Scope 3 Emission Analysis

for the Parents Association

of the European School I Luxembourg

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1. Description of the organization

Overview of the organization

The Parents Association (PA) of the European School I Luxembourg represents the interests and the concerns of parents of the students who attend the European School I in Luxembourg. It is a non-profit organization with membership of over 1000 families of the students who attend the school, representing approximately 70% of parents (APEEEL1, 2019). In addition, the Association is responsible for organizing afterschool clubs and sports activities for the students as well as well as organizing special events such as the Christmas market or the School Fête.

Office and staff

The association office and activities are conducted in the European School I Luxembourg in Luxembourg city, Luxembourg. The association does not own any facilities as it uses the school facilities for its activities after school hours. It does not pay rent, however it contributes for some of the costs to the school for example the cost of security guards for prorata of the time when activities are held.

There are 4 permanent employees responsible for day to day operations and 39 instructors responsible for conducting the afterschool activities with students (APEEEL1, 2019). In addition there are 21 elected members who meet at least monthly to decide on the various issues requiring the input of parents in the school community as well as managing the association activities.

Description of Activities

The main activity of the association with the highest Scope 3 emissions are the afterschool activities. In total 150 students were enrolled in private music lessons and 1284 students were enrolled in group activities.

The association also organizes different events, for example a Christmas market and a School Fête to raise funds and to present the work of the students in the various activities.

The third area of activities is linked to parent representation at school and governmental level. This is linked to some business travel.

2. Inventory Boundaries and Scope

Reporting year

The Association activities and operations overlap with the academic year. Data is reported from September to July with no activities taking place in August. This report examines operations of the Association for the school year of 2018-2019 as this is the last full annual data without the impact of COVID. During the last academic year running from Sept 2019 up to July 2020, all school activities were moved to online teaching affecting the activities of the association as well. The majority of the afterschool activities were canceled between March and July to comply with governmental regulations which makes the data for 2019-2020 less representative.

Boundaries

For the purposes of this report the Operational control method is used to establish operational and organizational boundaries. Under the Green Gas Protocol, operational control guidance requires companies to account for 100% of the greenhouse gas emissions over which they has operational control (World Resources Institute & World Business Council for Sustainable Development, 2011). This approach will more accurately capture the full emissions for activities over which the PA has operational control, including the space it occupies even though it does not have financial obligation to reimburse the school of its usage.

Many of the activities of the association are performed by parent volunteers so there are no reciprocal financial transactions, however some of these activities, for example travel to meetings, result in greenhouse gas emissions.

From an operational point of view only the emissions which result solely from participation in association activities are included. Since most of the activities take place on school

premises the travel of students to and from the location of the activity would be excluded if it fully overlaps with their normal school attendance.

Greenhouse gases (GHG) are reported for every category in CO_2 equivalent (CO_2e) in order to aggregate different greenhouse gases such as Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Each of these GHGs has different warming potential which is taken into account when calculating CO_2e. The benefit of using the CO_2e is that all the information can be aggregated into one number which is more easily understandable for the general public reviewing this report.

3. Key sources of Scope 3 emissions and calculation

The main activity of the association which would have the highest Scope 3 emissions are the afterschool activities. Over 1400 students were enrolled in private music lessons, sport activities, language, science, arts and crafts (V. Simonaviciute, personal communication, 11 2020).

The association also organizes different events, for example a Christmas market and a School Fête to raise funds and to present the work of the students in the various activities. Data collected on the school events was not sufficient to perform accurate analysis on their Scope 3 emissions. As the events are organized by volunteers a large proportion of their activities were not recorded. Only the overall expenses and funds raised are available in the annual accounts, which is not sufficient to perform accurate estimation of Scope 3 emissions. For this reason, the scope 3 emissions for the two events are not analyzed in this report.

The third area of activities is linked to parent representation at school and governmental level. It generates emissions from business travel and is included in this report.

Table 1:Relevant Scope 3 Emissions

Scope 3 Category	Relevant source of Scope 3 emissions	Included in the report

1. Purchased goods and services	Likely to have significant impact. The Association offers after school activities, which are in a way services facilitated by third party suppliers (teachers and instructors)	Yes
2. Capital goods	Expected to be fairly small impact as apart from some office equipment, the association does not own or purchase capital goods every year. No capital purchases were recorded for the reported year.	No
3. Fuel- and energy-related activities (not included in scope 1 or 2)	As the association does not pay for electricity or fuel this category is not applicable, however an indicative value can be calculated.	No
4. Upstream transportation and distribution	One source of such emissions could be the transportation of materials for the school events, likely to be very small	No
5. Waste generated in operations	Expected to be small, most of the emissions in this area would stem from events organization	No
6. Business travel	This category could have sizable impact on emissions due to the number of meetings held throughout Europe every year.	Yes
7. Employee commuting	This is expected to be a significant category, even if student comminuting is not included. Since all activities are held at the school site, student transport emissions to and from the activities can be shared with the school activities.	Yes
8. Upstream leased assets	Not relevant	NA
9. Downstream transportation and distribution	Not relevant	NA

10. Processing of sold products	Not relevant	NA
11. Use of sold products	Not relevant	NA
12. End-of-life treatment of sold products	Not relevant	NA
13. Downstream leased assets	Not relevant	NA
14. Franchises	Not relevant	NA
15. Investments	Not relevant	NA

Category 1 Purchased goods and services

The information used for Category 1 Purchased goods and services is based on reported monetary values, as declared by the PA (C. Balloch, Personal communication, 27 Nov, 2020). The expense report includes information on all the services and materials used by the PA throughout the year. Details are listed in table 2.

Table 2 Category 1 Included Items

Activity	**2018-2019, Euro**	**2002 Euro Values**	**2002, US$ value**
Conversion factor		*-24.18 inflation index*	*1 EUR=0.9927 USD*
Supplies - school materials	13,000	9,857	9,785
Guards	47,000	35,635	35,375
Bank fees for accounts and payment services	12,000	9,098	9,032
IT, printing & website hosting	17,000	12,889	12,795
Audit/ Payroll fees	9,000	6,824	6,774

Source: (APEEEL1, 2019; FXTOP, 2020)

To convert the financial costs into the relevant greenhouse gas emissions, the spent based method was used, due to the non-availability of supplier-specific data. Carnegie Mellon Economic Input-Output Life Cycle Assessment (EIO-LCA) tool was used to derive activity conversion values for each activity. More specifically, the purchaser model with US 2002 prices was preferred due to the German data being 7 years older. In addition, the purchaser model accounts for full emissions up to the point of purchase. The PA financial information for 2018-2019 was debased to 2002 prices and converted to US dollar to be aligned with the parameters of the model as shown in table 2.

Figure 1: Greenhouse gas emissions, Category 1, Eiolca.net

Custom Product
Displaying: Greenhouse Gases
Number of Sectors: Top 10

Change Inputs (Click here to view greenhouse gases, air pollutants, etc...)

Documentation:
The environmental, energy, and other data used and their sources.

Frequently asked questions about IO-LCA (or EEIO) models.

This EIO-LCA data model was contributed by Green Design Institute.

Your Custom Product

Ingredients	Weight
Stationery product manufacturing	9860
Investigation and security services	35000
Data processing, hosting, and related services	13000
Nondepository credit intermediation and related activities	9000
Accounting and bookkeeping services	6700

Sector		Total t CO2e	CO2 Fossil t CO2e	CO2 Process t CO2e	CH4 t CO2e	N2O t CO2e	HFC/PFCs t CO2e
	Total for all sectors	*17.4*	*15.0*	*0.653*	*1.28*	*0.293*	*0.173*
221100	Power generation and supply	6.41	6.31	0.000	0.017	0.039	0.041
322130	Paperboard Mills	1.39	1.39	0.000	0.000	0.000	0.000
322120	Paper mills	1.21	1.21	0.000	0.000	0.000	0.000
211000	Oil and gas extraction	0.799	0.225	0.146	0.428	0.000	0.000
481000	Air transportation	0.604	0.604	0.000	0.000	0.000	0.000
484000	Truck transportation	0.488	0.488	0.000	0.000	0.000	0.000
324110	Petroleum refineries	0.479	0.477	0.000	0.001	0.000	0.000
331110	Iron and steel mills	0.446	0.169	0.275	0.003	0.000	0.000
562000	Waste management and remediation services	0.318	0.012	0.000	0.302	0.003	0.000
561600	Investigation and security services	0.316	0.316	0.000	0.000	0.000	0.000

Source: (Carnegie Mellon University Green Design Institute, 2020)

Total emissions for category 1 stand at 17.4 tons of CO_2e.

Category 6 Business travel

An important element of the PA objectives is parents representation at school and country level. For this purpose 2 parent representatives travel three times a year to various

locations in Europe. Each meeting is organized in one of the other European Schools. Table 3 lists the locations as well as the distance from Luxembourg to each of the other schools where meetings are held.

The distance based method is used due to lack of exact fuel use for each trip. Carbon metrics are calculated using carbonfootrpint.com with the assumption that for distances over 500km the trip is done via a plane, while for those under 500km a car is used. The usual practice for trips made by car is that that 4 people, 2 from each Luxembourg based schools, share a vehicle thus reducing the overall carbon intensity of the trip (C. Balloch, Personal communication, 27 Nov, 2020).

CO_2e for each trip as based on carbonfootprint.com are reflected in table 3. Detailed results are available in Appendix A.

Table 3: Business Travel Location, distance, emissions

Location	**Distance in km**	**CO_2e metric tons one way**	**return trip per person**
Luxembourg, LU	5		0
Brusses, BE	220	0.04	0.02
Brusses, BE	220	0.04	0.02
Brusses, BE	220	0.04	0.02
Brusses, BE	220	0.04	0.02
Karlsruhe, DE	240	0.04	0.02
Mol, BE	250	0.04	0.02
Frankfurt, DE	260	0.04	0.02
Bergen, NE	450	0.08	0.04
Munich, DE	560	0.06	0.12
Varesse, IT	670	0.07	0.14
Aicante, ES	1600	0.19	0.38
Average 1 trip per person	**409.6**		**0.068**

Source (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)

On average, for all of the locations and modes of transport 0.068ton of CO_2e are generated in 2018-2019. Usually 2 people attend 3 events each year leading to 0.41 tons of CO_2e.

Any business travel will usually require 2 nights at a hotel per travel. Hotel stay emissions are calculated using the annual number of hotel nights times the hotel emission factor. The emission factor per hotel are derived from the UK Government's reporting standards (Department for Business, Energy & Industrial Strategy, 2019). Table 4 lists the conversion factors for each country destination. The number of schools in each location were used to calculate a weighted average. In this case the conversion factors for Belgium and Germany which have the most schools receive higher contribution. The conversion factor of 20.64 kg CO_2e was used as weighted average from all 5 locations to which business trips are made.

Table 4: Hotel conversion factors by location

Country	**Unit**	**kg CO_2e**	**Number of schools in each location**	
Belgium	Room per night	19.6	5	98.0
Germany	Room per night	20.8	3	62.4
Italy	Room per night	22.9	1	22.9
Netherlands	Room per night	25.0	1	25.0
Spain	Room per night	18.7	1	18.7
Weighted average	Room per night	20.64		
3 trips x 2 nights x 2 rooms x 20.64		**247.64**		

The hotel stay for 3 trips, 2 people each, staying 2 nights each will account for 0.25 tons CO_2e.

Total category 6 Business travel accounts for 0.66 tons CO_2e.

Category 7 Employee commuting

This category captures commuting of the 4 permanent employees as well as the 39 instructors who travel to location to offer different sports and academic afterschool activities. As with business travel, the distance based method is used due to lack of exact fuel use data.

The calculation for permanent employees is based on the assumption of 180 days travel to the office (36 weeks during the year, excluding holidays, 5 days per week). Table 3 lists the breakdown by mode of transport as well as the distance traveled. The CO_2e in tons is based on the carbonfotpring.com. Details of the carbon calculations from carbonfootprint.com are available in the Appendix B.

Table 5: Travel emissions of full time employees

Permanent Employee, 180 days in the office	**distance one way, km**	**total distance traveled per year, km (180 x distance x 2)**	**CO_2e, tons**
tram	5	1800	0.05
bus	25	9000	0.93
Car	40	14400	2.47
Total permanent employee			**3.45**

Source: (C. Balloch, personal communication, 11 2020; *Carbonfootprint.Com - Carbon Footprint Calculator*, 2020; author's elaboration, 2020).

The calculation for instructors is based on the assumption of 25 weeks travel to school premises, twice per week. Table 4 lists the breakdown by mode of transport as well as the distance traveled for the instructors. The average distances for travel in Luxembourg and the neighboring Border region are based on the Luxembourg government's transport strategy Modu 2. The CO_2e in tons is based on the carbonfotpring.com. Details of the carbon calculations from carbonfootprint.com are available in the Appendix B.

Table 6: Travel emissions of instructors

Instructors, 25 weeks of instructions, travel twice a week	**distance one way, km**	**total distance traveled per year, km (50 x distance x 2)**	**CO_2e**
5 French border, car	34	17000	
1 France, Orleans, train	500	25000	
1 German border, car	40	4000	
1 German border, bus/bike	35	3500	
2 Belgium border, car	42	8400	
29 Luxembourg of which			
20 car	13	26000	
5 bus/tram	13	6500	
4 walk	3		
Total per mode of transport			
Car		55400	9.5
train		25000	0.12
bus		5200	0.54
tram		1300	0.04
Total Instructors			**10.2**

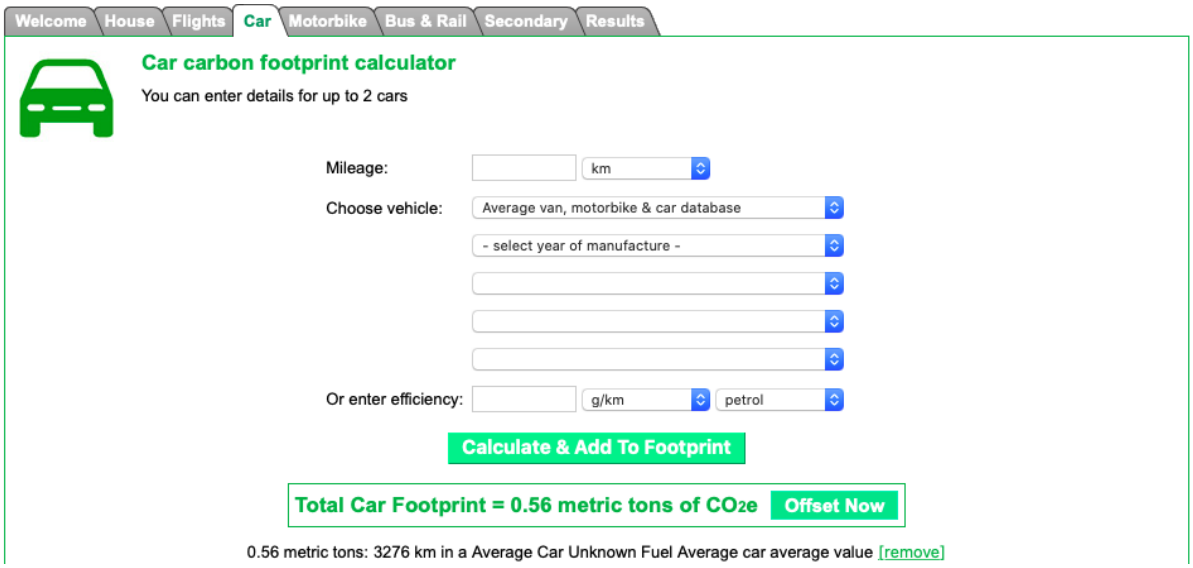
(*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020; Le Governement Du Grand-Duché de Luxembourg, 2018; V. Simonaviciute, personal communication, 2020 ; author's elaboration, 2020)

Student travel to and from activities can impact this category as well. Since the activities are located in the school building the travel to the activity overlaps in most cases with travel to school. There is no information on any additional travel for students generated specifically for the purpose to attend the activities outside of normal school related travel.

The final element of employee commuting includes the parent volunteer travel for management committee meetings. There are 10 large meetings involving all 21

representatives and a few smaller meetings involving 2 to 10 people every month. Each meeting will have 1 or 2 people absent and to account for the smaller meetings I am assuming that two full meeting occur every month. Based on the transport survey conducted by the association 70% of parents work in close proximity to the school (APEEE Luxembourg 1, 2019) so I am assuming that only 30% of parent volunteers need additional travel to school premises to attend the meetings. Using 13km of average travel distance one way for Luxembourg (Le Governement Du Grand-Duché de Luxembourg, 2018) the result is 3276 km of travel. All volunteers travel to the meetings by car so the total emissions based on carbonfootprint calculator are: 0.56 tons CO_2e (see Figure 2)

Figure 2: Management committee carbon emissions



Source: (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)

Table 7: Combined Category 7 emissions

Category 7 emissions	**CO_2e tons**
Full time employee emissions	3.45
Instructor travel emissions	10.2
Management committee emissions	0.56
Total Employee Commuting	**14.21**

The total GHG emissions generated by employee travel are 13.65 tons CO_2e.

4. Approach to calculating the remaining Scope 3 emissions

Fuel and energy related activities not included in scope 1 or scope 2

Category 3 can be excluded from the report as the Association does not purchase fuel or electricity. Even though the association does not pay for electricity it still uses it, so an indicative value of the emissions can be calculated for information purposes. This can be based on the pro-rata electricity use, for example number of rooms used for the allocated time, combined with the number of lights in each room to calculate the kW per hour use of electricity. This can be combined with the emission factor of the specific electricity provider or based on the average electricity mix for Luxembourg. Heating is not affected by additional use of the facilities due to the way the system is set up.

Waste generated from operations

The waste generated is expected to have a small impact overall. Most of these emissions will be related to the two events organized by the association every year. To track waste generation's footprint we would need better collection of information from the participants at these events, specifically the waste type and quantities generated at the events as well as the waste treatment method. At a typical event there is large quantities of food related waste as well as disposable plates, cups and utensils.

Transportation and distribution

It must be noted that the method used to calculate scope 3 emissions for Category 1- Purchased goods and services, and more specifically the Carnegie Mellon EIO-LCA purchaser model accounts for the transport emissions from manufacturer to the end consumer. As such the Transport emissions for purchased goods and services should not be included in this category. The only activities related to product transportation are the products sold and used during the two events the association organizes annually. The revenues generated in these events are used for fund raising and as such even though the association does not purchase the products it is the ultimate beneficiary of their sale. For this reason it can be considered that the upstream transportation emissions of these products would fall under the association scope 3 emissions. It is expected that these emissions will be fairly small so it

needs to be decided if measuring this category will provide enough relevant benefit for future mitigation efforts vs the efforts needed to accurately measure any upstream transportation costs not already included.

5. Next steps and reduction plan

Next steps

Table 8 provides a summary of calculated Scope 3 emissions for the Parent Association. The majority of emissions stem from Purchased goods and services with 54% and Employee commuting with 44%.

Future work will need to focus on more accurate reporting for Purchased goods and services focusing on two areas. One is using more accurate supplier emission data. The limitations of EIO-LCA is that it uses sector aggregation which might lead to over or underestimation of the results (Carnegie Mellon University, 2016). In addition the data used for EIO – LCA is US based which has different energy footprint compared to Luxembourg. The second area of improvement is related to more granular financial category reporting of the Parent Association which could be used to more accurately model the Purchased goods and services GHG emissions.

The second biggest category – Employee commuting is based on relatively granular data. One further area for improvement in this category is collection of data on any additional travel by students or parents in order to participate in afterschool activities. As more than 1000 students participate in these activities even a small share of students who might travel home and back for each activity can lead to significant increase to the GHGs allocated to this category.

Table 8: Summary of Emissions

Scope 3 Reporting Categories	GHG emissions CO_2e tons	% of total
1. Purchased goods and services	17.4	54%
2. Capital goods	Not calculated	-

3. Fuel- and energy-related activities (not included in scope 1 or 2)	Not calculated	-
4. Upstream transportation and distribution	Not calculated	-
5. Waste generated in operations	Not calculated	-
6. Business travel	0.66	2%
7. Employee commuting	14.21	44%
8. Upstream leased assets	Not relevant	
9. Downstream transportation and distribution	Not relevant	
10. Processing of sold products	Not relevant	
11. Use of sold products	Not relevant	
12. End-of-life treatment of sold products	Not relevant	
13. Downstream leased assets	Not relevant	
14. Franchises	Not relevant	
15. Investments	Not relevant	
Total Calculated Scope 3 Emissions	**32.27**	**100%**

Reduction targets

Reducing the association's Scope 3 emissions needs to be based on the categories with biggest impact. The key categories where changes should be implemented to achieve reduction in greenhouse gases would be Purchase of goods and services and Employee comminuting.

It is important to set annual targets for the reduction in order to achieve a sustained effect over the years and more importantly to spread out the limited resources the association has to implement these targets. One approach in deciding the targets will be to take inspiration from the targets set in the Paris climate agreement or the European Green deal which aims for achieving carbon neutrality by 2050 (CABUZEL, 2019) and translating the overall goal into yearly targets.

Mitigation approach

In order to better manage its emissions , the association needs to have a critical approach when purchasing any goods and services. Since this is the largest category, it offers the highest potential for savings. Some of the ideas that could be explored is working with its existing suppliers to find ways for more sustainable service offer, or looking for new suppliers which offer greener alternatives. For example webhosting, which is highly energy dependent could be hosted on servers using renewable energy thus reducing the carbon footprint of the service..

Potential reductions could be also significant for employee commuting, however, it could be a more challenging objective at least in the short term. One reason is the labor force which is spread out across 4 different countries. While the school is easily accessible by public transport, the widely spread population makes traveling by public transport slower than by car, and thus high share of workers in the region choose to commute by car. Still, there are options which the PA can pursue in order to incentivize its employees to substitute more polluting transport with cleaner options. Another option is to promote higher share of work from home for the roles for which this is a feasible option and virtual meetings as much as possible.

The last area where the PA can have significant impact on overall GHG reduction is through its wide reach in the school community. The school is home to over 3500 students and 1500 families and the association can use its links at both the school administration and the school community to advocate for change through the example it can set in the area of GHG reduction. For example during the School Fete in spring of 2019, the PA made special effort to reduce non-recyclable waste by substituting all cups with reusable ones and mandating that all plates and cutlery used at the event should be either reusable or recyclable (paper or bamboo). While this had direct effect on waste generation for the association it also had wider effect of popularizing the issue of waste generation and need of better recycling among the school community. More such opportunities need to be explored in order to magnify the effects of the association’s carbon reduction efforts.

The scope 3 report of the association can similarly be used to draw attention of the school community to the carbon footprint of all our activities and this invite the school and households to examine their own impact on the environment. Luxembourg is one of the countries with highest carbon footprint within Europe and the OECD so there is big scope for reduction (The World Bank Group, 2020).

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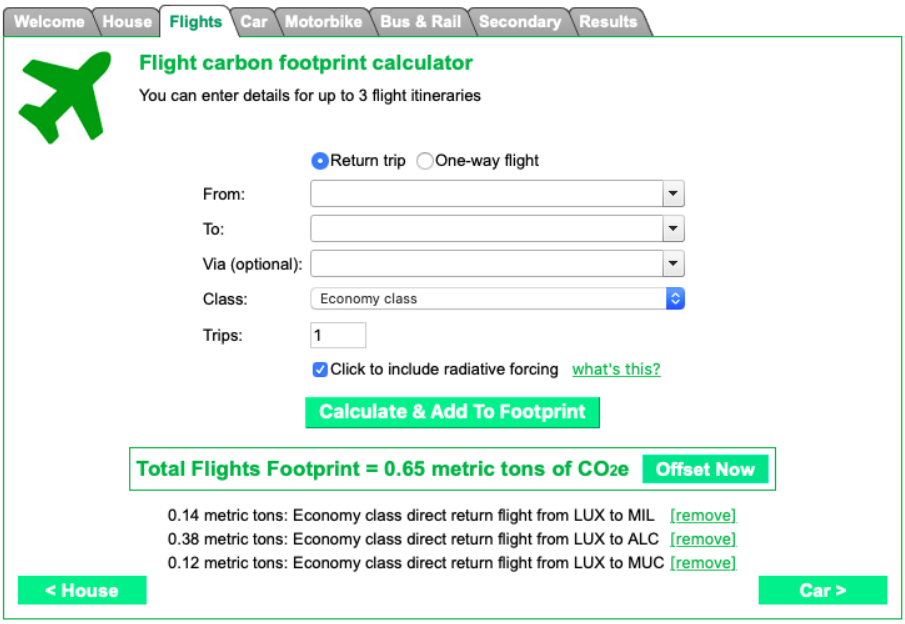
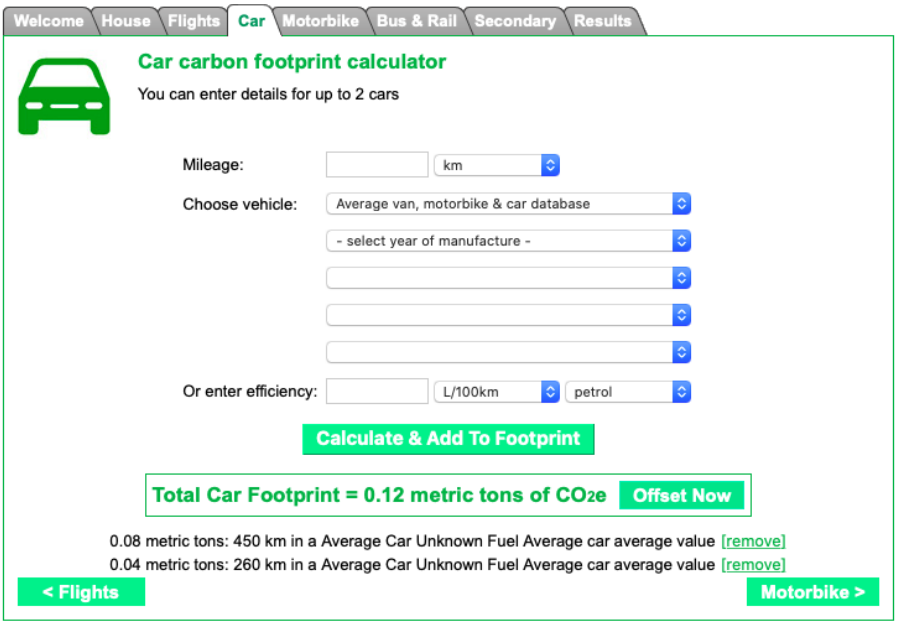
Appendix A: Business travel calculations.

Flight carbon emissions estimation



Source: (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)

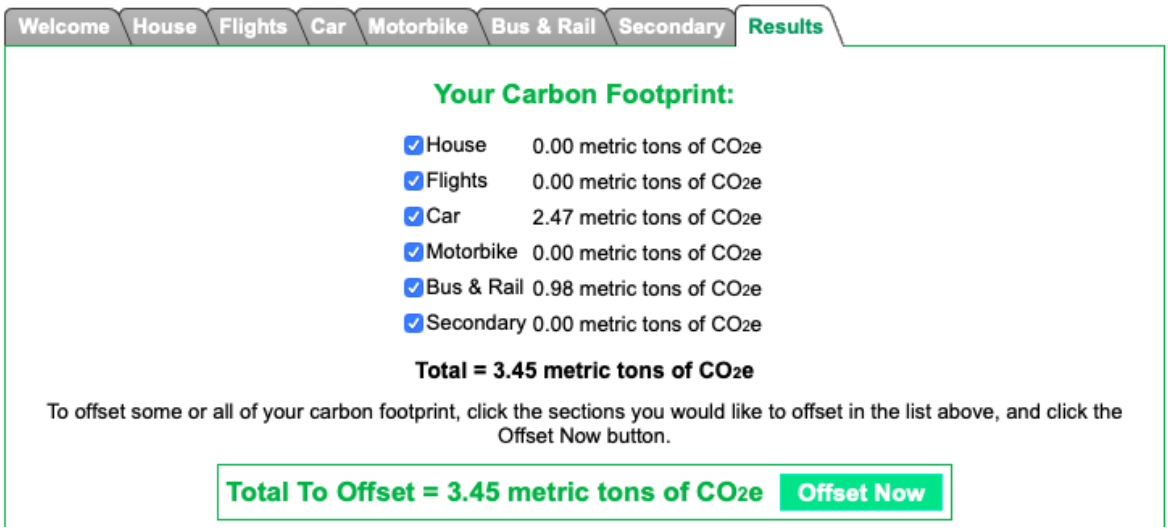
Car carbon emissions estimate, For car journeys Average Car, Unknown fuel type, and average car values were used.



Source: (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)

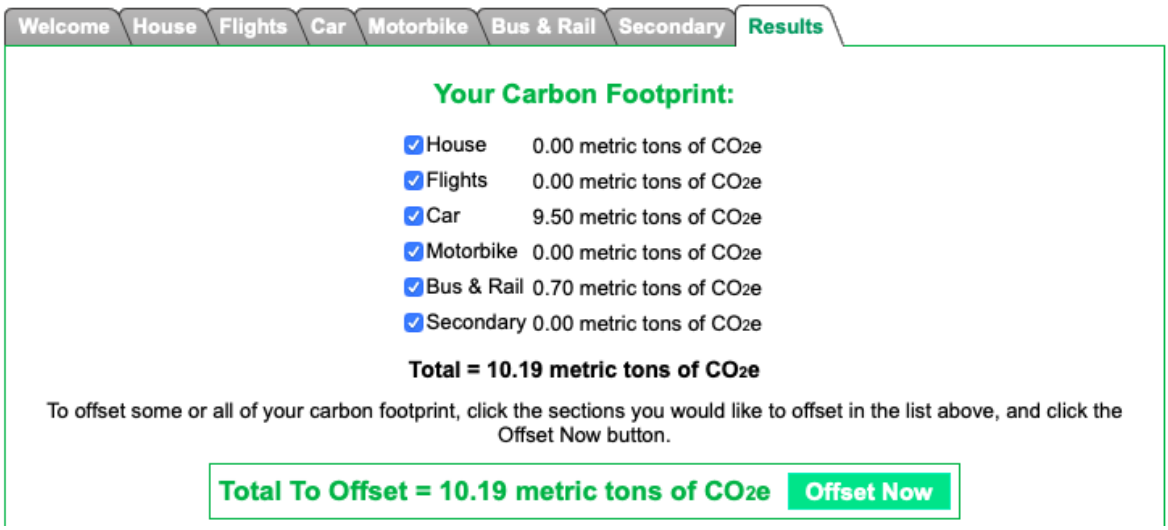
Appendix B: Employee travel calculations

Transport emissions estimate for full time employees (based on 14 400km car, 9 000km bus and 1 800 tram use)



Source: (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)

Transport emissions estimate for instructors (based on 55 400km car, 25 000km train, 5 200km bus and 1 300km tram)



Source: (*Carbonfootprint.Com - Carbon Footprint Calculator*, 2020)