

ANNEX I

The Annexes to Directive 98/70/EC are amended as follows:

(1) Point 7 of Part C of Annex IV, is replaced by the following:

7. Annualised emissions from carbon stock changes caused by land-use change, e_l , shall be calculated by dividing total emissions equally over 20 years. For the calculation of those emissions, the following rule shall be applied:

$$e_l = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_B^{(1)}$$

where

- e_l = annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO₂-equivalent per unit biofuel energy (megajoules)). “Cropland”⁽²⁾ and “perennial cropland”⁽³⁾ shall be regarded as one land use;
- CS_R = the carbon stock per unit area associated with the reference land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). The reference land-use shall be the land-use in January 2008 or 20 years before the raw material was obtained, whichever was the later;
- CS_A = the carbon stock per unit area associated with the actual land-use (measured as mass (tonnes) of carbon per unit area, including both soil and vegetation). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever is the earlier;
- P = the productivity of the crop (measured as biofuel energy per unit area per year) and
- e_B = bonus of 29 gCO_{2eq}/MJ biofuel if biomass is obtained from restored degraded land under the conditions provided for in point 8..

(2) The following Annex is added:

‘ANNEX Part A. Provisional estimated indirect land-use change emissions from
V biofuels (gCO_{2eq}/MJ)

Feedstock group	Mean ^a	Interpercentile range derived from the sensitivity analysis ^b
a	The mean values included here represent a weighted average of the individually modelled feedstock values.	
b	The range included here reflects 90 % of the results using the fifth and ninety-fifth percentile values resulting from the analysis. The fifth percentile suggests a value below which 5 % of the observations were found (i.e. 5 % of total data used showed results below 8, 4, and 33 gCO _{2eq} /MJ). The ninety-fifth percentile suggests a value below which 95 % of the observations were found (i.e. 5 % of total data used showed results above 16, 17, and 66 gCO _{2eq} /MJ).	

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Cereals and other starch-rich crops	12	8 to 16
Sugars	13	4 to 17
Oil crops	55	33 to 66
a	The mean values included here represent a weighted average of the individually modelled feedstock values.	
b	The range included here reflects 90 % of the results using the fifth and ninety-fifth percentile values resulting from the analysis. The fifth percentile suggests a value below which 5 % of the observations were found (i.e. 5 % of total data used showed results below 8, 4, and 33 gCO _{2eq} /MJ). The ninety-fifth percentile suggests a value below which 95 % of the observations were found (i.e. 5 % of total data used showed results above 16, 17, and 66 gCO _{2eq} /MJ).	

Part B. Biofuels for which the estimated indirect land-use change emissions are considered to be zero

Biofuels produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:

- (1) feedstocks which are not listed under Part A of this Annex.
- (2) feedstocks, the production of which has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories; forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland⁽⁵⁾. In such a case a direct land-use change emission value (e_l) should have been calculated in accordance with paragraph 7 of Part C of Annex IV.

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- (1) The quotient obtained by dividing the molecular weight of CO₂ (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664.
- (2) Cropland as defined by IPCC.
- (3) Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.’
- (4) ⁽⁺⁾ The mean values reported here represent a weighted average of the individually modelled feedstock values. The magnitude of the values in the Annex is sensitive to the range of assumptions (such as treatment of co-products, yield developments, carbon stocks and displacement of other commodities) used in the economic models developed for their estimation. Although it is therefore not possible to fully characterise the uncertainty range associated with such estimates, a sensitivity analysis conducted on the results based on a random variation of key parameters, a so-called Monte Carlo analysis, was conducted.
- (5) ⁽⁺⁺⁾ Perennial crops are defined as multi-annual crops, the stem of which is usually not annually harvested such as short rotation coppice and oil palm.’