Carbon Labelling in Europe

Final Report of the Carbon Labelling Project

Carbon Labelling Project

Carbon/Efficiency Labelling & Bio-Blending for Optimising Benefits of Biodiesel & Additive Use

Grant agreement no. EIE/06/015

Intelligent Energy – Europe (IEE)

ALTENER / STEER

September 2008

Authors:

Rainer Janssen

Dominik Rutz

WIP Renewable Energies

Germany

Carbon Labelling Partnership

The current report was elaborated in the framework of the project Carbon Labelling co-funded within the Intelligent Energy – Europe (IEE) programme of the European Commission (Grant Agreement No. EIE/06/015).

Carbon Labelling consortium:

- WIP Renewable Energies, Germany (Co-ordinator)
- Home Grown Cereals Authority, United Kingdom
- Senter Novem, The Netherlands
- Q1 Tankstellenvertrieb, Germany
- Malta Resources Authority, Malta

Report prepared by:

WIP Renewable Energies
Sylvensteinstr. 2
D-81369 Munich
Germany

Coordinators: Dr. Rainer Janssen
Dipl.-Ing. Dominik Rutz M.Sc.
Phone: +49 89 720 12739
Fax: +49 89 720 12791
Email: rainer.janssen@wip-munich.de
dominik.rutz@wip-munich.de
Internet: www.wip-munich.de

Acknowledgements:

The authors would like to thank all members of the Carbon Labelling project, namely, Rebecca Geraghty and Richard Safford (HGCA), John Neeft and Elke van Thuijl (Senter Novem), Sven Bürkner (Q1 Tankstellenvertrieb), as well as Simon Borg and Charles Buttigieg (MRA). Furthermore, the contributions of the Advisory Board Members are acknowledged: Birger Kerckow, (Agency of Renewable Resources), Don O'Connor (S & T Squared Consultants Inc.), Dr. Guido Reinhardt (Ifeu-Institute for Energy and Environmental Research Heidelberg GmbH), Dr. Jeremy Woods (Imperial College London), Uwe Fritsche (Öko-Institut), Prof. Martin Mittelbach (University of Graz), and Dr. Rocio Diaz-Chavez (Imperial College London).

Table of contents

Executive Summary

Road transport is the second largest source of greenhouse gas emissions (GHG) in the European Union (EU) after power generation. Road transport contributes about one-fifth of the EU's total emissions of carbon dioxide (CO_2) and it is one of the few sectors where emissions are still rising rapidly. Currently, passenger cars alone are responsible for around 12% of EU CO_2 emissions.

An opportunity to reduce CO_2 emissions in transport is provided by the use of biofuels with beneficial life cycle CO_2 emissions and other efficiency improvement measures such as low viscosity lubricants reducing fuel consumption.

In the framework of the Carbon Labelling project (Project No. EIE/06/015) supported within the Intelligent Energy – Europe (IEE) programme of the European Commission pilot carbon labelling initiatives were implemented in order to contribute to the reduction of GHG emissions in the European transport sector.

In the Carbon Labelling project, firstly a supportable methodology for the quantification of carbon life cycle reductions was identified in co-operation with recent and on-going activities and methodologies by European and worldwide expert groups such as SenterNovem (NL), Ifeu Institute (DE) and Imperial College (UK).

In a second step, the "CO_2Star" label was developed and the Carbon Labelling initiative actively promoted the carbon reduction potentials to consumers. The following three "CO_2Star" labelling initiatives were implemented:

- Biodiesel labelling initiative at Q1 fuel stations in Germany
- Improved lubricants labelling initiative at Q1 fuel stations in Germany
- Labelling of low carbon freight services in The Netherlands

Several consumer surveys were conducted in order to assess the success of these labelling initiatives and the public recognition of GHG labels. In addition, managing directors and CEOs of fuel retailers as well as freight service and forwarding companies were interviewed about their attitudes towards carbon labels.

Furthermore, co-operation links with other on-going European initiatives involved in labelling activities for biofuels and low carbon transport services were established including the LowCVP (Low Carbon Vehicle Partnership) initiative on the development of a biofuels sustainability label, and the lubricant labelling initiative of the campaign "Ich und mein Auto" launched by the German Energy Agency (dena).

Apart from these three core labelling activities, the Carbon Labelling project targeted to overcome barriers of biodiesel use in smaller EU countries by information campaigns. Due to their lower capacities and limited infrastructure, smaller EU countries the use of pre-blended biodiesel were assessed.

Based on the results and experiences from the pilot CO_2Star carbon labelling initiatives the following main conclusions and recommendations can be summarised:

- Currently, the involvement of stakeholders from industry, NGOs, and consumer organisations in the implementation of carbon labels is very difficult due to the existing uncertainties with respect to the legal, regulatory, and economic framework conditions, as well as due to the on-going public discussion about sustainability aspects of biofuels.

- Results of the consumer surveys show that the majority of consumers are not willing to pay a premium price for fuels with reduced GHG emissions, efficiency improvements, and 'low carbon' freight services. Furthermore, the price of a fuel is the main factor influencing the purchasing decision of consumers in Europe. Therefore, currently the added value of carbon labelling initiatives for fuel retailers and freight companies is limited.

- Furthermore, there is very little knowledge of the public about biofuels in general, and more specifically on the potential for GHG emission reductions offered by biofuels. Thus, significant efforts are needed to increase public awareness of biofuels and other options to reduce GHG emissions in the transport sector. Thereby, strategies need to be developed with different messages targeted at different segments of society.

- Carbon labelling of biofuels and efficiency improvements will only be effective if there is a choice of products for consumers. In this respect the labelling of the biofuel fraction in mandatory blends (e.g. B5, E5) is not recommended. Carbon labelling of fuels shall focus on high blends of biofuels (e.g. B100, B30, E85) or other alternative transport fuels.

- Additionally, the level of GHG emission reductions is only one of the sustainability criteria to be integrated in the new EU Renewable Energy Directive. Therefore, it may be advisable to implement a Sustainability Label for biofuels instead of a label solely focussing on GHG emission reductions.

- Finally, the potential contribution of biofuels to achieve GHG reductions in the transport sector is limited. Therefore, the focus of GHG reductions in the transport sector should be a combined strategy on measures which are decreasing fuel consumption, such as higher vehicle efficiencies (improved traffic management, speed limits, interactive traffic lights, etc.), and alternative mobility concepts (public transport, car sharing, etc.), as well as on the use of best-practice biofuels and improved lubricants.

Finally, experiences from the CO_2Star carbon labelling initiatives showed that the following eight main activities need to be implemented to set-up successful labelling initiatives for biofuels on national and/or EU level.

1. Finalisation of the EU Renewable Energy Directive (RED)
2. Increase of Consumer Awareness about Biofuels
3. Involvement of Biofuel Stakeholders
4. Development of Standards (Compliance with RED or "Gold Standard")
5. Selection of Label Application
6. Selection of Chain of Custody
7. Selection of the Institution Operating the Label
8. Definition of Certification and Accreditation Schemes

These specific activities are crucial for successful (carbon) labelling initiatives for biofuels. However, at the present stage it can not be guaranteed that biofuel labelling offers a valuable opportunity due to the current low interest of both biofuel stakeholders and consumers.

It is therefore recommended to proceed with labelling initiatives after the finalisation of the Renewable Energy Directive and the Regulation on emission standards for passenger cars.

1 European Climate and Energy Policy

The year 2007 marked a turning point for the European Union's climate and energy policy. Europe committed itself to tackle climate change, to face the challenge of secure, sustainable and competitive energy, and to make the European economy a model for sustainable development in the 21st century.

Upon agreement reached in March 2007 the following key targets were set by the European Council:

- A reduction of at least 20% in greenhouse gases (GHG) by 2020 – rising to 30% if there is an international agreement committing other developed countries to "comparable emission reductions and economically more advanced developing countries to contributing adequately according to their responsibilities and respective capabilities".
- A 20% share of renewable energies in EU energy consumption by 2020.
- A minimum target for alternative fuels (including biofuels) of 10% of vehicle fuel by 2020.

Important Communications from the European Commission on the topics energy and climate include COM(2008) 30 final “20 20 by 2020 – Europe’s Climate Change Opportunity” [EC 2008a] and COM(2007) 1 final “An Energy Policy for Europe” [EC 2007a].

Furthermore, in late 2007 the European Commission issued a Proposal for a Regulation of the European Parliament and of the Council “Setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles” [EC 2007b]. This regulation aims at reducing CO_2 emissions of passenger cars as a contribution to the achievement of abovementioned ambitious GHG emission reduction targets.

In this document the Commission proposes an integrated approach for the reduction of CO_2 emissions in passenger transport, that is, the target of 120g CO_2/km by 2012, in the knowledge that improvements in motor technology would have to reduce emissions to 130 g CO_2/km while complementary measures would contribute a further emissions cut of up to 10 g CO_2/km.

Since several months this proposal for a regulation is under discussion in the Council and the European Parliament, and it faces strong opposition by several car manufactures (especially those producing predominantly large cars) which anticipate negative impacts on the competitiveness of their products on international markets.

A recent policy debate (September 2008) of the European Parliament’s Commission on Environment made the following observations which will be taken into account by the presidency for the finalisation of the regulation:

The Commission's proposal setting performance emission standards for new passenger cars addresses the growing climate change impact from road transport and ensures that this sector contributes to the achievement of the Community's overall objective of limiting the global annual temperature increase to a maximum of 2 °C above pre-industrial levels;

- Delegations supported the integrated approach to reduce emissions as proposed by the Commission;
- The need was emphasised to strike the right balance between, on the one hand, competitiveness and competition neutrality and, on the other, the need to reduce CO_2 emissions from road transport;

In conclusion in order to proceed with the reduction of CO_2 emissions from road the finalisation of the Regulation on "Setting emission performance standards for new passenger cars" is urgently needed. Setting clear targets and specifying the potential contribution towards these targets of alternative fuels and efficiency improvements for car components (such as lubricants, tyres and air conditioning systems) will certainly also enhance the interest of car manufacturers in integrated carbon labelling initiatives. During the implementation of the Carbon Labelling project, it was not possible to gain the support of car manufacturers, mainly due to the existing regulatory uncertainties.

As an integral part of the European climate and energy policy, the European Commission published a Proposal for a Renewable Energy Directive (RED) on 23 January 2008 [EC 2008b].

The objective of this Directive is to further promote renewable energy as contribution to climate change mitigation, sustainable development, security of supply, development of a knowledge based industry creating jobs, economic growth, competitiveness, and regional and rural development.

The RED aims to establish an overall binding target of a 20% share of renewable energy sources in energy consumption and a 10% binding minimum target for alternative fuels in transport to be achieved by each Member State, as well as binding national targets by 2020 in line with the overall EU target of 20%.

With respect to the promotion of alternative fuels to achieve the 10% binding minimum target, the draft RED includes a set of sustainability criteria for biofuels and other bioliquids specified in Article 15 of the Directive.

The sustainability criteria proposed in the draft Directive of January 2008 state that biofuels will only count to national targets, renewable energy obligations, or be eligible for financial support, if:

- GHG emission savings shall be at least 35%
- Biofuels shall not be made from raw material obtained from land with recognised high biodiversity value (e.g. undisturbed forest, highly biodiverse grassland)
- Biofuels shall not be made from raw material obtained from land with high carbon stock (e.g. wetlands, cont. forested areas)
- Agricultural raw materials cultivated in the EU shall comply with good agricultural and environmental conditions

Since January 2008, the draft Directive is under negotiation within the European Parliament, the Council, and on Member State level. A large variety of stakeholders (including NGOs) is engaged in discussions on the actual sustainability criteria to be implemented. Main criticism of the draft include the omission of social sustainability criteria, the failure to include impacts

on food prices and food security as well as the effects of indirect land use change. Furthermore, the GHG emission reduction target of 35% is regarded as too low by many stakeholders.

The negotiations are still on-going and the final Directive is expected to be published before the end of 2008. Thereby, the current working document of the Directive (Status: 24 October 2008) includes several changes with respect to environmental sustainability criteria, social sustainability reporting requirements. The recent section on GHG emission reductions reads:

> *The greenhouse gas emission saving from the use of biofuels and other bioliquids taken into account for the purposes referred to in paragraph 1 of this Article shall be 35%. (Initial text)*
>
> ***With effect from 2017, the greenhouse gas emission saving from the use of biofuels and other bioliquids taken into account for the purposes referred to in paragraph 1 of this Article shall be 50%. (New text)***
>
> ***The greenhouse gas emission saving from the use of biofuels and other bioliquids shall be calculated as provided for in Article 17(1). (New text)***
>
> *In the case of biofuels and other bioliquids produced by installations that were in operation in January 2008, the first subparagraph shall apply from 1 April 2013. (Initial text)*

Thus, it is foreseen to keep the GHG emission reduction target at 35% during the first years of the implementation of the Directive, and increase the target to 50% after 2017.

The methodology for the calculation of the GHG emission reductions (Article 17 of RED) is briefly presented in Section 3.1 of this report. Currently, the main points of discussion concern the definition of default values for different biofuels included in an Annex to the Directive. Specifically, several potential biofuel exporting countries in Asia and Latin America are challenging the very unfavourable default values of biodiesel produced from palm oil and soybean oil in the Annex of this Directive.

As already anticipated in Section 1.1 of this report, significant uncertainty among stakeholders involved in the biofuels sector is currently caused by the on-going negotiations with respect to the sustainability criteria integrated in the new Renewable Energy Directive. As a consequence, the Carbon Labelling project faced considerable difficulties to involve stakeholders in the labelling initiatives promoting GHG reductions of biofuels.

2 The EU Carbon Labelling Project

Road transport is the second largest source of greenhouse gas emissions in the European Union (EU) after power generation. Road transport contributes about one-fifth of the EU's total emissions of carbon dioxide (CO_2) and it is one of the few sectors where emissions are still rising rapidly. Currently, passenger cars alone are responsible for around 12% of EU CO_2 emissions.

Recently, opportunities for reducing carbon dioxide emissions in the transport sector are discussed in order to meet European greenhouse gas reduction targets. The European Commission wants car manufacturers to cut the average CO_2 emissions of new car fleets to 130 g/km by 2012, 18% lower than 2005 levels [EC 2007b]. Improvements in motor

technology would have to reduce average emissions to 130 g/km, while complementary measures would contribute a further emissions cut of up to 10 g/km, thus reducing overall emissions to 120g/km. These complementary measures include efficiency improvements for car components, such as lubricants, tyres and air conditioning systems, and a gradual reduction in the carbon content of road fuels, notably through increased use of biofuels. One opportunity to support CO_2 emission reductions in the transport sector is to raise the awareness of consumers on the CO_2 reduction potential of biofuels and improved lubricants through the implementation of a European label.

The overall objective of the Carbon Labelling project was thus to reduce carbon emissions in the European transport sector by promoting the use of biodiesel and improved lubricants. In order to contribute to this goal **the Carbon Labelling project implemented the following labelling initiatives in the fields of biodiesel, improved lubricants and 'low carbon' freight services [RUTZ 2007c, JANSSEN 2008]**:

- **Biodiesel labelling initiative at Q1 fuel stations in Germany**
- **Improved lubricants labelling initiative at Q1 fuel stations in Germany**
- **Labelling of low carbon freight services in The Netherlands**

The work programme of the Carbon Labelling project implemented by project partners from Germany, United Kingdom, The Netherlands, and Malta included the following work packages:

- Carbon Life Cycle Assessment
- Carbon Label for Fuels
- Carbon Label for Lubricants
- Carbon Label for Freight Services
- Support for Biofuels in New EU States
- Consumer Survey
- Dissemination Activities

The Carbon Labelling project is coordinated by WIP Renewable Energies (Germany) and supported by the European Commission under the Intelligent Energy – Europe Programme (October 2006 to September 2008). More information on the Carbon Labelling project is available at the project homepage www.co2star.eu.

The development of a logo for the Carbon Labelling project was an important milestone since it is an integral part of the three Carbon Labelling campaigns (on biodiesel, lubricants, freight services) contributing to recognition by consumers. Figure 1 shows the "CO_2Star"logo selected by the project consortium for the promotion of CO_2 reduction in transport through biodiesel and lubricants.

Figure 1: CO_2Star logo developed for the Carbon Labelling project

Upon preparation of the Carbon Labelling project the timing for the planned labelling initiatives seemed excellent due to the increasing awareness of the European public with regards to the negative impact of climate change caused by increasing greenhouse gas (GHG) emissions.

However, during the implementation of the Carbon Labelling project voices of concern were raised with respect to the actual CO_2 reduction potential of biofuels as well as the overall sustainability of biofuels production and use. This on-going discussion made the European Commission integrate sustainability criteria and a threshold of required GHG savings into the new Draft Directive "on the promotion of the use of energy from renewable sources" (Renewable Energy Directive (RED)) which was issued on 23 January 2008 [EC 2008b]. Since then, the Draft Directive is under review by the European Parliament and the Member States and several changes to the initial draft have been proposed.

Until the present moment, the new Directive has not been launched causing significant uncertainties among stakeholders involved in the biofuels sector. Therefore, during the recent months it proved difficult to raise the interest of stakeholders to get involved in carbon labelling activities on biofuels before the final legislative and regulatory framework conditions for biofuels have been implemented on European level.

Furthermore, also the discussions on targeted average CO_2 emissions of new passenger car fleets are still on-going. No final decision has been reached on the overall CO_2 emission targets (proposed: 130 g/km by 2012), as well as on the complementary measures including biofuels and efficiency improvements (e.g. through improved lubricants) (proposed: 10 g/km by 2012).

3 Other Labelling Initiatives

During the implementation of the Carbon Labelling project the consortium partners established co-operation links with other on-going initiatives involved in labelling activities for biofuels and low carbon transport services.

A representative from the Carbon Labelling project participated in the second Steering Group Meeting of the LowCVP (Low Carbon Vehicle Partnership) initiative on the development of a biofuels sustainability label on 6th March 2008 in London, and presented outcomes and experiences of the Carbon Labelling project.

Furthermore, the lubricant labelling initiative of the Carbon Labelling project was implemented in close cooperation with the campaign "Ich und mein Auto" launched by the German Energy Agency (dena) in early 2008. Thereby, criteria for improved lubricants set up by dena were used for labelling CO_2Star lubricants of Q1.

3.1 LowCVP Initiative for a Biofuel Sustainability Label

Since April 2008 the United Kingdom is implementing the Renewable Transport Fuels Obligation (RTFO). This Obligation requires companies to sell a minimum of 2.5% renewable transport fuels in the UK in 2008/2009 and a percentage of 5% in 2010/2011.

Following the recent debate on the sustainability of biofuels and campaigns by NGOs focussing on negative aspects of biofuels, the UK Government announced to reward biofuels under the RTFO in accordance with their carbon savings from April 2010 and to require that biofuel feedstock meets appropriate sustainability standards.

Furthermore, the UK Government asked the LowCVP to explore the feasibility of a voluntary labelling scheme to allow responsible retailers to show that their biofuels are genuinely sustainable. The voluntary label is aimed at consumers and use of the label would demonstrate that the company sourced sustainable fuels. The label could be displayed on fuel pumps for biofuels or blends and via other publicity media.

In order to address this issue, the LowCVP commissioned the study '*Development of a Biofuel Label: Feasibility Study*' performed by Ecofys and E4Tech and published in March 2008 [ECOFYS 2008a].

The main outcome of this study is that the development of a voluntary consumer-focused biofuel sustainability label is feasible. However, presently it is not clear that a voluntary biofuel label is an efficient mechanism to ensure the sustainability of biofuels, and the development of a biofuel label was postponed due to the following reasons [LowCVP 2008]:

- Currently, there is considerable uncertainty with respect to the sustainability requirements on EU level, as the new Renewable Energy Directive has not been finalised.
- The effectiveness of the RTFO sustainability and GHG reporting scheme is not proven yet.
- The fuel retailers are hesitant to support biofuel labelling schemes considering the present uncertainties.

- NGOs have not provided clear support for a voluntary sustainability labelling for biofuels.

- The willingness of consumers to pay for labelled biofuels is not guaranteed, and the current knowledge on biofuels in the general public is low.

In contrary to the label developed by the Carbon Labelling project, this UK initiative focuses on sustainability criteria for biofuels in general with the inclusion of a GHG saving target. However, the UK initiative acknowledges that biofuels are only part of the solution, and efforts to address emissions from the transport sector require a package of measures.

3.2 The Swan Ecolabel

The Swan is the official Nordic Ecolabel, introduced by the Nordic Council of Ministers in 1989. The main aim of this Nordic Ecolabelling is to contribute to creating a sustainable society by providing independent information to consumers.

The Swan Ecolabel is based on a voluntary license system where the applicant agrees to follow a certain criteria set outlined by the Nordic Ecolabelling in cooperation with stakeholders including environmental, quality and health criteria. The Nordic Ecolabel now covers 67 different product groups, for which it is felt that ecolabelling is needed and will be beneficial. The Swan checks that products fulfil certain criteria using methods such as samples from independent laboratories, certificates and control visits.

In June 2008, the Swan Ecolabel announced the implementation of a set of criteria for fuel products, namely ethanol, biodiesel, biogas or a mixture of these fuels [SWAN 2008]. The Nordic Ecolabel has criteria for the entire product lifecycle, from the raw materials to the fuel available at the petrol stations.

The most essential requirements for Nordic Ecolabelled fuels are:

- Reduced emissions that negatively affect global warming and climate change: Over the course of the life cycle, emissions of greenhouse gases must not exceed 50 g of CO_2 equivalents/MJ of fuel. This value corresponds to a GHG emission reduction of 40% with regards to the fossil fuel comparison of 83.8 g CO_{2eq}/MJ specified in the RED.

- Restrictions on the total energy used at the production stage: Energy consumed in the production and transport of a Swan-labelled fuel must not exceed 1.4 MJ per MJ of fuel produced.

- Traceability of crops and certified sustainable farming.

- Defined limitations on health effects of these fuels.

In contrary to the label developed by the Carbon Labelling project and in line with the UK initiative, the Swan Ecolabel for fuels focuses on sustainability criteria for biofuels in general including a maximum emission of greenhouse gases.

Currently, the Swan Ecolabel has one company licensed in the fuel product group, namely the fuel retailer FordonsGas Sverige AB operating 28 biogas filling stations in the West of Sweden.

3.3 CEN Standard on Sustainability Criteria for Biomass

Upon an initiative by the Dutch Government, the Dutch National Standardisation Body NEN has made a proposal to the European Committee for Standardisation (CEN) for the development of a standard for sustainable biomass. The standard development process was started in February 2008 by the set-up of a Technical Committee within CEN (CEN/TC 383) chaired by NEN.

First debates within CEN/TC 383 addressed the topic whether the new standard "Sustainably produced biomass for energy applications" should be limited to the sustainability criteria integrated in the new EU Renewable Energy Directive or whether it should go beyond to include additional criteria and establish a so-called "Gold Standard". It was concluded to follow the criteria of the Renewable Energy Directive, to limit the standard to energy applications, and to exclude indirect effects due to land use change.

However, the developed CEN standard shall allow users to voluntarily go beyond the EU Renewable Energy Directive in the fields of social and economic criteria, biodiversity and indirect land use, as well as GHG emission reductions. The Technical Committee CEN/TC 383 is currently elaborating technical specifications and reports of which first drafts shall be available at the next committee meeting in early 2009.

Thereby, criteria on greenhouse gas emission reductions will be covered by activities within working group 2 of CEN/TC 383.

3.4 "Ich und mein Auto" Campaign for Lubricants

In 2008 the German Energy Agency (dena) launched the campaign "ich & mein Auto" in order to detect potential efficiency improvements in the transport sector and to provide practical information for consumers. The campaign includes information and recommendations on efficient tyres, driving practices and lubricants. Similarly to the CO_2Star campaign, this information is distributed by the dena campaign at the Point-of-Sale. In addition, free access to an online database on improved lubricants is available at the campaign website and facilitates purchase decisions for consumers. This initiative is supported by the German Ministry of Environment and industry partners.

In order to use and maximise synergies between the dena campaign and the CO_2Star campaign, both initiatives were closely linked to each other. Thereby, criteria for improved lubricants set up by dena were used for labelling CO_2Star lubricants of Q1.

3.5 EU Eco Label for Lubricants

The EU Eco-label has a clear objective of encouraging business to market greener products. Part of our mission is to provide the producers with the necessary information to reap the advantages of this strategy. If you are a retailer, discover here which benefits you can obtain from the Eco-label and learn from others'

experience. For the consumers, there is no better way to make informed environmental choices when purchasing. Environmental organisations already support the scheme, but what about some more pressure?

In the framework of the EU Eco-label, lubricants are a new product group. It comprises hydraulic oils, greases, chainsaw oils, two stroke oils, concrete release agents and other total loss lubricants, for use by consumers and professional users.

The criteria were adopted by the Commission Decision on 26 April 2005 establishing ecological criteria and the related assessment and verification requirements for the award of the Community eco-label to lubricants, as published in the Official Journal of 5 May 2005. They aim, in particular, at promoting lubricants that are of reduced harm to water and soil during use and lead to reduced CO_2 emissions.

Although motor oils for transport are not included in this Commission Decision, it may be interesting to assess opportunities to establish criteria for the EU Eco-label for automotive lubricants. Thereby, the CO_2 reduction potential could be one of the criteria of the label.

4 Carbon Life Cycle Assessment

In the framework of the Carbon Labelling project supportable methodologies for the quantification of carbon life cycle reductions were identified in co-operation with recent and on-going activities and methodologies by European and worldwide expert groups from research, industry and politics involved in carbon life cycle assessments. An application of carbon LCA methodologies within the Carbon Labelling project was necessary in order to define scientifically proven carbon reduction numbers. Therefore, approaches of SenterNovem (NL), Ifeu Institute (DE) and Imperial College (UK) were compared to each other and to the methodology proposed by the European Commission.

For the implementation of the labelling initiative on biodiesel in early 2007 (presented in Section 4 of this report), the carbon reduction number was calculated according to the methodology by the Ifeu institute (see Section 3.3), since it was the first available methodology during that time. The GHG calculation tools developed by Senter Novem (see Section 3.2) and HGCA/Imperial College (see Section 3.4) were issued at a later stage. Furthermore, the methodology for the calculation of GHG emission reductions to be integrated in the EU Renewable Energy Directive (see Section 3.1) is still under negotiation and shall be finalised until the end of 2008.

However, in future all GHG calculation tools used for the calculation of emission reductions of biofuels counting to the national targets specified in the EU Directive will need to comply with the methodology laid down in the EU Directive. Other calculation tools will thus need to be adapted to follow the methodology of the RED.

4.1 Methodology of the European Commission

Article 17 of the Draft Renewable Energy Directive covers the calculation of the greenhouse gas impact of biofuels and other bioliquids. According to this Article, the greenhouse gas emission saving from the use of biofuel and other bioliquids shall be calculated as follows:

(a) "for biofuels, where a default value for greenhouse gas emission savings for the biofuel production pathway is laid down in Part A or B of Annex VII, by using that default value;"

(b) "by using an actual value calculated in accordance with the methodology laid down in Part C of Annex VII; or"

(c) "by using a value calculated in accordance with the methodology laid down in Part C of Annex VII as the sum of actual values for some of the steps of the production process and the disaggregated default values in Part D or E of Annex VII for the other steps of the production process."

The Draft Directive also includes "Rules for calculating the greenhouse gas impact of biofuels, other bioliquids and their fossil fuel comparators" in Annex VII. Table I shows "Typical and default values for biofuels if produced with no net carbon emissions from land use change" included in Annex VII of the Draft RED. Several of these typical and default values are currently still under discussion.

Furthermore, the Draft Directive gives guidance on how to calculate greenhouse gas emissions from the production and use of transport fuels:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{ccs} - e_{ccr} - e_{ee}$$

E = total emissions from the use of the fuel;
e_{ec} = emissions from the extraction or cultivation of raw materials;
e_l = annualised emissions from carbon stock changes caused by land use change;
e_p = emissions from processing;
e_{td} = emissions from transport and distribution;
e_u = emissions from the fuel in use;
e_{ccs} = emission savings from carbon capture and sequestration;
e_{ccr} = emission savings from carbon capture and replacement; and
e_{ee} = emission savings from excess electricity from cogeneration.

Greenhouse gas emission savings from biofuels and other bioliquids shall be calculated as:

$$SAVING = (E_F - E_B)/E_F$$

E_B = total emissions from the biofuel or other bioliquid; and
E_F = total emissions from the fossil fuel comparator.

Table I: Typical and default values for biofuels if produced with no net carbon emissions from land use change [EC 2008b]

biofuel production pathway	typical greenhouse gas emission saving	default greenhouse gas emission saving
sugar beet ethanol	48%	35%
wheat ethanol (process fuel not specified)	21%	0%
wheat ethanol (lignite as process fuel in CHP plant)	21%	0%
wheat ethanol (natural gas as process fuel in conventional boiler)	45%	33%
wheat ethanol (natural gas as process fuel in CHP plant)	54%	45%
wheat ethanol (straw as process fuel in CHP plant)	69%	67%
corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant)	56%	49%
sugar cane ethanol	74%	74%
the part from renewable sources of ETBE (ethyl-tertio-butyl-ether)	Equal to that of the ethanol production pathway used	
the part from renewable sources of TAEE (tertiary-amyl-ethyl-ether)	Equal to that of the ethanol production pathway used	
rape seed biodiesel	44%	36%
sunflower biodiesel	58%	51%
palm oil biodiesel (process not specified)	32%	16%
palm oil biodiesel (process with no methane emissions to air at oil mill)	57%	51%
waste vegetable or animal oil biodiesel	83%	77%
Hydrotreated vegetable oil from rape seed	49%	45%
Hydrotreated vegetable oil from sunflower	65%	60%
Hydrotreated vegetable oil from palm oil (process not specified)	38%	24%
Hydrotreated vegetable oil from palm oil (process with no methane emissions to air at oil mill)	63%	60%
pure vegetable oil from rape seed	57%	55%
biogas from municipal organic waste as compressed natural gas	81%	75%
biogas from wet manure as compressed natural gas	86%	83%
biogas from dry manure as compressed natural gas	88%	85%

Thereby, the fossil fuel comparator E_F shall be the latest available actual average emission from the fossil part of petrol and diesel consumed in the Community with a current default value of 83.8 g CO_{2eq}/MJ.

Since this Draft Directive is currently under review, changes in the GHG calculation methodology may be implemented.

For the CO_2Star campaign implemented at Q1 fuelling stations in early 2007, rape seed biodiesel (RME) was used. According to the Draft Directive published in January 2008, the default value for GHG emission savings is 36% and the typical value is 44% (Table I).

4.2 Methodology of the Ifeu Institute

The Ifeu Institute, Germany, implemented several projects [IFEU 2003a, IFEU 2003b, IFEU 2004a, IFEU 2004b] in order to compare GHG balances of liquid biofuels with conventional liquid fuels. All calculations are based on complete life cycle comparisons. Thereby, different production sites, different production methods (conventional and organic farming) and

different applications (passenger cars, buses, trucks, tractors) are investigated. The following biofuels are in the research portfolio of the Ifeu Institute:

- Biodiesel (from rapeseed, sunflowers, soybeans, canola, coconut oil, recycled plant oil, animal grease)
- Plant oil (from rapeseed, sunflowers)
- Bioethanol (from sugar-cane, sugar-beet, corn, wheat, potatoes, molasses, lignocellulose)
- Bio-ETBE, Biomethanol, Bio-MTBE, Bio-DME
- BTL
- Other (non-liquid) biofuels for transportation such as biogas and hydrogen

According to the experts of the Ifeu Institute acting as members of the Advisory Board of the Carbon Labelling project, a GHG emission reduction of 60% was attributed to RME which is produced in Germany.

At the time of preparation and implementation of the biodiesel labelling initiative at the Q1 fuel stations in early 2007, the emission reduction number of 60% for RME was generally agreed upon by German stakeholders from industry and Government. Therefore, this reduction number was promoted by the CO_2 Star labelling initiative as described in Section 4 of this report.

4.3 Methodology of Senter Novem

In The Netherlands an Excel based GHG calculation tool (Figure 2) was elaborated by Ecofys, CE Delft, and SenterNovem in order to provide scientific support for policy decisions [ECOFYS 2008b]. The calculator can be applied for several biofuels and for several feedstocks.

This GHG calculator is currently in a testing phase with a variety of stakeholders in The Netherlands and has not been released to the general public. However, the consortium partner Senter Novem has made available this tool for the Carbon Labelling project to calculate GHG emission reductions of biodiesel currently sold by the fuel retailer Q1 (see Section 4.4).

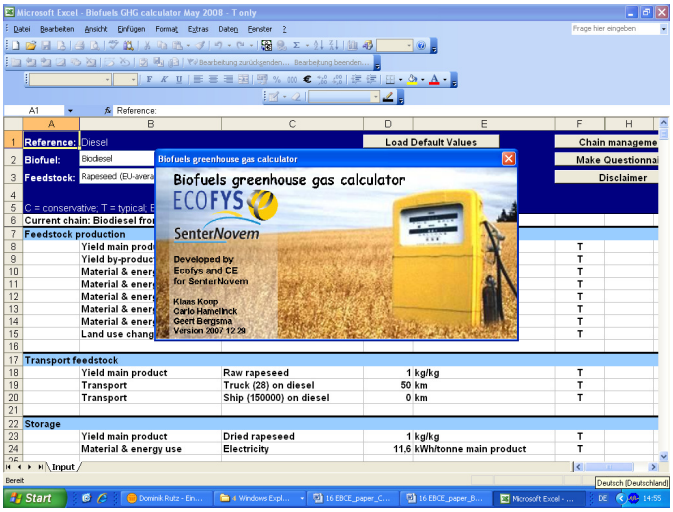

Figure 2: Biofuels GHG calculator of Senter Novem, The Netherlands

For biodiesel, the calculator includes data on feedstock production, transport and storage of feedstock, extraction, refining, esterification, and for the transport of the biodiesel. Thereby, GHG emission reductions can be calculated for biodiesel from rapeseed (Germany and The Netherlands), biodiesel from rapeseed (EU average), as well as biodiesel from soy, palm oil and used oils and fats. In all these cases, the calculator provides a pre-selection of default values as well as the option to insert user specific values.

Figure 3 shows the result for calculating default values for RME in Germany and The Netherlands (excluding GHG emissions for land use change). Results of the calculator indicate default GHG emissions for RME of 64.8% of the reference value of fossil diesel (i.e. GHG savings of 35.5%), and a default energy use of 35.4% compared to the fossil diesel reference.

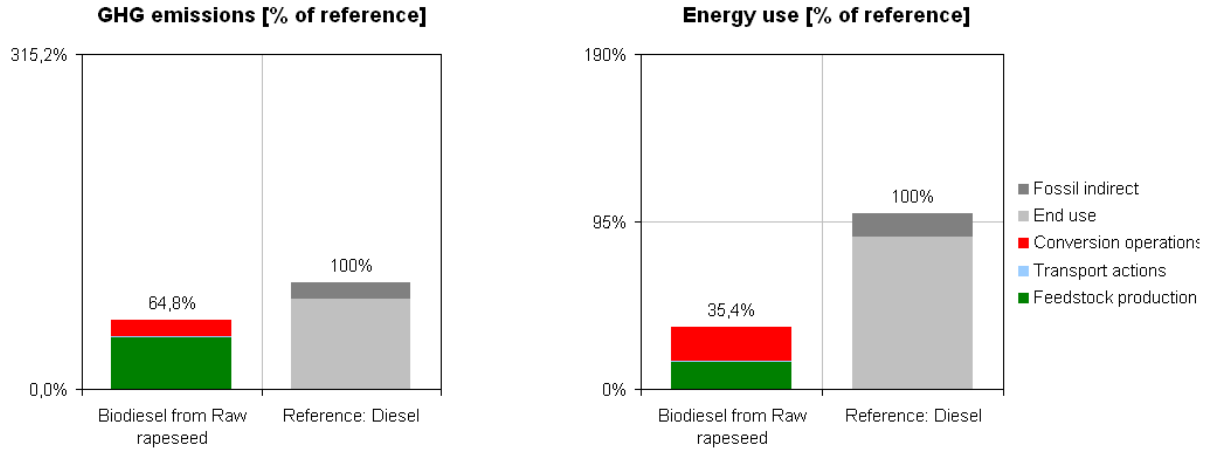

Figure 3: Default value of GHG emissions and energy use of RME in Germany and The Netherlands

4.4 Methodology of HGCA/Imperial College

The Biofuels GHG calculator developed by Imperial College London [BROWN 2008] and the Home Grown Cereals Authority (HGCA) is a spreadsheet-based tool (Figure 4) for calculating the GHG emissions resulting from the production and use of wheat-based bioethanol and rapeseed biodiesel in the United Kingdom.

It uses input data describing the entire production chain for any given batch of these biofuels, calculates the GHG emissions and compares the emissions with those produced from the production and use of an equivalent quantity of petrol or diesel. It is based on standard life-cycle analysis (LCA) principles, using user input or default data to produce inventories of inputs, outputs and GHG emissions for all supply chain stages.

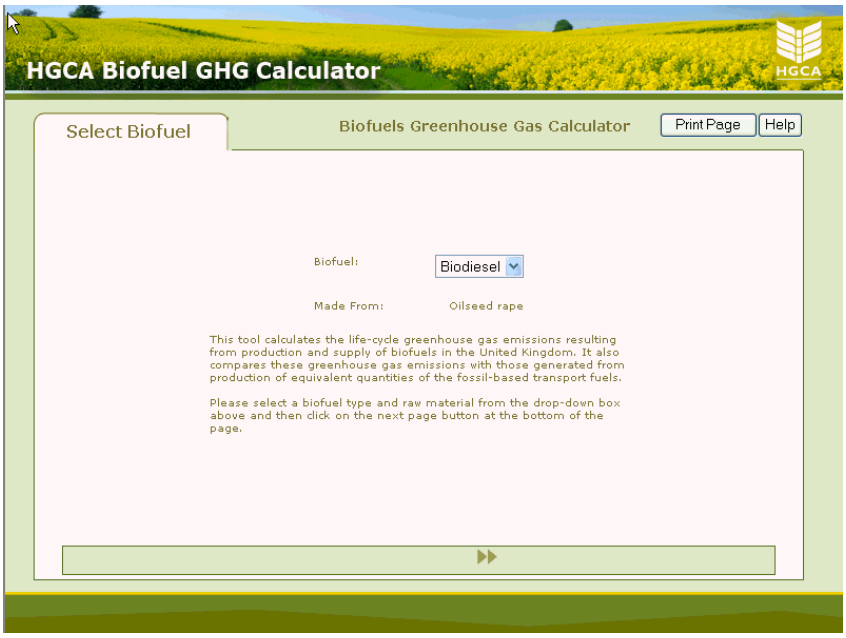

Figure 4: Biofuels GHG calculator of Home Grown Cereals Authority, UK

The resulting well-to-tank (WTT) emission figures allow appropriate comparisons between different biofuels and between biofuels and fossil fuels. For each WTT calculation, the calculator guides the user through a set of steps in a life cycle inventory, before presenting the results and allowing for examination of the detailed calculations. Each step of the calculations is presented on a separate page, so that users may more easily focus on those steps of most interest to them and simply accept defaults for those steps of less interest or over which they have little control. Thus a farmer can focus on analysing the GHG impacts of farm level choices, while simply accepting suggested defaults for fuel production plant and other supply chain parameters [WOODS 2008].

The default value for biodiesel from rapeseed calculated by this tool is 21.8%. The largest GHG emissions in this biodiesel process are related to fertilizers, pesticides, and seeds (1,087 kg CO_{2eq}/t) followed by N_2O emissions from soil (1,017 kg CO_{2eq}/t), biodiesel production (517 kg CO_{2eq}/t), on-farm fuel use (89 kg CO_{2eq}/t), biodiesel distribution (13 kg CO_{2eq}/t), oilseed transport (10 kg CO_{2eq}/t), and oil seed drying and storage (7 kg CO_{2eq}/t). On the other hand, 489 kg CO_{2eq} per ton of biodiesel are credited for the production of co-products.

This GHG calculation tool was developed with support of the Carbon Labelling project to specifically address the framework conditions of the United Kingdom. For applications calculating GHG emissions in Germany and The Netherlands the calculation tool developed by Senter Novem is more suitable and thus will be used in Section 4.4.

5 Farming Measures to Improve Biofuel GHG Life Cycles

In the framework of the Carbon labelling project, HGCA elaborated a report on "Farming measures for improved CO_2 life cycles of biofuels" [HGCA 2008a] which is summarised below.

In order to maximise the potential benefits for the EU biofuels industry, and in particular to maximise GHG savings, there is a need to promote farm-level reporting of GHG emissions. The aim of this reporting would be to allow a share of the value arising from avoided GHG emissions to be retained by growers and to incentivise continued improvements in GHG intensity of biofuel crop production. The parallel development of the science-base and the practical tools necessary to implement farm-level GHG auditing are also required.

This work has shown that whilst there are a range of important issues that remain to be resolved before farm-level GHG (carbon) reporting can become basic farming practice, these issues are not insurmountable. The farm audit trials and development of the calculator show that it is possible to use data obtained directly from farms to get credible individual GHG intensities. The resulting improved levels of accuracy of reported GHG emissions will be incentivised in the UK RTFO through adoption of conservative default values for GHG intensities [E4Tech, 2006].

Continued development of the farm audits is necessary to demonstrate to the farming and biofuel production communities that the collection, compilation and evaluation of farm-level data are both practical and accurate.

The main areas that farmers need to focus on to deliver low carbon feedstocks for biofuel production, in particular to manage nitrogen fertiliser inputs by optimising requirements per unit of output whilst maintaining high yields are:

- Feedstock production accounts for between 50 to over 80% of the total GHG emissions of the biofuel supply chains covered, and is therefore the dominant source of emissions in a biofuel supply chain.
- For biodiesel from rape, nitrogen inputs account for over 90% of the on-farm GHG emissions; nitrous oxide (N_2O) alone accounts for over 60% of those emissions.
- Nitrogen management choices for farmers include sourcing fertiliser from manufacturing plants with nitrous oxide abatement which can reduce feedstock-based emissions by 25-30% (for ammonium nitrate) and selection of varieties with lower nitrogen requirements which are inherently more suited to biofuel production e.g. low protein / high oil rapeseed.

In contrast to nitrogen fertiliser-related emissions, on-farm fuel, pesticide and seed supply-based emissions account for about 20% of the total farm-emissions and some gains could be made here, for instance, by minimising cultivation operations.

Agriculture has a critical role to play in ensuring that biofuels can provide a robust tool for climate change mitigation. However, to be credible, there is an urgent need for simple, practical and verifiable tools that allow farmers to focus on the main components of biofuel supply chains over which they have control. HGCA and its partners delivered a standardised, transparent and clear methodology for calculating both farm and whole-chain biofuel supply GHG balances. An integrated GHG calculator for biodiesel from rape (and bioethanol from wheat) and a new electronic questionnaire for farm audits were developed. By carrying out

these activities, a major step towards on-farm GHG certification has been taken and near-term future developments should lead to a simple, robust and transparent audit questionnaire for direct use in biofuel feedstock assurance and certification.

6 CO_2Star Label for Biofuels

The preparations for the carbon labelling initiative for pure biodiesel (B100) in Germany were done under very favourable framework conditions with a total tax exemption of B100 from mineral oil tax, vehicle warrantees for biodiesel use issued by the car producer Volkswagen and other vehicle manufacturers, and an increasing penetration of biodiesel in the German diesel fuel market.

Pure biodiesel (B100) made from rapeseed has been sold since the early 90ies at public gas stations in Germany. In 2006 more than 1,600 petrol stations offered this alternative fuel to private and commercial consumers and in total 500,000 tons were sold.

Due to the total tax exemptions in Germany biodiesel had been approximately 10-20 cent cheaper than fossil diesel. However, since August 2006 B100 is taxed with 8 cent, and the tax is increased stepwise every year. This changing biofuel policy in Germany (moving from tax exemption to an obligation of biofuel use in low blends) has decreased the price advantage of B100 and has led to significant sales cuts.

During 2007 and 2008 the high prices of biodiesel, together with the withdrawal of warranties by vehicle manufacturers for new models, have led to a significant breakdown of the B100 market which was eased for merely a few month due to the very high world market prices for oil in early 2008.

With this current market situation of B100 in Germany the carbon labelling initiative at Q1 fuel stations implemented within the Carbon Labelling project experienced rather difficult framework conditions.

6.1 CO_2Star Campaign at Q1 Fuel Stations

The German fuel distributor Q1 has 115 retail fuel stations in Germany, of which 100 are selling at least one alternative fuel. Q1 implemented the carbon labelling pilot programme (CO_2Star) at its fuel stations to provide information to consumers about environmental and economical benefits of biodiesel (B100). This campaign was launched on 12 July 2007 at a Q1 fuel station in Osnabrück, Germany (Figure 5) [JANSSEN 2008].

Figure 5: The CO_2Star team at the launch of the labelling initiative at Q1 in Germany

For the fuel labelling initiative at Q1, it was agreed upon by the project consortium and the members of the Advisory Board that for the pilot labelling initiative of biodiesel (B100 RME) at Q1 fuel pumps a CO_2 reduction of 60% was promoted based on results of the Ifeu Institute (Figure 6).

Figure 7 shows a Q1 fuel pump for B100 and information material about the CO_2Star campaign. A sticker which shows that biodiesel reduces 60% of CO_2 emissions is presented in Figure 6.

The GHG reduction potential of biodiesel is explained on a dedicated consumer information website as shown in Figure 8.

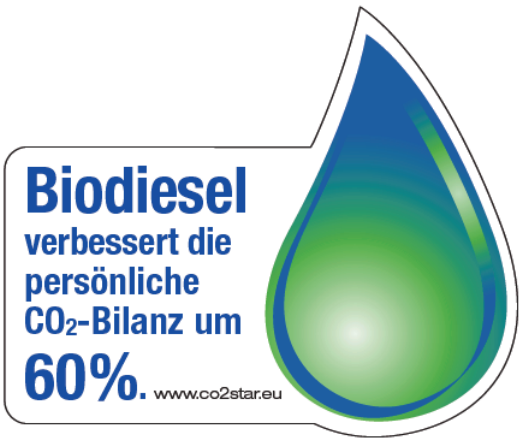

Figure 6: CO_2Star sticker for the CO_2Star campaign indicating 60% GHG reduction of RME (B100)

Figure 7: Q1 fuel pump for B100 and information material about the CO_2Star campaign

Figure 8: Consumer information website about the CO_2Star campaign at Q1

6.2 Consumer Survey at Q1 Fuel Pumps

In the framework of the CO_2Star campaign at Q1 fuel pumps, Q1 made a consumer survey in summer 2007 to assess the acceptability of a carbon label and to investigate the buying behaviour of German fuel customers [BUERKNER 2007].

The survey was carried out at 10 pilot stations with on-site consumer interviews. The interviews were made by Q1 staff after the customers have finished the fuelling process. The interviews included close and open ended questions and took 2 to 5 minutes. In order to address both diesel and biodiesel customers, two different questionnaires were used. The interviews were conducted in German.

The most important questions of the survey included:

- What are the most important motives when buying fuels?
- How aware are consumers about Climate Protection linked to their individual transportation?
- How do consumers assess the product biodiesel?
- Are consumers willing to contribute to Climate Protection by using climate friendly fuels?
- Would they pay a higher price for those fuels?

The main result of this survey is the high importance of price for diesel and biodiesel fuels as major factor influencing the purchasing decision of German clients. Thereby, biodiesel clients are even more price sensitive than fossil diesel clients. This may be caused by the former tax exemption of B100 in Germany leading to a lower price of biodiesel. 80% of the biodiesel consumers stated that the (cheap) price of biodiesel was the main reason to select this fuel.

Being confronted with a pro-climate statement the majority of consumers underlined their willingness to contribute to climate protection. However, only a minority would pay a surcharge for climate friendly fuels.

The knowledge of German fuel consumers about biofuels in general as well as about the carbon reduction potential of biodiesel is very low, even among biodiesel consumers. This underlines the necessity to extend the educational advertisement of biofuels. Activities like the Carbon Labelling Project are accepted, but further activities are urgently needed to increase the consumer awareness of biofuels.

In summary, this survey underlines the importance of monetary benefits for consumers offered by biofuels. The consumer is not willing to pay a higher price for biofuels, even if biofuels contribute to the reduction of GHG emissions and thus the mitigation of climate change. In the view of most consumers, it is mainly in the responsibility of the Government to address global problems such as climate change.

This result of the consumer survey highlights the limited value for fuel retailers of labels promoting the environmental benefits of biofuels, as consumers are not willing to face additional costs by purchasing fuels with lower GHG emissions.

In this respect, the change of biofuel policy in Germany withdrawing the tax exemption of B100 had a devastating effect on the market penetration of this fuel, an effect that can not be reversed by the promotion of the environmental benefits of biofuels.

Figure 9: On-site consumer survey and information at Q1 fuel pumps

6.3 Interest of Retailers in Fuel Labelling Programme

In addition to the consumer survey presented in Section 4.2, Q1 performed a survey with CEOs or Managing Directors of fuel retailers and oil companies in order to assess their acceptance of a CO_2 label for biofuels. Based on questionnaires which included structured open ended and semi-open ended interviews, 11 interviews were carried out in July 2008 [BUERKNER 2008].

The survey included the following questions:

- Which buying motives of consumers are expected by retailers?
- How important are "climate friendly products" for the business of retailers?
- Do retailers see a benefit in CO_2 labels?
- Which institutions are considered suitable to operate a CO_2 label?

Currently "Climate Protection" is regarded as a medium important topic which is not appreciated as a critical success factor for fuel retailers. This view is in line with the results of the consumer survey. Consumers underline the importance of the fuel price for their purchasing decision, and are not willing to pay a higher price for climate friendly fuels.

For the future, however, the 11 CEOs rated "Climate Protection" as more important for the success of their business.

The most important alternative fuels presently are LPG (Liquid Petroleum Gas), biodiesel, CNG (Compressed Natural Gas), and E85 (Ethanol), whereas the interviewed experts considered LPG, E85, CNG and Hydrogen as the most important alternative fuels for the future. Although biodiesel plays a major role among alternative fuels today, it is expected that due to the taxation of biodiesel in Germany the product will be eliminated from the market by its high price in the near future.

There is a general acceptance of a carbon label for fuels among the interviewed CEOs of German fuel retailers. However, their acceptance depends on the following issues which need to be addressed in a suitable manner:

- Which institution will evaluate products and monitor the labelling process?
- Will there be a fee to use this label?
- Which role will be taken by the government especially with regard to possible taxation measures?

The favoured body responsible for the operation of a carbon label is the Government (Ministry of Environment), followed by industry associations, the EU and NGOs. Thereby, it was stated that only a transparent and credible labelling process can guarantee acceptance by consumers.

In conclusion, these interviews show that there is a general interest of fuel companies to use carbon labels. This interest would grow significantly if consumers made their purchase decision on the basis of carbon reduction.

However, up to now there is no incentive for the consumer to buy carbon friendly fuels. Only a linkage of taxation levels with actual CO_2 emissions would lead to a fundamental change in consumer behaviour and subsequently in retail patterns.

6.4 Calculation of GHG Emission Reductions – Case Study

As stated in Section 4.1, the July 2007 pilot CO_2Star labelling initiative of biodiesel (B100 RME) at Q1 fuel pumps promoted a CO_2 reduction of 60% based on LCA results of the Ifeu Institute.

In the following months, GHG calculation tools have been developed stating considerably lower default and typical values for biodiesel produced from rape seed in Europe, namely a CO_2 reduction of 35.8% for the Dutch calculator, and 21.8% for the UK calculator (see Sections 3.2 and 3.4). However, a private communication with Dr. Guido Reinhardt from Ifeu Institute confirmed that "their" emission reduction number is still valid as a result of a detailed Life Cycle Analysis. Existing GHG calculators, on the other hand, need to follow a more simplified approach leading to lower emission reduction numbers. A simplified approach was also adopted within the new EU Renewable Energy Directive in order to limit the burden for the reporting of GHG emissions under biofuel sustainability schemes to be introduced in Europe.

In the framework of the Carbon Labelling initiative the GHG calculation tool developed by Senter Novem was applied in July/August 2008 to the biodiesel sold at Q1 fuel stations during this time. The biodiesel provided by the supplier Sunoil Biodiesel in 2008 to Q1 was produced from waste oils and fats sourced by the fuel producer in Germany, Belgium and the Netherlands. The Sunoil Biodiesel production facility has a capacity of about 60 million litres per year.

The input parameters for the GHG calculation tool provided by the director of Sunoil Biodiesel, Mr. Hadders, are presented in Table II (bold figures indicate user values different from the default values of the calculator).

Figure 11 shows the result for calculating GHG emission reductions for biodiesel from used oils and fats based on the data provided by the biodiesel producer Sunoil Biodiesel.

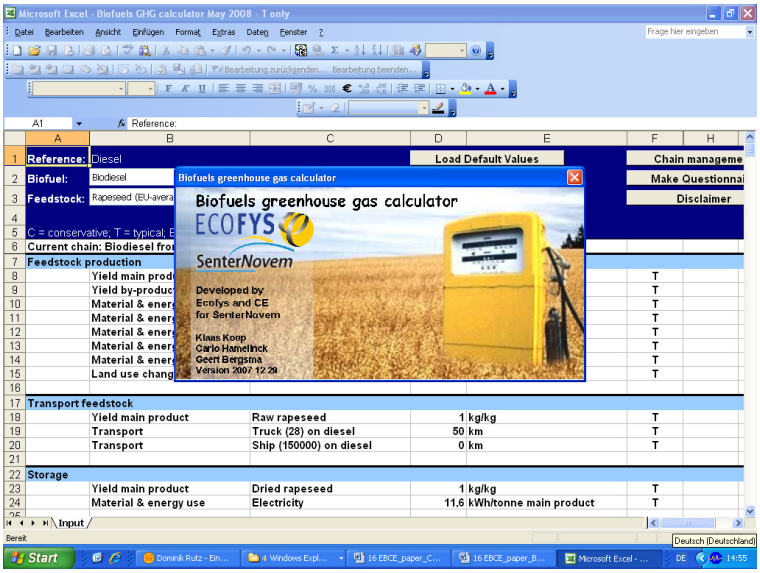

Figure 10: Biofuels GHG calculator of Senter Novem/Ecofys, The Netherlands

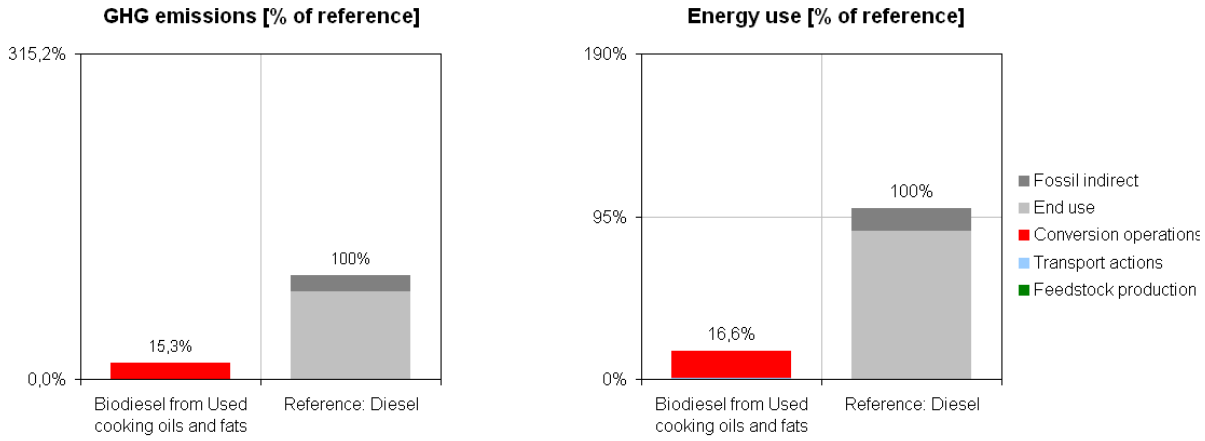

Figure 11: GHG emissions and energy use of biodiesel from used oils and fats received by the GHG calculater of Senter Novem

Biodiesel sold at the Q1 fuel stations in summer 2008 thus showed a GHG emission reduction of 84.7% which is slightly lower than the default value of 88.3% for biodiesel from used oils and fats in the GHG calculator of Senter Novem.

Currently, GHG emission reductions of biodiesel from used oils and fats are among the lowest values for biofuels. Furthermore, biodiesel from used oils and fats is often available at fairly competitive prices making it a favourable option for sales of B100 in the German fuel market.

Due to these high GHG savings the fuel retailer Q1 has agreed to continue using the dissemination and promotion material of the CO_2Star initiative (claiming a carbon reduction number of 60%).

However, representatives of Q1 highlighted potential future difficulties of providing input data for the calculation of GHG emissions, especially if biodiesel is purchased on the global market from large retailers which mix batches of biodiesel from different raw materials and origin. For future carbon labelling schemes of biofuels these difficulties have to be carefully taken into account.

Table II: User values for the calculation of GHG emission reductions for biodiesel from used oils and fats of Sunoil

Production chain step	Description	Description	User value	Default value	Unit
(1) Cooking	Yield main product	Used cooking oils and fats	**0.98**	1	kg/kg
(2) Cleaning	Yield main product	Cleaned recycled oil	1	1	kg/kg
(2) Cleaning	Material & energy use	Natural gas	6,8	6.8	MJ/tonne main product
(3) Esterification	Yield main product	Biodiesel	**0.85**	0.956	kg/kg
(3) Esterification	Yield by-product	Crude glycerine	**0.15**	0.0956	kg/kg
(3) Esterification	Material & energy use	Natural gas	1,441	1,441	MJ/tonne main product
(3) Esterification	Material & energy use	Electricity	31	31	kWh/tonne main product
(3) Esterification	Material & energy use	Methanol	**145**	89.7	kg/tonne main product
(3) Esterification	Material & energy use	HCl	**2**	7.9	kg/tonne main product
(3) Esterification	Material & energy use	Sodium methoxide	**20**	25.1	MJ/tonne main product
(4) Transport	Yield main product	Biodiesel	1	1	kg/kg
(4) Transport	Transport	Truck (28) on diesel	150	150	km
(4) Transport	Transport	Ship (150000) on diesel	0	0	km

7 CO_2Star Label for Lubricants

Until very recently, there were no campaigns for the broad introduction of Carbon Labels for lubricants, neither by the European Union, nor by the Governments, nor by private companies. Thus, the CO_2Star campaign is one of the first initiatives in this field.

Another initiative for increasing the awareness about the fuel saving potential of improved lubricants (synthetic lubricants) was launched by the German Energy Agency (dena) in 2008. The "Ich und Mein Auto" campaign (see Section 2.4) of the dena is focussing on consumer information in the Internet, as well as at fuel stations in Germany.

According to the dena (German Energy Agency), the ADAC (Allgemeiner Deutscher Automobil-Club), and the US EPA (Environmental Protection Agency) up to 2-6% fuel savings can be achieved with innovative lubricants and thus, carbon emissions can be reduced.

7.1 CO_2Star Campaign for Lubricants at Q1 Fuel Stations

In the framework of the Carbon Labelling project, a label for lubricants was developed to show the carbon reduction potential of improved lubricants to consumers. The German fuel retailer Q1 identified high quality lubricants and implemented in a pilot initiative the CO_2Star label on its products. Detailed information for consumers on fuel savings and emission reductions are provided at the CO_2Star website.

This CO_2Star campaign is linked to the information campaign on lubricants by the dena (Deutsche Energie Agentur, dena, Germany) "Ich und Mein Auto" informing consumers about efficiency savings through improved lubricants.

According to dena, in addition to the carbon reduction potential of improved lubricants, in average 70 Euros per year can be saved. The fuel saving effect can outweigh the increased lubricant costs (2-3 times the price of conventional lubricants) and save money in the long-term.

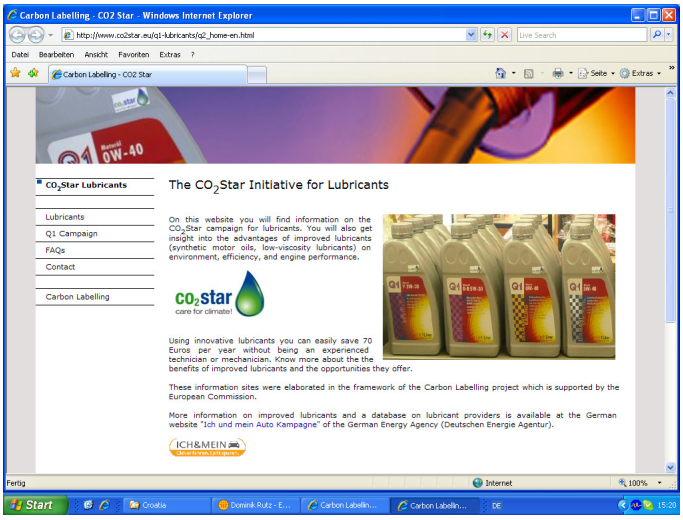

Figure 12: CO_2Star consumer website for lubricants

In June 2008 the CO_2Star campaign for lubricants was officially launched. Four low-viscosity (synthetic) lubricants of the German fuel retailer Q1 were awarded with the CO_2Star label in the framework of the Carbon Labelling project. These lubricants are defined as synthetic motor oils according to the German Energy Agency. Thereby, the specifications of these lubricants were provided by the lubricant producer and compared to other lubricants.

In the framework of the CO_2Star campaign for lubricants, the four awarded lubricants were labelled with a CO_2Star sticker and sold in Q1 shops. The personnel of the shops was informed about the campaign and trained in order to provide information to the consumers. Detailed information on the benefits of improved lubricants was explained on the CO_2Star website in English and German (http://www.co2star.eu, see Figure 12).

Characteristics of the four awarded lubricants and their suitability for different car types are described in [RUTZ 2008a].

7.2 Consumer Acceptance of Lubricant Labelling

The acceptance of a CO_2Star Label for Lubricants is very difficult to measure. During the test period of the CO_2Star label on lubricants, Q1 monitored awareness and reactions among their customers. However, the label had no effects on the sales numbers of the labelled lubricants [BUERKNER 2007].

The pilot labelling showed furthermore, that the most important criterion for purchase decisions of lubricants by consumers is to find the right oil which is approved by the car company in order not to affect the warranty.

Interviews with the consumers demonstrate that the selection of the right oil is rather challenging since the average consumer is totally overstrained by various declarations and approval systems as well as several engine types.

In conclusion, the CO_2 efficiency is not a driving motive for buying lubricants and thus, the effect of applying of a CO_2Star Label is rather low.

7.3 Interest of Retailers in Lubricant Labelling Programmes

The interest of retailers in a lubricant labelling programme was investigated by Q1 in a survey on "Acceptance of CO_2 fuel and lubricant labels by retailers" [BUERKNER 2008]. The survey was based on the following question: "Do you think a CO_2 label could foster the acceptance of lubricants and how important would a label be for your customers?"

In total, 11 CEOs or managing Directors of fuel retailers and oil companies were interviewed.

The results of the survey show that among CEOs, the acceptance of a CO_2 label for lubricants is low. The interviewed experts argued that it would be very complicated to assess different lubricants in terms of CO_2 reduction. Furthermore, the direct benefit of such a label is not evident to the retailers since it is not clear if such label was accepted by consumers. This is underpinned by the following statements of retailers:

"I think the consumer is already overstrained when buying lubricants. There are nearly 30 different specifications and 3 different approval systems that confuse the consumer. Additional labels would lead to more confusion."

"Which institution can monitor such a label? Who checks the reduction numbers? I think there is too much room for interpretation and manipulation."

In conclusion, the CO_2Star campaign showed that the awareness of the CO_2 reduction potential of improved lubricants among consumers is very low. The main drivers for purchase decisions of lubricants are the approval by the car manufacturers, quality, and the price. This result is underlined by a survey with retailers, which shows that lubricant producers and retailers see no benefit in lubricant labelling.

Furthermore, the interrelation between improved lubricants and the CO_2 reduction potential is very complex and the implementation of monitoring and certification measures in the field of carbon labelling for lubricants pose large difficulties.

Finally, the rather low emission reductions due to fuel savings of up to 2-6% may be impossible to verify in practice, as road profile, weather conditions, driving style, and other external factors can overshadow the benefits generated by improved lubricants.

8 CO_2Star Label for Freight Services

Freight companies in Europe are beginning to use biodiesel in higher blend levels, including e.g. B30 or B100 (pure biodiesel). This is resulting in lower CO_2 emissions per freight mile compared to truck companies using diesel. An opportunity exists to promote these companies as "low carbon" freight carriers through labels and promotional information that can be used with their customers. Depending on the interest of their freight customers, the promotion can address the end consumer through a label indicating the product was carried on a "low carbon" freight carrier.

The implementation of the CO_2Star labelling initiative in the Dutch horticultural sector has however experienced significant difficulties and delays due to the current uncertainty of stakeholders with regards to the public debate and legislative action on the sustainability of biofuels in Europe. Several stakeholders withdrew from the initiative due to their doubts that a promotion of environmental benefits offered by biofuels is currently accepted by consumers.

Important changes with respect to the initial planning of the Dutch CO_2Star labelling initiative include the delay of implementation until December 2008, the selection of B30 instead of B100 by the fuel provider BP, the downscaling of the number of truck, as well as a significantly reduced publicity of the initiative which now mainly serves as pilot to gather technical experience with high biofuel blends.

8.1 CO_2Star Labelling Initiative in the Dutch Horticultural Sector

The CO_2Star carbon labelling initiative for freight services is implemented in cooperation with the 'Schoon Geproduceerd, Schoon Vervoerd' ('Clean Production, Clean Transport') pilot project of the Greenports in the Netherlands [VAN DE GEIJN 2008, NEEFT 2008]. This project is an initiative of the Productshap Tuinbouw, a consortium of several leading Dutch parties in production, trade and distribution of flowers, plants, vegetables, and fruits. The project comprises the set-up of biodiesel (B30) refuelling stations at different locations as

well as the introduction of CO_2Star labels on the trucks transporting these products. Figure 13 presents the label of the Dutch CO_2Star freight labelling initiative.

Figure 13: Sticker for trucks of the Dutch CO_2Star freight labelling initiative

The first B30 biodiesel pump for the horticultural sector opened in the Netherlands in August 2008. The refuelling station of BP selling B30 diesel (a blend of 30% biodiesel and 70% mineral diesel) is located in Naaldwijk, close to the country's main horticultural production areas and auctions. In the framework of the Carbon Labelling project, this fuel pump was marked with the CO_2Star label (see Figure 14).

Figure 14: B30 fuel pump in Naaldwijk, The Netherlands

This initiative by the horticultural sector is a pilot project, from which lessons can be learned before scaling up to national or even European scale. The objective of this initiative is to gather technical data (performance, emissions, maintenance, commerce) in a small scale, real life experiment with high blends of biofuel.

Since August, 22 trucks equipped to transport horticultural products, have been filling their tanks with the B30 blend and use a carbon label to show customers and consumers that their products are transported by a 'low carbon' freight carrier. The label is also displayed on the tank at Naaldwijk.

BP offers B30 to transport companies for a maximum 1.5 million litres and duration of 2 years. The initial adaptation of trucks, maintenance, warranties and monitoring during 2 years were offered by Volvo. Compensation of remaining extra costs for fuel and maintenance were

offered by Productschap Tuinbouw, resulting in a safe and cost neutral operation for participating transport companies. Trucks in general make more than 100,000 km annually in Holland (collection of flowers at the greenhouses) or abroad (export to European countries).

Figure 15: Consumer information website for the CO_2Star freight service initiative in The Netherlands

8.2 The 'Clean Transport' Initiative of the Greenports

'Clean Transport' (in Dutch: 'Schoon Vervoerd') is an initiative of the Dutch flowers & food organisations and Rabobank Nederland to introduce biodiesel to reduce CO_2 emissions in road transport and decrease the dependency on fossil energy. It is also meant to demonstrate the innovative capacity of the sector not only for products and production processes but also in the wider sense of sustainability. Preferably 'Clean Transport' would use B100, but for pragmatic reasons B30 (30% biodiesel) was selected for the start-up at the Flora Holland site in Naaldwijk.

The initiative was launched in June 2005 as part of the energy related initiative 'Schoon Geproduceerd, Schoon Vervoerd' of the Greenports.

Greenports is a unique geographical cluster of related business activities in the Dutch flowers & vegetable industry (production, import, logistics and technical and financial services) with a total turnover of well over € 10 billion, 250,000 employees, 10,000 hectares of greenhouses and vast auction & trade areas concentrated in Aalsmeer, Barendrecht, Venlo, and Naaldwijk. The sector is leading in innovation of products, production processes, technology and services worldwide.

The energy bill of Greenports amounts to about € 1 billion and is rapidly increasing, despite intensive improvement efforts. For transport alone the energy bill amounts to about € 175 million on a yearly basis. The sector is well aware of the vulnerability for disruptions in the energy market. Many measures are taken in the greenhouses to transform the sector from a massive consumer (10% of the Dutch gas consumption) to a net producer of energy and to reduce the dependency of fossil sources. Measures are taken to move transport from road to water (shortsea, barge) and rail, to introduce new logistic concepts using containers instead of trailers (shift from road transport to multimodal transport) and ICT to better manage modal split and improve transport efficiency.

'Schoon Vervoerd' fits in this portfolio of measures. The Greenports have set themselves goals to reduce 30% CO_2 in 2020 and be independent of fossil energy sources by 2040. These goals serve economic values (reduce costs), and contribute to ensuring sustainability.

Transport in the Greenports has a specific pattern. Trucks collect products (flowers, vegetables, plants) from the greenhouses on a daily basis to a few large scale auction and trade sites. Trucks distribute products to various retail channels mainly in North West Europe. This pattern repeats on a daily basis with thousands of trucks involved for flowers as well as fruit and vegetables and hundreds of transport companies involved.

This pattern is very suitable for the introduction of biofuels as infrastructure (tanks and equipment) needs to be installed only on a few sites. Logistic services (filling the tanks), technical support (truck services) and monitoring (performance and emissions) can be concentrated on a few large scale locations. Multiple transport companies can participate in a small scale start-up, spreading the news. And last but not least, collective sector organisations can support the introduction.

Nonetheless, the preparation of this 'Clean Transport' initiative has required considerable ambition over a period of 3 years to get started.

8.3 Acceptance of CO_2 Labels by Freight Companies in Germany

In the framework of the Carbon Labelling project, a survey was performed to investigate the acceptance of CO_2 labels for biofuels by forwarding companies and commercial end-users in Germany, such as logistic companies and freight services [RUTZ 2008b].

Thereby, telephone interviews with representatives and decision makers of 13 forwarding companies and commercial end-users in Germany were conducted.

Evaluating the results of this survey, the current policy framework for biodiesel in Germany has to be considered. The former tax exemption of B100 in Germany was replaced by increasing taxes on B100 in 2007 and 2008. This stepwise increase of biodiesel taxes in Germany drastically decreased former cost benefits of biodiesel, and thus has effects on the acceptance of biodiesel by forwarding companies and commercial end-users.

The survey showed that most of the interviewed forwarding companies are aiming at climate protection as one of their ideological goals. Besides that, throughout all interviews, climate protection as well as the promotion of overall environmental conservation were considered as important and vital elements of business success in the sector.

In contrary to these results, climate protection and environmental conservation are apparently not considered as important issues at the end-customer level. According to the interviewed companies, customers mainly focus on the timing and the price of transport services. Likewise, new customers do not really demand "green services" in the freight forwarding business.

The utilisation of renewable transport fuels is thus strongly and almost exclusively driven by the desire to cut the prices of the transport sector. The available cost reduction potential of renewable fuels, however, is currently not sufficient. Therefore, it is necessary to create a political and economical framework that promotes and supports the introduction of renewable transport fuels by ensuring a competitive price of these fuels.

Likewise, all considerations to implement further CO_2 reduction potentials (high-performance lubricants, dedicated fuel additives, aerodynamic vehicle design, etc.) are directly dependent on the long-term availability of cost benefits created by a supportive political and economical framework.

The current marginal cost reduction potential of biodiesel in Germany due to the increasing taxes on B100 caused forwarding companies to stop using biodiesel. The high costs for refitting regular diesel engines and the increased maintenance intervals are not offset by savings of fuel costs. Furthermore, the existing uncertainty of biodiesel supply has caused a loss in consumer confidence.

Finally, the acceptance of a potential CO_2 label is very low, as representatives and decision makers of forwarding companies do not believe in the informative and declarative value of such a label.

Therefore, it is necessary to convince forwarding companies and end-users by the creation of a political and economical framework that promotes and supports the broad utilisation of biofuels. Only the implementation of taxation schemes related to CO_2 emissions could bring a significant change in the current situation. In connection to such measurement it could be promising to introduce a CO_2 label via qualified and prestigious institutions at national or even European level.

8.4 Recommendations for Labelling Initiatives in the Freight Sector

The current pilot initiative to introduce biofuels in the Dutch freight sector and to implement a carbon label was organised in a top-down approach. The sector organisation Productschap Tuinbouw decided to start a biodiesel project with freight companies to contribute to sustainability goals of the sector. The transport companies had not been involved up to the moment that the project was set-up and the decision to use carbon labels had already been taken without a detailed assessment of consumer attitudes.

Thus, it can be recommended to use a bottom-up approach in future carbon labelling initiatives in the freight sector. It should be ensured that the transporting companies feel that there is a need to use labels to promote the message of ‘clean transport’ to costumers or the general public.

The Dutch pilot initiative clearly indicated that a very large effort is required to start a high-blend biofuel project in a country without tax incentives for these fuels, the only incentive for the introduction of biofuels being an obliged market share (2% by energy in 2007, 3.25% in 2008) for biofuels.

A further recommendation, therefore, is that projects to reduce the carbon emissions (in transport as well as elsewhere) should be realised first before carbon labelling initiatives are implemented in order to reduce the overall complexity of the projects. After the introduction of carbon reduction measures (such as the introduction of biofuels), the value of carbon labels can be better assessed through dedicated consumer surveys. Good understanding of the consumer acceptance and potential added value of a label is a necessary pre-requisite for the introduction of labelling initiatives.

Carbon labels are an attractive tool to promote ‘clean transport’ and the reduction of GHG emissions in transport services. However, currently detailed consumer surveys on the

effectiveness of carbon labels in the freight sector are lacking. A final recommendation from the Carbon Labelling project would therefore be to perform further and detailed consumer surveys in the European freight sector.

9 Support for smaller EU Member States

Apart from the environmental benefit of using biofuels, biofuels may also provide a better diversification in the fuel mix of a country, reduce dependence on fossil fuels and create new possibilities of employment. In smaller European Member States (e.g. Malta, Slovenia), which do not have their own indigenous sources of fossil fuels and which presently rely on imported fuels for their energy needs, diversification of the fuel-mix would go a long way in enhancing security of supply.

Unfortunately, unlike larger EU member states, large scale-farming of vegetable plants for use in the production of biofuels in small EU countries may not be feasible. Thus, these countries with their limited land resource would still need to import biofuels from third countries to diversify their fuel mix. On the plus side however, biofuels are potentially available from a larger number of countries than the current oil-producing countries, many of which have political stability problems.

In the framework of the Carbon Labelling project, Malta and Slovenia were supported in promoting the use of biofuels. Based on the contributions of the Carbon Labelling partner Malta Resources Authority (MRA) and the other project partners the results in these support activities are shown below.

9.1 Limitations in reaching EU targets in small EU Member States

To reach the European biofuel targets smaller EU member states are faced by the following problems and market barriers [MRA 2007]:

- Availability of raw material
- Infrastructure limitations
- Quality Issues
- Economies of Scale Issues
- Negative Publicity
- Competing Sectors

These topics are considered as obstacles which might hinder a larger market penetration of biofuels in smaller EU member states.

9.2 Case study Malta

In 2005, Malta placed sixth in the production of biodiesel within all EU members. This result might seem contradictory to what is expected from a small Member State, however, the problem is not creating a market for biodiesel but actually reaching higher targets of biofuel market penetration.

Raw material

All studies related to the use of biodiesel and to its probable increase in use in the future, given the ambitious targets being set by the European Union, clearly state that one of the problems which may be encountered in reaching such targets will be related to the sourcing of the raw material. A number of raw materials are being used in this regard, with rape seed oil, palm oil and soy-bean oil being the main feedstock sources.

However, in order to grow these plants, a number of decisions as to land space allocation and good water reserves must necessarily be made. In this regard small states face the problem that the arable land available is scarce and water is also a highly valued and highly priced commodity.

Malta's potential for growing crops for producing biofuels is negligible due to both limited availability of arable land and water resources as described in the Malta Environmental and Planning Authority's Structure Plan, stating that "Cultivated land has however decreased from 15,200 ha in 1971 to 12,000 ha in 1986 and the trend is continuing." Malta's 2006 report on biofuels, submitted to the European Commission as part of the obligations set down by the directive, underlines these two limitations and specifies that the only current indigenous source available for the production of biodiesel is waste cooking oil.

However, even waste cooking oil as a source of raw material for the production of biodiesel is a finite source. Furthermore, not all of this source material is collected for biodiesel production. A report has shown that only 2,850 tons of waste cooking oil, equivalent to 50% of the current 5,700 tons of waste cooking oil produced is collected. Should all the 2,850 tons of waste cooking oils collected in Malta be diverted for the production of biodiesel, it is estimated that 2.85 million litres of biodiesel would be produced, resulting in only 1.56% by energy content of the total fuel sales to the transport sector. This figure is still short of the reference value set by the EU Directive.

Infrastructure limitations

As far as infrastructure is concerned, oil storage in Malta is paid at a high premium given its strategic location in the middle of the Mediterranean, the limited oil storage capacity and competing local and bunkering markets. Additionally, building new storage capacity is not a feasible option and would require further investment for many producers. This problem as regards biodiesel is not very acute today since quantities are still relatively small. However, should the amount of biodiesel consumption increase considerably, then biodiesel would find itself competing for storage space.

Given that the production of biodiesel is currently not cost effective without financial incentives, this added cost would further hinder biodiesel uptake. A real problem on the other hand currently exists at petroleum filling stations. At least a third of existing petroleum filling stations in Malta are kerb-side pumps with limited space available to dedicate tanks and dispensers exclusively to biodiesel or specific blends of biodiesel. This limits the amount of the product that can be retailed.

In order to partially overcome this problem a number of petroleum-filling stations have modified their petroleum fuel storage facilities and re-directed their use for the sale of 100% biodiesel. Presently, petroleum filling stations are permitted to store and dispense 100% biodiesel only. It is left up to the individual consumer to decide upon which blend is best

suited for his vehicle. About twenty stations, out of the 83 operating licensed petroleum filling stations are currently using this system.

Quality issues

As for all other fuels, ensuring fuel quality is of large importance in developing trust and building confidence. The issue of quality control is thus a matter of high importance in the development of a thriving biofuel market. In ensuring that only biofuels and particularly biodiesel products of the right quality are allowed into the market, the following minimum objectives should be met:

- the product sold must be suitable for the engine for which it is being marketed. In particular it must not cause damage to the engine;
- the product must comply to existing standards and legislation.

In Malta, the absence of appropriate laboratory facilities to ensure that the biodiesel offered on sale in the market is up to the applicable standard is a big drawback in the efforts to reduce costs.

Economy of scale issues

A future problem in Malta concerns the CIF (Cargo, Insurance & Freight) price at which biodiesel might be bought from the international market. In the international carriage of goods business, prices per litre increase with a decrease in the size of the cargo. Hence, smaller volumes of biodiesel become more expensive per litre of product purchased, than when imported in larger quantities. Therefore, unless a way is found to increase cargo sizes, importing pure biodiesel will very rarely be cost-effective in countries such as Malta.

Negative publicity

Publicity is a key issue in developing a market for a particular product. However, negative publicity can create an opposite effect on the market. For this reason, it is of large importance that confidence in biodiesel is ensured through proper education on the pros and cons of using biodiesel, throughout the fuel market chain from the producer/importer level, to the retailer and consumer level.

Competing sectors

In Malta, competing sectors further reduce the potential for biodiesel use for transport purposes. Diverting biodiesel use from transport to other uses, such as electricity and heat generation further diminishes Malta's chances of reaching the EU targets for biofuel use in the transport sector. In 2005, although 0.895 million litres of biodiesel were sold to the transport sector, this amount accounted for only 60% of the total biodiesel produced locally, with the balance (40%) going to industrial use.

9.3 Support measures in the local biofuel market of Malta

Some of the measures used by other EU countries cannot be applied to the Maltese market, given the particular conditions in Malta. However, certain features of these measures can be used to promote the biofuel market in Malta:

1. Creating a proper legislative framework;

2. Enhance education, communication and information throughout all the fuel market chain, from importer/producer to consumer;

3. Facilitating the collection of waste oils, from commercial establishments as well as from domestic sources;

4. Enforcement of the regulations regarding dumping of oils in sewers;

5. Creating stable market conditions through the publication of clear government commitments and policies in the short, medium and long term;

6. Encourage consumer confidence through enforcing of quality standards and control and policing "back street" blending;

7. Encouraging research and development in the use of biodiesel;

8. Voluntary agreements especially with fleet operators;

9. Government purchase of vehicles that can take higher blends. Green procurement, and government policy requiring its fleet to run on biodiesel;

10. Provision of capital allowances for producers of biodiesel;

11. Substitution obligation, either an obligation on fuel suppliers to add percentage of biodiesel to diesel or an obligation on fuel suppliers to 'push' a certain quantity of biodiesel into the market; and

12. A renewable fuels certificate system.

Whereas some of the issues such as creating a proper legislative framework listed would certainly strengthen the biofuels market in Malta, other proposals such as research and development are difficult to implement in Malta without EU funding.

9.4 Workshop in Malta

The first Carbon Labelling Workshop on "Biodiesel and other Biofuels for smaller EU Member States" took place in Malta on 11 December 2007. The workshop was organised by the Malta Resources Authority, Malta, and by WIP Renewable Energies, Germany. The workshop was opened by Antoine Riolo, CEO Malta Resources Authority, and Anthony C. Mifsud, Permanent Secretary Ministry for Resources & Infrastructure, Malta, who gave a Keynote speech. 39 participants, mainly key stakeholders from industry and policy sector, attended the workshop.

The Minutes [RUTZ 2007] and the presentations of the workshop are available at the Carbon Labelling website (www.co2star.eu).

Figure 16: Participants of the Carbon Labelling workshop in Malta

9.5 Workshop in Slovenia

The **second Carbon Labelling Workshop** on "Biodiesel and other Biofuels for new EU Member States" took place in Ljubljana, Slovenia, on 20 May 2008. The workshop was organised by WIP Renewable Energies, Germany in cooperation with the Slovenian Energy Restructuring Agency (ApE).

The workshop was opened by Franko Nemac, Director of ApE, and Dr Rainer Janssen (WIP) who welcomed the participants. 43 participants, mainly key stakeholders from industry and policy sector, attended the workshop.

The main objective of this workshop was to inform stakeholders in Slovenia about biofuels and more specifically about biodiesel as sustainable and efficient transport fuel. This included biodiesel production, legal issues, policies, GHG calculation models, and environmental impacts. In total, 14 presentations were given by biofuel experts.

The Minutes [RUTZ 2008d] and the presentations of the workshop are available at the Carbon Labelling website (www.co2star.eu).

Figure 17: Participants of the Carbon Labelling workshop in Slovenia

10 Consumer Survey on Carbon Labels in the UK

In the framework of the Carbon Labelling Project, and in line with the UK government Renewable Transport Fuel Obligation (RTFO) and the EU Renewable Energy Directive (RED), the HGCA tasked The Oxford Partnership to conduct research into UK consumer behaviour and attitudes towards environmental issues, their perception and knowledge of biofuels, and their attitudes toward a CO_2 label [HGCA 2008].

The research was carried out in the UK during February and March 2008 prior to the introduction of the RTFO on April 15th 2008. The main objective was to assess the impact of CO_2/efficiency labels on increasing awareness and interest in the use of biofuels and improved lubricants.

This survey followed a two phase approach. In phase one a qualitative survey was conducted among 8 focus groups in Newcastle, Birmingham, Watford and Bristol, with the group selection covering age, gender, and attitude to energy saving. Phase two consisted of quantitative research in the form of an omnibus survey (involving 583 passengers), to establish robust data on certain key issues surrounding biofuels.

10.1 Consumer Attitude towards Environmental Issues

The consumer survey revealed that there is an inherent scepticism regarding media reports about environmental issues and the seriousness of the global environmental situation. There is a tendency for some consumers to believe that the comparatively little they can achieve environmentally as individuals, is pointless when countries such as the USA and China will not commit to emission reductions under the Kyoto Protocol.

Consumers want to help the environment but often feel that it is not made easy enough for them. They ideally want assistance and greater commitment from government and their local council, who many believe are not serious enough about the protection of environment. Environmental and ethical issues should be addressed by the government as responsible and accountable body. Consumers also feel there should be financial incentives for being ‘green’.

Personal cost is a major consideration for most people. Those with strong convictions, although in the minority, are willing to pay more to protect the environment, while those with lesser convictions are not.

Overall, encouraging people to be environmentally responsible is a matter of winning both hearts and minds. However, this research suggests there is still some way to go to achieve this goal. Thereby, to achieve maximum impact the most credible information or advice should come from an independent consumer organisation or respected individual.

10.2 Consumer Attitude towards Biofuels

There is a high awareness of the term biofuel, but very little detailed knowledge about biofuels (e.g. on biofuel types, feedstock, properties, environmental performance). Consumers do not connect biofuels with the carbon cycle (which is rarely understood), and the emission reduction potential of biofuels is largely unknown.

In early 2008, almost all consumers were unaware of the implementation of the Renewable Transport Fuel Obligation (RTFO) mandating a blend of biofuel in petrol and diesel from April 2008. This led to a feeling of suspicion among many consumers as to why they have not heard of biofuels and the introduction of the RTFO. They also questioned why the blend of biofuel was not higher if biofuels offered significant advantages. Probably more importantly was the negative uncertainty surrounding biofuels such as their impact on engine performance and anticipated higher costs.

The majority of consumers would prefer the biofuels to be sourced within the UK to help UK farmers and to secure the fuel supply. However, the majority were not willing to pay a premium for biofuels no matter what the provenance.

Overall, consumer knowledge on biofuels is characterised by superficial understanding and high degree of ignorance of the key issues concerning biofuels. In order to connect with the public there needs to be a widespread communications strategy with different messages targeted at different segments of society.

Finally, respondents were very sceptical about organisations or individuals who might be the best spokesperson or body for biofuels, as most are believed not to be objective. Potential promoters of biofuels include Government, scientists, NGOs, as well as people's champions or media personalities.

10.3 Consumer Attitude towards Carbon and Efficiency Labels

In general, efficiency labels were considered to be a useful aid to the purchasing decision, but only where there is a choice. For white goods, houses and other items such as cars and tyres, efficiency labels provide useful and unbiased information. If there is no choice of products (e.g. mandatory inclusion of biofuels in road transport fuels), then the need for a label is low as it only serves to provide self justification for purchase.

With respect to the design it was felt that the label should be simple and universal, with the efficiency label ratings A to G of white goods serving as good example. Therefore, the option to include 'add-ons' to the CO_2Star label indicating for example carbon reductions in percent, sustainability criteria, quality aspects (ISO, DIN), efficiency improvements, source / origin, web-site for further information, was not supported. The following requirements were identified for a successful label:

- ***Eye catching*** *– well designed and distinctive*
- ***Simple*** *– lodging in peoples minds quickly*
- ***Relevant*** *– improves the likelihood of changing behaviour*
- ***Meaningful*** *– information which can be remembered and justified*

11 Summary and Recommendations

The following conclusions and recommendations can be drawn from the implementation of the pilot CO_2Star carbon labelling initiatives:

- Currently, the involvement of stakeholders from industry, NGOs, and consumer organisations in the implementation of carbon labels is very difficult due to the existing uncertainties with respect to the legal, regulatory, and economic framework conditions, as well as due to the on-going public discussion about sustainability aspects of biofuels.

⇒ It is therefore recommended to proceed with labelling initiatives after the finalisation of the Renewable Energy Directive and the Regulation on emission standards for passenger cars.

- Integrating a large variety of different measures for efficiency improvements (such as lubricants, additives, tyres, air conditioning, etc.) in a single label would cause a very high degree of complexity. Furthermore, some of these measures are very difficult to quantify and monitor resulting in significant problems for the operation of a labelling scheme.

⇒ In order to be suitable for labelling initiatives, these measures for efficiency improvements need to be clearly specified in a respective regulation on EU level. Furthermore, fiscal incentives such as a CO_2 tax for vehicles need to be implemented on EU level. As currently this regulatory framework and fiscal incentives are lacking, the interest of stakeholders (e.g. car manufacturers) in labelling initiatives is low.

- With respect to biofuels the level of GHG emission reductions is only one aspect in the current assessment of biofuel sustainability. Furthermore, the new Renewable Energy Directive mandating sustainability criteria for biofuels is still under discussion.

⇒ An agreement on the sustainability criteria (including the required GHG emission reduction levels) for biofuels to be integrated in the Renewable Energy Directive has to be reached before successful labelling initiatives for biofuels can be implemented.

⇒ A harmonisation of the existing GHG calculation methodologies has to be achieved. This will be needed to ensure the credibility of GHG emission reductions promoted through a label.

⇒ It may be advisable to implement a Sustainability Label for biofuels instead of a label solely focussing on GHG emission reductions.

- Carbon labelling of biofuels and efficiency improvements will only be effective if there is a choice of products for consumers.

⇒ In this respect the labelling of the biofuel fraction in mandatory blends (e.g. B5, E5) is not recommended. Carbon labelling of fuels shall focus on high blends of biofuels (e.g. B100, B30, E85) or other alternative transport fuels.

- Results of the consumer surveys show that the majority of consumers are not willing to pay a premium price for fuels with reduced GHG emissions, efficiency improvements, and 'low carbon' freight services. The price of a fuel is the main factor influencing the purchasing decision of consumers in Europe. Therefore, currently the added value of carbon labelling initiatives for fuel retailers and freight companies is limited.

⇒ It is necessary to create a political and economical framework that promotes and supports the introduction of renewable transport fuels (e.g. high blends of biofuels) by ensuring a competitive price of these fuels.

- Results of the consumer surveys show that there is very little knowledge of the general public about biofuels in general, and more specifically on the potential for GHG emission reductions offered by biofuels.

⇒ Significant efforts are needed to increase public awareness of biofuels and other options to reduce GHG emissions in the transport sector. Thereby, strategies need to be developed with different messages targeted at different segments of society.

- The contribution of biofuels to GHG reduction in the transport sector is limited.

⇒ The focus of GHG reductions in the transport sector should be a combined strategy on measures which are decreasing fuel consumption, such as higher vehicle efficiencies (improved traffic management, speed limits, interactive traffic lights, etc.), and alternative mobility concepts (public transport, car sharing, etc.), as well as on the use of best-practice biofuels.

12 Action Plan

Based on the results and experiences from the Carbon Labelling project the following section presents a list of activities for the successful implementation of national and/or EU wide carbon labelling initiatives.

Thereby, the focus was placed on the labelling of alternative fuels (e.g. biofuels) to achieve GHG emission reductions in the transport sector.

The integration of other measures for efficiency improvements (such as lubricants, additives, tyres, air conditioning, etc.) was omitted due to the high level of complexity and the difficulty in quantifying and monitoring various efficiency improvements. Furthermore, surveys performed in the framework of the Carbon Labelling project showed that there is very low interest in carbon labelling of lubricants by consumers as well as by fuel retailers. It is expected that integrated GHG emission reductions for passenger cars are best governed by a EU regulation specifying acceptable levels of GHG emissions per km (for average car fleets), accompanied by fiscal incentives such as CO_2 taxes introduced by the national governments.

The following activities need to be implemented to set-up labelling initiatives for biofuels on national and/or EU level. Thereby, it may be advisable to implement a Sustainability Label for biofuels instead of a label solely focussing on GHG emission reductions.

1. **Finalisation of the EU Renewable Energy Directive**

   An important pre-requisite for the set-up of labelling initiatives for biofuels is the entry into force of the EU Renewable Energy Directive including its sustainability criteria for biofuels. This legislation will provide a stable legal and regulatory framework for stakeholders active in the biofuels sector including the definition of mandatory GHG emission reduction targets and appropriate methodologies for the calculation of GHG emission reductions of biofuels. Thus, the current uncertainty of stakeholders will be removed which may open up opportunities for biofuel labelling initiatives.

2. **Increase of Consumer Awareness about Biofuels**

   Currently, the level of knowledge about biofuels among the general public is very low. Specifically, consumers are not aware of the potential GHG emission benefits offered by biofuels. Thus, an ambitious dedicated effort is needed to raise the level of knowledge about biofuels, both on national and on EU level. Thereby, strategies need to be developed with different messages targeted at different segments of society. An increased awareness of the benefits offered by biofuels may also lead to a larger willingness to pay a higher price for environmentally friendly fuels.

3. Involvement of Biofuel Stakeholders

Successful biofuel labelling initiatives can only be implemented with the strong support of stakeholders such as fuel retailers, oil companies, freight service providers, and respective industry associations. In future labelling initiatives approaches are needed to ensure that the involved companies feel that there is a need to use labels to promote 'clean fuels' and/or 'clean transport' to customers or the general public. Thereby, additional detailed consumer surveys may be needed to assess the added value of labels for involved companies and consumers.

4. Development of Standards (Compliance with RED or "Gold Standard")

Once the support of biofuel stakeholders and consumers is guaranteed, the standard (set of criteria) has to be developed, and the performance level that needs to be achieved to qualify for the label has to be defined. Standard development needs to be done by a respected standardisation body such as the European Committee for Standardisation CEN. Thereby, it needs to be decided whether the biofuel label shall mandate performance criteria (e.g. level of GHG emission reduction) as specified in the RED, or whether higher performance levels are required, thus establishing a "Gold Standard" for biofuels. A "Gold Standard" could for instance require a GHG emission reduction of 50% compared to the current target of the RED of 35%.

5. Selection of Label Application

Consumer surveys of the Carbon Labelling project indicate that labelling initiatives for biofuels will only be of value for consumers if a choice of products exists. As biofuels will be subject to (mandatory) sustainability requirements under the RED, future mandatory low blends of biofuels in fossil fuels (e.g. B5, E5) will not involve "choice" for consumers. In this case a label would fulfil an affirmative role (creating a "good feeling"). Applying labels to high biofuel blends (e.g. B100, B30, E85), however, would promote environmental benefits of biofuels with respect to an alternative (i.e. fossil fuels, low blends).

6. Selection of Chain of Custody

The practical feasibility of a biofuel label faces challenges presented by the fuel logistics. For the production of current biofuels it is often difficult to know the specific origin of the various feedstocks. Furthermore, biofuels from different origins may also be mixed in later stages of the fuel supply chain. Currently, three different chain of custody systems (systems for passing information through the supply chain) are under discussion, namely "book and claim", "mass balance", and "track and trace". In the last option, the labelled biofuel sold at the retailer can be tracked back to the origin of the feedstock. Such systems are ambitious, but would provide clear and trustworthy information to consumers. On the other hand, systems with a physical separation of the biofuel and the information carried by the label offer higher flexibility and lower costs for the industry. For the development of a biofuel label, the appropriate chain of custody system has to be selected in close cooperation with the biofuel stakeholders and consumers.

7. Selection of the Institution Operating the Label

The consumer surveys performed in the framework of the Carbon Labelling project indicate that the selection of the institution owning and operating the label is crucial for its credibility towards consumers. Potential candidates identified include governmental agencies on national and/or EU level, NGOs and industry associations. However, preferably a biofuel label should be operated by a well reputed organisation which is already successfully implementing other labelling schemes. Examples include the Kitemark, a registered British Standards Institute (BSI) voluntary certification label, the Swan Ecolabel introduced by the Nordic Council of Ministers, and the Forest Stewardship Council (FSC) label for certified wood products.

8. Definition of Certification and Accreditation Schemes

Verification and certification are essential aspects of labelling initiatives, as they provide the basis for the credibility of the label. Typical procedures involve a certification body performing an audit and verifying whether the biofuel meets the requirement set by the standard of the label. A positive certification decision leads to the right to carry the label. In order to ensure that the certification body has the required expertise and competency, they need to be accredited by a respected existing accreditation body. It is recommended that the certification body is an entity different from the owner of the label.

The abovementioned 8 specific activities are crucial for the set-up of a successful (carbon) labelling initiative for biofuels. However, at the present stage it can not be guaranteed that biofuel labelling offers a valuable opportunity due to the current low interest of both biofuel stakeholders and consumers.

13 Success stories of the Carbon Labelling project

The following three success stories from the implementation of the Carbon Labelling project can be highlighted.

1) ***Great success and large public outreach of the CO_2Star campaign on biodiesel (B100) at Q1 stations***

The CO_2Star initiative for biodiesel (B100) of the German fuel retailer Q1 was a great success with a very high outreach to the public. Flyers were distributed at the points-of-sale, stickers were given to the consumers, banners and posters were displayed at the fuel pumps, radio interviews were given and press releases were issued. The audience of the press releases were at least 10,000 people gaining the information trough radio broadcasts, newspapers, and magazines. Due to the campaigns and the enthusiasm of the service personnel of the fuel stations, several fuel consumers were even motivated directly at the fuel pumps to switch from fossil diesel to biodiesel. The campaign was launched on 12 July 2007 at a Q1 fuel station in Osnabrück, Germany.

2) ***Organisation of the first workshops dedicated to biodiesel in Malta and Slovenia***

The Carbon Labelling Project organised two stakeholder workshops in Malta and Slovenia. The aim of these workshops was to inform stakeholders in these New Member States about biofuels, and more specifically about biodiesel. Both workshops gained much interest within the stakeholder community since they were among the first events dedicated to biofuels in these countries.

3) ***Stimulation of discussions about GHG benefits of biofuels on the research and policy level***

The Carbon Labelling project highly stimulated discussions about GHG benefits of biofuels on the research and policy level. It presented a scientific platform for information exchange about different GHG calculation methodologies, especially for initiatives in Germany, UK, and the Netherlands as well as on European level. This was supported by the active participation of the Advisory Board members, consisting of leading experts in GHG calculations and biofuels, in the discussion about GHG benefits.

Thus, the Carbon Labelling project contributed to the harmonisation of the existing GHG calculation methodologies. This is needed to ensure the credibility of GHG emission reductions of biofuels. The Carbon Labelling project also played an active role in the discussion about the integration of GHG emission reduction levels in sustainability criteria for biofuels.

References

[BROWN 2008] BROWN G., Life-Cycle Greenhouse Gas Emissions from Fuel Ethanol: a Comparison of Supply Chains for Eight European Regions, in: Proceedings of the 16th European Biomass Conference and Exhibition, Valencia, Spain, 2-6 June 2008; (in press)

[BUERKNER 2007] BÜRKNER S., Customer Survey: Motives and Acceptance of Biodiesel among German Consumers. - A Survey in the Framework of the Carbon Labelling Project, http://www.co2star.eu/publications/ Customer%20Survey_Results20080207_final.pdf

[BUERKNER 2008] BÜRKNER S., Acceptance of CO_2 Fuel and Lubricants Label by Retailers. - A Report in the Framework of the Carbon Labelling Project, http://www.co2star.eu/publications/

[EC 2007a] Communication from the Commission to the European Council and the European Parliament: "An Energy Policy for Europe", COM(2007) 1 final, 10 January 2007

[EC 2007b] Proposal for a Regulation of the European Parliament and of the Council "Setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles", COM(2007) 856 final, 12 December 2007

[EC 2008a] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 20 20 by 2020 – Europe's Climate Change Opportunity, COM(2008) 30 final, 23 January 2008

[EC 2008b] Proposal for a Directive of the European Parliament and of the Council "On the promotion of the use of energy from renewable resources", COM(2008) yyy final, 23 January 2008

[ECOFYS 2008a] Development of a Biofuel Label: Feasibility Study, A Report by Ecofys and E4tech, commissioned by Low Carbon Vehicle Partnership, March 2008

[ECOFYS 2008b] Technical Specification: Greenhouse Gas Calculator for Biofuels, A Report by Ecofys, commissioned by Senter Novem, Version 2.1 (Confidential), 17 June 2008

[E4TECH 2006] BAUEN, A. WATSON, P. & HOWES, J. (2006). Methodology for Carbon Reporting under the Renewable Transport Fuel Obligation - DRAFT.

[HGCA 2008a] HOME GROWN CEREALS AUTHORITY (2008) Farming measures for improved CO2 life cycles of biofuels. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D16)

[HGCA 2008b] HOME GROWN CEREALS AUTHORITY (2008) Carbon Life Cycle Calculation for Biodiesel. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D3)

[HGCA 2008c] HOME GROWN CEREALS AUTHORITY (2008) Consumer survey on the acceptance of carbon labels for biofuels in the UK. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D17)

[IFEU 2003a] GÄRTNER S.O., REINHARDT G. (2003): Erweiterung der Ökobilanz für RME. - Ifeu Institut

[IFEU 2003b] GÄRTNER S.O., REINHARDT G., BRASCHKAT J. (2003): Life Cycle Assessment of Biodiesel: Update and New Aspects. - Ifeu Institut

[IFEU 2004a] QUIRIN M., GÄRTNER S.O., PEHNT M., REINHARDT G. (2004): CO2-neutrale Wege zukünftiger Mobilität durch Biokraftstoffe. - Ifeu Institut

[IFEU 2004b] QUIRIN M., GÄRTNER S.O., PEHNT M., REINHARDT G. (2004): CO_2 Mitigation

through Biofuels in the Transport Sector. - Ifeu Institut

[JANSSEN 2008a] JANSSEN R., RUTZ D., GRIMM H.P., HELM P., SAFFORD R., GERAGHTY R., WASON B., NEEFT J., THUIJL E., BORG S., BUTTIGIEG C., BÜRKNER S. (2008) Results from the European Carbon Labelling Initiative CO_2Star. - Proceedings of the 16th European Biomass Conference and Exhibition; Valencia, Spain; ISBN 978-88-89407-58-1

[JANSSEN 2008b] JANSSEN R., RUTZ D. (2008) Analysis and Feedback of the Carbon Labelling Project – Action Plan for Carbon Labelling Programmes. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D19)

[LowCVP 2008] Position Paper of the Low Carbon Vehicle Partnership – Feasibility of a Biofuel Sustainability Label

[MRA 2007] MALTA RESOURCES AUTHORITY (2007) Report on the present state of biodiesel in Malta and measures for its promotion. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D11)

[NEEFT 2008] NEEFT J., VAN THUIJL E., JANSSEN R., RUTZ D., Carbon Labelling in the Freight Sector – Working Paper, Report elaborated in the framework of the Carbon Labelling Project (Deliverable D10), September 2008

[RUTZ 2007] RUTZ D., JANSSEN R. (2007) Minutes of the 1st Carbon Labelling Workshop. - 11 December 2007, Floriana, Malta

[RUTZ 2008a] RUTZ D., JANSSEN R., BUERKNER S. (2008) CO_2 Labelling for Lubricants, Report elaborated in the framework of the Carbon Labelling Project (Deliverable D7)

[RUTZ 2008b] RUTZ D., JANSSEN R. (2008) Acceptance of CO_2 Labels for Biofuels by Forwarding Companies and End Users, Report elaborated in the framework of the Carbon Labelling Project, August 2008

[RUTZ 2008c] RUTZ D., JANSSEN R., HELM P., GERANGHTY R., BLACK M., WASON B., NEEFT J., VAN THUIJL E., BORG S., BÜRKNER S. (2007) The EU Carbon Labelling Initiative. - Proceedings of the 15th European Biomass Conference and Exhibition; Berlin, Germany; pp.2987-2989; ISBN 3-936338-21-3

[RUTZ 2008d] RUTZ D., JANSSEN R. (2008) Minutes of the 2nd Carbon Labelling Workshop. - 20 May 2008, Ljubljana, Slovenia

[SWAN 2008] Swan-labelling of Fuels, Version 1.0, 25 June 2008 – 30 June 2010, available at: http://www.svanen.nu

[VAN DE GEIJN 2008] VAN DE GEIJN (2008) Schoon Vervoerd, Clean Transport: Biodiesel in road transport for flowers & food. - Report elaborated in the framework of the Carbon Labelling Project (Deliverable D9)

[WOODS 2008] WOODS J., BROWN G., GATHORNE-HARD A., SYLVESTER-BRADLEY R., KINDRED D., MORTIMER N. (2007) Facilitating carbon (GHG) accreditation schemes for biofuels: feedstock production. – Carbon Labelling Project Report, Deliverable 3