WP0902 Act On CO2 performance in a Swedish evaluation

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A paper presented at eceee Summer Study 2009 (Gunnarsson et al 2009) compared the results of a number of Swedish and International carbon footprint or carbon calculators against each other.

How does the UK's Act On CO2 compare with these evaluations?

In the Swedish study, a fictitious Swedish family (the Albert's) is created in order to test seven calculators chosen randomly from those available on the internet. In the evaluation, six different characteristics are scored (0, 1, 2 or 3 points): user-friendliness; scope; calculation method; input data; advice and guidance and finally layout and presentation. It should be noted that carbon calculators are usually country-specific in order to allow for the carbon intensity of the country's electricity generation mix. The carbon intensity assumed in the paper is 52 grams CO2 per kWh, which reflects Sweden's reliance on hydro- and nuclear power, supported by biomass and gas/oil/coal fired power plants. The carbon intensity used for the Act On CO2 calculator is 0.527 kg CO2 per kWh (Defra 2007), ten times that of the Swedish one.

Following the methodology described in the Gunnarsson paper, Act On CO2 can be marked on each of the criteria. It is accepted that the assessment of the author may vary from the approach of the original researchers, however the description given for allocation of marks is descriptive and easy to follow. The assessment is shown in the table below.

Table 1: Assessment of Act On CO2 using the Gunnarsson methodology

Criterion	Mark (x weight)	Explanation
User-friendliness	2	The calculator is well laid out, logical and encourages the user to continue.
Scope	2 x 2	There is no information on how food consumption can affect CO2 emissions.
Calculation method	1 x 1.5	The calculator explains those categories covered, but does not explain the way that appliance use is calculated separately from household use. A separate Methodology paper gives further detail and highlights possibility for misinterpretation
Input data	2	Options for inputting bills or readings, annually, quarterly, monthly or on delivery. Only one heating fuel can be input, however. Options for car usage input give option for average use of different sized cars as well as own mileage or fuel use input
Advices and guidance	2	Many tips, but rather broad assumptions as to how much the changes could affect the results. Some options may not be appropriate for the house information provided.
Layout and presentation	2.5	The results are given and compared with the UK average, and a target of 20% reduction is given. This is not explained as a threshold for climate change impact, but as it does more than just compare the result with the average, an extra half mark was awarded.

The Act On CO2 calculator was used to assess the Albert family's carbon footprint using the figures provided in the paper. The heating system was assumed to be the most modern electric system available, and the insulation in the house assumed to be the best available. This is based on the assumption that new UK houses meet the building codes of Sweden from about 1980 (Pett 1999). It was assumed that all household appliances were relatively new. Usage of appliances was assumed to be fairly high, as the Alberts (2 adults and two teenage children, were described as 'wasteful'). In case the model within the calculator took account of climate, the Alberts were assumed to live in Edinburgh.

Results for Act On CO2

For the Alberts: 12.27 tCO2 per person per year

For Act On CO2: 14 marks out of 20 (70%)

Table 2: Analysis of the Albert's carbon footprint from Act On CO2

Breakdown of sections	CO2 Footprint
Total Footprint for Home	**1.89**
Hot water	0.55
Heating	1.29
Lighting	0.05
Total Footprint for Appliances	**1.46**
Kitchen	0
Entertainment	0
Study	0
Other	1.46
Total Footprint for Travel	**8.92**
Vehicle	5.60
Public Transport	1.66
Flights	1.67
Total Carbon Footprint	**12.27**

The calculator requires only one input of electricity use; the user puts in details of all electrical appliances and usage of TVs, washing machines, tumble dryers, computers. The result above appears not to have allocated any usage for these areas, which is strange, but has allocated a total amount to 'appliances' based on the balance from what the internal model assumes to be the heating requirement.

Discussion

Compared with the seven calculators assessed by the Lund researchers, Act On CO2 scores in the middle of the group. The carbon footprint is towards the high end, but if one reduced the household and appliance footprint to compare with the Swedish mix, the Alberts footprint would be 2.9 tCO2 lower, or 9.4 tCO2/year per person, which places it very close to the scores from the IVL and the SNF calculators (published by Swedish research institutes and energy agencies), which were assessed around the similar score. The Lund researchers point out that the three calculators that scored

highly for 'scope' produced the most similar results for the Alberts. Act On CO2 was only slightly lower on 'Scope' than these. One issue that the author was unsure of when completing the Act On CO2 assessment for the Alberts was the meaning of 'Individual' score. All household use was input, and it is assumed that the household use was divided by four to give the individual footprint. This was not specified anywhere. Should a person put in only their own appliances? Should the electricity use be divided by 4 when input? These issues are not obviously addressed although the 'help' function was not evaluated in this short summary.

Table 3: Summary of the results (data from Gunnarsson et al plus own data)

	EPA	Safe Climate	IVL	GH Profile 1	SNF	WWF	GH Profile 2	**Act On CO2**
User-friendliness	1.0	2.0	2.0	2.0	2.0	2.0	2.0	**2.0**
Scope	2.0	2.0	6.0	5.0	3.0	6.0	5.0	**4.0**
Calculation method	1.5	3.0	1.5	0	1.5	1.5	3.0	**1.5**
Input data	1.0	1.0	1.0	3.0	3.0	1.0	3.0	**2.0**
Advices/guidance	3.0	1.0	1.0	2.0	3.0	3.0	2.0	**2.0**
Layout/presentation	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**2.5**
% of maximum score	47.5	50.0	72.5	75.0	77.5	82.5	90.0	**70.0**
Total score	9.5	10.0	14.5	15.0	15.5	16.5	18.0	**14.0**
CO2 tons/person, year	5.4	4.3	7.6	13.6	7.2	14.9	6.9	**9.4***

*based on Swedish electricity mix; 12.27 based on UK mix.

The Act On CO2 calculator has seen a number of developments over the last two and half years since the trial version was made public. The latest version includes public transport, although the use of this, and of the flight calculator, was a little confusing. The focus remains entirely on direct end-use emissions, however. It could be suggested that an equivalent emissions factor could come from food consumption and waste as this household has in their household electricity consumption, based on the UK mix. However the largest single category for the Alberts in this analysis is the car petrol consumption, which, translating 10 litres/100 km into 23.5 miles per gallon, means that the main focus of the Alberts should be on the 5.60 tCO2/year of their car fuel consumption rather than in any other aspect of their footprint.

In discussion with the Swedish authors, the Act On CO2 summary table as shown in Table 2 above was thought to be a particularly good feature and it was recommended that such a table should be the feature of all good carbon calculators.

Conclusions

The Act On CO2 calculator tends to sit well within the range of those assessed by the Lund researchers, and similar issues of usability, transparency and scope exist. However the exercise reinforces the use of carbon calculators as a tool for ones own assessment, comparison, judgement and behaviour change, and highlights the needs for standards comparable across cultures and countries if any meaningful comparison between footprints counted using different calculators can be made.

References

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