *An average consumption of one 500ml bottle per person & meal was assumed.*

2.4.2 Consumables

Consumables in the conference included printed materials (book of abstracts, flyers, programs, signboards etc) as well as USB sticks for all the participants (302).

The calculations of emissions from printed materials were achieved by multiplying the estimated weight of paper[5], and a type of emission factor (1,64 kg CO_2 eq. per kg of printed paper) sourced from US EPA's Waste Reduction Model (WARM)[6]. The same method was applied for the USB sticks, where an average emission factor of 3 kg CO_2 eq. per USB stick was used.

GHG emissions: 1,6 t CO_2 eq.
Average GHG emissions per person: 0,005 t CO_2 eq.

2.4.3 Energy consumption

Energy consumption of the building where the conference were held, was estimated based on an emissions factor (15 kg CO_2 eq. per participant - day) that was sourced from CARBONTOUR+ Tool (www.carbontour-plus.com). This emissions factor is based on data from 10 conference rooms in various hotels in Greece. According to literature review, emission factors could reach 43 kg CO_2 eq. per participant and day[7].

GHG emissions: 13,5 t CO_2 eq.
Average GHG emissions per person: 0,045 t CO_2 eq.

2.4.4 Field trips

During the Conference, 3 trips took place. For each trip were used busses to transport around 120 participants each time. The total distance covered was 360 km. Emission factor used (0,0625 kg CO_2 eq. per passenger & km) were sourced from EEA[8].

GHG emissions: 2,8 t CO_2 eq.
Average GHG emissions per person: 0,023 t CO_2 eq.

[5] *Weight was estimated from materials size and an average paper density of 300 g/m^2.*
[6] *http://www.epa.gov/epawaste/conserve/tools/warm/pdfs/Paper_Products.pdf - Worst case scenario (no recycling) is taking into account.*
[7] *Estimation of luxury Crown Hotel in Melbourne, Australia (https://www.crownmelbourne.com.au/Assets/Files/Carbon%20Offset%20Program%20-%20Pricing.pdf)*
[8] *http://www.eea.europa.eu/publications/transport-at-a-crossroads*

3 FURTHER INFORMATION

If you would like to find out more about how your organisation can calculate its carbon emissions or for further information about carbon accounting, you can visit www.innoveco.gr or contact Mr. Georgios Konstantzos at gkonstantzos@innoveco.gr.

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