BP TARGET NEUTRAL
ONLINE EVENTS CALCULATOR:
METHOD FOR CALCULATING EMISSIONS ASSOCIATED WITH EVENTS

1.0 EXECUTIVE SUMMARY

BP Target Neutral's Events calculator measures and offsets the carbon footprint from operations and travel associated with events and conferences, allowing the user to offset the associated emissions.

When organising an event or conference this tool can also be used to identify the areas of highest emissions in order to help reduce them according to the 'Reduce, Replace, and Neutralise' framework that BPTN follows. The remaining carbon footprint can subsequently be offset through BP Target Neutral which supports a variety of low-carbon development projects globally. These aim to reduce carbon emissions as well as bring additional social and economic benefits to local communities, supporting the UN's Sustainable Development Goals.

This paper sets out the overarching approach for all GHG calculators adopted by BP Target Neutral whilst also outlining specific characteristics of BPTN's Events Calculator. It presents the rationale behind the method adopted for calculating emissions arising from various aspects of events.

1.1 EMISSION FACTORS

Emission factors are derived from the 2017 UK Government Greenhouse Gas (GHG) Conversion Factors for Company Reporting. The WBSCD/WRI GHG Protocol recognises this source for use as default emission factors where country specific values are not readily available.

This document, previously known as the 'Guidelines to Defra/DECC's GHG Greenhouse Gas Conversion Factors for Company Reporting', is updated on an annual basis. To have alignment across BP Target Neutral's suite of tools, all emission factors are updated simultaneously for consistency, therefore there may be a short lag between emission factor release dates and when the calculators are updated.

Emissions are determined from either (1) fuel use, taking into account the vehicle and fuel types, or (2) distance travelled using the appropriate average emission factors for different travel modes.

When calculating emissions, not only are direct 'tank-to-wheel' emissions of CO_2, CH_4 and N_2O from the combustion of fuel accounted for, but also the indirect emissions associated with the extraction and transport of primary fuels as well as the refining, distribution, storage and retail of finished fuels - otherwise known as the 'well-to-tank' emissions.

The applicable 'well-to-tank' emissions, whether relating to fuels or different travel modes, are therefore lifted from the specific '*WTT*' table and added to the relevant conversion factor. Table 1 below shows a small sample of emission factors used in the online calculator and used within the example calculations which follow.

Table 1: Example emission factors used for the European markets

Emissions Category	Description	TTW Emissions	WTT emissions	Total WTW emissions	
Fuel	100% mineral petrol	2.30075	0.59549	2.89624	$kgCO_2e$/litre
Fuel	Liquid Petroleum Gas (LPG)	1.50807	0.18961	1.69768	$kgCO_2e$/litre
Car	Small petrol car, up to 1.4 litre engine	0.15649	0.04253	0.19902	$kgCO_2e$/km
Train	National rail	0.04678	0.00921	0.05599	kgCO2e/pkm
Underground/tram	London Underground	0.04674	0.00745	0.05419	kgCO2e/pkm
Coach/bus	Coach	0.0278	0.00659	0.03439	kgCO2e/pkm
Taxi	Regular taxi	0.15617	0.03721	0.19338	kgCO2e/pkm

1.2 KNOWN TRAVEL ARRANGEMENTS

Four options are available to the user, as shown in Figure 1. By clicking on the appropriate button, the user is taken to another tab where specific data points can be entered.

Figure 1: Known travel arrangements – travel modes

1.2.1 Air travel

Two key elements form the basis of air travel emissions calculations:

(1) An uplift factor of 8% applied to the flight distance to factor in sub-optimal routing and stacking at airports during periods of heavy congestion; and

(2) The Radiative Forcing Index (RFI) of 1.9 is applied to the CO2 emissions factor of any given flight type to account for non-CO2 climate change effects of aviation, as outlined by The Committee on Climate Change. For example, this includes the

emissions associated with vapour trails or NOx emissions.

These two factors have already been incorporated into DEFRA's GHG conversion factors. As mentioned in Section 1.2, 'WTT' emissions have been included in the relevant emission factors.

Flight distances are calculated using the Great Circle Flight methodology to account for the curvature of the Earth.

Emission factors are applied according to the route length, e.g. domestic, short-haul international or long-haul international. According to principles outlined in Carbon Planet's GHG Emissions Resulting from Air Travel, band distances can be used to determine the flight type. Table 2 below outlines the band start point for each flight type as well as the associated emission factor.

Table 2: Flight type band start points and emission factors

Flight type	Band start (km)	TTW Emissions	WTT emissions	Total WTW emissions	
Domestic	0	0.26744	0.0293	0.29674	(kg CO2e/pkm)
Short-haul international	401	0.16103	0.0176	0.17867	(kg CO2e/pkm)
Long-haul international	3700	0.19745	0.0216	0.21908	(kg CO2e/pkm)

Class information is not taken into consideration i.e. the average conversion factor, instead of factors specific to economy, business or first class travel, is used for each flight type.

For a person making a return trip from London Heathrow (LHR) to Cape Town (CPT), the user must first go to the bottom table to retrieve the three-letter IATA airport codes for both airports. Entering the 'from' and 'to' airports automatically calculates the distance between these two points.

Emissions for four people making a return trip from London Heathrow to Cape Town:

= 2 x (distance x long-haul international average emission factor x number of trips)
= 4 x (2 x 9,635 km x 0.21908 kgCO2e/pkm)
= 16,884 kgCO2e = 17.0 tCO2e

1.2.2 Car travel

Car travel emissions calculations are made up of these five key elements:

a. number of cars;
b. distance travelled (to be input in either km or miles);
c. car size, with the options being: unknown, small, medium, large;
d. car fuel (unknown, petrol, diesel, LPG, hybrid); and

e. whether the trip undertaken by these cars is a return trip.

The assumption here is that the user would obtain the distance travelled from a web mapping service, such as Google Maps or Bing Maps.

For example, if one driver travelled 5,000 miles one-way and opted for a small petrol car, emissions generated would be as follows:

> = distance in km x emission factor
> = (distance in miles x conversion to km x number of trips) x emission factor
> = (5,000 miles x 1.6093 km/mile x 2) x 0.19902 kgCO2e/km
> = 3,202 kgCO2e = 3.2 tCO2e

1.2.3 Train travel

Users are able to input the following three data points:

a. number of people travelling;
b. distance travelled (to be input in either km or miles); and
c. whether the trip undertaken by these people is a return trip.

Again, it is assumed that the user would obtain the distance travelled from a web mapping service, such as Google Maps or Bing Maps, which would return a road distance value. No uplift factor is applied to the distance entered by the user as driving distances are found to broadly correlate with train distances.

Emissions for 5 people travelling from London Paddington to Oxford and back:

> = number of people travelling x distance per journey x number of trips per journey x emission factor
> = 5 x 79.9 km x 2 x 0.05599 kgCO2e/pkm
> = 44.74 kgCO2e = 0.04 tCO2e

1.2.4 Coach travel

Calculating the emissions from travel by coach or bus requires the user to enter:

a. the number of people travelling;
b. the distance travelled (to be input in either km or miles); and
c. whether the trip undertaken by these people is a return trip.

Emissions for 35 people making one return 14-mile trip to the event and back:

> = number of people travelling x (distance travelled in miles x conversion to km) x number of trips per journey x emission factor
> = 35 x (14 x 1.6093 km/mile) x 0.03439 kgCO2e/pkm x 2

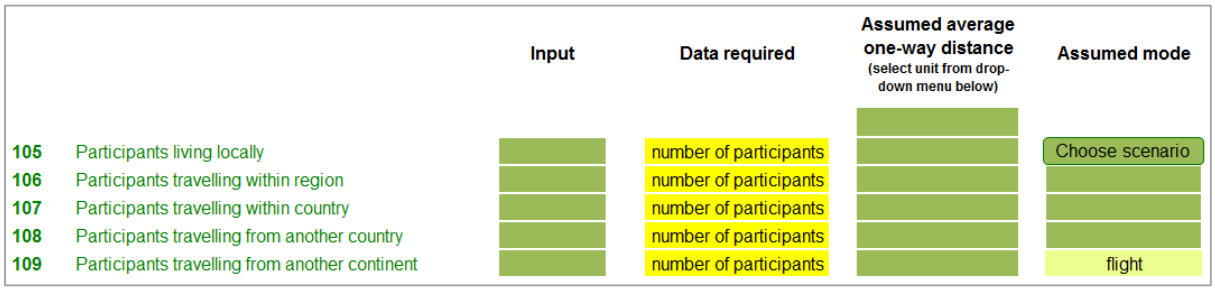
= 54.24 kgCO2e = 0.05 tCO2e

1.3 UNKNOWN TRAVEL ARRANGEMENTS

When travel arrangements are not known in detail, more streamlined calculations are made on the basis of the following factors (see also Figure 2):

a. the number of participants;
b. where people are travelling from, i.e. local or non-local;
c. assumed one-way distances (in km or miles); and
d. assumed mode of travel.

Figure 2: Interface for unknown travel arrangements



		Input	Data required	Assumed average one-way distance (select unit from drop-down menu below)	Assumed mode
105	Participants living locally		number of participants		Choose scenario
106	Participants travelling within region		number of participants		
107	Participants travelling within country		number of participants		
108	Participants travelling from another country		number of participants		
109	Participants travelling from another continent		number of participants		flight

1.3.1 Local travel

For people travelling locally to the event location, three different travel scenarios are available to account for urban (high density or medium density), and suburban (low density) settings, where the percentages travelling via various modes are as outlined in Table 3. If none of these scenarios are deemed appropriate, the user can then tailor scenarios by entering the percentage of people travelling by underground train, bus, train, taxi/car, or cycling/walking. It is a requirement that choosing a tailored approach across various methods of transport should always amount to 100%.

Table 3: Local travel scenarios

Scenario	Scenario type	Underground train	Bus	Train	Taxi/car	Cycling/ walking
Scenario 1	Urban – High density	50%	15%	15%	15%	5%
Scenario 2	Urban – medium density	0%	30%	30%	30%	10%
Scenario 3	Suburban – low density	0%	20%	20%	50%	10%
Scenario 4	Tailored	Entered by user as appropriate, and the total must always equate 100%				

Emissions for 110 people travelling locally over 5km in a high density location:

Underground train travel emissions
= 2 x [number of people x distance x scenario percentage x emission factor]
= 2 x [110 x 5 km x 50% x 0.05419 kgCO2e/pkm]

=29.8 kgCO2e

Bus travel emissions
= 2 x [number of people x distance x scenario percentage x emission factor]
= 2 x [110 x 5 km x 15% x 0.03439 kgCO2e/pkm]
= 5.7 kgCO2e

Train travel emissions
= 2 x [number of people x distance x scenario percentage x emission factor]
= 2 x [110 x 5 km x 15% x 0.05599 kgCO2e/pkm]
= 9.2 kgCO2e

Taxi/car travel emissions
= 2 x [number of people x distance x scenario percentage x emission factor]
= 2 x [110 x 5 km x 15% x 0.19338 kgCO2e/pkm]
= 31.9 kgCO2e

Cycling/walking travel emissions
= 2 x [number of people x distance x scenario percentage x emission factor]
= 2 x [110 x 5 km x 5% x 0 kgCO2e/pkm]
= 0.0 kgCO2e

Total travel emissions
= (29.8 + 5.7 + 9.2 + 31.9) kgCO2e
= 76.6 kgCO2e

1.3.2 Non-local travel

Four non-local travel options are available i.e. participants travelling:

a. within the region;
b. within the country;
c. from another country; and
d. from another continent.

For all non-local travel categories the number of participants is entered as well as the distance travelled. The user then selects the travel scenario for the first category as being 'car', 'car or train', or 'train'. For people travelling within the country or from another country, an additional scenario of 'car or train or flight' is listed. Participants travelling from another continent are only assigned one travel mode which is by air travel.

The calculations work the same way as for local travel with each of these scenarios carrying a set percentage for the car and train modes.

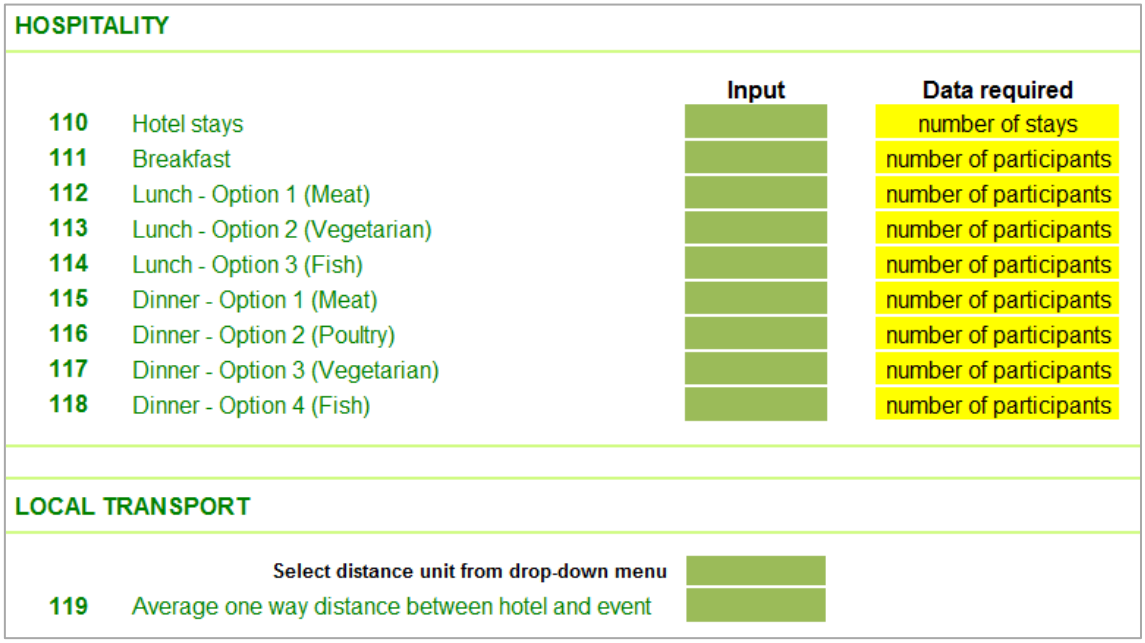
1.4 EMISSIONS ASSOCIATED WITH FOOD, ACCOMMODATION AND LOCAL TRANSPORT

Many participants often require hotel accommodation and meals when an event is scheduled over a few days. The calculator allows for these emissions to be captured, including the additional emissions for travel from the event location and the hotel.

a. The emission factor relating to hotel stays are derived from the Carbon Fund while those associated with food are taken from DEFRA's Scenario building to test and inform the development of a BSI method for assessing GHG emissions from food.

b. Local transport is assigned as travel by taxi. Distance brackets are used to assign the proportion of people choosing to take a taxi to and from the event.

Figure 3: Data entry fields on main menu for food, accommodation and local transport



Emissions associated with a total of 100 hotel stays for the event:

= number of hotel stays x emission factor
= 100 x 33.38 kgCO2e /room/night
= 3,338 kgCO2e = 3.3 tCO2e

Emissions for 100 breakfasts required for the event:

= number of breakfasts x emission factor
= 100 x 0.7034 kgCO2e
= 70.3 kgCO2e = 0.07 tCO2e

Emissions associated with 100 hotel stays whereby the hotel is located 2 km away from the event:

= 2 x [number of hotel stays x distance x proportion of people taking taxis x emission factor]
= 2 x [100 x 2 km x 70% x 0.19338 kgCO2e]
= 54.1 kgCO2e

1.5 OTHER

Often event participants are given stationery to use during the event, or other miscellaneous items as keepsakes e.g. paperweights, memory sticks, keychains etc.

This is accounted for under this category where the user only has to input the number of items given away and the carbon footprint associated with each item.

1.6 RENTAL

The calculator also allows the user to include the GHG emissions associated with rental of the event space, if applicable.

Calculations for this category are made up of the following three factors:

a. country;
b. number of hours; and
c. approximate size of rental space (entered in square feet or square metres)

The country-specific electricity emission factor from IEA's CO2 emissions from fuel combustion is applied, as well as the Defra gas combustion figure, and space- and time-based emission factors for fuel and electricity consumption from the US Department of Energy.