REPORT FROM THE FRENCH AUTHORITIES

PURSUANT TO ARTICLE 19(2) OF DIRECTIVE 2009/28/EC AND TO ARTICLE 7d(2) OF DIRECTIVE 2009/30/EC

Contents

I Background

Article 19(2) of Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and Article 7d(2) of Directive 2009/30/EC of 23 April 2009 on the specification of petrol, diesel and gas-oil stipulate that Member States must identify, by 31 March 2010, regions (NUTS 2 areas) or departments (NUTS 3 areas) where greenhouse gas emissions linked to the agricultural phase of biofuel production were lower than or equal to the values under the heading 'Disaggregated default values for cultivation' in part D of Annex V to Directive 2009/28/EC and in part D of Annex IV to Directive 2009/30/EC. They must also specify the methodology and data used to draw up this list. In 2010 France issued an initial report covering five production pathways and all relevant French regions for which reliable data were available. In 2013 France carried out a series of supplementary calculations for two production pathways, thus supplementing the 2010 report.

In accordance with the methodology developed in part C of Annex V to Directive 2009/28/EC and in part D of Annex V to Directive 2009/30/EC, the goal was to calculate emissions from the extraction or cultivation of raw materials ('e_{ec}' parameter); land-use changes are not taken into account.

This report fulfils France's regulatory obligations.

II Scope of this report

Two types of crops of agricultural raw materials produced in mainland France and used for the production of biofuels were considered:

- Biodiesel production pathways: rapeseed and sunflower.

The following production regions were studied:

Agricultural raw materials	Production regions studied
Rapeseed	Alsace, Aquitaine, Provence-Alpes-Côte-d'Azur
Sunflower	Provence-Alpes-Côte d'Azur

Other regions currently have low levels of production of the abovementioned crops; given the lack of data representing the technical itineraries, they could not be assessed. They are summarised in the table below.

Agricultural raw materials	Production regions not studied	Share of the regions in relation to the total cultivated area in France	
Rapeseed	None	0%	0%
Sunflower	Alsace	0.12%	2.5%
	Lower Normandy	0.14%	
	Brittany	0.02%	
	Franche-Comté	1.48%	
	Upper Normandy	0.02%	
	Limousin	0.27%	
	Lorraine	0.32%	
	Picardy	0.13%	

For these different regions, in accordance with part C(6) of Annex V, estimates for emissions could be made at a later stage for the smaller areas, depending on the local crop routes.

France intends, if necessary, to extend the scope of the report at a later stage, based on the availability of data relating to the production of energy crops at national level and depending on the development of crops of agricultural raw materials, particularly in the overseas territories.

The calculation method, similar to the one used in 2010, and the list of regions identified are set out in detail below.

III - Methodology and data used

Preamble

In order to calculate the greenhouse gas emissions linked to the production of agricultural raw materials and to identify the French regions which comply with the default values of the 'cultivation' phase laid down in the Directive, France has a robust national methodology developed as part of an analysis of the life cycle of first generation biofuels in France carried out by ADEME[1] since 2008 and bringing together all players involved (State, agricultural and industrial professionals, environmental protection associations). The results of that study were published on 8 April 2010 on the ADEME website (http://www2.ademe.fr).

This methodology was not strictly applied when drawing up this report in an effort to harmonise it with the method for estimating agricultural greenhouse gas emissions with the calculation tool

[1] French Agency for the Environment and Energy Management.

developed by the Joint Research Centre (JRC) which produced the default values shown in part D of Annex V to Directive 2009/28/EC and in part D of Annex V to Directive 2009/30/EC (see Annex).

1) Description of the method

a) General framework

The method used is based on the methodology developed as part of the analysis of the life cycle of first generation biofuels in France. The methodological elements provided by the JRC[2] were used to calculate nitrous oxide emissions (N2O) linked to the use of nitrogenous fertilisers.

In accordance with the method used by the JRC and which resulted in the default values shown in part D of Annex V to Directive 2009/28/EC and in part D of Annex V to Directive 2009/30/EC, the following headings were taken into consideration to calculate the greenhouse gas emissions linked to the production of agricultural raw materials:

- production and use of fertiliser inputs (mineral nitrogen, potassium K2O, phosphoric acid P2O5);
- production and use of plant health products (various pesticides);
- production of seeds;
- consumption of diesel necessary for mechanisation.

Similarly, in accordance with the method set out in part C of Annex V to the Directive, the consumption of energy for irrigation on the one hand, and drying and ventilation during the storage of grain on the other hand, was not taken into account, nor the depreciation of agricultural equipment and buildings (see part C(1) of Annex V to Directive 2009/28/EC and part C(1) of Annex IV to Directive 2009/30/EC).

For each type of energy crop and for each region studied, these headings were converted into greenhouse gas emissions according to the following general formula:

quantity of inputs (kg or l) linked to the heading considered (per kilogram of grain or per kilogram of sugar for sugar beet)		**rate of energy allocation** (%) in France (proportion of emissions allocated to biofuels, the rest being allocated to by-products)		

[2] Following a request made in a note from the French authorities in January 2010.

per hectare for a given crop and region _____ **yield** of the crop considered (per kilogram of grain per hectare) in a given region	x	_____ **industrial processing yield** in France (in Mega Joules of biofuels/kg of grain)	x	**factor of greenhouse gas emissions** in France (in kg CO_{2eq} by quantity of inputs)

The results by heading were then added together to reach an overall greenhouse gas emissions value for the crop phase, expressed in gCO 2eq/MJ of biofuels.

France intends, if necessary, to update the data relating to greenhouse gas emissions linked to the agricultural phase of the production chain of biofuels, based on the technical and scientific progress made at national and European levels.

b) Details about the calculation of nitrous oxide emissions

The calculation was done based on the methodology used by the JRC which means that the different types of soil, climate and crop routes can be taken into account.

Contrary to the approach used in the analysis of the life cycle of first generation biofuels in France, based on the guidelines of the Intergovernmental Panel on Climate Change (IPCC), the JRC's approach is based on the observation that (direct and indirect) emissions of nitrous oxide are not directly correlated to the yield of agricultural crops and to the application of nitrogenous fertilisers and that these are mainly the result of the type of soil and climate.

There is currently no calculation method which is sufficiently robust or validated to vary the nitrous oxide emissions rate by French region. The average generic values used by the JRC were therefore applied to all of the French regions studied:

Greenhouse gas emissions (in kg N2O/ha)	**Rapeseed**	**Sunflower**
Average values	3.11	1.45

The French authorities point out, however, that the calculation made by the JRC is based on the hypothesis that the direct emissions of N2O are mainly the result of the type of soil and climate, and are only linked to nitrogen inputs in a secondary way and not proportionally; the analysis of the life cycle for first generation biofuels in France has led to higher values for N2O emissions, as mentioned in the annex of the report.

In view of this observation, the French authorities call on the European Commission to improve the methodology developed by the JCR as a matter of priority in order to significantly increase its

robustness and accuracy; they also request the European Commission to inform them of the progress made in this work and its future intentions.

c) Industrial processing yields and allocation

The industrial phase is characterised by a processing yield, which translates the conversion of kilograms of grain into kilograms of biofuels, and by the production of by-products, to which a share of the environmental impact can be allocated, in particular greenhouse gas emissions.

Processing yields

The processing yields have been provided by French industry, as part of the analysis of the life cycle of first generation biofuels in France. For confidentiality reasons linked to industrial secrecy, these have been presented in the form of ranges of values in the following table:

Crops	**Average industrial yield in France**	
Rapeseed	0.39-0.41	kg biodiesel/kg grain
Sunflower	0.40-0.43	kg biodiesel/kg grain

The net calorific values necessary to convert these values into megajoules of biofuels produced are those used in Annex III to Directive 2009/28/EC:

- rapeseed and sunflower biodiesel: 37 MJ/kg

Energy allocations

The production of biofuels from agricultural raw materials also generates by-products which can be used in animal feed, land application or for the production of energy. A part of the impact of the agricultural phase must therefore be allocated to them, according to an energy allocation based on the net calorific value of the different by-products.

The allocation ratios used are based on the analysis of the life cycle of first generation biofuels in France and are based on industrial processing units in operation. For confidentiality reasons, these are rounded up to average values.

Crops	**Allocation ratios**
Rapeseed	59%
Sunflower	60%

2) Data used

a) Primary data

The primary data relate to the technical agricultural itineraries and to the yields of the different crops in the regions considered. They were provided in 2009 and 2010 during the previous study by the statistics services of the Ministry for agriculture and were supplemented by the technical institutes concerned[3]. These data were kept so as to ensure consistency in the calculations between

[3] Oilseeds (sunflower, rapeseed): CETIOM (Inter-professional technical centre for mainland protein crops)

the data declared in 2010 and the supplementary data contained in this report. Only local technical values (fertilizer inputs) have been updated.

Parameters	Source
Average agricultural yield (average value for 2005-2009)	Annual surveys (2005-2008), statistical services of the Ministry of Agriculture FranceAgriMer (2009)
Mineral nitrogen fertilisers, plant health products and seeds	'Crop practices' survey (2006), statistical services of the Ministry of Agriculture Technical institutes
Fertilisers P_2O_5 and K_2O	COMIFER[4]
Diesel	Technical institutes

The corresponding national average values, obtained by a weighting based on the cultivated areas per department, are presented by way of example in the table below; the headings in italics are those for which a national average value was used in the calculations, as there were no regional data available:

	Biodiesel	
	Rapeseed	**Sunflower**
Yield (kg per hectare)	3326	2397
Mineral nitrogen (kg per ha)	165	56
Fertiliser P_2O_5 (kg P per ha)	42	29
Fertiliser K_2O (kg K per ha)	28	25
Plant health products (in kg of active material per ha)	2.6	2.2
Seeds (kg per ha)*	3	5
Diesel (L per ha) (MJ/ha)	68 2438	66.8 2395

* : as some regions do not have data on the quantity of seeds used and of plant health products applied for sunflower and rapeseed, the highest value identified for the French regions surveyed was applied to these regions for the crop in question.

[4] French Centre for the study and development of rational fertilisation

b) Secondary data

The secondary data relate to generic parameters for chemical conversion, energy conversion or conversion of greenhouse gas emissions:

- average potassium (P) and calcium (K) content of exported grain;
- unitary emission factors (in kg eq. CO_2/kg of MJ).

Parameters	Values		Sources
	Rapeseed	Sunflower	
Average P content (kg of P_2O_5/kg of grain with reference moisture content)	0.0125	0.012	COMIFER
Average K content (kg of K_2O_5/kg of grain with reference moisture content)	0.0085	0.0105	COMIFER
Greenhouse gas emissions linked to the production of seeds	1.95	2.03	ACV study on first generation biofuels, 2010, ADEME, based on ECOINVENT data

Parameters	Values	Sources
Greenhouse gas emissions linked to the production of manure and fertilisers (kg CO_2eq):		ACV study on first generation biofuels, 2010, ADEME, based on ECOINVENT data
- mineral nitrogen (/kg N)	5.3	
- P_2O_5 (/kg P_2O_5)	0.56	
- K_2O (/kg K_2O)	0.44	
- plant health products (/kg)	7.71	
Greenhouse gas emissions linked to the combustion of diesel (kg CO_2eq/kg)	3.66	
N_2O emissions (kg CO 2eq/kg)	298	IPCC

IV – List of regions (NUTS 2 areas)

This section presents, for each of the five energy crops produced in mainland France, the list of regions for which greenhouse gas emissions are less than the default values contained in the 'Cultivation' section of part D of Annex V to Directive 2009/28/EC. In addition, a regional value has been attributed to colza, calculated in the Provence-Alpes-Côté-d'Azur region, which exceeded the default value.

1) Biodiesel production pathways

c) ***Rapeseed***

French regions studied, where emissions calculated are lower than the default values	**in g equivalent CO2 /MJ**
Default emission values laid down in Annex V to Directive 2009/28/EC	29
Alsace	23
Aquitaine	26
French regions studied, where emissions calculated are lower than the default values	**in g equivalent CO2 /MJ**
Provence-Alpes-Côte d'Azur	33

d) Sunflower

French regions studied, where emissions calculated are lower than the default values	**in g equivalent CO2 /MJ**
Default emission values laid down in Annex V to Directive 2009/28/EC	18
Provence-Alpes-Côte d'Azur	16