

## 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 CO<sub>2</sub>-equivalent per unit biofuel energy (megajoules)). “Cropland”<sup>(2)</sup> and “perennial cropland”<sup>(3)</sup> 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<sub>2eq</sub>/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<sub>2eq</sub>/MJ)

Feedstock group	Mean <sup>a</sup>	Interpercentile range derived from the sensitivity analysis <sup>b</sup>
<b>a</b>	The mean values included here represent a weighted average of the individually modelled feedstock values.	
<b>b</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 <sub>2eq</sub> /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 <sub>2eq</sub> /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
<b>a</b>	The mean values included here represent a weighted average of the individually modelled feedstock values.	
<b>b</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 <sub>2eq</sub> /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 <sub>2eq</sub> /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<sup>(5)</sup>. 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.

## ANNEX II

The Annexes to Directive 2009/28/EC are amended as follows:

- (1) Point 7 of part C of Annex V, 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:

$$e_l = (CS_R - CS_A) \times 3,664 \times 1/20 \times 1/P - e_B,^{(6)}$$

where

- |        |   |  |
|--------|---|--|
| $e_l$  | = | annualised greenhouse gas emissions from carbon stock change due to land-use change (measured as mass (grams) of CO <sub>2</sub> -equivalent per unit of biofuel or bioliquid energy (megajoules)). “Cropland” <sup>(7)</sup> and “perennial cropland” <sup>(8)</sup> 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 <sub>A</sub>	=	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 <sub>A</sub> shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;
P	=	the productivity of the crop (measured as biofuel or bioliquid energy per unit area per year) and
e <sub>B</sub>	=	bonus of 29 gCO <sub>2eq</sub> /MJ biofuel or bioliquid 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 VIII biofuel and bioliquid feedstocks (gCO<sub>2eq</sub>/MJ)

Feedstock group	Mean <sup>a</sup>	Interpercentile range derived from the sensitivity analysis <sup>b</sup>
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<sub>2eq</sub>/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<sub>2eq</sub>/MJ).

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

Biofuels and bioliquids 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<sup>(10)</sup>. In such a case a direct land-use change emission value (e<sub>l</sub>) should have been calculated in accordance with point 7 of part C of Annex V.

(3) The following Annex is added:

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‘ANNEX Part A. Feedstocks and fuels, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:

- (a) Algae if cultivated on land in ponds or photobioreactors.
- (b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC.
- (c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive.
- (d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex.
- (e) Straw.
- (f) Animal manure and sewage sludge.
- (g) Palm oil mill effluent and empty palm fruit bunches.
- (h) Tall oil pitch.
- (i) Crude glycerine.
- (j) Bagasse.
- (k) Grape marcs and wine lees.
- (l) Nut shells.
- (m) Husks.
- (n) Cobs cleaned of kernels of corn.
- (o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil.
- (p) Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2.
- (q) Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs.
- (r) Renewable liquid and gaseous transport fuels of non-biological origin.
- (s) Carbon capture and utilisation for transport purposes, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.
- (t) Bacteria, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.

Part B. Feedstocks, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:

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- (a) Used cooking oil.
- (b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council<sup>(11)</sup>

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- (1) The quotient obtained by dividing the molecular weight of CO<sub>2</sub> (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.’.
- (6) The quotient obtained by dividing the molecular weight of CO<sub>2</sub> (44,010 g/mol) by the molecular weight of carbon (12,011 g/mol) is equal to 3,664.
- (7) Cropland as defined by IPCC.
- (8) 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.’.
- (9) (†) 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.
- (10) (++) 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.’.
- (11) Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009, p. 1).’.