



Assessment of best practices in UCO  
processing and biodiesel distribution  
***D4.2 - European and National Technical Norms***

TECHNICAL UNIVERSITY OF CRETE  
M a r c h · 2 0 1 3

## PROMOTION OF USED COOKING OIL RECYCLING FOR SUSTAINABLE BIODIESEL PRODUCTION (RecOil)

RecOil aims to increase sustainable biodiesel production and its local market intake by enhancing household used cooking oil collection and transformation. It assesses the “UCO to biodiesel” chain best practices, through a household survey, the industry expertise, the local authorities’ cooperation, and a review of the legal and market barriers and opportunities. The information gathered will integrate an online decision-making guide: a tool to assist stakeholders in developing an UCO-to-biodiesel supply chain adjusted to local specifications. Pilot projects in promotion, collection, transformation and commercialization of UCO/biodiesel will be carried out according to the best practices identified. These projects will be living labs helping to validate the feasibility of these good practices but also showcasing and spreading the project’s results in a way that the achievements can be used to promote similar initiatives in other regions and by other entities. Promotional campaigns and communication tasks will be developed to guarantee stakeholders’ involvement and to increase public interest about UCO recycling, motivating a behavioral change among citizens.

RecOil is supported by the European Commission within the frame of the Intelligent Energy for Europe Programme.

Nº CONTRACT	IEE/11/091/SI2.616369
DELIVERABLE	WP4 –D4.2
WP Leader	Technical University of Crete, Renewable and Sustainable Energy Systems Lab
AUTHOR(s)	Theocharis Tsoutsos, Tournaki Stavroula, Georgatou Christina
DISSEMINATION LEVEL	Public
STATUS	Version 8
DATE	Ver1: issued at March 4 <sup>th</sup> , 2013. Current Revision 30/10/2013



## CONTENTS

<b>1. INTRODUCTION – AIM OF THE REPORT .....</b>	<b>2</b>
<b>2. BIODIESEL PRODUCTION AND DISTRIBUTION IN EUROPE .....</b>	<b>3</b>
2.1 Related Policies and Priorities .....	3
2.2 Classification of Used Cooking Oil (UCO) .....	11
<b>3. EUROPEAN TARGETS FOR 2020 AND 2050 .....</b>	<b>13</b>
<b>4. EU BIODIESEL PRODUCTION .....</b>	<b>14</b>
<b>5. NATIONAL LEGAL/NORMATIVE ENVIRONMENT WITH REGARD TO THE UCO PROCESSING AND BIODIESEL DISTRIBUTION .....</b>	<b>17</b>
5.1 Denmark .....	19
5.2 Greece .....	23
5.3 Italy .....	32
5.4 Portugal .....	38
5.5 Spain.....	46
<b>6. TECHNICAL NORMS RELATED TO THE UCO PROCESSING.....</b>	<b>53</b>
6.1 European standards related to the biodiesel production plants .....	53
6.2 National standards and Quality protocols related to the biodiesel production plants.....	62
6.2.1 Denmark.....	64
6.2.2 Greece.....	64
6.2.3 Italy.....	65
6.2.4 Portugal.....	66
6.2.5 Spain .....	68
<b>7. TECHNICAL NORMS RELATED TO BIODIESEL DISTRIBUTION .....</b>	<b>69</b>
7.1 European standards related to the biodiesel distribution.....	69
7.2 National standards related to the biodiesel distribution .....	70
7.2.1 Denmark.....	70
7.2.2 Greece.....	70
7.2.3 Italy.....	70
7.2.4 Portugal.....	71
7.2.5 Spain .....	71
<b>8. BARRIERS AND FUTURE PERSPECTIVES IN USED OIL PRODUCTION, DISTRIBUTION AND EXPLOITATION .....</b>	<b>72</b>
<b>9. REFERENCES.....</b>	<b>74</b>
<b>10. ABBREVIATIONS.....</b>	<b>76</b>
<b>11. ANNEXES .....</b>	<b>77</b>
11.1 Template to gather national data .....	78



## 1. INTRODUCTION – AIM OF THE REPORT

Task 4.2 examines European and national standards and technical norms related with the UCO processing and the biodiesel distribution. Furthermore, it outlines the relevant legal / normative environment and national targets.

The ultimate objective of the WP4 is to assess existing practices and to identify barriers and future perspectives in used oil production, distribution and exploitation. For this, it is necessary to understand the national legislation and regulations concerning the UCO processing methods and the biodiesel distribution.

The national legislative framework with regard to biodiesel production and distribution, as well as the relevant technical norms and quality standards were identified and recorded by the RecOil partners according to a common template (Annex 1) developed by TUC. The data gathered were compiled and compared and are presented to the following report. The European policy and targets as well as the European standards were also recorded by TUC.



## 2. BIODIESEL PRODUCTION AND DISTRIBUTION IN EUROPE

### 2.1 Related Policies and Priorities

The key points of the following EU policies and legislation with respect to biodiesel are summarized in this chapter:

- Communication from the commission on Clean Power for Transport: A European alternative fuels strategy, Brussels, 24.1.2013 COM (2013) 17 final
- Renewable Energy Directive, 2009/28/EC (RED Directive)
- COM (2011) 31SEC (2011) 129 final - 31.1.2011 Renewable Energy: Progressing towards the 2020 target and the Report accompanying the document on the operation of the mass balance verification method for the biofuels and bioliquids sustainability scheme in accordance with Article 18(2) of Directive 2009/28/EC).
- DIRECTIVE 2009/30/EC - amendment to Directive 98/70/EC on environmental quality standards for fuel (Fuel Quality Directive)
- Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels 2010/C 160/02
- Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme 2010/C 160/01
- Report from the commission on indirect land-use change related to biofuels and bioliquids 22-12-2010 COM (2010) 811 final
- Proposal for a Directive amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources - Brussels, 17.10.2012 COM(2012) 595 final 2012/0288 (COD)
- 96/82/EC (SEVESO II Directive)
- 2003/105/EC amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances
- 2012/18/EU (SEVESO III Directive)
- DIRECTIVE 2009/30/EC - amendment to Directive 98/70/EC on environmental quality standards for fuel (Fuel Quality Directive)



→ **Communication from the commission on Clean Power for Transport: A European alternative fuels strategy, Brussels, 24.1.2013 COM (2013) 17 final**

Biofuels are currently the most important type of alternative fuels, accounting for 4.4% in EU transport. The Commission has proposed to limit the amount of first generation biofuels that can be counted towards the Renewable Energy Directive targets to 5%, and increased the incentives for advanced biofuels such as those made from ligno-cellulosic biomass, residues, waste, and other non-food biomass, including algae and microorganisms. After 2020, the Commission supports that only the latter biofuels should receive public support.

→ **Renewable Energy Directive, 2009/28/EC (RED)**

RED sets ambitious targets, for the EU to reach a 20% share of energy from RES by 2020 and a 10% share of RES specifically in the transport sector. To achieve these objectives, the Directive established, for each Member State (MS) a mandatory national target for the overall share of energy from RES in gross final consumption of energy set on the basis of the different starting points of the various countries. The 10% target for the transport sector was set at the same level for each MS, in order to ensure consistency in transport fuel specifications and availability.

It also establishes a set of sustainability criteria for biofuels and bioliquids (Art. 17).

Only biofuels and bioliquids (including those imported and/or obtained from raw materials cultivated outside the territory of the Community) that fulfill those criteria can be taken into account for the following purposes:

- > measuring compliance with the requirements of this Directive concerning national targets;
- > measuring compliance with renewable energy obligations; and
- > eligibility for financial support for the consumption of biofuels and bioliquids.

The sustainability criteria established by the Directive are related mainly to the following environmental aspects/issues:

- > biodiversity;
- > the protection of rare, threatened or endangered species and ecosystems;
- > and greenhouse gas emission savings.

The greenhouse gas emission (GHG) saving from the use of biofuels and bioliquids as mentioned above, shall be at least 35%:

- from 1 January 2017, GHG emissions savings from the use of biofuels and bioliquids shall be at least 50 %.
- From 1 January 2018 GHG emissions savings shall be at least 60 % for biofuels and bioliquids produced in installations in which production started on or after 1 January 2017.
- In the case of biofuels and bioliquids produced by installations that were in operation on 23/1/2008, the first subparagraph shall apply from 1/4/2013.

*The GHG emission savings from the use of biofuels and bioliquids shall be calculated in accordance to Article 19.*

Biofuels and bioliquids taken into account for the purposes referred above, shall not be made from raw material obtained from land with high biodiversity value (Art.17, §3) or land with high carbon stock (Art.17, §4) or land that was peatland in January 2008, unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil. Agricultural raw materials cultivated in the Community and used for the production of biofuels and bioliquids taken into account shall be obtained in accordance with to Council Regulation (EC) No 73/2009 of 19 January 2009.

Furthermore, the contribution made by biofuels produced from wastes, residues, non-food cellulosic material and ligno-cellulosic material shall be considered to be twice that made by other biofuels (Art. 21).

Also, establishes verification codes for the compliance with the sustainability criteria (Art.18). Europe has the strictest criteria in the world for biofuel sustainability and the Commission has provided guidelines for their application with the **COM(2010/C 160/02) on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels.**

MS shall require economic operators to use a mass balance system which:

- > allows consignments of raw material or biofuel with differing sustainability characteristics to be mixed
- > requires information about the sustainability characteristics and sizes of the consignments referred to remain assigned to the mixture
- > provides for the sum of all consignments withdrawn from the mixture to be described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture.

An assessment of the operation of the verification method for compliance with the sustainability criteria (referred to as mass balance system) is contained in the **COM (2011) 31SEC (2011) 129 final - 31.1.2011 Renewable Energy: Progressing towards the 2020 target and the Report accompanying the document on the operation of the mass balance verification method for the biofuels and bioliquids sustainability scheme in accordance with Article 18(2) of Directive 2009/28/EC**<sup>1</sup>.

MS shall ensure that information is given to the public on the availability and environmental benefits of all different RES for transport. When the percentage of biofuels blended in

---

<sup>1</sup> According to the report, the mass balance system is a stringent system. It is clear that it requires farmers and industries to adapt their practices. In terms of integrity and effectiveness, there is at present no potential to allow for verification methods for the biofuels and bioliquids sustainability scheme that are less stringent than the mass balance system laid down in the Directives. In line with the Directives the Commission will assess again by 2012 whether there is such potential.



mineral oil derivatives, exceeds 10% by volume, MS shall require this to be indicated at the sales points.

Table 1. Energy content of transport fuels (RED Directive -ANNEX III)

Fuel	Energy content by weight (lower calorific value, MJ/kg)	Energy content by volume (lower calorific value, MJ/l)
Biodiesel (methyl-ester produced from vegetable or animal oil of diesel quality, to be used as biofuel)	37	33

Table 2. Rules for calculating the GHG impact of biofuels, bioliquids and their fossil fuel comparators Typical and default values for biofuels if produced with no net carbon emissions from land-use change (RED -ANNEX V)

Biofuel production pathway	Typical GHG emission saving	Default GHG emission saving
waste vegetable or animal (*) oil biodiesel	88 %	83 %

*\*Not including animal oil produced from animal by-products classified as category 3 material in accordance with Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules on animal by-products not intended for human consumption*

The calculation methodology is described; there is a bonus of 29g CO<sub>2</sub>/MJ for biofuels from degraded/contaminated land. The disaggregated default GHG emission values for biofuels and bioliquids produced from waste vegetable or animal oil biodiesel in cultivation are 0, in processing of waste vegetable or animal oil to biodiesel are 9 (typical), 13 (default).

Table 3. GHG emission values for biofuels and bioliquids produced from waste vegetable or animal oil biodiesel

Waste vegetable or animal oil to biodiesel	Typical GHG emissions (gCO <sub>2</sub> eq/MJ)	Default GHG emissions (gCO <sub>2</sub> eq/MJ)
Processing	9	13
Transport and Distribution	1	1
<b>Total</b>	<b>10</b>	<b>14</b>

→ **DIRECTIVE 2009/30/EC - amendment to Directive 98/70/EC on environmental quality standards for fuel (Fuel Quality Directive)**

- > Article 7a introduces a mandatory target by 2020 of a 6% reduction in the GHG intensity of fuels used in road transport and non-road mobile machinery, while leaving open the possibility for increasing the ambition to 10%. The aim is to secure specific reductions in GHG emissions associated with all aspects of production and use of energy used for road transport and non-road mobile machinery. This will primarily be done by refinery



efficiencies and biofuel blending. To that effect, Commission need to assess a further increase of the ambition level of 2% from other technological advances, such as the supply of electricity for use in transport. A further 2% is envisaged to be achieved by the use of CDM credits for flaring reductions not linked to EU oil consumption.

- > MS may permit the placing on the market of diesel with a fatty acid methyl ester (FAME) content greater than 7 % (B7) with the appropriate information to consumers concerning the biofuel, in particular FAME content of diesel fuel. (Biofuel contents are expressed as the percentage of bio-component in fossil fuel on a volume basis. B7 stands for 7% v/v FAME in diesel fuel while E5 stands for 5% v/v ethanol in gasoline).
- > MS shall monitor compliance with the requirements in respect of petrol and diesel fuels, on the basis of the analytical methods referred to in European standards EN 228:2004 and EN 590:2004 respectively.

Table 4. Environmental Specifications for market fuels to be used for vehicles equipped with compression ignition engines, Type: Diesel (Fuel Quality Directive, ANNEX II)

Parameter <sup>2</sup>	Unit	Limits	
		Minimum	Maximum
Cetane number		51,0	—
Density at 15 °C	kg/m (3)	—	845,0
Distillation:			
— 95 % v/v recovered at:	°C	—	360,0
Polycyclic aromatic hydrocarbons	% m/m	—	8,0
Sulphur content	mg/kg	—	10,0
FAME content — EN 14078 <sup>3</sup>	% v/v	—	7,0 <sup>4</sup>

#### Rules for calculating life cycle GHG emissions from biofuels ((Fuel Quality Directive ANNEX IV)

The typical and default values for biofuels if produced with no net carbon emissions from land use change, the methodology of GHG emissions from the production and use of biofuels, and the disaggregated default values for biofuels refer to Annex V of the RED Directive.

Furthermore, it enables more widespread use of ethanol in petrol, by setting blending criteria with petrol, in specific, 10% Ethanol (E10) petrol. To avoid potential damage to old cars, continued marketing of petrol containing maximum 5% ethanol guaranteed until 2013, with the possibility of an extension to that date if needed.

<sup>2</sup> Test methods shall be those specified in EN 590:2004. MS may adopt the analytical method specified in replacement EN 590:2004 standard if it can be shown to give at least the same accuracy and at least the same level of precision as the analytical method it replaces.

<sup>3</sup> CSN EN 14078 - Liquid petroleum products - Determination of fatty acid methyl ester (FAME) content in middle distillates - Infrared spectrometry method

<sup>4</sup>FAME shall comply with EN 14214. Differences exist between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.

→ **Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels 2010/C 160/02**

Following to the RED and the Fuel Quality Directives, the Commission released a Communication paper which sets out how MS and economic operators can implement the sustainability criteria and the RED's counting rules for biofuels in practice. This Communication is accompanied by Commission guidelines for the calculation of land carbon stocks, a binding document adopted according to Annex V, point 10 of the RED and by a Communication on voluntary schemes and default values.

→ **Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme 2010/C 160/01**

Both RED and Quality Fuel Directives impose a number of sustainability criteria that economic operators need to meet in order for biofuels to be counted towards the legislative targets and qualify for support schemes. The sustainability scheme contains two tools designed to reduce the administrative burden for economic operators:

- > The option to use recognized 'voluntary schemes' or 'bilateral and multilateral agreements' to show compliance with some or all of the sustainability criteria; and
- > The option to use 'default values' laid down in the Directive to show compliance with the sustainability criterion on GHG emissions savings.

In this communication, an assessment and recognition process of a voluntary scheme with its requirements is being described.

→ **Renewable Energy: Progressing towards the 2020 target and the Report accompanying the document on the operation of the mass balance verification method for the biofuels and bioliquids sustainability scheme in accordance with Article 18(2) of Directive 2009/28/EC - 31.1.2011- COM (2011) 31SEC(2011) 129 final**

Typically, biofuels/bioliquids have a production chain with many links, from field to distribution of the fuel. Feedstock is often transformed into an intermediate product and then into a final product. It is in relation to the final product that compliance with the requirements of the Directives needs to be shown. To show this, claims will need to be made about the raw material and/or intermediate products used.

The method laid down for the chain of custody is the mass balance method. This requires a physical link between all stages. It requires farmers and industries to adapt their practices. In terms of integrity and effectiveness, there is at present no potential to allow for verification methods for the biofuels and bioliquids sustainability scheme that are less stringent than the mass balance system laid down in the Directives.

→ **Report from the commission on indirect land-use change related to biofuels and bioliquids 22-12-2010 COM (2010) 811 final**

Highlights that due to the growing global demand for agricultural commodities there is a risk that part of the demand for biofuels will be met through an increase in the amount of land devoted to agriculture worldwide. It focuses on the consequences for the GHG emissions of biofuels, as required by the Directives, considering the indirect land use change.

Scientific work indicates that emissions from indirect land-use change can vary substantially between feed stocks and can negate some or all of the GHG savings of individual biofuels relative to the fossil fuels they replace.

Biofuel feedstock may be produced on land directly converted from another status to agricultural land. The carbon emissions from such land-use change have to be included in the overall calculation of GHG emissions of the specific biofuel, in order to determine if it meets the sustainability criteria. However, if it is instead cultivated on existing agricultural land, it may then displace other crop production some of which ultimately may lead to conversion of land into agricultural land. Through this route, the extra biofuel demand can lead indirectly to land-use change.

→ **Proposal for a Directive amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources - Brussels, 17.10.2012 COM(2012) 595 final 2012/0288 (COD)**

Whilst RED and Fuel Quality Directives include sustainability criteria including minimum GHG saving thresholds, the GHG emissions associated with changes in the carbon stock of land resulting from indirect changes in land use (ILUC) are not subject to reporting requirements. In October 2012 the EC published a proposal to minimize the climate impact of biofuels, by amending the current legislation on biofuels through the Renewable Energy and the Fuel Quality Directives aimed to:

- > limit the contribution that conventional biofuels (with a risk of ILUC emissions) make towards attainment of the targets in the Renewable Energy Directive;
- > improve the GHG performance of biofuel production processes (reducing associated emissions). The GHG emission savings from the use of biofuels taken into account for the purposes referred to in paragraph 1 shall be at least 60 % for biofuels produced in installations starting operation after 1st July 2014;
- > include indirect land use change (ILUC) factors in the reporting by fuel suppliers and MS of GHG savings of biofuels and bioliquids;
- > encourage a greater market penetration of advanced (low-ILUC) biofuels by allowing such fuels to contribute more to the RED targets than conventional biofuels;
- > improve the reporting of GHG emissions by obliging EU MS and fuel suppliers to report the estimated indirect land-use change emissions of biofuels;



- > limit the amount of food crop-based biofuels and bioliquids that can be counted towards the EU's 10% target for renewable energy in the transport sector by 2020, to the current consumption level, 5% up to 2020, while keeping the overall renewable energy and carbon intensity reduction targets;
- > provide market incentives for biofuels with no or low indirect land use change emissions, and in particular the 2nd and 3rd generation biofuels produced from feedstock that do not create an additional demand for land, including algae, straw, and various types of waste, as they will contribute more towards the 10% renewable energy in transport target of the RED.

→ **96/82/EC (SEVESO II Directive)**

The Directive aims at the prevention of major-accident hazards involving dangerous substances and at the limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environment (environmental aspect). It no longer contains a list of industrial activities. It solely relates to the presence of dangerous substances in establishments. Seveso II Directive applies to establishments defined as “the whole area under the control of an operator where dangerous substances are present in one or more installations, including common or related infrastructures or activities”.

- > Annex I, Part I includes a short list of hazardous substances with its threshold levels.
- > Annex II includes generic categories such as toxic, explosive or flammable substances
- > Annex III imports a Safety Management System

→ **2003/105/EC amending Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances**

Three main industrial accidents in Toulouse, Baia Mare and Enschede, as well as studies on carcinogens and substances dangerous for the environment as mentioned in the parts takes into account by this Directive, led to the amendments of Seveso II Directive.

- > cover risks arising from storage and processing activities in mining
- > from pyrotechnic and explosive substances
- > from the storage of ammonium nitrate and ammonium nitrate based fertilizers.

→ **2012/18/EU (SEVESO III Directive)**

This Directive lays down rules for the prevention of major accidents which involve dangerous substances, and the limitation of their consequences for human health and the environment. It does not apply to the transport of dangerous substances. Technical updates take into account changes in EU chemicals classification, adapting the EU system to the new UN international chemicals classification (Globally Harmonized System - GHS), which will be repealed by the CLP Regulation by June 2015.



- > The MAPP (Major Accident Prevention Plan) is implemented by appropriate means, structures and by a safety management system, in accordance with Annex III of this directive.
- > There are stricter standards for inspections of establishments to ensure more effective enforcement of safety rules.
- > The chemical and thermal processing operations and storage related to those operations which involve dangerous substances, are included in this Directive.
- > In Annex I, Part I, updates the dangerous substances covered by the hazard categories are listed and their qualifying quantities, compared with the 2003/105/E Directive. Regarding the biodiesel production procedure, substances like methanol and alternative fuels serving the same purposes and with similar properties as regards flammability and environmental hazards as petroleum products are included.
- > Substances and mixtures are classified in accordance with Regulation (EC) No 1272/2008.
- > Mixtures shall be treated in the same way as pure substances provided they remain within concentration limits set according to their properties under Regulation (EC) No 1272/2008, or its latest adaptation to technical progress, unless a percentage composition or other description is specifically given.
- > All citizens become better access for to information about risks and about how to behave in the event of an accident.

## 2.2 Classification of Used Cooking Oil (UCO)

UCO is identified as EWC 20 01 25, “edible oil and fat”. The European Commission interprets catering waste to include used cooking oils from restaurants and catering facilities but does not include used cooking oils from manufacturing premises. Oils from manufacturing premises are felt to be identifiable, traceable and to contain no specified deleterious or prohibited contaminants.

### → **Animal By-Products Legislation 1774/2002**

The main legislation to affect UCO in the European Union is the EU Animal by-product regulation 1774/2002. The ban includes the use of Used Cooking Oils originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens. The effect of this ban is that, from 1st May 2003, (some countries argued for a delay in its implementation) used cooking oils from catering premises can no longer be used as an ingredient in animal feed. The Regulation was put in place following a series of food- and feed-borne crises (related to Bovine Spongiform Encephalopathy - BSE, dioxins, foot and-mouth disease and classical swine fever) and introduced a number of safeguards to prevent risks to public and animal health. The health risks related to UCO include the presence of undesirable levels of contaminants (polycyclic aromatic hydrocarbons (PAHs), PCBs, dioxins, etc). Certain products coming from oil degradation during frying and cooking

show some toxicity, such as triacylglycerol dimers, trimers and other polymers, cyclic monomers and compounds derived from the oxidation of cholesterol. The use of UCO in animal feed poses risks for animal health and, as a result of bio-accumulation, for consumer health. Nevertheless, the Regulation allows the use of such oils from food industry (other than catering facilities) where a credible system of traceability and quality control can be ensured. It also allows the recycling of UCO into technical products for pure industrial uses such as production of soaps, biodegradable lubricants or combustion as bio-fuel, etc. (Guidance on applying the new Animal By Products Regulation (EC) No 1774/2002 Prepared by the Biological Risks Unit of the European Commission's Directorate General for Health and Consumer Protection April 2004)

→ **Landfill Directive 99/31/EC**

The Landfill Directive requires each Member State to set out a pollution control regime for the purpose of implementing Council Directive 99/31/EC on the landfill of waste. The Regulations prohibit the acceptance of certain types of wastes at landfills, including liquid wastes.

→ **Waste Incineration Directive 2000/76/EC**

Waste incineration and co-incineration processes are subject to stringent controls. New incineration and co-incineration installations need to meet the technical requirements of WID. (DEPARTMENT OF THE ENVIRONMENT PLANNING AND ENVIRONMENTAL POLICY GROUP GUIDANCE ON: DIRECTIVE 2000/76/EC, ON THE INCINERATION OF WASTE, Edition 3 December 2011) With respect to the use of Used Cooking Oil (UCO), the use of oil is relevant in that oil that has been used for cooking vegetables (for example, chip potatoes) remains a vegetable waste whereas oil that has been used for cooking meat or fish ceases to be a vegetable waste (and consequently is not excluded from the WID).

→ **UCO for biodiesel production**

The relevant EU legislation is:

- > Regulation 1069/2009 hereafter referred to as the "Control Regulation".
- > Implementing Regulation 142/2011 hereafter referred to as the "Implementing Regulation".

The EU Implementing Regulation states that the UCO that has been in contact with animal proteins and has subsequently been processed (rendered) by any of the processing methods 1 to 5 or 7, as described in Annex IV, Chapter III of the EU Implementing Regulation, is suitable starting materials for biodiesel production. UCO is often used as a starting material for biodiesel production, both in small scale "back yard" plants and large commercial factories. A biodiesel plant produces biodiesel from fats/oils by the chemical process

detailed in Annex IV, Chapter IV, Section 2, point D of the EU Implementing Regulations. Category 1 and 2 plants must operate a three step process; category 3 plants are permitted to operate a two-step process.

The Regulations enable animal fats, animal oils or vegetable oils that have been in contact with animal proteins or have been extracted from foods containing ABPs and are no longer intended for human consumption to be processed into biodiesel in an approved plant. To meet the specified treatment parameters, biodiesel plants must comply with the general requirements for transport, documentation and record-keeping set out in Annex VIII, Sections I to IV of the EU Implementing Regulation. The approved biodiesel plant must additionally be approved and/or registered with the EU Feed Hygiene Regulation No 183/2005. Waste products such as filter contents, sludge, and ash must be disposed of as animal by-products in accordance with the EU Control Regulation and the EU Implementing Regulation.

### 3. EUROPEAN TARGETS FOR 2020 AND 2050

EU should reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector according to the RED Directive. The EU is also committed to reducing its domestic GHG emissions by at least 20 % by 2020 and achieving energy efficiency of 20 % by 2020.

Table 5 presents the total 2020 targets in renewable energy share, according to the aggregated projects of the NREAPs of the 27 EU MS.

Table 5. Renewable Energy Projections (NREAPs of the 27 EU MS, February 2011).

	Reference Scenario (%)				Additional efficiency scenario (%)			
	2005	2010	2015	2020	2005	2010	2015	2020
Electricity	15,3	19,3	24,9	31,3	15,3	19,4	26,0	34,0
Heating and Cooling	9,9	12,2	14,9	19,2	9,9	12,5	15,9	21,4
Transport	1,3	4,7	6,3	9,2	1,3	4,8	6,8	10,2
Transport Target	1,4	4,9	6,8	10,1	1,4	5,0	7,2	11,3
Total before aviation reduction	8,5	11,3	14,3	18,6	8,5	11,5	15,2	20,6
Total after aviation reduction	8,5	11,3	14,4	18,7	8,5	11,6	15,3	20,7

Analysis on transport scenarios<sup>5</sup> based on currently approved biofuel blends (B7, E5, E10) for broad market road fuels almost meets the RED’s 10% renewable energy target.

The EU is committed to reduce GHG emissions to 80-95% below 1990 levels by 2050. The “Energy Roadmap 2050” adopted on 15 December 2011 gives directions towards a future European energy system. Moreover, according to the Communication of 8 March 2011, “A Roadmap for moving to a competitive low carbon economy in 2050” the EU should prepare for reductions in its domestic GHG emissions by 40 % by 2030, and by 80 % by 2050. These emission levels are calculated with respect to 1990 levels. This roadmap must be accompanied by sectoral strategies fostering technological innovations.

## 4. EU Biodiesel Production

The EU biofuels market has become one of the largest throughout the world, over the last years. About 380 biofuel plants (2012) with a production capacity of about 1,055 PJ were operational.

According to the European Biodiesel Board platform, the biodiesel production and production capacity in Europe, during the last years, is shown at the following Table (Table 6) and Figure 1:

Table 6. EU Biodiesel Production and Capacity (European Biodiesel Board, 2012)

YEAR	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU Biodiesel Production (.000 ts)	1,065	1,034	1,933.4	3,183.4	4,890	5,713	7,755	9,046	9,570	N/A
EU Biodiesel Production Capacity (.000 ts)	N/A	2,048	2,246	4,228	6,069	10,289	16,000	20,909	21,904	22,117

<sup>5</sup> **EU renewable energy targets in 2020: Analysis of scenarios for transport** JEC Biofuels Programme, L. Lonza European Commission Joint Research Centre, Institute for Energy, H. Hass, H. Maas EUCAR, A. Reid, K. D. Rose CONCAWE

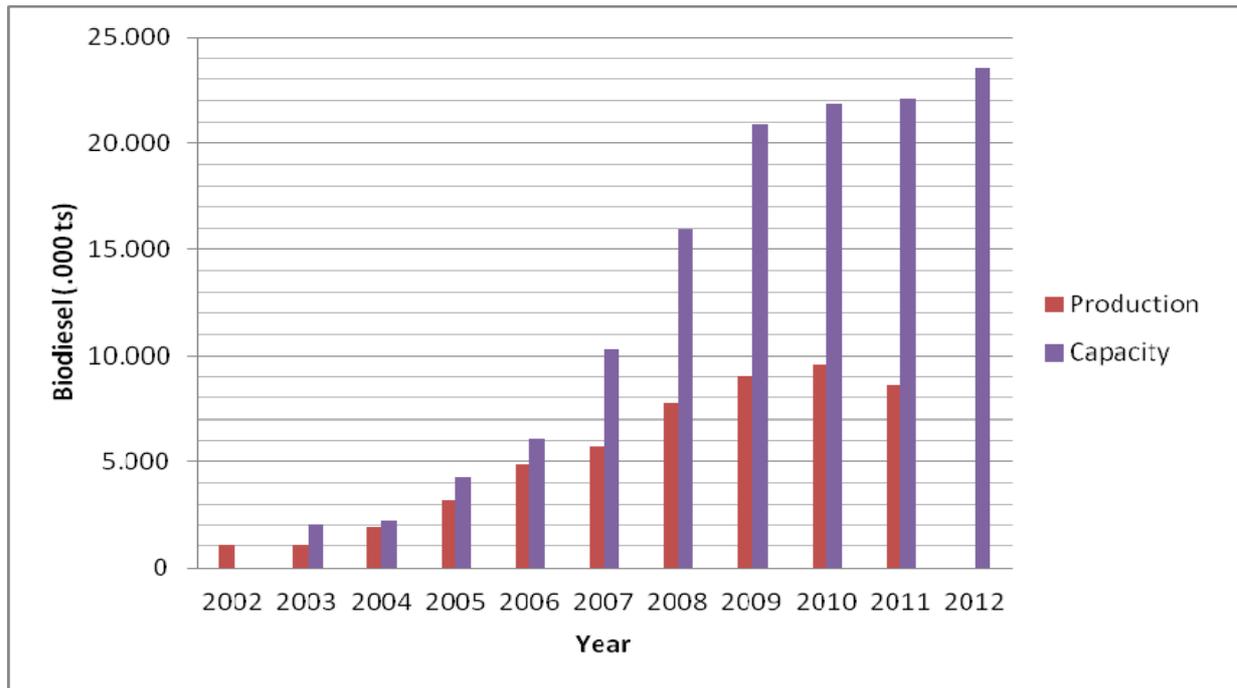


Fig 1. Biodiesel capacity and production in EU27 (European Biodiesel Board, 2012)

The European Union has supported the increase of biofuel consumption in transport as means of reducing GHG emissions, also positive for the security of energy supply, technological development, economic development at regional scale and job creation. However, the European Union governments no longer view the rapid increase in biofuel consumption as a priority. Between 2010 and 2011 biofuel consumption increased by 3.1%, which translates into 14 million tonnes of oil equivalent (toe) used in 2011 compared to 13.6 million toe in 2010. The European Union’s attention has shifted to setting up sustainability systems to verify that the biofuel used in the various countries complies with the Renewable Energy Directive’s sustainability criteria.

Table 7a shows the biofuels consumption in transport of the RecOil participating countries and of Germany, which is the main actor in biofuel production, according to EurObserv'ER biofuels barometer.

Table 7a. Biofuel consumption for transport in the EU (toe), 2006-2011, EurObserv'ER biofuels barometer

Year	EU	Spain	Italy	Greece	Portugal	Denmark	German
2006	4,073,904	54,102	148,967	46,440	70,312	0	2,532,003
2007	5,898,735	259,000	135,880	81,242	134,959	0	2,906,266
2008	8,018,003	520,012	658,379	67,398	128,837	243	2,381,653
2009	9,665,725	907,951	1,051,639	76,001	255,051	3,280	2,224,349
2010	10,579,063	1,186,950	1,297,316	124,606	325,254	725	2,234,954
2011*	10,842,655	1,443,131	1,286,711	103,396	306,894	4,419	2,143,929

\*forecast

The main actors in the EU biodiesel market, according to the EurObserv'ER Biofuels Barometer and the EBB are shown in Table 7b.

Table 7b. 2008 Production capacity of the main EU biodiesel producers (Biofuels Barometer, 2009)

Company	Country	Units in Europe	Production capacity
Diester Industries / Prolea-Sofiproteol group	France	10	2,250 ML/yr
ADM Biodiesel	Germany	3	1,130 ML/yr
Biopetrol Industries	Switzerland	3	840 ML/yr
Verbio	Germany	2	510 ML/yr
Cargill	Germany	2	420 ML/yr
Ital Green Oil / Marseglia group	Italy	1	410 ML/yr
Bioenergética Extremeña	Spain	1	360 ML/yr
Acciona Energia	Spain	2	300 ML/yr
Gate	Germany	2	290 ML/yr
Biofuels Corporation	United Kingdom	1	280 ML/yr
Novaol	Italy	1	280 ML/yr
Natural Energy West (NEW)	Germany	1	280 ML/yr

## 5. NATIONAL LEGAL/NORMATIVE ENVIRONMENT WITH REGARD TO THE UCO PROCESSING AND BIODIESEL DISTRIBUTION

The following tables provides an overview of the RecOil national markets and legislation, summarising the data collected by the RecOil partners.

Table 8a. Biodiesel Market at the RecOil countries (2011)

	Denmark	Greece	Italy	Portugal	Spain
Biodiesel production, ts (source Recoil)	170,152.5	116,160.0	620,000.0	369,297.3	647,199.0
Biodiesel production capacity ts (2011 - EBB)	155,000	812,000.0	2,265,000.0	468,000.0	4,410,000.0
Biodiesel consumption in transport at 2011, toe (Biofuels Barometer, 2013)	4,419.0	103,396.0	1,286,711.0	306,894.0	1,443,131.0
UCO volume processed, Recoil Data	N/A	15,865.0	45,000.0	4,470.0	90,000.0

Table 8b. RecOil countries national biodiesel specifications

	Denmark	Greece	Italy	Portugal	Spain
Harmonisation with 2009/30/EC (sustainability criteria)	Yes (since 2010)	Yes (since March 2012)	Yes (since March 2011)	Yes (since Oct. 2010)	Yes (since Nov. 2011)
Biodiesel 2020 targets (NREAP)	10%	10%	10%	10%	13,6%
Direct subsidies or tax relief quota	CO <sub>2</sub> tax relief, € 75/ 1,000 L (including VAT)*	No	No	Exception from ISP** tax for small producers < 3000 ts/year	No
Double counting	UCO no animal fat yes	Yes***	Yes	Yes	UCO undefined animal fat yes
Quota System	No	Yes	Yes	Yes	Yes
Share of UCO to the raw materials	N/A	12%	7.3%	1.2%	14.31%
Obligatory share of biodiesel in car fuel mix	5.75%	6.57%	7%	5,5% (6,75% end of 2014)	7%

\*When used for private heating biodiesel is completely exempted from tax, whereas use in district heating supply can be restricted.

\*\* Tax on petroleum and energy products. Till 2010 larger producers could benefit of a tax relief was 280 Euros/1000L

\*\*\* Double counting in Greece has been introduced to the legislation but has not yet been in place.

The annual biodiesel production and the biodiesel produced from UCO as recorded by the RecOil partners are presented at Table 9. Fig. 2 presents also the biodiesel production capacity.

Table 9. Biodiesel production and UCO processed UCO at the RecOil countries (2011)

Country	Biodiesel Production (ts)	UCO processed (ts)
Denmark	170,152.5	N/A
Greece	116,160.0	15,865.33
Italy	620,000.0	45,000.0
Portugal	369,297.3	4,470.3
Spain	647,199.0	90,000.0

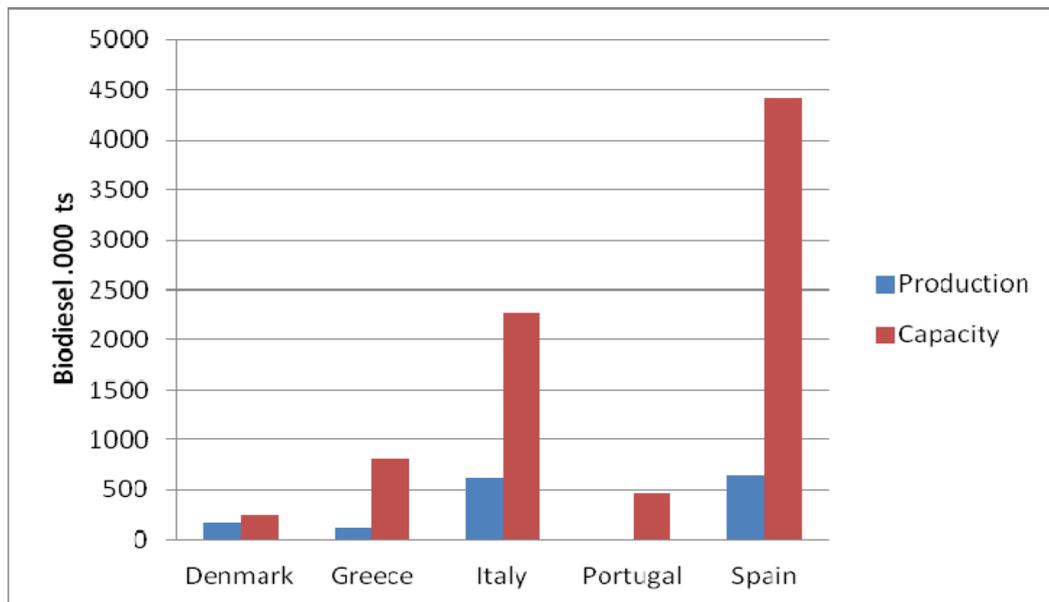


Fig. 2 Biodiesel production and biodiesel capacity in 2011, at RecOil countries

## 5.1 Denmark



### 5.1.1. Basic biodiesel market data

- > *Volume of biodiesel currently produced:* According to the Danish Energy Agency's annual statistics the biodiesel production for 2011 has an energy content of 20112,965 TJ while the imports have an energy content of 3,416 TJ. According to the EurObserv'ER biofuels barometer the biodiesel consumption for transport was 4,419 toe.
- > *Biodiesel production capacity:* There are 2 factories in Denmark – Daka Biodiesel has a fully utilized production capacity of 55,000 ton per year, based on animal rendering waste, and Emmelev a fully utilized capacity of 100,000 ton per year on basis of rape seed.
- > *Number of biodiesel plants:* two (2) main biodiesel factories:
  - Daka Biodiesel (<http://www.dakabiodiesel.dk/>) owned by DAKA, which handles animal by-products wastes in Denmark, i.e. category 1, 2 and 3 waste according EU's Animal By-Products Regulation (1069/2009/EU). The current production capacity of 55 million liters per year is fully utilized.
  - Emmelev (<http://www.emmelev.dk/>) is primarily producing biodiesel on basis of rape seeds, and has a fully utilized production capacity of 100 million liters per year.

Besides that, there happens biodiesel production in a few other companies, as well as some uncontrolled small-scale production of rape seed oil, made with small screw presses. Daka Biodiesel is organizing the processing of animal fats for biodiesel in Denmark, while others export it for processing abroad.

- > *UCO volume processed:* The Danish Energy Agency informs that they do make statistics for the share of biodiesel stemming from UCO.
- > *UCO collection:* The potential UCO collection is estimated to 11-12,000 ton annually, whereof probably most is collected, but only 10-20% in an official way, whereas the rest ends up in a "grey" market, actually deteriorating the confidence to UCO as a sustainable biomass.

### 5.1.2. National Legislation and Regulations Overview

- > *Harmonization of national legislation with 2009/28/EC. Is there in force legislation in compliance with Directive 2009/30/EC, as concerns the sustainability criteria (Articles 17 to 21)*

Denmark has implemented EU's RE Directive (2009/28/EU) in Act on Sustainable Biofuels (<https://www.retsinformation.dk/Forms/r0710.aspx?id=137888>), which enforces EU's RE Directive and determine that companies that markets liquid fuels are obliged to ensure that at least 5.75% of it is sustainable bio-fuel, calculated on an annual basis.

Cabinet Regulation on Sustainability of Biofuels:

(<https://www.retsinformation.dk/Forms/R0710.aspx?id=144590>) refers to the mentioned in Act on Sustainable Biofuels, and an important decision in this is the legalization of the Bioenergy Handbook ([http://www.ens.dk/da-DK/Info/Lovstof/gaeldende\\_love/transport/Documents/H%C3%A5ndbog%20efter%20h%C3%B8ring\\_uden%20trc\\_060711.pdf](http://www.ens.dk/da-DK/Info/Lovstof/gaeldende_love/transport/Documents/H%C3%A5ndbog%20efter%20h%C3%B8ring_uden%20trc_060711.pdf)).

- > *Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?*

The Danish legislative set-up is aiming at brief provisions in the Law and the Cabinet Regulation, whereas the Bioenergy Handbook, which is a document with 77 pages, contains the detailed provisions, which can be amended administratively by the current Government.

- > *Is there any voluntary 'certification' scheme(s) for biofuel and bio liquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?*

The Bioenergy Handbook defines requirements for fuels to be considered sustainable. The sustainability criteria are in general in line with the minimum requirements in EU's legislation. All companies that operates under responsibility to the in Law on Sustainable Biofuels , i.e. who market liquid fuels, are obliged to make an annual report to the Danish Energy Agency. They are as well obliged to contract a controller according International Standard on Assurance Engagements (ISAE 3000).

- > *Mention any direct subsidies or tax relief quotas which benefits the biodiesel sector*

The use of biodiesel for transport in Denmark is taxed in the same way as fossil based diesel, despite from a CO<sub>2</sub> tax relief, equal to about € 75 per 1,000 L (including VAT). When used for private heating purposes biodiesel is completely exempted from tax, whereas use in district heating supply can be restricted.

> *Status of Double counting provision. Is UCO currently accepted as DC, what about animal fat?*

The Bioenergy Handbook provides a positive list of biofuels that counts double with respect to sustainability. UCO is not on the positive list, whereas animal fat counts double.

> *Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?*

Denmark has no subsidization of biodiesel production, wherefore there is no need for auctions, quotas or the like for distribution of production rights on the factories, which activities are purely commercially based.

> *Which is the share of UCO to the raw materials used for the biodiesel production?*

In Denmark, it is the municipality that administers the demand about collection of UCO, and typically they are focused on the larger kitchens. The following conditions affect the collection of food waste in general, and UCO in specific in Denmark:

- Following the outbreak of BSE (mad cow disease) the former law that demanded canteens and restaurants to collect food waste was annulled. It was of veterinary reasons not anymore possible to collect, mix and deliver the raw food residues like formerly. Today the most common way to dispose of food residues is to deliver it with other garbage to the municipal waste collection.
- A majority of household waste is incinerated in Denmark and around half of the heat used in district heating in Denmark stem from this. This means that any energy value in UCO's that ends up in household waste is utilized.
- Most wastewater treatment plants collect flotation fats and uses this as well as waste water sludge for biogas production or similar energy valorization.

Daka Biodiesel is one of the companies that collect UCO from restaurants etc. Other companies such as Renoflex/Marius Pedersen (<http://www.mariuspedersen.dk/>), PNA (<http://www.pna.dk/>) and MBP Group (<http://www.mbpgroup.eu/>) collect UCO as well. UCO makes up an unknown, but in any case a marginal share of the used biodiesel.

> *Which the way/formula of calculation of the annual quota to be produced in your country?*

As referred, there is no quota system to regulate the annual biodiesel production.

### **5.1.3. National Targets for biodiesel in compliance with the 2020 targets**

In accordance with the Act on Sustainable Biofuels, an importer or manufacturer of petrol or diesel has an obligation to ensure that biofuels make up at least 5.75 % of the company's

total annual sale of fuel to land transport, measured according to energy content. This target will be phased in over a three year period: 0.75 % in 2010, 3.35 % in 2011 and 5.75 % in 2012. The government must, and will ensure that in accordance with the RE Act, at least 10 % renewable energy is reached in the transport sector by 2020. The government will ensure the fulfillment of this target through the increased use of biofuels in the transport sector and by promoting electric vehicles.

The 2020 targets for biodiesel in the NREAP set out to 167 ktoe, equal to 7.0 PJ. The target is on track; home production and import had in 2011 reached 6.4 PJ, as mentioned above.

#### **5.1.4. Biodiesel Blending limits**

##### *Obligatory share of biodiesel in car fuel mix*

The Act on Sustainable Biofuels recommends, and the sector has since 1 July 2011 implemented the 5.75% target in the way, that of technical reasons petrol is mixed with 5% biofuels and diesel with 7% biofuels in Denmark.



## 5.2 Greece

### 5.2.1 Basic biodiesel market data

- > *Volume of biodiesel currently produced:* 132,000 kL
- > *Biodiesel production capacity:* 802,000 ts
- > *Number of biodiesel plants:* 13
- > *UCO volume processed:* 15,840 kL

Table 10. Biodiesel distribution and production capacity in Greece

	2007	2008	2009	2010	2011
Biodiesel distribution (JMD, .000 kL)	114	123	182	164	132*
Biodiesel production capacity (EBB Platform, .000 Tones)	440	565	715	662	802
Biodiesel consumption in transport (Biofuels Barometer, toe)	81,242	67,398	76,001	124,606	103,396

\*as extended for 2012

At the latest biodiesel distribution and production call, 36 Greek companies expressed their interest in participating in the distribution while 23 have complied the biodiesel production and distribution criteria according to Table 12. There are 13 biodiesel plants (Table 11), while 10 companies import biodiesel from other EU countries.

UCO are included in the biodiesel blending with at least 12%, while data from the import mixtures are not available.

Table 11. Greek biodiesel plants according to the last JMD for biodiesel production and distribution.

COMPANY NAME	LOCATION AREA	BIODIESEL ORIGIN	QUOTA (BIODIESEL)	BIODIESEL QUANTITY PER YEAR (.000 L)
P. N. Pettas ABEE	Municipality of Patras	Municipality of Patras	19,60%	25.872,73
Biontizel EPE	Municipality of Thessaloniki	Municipality of Thessaloniki	4,17%	5.510,27
New Energy SA	Municipality of Serres	Municipality of Serres	8,79%	11.597,89
Agroinvest AEBE	Municipality of Fthiotida	Municipality of Fthiotida	9,98%	13.172,40
EL.BI. ABEE	Municipality of Kilkis	Municipality of Kilkis	11,66%	15.391,86
Bioenergia SA	Municipality of Chalkidiki	Municipality of Chalkidiki	1,27%	1.674,80
Staff Colour Energy ABEE	Municipality of Larissa	Municipality of Larissa	0,97%	1.284,14
Ekkokistiria Klostiria N.Greece SA	Municipality of Komotini	Municipality of Xanthi	2,99%	3.942,46
Petsas SA	Municipality of Komotini	Municipality of Komotini	1,45%	1.917,30
GF energy ABEE	Municipality of Komotini	Municipality of Komotini	12,62%	16.658,66
Mil Oil Hellas SA	Municipality of Thessaloniki	Industrial area of Serres	1,90%	2.507,09
Elin Biokausima SA	Municipality of Athens	Industrial area of Volos	8,83%	11.652,80
Manos SA	Municipality of Athens	Industrial area of Volos	2,48%	3.277,55

## 5.2.2 National Legislation and Regulations Overview

A number of regulations for the introduction of biofuels and the accomplishment of the national targets have been in place during the last years.

- **Law 3054/2002.** This is the first Greek Law including biofuels in the existing legal framework for oil products. The licensing regulation of a) refineries, b) oil marketing, c) heating oil selling, d) LPG bottling - distribution, e) direct petroleum supply and import, and f) pipeline transportation is being established.
- **Law 3423/2005.** Following the established licenses for petroleum products, this law inserts the biofuel distribution license and the mandatory collection from the refineries of pure biodiesel quantities for blending with diesel for transport. The blending rates are established according to the supreme chemical council (s.c.c) decisions, and start at 5% by volume.
- **Law 3769/2009** replaces the article 15A L. 3054 with article 22 in which:
  - Issues about the call for annual biodiesel distribution, the quantity calculations, the control of the applications and evaluation criteria and the distribution regulation are settled. The annual biodiesel amount to be distributed is determined by a Ministerial Decision issued every year before April 15 for the period from July 1 that year to June 30 of the following year (Art. 4, § A).
  - a joint ministerial decision is provided to provide a framework for further development of the biofuels use, which defines the products individually or in mixtures, mixing rates, process and incentives for production, the availability and consumption, and any other necessary details (§12). It is possible to determine the minimum required mixing rate of biofuels or other renewable fuels with compatible products corresponding refining of crude oil, if they are within the limits specified in the relevant decisions of the Supreme Chemical Council (§ 12).
  - According to the formula, under which the evaluation criteria for the annual distribution of biodiesel (Art. 22, § 6) are given, the amount of Biodiesel derived from Greek energy crops amounts to 25% of the total amount of the distributed quantity. Especially in 2009, this percentage varies to 35%. Also, according to the same formula, 10% of total amount is distributed among the beneficiaries who deposit cooperation agreements with research institutions or contracts participation in research projects within the EU on issues concerning biofuels and biomass.
- **Law 3851/2010** is of particular importance, simplifying the licensing procedure of the RES projects, and setting specific targets for 2020 regarding the share of RES in final energy consumption. The share of RES is amended upwards to 20% of gross final energy consumption by 2020 (2% above the mandatory level of 18% set by Directive 2009/28/EC).



- **Law 4042/2012.** This law establishes the legal framework on the protection of the environment through criminal law and on waste generation and management in compliance with Directives 2008/99/EC and 2008/98/EC. It constitutes one of the basic laws of the environmental impact assessments legislation in recent Greece by making substantial changes in the environmental licensing of all activities in compliance with the European Directives.
- **Law 4062/2012** By this law the RED and Fuel Quality Directives (including their annexes) are inserted in the Greek legal framework:
  - In art. 14-17, art. 23-27, art. 29-30 deals with the provisions of the RED and in specific: the NREAP, the share of RES energy estimation procedure, bilateral agreements, sustainability criteria, double counting system for biofuels made from waste, residues, non-food cellulosic and ligno-cellulosic material,
  - In art. 18-22, art. 31 the 2009/30/EC deals with the provisions of the RED and in specific: sustainability criteria, verification method for compliance with the sustainability criteria, Rules for calculating life cycle green house emissions from biofuels
  - In art. 34, L. 3054/2002 is amended. the Minister of Environment and Climate Change Ministry issues every year before the 10th of November a decision to determine the annual distribution amount of biodiesel for the next year and the percentage of blending biodiesel fuel mixture which must be ensured by the blending responsables (refineries).
  - For the calculation of that amount are considered: i) the minimum blending percentage of the biodiesel fuel mixtures ii) the estimated consumption of diesel for transport for the next year.
  - The amendments on the biodiesel blending, distribution, technical specification and supervision, are subsequently determined by Ministerial Decisions, as described below.

### ***Ministerial Decisions for the biodiesel distribution***

- Distribution for 2007 of 114,000 kL of biodiesel.
- Δ1/A/879/11.01.2008 Redistribution for 2007 of 4,405 kL of biodiesel.
- Δ1/A/8090/04.04.2008 Distribution for the months of March, April and May 2008, of 30,400 kL of biodiesel.
- Δ 1/A/19792/08.08.2008 Distribution for the year 2008, of 123,000 kL biodiesel (after the Invitation for participation in the distribution year 2008).



- Δ1/A/25573/10.12.2009 Distribution for the year 2009, of 182,000 kL biodiesel (after the Invitation for participation in the distribution year 2009).
- Δ1/A/15555/4-8-2010 Distribution for the year 2010, of 164,000 kL biodiesel (after the Invitation for participation in the distribution year 2009).
- Δ1./A/23603/21-10-2011 Distribution for the year 2011, of 132,000 kL biodiesel.
- Δ1/A/οικ.6227/18-3-2011. A supervisory committee is established which continuously monitors and controls the process and the work of the Audit and Evaluation committee (§4 of Article 15A L. 3054/2002 as amended), and updates the Environmental and Climate Change Ministry's political leadership. The Supervisory Commission is also in charge of a proposal of improved process for the control of the applications in accordance with Article 15A L. 3054/2002 and the thereby resulting joint ministerial decisions.
- Δ1/A/οικ.10839/15-5-2012. Biofuels made from waste, residues, non-food cellulosic and ligno-cellulosic material can count double toward the mandate (double counting system). Furthermore, sustainability criteria are set according to art. 21, 22 L.4062/2012.
- Δ1/A/οικ.10839/15-5-2012. Determination of criteria and distribution methodology of biodiesel, which modifies the quota System to regulate the annual biodiesel production (in volume) between biodiesel producers (formula is presented in the following pages).

#### ***Data management System regulations***

- Δ1/B/7364/30-03-2012, as amended with Δ1/οικ.16421/02.08.2012 a Data Management and Information System is created for the analytical monitoring of production, refining, storage, import, export production and distribution of crude oil, semi-treated and petroleum products. The Administration of Petroleum Policy of the Environmental and Climate Change Ministry is the responsible authority for the update the management and the properly functioning of the data management system ([www.fuelstats.gr](http://www.fuelstats.gr)).

#### ***Supreme chemical council decisions***

- 460/2009: The quality norm for diesel is set to EN: 590/2009 and the maximum blending rate of biodiesel in diesel is 7% v/v.
- 316/2010: Specifications in the field of petrol and diesel quality are established according to Directive 2009/30/EC, and especially EN.14214.

### ***Licensing Procedure***

The production importing or trading in Greek territory of biofuels or bioliquids requires a **Biofuels Distribution License**. The distribution license is granted to limited liability companies (Ltd) established in an EU MS or in collective agricultural organization. The Competent authority is the Administration of Management and Supervision of Petroleum Products. Precondition for the grant of a distribution license is the *operating license* of a biofuel plant or the existence of active contracts for the purchase of biofuels or bioliquids from plants within or outside the Greek territory. The distribution licensee allows producing or importing biofuels and distributing them within the Greek territory in refineries, in licensed markets.

- > ***Harmonization of national legislation with 2009/28/EC. Is there in force legislation in compliance with Directive 2009/30/EC, as concerns the sustainability criteria (Articles 17 to 21)***

Law 4062/2012 articles 14 to 31, aligns the Greek legislation with both directives 2009/28/EC and 2009/30/EC. As described in the relevant legislation, art. 18 and art. 20 refer to the sustainability criteria as described in the RED and Biofuel Quality Directives.

- > ***Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?***

Recently, due to the JMD Δ1/A/οικ.10839/15-5-2012, the competent Authority to monitor the compliance with the sustainability regulations is the Office of Sustainability of Biofuels and Bioliquids according to Article 29 of Law 4062/2012

Responsible body concerning the Quality of biodiesel: the Supreme Chemical Council

Responsible body concerning the application procedure: Supervisory Commission of the Environmental and Climate Change Ministry

Responsible body concerning the Data Management and Information System: Administration of Petroleum Policy of the Environmental and Climate Change Ministry

- > ***Is there any voluntary 'certification' scheme(s) for biofuel and bioliquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?***

Since August 2012, technical regulations of biofuels are established, according to EN14214. The proposed Plan provides furthermore general technical guidelines for the safe operation of the storage and handling of biofuels, namely liquid fuels derived from biomass, specifically biodiesel and bioethanol, which are stored and handled on oil refining and storage site, individually or in combination with the corresponding petroleum products, diesel and gasoline.



Furthermore, certification qualifications are issued due the recent JMD Δ1/A/οικ.10839/15-5-2012 art. 3, according to art. 21, 22 of L.4062/2012.

> ***Mention any direct subsidies or tax relief quota which benefits the biodiesel sector***

According to Law 2960/2001 "National Customs Code" as amended by Law 3336/2005 and Law 3340/2005, for the years 2005, 2006 and 2007 (relevant quantities 51,000, 91,000 and 114,000m<sup>3</sup> of biodiesel) there was no Special Consumption Tax. Then there was a gradual increase until 2010 where it was equated with diesel with a coefficient of 352. Today the special consumption tax of biodiesel as transportation fuel is 412 € /1,000L.

> ***Status of Double counting provisions***

The government plans a double counting system which will probably form an incentive using biofuels made of waste and cellulosic material (2nd generation biofuels). (This is issued due the joint ministerial decision Δ1/A/οικ.10839/15-5-2012). Till now, no double counting has been implemented.

> ***Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?***

A quota system exists in the greek legislation, as mentioned in the Ministerial Decisions. Furthermore, the criteria of biodiesel distribution among the producers are:

- The quantities of raw materials from areas of domestic energy crops for the production of biodiesel, through contractual agreements with farmers which are registered in the Integrated Management and Control System
- The quantities of cotton, national origin, intended for biodiesel production
- The quantities of used vegetable oils, UCO, and animal fats, of domestic origin, intended for the production of biodiesel
- The requested amount of biodiesel. In each case, the amount requested cannot exceed to distribution of total annual quantity verbatim biodiesel
- The cooperation of the applicant company with universities or research institutions and organizations based in Greece for research programs or projects related to biofuels, bioliquids and biogas from raw materials as defined in art. 2 of Decision D1/A/οικ.10839/15.5.2012. The research programs or projects must be at least six months in effect at the closing date for applications. In each case, the applicant company must have its own contribution to the budget research program or project.



> **Which is the share of UCO to the raw materials used for the biodiesel production?**

The share of UCO, according to the latest biodiesel distribution decision is at least 12% but considering the fact of no available data from the import UCO share, it is expected to be higher.

> **Which the way/formula of calculation of the annual quota to be produced in your country?**

$$K_i = \{ [0,60 * EL1i / (Total EL1i)] + [0,025 * L2i / (Total EL2i)] + [0,125 * EL3i / (Total EL3i)] + [0,1875 * A_i / (Total A_i)] + [0,625 * E_i / (Total E_i)] \} * \text{annual compulsory biodiesel quantities, where:}$$

*i* = the company under consideration

*K<sub>i</sub>* = compulsory pure biodiesel quantities, in Kiloliters for company *i*

*EL1<sub>i</sub>* = Kiloliters of pure biodiesel produced from domestically grown energy crops through contractual agreements with farmers, assuming the performance ratio per ton of raw material as 0,39 for sunflower seed, 0,39 for rapeseed and 0,2 for soya seed.

*EL2<sub>i</sub>* = Kiloliters of pure biodiesel produced from domestic cottonseed through submitted invoices or/and accounts assuming a production of 0,14 kiloliters of biodiesel per ton, or/and from domestically produced cottonseed oil through submitted invoices assuming a production of 0,95 kiloliters of biodiesel per metric ton.

*EL3<sub>i</sub>* = Kiloliters of pure biodiesel produced from used vegetable oils, fried oils and animal fats of domestic origin that are considered appropriate for biodiesel production, through the submission invoices or/and accounts, assuming a production of 0,95 kiloliters of biodiesel per metric ton of raw material.

*A<sub>i</sub>* = the requested amount of biodiesel in kiloliters

*E<sub>i</sub>* = indicator calculated on the basis of submitted documents, equal to one (1) for fulfilling the related conditions or zero (0) for detection of non-fulfilling.

### 5.2.3 National Targets for biodiesel in compliance with the 2020 targets

Following to the RED requirements the mandatory RES target for Greece is set to a 18% of total national energy consumption. According to Law 3851/2010 “Accelerating the development of Renewable Energy Sources to deal with climate change and other regulations in topics under the authority of MEECC”, the national target for RES is set at 20% of final energy consumption by 2020 (increased from the 18% set out in EU regulation Directive 2009/28/EC).

*This objective is specified in 40% participation of RES in electricity, 20% in heating and cooling and 10% for transport.*

According to the 1<sup>st</sup> NREAP, the elements of the National Renewable Energy Policy presented are based on economic forecasts that are those agreed for the Stability, Development and Reconstruction Program (Greek recovery plan). According to that, three scenarios were developed, the Reference, the Compliance and the Compliance under Accelerated Economic Growth until 2020 scenario.

The National 2020 target and estimated trajectory of energy from renewable sources in transport is:

Table 13. National 2020 targets and estimated trajectory of energy from RES in transport

%	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES-Transport	0,02%	1,7%	3,3%	4,1%	4,8%	5,6%	6,3%	7,1%	7,8%	8,6%	9,4%	10,1%

#### 5.2.4 Biodiesel Blending limits

##### *Obligatory share of biodiesel in car fuel mix*

Currently the share of biodiesel is 6,5%. Each year by a JMD the percentage of blending biodiesel fuel mixture which must be ensured by the blending responsables (refineries) is determined by a JMD. For the calculation of that amount i) the minimum blending percentage of the biodiesel fuel mixtures and ii) the estimated consumption of diesel for transport for the next year are considered.



## 5.3 Italy

### 5.3.1 Basic biodiesel market data

- > *Volume of biodiesel currently produced:* According to the biodiesel Association's statistics, in 2011 the Italian production of biodiesel was about 620,000 ts.
- > *Biodiesel production capacity:* 2,395,240 ts

Table 13a. Biodiesel consumption in transport for Italy according to Biofuels Barometer, 2011

	2007	2008	2009	2010	2011
Biodiesel consumption in transport (Biofuels Barometer , toe)	135,880	658,379	1,051,639	1,297,316	1,286,711

Table 13b. Biodiesel production data for Italy, 2011

PRODUCTIVE CAPACITY (ts)	PRODUCTION (ts)	IMPORTS (ts)	EXPORTS (ts)	CONSUMPTION (ts)
2,395,240	620,000	1,019,000	158,000	1,456,000

- > *Number of biodiesel plants:* There are 16 biodiesel plants in Italy (2 of them in operation):

Table 14. Biodiesel plants in Italy

BIODIESEL PLANTS	LOCALITY	PRODUCTIVE CAPACITY(ts)
Alchemia Italia Srl	Rovigo(RO)	15,000
<b>Bio-Ve-Oil_Olimpo Srl (in work)</b>	<b>Corato(BA)</b>	<b>100,000</b>
Cereal Docks Spa	Vicenza(VI)	150,000
Comlube Srl	Castenedolo(BS)	120,000
DP Lubrificanti Srl	Aprilia(LT)	155,520
<b>Ecoil (in work)</b>	<b>Priolo(SR)</b>	<b>200,000</b>
F.A.R. Spa Divisione Polioli	Cologno Monzese(MI)	100,000
Eco Fox Srl	Vasto(CH)	199,416
ITAL Bi Oil Srl	Monopoli(BA)	190,304
ITAL Green Oil Srl	San Pietro di Morubio(VR)	365,000



GDR Biocarburanti	Cernusco sul Naviglio(MI)	50,000
MYTHEN Spa	Ferrandina(MT)	200,000
NOVAOL Srl Livorno	Livorno(LI)	250,000
NOVAOL Srl Ravenna	Ravenna(RV)	200,000
Oil B Srl	Solbiate Orona(VA)	200,000
Oxem Spa	Mezzana Bigli(PV)	200,000
<b>Total productive capacity(tons)</b>		<b>2,395,240</b>

On the web-site: <http://www.assocstieribiodiesel.com/cartina.asp> there is also a map with the location of these plants.

> *UCO volume processed*

CONOE (*Consorzio obbligatorio nazionale di raccolta e recupero di oli e grassi vegetali ed animali esausti*, see <http://www.conorzioconoe.it/>) estimates that in 2011 the national production of UCO was about 280,000 ts, whose 57% coming from households. The other 25% was produced by restaurants and the last 18% from food industry.

In 2011 only 16% of this UCO was delivered and recovered (about 45,000 ts) while for the year 2012 CONOE forecasts a recovery of 100,000 ts. Therefore other estimates by CONOE say that about 50% of UCO delivered is used for biodiesel production.

### 5.3.2 National Legislation and Regulations Overview

National Waste framework Law (Decree 152/06) establishes a specific national consortium for the proper collection and treatment of spent vegetables and animal oils and fats.

Any UCO holder is forced to deliver it to CONOE consortium, which is also responsible of collection of this product. CONOE controls and monitors the used oil and fats chain. The main objective of the Consortium is to assure national transport, storage, treatment end recovery of used oil and fats reducing their dispersion and the consequent pollution. Conoe joints companies that have several functions: production, import, storage, recycling and recovery, harvesting and transport.

A UNI standard containing the list of UCO requisites for energy use (biofuels for electricity and heat production) is going to be published by CMI (Comitato Termotecnico Italiano).

- > *Harmonization of national legislation with 2009/28/EC. Is there in force legislation in compliance with Directive 2009/28/EC, as concerns the sustainability criteria (Articles 17 to 21)*

The renewable energy decree of 2011 (legislative decree 3rd March 2011, n°28, transposition of the European Directive 2009/28/CE) introduced important updates for the Italian biofuels sector that can be summarized as follows:

- a new definition of biofuels according to the European RES directive 28/2009 and the impact on raw materials that can be used for their production;
- the introduction of new mechanisms for the verification of sustainability criteria;
- the modification of mandatory quota for biofuels used in traditional transport fuels.

The transposition of the definition of biofuels according to the RED implies that only biofuels meeting the minimum 35% emission reductions by 2012 (increasing to 50% in 2017 and 60% in 2018) as well as the other sustainability criteria introduced by the RED shall be utilized for the achievement of the Italian national targets.

- > *Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?*

The Ministerial Decree of 23 January 2012 has introduced the Italian regulation for the certification of mandatory sustainability criteria for biofuels, whose main principles are summarized here below:

- a National accreditation organism, named “Accredia” is introduced, and is the sole organism responsible for the accreditation or certification bodies;
- the National system for the certification of sustainability criteria is composed by the accreditation body (Accredia); the accredited certification bodies; the certification schemes used by certification bodies; the economic operators subject to audits from the certification bodies;
- the minimum verification activities due by certification bodies on economic operators are: an initial audit and an annual audit of the operators or one every six months;
- The certification bodies assign a “Certificate of Conformity” to operators, that is valid for 5 years and which can be revoked in case of lack of compliance;
- Operators in a given supply chain, delivering their product to the next operator of the supply chain, must release a “Declaration of Conformity” for each lot of the delivered product (or in certain cases a Certificate of Sustainability);
- Operators can also choose to certify their products based on voluntary schemes approved by the Commission, provided that they are audited by accredited certification bodies.

Other institutions responsible for monitoring sustainable criteria of biofuels are:

→ **ISPRA**- *Istituto Superiore per la Protezione e la Ricerca Ambientale*- Agency for environmental protection and technical services.

Since 1st January 2012, by January 31 of each year, biofuel providers transmit to the Ministry of Environment, through ISPRA, a report (a self-certification) about the GHG emissions of fuels and in which they specify:

- the total quantity of each type of fuel or energy supplied, indicating the place of purchase and its origin;
- the emissions of GHGs produced during the life cycle per unit of energy.

The report shall be linked by documents that ensure the assessment of the sustainability criteria from economic operators.

> *Is there any voluntary 'certification' scheme(s) for biofuel and bio-liquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?*

There are no Italian voluntary certification schemes but only the National certification scheme introduced by the Ministerial Decree of 23 January 2012.

> *Mention any direct subsidies or tax relief quota which benefits the biodiesel sector*

In Italy for the period 2007-2010 a quota system was established to support the production of biodiesel. This system consisted in a reduction of the excise tax of 20% for diesel until a quantity of 250,000 ts. At present, biofuels in Italy don't have any tax benefits. In fact the Italian Government decided only to fix a minimum quota with application of a sanction.

> *Status of Double counting provision.*

The legislative decree n°28/11 considers the double counting for biofuels produced by waste and sub-products. As consequence, biodiesel produced by animal fat is supported. The benefits are possible only if the waste and sub-products have no other productive or commercial purpose than biofuel production, in order to not modify the natural dynamics of market.

Therefore, the decree points out that the source of raw material and its transformation in biofuels must be traceable according to the legislative decree n°152/2006. The aim is to avoid a huge import of waste and sub-product from extra-European countries.

- > *Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?*

No, at the moment there isn't any quota System that regulates biodiesel production between producers.

- > *Which is the share of UCO to the raw materials used for the biodiesel production?*

45.000 tons UCO transformed in biodiesel (Conoe)

620.000 tons biodiesel produced in 2011(Assocostieri)

Biodiesel from UCO: 7,3%

- > *Which is the way/formula of calculation of the annual quota to be produced in your country?*

According to the legislative decree n°28/11 the annual blending rate of biofuels is set by the National Action Plan for Renewable Energy. Gasoline and diesel supplier are obliged to enter into the fuel distribution network a minimum quota that is calculated according to the total calorific value of gasoline and diesel supplied in the previous year.

### **5.3.3 National Targets for biodiesel in compliance with the 2020 targets**

The Italian national target for the share of renewable sources in gross final consumption of energy in 2020 is 17%. Italy's NREAP sets a target of 10% in the transport sector by 2020.

- > *Which is the current implementation status of the biodiesel targets of NREAP?*

As regards mandatory quotas for biofuels, the financial Law of 2007 fixed a minimum share of 2% biofuels in the final consumption of transport fuels by 2008, 3% by 2009 and 5,75% by 2010, but at the end of 2009 this target was reduced to 3,5% by 2010, 4% by 2011 and 4,5% by 2012.

The renewable energy decree of 28/2011 has further postponed the minimum share of 5% biofuels to 2014 instead of 2013.

### **5.3.4 Biodiesel Blending limits**

#### *Obligatory share of biodiesel in car fuel mix*

Biofuel blending limits in the EU are set according to conventional fuel standards, designed to ensure compatibility with conventional power trains and refueling infrastructure. Biodiesel is regulated by standard EN590/2004 allowing up to 5 % v/v blending of fatty-acid methyl ester (FAME) in diesel fuel. According to the manufacturers, the latest generation of diesel engines equipped with sophisticated after-treatment technologies (i.e. DPF, SCR)



cannot tolerate more than 7% of biodiesel blended with diesel fuel, while in older technology engines, there are no problems with higher biodiesel contents and minor modifications may be necessary when using pure biodiesel. In general, pure vegetable oils cannot be used in modern diesel engines.



## 5.4 Portugal

### 5.4.1 Basic Biodiesel Market Data

> *Volume of Biodiesel currently produced :*

Biofuels Production Estimation by General Directorate of Energy and Geology (DGEG):

Table 15. Biodiesel production for Portugal

	2007	2008	2009	2010	2011
Producers of the General Scheme (.000 liters)			287.871	359.883	414.659
PPD - Dedicated Small Producers (.000 liters)	221.839	190.912	5.655	4.512	4.997
Biodiesel consumption in transport (Biofuels Barometer, toe)	134,959	128,837	255,051	325,254	306,894

> *Biodiesel production capacity*

In 2011 the installed capacity for biodiesel production was about 707.428 tons/year (regarding large facilities with installed capacity over 3,000 ts/year).

> *Number of biodiesel plants*

In 2011 there were 7 major producers of biodiesel and about 18 small producers of biofuels in activity.

> *UCO volume processed*

In 2011 it is estimated that 4,967 L of UCO were used in biofuel production, which represents about 1.2% of the raw material used in the production of biofuels.

### 5.4.2 National Legislation and Regulations Overview

Regarding UCO processing:

- National Decree-Law n. ° 267/2009- legal requirements regarding the UCO waste management produced by the industrial sector, hotels, restaurants (HORECA) and domestic sector(set in force since November 1 of 2009).
- National Executive Rule n. ° 209/2004, mentions UCO as “20 01 25 Edible fuel and fat” according to the European Waste List.
- National Dispatch n. ° 21295/2009 - waste fuels strategy.



- National Decree-Law n. ° 178/2006, - general requirements of waste management and for waste management license (national Executive Rule n. ° 50/2007, January 9).
- National Executive Rule n. ° 335/97, May 16 - technical standards of the waste transportation.
- National Decree-Law n. ° 147/2008, July 29 establishes the environmental accountable legal requirements.
- National Decree-Law n. ° 209/2008, October 29 establishes the industrial activity scheme (REAI).

The licensing process of facilities was approved by the national Regulatory Decree n. ° 61/2007, taking into account Article 74 of the national Decree-Law n. ° 555/99, December 16 as amended by the national Law n. ° 60/2007, September 4 and the national Executive Rule n. ° 216-D/2008, March 3 (Annex VII).

Regarding the biodiesel distribution:

According to Directive 2009/28/EC there is in force the national Decree-Law n. ° 117/2010, 25 October that repeals the national Decree-Law n. ° 62/2006, March 21 with exception of Articles 6th and 7th and establishes the sustainability criteria's for the biofuels and bioliquids production and use, such as, the terrestrial transport biofuels promotion and the definition of the mandatory incorporation of biofuel 2011-2020.

The mechanisms to promote biofuels in terrestrial transports, defining and regulating minimum quotas of mandatory incorporation of biofuels in diesel as well as the procedures for its monitoring and control are established on the national Decree-Law n. ° 49/2009, February 26. These requirements shall not apply to dedicated small producers of biofuels or other renewable fuels, defined under Article 7th of the national Decree-Law n. ° 62/2006, March 21.

To producers of biofuel substitutes for diesel fuel intended for incorporation in fossil fuels for terrestrial transportation and any entities that introduce diesel consumption, processing declarations of release for consumption (DIC) under the Code of Special Taxes on Consumption (CIEC) approved by Decree-Law n. ° 73/2010 of June 21, should inform wholesalers, retailers or final consumers supplied by retailers, the content of biofuels of the product provided, and if the percentage of incorporation is greater than the technical specifications laid down in specific legislation meet the terms of the Article 9th of the Decree-Law n. ° 62/2006, of 21 March, and Article 10th of the Decree-Law n. ° 89/2008 of 30 May (sets the norms relative to the technical specifications applied to fuels, establishing rules for the quality control of road transport fuels and the conditions for the sale of blends of biofuels with gasoline and gasoil in concentrations higher than 5% in volume terms.



Exemption of the tax on petroleum and energy products (ISP) regarding to products that are produced from dedicated small producers approved by national Executive Rule n.º 320-E/2011, December 30.

The recognition as a dedicated small producer must have a joint order from DGEG and from general director of the Customs and Especial Taxes on Consumption (DGAIEC), in accordance with n.º 4 of Article 7th approved by national Decree-Law n.º 62/2006, March 21.

Technical specifications and quality control of fuels are in compliance with national Decree-Law n.º 89/2008, May 30 (modified by national Decree-Law n.º 142/2010, December 31).

National Strategy for 2020 Energy (ENE 2020) approved by Resolution of the Minister Council n.º 29/2010, April 15.

*Additional notes: National Decree-Law n.º 6/2012, January 17 amend the Article 11<sup>th</sup> of the national Decree-Law n.º 117/2010, October 25; and national Decree-Law n.º 206/2008, October 23 amend the Article 7<sup>th</sup> of the national Decree-Law n.º 62/2006, March 21.*

> ***Harmonization of national legislation with 2009/28/EC. Is in force legislation, in compliance with Directive 2009/28/EC, as concerns the sustainability criteria (Articles 17 to 21)***

The Decree-Law n.º 117/2010 25 October repeals the national Decree-Law n.º 62/2006, March 21, with exception of Articles 6th and 7th and transposing into national law the Articles 17th to 19th and Annexes III and V of the Directive n.º 2009/28/EC, April 23. The sustainability criteria's for the biofuels and bioliquids production and use, such as the terrestrial transport biofuels promotion and the definition of the mandatory incorporation of biofuel 2011-2020 are also established on this decree.

Apart from that it was created a National Renewable Energy Action Plan (NREAP) under Directive 2009/28/EC that include the specific measures to fulfill the requirements establish in 17.º to 21 º of the Directive 2009/28/EC.

> ***Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?***

Regarding to the coordination of the verification process of the sustainability criteria's the responsible body is the National Laboratory of Energy and Geology (LNEG) in compliance with Chapter IV of the national Decree-Law n.º 117/2010, October 25.

The responsible entity that should be notified regarding the commercialization of biofuels is General Directorate of Energy and Geology (DGEG) in compliance with Chapter III of the national Decree-Law n.º 117/2010, October 25. This entity it's also responsible for the supervision of the procedures carried out by the coordinator entity of the compliance with the sustainability criteria (LNEG).

> ***Is there any voluntary 'certification' scheme(s) for biofuel and bio liquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?***

National Laboratory of Energy and Geology (LNEG) is assigned to coordinate the process of verification of compliance with sustainability criteria.

By a joint order of the Government members responsible for energy, environment and agriculture areas, there is a voluntary national scheme for biofuel and bio liquid sustainability according to the Executive Rule n. ° 8/2012, January 4, which approves the Regulation of the Operation of the Coordinating Entity of the Sustainability Criteria Compliance (ECS). The ECS duties are ensured by LNEG.

> ***Mention any direct subsidies or tax relief quota which benefits the biodiesel sector***

In Portugal there are two support schemes for biofuels: the general scheme (major producers) and PPD – Dedicated Small Biofuel Producer (capacity less than 3,000 ts / year). As mentioned the national Decree-Law n.º 117/2010, October 25 establishes sustainability criteria for the production and use of biofuels and bioliquids and sets limits of the biofuels mandatory incorporation for 2011-2020. This law also establishes a mechanism to support biofuels to run until 2020.

- PT tax benefits in force - Decree-Law n.º 117/2010: establish the criteria to qualify the sustainable biofuels;
- creates a new mechanism of support to incorporate biofuels at the transport sector;
- finish with the tax relief for the larger producers (until the end of 2010 larger producers benefits of a tax relief of 280Euros/1000l);
- small producers still benefits from ISP tax exemption if they produced lower than 3000 ton/l of biofuels;
- creates a biofuels entitlements emission system (TdB) to check producers meet the targets of the incorporation of the biofuels; double counting when the feedstock origin is from residues (UCO) or other detritus;
- Each incorporator can obtain TdB from two different ways:
  - Incorporating biofuels to reach their own target, or
  - Getting TdB from other agent

Until December 15th of the year before TdB emission producers should present a request with maximum production for the next year (proving with documentation their real capacity);

The paragraph n.º 1 of the Article 28th of the national Decree-Law n.º 117/2010, October 25 define a specific goal to accomplish by the end of 2014, the introduction of a minimum of 6.75% (by volume) biodiesel (FAME) in diesel used in this sector. Therefore, pursuant to Article 29th of this decree, shall be allocated by the end of 2014, reservation quotas of the biofuels entitlements emission (TdB-D).

Consider also for exemption of the tax on petroleum and energy products national Executive Rule n.º 320-E/2011, December 30 (procedures for recognition as dedicated small producers and an exemption of the tax on petroleum and energy products benefits).

> ***Status of Double counting provisions***

In accordance with the provisions of the national Decree-Law n.º 117/2010, October 25 if the raw materials used in the production of biofuels are from:

- Residues or waste, for each tep of biofuel consumption incorporated into the consumption it will be emitted 2 TdB;
- Non-food cellulosic and ligno-cellulosic material, for each tep of biofuel consumption incorporated into the consumption it will be emitted 2 TdB;
- Non-food endogen origin, for each tep of biofuel consumption incorporated into the consumption it will be emitted 1,3 TdB;
- Agriculture endogen origin, for each tep of biofuel consumption incorporated into the consumption it will be emitted 1,1 TdB.

> ***Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?***

The paragraph n.º 1 of the Article 28<sup>th</sup> of the national Decree-Law n.º 117/2010, October 25 define a specific goal to accomplish by the end of 2014, the introduction of a minimum of 6.75% (by volume) biodiesel (FAME) in diesel used in this sector. Therefore, pursuant to Article 29<sup>th</sup> of this decree, shall be allocated by the end of 2014 reservation quotas of the biofuels entitlements emission TdB-D).

This Decree-Law also provides in its Article 19<sup>th</sup> that dedicated small producers of biofuels benefit of an exemption of the tax on petroleum and energy products (ISP) under the Code of Special Taxes on Consumption (CIEC). Consider also for exemption of the tax on petroleum and energy products national Executive Rule n.º 320-E/2011, December 30.

The entity who's responsible for the biofuels entitlements emission is LNEG.

> ***Which is the share of UCO to the raw materials used for the biodiesel production?***

In 2011 were used in biofuel production about 4.967 liters of UCO, which represents about 1.2% of the raw material used in the production of biofuels.



> **Which the way/formula of calculation of the annual quota to be produced in your country?**

In compliance with Articles 28th e 31th of the national Decree-Law n. º 117/2010, October 25 the formula for calculation it's according to Executive Rule n. º 41/2011, January 19. The Decree-Law n. º 117/2010, October 25, states in Article 28th an obligation of incorporation, by the end of 2014, a minimum of 6.75% (v/v) biodiesel in diesel fuel used in terrestrial transport sector. In order to maintain national production of biofuels with a cost that is acceptable to the end user has been published the Executive-Rule n.º 40/2011, January 19, which established a new formula for calculating the maximum selling price of biodiesel by producers of biofuels entities obliged to perform its incorporation in diesel, when accompanied by their biofuels entitlements (TdB). The formula is:

Maximum price (in Euros per cubic meter) = mix oils index + freight index + methanol index + variable production costs + other production costs

	Winter Jan, Feb, Nov, Dec	Intermediate Mar, Oct	Summer Apr, May, Jun, Jul, Aug, Set
Meses de aplicação	Inverno — Janeiro, Fevereiro, Novembro, Dezembro	Intermédio — Março, Outubro	Verão — Abril, Maio, Junho, Julho, Agosto, Setembro
Index mix óleos . . . . .	$0,30 * S + 0,70 * C$	$0,70 * S + 0,10 * P * \text{€/USD} + 0,20 * C$	$0,75 * S + 0,25 * P * \text{€/USD}$
Index frete . . . . .	26	$0,90 * 26 + 0,10 * Fp * \text{€/USD}$	$0,75 * 26 + 0,25 * Fp * \text{€/USD}$
Index metanol . . . . .	$11\% * Me$		
Custos variáveis produção . . . . .	110		
Outros custos produção . . . . .	70		

Where,

$S = (\text{quotation published in REUTERS - SOIL-NLD-GUM -P1, in €/t}) * 0,91;$

$P = (\text{quotation published in REUTERS - PALM-OLEIN -P1 in USD/t}) * 0,91;$

$C = (\text{quotation published in REUTERS - RPEO-NLEURO -P1, in €/t}) * 0,91;$

$Fp = (\text{quotation published in REUTERS - FIX-MYRDM5 -10, in USD/t}) * 0,91;$

$Me = (\text{quotation published in Reuters - MTH-CIFNWE, in €/t}) * 0,792;$

€/USD = exchange rate €/USD published by the European Central Bank.



Each raw material quotation it's related to a code published in REUTERS, obtained through consultation. DGEG has direct access to REUTER's application and extract data per each raw material in a determinate period. For example:

Calculation of maximum price of February 2013 (Winter) =  $[0,30 * (\text{quotation of SOIL publishes in Reuters in the period from December 20 until January 19} * 0,91) + 0,70 * (\text{quotation of RPEO publishes in Reuters in the period from December 20 until January 19} * 0,91)] + 26 + [11% * (\text{quotation of Methanol publishes in Reuters in the period from December 20 until January 19} * 0,792)] + 110 + 70 = 1.053,31 \text{ €/m}^3$

The maximum selling price of biodiesel is limited to the amount obtained by applying the following formula:

$$\text{Limit} = \text{GO 10 ppm} * 0,845 * \text{€/USD} + 650$$

Where:

*GO 10 ppm = quotation Northwest Europe Cargoes Mean CIF NWE/Basis ARA Diesel 10 ppm NWE, in USD/ton, published in Platts European Marketscan;*

*€/USD = exchange rate €/USD published by the European Central Bank.*

### 5.4.3 National Targets for biodiesel in compliance with the 2020 targets

According to NREAP-Portugal:

Table 16. National 2020 targets for Portugal

%	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES-T (*)	0,19%	5,0%	5,1%	5,3%	5,7%	5,9%	8,0%	8,2%	9%	9,3%	9,7%	10,0%
RES Biodiesel from UCO	0,00%	0,07%	0,07%	0,08%	0,08%	0,10%	0,10%	0,10%	0,12%	0,12%	0,14%	0,14%

(\*) Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Article 5(1)(c) and 5(5) of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Chart 1). Line (J) from Chart 3b divided by row (3) of Chart 1.

#### > **which is the current implementation status of the biodiesel targets of NREAP?**

The paragraph n. ° 1 of the Article 28th of the national Decree-Law n. ° 117/2010, October 25 define a specific goal to accomplish by the end of 2014, the introduction of a minimum of 6.75% (by volume) biodiesel (FAME) in diesel used in this sector.



#### **5.4.4 Biodiesel Blending limits**

##### *Obligatory share of biodiesel in car fuel mix*

In Portugal, currently, it is 5,0% (according to the Article 11th of the national Decree-Law n. ° 117/2010, October 25). For 2013 and 2014 it will be 5,5% (according to the Article 11th of the national Decree-Law n. ° 117/2010, October 25, modified by the national Decree-Law n. ° 6/2012, January 17). We have also taken into account that the incorporators are obligated until the end of 2014 to incorporate on diesel used in the terrestrial transport sector a minimum of 6,75% in volume of biodiesel (Article 28th of the national Decree-Law n. ° 117/2010, October 25).



## 5.5 Spain

### 5.5.1 Basic biodiesel market data

- > *Volume of biodiesel currently produced:* 775,823 m<sup>3</sup> (2010)
- > *Biodiesel production capacity:* 4,897,715 m<sup>3</sup> (2011)
- > *Number of biodiesel plants:* 44 (2011)
- > *UCO volume processed:* 193,639 m<sup>3</sup> (2011)

Source: IDAE, 2011.

Biodiesel consumption in transport for Spain (Biofuels Barometer, toe)

	2007	2008	2009	2010	2011
Biodiesel consumption in transport (Biofuels Barometer, toe)	259,000	520,012	907,951	1,180,950	1,443,131

### 5.5.2 National Legislation and Regulations Overview

· General framework:

- Law 34/1998, of October 7<sup>th</sup>, on hydrocarbons sector. (Amended by Law 12/2007, of 2<sup>nd</sup> July). It regulates market activities regarding liquid and gaseous hydrocarbons, including biofuels produced from vegetal oil (price, distribution, storage, etc.). It also establishes the national yearly objective for transport biofuels for the period 2008-2010 (minimum share of biofuels regarding fossil fuels).

· Technical specification and fuel quality:

- Royal Decree 61/2006 of 31<sup>st</sup> January, determining the specifications of petrol, diesel, fuel oils and liquefied petroleum gases, and regulating the use of certain biofuels; amended by Royal Decree 1088/2010 of 3<sup>rd</sup> September. Particularly, in the case of biodiesel the norm sets the obligation to display a disclaimer concerning blends of more than 7% and defines the technical specifications for this fuel (UNE-EN 14214 for automotive uses and UNE-EN 14213 for heating systems).



## · Taxation

- Law 38/1992 of 28<sup>th</sup> December for Excise taxes. Modified by Law 53/2002 of 30<sup>th</sup> December on Fiscal, Administrative and Social Policy Measures and by Law 22/2005 of 18<sup>th</sup> November, incorporating into Spanish legislation several EU directives on taxation and on energy and electricity products; and on the common system of taxation applicable in the case of parent companies and subsidiaries of the different Member States; and regulating the tax system of cross-border contributions to pension funds within the scope of the European Union.
- Royal Decree 1165/1995 of 7<sup>th</sup> July, approving the Regulations on Excise taxes; amended by Royal Decree 1739/2003 of 19<sup>th</sup> December, amending the Regulation on Excise Taxes, approved by Royal Decree 1165/1995, of 7<sup>th</sup> July and Royal Decree 3485/2000 of 29<sup>th</sup> December; amended by Royal Decree 774/2006 of 23<sup>rd</sup> June; amended by Royal Decree 191/2010, of 26<sup>th</sup> February.

## · Compulsory Use

- ITC/2877/2008 Ministerial Order of 9<sup>th</sup> October, establishing a mechanism to promote the use of biofuels and other renewable fuels for transport purposes.
- Royal Decree 459/2011 of 1<sup>st</sup> April, setting the compulsory targets for biofuels for years 2011, 2012 and 2013.
- Circular 1/2013 of 9<sup>th</sup> May, of the National Energy Commission, regulating the management of the mechanism to promote the use of biofuels and other renewable fuels for transport purposes.
- Royal Decree-Law 4/2013 of 22nd February on measures to support entrepreneurs. It includes an amendment to RD 1597/2011 of 4<sup>th</sup> November transposing the provisions on the sustainability criteria for bioliquids into Spanish law, and sets new compulsory targets for biofuels for 2013 and following years.



· Sustainability

→ Royal Decree 1597/2011, of 4<sup>th</sup> November, regulating the sustainability criteria for biofuels and bioliquids, the National Verification System for Biofuels Sustainability and the double value of certain biofuels.

> ***Harmonization of national legislation with 2009/28/EC. Is there in force legislation in compliance with Directive 2009/30/EC, as concerns the sustainability criteria (Articles 17 to 21)***

The Royal Decree 1597/2011 transposed EU sustainability criteria to national regulation (articles 17 to 21 from Renewable Energy Directive) defined Spain's National Scheme for verification of compliance and transposed those provisions in the Directive related to double credit for certain biofuels.

> ***Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?***

The National System for Sustainability Certification is comprised by:

→ National Energy Commission (CNE), which is be part of the national system of verification of sustainability and responsible for issuing and accounting biofuel's consumption certificates (SICBIOS).

→ Ministry of Industry, Energy and Tourism, which oversees the system.

→ Sustainability certification entities, which have to be accredited for this purpose and is responsible for issuing the sustainability verification report.

→ Economic agents (including farmers, raw materials elevators and merchants, biofuel producers, petrol and petrol logistics companies, etc.) which have to maintain relevant information on sustainability assurance for a 5 years period for auditing purposes.

> ***Is there any voluntary 'certification' scheme(s) for biofuel and bioliquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?***

Sustainability criteria are identical to those in Directive 2009/28/EC:

→ In terms of land use, there are certain land categories excluded from production of biofuels raw material. In addition to that, when land category is appropriate Statutory Management Requirements and Good Agricultural and Environment Condition have to be observed.

- For GHG-emission savings default values or calculated values can be used. A GHG calculator is available in the IDAES's webpage.

To prove sustainability it maintains the three options described in the RED which are voluntary schemes, national schemes or a bilateral/multilateral agreements recognized by the EU Commission. Combinations of these options are also accepted.

In addition to these three paths, the Director General for Energy Policy and Mines (Spanish Ministry of Industry, Energy and Tourism) can deem appropriate to recognize other MS national verification systems. (Most Spanish biofuel producers have chosen to obtain certification from ISCC, 2BSvs and RBSA).

According to the RD 1597/2011, obligated parties must submit to the CNE batch identification, biofuel type, volume, raw materials and country of origin. As it pertains to information regarding sustainability, this should include the system chosen for sustainability certification. Also a responsible declaration or a sustainability verification reporting assuring compliance with mass balance and traceability as well as with GHG emission reduction, land use and good agricultural practices is required.

Sustainability requirements for all biofuel marketed in order to be eligible to count against consumption targets, were supposed to be launched on January 1st 2013. The "Royal Decree-Law 4/2013 on measures to support entrepreneurs, stimulate growth and create employment" includes an amendment to RD 1597/2011. This amendment enshrines the suspension, for an unspecified period of time, of the application of the sustainability criteria which was already behind schedule due to delayed transposition of the directive in question. During this unspecified period, the sustainability criteria will be indicative, thereby suspending the possibility of initiating any sanctions except in the case of failure to provide the information required.

> ***Mention any direct subsidies or tax relief quota which benefits the biodiesel sector***

According to Law 22/2005, biofuels were exempted from the hydrocarbons tax, currently set at 0,278 €/liter for diesel and 0,371 €/liter for gasoline, until 31 December 2012.

This special rate only applied to the volume of the actual biofuel, even when it is mixed with other products. If deemed appropriate, on the basis of the relative production cost of petroleum products and biofuels, the zero rate could be replaced with a positive levy which shall not exceed the tax rate applicable to equivalent conventional fuels. Nevertheless biofuels were subject of the tax on retail sales of hydrocarbons, whose total amount varies depending on the region and a VAT of 21%.

This tax exemption is not in force since 1st January 2013.

> *Status of Double counting provisions*

According to RD 1597/2011, biofuels derivatives from waste, residues, non-cellulosic and lingo-cellulosic materials shall count double to meet national targets as this type of biofuel rise less land use concerns and provide with greater emission savings. On the downside for the biodiesel industry, the double counting reduces the volume needed for mandate compliance. Even though this norm transposes article 21.2 of RED, it provides no details on the following essential aspects: definitions wastes and residues, feedstocks eligible for double counting, the start date of double counting and traceability mechanism of double counting biofuels.

> *Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?*

To accomplish the targets set in the Directive, Spain opted for a mandatory biofuels blending beginning in 2009. The amounts of transport biofuels that must be place in the market by fuel sector operators are shown in the following table. Gaps between specific and overall mandates can be fulfilled by either biofuel.

Table 17. Biodiesel and bioethanol rates for Spain according to RD 459/2011 and RDL 4/2013

Year	Type of mandate	Overall mandate	Biodiesel specific mandate	Bioethanol specific mandate
2008	Voluntary	1,9	1,9	1,9
2009	Mandatory	3,4	2,5	2,5
2010	Mandatory	5,83/4,78	3,9	3,9
2011	Mandatory	6,2	6	3,9
2012	Mandatory	6,5	7	4,1
2013*	Mandatory	4,1	4,1	3,9

\* RDL 4/2013 decreased the mandatory rates for 2013 and following years.

The CNE issues certificates in favor of each party obliged based on the information supplied through the Certification System (SICBIOS). One certificate equals one metric ton of biofuel marketed. There are biodiesel and bioethanol specific certificates that count against each mandate. Certificates can be transferred between parties and since 2010 they can be also transferred to the following year (up to a maximum of 30%). At the end of the year CNE calculates whether the obligated parties met the mandate. Fines of 350 € are imposed per certificate that the obligated party failed to market. The mandates are based in energy content (toe), not in volume.

> *Which is the share of UCO to the raw materials used for the biodiesel production?*

As indicated by the Report about Biofuels Use 2011 published by the CNE, the share of UCO to the raw materials used for the biodiesel produced in Spain during 2011 was the 24,96%. In the following table you could find the share of all raw materials:

Table 18. Share rate of raw materials in the biodiesel production in Spain (2011)

Raw Material	Share (%)
Palm oil	44,81
Used Cooking Oil	24,96
Soya oil	23,88
Animal fats	4,42
Rapeseed oil	1,13
Sunflower oil	0,36

Source: CNE, 2012

> *Which is the way/formula of calculation of the annual quota to be produced in your country?*

According to Ministerial Order ITC/2877/2008, the amounts of biofuel that must be place in the market by fuel sector operators can be calculated using the following formula:

$$OB_{in} = \frac{(CBD_{in} + CBG_{in})}{(D_{in} + G_{in})}$$

Where:

$OB_{in}$  = Biofuel production objective corresponding to the company "i" during the year "n".

$CBD_{in}$  = Amount of biofuel certificates for biodiesel owned by the company "i" during the year "n".

$CBG_{in}$  = Amount of biofuel certificates for gasoline owned by the company "i" during the year "n".

$D_{in}$  = Amount of diesel (toe) sold or consumed by the company "i" during the year "n", including biofuel-blended diesel and pure biofuel capable to be mixed with fossil diesel.

$G_{in}$  = Amount of gasoline (toe) sold or consumed by the company "i" during the year "n", including biofuel-blended diesel and pure biofuel capable to be mixed with fossil diesel.

### 5.5.3 National targets for biodiesel in compliance with 2020 targets

According to the Spanish's National Renewable Energy Action Plan 2010-2020, the national target and estimated trajectory of energy from biodiesel in transport sector is shown in the following table:



Table 19. National targets for biodiesel production for Spain (2011)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biodiesel , ktoe	1,816	1,878	1,900	1,930	1,970	2,020	2,070	2,120	2,170	2,313

Source: IDAE, 2011.

Table 20. Biofuel consumption for transport in Spain (2011)

	2005	2006	2007	2008	2009	2010	2011
Biodiesel, ktoe	23	54	259	894	908	1187	1443

Source: EurObserv'ER, 2011.

#### 5.5.4 Biodiesel blending limits

There is no obligatory share of biodiesel in car fuel mix. However, according to the Royal Decree 1088/2010, in order to ensure appropriate consumer information, fuel suppliers shall display the following disclaimer concerning biodiesel blends of more than 7%: “Before using this product, please make sure it is suitable for your engine”.

## 6. TECHNICAL NORMS RELATED TO THE UCO PROCESSING

The production, storage, transportation and use of various biofuels is governed by a range of international standards. In the following chapters the applicable standard in EU and the RecOil countries are presented

### 6.1 European standards related to the biodiesel production plants

In this chapter the following standards are presented:

EN 14214:2008 + A1 2009	Automotive fuels. Fatty acid methyl esters (FAME) for diesel engines. Requirements and test methods. (FAME B100)
EN 590:2009	Automotive fuels. Diesel. Requirements and test methods. (Diesel with B7)
EN 14213:2003	Heating fuels. Fatty acid methyl esters (FAME). Requirements and test methods
EN 14078:2009	Liquid petroleum products. Determination of fatty acid methyl ester (FAME) content in middle distillates. Infrared spectrometry method
EN 16214-1:2012	Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 1: Terminology (approved on Sep. 2012)
EN 16214-3:2012	Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 3: Biodiversity and environmental aspects related to nature protection purposes

#### 6.1.1 Automotive fuels. Fatty acid methyl esters (FAME) for diesel engines. Requirements and test methods. (FAME B100)

**EN 14214:2008 + A1 2009:** specifies requirements and test methods for marketed and delivered fatty acid methyl esters (hereafter known as FAME) to be used either as automotive fuel for diesel engines at 100 % concentration, or as an extender for automotive fuel for diesel engines in accordance with the requirements of EN 590. At 100 % concentration it is applicable to fuel for use in diesel engine vehicles designed or subsequently adapted to run on 100 % FAME

**Differences exist between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.**

Blends are designated as "B" followed by a number indicating the percentage biodiesel. For example: B100 is pure biodiesel. B99 is 99% biodiesel, 1% petrodiesel. B20 is 20% biodiesel and 80% fossil diesel

Table 21. EN 14214 -Specifications

Property	Units	lower limit	upper limit	Test-Method
Ester content	% (m/m)	96,5	-	EN 14103
Density at 15°C	kg/m <sup>3</sup>	860	900	EN ISO 3675 / EN ISO 12185.
Viscosity at 40°C	mm <sup>2</sup> /s	3,5	5,0	EN ISO 3104
Flash point	°C	> 101	-	EN ISO 2719 / EN ISO 3679.
Sulfur content	mg/kg	-	10	- EN ISO 20846 / EN ISO 20884.
Carbon residue remnant (at 10% distillation remnant)	% (m/m)	-	0,3	EN ISO 10370
Cetane number	-	51,0	-	EN ISO 5165
Sulfated ash content	% (m/m)	-	0,02	ISO 3987
Water content	mg/kg	-	500	EN ISO 12937
Total contamination	mg/kg	-	24	EN 12662
Copper band corrosion (3 hours at 50 °C)	rating	Class 1	Class 1	EN ISO 2160
Oxidation stability, 110°C	hours	6	-	prEN 15751 / EN 14112
Acid value	mg KOH/g	-	0,5	EN 14104
Iodine value	-	-	120	EN 14111
Linolenic Acid Methylene	% (m/m)	-	12	EN 14103
Polyunsaturated (>= 4 Double bonds) Methylene	% (m/m)	-	1	EN 14103
Methanol content	% (m/m)	-	0,2	EN 14110I
Monoglyceride content	% (m/m)	-	0,8	EN 14105
Diglyceride content	% (m/m)	-	0,2	EN 14105
Triglyceride content	% (m/m)	-	0,2	EN 14105
Free Glycerine	% (m/m)	-	0,02	EN 14105 / EN 14106
Total Glycerine	% (m/m)	-	0,25	EN 14105
Group I metals (Na+K)	mg/kg	-	5	EN 14108 / EN 14109 / EN 14538
Group II metals (Ca+Mg)	mg/kg	-	5	EN 14538
Phosphorus content	mg/kg	-	4	EN14107

The European standard for biodiesel EN 14214 is translated into the respective national standards for each country that forms the **CEN** (European Committee for Standardization) area e.g., for the United Kingdom, BS EN 14214 and for Germany DIN EN 14214. It may be used outside the CEN area as well.

The German standard **DIN 51606** is considered to be the highest standard currently existing, and is considered by almost all vehicle manufacturers as evidence of compliance with the strictest standards for diesel fuels. The vast majority of biodiesel produced commercially meets or exceeds this standard.

There are DIN standards for three different types of biodiesel, which are made of different oils:

- RME (rapeseed methyl ester, according to DIN E 51606)
- PME (vegetable methyl ester, purely vegetable products, according to DIN E 51606)
- FME (fat methyl ester, vegetable and animal products, according to DIN V 51606)

**ASTM D6751** is a specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels set by the American Society for Testing and Materials (ASTM) International.

It is generally comparable to European standard EN 14214.

Other international standards published by ASTM International include:

- D6751-08 Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels.
- D975-08a Specification for Diesel Fuel Oils (on and off-road applications).
- D396-08b Specification for Fuel Oils (home heating and boiler applications).
- D7467-08 Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20).

Table 22 allows comparing the different standard requirements.

Table 22. Different FAME standard requirements compared with petroleum diesel standard

Biodiesel Standards		Europe	Germany	USA	Petroleum Diesel
Specification		EN 14214	DIN V 51606	ASTM D6751-07b	EN 590: 1999
Applies to		FAME	FAME	FAME	Diesel
Density 15 °C	g/cm <sup>3</sup>	0.86 – 0.90	0.875 – 0.90		0.82 – 0.845
Viscosity 40 °C	mm <sup>2</sup> /s	3.5 – 5.0	3.5 – 5.0	1.9 – 6.0	2.0 – 4.5
Distillation	% @ °C			90 %, 360 °C	85%, 350°C – 95%, 360°C
Flashpoint	°C	101 min	110 min	93 min	55 min
CFPP	°C	*country	Summer : 0 °C		*country specific



		specific	Spt/aut : -10 °C	Winter : -20 °C	
Sulphur	mg/kg	10 max	10 max	15 max	350 max
Carbon residue (10% dist. Residue)	%mass	0.03 max	0.03 max		0.3 max
Sulphated ash	%mass	0.02 max	0.03 max	0.02 max	
Oxid ash	%mass				0.1 max
Water	mg/kg	500 max	300 max	500 max	200 max
Total contamination	mg/kg	24 max	20 max		24 max
Cu corrosion max	3h/50°C	1	1	3	1
Oxidation stability	hrs; 110°C	6 hours min		3 hours min	N/A (25 g/m <sup>3</sup> )
Cetane number		51 min	49 min	47 min	51 min
Acid value	mgKOH/g	0.5 max	0.5 max	0.5 max	
Methanol	%mass	0.2 max	0.3 max	0.2 max or Fp <130 °C	
Ester content	%mass	96.5 min			
Monoglyceride	%mass	0.8 max	0.8 max		
Diglyceride	%mass	0.2 max	0.4 max		
Triglyceride	%mass	0.2 max	0.4 max		
Free glycerol	%mass	0.02 max	0.02 max	0.02 max	
Total glycerol	%mass	0.25 max	0.25 max	0.24 max	
Iodine value	%mass	120 max	115 max		
Linoleic acid ME	%mass	12 max			
C(x:4) and greater unsaturated esters	%mass	1 max			
Phosphorus	%mass	4 max	10 max	10 max	
Alkalinity	mg/kg		5 max		
Gp I metals (Na,K)	mg/kg	5 max		5 max	
Gp II metals (Ca,Mg)	mg/kg	5 max		5 max	
PAHs	%mass				11 max
Lubricity / wear	µm @ 60°C				460 max

### EN 14214 evolution

In cooperation with the CEN/TC 19 Steering Group and the WG 24 Conveyor, the CEN/TC 19 Chairman decided to revise the Annex C on “Background to national cold climate decisions” as presented by document N 1533. The main revisions are:

- updating of the correlation equation, following CEN/TC 19/WG 36 review, and
- distinct caution statement on the methodology’s inherent uncertainty.

Table 23. Relationship between Maximum content of Monoglyceride [%] and Cloud Point [°C] / CFPP [°C] During Summer Period

								Method
	Cloud Point °C	16	13	9	5	0	-3	EN23015
	CFPP °C	13	10	5	0	-5	-10	EN116
Monoglyceride content max %	0.7		-	-	-	X	X	EN14105
	0.6		-	-	-	X	X	
	0.5		-	-	X	X	X	
	0.4		-	X	X	X	X	
	0.3		X	X	X	X	X	
	0.15	X	-	-	-	-	-	

Table 24. Relationship between Maximum content of Monoglyceride [%] and Cloud Point [°C] / CFPP [°C] During Winter Period

								Method
	Cloud Point °C	16	13	9	5	0	-3	EN23015
	CFPP °C	13	10	5	0	-5	-10	EN116
Monoglyceride content max %	0.7		-	-	-	-	X	EN14105
	0.6		-	-	-	X	X	
	0.5		-	-	-	X	X	
	0.4		-	-	X	X	X	
	0.3		-	X	X	X	X	
	0.15	-	-	-	-	-	-	



## 6.1.2 Automotive fuels. Diesel. Requirements and test methods. (Diesel with B7)

**EN 590:2009.** European Standard that describes the physical properties that all automotive diesel fuel must meet if it is to be sold in the European Union, Croatia, Iceland, Norway and Switzerland. It allows the blending of up to 7% fatty acid methyl ester biodiesel with 'conventional' diesel - a 7:93 mix.

### EN 590:2009 Specifications

Property	Unit	lower limit	upper limit	Test-Method
Cetane index		46,0	-	EN ISO 4264
Cetane number		51,0	-	EN ISO 5165
Density at 15°C	kg/m <sup>3</sup>	820	845	EN ISO 3675, EN ISO 12185
Polycyclic aromatic hydrocarbons	%(m/m)	-	11	EN ISO 12916
Sulphur content	mg/kg	-	350 (until 2004-12-31) or 50,0	EN ISO 20846, EN ISO 20847, EN ISO 20884
			10,0 (on the 01-01-2009)	EN ISO 20846, EN ISO 20884
Flash point	°C	Above 55	-	EN ISO 2719
Carbon residue (on 10% distillation residue)	%(m/m)	-	0,30	EN ISO 10370
Ash content	%(m/m)	-	0,01	EN ISO 6245
Water content	mg/kg	-	200	EN ISO 12937
Total contamination	mg/kg	-	24	EN ISO 12662
Copper strip corrosion (3 hours at 50 °C)	rating	Class 1	Class 1	EN ISO 2160
Oxidation Stability	g/m <sup>3</sup>	-	25	EN ISO 12205
Lubricity, corrected wear scar diameter (wsd 1,4) at 60 °C	µm	-	460	EN ISO 12156-1
Viscosity at 40 °C	mm <sup>2</sup> /s	2,00	4,50	EN ISO 3104
Distillation recovered at 250 °C, 350 °C	%V/V	85	<65	EN ISO 3405
95%(V/V) recovered at	°C	-	360	
Fatty acid methyl ester content	%(V/V)	-	7	EN 14078

### **EN 14214 modification to define a B10 standard**

Including B10 into EN 590, have to be consistent with 2009/30/EC and Mandate M/394, which states that proper functioning in the intended applications must be guaranteed (page 4, last sentence).

In order to increase the use of renewable products in road fuels, CEN is improving the EN 590 diesel fuel specification to allow blending of up to 10% v/v FAME complying with the EN 14214 specification. Some vehicle manufacturers have claimed that certain types of diesel particulate filters (DPF) systems are unable to use more than 7% (V/V) FAME due to increasing engine oil dilution and proposed to the Commission not to develop the B10 specification in EN 590 and to create a separated standard.

A draft document concerning a B10 standard has been produced. Based on this document an enquiry was led (Aug-October 2011) and commentaries were resolved (June 2012). A formal vote took place in September 2012 to produce a publication (expected at the beginning of 2013).

Further modifications to standard for later revision:

- Phosphorus reduction
- Alkaline metal reduction
- Petro Oxy test method and limit introduction
- Inclusion of FAEE
- Acid number test
- Improved cetane measurement
- Incorporate ICP-OES method (if not done for enquiry)
- Inclusion of SMG method and limit value, if appropriate

### **B30 specifications: work in progress**

In March 2012 the TF FAME presented a B30 draft to be discussed during the WG 24 meeting. The report is published as CEN/TR.

The main target is to establish a specification for blending from more than 10 % (V/V) up to 30 % (V/V) of FAME in diesel fuel to be used in captive fleet application for designated vehicles.

TF FAME considers feasible the B30 specific and recommends WG24 to set up the existing work item to create an EN specific as soon as possible.

UE Commission DG Energy supports the development of a B30 specific standard.

The high FAME content (B11 -B30) specific will be a blend of diesel fuel complying with EN 590 and FAME complying with EN 14214. Not all the parameters required by the two specifics will be included. The current version won't consider the following parameters: Linolenic Acid



Methyl Ester, Aromatics, Glycerides: Mono, Di, and Tri, Glycerine (glycerol), total and free, Total acidity, Iodine number, Alkali metals (Na + K), Alkaline earth metals (Ca + Mg), Phosphorus, Lubricity, Copper strip corrosion.

### 6.1.3 Heating fuels. Fatty acid methyl esters (FAME). Requirements and test methods

EN 14213:2003<sup>6</sup> This European Standard specifies requirements and test methods for marketed and delivered fatty acid methyl esters (FAME) to be used either as a heating fuel at 100% concentration, or as a blending component for the production of heating fuel. At 100% concentration it is applicable to fuel for use in heating equipment designed or subsequently adapted to run on 100% FAME.

### 6.1.4 Liquid petroleum products. Determination of fatty acid methyl ester (FAME) content in middle distillates. Infrared spectrometry method

EN 14078:2009: This test method covers the determination of the content of fatty acid methyl esters (FAME) biodiesel in diesel fuel oils

### 6.1.5 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 1: Terminology (approved on Sep. 2012)

EN 16214-1:2012: This European Standard defines the terminology to be used in the field of sustainability criteria for the production of biofuels and bioliquids for energy applications. This European Standard specifically considers some relevant terms and definitions used in the European Commission Directive 2009/28/EC [1], referred to as Renewable Energy Directive (RED), and in the European Commission Directive 2009/30/EC [2] referred to as Fuel Quality Directive (FQD), or in other European regulations.

<sup>6</sup> Recently, the EN 14214:2012 was approved about **Liquid petroleum products - Fatty acid methyl esters (FAME) for use in diesel engines and heating applications - Requirements and test methods**. This European Standard includes EN 14213 in the existing EN 14214 and specifies requirements and test methods for marketed and delivered fatty acid methyl esters (hereafter known as FAME) to be used either as fuel for diesel engines and for heating applications at 100 % concentration, or as an extender for distillate fuel for diesel engines in accordance with the requirements of EN 590 and for heating fuel. At 100 % concentration it is applicable to fuel for use in diesel engines and in heating applications designed or subsequently adapted to run on 100 % FAME.



### **6.1.6 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 3: Biodiversity and environmental aspects related to nature protection purposes**

EN 16214-3:2012: This European Standard only defines procedures, criteria and indicators to provide the required evidence for:

- > production of raw material in areas for nature protection purposes;
- > harvesting of raw material from highly biodiverse non-natural grassland; and
- > cultivation and harvesting on peatland.

This European Standard specifies requirements relevant for the provision of evidence by economic operators that the production, cultivation and harvesting of raw materials is in accordance with legal or other requirements concerning the areas mentioned above. It is applicable to production, cultivation and harvesting of biomass for biofuels and bioliquids production.

## 6.2 National standards and Quality protocols related to the biodiesel production plants

An overview of the quality protocols at the RecOil countries is presented at Tables 24 and 25.

Table 25. Technical Norms with regard to the biodiesel production at the RecOil Countries

Country	EN 14214:2008 + A1 2009	590:2009	EN 14213:2003
Denmark	Yes	Yes	
Greece	Yes	Yes	Yes
Italy	Yes	Yes	
Portugal	Yes	Yes	
Spain	Yes		Yes

Table 26. Technical Norms with regard to biodiesel distribution at the RecOil Countries

Country	Seveso II	other
Denmark	Yes	
Greece	Yes	<i>Technical instructions for storage and handling of biofuel refinery facilities - storage facilities and distribution of petroleum products</i>
Italy	Yes	
Portugal		distribution of petroleum products Decree-Law n. ° 267/2002 Decree-Law n. ° 389/2007 Decree-Law n.° 31/2008
Spain	Yes	

The main difference that exists between EN 14214 standards of different countries can be found in the national annex detailing climate related requirements of biodiesel. For climate-dependent requirements options are given to allow for seasonal grades to be set nationally. The options are for temperate climates six CFPP (cold filter plugging point) grades and for arctic climates five different classes. Climate-dependent requirements are given to the EN 14214 documentation divided into two sections, one for temperate climates and one for arctic climates.

In Table 27, some specific CFPP requirements are shown as example of differences between EN 14214 standards of different countries. Requirements are referred to summer and winter periods and may include (an) intermediate and/or regional period(s) which shall be justified by national meteorological data.

Table 27. Country Specific CFPP requirements according to various national versions of EN 14214

Country	Standard	Season	Dates of season	MAX CFPP (°C)
United Kingdom	BS EN 14214	Summer	16th March – 15th November	-5 °C
		Winter	16th November – 15th March	-15 °C
Austria	ONREM EN 14214	Summer	1st April – 30th September	+5 °C
		Winter	1st October - 28th February	-20 °C
		Spring	1st March – 31st March	-15 °C
Estonia	EVS EN 14214	Summer	1st May – 20th September	-5 °C
		Winter	1st December – 29th February	-26 °C
France	NF EN 14214	Summer	15th April – 31st October	0 °C
		Winter	1st November – 31st March	-15 °C
Germany	DIN EN 14214	Summer	15th April – 30th September	0 °C
		Winter	16th November – 28th February	-20 °C
		Spring	1st March – 14th April	-10 °C
		Autumn	1st October – 15th November	-10 °C
Greece	ELOT EN 14214	Summer	1st April – 30th September	+5 °C
		Winter	1st October - 31st March	-5 °C
Italy	UNI EN 14214	Summer	March 16th – November 14th	-15 °C
		Winter	November 15th – March 15th	0 °C
Ireland	IS EN 14214	Summer	16th March – 21st October	-5 °C
		Winter	22nd October – 15th March	-15 °C
Netherlands	NEN EN 14214	Summer	1st May – 30th September	0 °C
		Winter	1st December – 29th February	-15 °C
		Rest of the year		-5 °C
Portugal	NP EN 14214	Summer	1st April – 14th October	0 °C
		Winter	1st December – 29th February	-10 °C
		Spring	1st March – 31 March	-5 °C
Spain	UNE EN 14214	Summer	1st April – 30 September	0 °C
		Winter	1st October – 31st March	-10 °C

## 6.2.1 Denmark



International standards such as the Sevezo II Directive, is e.g. implemented in national legislation under the Danish Emergency Management Act.

## 6.2.2 Greece



### 6.2.2.1 Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods

EΛOT EN 14214:2008 + A1:2009 : This European Standard specifies requirements and test methods for marketed and delivered fatty acid methyl esters (hereafter known as FAME) to be used either as automotive fuel for diesel engines at 100 % concentration, or as an extender for automotive fuel for diesel engines in accordance with the requirements of EN 590. At 100 % concentration it is applicable to fuel for use in diesel engine vehicles designed or subsequently adapted to run on 100 % FAME

The specifications are the same as mentioned in the European Standards. Differences exist though, between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.

The National requirements in Greece according to EΛOT EN 14214 standards are:

Country Specific CFPP (cold filter plugging point) requirements according to various national versions of EN 14214	Season	Dates of season	Max CFPP (°C)
ELOT EN 14214	Summer	1st April to 30th September	+5°C
	Winter	1st October to 31st March	-5°C

### 6.2.2.2 Automotive fuels. Diesel. Requierments and test methods. (Diesel with B7)

EΛOT EN 590:2009. European Standard that describes the physical properties that all automotive diesel fuel must meet if it is to be sold in the European Union, Croatia, Iceland, Norway and Switzerland. It allows the blending of up to 7% fatty acid methyl ester biodiesel with 'conventional' diesel - a 7:93 mix

### 6.2.2.3 Heating fuels. Fatty acid methyl esters (FAME). Requirements and test methods

EΛOT EN 14213:2003 : This European Standard specifies requirements and test methods for marketed and delivered fatty acid methyl esters (FAME) to be used either as a heating fuel at 100% concentration, or as a blending component for the production of heating fuel. At 100% concentration it is applicable to fuel for use in heating equipment designed or subsequently adapted to run on

100% FAME. The biodiesel-diesel blend should meet the quality requirements of heating oil.

#### 6.2.2.4 Liquid petroleum products. Determination of fatty acid methyl ester (FAME) content in middle distillates. Infrared spectrometry method

ΕΛΟΤ EN 14078:2010: This test method covers the determination of the content of fatty acid methyl esters (FAME) biodiesel in diesel fuel oils. (By this test method, the approved FAME concentration is 7% , not 6,5% according to tha latest JMD)

### 6.2.3 Italy



#### 6.2.3.1 Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods

##### UNI EN 14214 published in October 2012

The specifications are the same as mentioned in the European Standards. Differences exist though, between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.

For Italy, the National requirements according to UNI EN 14214 standards are:

Standard	Season	Dates of season	MAX CFPP (°C)
UNI EN 14214	Summer	March 16th – November 14th	-15 °C
	Winter	November 15th – March 15th	0 °C



## 6.2.4 Portugal

### 6.2.4.1 Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods

EN 14214: European standard that describes the requirements and test methods for FAME, the most common type of biodiesel

Biodiesel fuels can also be produced using other alcohols, for example using ethanol to produce fatty acid ethyl esters, however these types of biodiesel are not covered by EN 14214 which applies only to methyl esters i.e. biodiesel produced using methanol. This European Standard exists in three official versions - English, French, and German. The current version of the standard was published in November 2008 and supersedes EN 14214.

#### EN 14214 -Specifications

Property	Units	lower limit	upper limit	Test-Method
Ester content	% (m/m)	96,5	-	EN 14103
Density at 15°C	kg/m <sup>3</sup>	860	900	EN ISO 3675 / EN ISO 12185.
Viscosity at 40°C	mm <sup>2</sup> /s	3,5	5,0	EN ISO 3104
Flash point	°C	> 101	-	EN ISO 2719 / EN ISO 3679.
Sulfur content	mg/kg	-	10	- EN ISO 20846 / EN ISO 20884.
Carbon residue remnant (at 10% distillation remnant)	% (m/m)	-	0,3	EN ISO 10370
Cetane number	-	51,0	-	EN ISO 5165
Sulfated ash content	% (m/m)	-	0,02	ISO 3987
Water content	mg/kg	-	500	EN ISO 12937
Total contamination	mg/kg	-	24	EN 12662
Copper band corrosion (3 hours at 50 °C)	rating	Class 1	Class 1	EN ISO 2160
Oxidation stability, 110°C	hours	6	-	prEN 15751 / EN 14112
Acid value	mg KOH/g	-	0,5	EN 14104
Iodine value	-	-	120	EN 14111
Linolenic Acid Methylene ester	% (m/m)	-	12	EN 14103
Polyunsaturated (>= 4 Double bonds) Methylene ester	% (m/m)	-	1	EN 14103
Methanol content	% (m/m)	-	0,2	EN 14110I
Monoglyceride content	% (m/m)	-	0,8	EN 14105
Diglyceride content	% (m/m)	-	0,2	EN 14105
Triglyceride content	% (m/m)	-	0,2	EN 14105
Free Glycerine	% (m/m)	-	0,02	EN 14105 / EN 14106

Total Glycerine	% (m/m) -	0,25	EN 14105
Group I metals (Na+K)	mg/kg -	5	EN 14108 / EN 14109 / EN 14538
Group II metals (Ca+Mg)	mg/kg -	5	EN 14538
Phosphorus content	mg/kg -	4	EN14107

“Pump marking” chapter from EN14214 is complemented by national Decree-Law n. ° 117/2010, October 25 and also Articles 6<sup>th</sup> e 7<sup>th</sup> of the national Decree-Law n. ° 62/2006, March 21.

Regarding to the cold weather requirements they are detailed into the national Executive Rule n. ° 41/2011, January 19.

Meses de aplicação	Winter Jan, Feb, Nov, Dec	Intermediate Mar, Oct	Summer Apr, May, Jun, Jul, Aug, Set
	Inverno Janeiro, Fevereiro, Novembro, Dezembro	Intermédio Março, Outubro	Verão Abril, Maio, Junho, Julho, Agosto, Setembro
Index mix óleos . . . . .	$0,30 * S + 0,70 * C$	$0,70 * S + 0,10 * P * \text{€}/\text{USD} + 0,20 * C$	$0,75 * S + 0,25 * P * \text{€}/\text{USD}$
Index frete . . . . .	26	$0,90 * 26 + 0,10 * Fp * \text{€}/\text{USD}$	$0,75 * 26 + 0,25 * Fp * \text{€}/\text{USD}$
Index metanol . . . . .	11% * Me		
Custos variáveis produção . . . . .	110		
Outros custos produção . . . . .	70		

#### 6.2.4.2 Environmental Perspectives (ex. green labels)

ISO 14000 Family of standards - Environmental management

#### 6.2.4.3 Automotive fuels. Diesel. Requirements and test methods. (Diesel with B7)

PT EN590 standard (automotive fuels)

#### 6.2.4.4 Standards regarding the management and operation of the biodiesel facility

ISO 9000 Family Standards - Quality management  
 ISO 19011 - Sets out guidance on internal and external audits of quality management systems  
 ISO 26000 - Social responsibility  
 ISO 50001 - Energy management  
 OHSAS 18001 – Health and Safety



## 6.2.5 Spain



According to Royal Decree 1088/2010, the technical specifications for biodiesel are UNE-EN 14214 (automotive uses) and UNE-EN 14213 (heating systems).

## 7. TECHNICAL NORMS RELATED TO BIODIESEL DISTRIBUTION

Biodiesel storage and distribution can affect the fuel quality due factors like microbial contamination, chemical contamination, exposure to light, temperature and exposure to air. Following there are the procedures recommended for the transportation of biofuels.

### 7.1 European standards related to the biodiesel distribution

The following procedures are recommended for transporting biofuels in general and B100 in particular, either in vessels, tankers, trucks or rail:

- > Acceptable materials: aluminum, carbon steel or stainless steel
  - Inspected tanks with accompanying cleanliness certificates
    - In the absence of certificates, inspect previous tanks and residues
    - In general, only regular diesel is accepted as residue
  
- > Not accepted:
  - Food products or vegetable oil raw materials
  - Gasoline
  - Lubricants
  - No residual water should be present
  
- All parts in contact with the product must be compatible with it
- Special isolation or heating system in the event of transport, loading and unloading, at extremely cold temperatures
- Biofuels “cloud point”, temperature, ambient temperature, kind of transport and its transit-time, are all factors to take into account when transporting biodiesel.

## 7.2 National standards related to the biodiesel distribution

### 7.2.1 Denmark

International standards such as the Seveso II Directive, is e.g. implemented in national legislation under the Danish Emergency Management Act.

### 7.2.2 Greece

According to the Environmental and Climate Change Ministry's *“Technical instructions for storage and handling of biofuel refinery facilities - storage facilities and distribution of petroleum products”* following provisions apply in Greece:

#### Storage

- > Biodiesel and biodiesel blends with conventional diesel should be stored in clean, dry and dark environment. Measures must be taken to avoid influx of water into the reservoir. The presence of water in the bottom is conducive for the development microorganisms in biodiesel.
- > During the change of a tank use from biodiesel mixture storage to diesel storage, the tank must be cleaned, inspected and repaired. Older tanks should thoroughly be cleaned to remove particles and sediment that may eventually contaminate the supply tank.

#### Transportation

- > Pure Biodiesel or biodiesel – diesel blends are transported by trucks, oil transport modes or tankers. The pure biodiesel, which is not classified as dangerous liquid for transport, may be carried by tankers and transport modes for liquid chemicals. To avoid contamination of the product, it is recommended, before loading a biodiesel to an oil tank, to check that there are no residues of petroleum or water. The transfer of pure biodiesel by tanks which previously brought acidic or basic blendings, glycerin, vegetable oils, etc., shall occur only after cleaning the tank.

In any case it is recommended to take all precautions to avoid conditions of ignition.

### 7.2.3 Italy

Italy transposed the "Seveso II" Directive with the Legislative Decree 334/99. This Decree was modified by the Legislative Decree 238/05 (transposition of 2003/102/CE Directive). The decree lists the products considered as dangerous in Annex I and biodiesel is not contained in this list. However the liability of biodiesel to the Decree 334/99 was confirmed by a note of the Ministry of Internal Affairs of 4 June 2007, due to its chemical-physical characteristics notwithstanding its source (vegetal instead of mineral as other petroleum products).

## 7.2.4 Portugal

Seveso II Directive transposed into national law by Decree-Law n. ° 254/2007 of July 12 establishes a set of obligations applicable to operators of facilities that store 'hazardous substances', within the meaning given by the law, above the amounts determined in Annex I. These obligations are proportionate to the level of danger of the establishment.

In order to evaluate the framework of a certain establishment by Decree-Law n. ° 254/2007 of July 12 it is necessary to check the quantity and substances dangerous and mixtures likely to be present. Biodiesel (FAME) is not normally classified as hazardous which can be confirmed by the information available on the specific product so in this case an establishment that stores only this product would not fit in the decree.

Regarding the storage and distribution of petroleum products, there are specific legislation related to the products to be stored and different licenses entities including the General Directorate for Energy and Geology and the Regional Economy Directorates. In this context the Decree-Law n. ° 267/2002 of November 26, as amended by Decree-Law n. ° 389/2007 of November 30, by Decree-Law n.° 31/2008 of February 25 and by Decree-Law n. ° 195/2008 of October 6, establishes procedures and defines competences for the purpose of licensing and storage facilities for petroleum products inspection and liquid and gaseous fuels supply facilities. Note that in cases that these establishments are covered by Decree-Law n. ° 254/2007 of July 12 the respective obligations are applied.

## 7.2.5 Spain

In Spain, SEVESO Directives were transposed by the following norms:

- Royal Decree 1254/1999, of 16 July, which approves the control measures for risks of serious accident involving hazardous substances; amended by Royal Decree 119/2005, of 4 February, and Royal Decree 948/2005, of 29 July.

## 8. BARRIERS AND FUTURE PERSPECTIVES IN USED OIL PRODUCTION, DISTRIBUTION AND EXPLOITATION

### 8.1 Biodiesel Production

Regarding the biodiesel production from UCO, the resulting product cannot be considered biodiesel according to the specifications of EN 14214 Standards.

The obtained FAME does not meet all the specifications set out in the EN 14214 Standard for FAME content and kinematic viscosity due to the presence of polar compounds that have larger molecular weight (dimers and polymers) than FAME and cause the kinematic viscosity to increase. Furthermore, the polar FAME content must be considered in order to fulfill the ester content specification. For the application of used frying oils in biodiesel production it is essential to carry out a complete characterization of the raw material and revise the methods to determine the specifications on EN 14214 because some of them are not suitable for this raw material.

The main target is to establish a specification for blending from more than 10 % (V/V) up to 30 % (V/V) of FAME in diesel fuel to be used in captive fleet application for designated vehicles. The high FAME content (B11 -B30) specific will be a blend of diesel fuel complying with EN 590 and FAME complying with EN 14214. Not all the parameters required by the two specifics will be included. The current version won't consider the following parameters: Linolenic Acid Methyl Ester, Aromatics, Glycerides: Mono, Di, and Tri, Glycerine (glycerol), total and free, Total acidity, Iodine number, Alkali metals (Na + K), Alkaline earth metals (Ca + Mg), Phosphorus, Lubricity, Copper strip corrosion.

### 8.2 Double counting System

Biodiesel is a high-cetane fuel, which can be fully blended with fossil diesel to run compression ignition engines. It offers low emissions of GHG, sulphur compounds and particulate matter compared with fossil diesel. In current practice, a 5-20% (B5, to B20) 1st generation biodiesel (fatty acid methyl ester, FAME) is blended with fossil diesel. A full blending (up to B100) is possible for advanced biodiesel. So-called second generation biofuels are seen as a solution in this respect, as they are produced from waste products generated from other processes. Under the RED, biofuels made from waste, residues, non-food cellulosic and ligno-cellulosic material (Article 21.2) can count double toward the mandate. Till now, Italy has included UCOs in their double counting provisions while in Spain and Portugal it has not been defined yet. In Greece, double counting has been introduced to the legislation but has not yet been in place. Denmark does have a quota system and does not consider UCOs in a double counting system.

There is an open debate about double counting in EU, the double counting mechanism is kept in the text of the Parliament's position at the proposal for the ILUC Directive, currently under consultation.

### **8.3 Taxation**

While there were tax reliefs in the previous years in the biodiesel market, nowadays there is a Stepwise increasing tax on biodiesel and tax equalization with conventional fuels.

The lack of taxation incentives affects the biodiesel selling prices. It is reported that the VAT should decreased to 6% from 23% (gr, es, it).

### **8.4 Transpose of the European Policy**

Mostly in Spain, it is reported that authorities are not implementing the EU regulations (such as sustainability norm), so biodiesel which is rejected in the rest of EU member states is accepted in Spain. In Italy, an EU level regulation needs to be applied regarding the imports of products that are subsidized through differential export tariffs in non EU producing countries. In Denmark, UCOs are not allowed in the double counting system.



## 9. REFERENCES

1. European Commission [http://ec.europa.eu/energy/renewables/biofuels/biofuels\\_en.htm](http://ec.europa.eu/energy/renewables/biofuels/biofuels_en.htm) [assessed January 2013].
2. The National Renewable Energy Action Plans of the EU (covering all 27 EU MS), February 2011
3. European Biomass Industry Association – EUBIA, <http://www.eubia.org/> [assessed January 2013].
4. EBB-European Biodiesel Board, [www.ebb-eu.org](http://www.ebb-eu.org) [assessed January 2013].
5. EU renewable energy targets in 2020: Analysis of scenarios for transport JEC Biofuels Programme, L. Lonza European Commission Joint Research Centre, Institute for Energy, H. Hass, H. Maas EUCAR, A. Reid, K. D. Rose CONCAWE.
6. The Biodiesel Handbook, Gerhard Knothe, Jon Van Gerpen, Jürgen Krahl, 2005 AOCS Press.
7. [www.ecoprog.com/en/publications/energy-industry/biofuel-plants.htm](http://www.ecoprog.com/en/publications/energy-industry/biofuel-plants.htm),  
[www.biofuels-platform.ch/en/infos/eu-actors.php](http://www.biofuels-platform.ch/en/infos/eu-actors.php)
8. EurObserv'ER biofuels barometer, [www.eurobserv-er.org/default.asp](http://www.eurobserv-er.org/default.asp), [assessed April 2013]
9. ISCC-EU ([www.iscc-system.org/en/certification-process/registration/registration-eu/](http://www.iscc-system.org/en/certification-process/registration/registration-eu/))
10. Redcert-EU, [www.redcert.org/index.php?option=com\\_content&view=article&id=231&Itemid=91&lang=en](http://www.redcert.org/index.php?option=com_content&view=article&id=231&Itemid=91&lang=en)

### DENMARK:

1. Daka Biodiesel ([www.dakabiodiesel.dk](http://www.dakabiodiesel.dk))
2. Emmelev ([www.emmelev.dk](http://www.emmelev.dk))
3. Energistatistik- [http://www.ens.dk/da-DK/Info/TalOgKort/Statistik\\_og\\_noegletal/Aarsstatistik/Documents/Energistatistik%202011.pdf](http://www.ens.dk/da-DK/Info/TalOgKort/Statistik_og_noegletal/Aarsstatistik/Documents/Energistatistik%202011.pdf)
4. Lov om Bæredygtige Biobrændstoffer ([www.retsinformation.dk/Forms/r0710.aspx?id=137888](http://www.retsinformation.dk/Forms/r0710.aspx?id=137888))
5. Bekendtgørelse om Bæredygtighed af Biobrændstoffer ([www.retsinformation.dk/Forms/R0710.aspx?id=144590](http://www.retsinformation.dk/Forms/R0710.aspx?id=144590))
6. Bioenergi Håndbogen ([http://www.ens.dk/sites/ens.dk/files/klima-co2/co2-kvoter/vejledning-virksomheder-kvoteordningen/rapportering-co2-udledning/H%C3%A5ndbog%20efter%20h%C3%B8ring\\_060711\\_version%201%201%201\\_300512%20\(2\).pdf](http://www.ens.dk/sites/ens.dk/files/klima-co2/co2-kvoter/vejledning-virksomheder-kvoteordningen/rapportering-co2-udledning/H%C3%A5ndbog%20efter%20h%C3%B8ring_060711_version%201%201%201_300512%20(2).pdf))
7. <http://brs.dk/eng/operations/national/Pages/national.aspx>

### GREECE:

1. Ministry of Environment, Energy and Climate Change - Administration of Petroleum Policy <http://www.ypeka.gr> [assessed January 2013].
2. 1<sup>st</sup> National Renewable Energy Action Plan in the scope of directive 2009/28/EC for Greece <http://www.ypeka.gr> [assessed January 2013].
3. 2<sup>nd</sup> National Renewable Energy Action Plan in the scope of directive 2009/28/EC for Greece <http://www.ypeka.gr> [assessed January 2013].
4. First Progress Report on the Promotion and Use of Energy from Renewable Sources in Greece Submitted under Article 22 of Directive 2009/28/EC2012.
5. National Energy Planning Roadmap for 2050 for Greece.



#### ITALY:

1. <http://www.assocstieribiodiesel.com/statistiche.asp>
2. <http://www.assocstieribiodiesel.com/produttori.asp>
3. <http://www.aoe.it/3skl/vortal/aoe/index.jsp>
4. [http://www.aoe.it/3skl/vortal/aoe/index.jsp?id\\_lingua=0&id\\_struttura=120&opzione=documento&id\\_categoria=7&subopzione=doc&id\\_documento=9&visPrimo=0&titoloPagina=NORMATIVA](http://www.aoe.it/3skl/vortal/aoe/index.jsp?id_lingua=0&id_struttura=120&opzione=documento&id_categoria=7&subopzione=doc&id_documento=9&visPrimo=0&titoloPagina=NORMATIVA)
5. [http://scp.eionet.europa.eu/facts/factsheets\\_waste/2009\\_edition/factsheet?country=IT](http://scp.eionet.europa.eu/facts/factsheets_waste/2009_edition/factsheet?country=IT)
6. [http://www.conorzioconoe.it/chi\\_siamo.php](http://www.conorzioconoe.it/chi_siamo.php)
7. <http://www.bioenergytrade.org/downloads/iea-task-40-country-report-2011-italy.pdf>
8. [http://www.agriregionieuropa.univpm.it/dettart.php?id\\_articolo=764](http://www.agriregionieuropa.univpm.it/dettart.php?id_articolo=764)
9. [http://www.senato.it/documenti/repository/commissioni/comm10/documenti\\_acquisiti/AG%20302/2011\\_02\\_02%20-%20Assocstieri%20Testo%20definitivo%20per%20audizione%20al%20SENATO.pdf](http://www.senato.it/documenti/repository/commissioni/comm10/documenti_acquisiti/AG%20302/2011_02_02%20-%20Assocstieri%20Testo%20definitivo%20per%20audizione%20al%20SENATO.pdf)
10. [http://www.assocstieri.it/presentazioni/La%20nuova%20PAC-come%20prepararsi%20al%20cambiamento\\_Tenuta%20Agricola%20di%20Ca%20Tron%20Roncade%20-%20TV,%2015%20Luglio%202011.pdf](http://www.assocstieri.it/presentazioni/La%20nuova%20PAC-come%20prepararsi%20al%20cambiamento_Tenuta%20Agricola%20di%20Ca%20Tron%20Roncade%20-%20TV,%2015%20Luglio%202011.pdf)
11. <http://www.gse.it/it/EnergiaFacile/guide/Trasporti/Biocarburanti/Pages/default.aspx>
12. <http://www.eurobserv-er.org/downloads.asp>
13. <http://setis.ec.europa.eu/newsroom-items-folder/biofuels-for-the-transport-sector>
14. [http://www.minambiente.it/home\\_it/menu.html?mp=/menu/menu\\_attivita/&m=argomenti.html%7CRischio\\_industriale.html%7CLa\\_Direttiva\\_Seveso\\_II\\_Presentazione.html](http://www.minambiente.it/home_it/menu.html?mp=/menu/menu_attivita/&m=argomenti.html%7CRischio_industriale.html%7CLa_Direttiva_Seveso_II_Presentazione.html)
15. <http://www.vigilfuoco.it/allegati/QuesitiRischi/friuli1.pdf>

#### PORTUGAL:

1. <http://www.dgeg.pt/>
2. <http://www.apambiente.pt/>
3. <http://dre.pt/>

#### SPAIN:

1. Torres y Carrera. *Biofuels 2010*, 2011.
2. Institute for Energy Diversification and Saving (IDAE). *Spanish Renewable Energy Plan (PER) 2011-2020*, 2011.
3. USDA Foreign Agricultural Service. *Spain's biodiesel standing report*, 2011.
4. USDA Foreign Agricultural Service. *Spain's national biofuels' sustainability scheme*, 2012.
5. National Energy Commission (CNE). *Report about biofuels use 2010*, 2012.



## 10. ABBREVIATIONS

1 PJ	One quadrillion joules (PJ) = 278 million kWh
1 toe	One tonne of oil equivalent = 11.63 MWh
CEN	European Committee for Standardization
CFPP	Cold filter plugging point
CLP	Classification, Labelling and Packaging
CO <sub>2</sub> eq	Equivalent carbon dioxide
DPF	Diesel Particulate Filters
EBB	European Biodiesel Board
EC	European Council
FAME	Fatty Acid Methyl Esters
GHE	Green House Emissions
GHS	Globally Harmonized System
ILUC	Indirect land use changes
J	joule
JMD	Joint Ministerial Degree
L	litres
MAPP	Major Accident Prevention Plan
MS	Member State
NREAP	National Renewable Energy Action Plan
RED	Renewable Energy Directive
SCC	Supreme Chemical Council
ts	tonnes
UCO	Used Cooking Oils



# 11. ANNEXES



## 11.1 Template to gather national data

### TASK 4.2 European and National Legislation and Technical Norms

COUNTRY: \_\_\_\_\_

#### 1. NATIONAL LEGAL/NORMATIVE ENVIRONMENT WITH REGARD TO THE UCO PROCESSING AND BIODIESEL DISTRIBUTION

*Please keep this chapter short (sinopsis of key points), 2-3 pages should be enough*

##### 1.1 Biodiesel Market Data

*Please, provide data about:*

- > *the volume of biodiesel currently produced in your country*
- > *the biodiesel production capacity*
- > *the number of biodiesel plants and*
- > *the UCO volume processed.*

##### 1.2 National Legislation and Regulations Overview

- > *Give a brief description of the current national legislation / regulations regarding the UCO processing and biodiesel distribution, including licensing*
- > *Harmonisation of national legislation with 2009/28/EC. Is there in force legislation in compliance with Directive 2009/28/EC, as concerns the sustainability criteria (Articles 17 to 21)*
- > *Is there a national institution/body responsible for monitoring/verifying compliance with the criteria?*
- > *Is there any voluntary 'certification' scheme(s) for biofuel and bioliquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC?*
- > *Mention any direct subsidies or tax relief quota which benefits the biodiesel sector*
- > *Status of Double counting provision. Is UCO currently accepted as DC, what about animal fat*

*(Background: Under the RED, biofuels made from waste, residues, non-food cellulosic and ligno-cellulosic material (Article 21.2) can count double toward the mandate. Not all 27 Member States have, however, taken provisions to ensure that this can happen)*

- > *Is there in place a quota System to regulate the annual biodiesel production (in volume) between biodiesel producers?*



- > Which is the share of UCO to the raw materials used for the biodiesel production?
  
- > Which the way/formula of calculation of the annual quota to be produced in your country?  
i.e. in Greece is:

$$K_i = \{ [0,35 * EL1i / (Total EL1i)] + [0,05 * L2i / (Total EL2i)] + [0,075 * EL3i / (Total EL3i)] + [0,20 * Ai / (Total Ai)] + [0,05 * Ii / (Total Ii)] + [0,05 * Ei / (Total Ei)] + [0,15 * Pi / (Total Pi)] + [0,075 * PKi / (Total PKi)] \} * \text{annual}$$

compulsory biodiesel quantities, where:

*i* = the company under consideration

*K<sub>i</sub>* = compulsory pure biodiesel quantities, in Kiloliters for company *i*

*EL1<sub>i</sub>* = Kiloliters of pure biodiesel produced from domestically grown energy crops through contractual agreements with farmers, assuming a production of 1.0 kiloliters of biodiesel per hectare of energy crop

*EL2<sub>i</sub>* = Kiloliters of pure biodiesel produced from domestic cottonseed through submitted invoices or/and accounts assuming a production of 0,14 kiloliters of biodiesel per ton, or/and from domestically produced cottonseed oil through submitted invoices assuming a production of 0,95 kiloliters of biodiesel per metric ton.

*EL3<sub>i</sub>* = Kiloliters of pure biodiesel produced from used vegetable oils, fried oils and animal fats of domestic origin that are considered appropriate for biodiesel production, through the submission invoices or/and accounts, assuming a production of 0,95 kiloliters of biodiesel per metric ton of raw material.

### 1.3 National Targets for biodiesel in compliance with the 2020 targets

- > please present the 2020 targets for biodiesel according to the NREAP
- > which is the current implementation status of the biodiesel targets of NREAP?

### 1.4 Biodiesel Blending limits

Obligatory share of biodiesel in car fuel mix

i.e. in Greece, currently, this is 6,5%

## 2. TECHNICAL NORMS RELATED TO THE UCO PROCESSING

### 2.1 European standards related to the biodiesel production plants

*EU level to be covered by TUC -Report on technical norms applied to different stages of the production line, and to the operation of a biodiesel plant*

*Example - Processing:*

i.e EN 14214:2003 European Standard that describes the requirements and test methods for FAME, the most common type of [biodiesel](#)

Biodiesel fuels can also be produced using other alcohols, for example using ethanol to produce fatty acid ethyl esters, however these types of biodiesel are not covered by EN 14214 which applies only to methyl esters i.e. biodiesel produced using methanol. This European Standard exists in three official versions - English, French, German. The current version of the standard was published in November 2008 and supersedes EN 14214:2003.

**Differences exist between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.**

#### EN 14214 -Specifications

Property	Units	lower limit	upper limit	Test-Method
Ester content	% (m/m)	96,5	-	EN 14103
Density at 15°C	kg/m <sup>3</sup>	860	900	EN ISO 3675 / EN ISO 12185.
Viscosity at 40°C	mm <sup>2</sup> /s	3,5	5,0	EN ISO 3104
Flash point	°C	> 101	-	EN ISO 2719 / EN ISO 3679.
Sulfur content	mg/kg	-	10	- EN ISO 20846 / EN ISO 20884.
Carbon residue remnant (at 10% distillation remnant)	% (m/m)	-	0,3	EN ISO 10370
Cetane number	-	51,0	-	EN ISO 5165
Sulfated ash content	% (m/m)	-	0,02	ISO 3987
Water content	mg/kg	-	500	EN ISO 12937
Total contamination	mg/kg	-	24	EN 12662
Copper band corrosion (3 hours at 50 °C)	rating	Class 1	Class 1	EN ISO 2160
Oxidation stability, 110°C	hours	6	-	prEN 15751 / EN 14112
Acid value	mg KOH/g	-	0,5	EN 14104
Iodine value	-	-	120	EN 14111
Linolenic Acid Methylenelester	% (m/m)	-	12	EN 14103
Polyunsaturated (>= 4 Double bonds) Methylenelester	% (m/m)	-	1	EN 14103
Methanol content	% (m/m)	-	0,2	EN 141101
Monoglyceride content	% (m/m)	-	0,8	EN 14105
Diglyceride content	% (m/m)	-	0,2	EN 14105
Triglyceride content	% (m/m)	-	0,2	EN 14105
Free Glycerine	% (m/m)	-	0,02	EN 14105 / EN 14106
Total Glycerine	% (m/m)	-	0,25	EN 14105
Group I metals (Na+K)	mg/kg	-	5	EN 14108 / EN 14109 / EN 14538
Group II metals (Ca+Mg)	mg/kg	-	5	EN 14538
Phosphorus content	mg/kg	-	4	EN14107



*Management*

i.e. (family ISO 9000, ISO 50001)

*Environmental Perspectives (ex. green labels)*

i.e. ISO 14000

**2.2 National standards and Quality protocols related to the biodiesel production plants**

Differences exist between the national versions of the EN 14214 standard. These differences relate to cold weather requirements and are detailed in the national annex of each standard.

**TO BE FILLED BY NATIONAL RESPONSIBLE PARTNERS**

*Please define which standards are in force in your country, provide short description of specification including which are the test methods used by the producers in the country*

*Processing:*

i.e DIN V 51606 (GERMANY)

*Management / Operations*

*Environmental Perspectives (ex. green labels)*

**3 TECHNICAL NORMS RELATED TO BIODIESEL DISTRIBUTION**

EU Level: 96/82/EC (SEVESO II Directive), 2003/105/EC, 2012/18/EU (SEVEZO III Directive).

*PLEASE Mention specific provisions/national standards for security / safety issues in biodiesel distribution*



## RecOil Partnership

- Energy and Environment Agency of Arrábida (coordinator)
- Factor Social
- Technical University of Crete
- Local Energy Agency Province of Cosenza
- Energy Management Agency Province of Cádiz
- Regional Energy Agency for Barreiro, Moita, Montijo and Alcochete
- Elin Biofuels S.A.
- Energy, Transport, Agriculture SRL
- Municipality of Castrolibero
- European Biomass Industry Association
- Agro Business Park.



