Department for Environment, Food and Rural Affairs

UK Greenhouse Gas Conversion Factors

Common Queries about the Greenhouse Gas Conversion Tool

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Contents

General queries

Conversion factors – using the right years

The factors relevant to your reporting year should be applied. For example, the 2013 factors should be applied for the 2013 calendar year.

For organisations reporting data that falls into more than one calendar year, in general the factors applicable to the greatest amount of raw data should be applied. For example, for data spanning 1st April 2013 – 31st March 2014, the 2013 factors should be applied as 9 months of data fall into the 2013 calendar period.

Conversion factors for 2012 and 2013

Check you have downloaded the "G*ive me everything"* version of the spreadsheet located on the furthest right tab at the bottom of the home page of the UK conversion factors webpage. The other tabs called *"I want to choose my own set of carbon conversion factors" and "I want to see Defra's frequently used conversion factors"* will supply self-selected or abridged versions of the factors which could explain apparently 'missing' factors.

Find historic factors if you have several years' worth of data to report

The *"Give me everything"* download, located on the furthest right tab at the bottom of the home page of the UK conversion factors webpage allows you to download factors back to 2002 for electricity and heat and steam. All of the other factors published prior to 2012 can be found in the Defra archive pages located here: http://webarchive.nationalarchives.gov.uk/20110710105658/http://archive.defra.gov.uk/environment/business/reporting/older-ghg-conversion-factors.htm. Note: the electricity and heat and steam factors in the archives should not be used for reporting, you should use the factors in the new online tool as described above.

Electricity factors – using the right year's data

The factors previously published have been relabelled so that the electricity factors that were called '2010' in the 2012 factors release are now called '2012' to align with the year of issue. You should align the factors to the years you are reporting for.

Automatic conversions – how to do calculations yourself

Simply multiply your raw data by the appropriate conversion factor (ensure the units of measure are appropriate). If you require your result in tonnes, divide the answer by 1000.

Re-baselining - latest guidance and the necessary data

The latest guidance on re-baselining relates only to specific factors for electricity, heat and steam, other factors remain the same. Recent changes to the conversion factors are all listed on the *'what's new'* tab on the conversion factor spreadsheets listed on the website.

Units – which to use, kg CO_2e, kg CO_2, kg CH_4 or kg N_2O

Typically organisations use kg CO_2e as they report on a CO_2e basis (this means they are reporting all of the Kyoto protocol gases). UK quoted companies required to report their annual emissions in their directors' report need to use kg CO_2e under the mandatory GHG regulations. Defra advise organisations reporting voluntarily to use kg CO_2e as this is the most comprehensive way to report your organisations impact; the 'e' in CO_2e signifies that CO_2 plus the other Kyoto gases in CO_2 equivalent are incorporated into the conversion factor value. Companies reporting for other compliance schemes should refer to the legal requirements of the scheme to establish which units to report in.

Overseas emissions – using Defra conversion factors to calculate

The UK conversion factors spreadsheet contains factors associated with overseas electricity generation (scope 2) and transmission and distribution (scope 3). Other global operational activities and fuels should be calculated using the most appropriate factors to the overseas operations, which should ideally be overseas conversion factors. For example gas and transport factors may differ overseas as the make-up of the gas grid and transport network varies on a country by country basis. If, however no appropriate factor can be found Defra may be used as a proxy – this should be transparently annotated in your report. The World Resources Institute's GHG Protocol can also be used as a source of international factors.

Fuels

Conversion factors prior to 2012

Factors relating to electricity, heat and steam have been updated following methodological changes. All historic and current factors relating to these emission sources should be sourced through the online tool, here: http://www.ukconversionfactorscarbonsmart.co.uk/

All other factors published prior to 2012 can be found in the Defra archive pages located here:
http://webarchive.nationalarchives.gov.uk/20110710105658/http://archive.defra.gov.uk/environment/business/reporting/older-ghg-conversion-factors.htm

Reporting on kWh of fuel – using the "Gross" or "Net" CV columns

In general, unless you have specific knowledge about your fuels that would lead you to choose *"Net CV",* organisations should use *"Gross CV"* factors by default.

Therms - conversion factors, and how to convert kWh

Defra provide a specific conversion table at the back of these listings to allow organisations to convert the conversion factors into different units where required. Please see the *'conversions'* listing.

Accounting for fuel bought at the forecourt

The average biofuel blend emission factor should be used for forecourt fuel. The standard fuel blend bought at the forecourt contains a minimum of 5% biodiesel. The 100% mineral oil petrol and diesel factors should only be used if you are sure you have purchased pure mineral oil fuels.

Accounting for biofuel

If your organisation is reporting in terms of CO_2e, the CH_4 and N_2O components of the combustion of the biofuel should be reported in scope 1 using the conversion factors in the *'bioenergy'* tab.

To report the CO_2 components of the fuels as well (recommended) you should use the conversion factors labelled *'outside of scopes'* and report these emissions outside of your gross emissions total (label them '*outside of scopes'*). This procedure is required because the scope 1 impact of the CO_2 released through these fuels has been determined to be a net '0' (since the fuel source itself absorbs an equivalent amount of CO_2 during the growth phase as the that CO_2 is released through combustion). For a worked example please see *the 'whats new'* tab of any conversion factor download from the online tool.

Natural gas - calorific value

Typical calorific values / densities of natural gas and most common fuels are listed under the fuel properties tab on any version of the downloadable spreadsheet.

Well to tank (WTT)

Accounting for emissions produced in own supply chain

Well to tank (WTT) fuels conversion factors should only be used to account for the upstream scope 3 emissions associated with extraction, refining and transportation of the raw fuel sources to an organisation's site (or asset), prior to their combustion.

Scope - WTT emissions

Well to tank (WTT) factors should be reported under scope 3 emissions representing those that are produced indirectly by the reporting company.

‘Outside of scopes’

Reporting ‘outside of scope’ emissions

Outside of scopes emissions should be reported out with your gross emissions total. A worked example is provided under the *‘what’s new’* tab on any version of the 2013 conversion factor download.

‘Outside of scope’ emissions – when to use outside of scopes factors

They should be used to account for burning biomass and other biofuels. The emissions are labelled *‘outside of scopes’* because the scope 1 impact of the CO_2 released through these fuels has been determined to be a net ‘0’ (since the fuel source itself absorbs an equivalent amount of CO_2 during the growth phase as the that CO_2 is released through combustion). Therefore, to fully account for the emissions, the CO_2 component should be quantified but should be placed *‘outside of scopes’*, (as opposed to in scope 1 which is usual for directly combusted fuels). Note: if your organisation is reporting in terms of CO_2e, the CH_4 and N_2O components of the combustion of the fuel should be reported in scope 1 using the conversion factors in the *‘bioenergy’* tab.

Historic reporting of ‘outside of scopes’ factors

The *‘outside of scopes’* factors should only be used for reporting using the 2013 issued factors and onwards. These factors have not been calculated prior to 2013 and will not form part of your emissions total in the past. If you wish to report these emissions it would be beneficial to introduce this new category with a footnote to explain the addition from 2013 onwards.

Refrigerant

Refrigerant leakage – guidance and calculations

Further guidance on how to calculate refrigerant leakage is provided in Defra’s 'Environmental reporting guidelines'.

Reporting refrigerant types and gases – what to report under ‘scope 1’

Only Kyoto Protocol gases need to be reported under scope 1, all non-Kyoto gases (e.g. Montreal Protocol gases) should be reported separately.

Passenger vehicles

Age of vehicles – using the right conversion factors

The conversion factors are based on information from the DfT (Department for Transport) who regularly analyse the mix of cars on the road in Britain through DVLA records and automatic number plate recognition (ANPR) data. The conversion factors are updated each year to reflect changes in the spectrum of cars of different types and ages being driven.

Improving calculations – when you know the average mpg of your passenger vehicles as well as mileage

The mpg (miles per gallon) of the vehicle should be used to convert the distance travelled into litres of fuel used (refer to the *'conversions'* listing to find values to assist this calculation). The conversion factor for litres of fuel can then be applied, which will give a more accurate view of the actual emissions from the vehicle (the conversion factors for vehicle mileage represent the average mpg of the whole UK vehicle population, therefore knowing your vehicle's actual mpg and using this value will yield more precise results).

Improving calculations – when you know the average gCO_2/km of your passenger vehicles as well as mileage

If you know the manufacturers gCO_2/km data this may be used as an alternative (and more precise) calculation for your passenger vehicle's emissions. The factors provided by manufacturers should be uplifted by 15% and multiplied by the km distance travelled in the vehicle.

Delivery vehicles

Gross vehicle weight - definition

The gross vehicle weight value is the maximum operating weight of the vehicle including passengers, cargo and any additional body work i.e. a tail lift or box section. This excludes the weight of any additional trailers.

Average payload – definition

Payload is the weight of goods being transported by a vehicle – typically stated in tonnes. Average payload in this context is the average amount of goods a vehicle of a given type is carrying.

UK electricity

When to update electricity calculations

New electricity factors have been released for all previous years back to 2002 and can be found in the 2013 online tool. This is the final time historic factors will be reissued, so 2013 is the last time organisations need to perform historic updates.

Re-baselining of electricity emissions - historic conversion factors

The *"Give me everything"* download, located on the furthest right tab at the bottom of the home page of the UK conversion factors webpage allows you to download factors back to 2002 for electricity. Please note, Defra advise organisations to account for transmission and distribution losses historically under scope 3. Factors for this are located in the *'transmission and distribution'* tab of each set of factors on the UK conversion factors webpage.

CRC reporting – using the right factors

At this time factors for CRC reporting are not aligned with Defra's conversion factors. If you are reporting to CRC you should refer to specific CRC guidance on conversion factors.

UK electricity factors – why the factors are much lower than last years'

Even though the values are noticeably lower than previously issued in *'table 3c'* of the conversion factors, the current factors are correct. In the past organisations were advised to use the 5 year grid rolling average factors from *'table 3c'*; from 2013 onwards, organisations are advised to use 1 year grid rolling average factors (indeed these are the only factors publically issued via the online tool). The 1 year factors are lower than the 5 year factors; this is one of the reasons organisations must update their electricity calculations for all previous years.

Using 'electricity consumption' factor instead of 'electricity generation'

If you are not publishing a company report, but need a factor for 'electricity consumption' instead of 'electricity generation'.

For company reporting purposes, organisations should use the *'electricity generation'* figures for scope 2 electricity and may use the *'T&D'* factors for reporting scope 3 losses. However, for other reporting contexts (where specific scopes do not need to be reported) the 'electricity consumption' figure, (as published in 2011 and 2012 conversion factors) can be calculated by adding together the *'electricity generation'* and *'T&D'* values within each year.

Average factors – rebaselining 5 year grid rolling average

These factors are based on 1 year average factors. If you previously used a 5 year grid rolling average factors, then please refer to the *'what's new'* tab for full instructions on how to rebaseline your data to compensate for the changes made.

Green electricity - purchased through the grid

Green electricity purchased through the grid should use the grid emission factors as these factors take into account the efficiencies made in the national infrastructure (e.g. from electricity produced from green sources). Annex G (pg 100 of the pdf) of Defra's 'Environmental reporting guidelines' contains further information on how to account for renewable electricity that you have generated and exported to the national grid/third party.

Overseas electricity

CO_2e factors – availability of overseas electricity factors

At this time there are no international conversion factors based on CO_2e available from Defra. Only available on a $kgCO_2$ basis.

Transmission and distribution

T&D – reporting

Organisations are advised to account for the major impacts associated with their organisation. For most organisations this would include reporting on electricity, and as such associated T&D may be reported. T&D is a scope 3 emissions source and as such is viewed as a 'voluntary' disclosure however it would be considered good practice to include this impact.

Water

Water factors – no change since 2012

There have not been any newer available factors; therefore water has remained the same in the 2013 factor release as it was in 2012.

Material use

Waste – which factors to use

The material use factors are not appropriate for waste. For specific end of life figures please see the *'waste disposal'* listing.

Accounting for emissions of materials purchased

These factors are appropriate as they cover the extraction (or sorting if they are secondary materials), primary processing, manufacture and transportation of materials to the point of sale.

Waste disposal

Emissions from waste/ recycling - why emissions calculated can be much lower using the 2012 and 2013 factors

The methodology for calculating carbon emissions from waste has changed. Where previously a lifecycle analysis approach was used (up until 2011) the factors now only consider collection and transport to an energy recovery or materials reclamation facility only (with the exception of landfill categories).

Waste/ recycling factors - why only emissions for collection and transportation of waste are considered

This is in line with GHG Protocol Guidelines, with subsequent emissions attributed to electricity generation or recycled material production respectively. This is with the exception of landfill waste where the factors in the tables cover collection, transport as well as landfill emissions.

Waste disposal factors - why many of these factors are the same value e.g. '1' or '21'

These factors frequently have the same value because they account for the emissions associated with disposing of the material (this includes the carbon associated with transport of the material to the recycling or waste facility and any preliminary processing), but do not take into account the actual recycling / waste process itself (with the exception of landfill factors).

Procurement of goods – using the right factors

The waste factors are not appropriate for procurement of goods. For specific procurement factors please see the 'material use' listing.

Calculation of weight of waste

There are a variety of different methods to work out the amount of waste your organisation generates. Waste transfer/ consignment notes from your commercial waste collector are a good place to start as they may have specific information on the waste they collect from you, or they may be able to advise on an average weight you can apply given the waste infrastructure you have on site. Alternatively, you can conduct a waste audit, whereby a member of staff samples the composition of your waste and weighs the waste and/or recycling generated on a regular basis.

Business travel (air, sea and land)

Radiative forcing – inclusion of radiative forcing in air travel reporting

Whilst the factors including radiative forcing are not compulsory, inclusion of 'RF' is advisable.

'Passenger.km' – definition

This unit of measure relates to the distance travelled by one passenger via a particular mode of transport. This allows organisations to account for one person travelling on a train (who would be allocated a proportion of the train's emissions) rather than reporting the emissions of the whole train.

Domestic, short-haul and long-haul flights – definition

Broadly speaking the definition of domestic flights, are those within the UK, short-haul are those within Europe and long-haul are outside of Europe

Why impact of flying in business class is higher than economy

Air travel factors are calculated on the basis of the area of the plane each passenger takes up. If a plane is comprised totally of business class seats, as opposed to more closely packed economy class seats, fewer passengers can fly and therefore each passenger takes a larger share of the emissions.

How to calculate air travel when you only have data on spend

At this time there are no confirmed industry benchmarks that provide accurate CO_2e/£ spend data for air travel. We recommend that organisations improve their data collection processes so that they can report on distance (for which CO_2e/km figures are available). Alternatively, organisations may, over a number of years collect their own data and generate their own benchmarks.

Inclusion of distance uplift or radiative forcing

What to do when your organisation has previously reported using Defra factors but not included the distance uplift or radiative forcing.

Users should generally include the distance uplift of 8% and the radiative forcing increase of 90% in the emissions reporting. However, for organisations that do not wish to do so, they should select the 2013 conversion factor *'Without RF'* and manually remove the 8% distance uplift. Organisations that have not previously applied the distance uplift and radiative forcing will need to perform this calculation to make their historic data comparable, or alternatively they may rebaseline their historic data set and include the two effects going forward.

Factors for rail and taxis – where to find factors under 'business travel'

Factors for rail and taxis as well as international rail, buses and motorbikes are located in the business travel – land tab of the *"Give me everything"* version of the conversion factor spreadsheet.

Shipment through a third party

The *'freighting goods'* tab should be used. Factors are available here for a whole vehicles' worth of goods or per tonne of good shipped via a specific transport mode.

Managed assets

Leased assets

This is for use by organisations using the financial control or equity share boundaries that lease assets from another party. In these cases, check the lease type. If it is an operating lease, use the '*managed assets'* conversion factors to report vehicle emissions as scope 3. Otherwise use the other conversion factors in the *'passenger travel'* and *'delivery vehicles'* tabs and report emissions as scope 1. For further information please read the 'Leased assets guidance'.

Supply chain

Supply chain factors (Annex 13)

Conversion factors for the supply chain, (previously the annex 13 factors), are still available but are situated in the new Defra reporting guidelines. Please find them on page 85 – annex E of the following pdf: https://www.gov.uk/government/publications/environmental-reporting-guidelines-including-mandatory-greenhouse-gas-emissions-reporting-guidance

Supply chain factors - Why these factors are no longer located in the main conversion factor repository

The conversion factors have been removed to guidance since their intention is the allow companies to identify large areas of supply chain GHG impact using spend data, then the organisations should ideally investigate their material impacts more thoroughly, applying more specific factors for individual activities. In effect these factors should be used as an evaluative tool, and only provide a rough proxy of supply chain emissions.

CHP

CHP – using the right conversion factors

Please refer to the guidance paper on how to measure and report your emissions. CHP can be found on annex D page 83. https://www.gov.uk/measuring-and-reporting-environmental-impacts-guidance-for-businesses

Conversions

Units of measure – calculating greenhouse gas emissions when your organisation collects data in units of measure that do not have conversion factors

The *'conversions'* tab should be used to convert the units of measure you have available into one that has a conversion factor associated with it.

This document/publication is also available on our website at:

https://www.gov.uk/measuring-and-reporting-environmental-impacts-guidance-for-businesses

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