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1 Introduction

The BIONIC project addresses the issues of biofuel supply and use in transport specifically from the perspective of local and regional public authorities and promotes developments in the regional production and use of transport biofuels. There are a range of barriers that hinder successful introduction of biofuels in the transport sector. BIONIC explores and develops the role that local and regional public authorities can play in overcoming these barriers.

Five regional communities are involved,

- North West England in the UK;
- Cantabria in Spain;
- Värmland in Sweden;
- Prahova in Romania; and
- Pazardjik in Bulgaria.

BIONIC consists of 9 interdependent work packages; this report forms the 2010 update of Deliverable 2.1 of Work Package 2 state-of-the-art review. The key aim of WP2 is to identify existing initiatives of relevance to the project, whether technical, regulatory or concerning networks and reviews European and National policy frameworks across the EU. This information gathering exercise ensures that the work of BIONIC builds on current state-of-the-art, in order to maximise the chances of success.

The work was conducted at two levels: the European and National policy level and the level of individual initiatives from across Europe, outside the partner regions. A review of initiatives from across the European Union in terms of their focus, method, scope and success in addressing the barriers currently limiting the wider deployment of biofuels within the transport sector was conducted, and this is included in the first release of D2.2, dated 2008. The research was conducted by all partners and led by TTR according to a detailed proforma developed at the start of the task.

This update report outlines the existing status of biofuel use and gives updated information about existing biofuel initiatives in each of the partner countries.

2 European initiatives

2.1 Overview of biofuel consumption and production

Table 2.1 shows the biofuel consumption for transport in each of the EU states for 2009.

Table 2.1: Biofuels consumption for transport in The EU in 2009

Biofuel consumption for transport in the European Union in 2009 (in toe)*

Pays/ Country	Bioéthanol/ Bioethanol	Biodiesel/ Biodiesel	Autres**/ Other**	Consommation totale/ Total consumption
Germany	581 686	2 224 349	88 373	2 894 407
France	455 933	2 055 556	–	2 511 490
Italy	118 014	1 048 988	–	1 167 002
Spain	152 193	894 335	–	1 046 528
United Kingdom	159 000	822 872	–	981 872
Poland	136 043	568 997	–	705 040
Austria	64 249	424 901	13 369	502 519
Sweden	199 440	159 776	35 015	394 231
Netherlands	138 650	228 886	–	367 536
Belgium	37 577	221 252	–	258 828
Portugal	0	231 468	–	231 468
Romania	53 274	131 328	–	184 601
Hungary	64 488	119 303	–	183 791
Czech Republic	51 097	119 809	–	170 906
Finland	79 321	66 280	–	145 601
Ireland***	19 733	54 261	–	73 994
Slovakia	6 820	55 041	–	61 861
Greece	0	57 442	–	57 442
Lithuania	14 091	37 770	–	51 861
Luxembourg	740	39 915	498	41 154
Slovenia	1 859	27 993	–	29 852
Cyprus	0	15 024	–	15 024
Bulgaria	0	6 186	–	6 186
Latvia	1 120	3 570	–	4 690
Denmark	3 913	243	–	4 156
Malta	0	583	–	583
Estonia	n.a.	n.a.	–	n.a.
Total EU 27	2 339 241	9 616 129	137 255	12 092 625

* Estimation. ** Huiles végétales utilisées pures pour l'ensemble des pays, excepté pour la Suède qui consomme du biogaz carburant. Vegetable oil consumed in pure form in all countries, except Sweden which consumes biogas fuel. *** Pour des raisons de confidentialité, la consommation d'huile végétale a été ajoutée à la consommation de biodiesel en Irlande. For reasons of confidentiality, vegetable oil consumption has been added to the biodiesel figure for Ireland. n.a. : non disponible. Not available. Source: Eurobserv'ER 2010.

Source: <http://www.eurobserv-er.org/pdf/baro198.pdf> : Biofuels Barometer July 2010

The table shows that a total of 12,092,625 toe of biofuel was used in the EU in 2009.

The table below shows biodiesel production of each of the states in the EU for 2008 and 2009. Total production increased from 7755 thousand tonnes in 2008 to 9046 thousand tonnes in 2009.

Table 2.2: Biodiesel production in The EU in 2008 and 2009

Biodiesel production in the European Union in 2008 and 2009 (in thousands of tonnes)

Pays/Country	2008	2009*
Germany	2 819	2 539
France	1 815	1 959
Spain	207	859
Italy	595	737
Belgium	277	416
Poland	275	332
Netherlands	101	323
Austria	213	310
Portugal	268	250
Denmark/Sweden	231	233
Finland**	85	220
Czech Republic	104	164
United Kingdom	192	137
Hungary	105	133
Slovakia	146	101
Lithuania	66	98
Greece	107	77
Latvia	30	44
Romania	65	29
Bulgaria	11	25
Estonia	0	24
Ireland**	24	17
Cyprus	9	9
Slovenia	9	9
Malta	1	1
Luxembourg	0	0
Total EU 27	7 755	9 046

* Estimations. ** Figures for Ireland include hydro-diesel production
Sujet à une marge d'erreur de +/- 5%. Subject to a 5% margin of error.
Source: EBB 2010.

Sources: <http://www.eurobserv-er.org/pdf/baro198.pdf> Biofuels Barometer July 2010

Table 2.3 shows bioethanol production of each of the states in the EU for 2009. Production of bioethanol totalled 36,738 million litres for the year.

Table 2.3: Bioethanol production in The EU in 2009

Bioethanol fuel production in the European Union in 2009
(in millions of litres)*

Pays/Country	2009
France	1 250,0
Germany	750,0
Spain	437,0
Austria	180,0
Sweden	175,0
Poland	165,5
Hungary	150,0
Belgium	143,2
Slovakia	118,0
Czech Republic	112,5
Italy	72,0
United Kingdom	70,0
Lithuania	30,0
Latvia	15,0
Finland	4,0
Ireland	1,6
Total EU 27	3 673,8

En 2008, la production de bioéthanol carburant était estimée à 2 257 millions de litres par UEPA et à 2 855 millions de litres par eBIO. In 2008, production of bioethanol fuel was estimated at 2 257 million litres by UEPA and 2 855 million litres by eBIO. Source : Données communes UEPA et eBIO 2010./Common data UEPA and eBIO 2010.

Sources: <http://www.eurobserv-er.org/pdf/baro198.pdf> Biofuels Barometer July 2010

2.2 Technical initiatives

2.2.1 Biofuel production

NILE- New Improvements for Ligno-cellulosic Ethanol

NILE is an integrated project carried out within the 6th Framework Program of the European Union. The project ran from October 2005 to 31 March 2010. Its overall objective was to develop cost effective production of clean bioethanol from lignocellulosic biomass (LCB), enabling its use as a transport biofuel. NILE developed, investigated and evaluated new technologies for efficient conversion of lignocellulose to bioethanol. These technologies were verified using a unique and fully integrated pilot plant providing reliable data for global socio-economic and environmental assessments and for the design of a future demonstration unit.

The activities of NILE aim at overcoming critical hurdles in process development. Key issues were:

- decreasing the cost of enzymatic hydrolysis of lignocellulose to fermentable sugars using new engineered enzyme systems;
- removing current intrinsic limitations in the conversion of fermentable sugars to ethanol;
- Validating the engineered enzyme systems and yeast strains in a fully integrated pilot plant. Validation included all process steps and recycling of process streams;
- analysing socio-economic and global environmental impacts of the production and use of bioethanol from LCB based on the new data obtained; and
- dissemination and training of target groups.

The project mobilises the critical mass of end-users and world-leading expertise necessary to improve the whole bioethanol from LCB chain. By its integrated structure, NILE supported the development of research activities in close connection with industrial processes, their validation, their technical and socio-economic assessments and their dissemination as well as training activities. This development ensures a real industrial and societal impact of the developed technology thus strengthening European competitiveness.

More information about the project can be found at <http://www.nile-bioethanol.org>

Biogas Regions

Based on the review that biogas production is still lagging behind in Europe in relation to the objectives fixed for 2010 and its important role within the European Biomass Action Plan this project fosters biogas development in seven highly motivated European regions from November 2007-November 2010. The project includes partners from Austria, Belgium, Italy, Spain, Poland, France and the UK.

The barriers for developing this technology are manifold. Profiting from countries with a rapidly growing market of biogas plants, the organised know-how transfer and sharing of experience will enable a rapid uptake in the less developed regions. More information such as project newsletters, regional brochures and regional action plans can be found at <http://www.biogasregions.org/>

2.2.2 Biofuel usage

SUGRE

SUGRE (*Sustainable Green Fleets*) is a project promoting alternative propulsion and mainly focuses on fleets, but not only with regards to land

transport. The main objective was to promote and support the conversion of fleets to alternative propulsion (ranging from bio-fuels, methane as fuel to hybrid systems comprised of combustion engines and electric propulsion systems) and the energy efficient usage of them. SUGRE fostered a positive attitude towards alternative fuels and new power train concepts using captive fleets as forerunners and proof for the viability of alternative propulsion.

Partners come from a number of European countries, such as Austria, Italy, Hungary, Germany, Spain, Bulgaria, Iceland, Netherlands, UK and Romania. The project was completed in December 2008.

More information is available from the website <http://www.sugre.info>

BIOSIRE

BIOSIRE aims to establish a shift towards bio-diesel and electric propulsion for fleets, ships and special vehicles in tourist areas in Spain, France, Greece, Italy, Croatia and Austria. Project partners consist of regional authorities, energy agencies, and research and consultancy organisations which specialise in energy, agriculture and transport.

BIOSIRE's local actions are directed at market transformation and changing the behaviour of fleet operators, tourists and residents, farmers and potential suppliers of used cooking oils. These actions cover the full production and distribution chain. BIOSIRE co-operates closely with other projects on sustainable tourism and alternative propulsion and invites their representatives to discuss common themes. BIOSIRE will formulate recommendations for other tourist regions and provides an opportunity for participating regions to be directly involved in project events.

The project started in Autumn 2008 and more information can be found at the project's website: <http://www.biosire.eu>. Project deliverables can also be downloaded from the website.

Madagascar

MADEGASCAR (**M**arket **d**evelopment for **g**as driven **c**ars) was a project operating from September 2007 to January 2010. The project aimed at developing the market for gas driven vehicles (natural gas and biomethane fuelled vehicles) with the overall goal to increase the number of energy efficient and alternative fuelled vehicles in European countries.

The project addressed existing barriers by creating more acceptance on the consumer side, educating fleet owners as well as car dealers, incentive programmes and by awareness raising and information activities. On the other side, activities for improving supply infrastructure (fuel stations) and market structure, including the integration of biogas, were carried out.

The main target groups for the project were fleet managers of companies and public organisations, private car owners, suppliers of fuel, car dealers and manufacturers and decision makers.

Many resources such as details on the final conference, project newsletters, partner country profiles and links to other relevant websites can be found at <http://www.madagascar.eu>

2.3 Regulatory initiatives

2.3.1 Procurement

EloBio

The current market introduction of biofuels has significant impacts on other commodity markets. Such policy-induced market disturbances can become a major barrier for industry and public support for biofuels. Therefore, this project develops low-disturbing policy options, enhancing biofuels but minimising the impacts on food and feed markets, and markets of biomass for power and heat.

The project consists of a review of current experiences with biofuels and other RE policies and their impacts on other markets, iterative stakeholder-supported development of low disturbing biofuels policies, model-supported assessment of these policies' impacts on food & feed and lignocellulosic markets, and finally an assessment of the selected optimal policies on biofuels costs and potentials. A dissemination package accompanies the project, inter alia aiming at providing relevant inputs for the next review of the biofuels directive and other relevant policy developments.

The project is expected to lead to the following results;

- A clear vision on policy options with the least negative impacts on other markets in food, feed and lignocellulosic materials; a vision shared with and approved of by policy makers and by relevant market actors and other stakeholders;
- As a result of the project and its dissemination activities, more than half of the EU Member State policies on biofuels and related domains will be optimised or improved with Elobio results as one of the inspirations;
- A reliable estimate of the potential and costs of biofuels, given the application of these low-disturbing policy measures;
- Improved models and tools to assess the relations between biofuels policies and the markets for food, feed and lignocellulosic materials; and
- Improved models and tools to assess the impact of policy and market interactions on the allocation of biomass for the electricity, biofuels and heating/cooling sectors

Project partners come from The Netherlands, Belgium, Poland, Spain, Denmark, Austria, and Sweden. A number of resources including presentations, policy papers and reports can be downloaded from <http://www.elobio.eu/publications/>.

PROCURA

The Procura project, a General Action of the Intelligent Energy for Europe Programme sponsored by the European Union, is developing joint procurement models, fleet scan tools and manuals to facilitate the acquisition and maintenance of AFV vehicles for private and public fleets. Procura will also work on the start-up development of second hand markets and certification systems for AFVs. In five pilot projects in Italy, Netherlands, Poland, Portugal and Spain the models, tools and manuals will be used to assist local fleet owners in their decision to integrate AFVs in their fleets. More information can be found on the project website: <http://www.procura-fleets.eu/>

COMPRO

The aim of COMPRO (**COM**mon **PRO**urement of Collective and Public Service Transport Clean Vehicles) is to improve the development of the clean vehicles market. COMPRO will analyse the conditions for a common procurement of clean collective and public transport vehicles by creating an international buyers consortium of local authorities. Initially there are four local authorities but COMPRO aims to enlarge the group of potential purchasers in order to reach the critical mass needed to allow for competitive prices.

COMPRO is coordinated by ISIS (Institute of Studies for the Integration of System) based in Rome, Italy. Current partners include authorities from France (Nantes Metropole), Italy (Region of Emilia Romagna), Sweden (Göteborg), and Germany (The City-State of Bremen).

The first meeting of the 'Follower Cities' that have officially joined COMPRO activities, was held in Rome in January 2009. During the meeting, the first experiences of the COMPRO Project concerning the technology debate were presented.

More details on the project are available at <http://www.compro-eu.org>

BioNorm II

The development of European Standards (EN) is seen as a major driver to expand the market for solid biofuels. This market expansion is needed to fulfil the aims defined within the European Commission's White Paper on renewable energy, the directive on "green" electricity from renewable energy (EU-Directive COM(2000) 279 final), and the European Biofuel Directive as well as various political goals on the national level.

Against this background the aim of the BioNorm II project was to carry out pre-normative research in the field of solid biofuels in close collaboration with the work of CEN TC 335 "Solid Biofuels". Due to the wide range of standards to be

developed by CEN TC 335, this project focused on such aspects urgently needed by industry to increase the markets for solid biofuels where significant pre-normative R&D need is given.

This applies in particular to an acceptable and transparent definition of the key properties of solid biofuels traded on the market, accounting for the given needs from the production and provision chain as well as the end user. Furthermore, reference test methods and rapid test methods are necessary to prove if the defined key properties are met. Additionally, rules for sampling and sample planning as well as quality measures especially adapted to the needs of solid biofuels are urgently needed.

More information on the project including the project's final conference can be found at <http://www.bionorm2.eu>.

2.3.2 Market and supply chain development

E-Energy Market

E-Energy Market is an electronic platform for the biofuel industry and brings together companies involved in the biofuel industry. Buyers and sellers can initiate auctions and in this way trade with each other in a very time and cost effective way.

E-Energy Market matches the buyers and sellers. Herewith it brings transparency to the biofuel market. The transparency will stimulate the use of biofuels with all its beneficial effects. The system of auctioning is comparable to eBay for the Regular Auction. With Reverse auctions the buyer takes the initiative and asks for offers, comparable to the RFQ (Request for Quotation). Any product that could be defined as renewable energy, biofuels or bio-energy or related to these categories, can be traded. This includes biodiesel, bioethanol, biomass, vegetable oil, feedstock, hardware, vehicles, books, raw materials and business services.

E-Energy Market can be accessed at <http://www.e-energymarket.com>.

EUBIONETT III

The EUBIONETT III project will in the long run:

- boost sustainable and transparent international biomass fuel trade;
- secure the most cost efficient and value-adding use of biomass for energy and industry;
- boost the investments on best practice technologies and new services on biomass heat sector; and
- enhance sustainable and fair international trade of biomass fuels.

The EUBIONET III project is coordinated by VTT and will run 2008 – 2011. The project aims to increase the use of biomass based fuel in the EU by finding ways to overcome market barriers;

- National biomass programmes and biomass fuel potentials will be analysed especially for different industrial residues and agrobiomass;
- International trade of biomass fuel will be promoted, price mechanisms will be analysed and new CN codes for biomass fuels will be proposed;
- Certification and sustainability criteria for biomass fuels will be set in co-operation with market actors;
- Implementing of new CEN standards for solid biofuels will be enhanced;
- Bioenergy use will be promoted by raising awareness on biomass heating aiming at fuel switch to biomass; and
- The appropriate use of biomass resources will be assessed by analysing raw material availability within and between bioenergy, forest industry and agricultural sectors.

More information can be found at <http://www.eubionet.net> including project information, reports, case studies, and other related reports.

BEST

The project **Bioethanol for Sustainable Transport** looked at the introduction and market penetration of bioethanol as a vehicle fuel, and the introduction and wider use of flexible fuel vehicles and ethanol cars on the market. BEST involved ten different cities and regions in Europe, South America and Asia and included some car makers (Saab and Ford) as well as bioethanol manufacturers and leading universities.

The project started in January 2006 and continued till December 2009. A number of deliverables can be downloaded at the project website including the project's Final Report: <http://www.best-europe.org/Pages/Document.aspx?id=6>

RENEW

The project's main mission was to prove different concepts of fuel production from biomass. Other objectives included:

- Production routes for BTL fuels were demonstrated and the full supply chain was assessed in terms of biomass potential, life cycle, costs and technological options;
- Fuels were produced and tested in order to demonstrate benefits of optimised fuels for advanced powertrains; and
- To provide the scientific and technological basis for the transition into a sustainable and environmentally friendly road transport sector based on renewable fuels.

The project commenced in January 2006 and ran for a duration of 48 months. Project partners came from Ireland, Sweden, Germany, France, Spain, Switzerland, Greece, Austria and Poland.

A number of resources are available from the project website such as project presentations, event reports, details about process development, technical assessments reports, life cycle assessment reports and economic assessment reports. The project website is: http://www.renew-fuel.com/fs_documents.php

2.4 Promotional activities

There are promotional aspects to all of the networking initiatives outlined in Section 2.5.

2.5 Networking initiatives and network development

The BioMotion project

The central objectives of BioMotion are to increase use, knowledge and acceptance of biofuels by information, motivation, cluster building and supporting regional implementation strategies. BioMotion takes into account not just the first-generation fuels (plant oils and biodiesel), but also biogas, ethanol and BTL.

The project will:

- create and establish an expert cluster to bring the results acquired in the regions to the transnational Biofuel Network;
- create and establish 7 Biofuel Information Centres, one in each participating region;
- support and initiate best practice examples (beacons);
- motivate users with special campaigns on the BioMotion Tour; and
- establish value-added chains for rural areas 'from field to tank', in which producers, farmers, traders, plant processors and consumers can have profit.

The Biomotion Tour is aimed at promoting information about biofuels as well as raising the level of awareness about them. The project partners and their regional cooperation partners will demonstrate the use of vehicles powered by biofuels. Vehicle manufacturers and dealers in the participating countries provide vehicles powered by ethanol, plant oil, bio diesel and biogas. Particular activities and beacons in the regions concerned with the production, distribution and usage of bio fuels will be involved in this. Along the journey route, info-stops and action days are organised to offer information to the general public and exchange information about biofuels with a wide range of organisations and officials.

More information on the project and the tour can be found at <http://www.biomotion-tour.eu/>

BioDieNet

The objective of BioDieNet has been the promotion of localised biodiesel production for transportation purposes, by means of the active involvement of local Energy Agencies in more than 10 European countries. The action established a working network of Energy Agencies, working closely with their associated local municipalities and regional governments and other market actors across Europe who are engaged in or planning to be engaged in the supply of locally-produced biodiesel from used cooking oils.

The network provides specific, practical information, education, dedicated tools and support to help set up and maintain projects which result in greater uptake of locally produced biodiesel by public and private vehicle fleets as well as individual vehicle owners. Through the involvement of Energy Agencies traditional barriers of centralised biodiesel structures are addressed to enable the easier introduction of higher concentrations (20- 100%), and to reduce the high risks involved for potential biodiesel producers.

The project has now been completed and more information is available at <http://www.biodienet.eu>.

Information on the website includes case studies and accounts of events. The Final Report can be downloaded at <http://www.biodienet.eu/wp-content/uploads/2010/03/publishable-report-EIE06090-Final.pdf>;

Biogas Accepted

Biogas is the renewable energy product of anaerobic degradation of organic materials, e.g., animal manure, household kitchen waste and restaurant waste, waste water sludge, and plants cultivated for energy purposes. Biogas production and utilisation has already been used in several European countries and best practices have already been identified. However, there is still a strong effort to be made to promote knowledge about biogas production or uses and transferring such best practices across the EU Member Countries is needed.

The project created tools for increasing biogas acceptance by the general public as well as for addressing regional actors and consumers, plant operators, neighbours and local politicians. Recent and planned biogas projects were supported in Austria, Hungary, Italy, Poland, Slovakia and Spain. Using tools, such as public presentations, discussions and round tables, the project and its results strengthened the interaction among local authorities and the citizens.

Project results included:



- A standardised tool for increasing biogas acceptance on the web-site in English and 6 partner countries' national languages. This tool provided a cost-effective solution with the aim of accelerating market orientation and market growth;
- Online Tool for biogas plant operator: types of biogas application precisely technically defined and applicable in 6 selected regions;
- On-line evaluation, manuals and application recommendations;
- A handbook for regional biogas integration policy comprised of experiences and results of the project activities (application of the acceptance promoting tool, discussions, round tables, SWOT analysis) and was targeted at European policy makers; and
- Increased acceptance and use of renewable energies at the local level.

More information can be found at <http://www.biogasaccepted.eu/>

3 Initiatives in Partner Countries

3.1 Bulgaria

3.1.1 Technical initiatives

3.1.1.1 Biofuel production

Production of biodiesel

Biodiesel production started in Bulgaria in 2001 at SAMPO AD's plant in Brussartzi (North Western Bulgaria), producing a capacity of 3,000 tonnes per year. The feedstock consisted mostly of used cooking oil collected from restaurant chains. In addition to operating this plant, SAMPO AD is also a producer of biodiesel plant equipment.

Another Bulgarian biodiesel plant equipment producer is the company M Engineering. This producer has supplied equipment for several plants in Bulgaria and for a plant in Jalgava, Latvia (5,000 t/yr). M Engineering is currently installing a biodiesel plant in Romania.

EKO ZORA Ltd. is participating in a project which aims to develop biodiesel installations which will use waste oil as raw material for biodiesel production. The company specialises in the design, production and upgrade of Vegetable Oil Refining Plants and Mobile Plants for Essential Oils. Two other producers of biodiesel are Gamakol EOOD (Plovdiv) and Bioenergomach (Aksakovo).

In recent months, many new plants have started operation. This includes the newly constructed plant in Dimovo, near Vidin, with a capacity of 7,000 tonnes per year. This plant belongs to the company Ecoproecti OOD, and several other new biodiesel producers (in the areas of Plovdiv, Rousse, Dobrich, etc). It is difficult at present to obtain precise information about the output, the capacity and even about the exact number of biodiesel plants in Bulgaria. Some press publications estimate the overall number of biodiesel plants in Bulgaria to have reached 100.

The biggest biodiesel production plants already in operation are as follows:

- Green Oil OOD (in Silistra), with a capacity of 15,000 t/yr;
- Klas Olio OOD (in Dobrich), with a capacity of 30,000 t/yr; and
- Biodreams Ltd (in Lovech), with a capacity of 20,000 t/yr.

A second plant of Green Oil OOD is being constructed in Pleven, with a capacity of 30,000 t/yr. Some future projects include:

- The construction of a plant in Provadia by Slunchevi Luchi EAD - with a design capacity of 100,000 t/yr;
- A plant in Vidin, planned by Eco Petroleum OOD - with a design capacity of 200,000 t/yr; and
- Green Fuel Corporation is contemplating the construction of a 45,000 t/y plant in the Pleven region.

Several of the above biodiesel and equipment producers participate in the National Association for Biofuels and Renewable Energy Sources in Bulgaria. It is interesting to note that several biodiesel producing companies have previous experience in producing cooking oil (e.g. Green Oil OOD, Klas Olio OOD, Sluchevi Luchi EAD). A branch organisation representing Bulgarian cooking oil producers is the Oilseed Oil Producers Association Bulgaria.

There are a number of additional small-scale projects in Bulgaria, the viability of which is still disputable.

Production of bioethanol

The first production line for bioethanol was launched in September 2006 with a capacity of 8000 tonnes/year in a plant situated in Alfatar. The main raw materials for production were wheat, maize, barley, and sugar beet. However, for Bulgaria, the most appropriate raw materials for bioethanol production are maize and wheat. It is predicted that the majority of output is exported mainly to Austria and Germany. The company plans to increase its production capacity by four times in the near future.

Currently, in Bulgaria, there are several projects which will launch new production installations for bioethanol, and one of them is Zaharni Zavodi in Gorna Oriahovitzza, which will have a total annual capacity of 40,000 tonnes.

The following is statistical information to illustrate the production of biodiesel and bioethanol in recent years in Bulgaria.

Table 3.1: Production of biofuels in Bulgaria (tonnes) *

Year	Biodiesel	Bioethanol
2006	9 431	2 049
2007	4 036	1 977
2008	4 260	2 118
2009	18 455,50	No statistics

Table 3.2: Predictions for next years (tonnes) *

Year	Biodiesel	Bioethanol
2010	108 000	24 500
2015	185 000	33 400
2020	277 000	37 000

* Statistics according to data from Ministry of Economy, Energy and Tourism (MEET)

Obviously the predictions for 2010 for the production of 132,500 tonnes of biofuels will not be reached, although currently in Bulgaria there is installed capacity for:

- biofuel production of 368 100 tonnes/year;
- biodiesel – 338 100 tonnes/year; and
- bioethanol – 30 000 tonnes/year.

Raw material supply

When biodiesel production started in Bulgaria in 2001, it was first based on waste cooking oil. Since the beginning of 2006, there has been a rapid growth of biodiesel production and most of it is already based on sunflower or rapeseed oil. A substantial part of sunflower and rapeseed quantities continue to be used for cooking oil production. The theoretical potential for the collection of waste cooking oil from restaurants and cafeterias amounts to about 8,000 tonnes annually.

According to data from the Ministry of Agriculture and Food Supply, the total area of abandoned land (uncultivated lands) in Bulgaria for the last four years is around 460 thousand ha (that is 8% of the total agricultural land in Bulgaria). If only 50% of this uncultivated land (230 thousands ha) is used for growing energy crops, and an average country yield is reached, the following quantities of biofuels can be produced alternatively:

- 460 kt /year of bio-ethanol from sugar beet (*Beta vulgaris* L.) with an energy equivalent of 295 ktoe;
- 200 kt /year of bio-ethanol from wheat with an energy equivalent of 128 ktoe;
- 147 kt /year of bio-diesel from sunflower with an energy equivalent of 132 ktoe; and
- 156 kt /year of bio-diesel from rapeseed (*Brassica napus*) with an energy equivalent of 140 ktoe.

Some statistical information about sunflower seed, rapeseed, wheat, and grain maize harvests during the period 2001-2007 are presented in the tables below, according to statistical information from the Ministry of Agriculture and Food.

Table 3.3: Sunflower seed harvests in Bulgaria during the period 2001-2007

Year	Harvested area (hectares)	Average yield (t/hectares)	Harvested quantity (t)
2001	389,700	1.040	405,087
2002	427,838	1.400	599,551
2003	659,631	1.200	788,763
2004	592,785	1.820	1,078,832
2005	653,371	1.470	934,855
2006	753,200	1.590	1,157,000
2007	686,700	0.940	564,000

Table 3.4: Rapeseed harvests in Bulgaria during the period 2001-2007

Year	Harvested area (hectares)	Average yield (t/hectares)	Harvested quantity (t)
2001	16,700	1.130	19,000
2002	6,901	1.170	8,061
2003	12,687	0.890	11,291
2004	11,250	1.99	22,388
2005	10,993	1.98	21,778
2006	16,500	1.80	28,000
2007	54,700	1.72	93,000

Table 3.5: Wheat harvests in Bulgaria during the period 2001-2007

Year	Harvested area (hectares)	Average yield (t/hectares)	Harvested quantity (t)
2001	1,366,600	3.010	4,077,000
2002	1,382,900	3.010	4,123,000
2003	903,300	2.380	2,004,000
2004	1,039,679	3.810	3,961,000
2005	1,101,807	3.160	3,478,000
2006	979,900	3.400	3,302,000
2007	1,120,500	2.200	2,391,000

Table 3.6: Grain maize harvests in Bulgaria during the period 2001-2007

Year	Harvested area (hectares)	Average yield (t/hectares)	Harvested quantity (t)
2001	400,100	2.470	873,000
2002	309,200	4.240	1,288,000
2003	429,800	2.800	1,161,000

2004	383,200	5.540	2,123,000
2005	298,700	5.308	1,586,000
2006	358,500	4.530	1,588,000
2007	396,700	1.460	313,000

It should be noted that sunflower is traditionally grown in Bulgaria. Rapeseed was first cultivated in the 19th Century, but only in small quantities. Larger scale cultivation started again about 10 years ago. However, there are still some problems, due to climatic conditions and other reasons (rapeseed needs a lot of humidity in September and there is the hazard of freezing during winter in Bulgaria).

According to BMAF [2007a], the average sunflower and rapeseed prices in 2005 were:

- Sunflower seed: BGN 402 (€205.54) per tonne; and
- Seeds of rapeseed crops: BGN 405 (€207.07) per tonne.

An interesting calculation is provided by JICA [2006] concerning the additional agricultural land area needed to meet the indicative target for a share of 5.75% biofuels in the overall fuel consumption for transport purposes. Based on 2004's transport fuel consumption in Bulgaria, this percentage corresponds to an overall amount of 104,075 tonnes of oil equivalent annually (toe/yr). With the assumption of a proportional distribution of biodiesel and bioethanol percentage respectively to 2004's consumption of diesel oil and gasoline, the 2010 indicative target for consumption of biofuels would be as follows:

- Biodiesel: 70,265 toe/yr (which corresponds to 79,500 t/yr);
- Bioethanol: 33,810 toe/yr (which corresponds to 53,000 t/yr).

With the current yields, the additional agricultural area needed for cultivation of the corresponding quantities of sunflower and wheat would amount to 207,230 hectares, which is about 45% of the currently non-cultivated agricultural land [JICA 2006]. The producers of sunflower, rapeseed, wheat, and grain maize in Bulgaria are in 3 categories:

- tenant farmers;
- agricultural co-operatives; and
- farmers that work on their own land.

In the absence of specific statistics concerning sunflower, rapeseed, wheat, and grain maize cultivators, it is interesting to quote some general statistics concerning the structure of land ownership in Bulgaria. According to BMAF [2007a], the average size of agricultural properties is quite small: 0.64 hectares. However, due to the leasing of land by tenant farmers, the percentage of farms with a cultivated area more than 50 hectares is quite high: 78.5%. In the case of sunflower, rapeseed and wheat growing, the farms with such activities and a cultivated area above 50 hectares still have a higher percentage. It is interesting also to note that agricultural activities correspond to about 24.9% of the overall employment in Bulgaria [BMAF 2007a].

In the typical case, the cultivation of sunflower and rapeseed for biodiesel production is initiated and organised by biodiesel producers. A good example in this respect is the company Ecoproecti OOD in Dimovo (North Western Bulgaria). This company constructed a biodiesel plant in an area that previously had a very high rate of unemployment (more than 35%). Some additional activities included distribution to local farmers of high quality seedlings and cultivation of a company owned experimental field with the aim to achieve higher yields. The greater demand for sunflower and rapeseed resulted in an increase of about 60% for local prices of agricultural land.

In Bulgaria, in order to receive the €45.00/ha subsidy for energy crops, farmers must present contracts with processing companies showing that they will buy the raw material. New refineries for biodiesel and bioethanol production from grain and oilseed crops must guarantee to the Paying Agency in the Ministry of Agriculture and Forestry that they will buy the raw material at a rate of €60 per ha. In this way the State can be certain that crop producers who are subsidised for growing energy crops have submitted the raw material for processing and for no other purpose.

3.1.2 Biofuel distribution and usage

From 1st of January 2008, each petrol station in Bulgaria has to offer biodiesel and bioethanol according to the Renewable Energy and Biofuels Law (REBL).

Tempo Petrol EOOD is the first company which started to offer biodiesel in its petrol station chain. In some of its petrol stations it offers a blend of bioethanol and petrol. The price is slightly below the price of petrol.

However, in 2009 it was established that the regulation for compulsory blending of petrol oil fuels with a bio-component had not been fulfilled. Thus Bulgaria could not reach the indicative national targets. There were several reasons for not complying with the REBL with reference to the compulsory blending of fuels with a bio-component. The main ones pointed out by the suppliers and importers of liquid fuels were:

- Difficulties in reaching the requirements of Standard EN 228 when blending bioethanol with gasoline;
- Lack of tax concessions for biofuels and blends with biofuels;
- Lack of accredited laboratories for quality control of biofuels, which could accurately determine the content of bio-component in blends; and
- The need for time to execute investment programs by producers and importers of liquid fuels, due to the need to change the technology of distributional systems (setting the systems in compliance with the REBL regarding the process of blending biofuels with petrol fuels).

The end users of biodiesel in Bulgaria are transport companies, private cars and some heating systems. As mentioned, official statistics about biodiesel production and consumption do not yet exist. Therefore just some examples of various types of end users are provided here. For example, one of the clients of the first biodiesel producer in Bulgaria, Sampo AD, is the transport company Trayana Trans, which uses biodiesel as a fuel for its fleet of trucks. Another example is the Trade Storehouse in Gabrovo, which has its own biodiesel installation and the fuel produced is used for both transport and heating purposes.

Several filling stations in Bulgaria provide biodiesel, e.g. the 8 Tempo Petrol EOOD filling stations.

3.1.3 Regulatory initiatives

On 18 July 2006, A Work Group was established with representatives from the National Association for Biofuels and Renewable Energy Sources. The Work Group has the following members:

- Alexander Penchev, ESD Bulgaria Ltd. – Chairman of the Work Group;
- Dimitar Zamfirov, Chairman of the National Association for Biofuels and Renewable Energy Sources (NABRES);
- Miryana Evtimova, Secretary of the National Association for Biofuels and Renewable Energy Sources;
- Martin Banov, representing the Institute for Soil Science in Sofia;
- Dr. Stefan Stefanov, Chairman of the Bulgarian Association of Farmers;
- Rayna Anguelova, ESD Bulgaria Ltd; and
- Ilian Jeliaskov, ESD Bulgaria Ltd.

This Work Group has contributed to the elaboration of various governmental regulative documents which have fostered production and usage of biofuels. Such documents are:

- Renewable Energy Law applicable from January 1, 2007; and
- National long-term programme for stimulation of biofuel usage in the transport 2008 – 2020.

The Law and the National programme predict tax and other preferences for producers and end-users of biofuels. On the other hand, the adopted biofuel standards, which have been harmonised with similar standards from other European countries, form the regulative framework needed for the production of these fuels.

3.1.3.1 Procurement

No procurement associations have been developed yet in Bulgaria, as the current use of biofuels is relatively low. But the growing demand of biofuels, as well as the existing regulative framework which is fostering production and usage, are a good precondition for the establishment of such groupings and associations.

3.1.3.2 Market and supply chain development

The Renewable Energy Law (proposed by the Ministry for Economy and Energy) was discussed at governmental level during 2006. The aim was to devise a general framework and develop specific biofuel regulations. In May 2006, the Ministry for Economy and Energy initiated the preparation of legislation aimed at supporting the use of renewable energy sources and biofuels.

In December 2006 the Bulgarian Association for Biofuels worked on the seven political axes mentioned in the EU Strategy for biofuels of February 2006¹ and sent its comments to:

- the Parliamentary Commission of Energy;
- the Parliamentary Commission of Environment;
- the Parliamentary Commission of Budget;
- the Ministry of Economy and Energy;
- Ministry of Environment and waters; and
- the council of ministers.

In the course of stakeholder discussions held in relation to the drafting of the Renewable Energy Law (RES law), participants suggested three principal scenarios for the development of biofuels production for the period between 2008 and 2015, completed by indicative targets. The following levels for the necessary quantity of biofuels on the domestic market as a percentage of total quantity of fuels used in the period were suggested:

- 2008: 2%
- 2010: 5.75%
- 2015: 10%

3.1.4 Promotional activities

Promotional activities in Bulgaria are carried out mainly by the National Association of Biofuels, which organises thematic conferences, seminars, workshops, maintains specialised web-sites, etc. Examples include:

¹ "An EU Strategy for Biofuels" [COM(2006) 34 final - Official Journal C 67 of 18 March 2006].

- National conference “*Renewable Energy from agriculture*” held in Sofia, December 2006;
- National seminar *Biodiesel workshop* held in Sofia, July 2006.

Other organisations performing promotional activities in the field of biofuels are:

- the Energy Efficiency Agency – an executive agency to the Ministry of economy and energy;
- ESD – Bulgaria Ltd – a company specialising in the field of energy efficiency.

3.1.5 Networking initiatives and network development

The initial activities of the BIONIC project coincided with a period of rapid growth of biofuel production in Bulgaria. This growth can be explained by the following factors:

- Availability of raw materials – sunflower, rape and maize seeds, and wheat;
- Experience in biodiesel production, dating from 2001 (early production was based mostly on waste cooking oil);
- Good local expertise in manufacturing of biofuel production equipment;
- Biodiesel and bioethanol production became popular; and
- Introduction in January 2006 of a zero excise tax rate for pure biodiesel, which made biodiesel production financially attractive.

In these conditions, the associations of participants in biofuel developments already existing from previous years increased their activities. Such associations are:

The National Association for Biofuels and Renewable Energy Sources.

This Association started in 2002 and groups almost all active players in Bulgaria in the sphere of biodiesel and bioethanol production and distribution. It already acts as a network of stakeholders, interested in biodiesel and bioethanol issues and represents biodiesel producers in contacts with national and regional authorities (representatives of this Association took part in discussions and work groups, concerning the development of a new draft law for renewable energy). Its president is Mr. Dimitar Zamfirov, owner of the first biodiesel production plant in Bulgaria.

The Oilseed Oil Producers Association Bulgaria.

In this Association, founded in 1994, about 30 cooking oil producers in Bulgaria are members. The reason for mentioning them here is because several such companies are also interested in investing in biodiesel plants. The Chairman of the Association is Mr. Vidy Vidov.

The Bulgarian Association of Farmers.

This is an association of private farmers headed by Dr. Stefan Stefanov.

3.1.6 Conclusion

In the last few years the Bulgarian government has initiated various legislative initiatives for the successful application of the requirements of Directive 2003/30/EC for stimulating the utilisation of biofuels or other RES in the transport sector. The application of the requirements for stimulating biofuel utilisation on a national level will lead to a wider utilisation of biomass, which will lead to sustainable development not only in the agricultural sector and forestry, but also in the country as a whole.

In order to stimulate the biofuel utilisation in Bulgaria, the following actions and measures for active engagement of the governments should be approved, namely:

- Active awareness raising and popularisation of biofuel utilisation, by introducing it in the state and municipal transport for own needs;
- Establish state register (maintained by the MEET) for biofuel production, thus identifying producers; and
- Remove the guarantee of €60 per hectare, currently required by the energy crops producers in order to receive the subsidy of €45 per hectare.

The production of biofuels in Bulgaria is based on local resources, which is a good precondition for sustainable supplies. Biofuels are a good alternative to petrol fuels, and can limit the energy dependence from import of liquid fuels, contributing to sustainability in energy supply.

Substitution of petrol fuels by biofuels is actually one possibility for RES energy potential in the country. This can lead to a more rational use of agricultural land, as well as to the possibility for utilising set-aside agricultural lands. At the same time, the whole chain, from growing energy crops to distribution and consumption of biofuels, would contribute by increasing employment, especially in rural areas which have less economic development.

The wider use of biofuels in different sectors such as urban transport, inside transport in production units and harbours would lead to a decrease of CO₂ emissions in regions with a high level of greenhouse gases, environmental improvement, and better quality of life in regions with a high concentration of gas emissions.

3.2 Romania

3.2.1 Technical initiatives

3.2.1.1 Biofuel production

The availability of biofuels in Romania is characterised by the incipient market situation. According to Ministry of Agriculture and Rural Development (Note no. 277339/11.04.2007) in Romania there are twelve private fiscal investors registered for the production of large quantities of biodiesel, from which the following four are fiscal registered:

1. *SC AUTOELITE SRL*, Baia Mare, str. Baii, nr.3, jud Maramures;
2. *SC BLITZ TRANSPORT SRL*, Comarnic, str. Podul-Lung, nr. FN, judetul Prahova;
3. *SC ULEROM SA*, Vaslui, str. Podul Inalt, nr. 2, judetul Vaslui;
4. *SC PRIO BIOCMBUSTIBIL SRL*, str. Dr. Raureanu, nr.1, sector 5, Bucuresti.

The following eight have completed applications for fiscal registration:

1. *SC V & G OIL 2002 SRL*, Odobesti, Sos. Vrancei, km 6, judetul Vrancea;
2. *SC VIROMET SA*, Victoria, Aleea Uzinei, nr. 8, judetul Brasov;
3. *SC NAZAC TRADE SRL* Galati, str. Constructorilor, nr. 8, judetul Galati;
4. *SC BIO DIESEL SRL*, comuna Murgasi, sat Picaturile, judetul Dolj;
5. *SC ANYKPROD SRL*, Gradinari, sat Petculesti, nr. 159, judetul Olt;
6. *SC LETSOL IMPORT EXPORT SRL*, Slatioara, sat Salcia, nr 11, judetul Olt;
7. *SC CHIMOFARM SRL*, Roman, str. Nordului, nr.3, jud. Neamt;
8. *SC PROFILAND SRL*, Galati, Sos. Smardan, nr. 1 A, judetul Galati.

According to the Ministry of Economy and Finance [Romania 2007 Report under Directive 2003/30/EC], private investors are developing projects to produce large quantities of biodiesel. This is on the basis of Romanian potential to supply a quantity of raw material of about 500,000 to 550,000 tonnes per year for the production of a similar level of biofuel of 500,000 to 550,000 t/yr.

Romania should ensure that the introduction of transport biofuels on the market for a target of 5.75% by 2010 is calculated on the basis of energy content of all petrol and diesel used in transport. This is according to the provision of the Directive 2003/30/EC, that leads to the overall needed quantity of biofuels of about 300,000 t/yr for 2010.

Considering operative biodiesel capacities in 2007, and current biodiesel producers who have put in operation new production capacities, and including interested producers for building new production capacities in the future, it can be estimated that production capacity can increase to 400,000 to 500,000 tonnes per year of biodiesel for local market and export on the EU market.

3.2.1.2 Biodiesel producers

The biodiesel market presents a variety of actors, with both large production units and a number of very small projects.

In 2005, Martifer announced plans to invest in biodiesel production plants and raw materials in Romania, through its division Prio (formerly Biomart). The company announced plans to invest €47 million in building a biodiesel plant at Lehliu Gara, in the Calarasi County. Production started at the end of 2007 with a 100,000 tonnes/year capacity. An additional €16 million will be invested in a refinery and at a later stage, investments will also be made in crushing capacities. Prio aims at providing for 30% of the biodiesel demand in Romania. Martifer also announced plans to acquire some 50,000 ha of land from Agromart – a rapeseed and flaxseed supplier – to guarantee biodiesel raw materials supply for this plant.

Since 2007, the Romanian edible oil producer ULEROM (part of the domestic food and agriculture holding company RACOVA) is operating a 60,000 tonnes/year biodiesel production plant, located alongside the company's edible oil plant in Vaslui, northeast Romania. The company is already planning to expand capacity to 120,000 tonnes/year, provided that sufficient demand for biodiesel on the local and international market arises.

Other producing companies include the crushing company Ultex Tandarei (60,000 t/yr capacity), and Autoelite in Baia Mare (20,000 t/yr).

Biodiesel projects that are currently being developed include the Constanta-based Argus company, Expur SA in Slobozia (Ialomita county) with 100,000 t/yr capacity and Procera Biofuels in Fundulea (Calarasi county) with a 35,000 t/y capacity. Spanish investors are said to be planning to spend some €18 million in the north eastern county of Iasi. The Romanian edible oil producer Prutul intends to invest €25 million over the next three years to modernise production facilities and build a new oil and possibly biodiesel plant.

3.2.1.3 Oil producers extending production with biodiesel capacities

The company Prutul produced some 25,000 tonnes of edible oil in 2006 and is planning to reach a 12% market share. Other major edible oil producers include Bunge Romania, Argus, Cargill Oils, Ulvex and Ulerom.

Romania holds a very strong position as a producer of edible oils in Europe. With investments estimated at €20 million in 2005, the industry has been evolving rapidly in the past couple of years towards high concentration, given the presence of large players, both domestic and international (Bunge, Cargill, Argus, Agricover, Ardealul currently account for 85% of the oil market). The value of the domestic market is estimated at over €300 million (which does not

include the value of the 20,000 tonnes of oil obtained in rural crushing plants for household self-consumption).

3.2.1.4 Technology providers

Romania seems to rely mainly on EU technology providers, at least for the most recent biodiesel projects (Desmet Ballestra notably). However, the US-based Greenline Industries supplied in 2007 the equipment for the ULEROM project and seems to be particularly well equipped for the Romanian market since the design allows a rapid deployment of small- to medium-sized plants.

3.2.1.5 New projects

Starting in 2005, Man Ferrostaal (a division of the German truck manufacturer MAN) announced its plans to establish a farm centre and a biodiesel factory at Atel and Loamnes, Sibiu. The Atel project estimates that it would need approximately 120,000 ha of rapeseed per year and it was planned to start building of the biodiesel production capacity by the end of 2007. At present construction is delayed due to extended negotiations of the biodiesel refinery project.

In 2009 new capacities for biofuel production were added on the Romanian market. One of them is the biodiesel unit from Expur SA Slobozia (Ialomita county) with a capacity of 100,000 t/yr, realised with an investment of €45 million. This unit was built by Romanian companies under the supervision of IPIP Ploiesti.

Starting in October 2009 a new unit for bioethanol production is working at Zimnicea with a capacity of 82,000 t/yr. This investment of €50 million was made by an important Romanian company: InterAgro S.A. The entire production will be mixed with gasoline by the most important Romanian fuels producers: OMV-Petrom and Petrotel-Lukoil Romania.

3.2.2 Biofuel distribution and usage

The distribution network has remained the same, with little change regarding the owners of fuel distribution stations. Some private fuel distribution stations were bought by major fuel distribution companies, such as OMV, Lukoil and Rompetrol. After a modernisation process these stations were reintroduced. In our region there are no changes regarding the production of biofuels and their distribution.

Biofuel use in 2009 was in the limit of 4% vol biodiesel in diesel fuel, as per the Romanian legislation fixed by HG 1844/2005. Because Romanian biofuels

producers didn't assure the entire quantity to be mixed with diesel fuel, almost 50% of biodiesel was imported. It is necessary to explain that Romanian biodiesel production capacity could assure market demand, but the production price was higher than the external price and for that the consumers have bought biodiesel from external market. Unfortunately, in 2010 the situation remains like in 2009, and a large quantity of biodiesel is imported.

Romania will respect the decision of The European Directive 2003/30/CE regarding the level of biofuels mixed with petroleum fuels and on 31.Dec, 2010 we will attain 5.75 % vol of biodiesel in diesel fuel.

3.2.3 Regulatory initiatives

3.2.3.1 Procurement

Since the announcement of the biofuels mandate, major domestic fuel suppliers such as Rompetrol and Lukoil signalled their willingness to invest in captive biofuel facilities.

The oil company Rompetrol is building a 60,000 tonnes per year biodiesel unit in Navodari. Rompetrol Downstream has already introduced in its stations and warehouses network a B2 blend branded 'Efix Diesel', which will be distributed in more than 350 petrol stations. The firm has signed a 20,000 tonnes contract for biodiesel supply with the Portuguese group Prio/Biomart, part of Martifer.

The local branch of the Russian oil company Lukoil will invest \$15 million in a biodiesel production line at its Petrotel refinery. This began biodiesel production in the first half of 2008. Ulerom has negotiated distribution contracts with local oil companies Petrom and Rompetrol.

3.2.3.2 Market and supply chain development

In Romania there is no international trade of biodiesel at present. Production capacities are at the primary stage of development; the first industrial capacities to start production of biodiesel were by the end of 2007.

Rapeseed producers have actively participated in international trade of raw material for biodiesel production on a European scale over the last few years. Hence, the large majority (90%) of rapeseed production is exported, while the remaining rapeseed and rapeseed oil production is used in Romania for other purposes than biofuel (textiles and chemistry). Rapeseed cultivated areas and production have shown a continuous increasing trend. Currently, we may consider that over 100,000 tonnes of rapeseed production are exported for biodiesel production.

Following the start of production from the end of 2007, Romanian producers of biodiesel exported in Europe an important share of the production of biodiesel, but the main part of production was distributed on the local market. The further accession of Romania on the European biodiesel market will boost interest for alternative motor fuels and will increase the acceptability of biodiesel as a common trading commodity. This is an important step for strengthening the biodiesel supply chain and market structures for biodiesel products and technologies in Europe as a whole.

Considering Romania's important potential for biodiesel production, it is important to avoid an overproduction situation arising in the medium term. It is therefore essential to ensure a genuine market for Romanian biodiesel both internally as well as in the EU. With regard to market opportunities in Romania, it seems essential to devise a wide-ranging information campaign on the main advantages of biodiesel targeting the public. Another option would be the promotion of high blends towards public transportation companies and captive-fleets managers. On the export side, Romania could secure market opportunities with EU countries lacking biodiesel (e.g. Slovenia, Malta, Cyprus).

3.2.3.3 Marketing of glycerine

With regard to glycerine, Romania could probably add additional outlets for biodiesel glycerine by investing in pharmaceutical grade refining capacities, which is still missing so far.

3.2.3.4 Marketing of by-products

As an EU Member State benefiting from the advantages of the internal market, Romania would certainly benefit from exporting meals resulting from biodiesel production to cover EU deficit in vegetable proteins.

3.2.4 Promotional activities

Important oil companies such as Petrom, Rompetrol and Lukoil are key stakeholders for biofuel promotion (for marketing reasons) and in pioneering biofuel distribution in Romania.

3.2.4.1 Networking initiatives and network development

The network initiative to promote biofuels in Ploiesti City materialised as a BIOBUS which was fuelled with B25 (25% biofuels and 75% diesel fuel). This action was promoted by the distribution of booklets, posters and banners. The local and national newspapers made a presentation of this initiative. The public very much appreciated this action and there was a lot of very interesting and favourable comments.

Another very important initiative was a workshop regarding the influence of humans on climate change, organised in the period of the Denmark World Meeting. On this occasion, 50 people signed an agreement regarding the protection of nature concerning their activities in order to reduce GHG emissions and climate change effects.

3.3 Spain

3.3.1 Technical initiatives

3.3.1.1 Biofuel production

The production of biofuels in Spain has increased during the last period, although this increase has not been equivalent to the production capacity installed. In 2008 production increased by 7.41% compared to 2007. It is important to notice that this information refers to all kinds of biofuels, as there are huge divergences between the behaviour of biodiesel and bioethanol. Biodiesel production increased by 42.000 tn whereas bioethanol decreased by 10.700 tn.

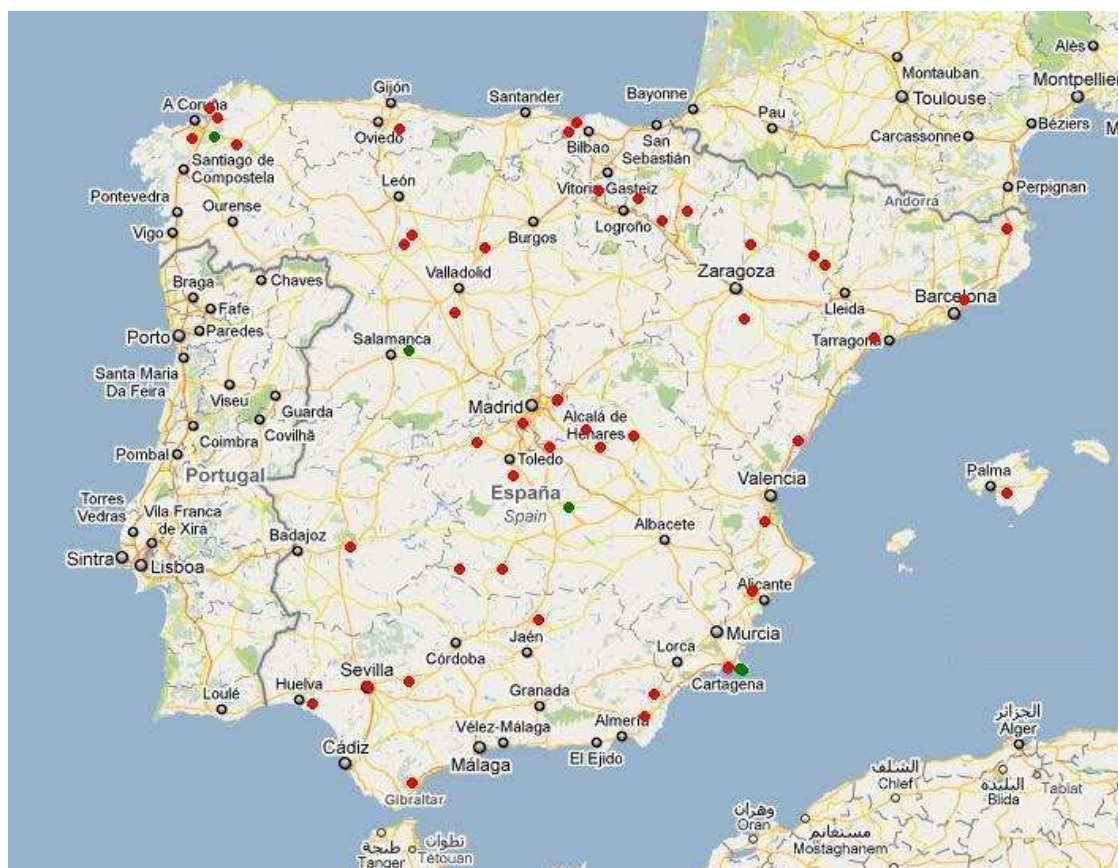
Table 3.7 Development of biofuels production and capacity in Spain

		2005	2006	2007	2008	% Variation 2008/2007
Production	Bioethanol	238.782	321.000	284.131	273.377	-3,78%
	Biodiesel	71.469	124.577	148.777	191.621	28,80%
	Total	310.251	445.577	432.908	464.998	7,41%
Capacity	Bioethanol	257.000	441.000	456.000	456.000	0,00%
	Biodiesel	141.500	248.310	815.190	3.290.038	303,59%
	Total	398.500	689.310	1.271.190	3.746.038	194,68%

Source: data from APPA

Looking at production capacity installed in Spain, productivity indexes are really worrying, because total production represents only 12.4% of the available installed capacity in 2008. This information contrasts with the data for previous years, when these indexes corresponded to 77.5% (2005) and 64.5% (2006). The explanation for this is that production and demand of biofuels has not increased at the same level as the building of production facilities, due to the lack of success at considering alternative biofuels as a proper renewable energy source. It is also important to take into account that this demand reduction is not only due to the lack of popularity of biofuels, but also due to massive imports of biofuels coming from countries dumping subsidised biofuels and therefore offering much lower prices than national producers.

Figure 3.1 Production plants in Spain.



Source: APPA

Table 3.8 Biofuels production in 2009

BODIESEL	BIETHANOL
45 plants	4 plants
4.110.400 tonnes/year	464.058 tonnes/year

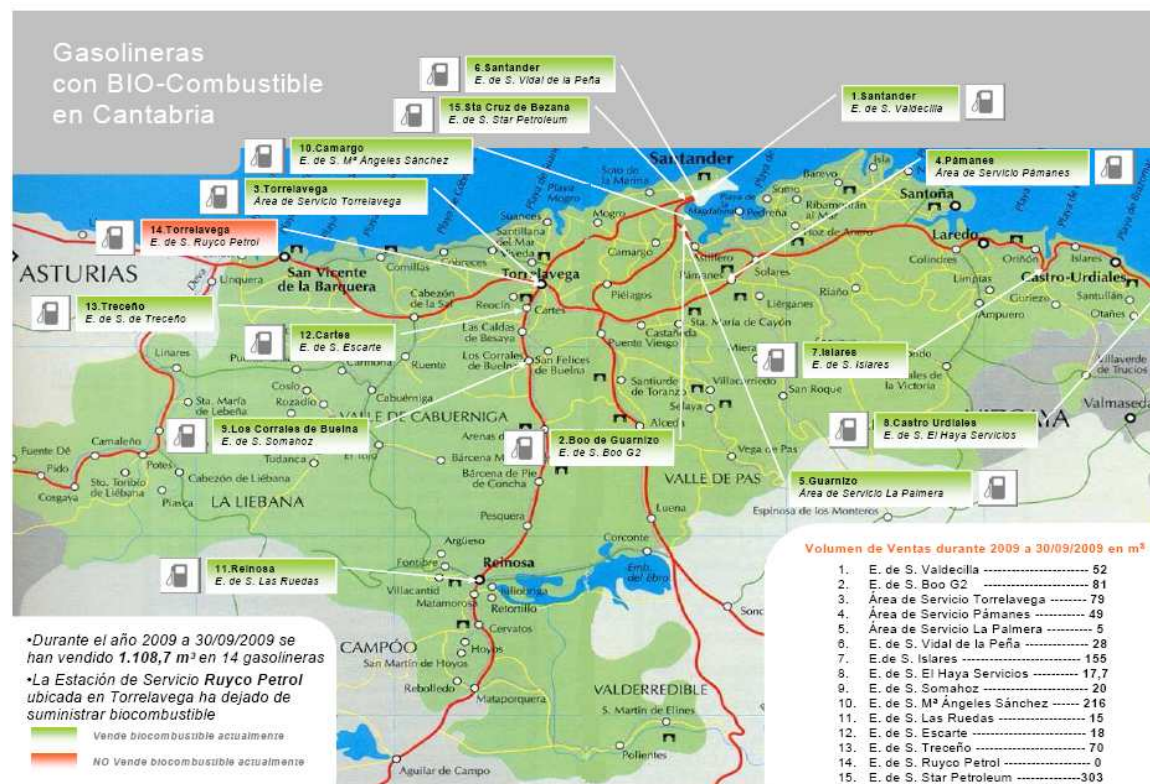
3.3.2 Biofuel distribution and usage

Among the activities developed by Cantabria in the BIONIC project, it is worth mentioning a case study on the use of biofuels in the region. This study analyses all the petrol stations which are selling biofuels in Cantabria, specifying who their provider is and the volumes of biofuel sold. The main conclusions of this study will be included under the deliverable for WP 5.

One of the most outstanding pieces of information extracted from the study is the fact that nowadays there is still no petrol station providing bioethanol in the region. With regards to biodiesel, there are fifteen stations distributing this product. Below is a map, showing all the different petrol stations selling biofuels

in the region. In the right side corner it is possible to read the volume sold in each one.

Figure 3.2 Biofuels distribution in Cantabria



Biofuel use in Spain is not as successful as in other European countries. Obviously this situation has a big impact on usage levels, which are not as high as expected. The main reasons for this context are:

- negative image of biofuels linked to hunger or deforestation in poor countries;
- lack of incentives for final users (prices);
- distrust on both technical efficiency (in terms of consumption and engine maintenance) and environmental benefits;
- lack of a wide distribution network (stations – pumps) which guarantees supply for final users across the region;
- insufficient support by public organisations; and
- scepticism on the future of biofuel market.

For all these reasons, biofuel use among private vehicles is very limited. Despite this, in Cantabria at the moment 80% of the bus fleets are running on B10, due to the policies promoted by the Administration.

3.3.3 Promotional activities

Biofuels in Spain are not very popular. At present, other alternative energy sources such as wind energy or electric cars are generating more interest from the public and the administration. This fact, together with the economic crisis, has dramatically reduced the interest in developing promotional activities on biofuels, so it is not possible to mention any new activities.

3.3.4 Networking initiatives and network development

There are no new networking initiatives, and most of the projects and initiatives detailed in the previous versions of this deliverable (D2.1 2008 and 2.1 2009) have now come to an end.

3.4 Sweden

3.4.1 Technical initiatives

3.4.1.1 Biofuel production

Updated production information since the release of D2.1 2009 is:

- Agroetanol AB now has a yearly production of ethanol at 210 000 m³.
- Etek, Etanolteknik AB is now a member of the SEKAB-group and has changed its name to SEKAB E-Technology.
- There is a new time-schedule for the planned methanol production plant in Hagfors. Construction starts in 2011 with a duration of around three years. The daily production is calculated to 375 000 litres per day² and estimated cost is SEK 3 billion.
- The RME-producer Ecobränsle was sold from Lantmännen to Energigårdarna, who took over in May 2010.

Some recent news includes;

- In June 2010 a new up-grading plant for biogas produced from sewage sludge opened in Karlstad. The up-graded gas is transported to Värmland's first filling station, also in Karlstad. This opened in May 2009.

3.4.2 Biofuel distribution and usage

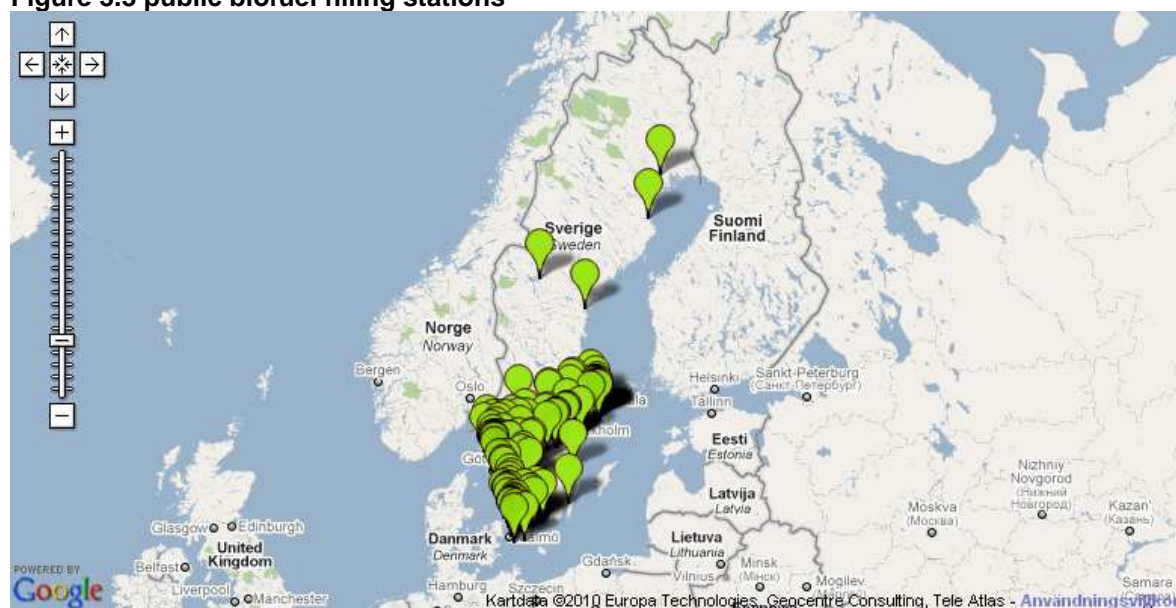
Updated information since the release of D2.1 2009 includes:

- In June 2010, the number of public filling stations was around 110 and in addition to these, there are another 30 for heavy vehicles³. More filling stations are planned for the future. During 2009 the total amount of vehicle gas sold in Sweden was 69 billion Nm³, of which 43 billion Nm³ was biogas.

² www.varlandsmetanol.se

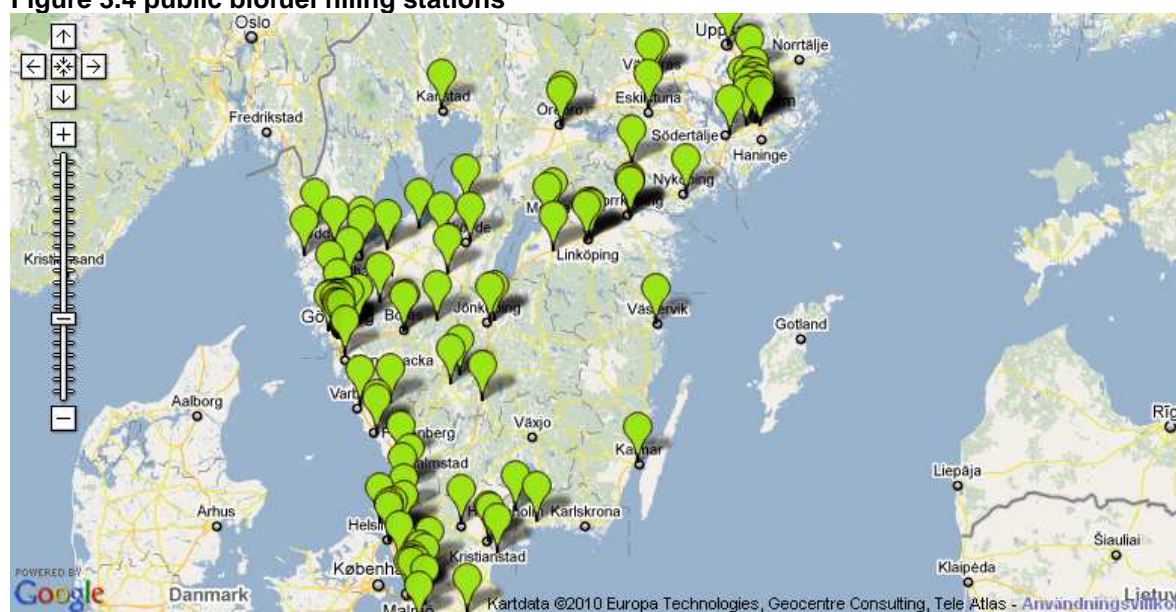
³ www.gasbilen.se

Figure 3.3 public biofuel filling stations



Source: <http://www.gasbilen.se/Tanka/Tankstallen.aspx>

Figure 3.4 public biofuel filling stations



Source: <http://www.gasbilen.se/Tanka/Tankstallen.aspx>

Mentioned suppliers and updates on number of stations:

- FordonsGas Väst: 28 filling stations⁴
- AGA: no number of stations found⁵
- EON around 20 stations⁶
- Svensk biogas: 14 stations⁷

⁴ www.fordonsgas.se

⁵ www.aga.se

⁶ www.eon.se

⁷ www.svenskbiogas.se

- Others (municipalities and petrol companies) are found on www.gasbilen.se/tanka/Distributörer.

Some recent news includes:

- The municipality of Karlstad has 76% alternative fuel cars, according to an investigation made by Gröna bilister 2010⁸
- The employment office in Karlstad has used ethanol cars from a car sharing system since January 2010. The cars are available for the public during evenings and weekends.
- Great efforts on the conveyance of goods have been made, for example through the projects KNEG⁹ and CleanTruck¹⁰. Through the CleanTruck-project firms of haulage contractors get contributions for investments in clean vehicles to be used in the Stockholm area. The project is financed both by participating companies and Life+. KNEG is a cooperation project with many participating companies as well as universities, a trade organisation and the Swedish Transport Administration. Their common vision is that the conveyance of goods on Swedish roads should be climate neutral, by for example increased usage of renewable fuels.
- In Värmland, the municipality of Säffle intends to build a filling station for biogas with subsidies. The station will hopefully be opened already within a year.

3.4.3 Regulatory initiatives

3.4.3.1 Procurement

Procurement of biofuel vehicles and biofuels is a continuous process in most municipalities and companies in Sweden. In Värmland there are for example many ethanol cars in use. Biodiesel oil is used in a variety of vehicles and there are also biogas refuse lorries. Discussions are on-going regarding change of fuels for bus-fleets.

3.4.4 Promotional activities

Recent news includes:

- The regional energy agencies of Sweden have produced a magazine, "Klimat & Transporter" about green cars, renewable fuels and "greener" traffic.
- The Swedish Association of Green Motorists released in June 2010 a ranking list of Swedish municipalities, where their work on cleaner

⁸ www.gronabilister.se/kommunranking-2010

⁹ www.kneg.org

¹⁰ www.stockholm.se/cleantruck

transportations was evaluated. Some of the categories in the evaluation were of course about renewable fuels ¹¹.

- Individuals who want to buy a clean car can find information on a number of websites, both from non-profit associations and public authorities.
- The car producer SAAB is participating in STCC's City Race (in Gothenburg 4-5 June) and driving a car that runs on biogas for the first time.

3.4.5 Networking initiatives and network development

Recent news includes:

- In April 2010 a new gas association was formed, *Energigas Sverige* ("Energy gas Sweden"). The new association gathers members from two former organisations for biogas and gas.

¹¹ www.gronabilister.se/kommunranking-2010

3.5 UK

3.5.1 Technical initiatives

3.5.1.1 Biofuel production

Bioethanol Ltd – Bioethanol from Wheat, Barley, Molasses, Sugar Beet

An ethanol refinery is planned to be built at Immingham initially with a capacity of 100000 tonnes of bioethanol as a joint venture between Bioethanol Ltd and Centaur Grain, using 320000 tonnes of wheat. The plant is also designed to take various proportions of starches and sugars. Planning was approved in 2007 but construction of the plant has been delayed and is now due to be completed in 2012.

British Sugar – Bioethanol from sugar beet

The UK's first bioethanol refinery at Wissington, near Downham Market, Norfolk which is producing 70 million litres of bioethanol per year from sugar beet. It uses 650,000 tonnes of sugar beet in production which is equivalent to 110,000 tonnes of sugar. There remains an aspiration to move to biobutanol production but there is no reported activity in this area at the moment.

Vivergo - Bioethanol from Wheat

The company is a partnership between BP, British Sugar and Dupont. Through this alliance it hopes to capitalise upon BP's fuels technology expertise and access to major fuel markets; British Sugar's experience in the agricultural value chain and links to feedstock supply. DuPont provides biotechnology and bio-manufacturing capabilities.

Located in Hull adjacent to BP Chemicals site, the plant will have a capacity to produce 420 million litres of bioethanol from UK grown wheat. Commissioning is due to take place in spring 2010. Vivergo claim the plant will bestow 3 major benefits:

- The plant is located in the UK wheat belt.
- Local proximity to good quality CHP sources will provide steam to the bio refinery
- The deep port location will optimise supply chain logistics

Ebony Solutions Ltd – Biodiesel from sustainable feedstocks

Producing 24 million tonnes of biodiesel per annum the company manufacture a fuel they have developed called Ultra 20. This fuel complies with EN590 and is approved by Cummings, Citroen, Peugeot and Daimler Chrysler in their vehicles.

ESL state that they use the following feedstocks for biodiesel production:

- Animal or fish oils of known origin with traceable history. Used vegetable oils from food manufacturers, the catering or pharmaceutical industry.
- Virgin vegetable oils which have been rejected for human consumption by 'sell by date' or contamination.
- Non edible vegetable oils such as jatropha oil or algae-produced oils of known and sustainable origin.

According to Renewable Transport Fuels Obligation reports ESL's biodiesel achieves an 85% reduction in greenhouse gas emissions. A blended product is sold usually at 100%, 20% or 5% inclusion rates.

Ensus - Bioethanol from Wheat

Ensus Group is developing what is claimed to be the largest biorefinery in Europe, at Wilton in the North East of England. The plant will produce 400 million litres of bioethanol per annum from EU wheat stocks using 1.2 million tonnes of wheat per year. Ensus claims the feedstock will be produced from existing arable land area without adverse effects. The first shipment of bioethanol from the facility was dispatched in March 2010.

Ensus claim that the facility will produce approximately one third of the UK's bioethanol demand for the RTFO and that the bioethanol will reduce greenhouse gas emissions by around 70%. In addition to producing fuel, the facility will also produce 350000 tonnes of high protein animal feed which replaces imported soy resulting in a doubling of the greenhouse gas savings generated by Ensus bioethanol. Ensus also claim that the reduction in soy imports reduces deforestation pressures in South America and reduces global emissions from land use change.

Shell have a ten year contract to take the bioethanol and Greencore International hold the contract to supply the wheat feedstocks.

Rye Biofuels – biodiesel from UCO

Rye Biofuels is owned by Edible Foods Direct which is a company that sells cooking oils and related products to the catering sector. The concept was developed from the desire to build a closed loop business through:

- Retail
- Reclaim
- Recycle
- Retail
- Recycle

In partnership with Edible Foods Direct cooking oil is sold to caterers and then collected from them following use to be converted into biodiesel for sale. In addition to offering bulk sales across the UK the EN specification fuel is also available to individuals through a fuel pump at the biodiesel production facility.

Kassero Edible Oils Ltd

A Bristol based catering supplier who have diversified into the production of biodiesel from UCO. The company offers a free collection service for used oils and fuels all of its own delivery vans with biodiesel. The production facility is capable of producing in excess of 1 million litres of biodiesel a year and can supply any quantity from 1000 to 25000 litres.

Regenatec – Pure Plant Oils

Regenatec is an Oxfordshire based environmentally focused technology company which is actively progressing the development of PPO fuel. A leading additive supplier has developed an additive pack for Regenatec and the fuel is being subjected to an ongoing evaluation process with fleet customers but also with academic partners at Oxford Brookes University Automotive Labs and Brunel University. The fuel can be supplied to anywhere in the UK in quantities from 1000 to 28000 litres.

In addition to supplying fuel, Regenatec also perform vehicle conversions for heavy diesel vehicles. The resulting vehicle can use 100% pure plant oil all year even in sub zero temperature or it can use any mixture of biodiesel, diesel or PPO. Regenatec will provide an engine warranty if Regenatec fuel is used.

Eco Biofuels (Burnley) – Biodiesel from UCO

Eco Biofuels produced biodiesel from waste cooking oil. The company operated its own pump selling directly to the public. A large proportion of sales were to the town's taxi operators. Despite falling feedstock prices throughout 2008 the company struggled to remain viable. By 2009 production and sales volumes had fallen to approximately 750 litres per week; half the break even level. The company ceased trading in 2009 following a fire at the plant.

Euro Bioflow Limited

Euro Bioflow is a modern customer focused company delivering EN14214 Biodiesel and Biofuel consultancy services to the bulk fuel market place. They operate a wholesale supply service from their production facility in Wirral which they claim has been designed and manufactured utilising the most up to date technical and engineering skills available in the UK.

Euro Bioflow was formed as a renewable transport fuels supplier to meet the needs of commercial vehicle operators. Euro Bioflow believe that with fuel bills between 30% - 40% of the overall costs of the haulage business, biodiesel can help to reduce costs whilst also providing environmental benefits.

Newton Rigg College, Cumbria

The college have developed a facility for local farmers to hire, enabling them to crush OSR and process the rape oil into biodiesel.

The current prices for Oil Seed Rape are too high for the process to be economically viable and as yet the plant remains unused.

3.5.2 Biofuel distribution

Morrisons - Biofuel distribution

Morrisons supermarket has led the way in making biofuels more widely available to the general public. Morrisons was the first forecourt in the UK to install an E85 bioethanol pump selling 85% bioethanol and 15% petrol at its Norwich store in March 2006. By July 2007 it was installing its 16th bioethanol pump as it rolled out distribution over the country.

In October 2007 Morrisons began to offer B30 biodiesel, 30% biodiesel. By February 2009 B30 is reported to be in 110 forecourts at Morrison stores.

However in February 2010 Morrison's announced that it was withdrawing B30 and E85 pumps due to the unfavorable tax position within the April 2010 budget.

Harvest Energy

Harvest is one of the UK's largest independent blenders and suppliers of road fuel, and have promoted the use of biofuels. Morrisons bioethanol and biodiesel B30 fuels were sourced from Harvest Energy which was the major UK fuels distributor with around 5% of the UK fuels market. The business is owned by Irish equity company Ion Equity which also owns Topaz Energy Ltd, a distribution fuel business in Ireland and SWS Group, an alternative energy supplier and business process outsourcer in Ireland.

Harvest has now opened 5 London based branded retail sites through which to sell their fuels, biofuel and conventional fuel to the wider public.

Petroplus

Petroplus is a blender of biofuels. It refines North Sea Oil and blends with biofuel. According to their website, Petroplus supplies the major part of the UK's biodiesel, branded as Bioplus which is a 5% blend. We understand that they take biodiesel production from Argent Energy. Petroplus is a contributor to the NE biofuels group.

3.5.3 Regulatory initiatives

3.5.3.1 Procurement

London Borough of Richmond Council – Sourcing biodiesel

The London Borough of Richmond have made a commitment to run their fleet on 100% biodiesel sourced from waste cooking oil. They have undertaken trials and issued a tender for 750000 litres of biodiesel a year to be sourced from waste cooking oil collected from Greater London. They believe that this will require a framework agreement of up to 20 producers to be able to supply them.

Richmond Council avidly advocates that the duty on biofuels should reflect feedstocks source. They report that the cost of collection of waste cooking oil (UCO) has not been factored into the cost of estimates used by government and report that at the start of 2009, even with the 20p duty differential, they were paying up to 17p per litre more for biodiesel from UCO than conventional fossil diesel.

3663 – Using food waste for fuel to deliver to food service customers

Food service company 3663, runs a fleet of 1000 trucks which deliver to food outlets. In 2007 they established a trial to run vehicles on 30% biodiesel sourced from waste cooking oil supplied by Convert2Green. By March 2009 this had been extended to cover almost 75% of the fleet.

We understand that it is not 3663 themselves who are collecting the waste oil, but that the separate specialist oil company Arrow Oils are providing the collection service issuing waste notes to all customers. Arrow operate 100 vehicles from 15 depots collecting 200,000 litres of used cooking oil per week.

Nevertheless the partnership between 3663 and Convert2Green is reported to have produced nearly four million litres of biodiesel and reduced CO₂ emissions by more than 10,000 tonnes compared to mineral diesel.

3.5.3.2 Market and supply chain development

Northeast Biofuels Ltd

Is a cluster of companies and organisations committed to developing a sustainable transport biofuels business in the North East. The group whose activities include the production of biodiesel blends and bioethanol petrol additives from non food crops and development of related supply chains consist:

- Regional Development Agency One North East
- North East Process Industry Cluster (NEPIC)
- GrowHow
- Centre for Process Innovation (CPI)
- Sembcrop Utilities
- Agrovista (UK) Ltd
- Northwoods
- Simon Storage
- Profitech
- AV Dawson
- Graphite Resources
- The National Skills Academy Process Industries
- px
- Seymour Hawthorn Consultancy
- Durham University

- Newcastle University
- Petroplus
- NRG
- Crest Global
- Renew
- Monsanto
- Dow
- NFPAS
- Four Rivers Future Oils Limited
- Ligno Synthetics
- GrainCo
- K Home International
- Farmway
- BOC
- Ensus

The group have been supported to provide research and hold events which have included a study by North Energy Associates into the primary energy inputs and GHG emissions for the production of 1 tonne of unblended biodiesel derived from OSR.

The study, North East Biofuel Supply Chain Carbon Intensity Assessment which was jointly commissioned by North East Biofuels with the Low Carbon Vehicle Partnership was funded by HGCA. It concluded that UK grown OSR converted to biodiesel and the resulting meal used for livestock feed produced a 57%¹² reduction in primary energy consumption and 66% net saving in CO₂ emissions. When the resulting meal was used as an energy source the reduction in primary energy consumption was 97% with 94% saving in CO₂ emissions.

North East Process Industry Cluster (NEPIC)

NEPIC is an organisation that represents more than 500 North east based companies involved in the process sector including biofuel and related technology industries. The process sector represents £10 billion a year, over 25% of the regions GDP, employs over 34,000 people directly with a further 200,000 indirect jobs.

The organisation has been commissioned by One Northeast, The Regional Development Agency for the North of England, to deliver the Regional Strategy for Transport Biofuels. The work will be delivered in partnership with North East Biofuels and will help biofuels market development in the region by:

- Providing advice on developing EU Carbon and Sustainability Standards
- Providing advice on the EU Renewable Energy Directive

¹² Compared with conventional ultra low sulphur diesel

- Providing Advice on developing RTFO Carbon and Sustainability reporting standards
- Providing advice on Government White Paper
- Providing and developing responses to local, regional, national and European legislation

3.5.4 Promotional activities

www.biodieselnow.co.uk

A professional and well researched website intended to provide general and detailed information about biofuels to the general public. The website was established by North East Biofuels, NEPIC, Renewable Energy Association (REA) and One North East and is managed by REA.

<http://Biofuel.org.uk>

An information website providing general information about biofuels. The site is managed by XEC Internet Consultants

www.biodieselfillingstations.co.uk

A website which provides general information about biofuels as well as the locations of filling stations. The website appears to be run by a private individual and it is unclear how often the website is updated.

3.5.5 Networking initiatives and network development

UK Sustainable Biodiesel Alliance (UKSBA)

UKSBA was formed by a group of used cooking oil derived biodiesel producers in response to the UK Government's proposal to remove the 20 p/litre tax incentive for biofuels in 2010. The Group successfully lobbied for the incentive to be kept specifically for biodiesel made from waste cooking oil due to the excellent sustainability and greenhouse gas emissions savings generated by this fuel.

UKSBA are also calling for the Government to look at ways to:

- Engage in proper discussion with the industry to ensure that the RTFO can properly compensate for any proposed tax changes and support the industry
- Look at ways to incentivise biodiesel use at a local level, such as through exemption from congestion charging schemes or reduction in road tax

Environmental Protection UK (EPUK)

www.environmental-protection.org.uk/transport/biomethane-transport-forum

The organisation hosts the Biomethane Transport Forum which acts as one voice for all those pressing for the development of biomethane as a transport fuel.

A Stakeholder Network acts as a focal point for meetings (physical & web) and conferences. Members can access a developing data store for web content (technical reports, policy documents, news updates, diary notes, blogs and thought places) related to biomethane activities in the UK and overseas.

The Steering Group provides an organisational centre for the network, acting as a focal point for the collation and assessment of information and guiding development of the network.

Reports include:

- Biogas as a Road Transport Fuel Report;
- Expert Paper on Global Impacts of Road Transport Biofuels;
- Environmental and Rural Impacts of Biofuel;
- Sustainable Transport Fuel from Local Woodland; and
- Fuelling Road Transport