Different waste and energy sources produce different carbon emissions when they break down

An emission factor is a representative value that relates the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.

Estimates of Scope 3 greenhouse gas emissions associated with the disposal of waste can be calculated according to the general equation:

GHG emissions (t CO2-e) = Qj x EFj

where:

Qj is the **quantity of waste** by type j

EFj is the **emission factor** of waste type j (see Table 42, column B)

**Emissions Factors:**

* Food = 1.6
* Paper/cardboard = 2.5
* Garden waste = 1.2
* Inert waste = 0.00

**Example: Calculation of lifetime emissions generated from solid waste**

A higher education facility produced a total solid waste stream of 240 tonnes which was disposed of in the local landfill. This waste comprises 140 tonnes of food waste, 50 tonnes of paper/cardboard, 10 tonnes of garden waste and 40 tonnes of inert waste (e.g. concrete, metal, plastic and glass). As each waste stream needs to be treated separately, their lifetime greenhouse gas emissions (GHG) are calculated as follows:

GHG emissions (t CO2-e) = Qt x EF (Table 42, Column B)

Food = 140 x 1.6 = 224 tonnes CO2-e

Paper = 50 x 2.5 = 125 tonnes CO2-e

Garden = 10 x1.2 = 12 tonnes CO2-e

Inert = 40 x 0.0 = 0 tonnes CO2-e

Total Waste GHG emissions = 361 tonnes CO2-e

<http://watchmywaste.com.au/food-waste-greenhouse-gas-calculator/>

Table 42: Waste mix methane conversion factors

| **Waste types** | **Default DOC proportion** | **Conversion factor CO2-e (t=tonnes)** |
| --- | --- | --- |
|  | A | B |
| Food | 0.15 | t x 1.6 |
| Paper and cardboard | 0.4 | t x 2.5 |
| Garden and green waste | 0.2 | t x 1.2 |
| Wood | 0.43 | t x 1.2 |
| Textiles (i.e. clothing/fabric) | 0.24 | t x 1.5 |
| Inert waste (e.g. concrete/metal/plastics/glass) | 0 | t x 0 |

The emission factors in column B of Table 42 have been calculated according to the default variables detailed in Table 43 and the following formula:

GHG Emissions (t CO2-e) = [ ( ( Q x DOC x DOCF x F1 x 1.336 ) – R ) x ( 1 – OX ) ] x 21

Table 43: Waste variables and default values

|  |  |
| --- | --- |
| **Variable** | **Default values** |
| Q (Activity) | Quantity of municipal solid waste expressed in tonnes and sourced from waste records or contractor invoices |
| DOC | Degradable Organic Carbon expressed as a proportion of the particular waste type and contained in Table 42. |
| DOCF | Fraction of degradable organic carbon dissimilated for the waste type produced with default values as follows:  Food – 0.84  Paper and cardboard – 0.49  Garden and green – 0.47  Wood – 0.23  Textiles – 0.5  Sludge – 0.5  Nappies – 0.5  Rubber and leather – 0.5  Inert waste, including concrete, metal, plastic and glass – 0.0  Alternative waste treatment residues – 0.5 |
| Fl | Methane fraction of landfill gas which has a default value of 0.50 |
| 1.336 | Conversion rate of carbon to methane |
| R | Recovered methane during the year, measured/expressed in tonnes |
| OX | Oxidation factor which has a default value of 0.1 for covered, well-managed landfills (and a value of 0 for uncovered landfills) |
| 21 | CH4 global warming potential used to convert the quantity of methane emitted to CO2-e from the quantity of waste produced |