

# CO<sub>2</sub> Labelling for Lubricants

Report elaborated in the framework of the Carbon Labelling Project

## Deliverable D7

Intelligent Energy – Europe (IEE)



September 2008

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*Carbon Labelling (Contract No. EIE/06/015) is supported by:*



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## 1. Introduction

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<sub>2</sub>) 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<sub>2</sub> emissions.

Currently, opportunities for reducing carbon dioxide emissions in the transport sector are discussed in order to meet European greenhouse gas reduction targets. An integrated strategy to reduce carbon dioxide emissions could include for example the use of biofuels and electricity, regulations on improved engines and vehicle efficiencies, use of CO<sub>2</sub> efficient tyres, introduction of automatic tyre pressure control systems, driver training, and the use of improved lubricants (synthetic motor oils, low-viscosity lubricants).

According to the dena (German Energy Agency), the ADAC (Allgemeiner Deutscher Automobil-Club), and the US Environmental Protection Agency up to 2-6% fuel savings can be achieved with innovative lubricants and thus, carbon emissions can be reduced. Also the UK Department for Transport's Energy Best Practice Programme states that "in principle, lubrication technology has the potential to improve fuel economy. As an example, at least one big manufacturer is confident enough to offer a money-back guarantee if fuel costs are not cut by at least 4% when you use the latest low viscosity oils (e.g. 0W-30 oil)..."

In the framework of the Carbon Labelling project, which is supported by the Intelligent Energy for Europe Programme, 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<sub>2</sub>Star label on its products. Detailed information for consumers on fuel savings and emission reductions were provided at the CO<sub>2</sub>Star website.

Thereby, the CO<sub>2</sub>Star campaign is also linked to the information campaign on lubricants by the dena (Deutsche Energie Agentur, dena, Germany) "ich-und-mein-auto". This campaign informs 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 since it costs about the double or triple price of conventional lubricants and save money in the long-term.

## 2. Characteristics of Lubricants

Lubricants (motor oils) are liquids used for lubrication of various combustion engines. While the main function is to lubricate moving parts, motor oil also cleans, inhibits corrosion, improves sealing and cools the engine by carrying heat away from the moving parts. The majority of motor oils are derived from crude oil. Lubricants mostly consist of hydrocarbons: organic compounds consisting entirely of hydrogen and carbon.

Lubricants are categorised into mineral or synthetic motor oils depending on the production process technology. Mineral oils are produced by basic conversion technologies. They fulfill only minimum standards. Synthetic oils (low-viscosity lubricants) are produced in synthetic processes which significantly improves the characteristics of the product.

Synthetic motor oils have several advantages when compared to mineral motor oils. The main advantage is the high viscosity at a broad range of temperatures. This reduces fuel consumption significantly. According to the dena (German Energy Agency), and the ADAC (Allgemeiner Deutscher Automobil-Club), the following fuel savings for passenger cars can be achieved:

in town      4 - 6 %

out of town 2 - 4 %

highway    2 %

An example for fuel savings of improved lubricants for trucks is given by Shell which reports fuel savings of 2- 3% from the engine oil alone. The tables below illustrate the results of testing conducted in a variety of Mercedes Benz and Volvo engines in both bus fleets and haulage situations. The tables show fuel savings when RIMULA Ultra 5W-30 is compared to conventional 15W- 40 and 20W- 40 oils.

### For Fleets

Engine Oil	Gear Oil	Axle Oil	Grease	Fuel Savings*	Average Cost Savings per truck**
RIMULA Ultra 5W-30	SPIRAX GSX	SPIRAX ASX	RETINAX LX	5%	1,500 €
RIMULA Ultra10W-40	SPIRAX GSX	SPIRAX ASX	RETINAX LX	4%	1,200 €
RIMULA Signia 10W-40	SPIRAX GSX	SPIRAX ASX	RETINAX LX	4%	1,200 €

### For Bus and Coach

Engine Oil	Automatic Transmission Oil	Axle Oil	Grease	Fuel Savings*	Average Cost Savings per truck**
RIMULA Ultra 5W-30	DONAX TX	SPIRAX ASX	RETINAX LX	4-5%	1,200 - 1,500 €
RIMULA Ultra10W-40	DONAX TX	SPIRAX ASX	RETINAX LX	3-4%	900-1,200 €
RIMULA Signia 10W-40	DONAX TX	SPIRAX ASX	RETINAX LX	2-3%	600-900 €

\* possible fuel savings when compared with 15W- 40 engine oils and GL-4 90 or GL-5 85W 140 gear and axle oils.

\*\* assuming 100,000km per year with a fuel consumption of 30 litres/100km.

Being more specifically, the most important advantages of synthetic motor oils are:

- improved flow properties at low temperatures
- low friction during cold starts of the engine
- low wear and tear due to fast lubrication of the engine
- the lubricant film is not cut in case of high temperatures
- reduction of oil consumption due to higher vapour point
- reduction of deposits in the motor

The most common classification for motor oils is provided by the American Society of Automotive Engineers (SAE). The SAE designation for motor oils gives information about the viscosity of the oil at low and high temperatures. For multi-grade oils it includes two grade numbers. For example, SAE 10W-30 designates a common multi-grade oil.

The first number (e.g. 10) associated with the W ('W' is for Winter) describes viscosity characteristics of the oil at low temperatures like in winter. The second number (e.g. 30) characterizes the viscosity of this multi-grade oil at 100°C (212°F) operating temperature.

As a basic rule it can be said that the lower the first number and the higher the second number, the better is the viscosity and thus fuel efficiency. For instance, a SAE 0W - 30 graded motor oil has very good viscosity properties.

The following oils are improved oils with lower fuel consumption characteristics:

#### **SAE 0W - X and SAE 5W - X (X = 20 to 60)**

For vehicles with diesel engines and particulate filter only low ash motor oils should be applied. They are indicated as "Low-SAPS-Oil" or "Low-Ash-Oil". They can be also identified as ACEA classification C1, C2, C3 and C4.

Usually, synthetic lubricants can be bought in any shop selling motor oils. Detailed information can be obtained from the vehicle manufacturer, service personnel, and garage or equipment provider about synthetic lubricants. Most vehicle manufacturers claim for specific minimum requirements of lubricant efficiency. Details and recommendations can be found in the user manuals of the vehicle.

It is possible to switch from conventional to synthetic lubricants without difficulties, but complete oil change is recommended. In order to avoid negative impacts on the environment, oil changes should be done by professionals and lubricant characteristics and requirements which are claimed by the vehicle manufacturer should be taken into consideration. Suitable oil change intervals are recommended by the vehicle manufacturers. The use of synthetic lubricants is a cost effective option even for older vehicles, but only if oil consumption is less than 0.3 l per 1,000 km.

### **3. "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<sub>2</sub>Star



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<sub>2</sub>Star campaign, both initiatives were closely linked to each other. Thereby, criteria for improved lubricants set up by dena were used for labelling CO<sub>2</sub>Star lubricants of Q1.

## 4. 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.

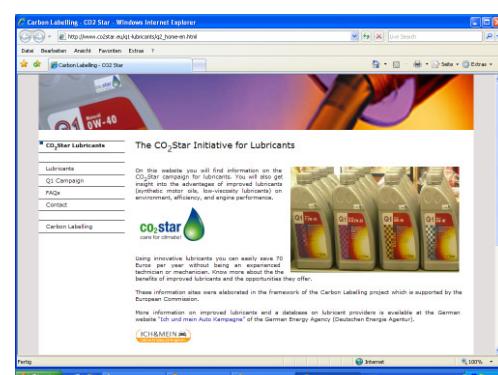


The criteria were adopted by the Commission Decision on 26 April 2005 establishing ecological criteria and the related assessment and verification requirements for the award of the Community eco-label to lubricants, as published in the Official Journal of 5 May 2005. They aim, in particular, at promoting lubricants that are of reduced harm to water and soil during use and lead to reduced CO<sub>2</sub> 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<sub>2</sub> reduction potential could be one of the criteria of the label.

## 5. CO<sub>2</sub>Star Campaign for Lubricants

In June 2008 the CO<sub>2</sub>Star campaign for lubricants was officially launched. Four low-viscosity (synthetic) lubricants of the German fuel retailer Q1 were awarded with the CO<sub>2</sub>Star 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<sub>2</sub>Star campaign for lubricants, the four awarded lubricants were labelled with a CO<sub>2</sub>Star sticker and sold in Q1 shops. The personnel of the shops were 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<sub>2</sub>Star website in English and German (<http://www.co2star.eu>).

Some characteristics of the four awarded lubricants and the suitability for different car types are described in the following chapters.

### 5.1. Q1 RUBIN SYNTHETIC V 5W-30

The Q1 RUBIN SYNTHETIC V 5W-30 oil is a high performance motor oil based on innovative HC-synthesis technology. It is suitable for nearly all VW vehicles (VW 504.00/507.00) and was especially designed for modern cars with a self regenerating diesel particle filter system according to EURO 5 standard.

By using this oil the intervals for an oil change can be expanded up to 30.000 km. This lubricant is sold in 1 litre containers in all Q1 shops.



### 5.2. Q1 RUBIN SYNTHETIC D-B 5W-30

The Q1 RUBIN SYNTHETIC D-B 5W-30 oil is a high performance motor oil based on innovative HC-synthesis technology.

This oil was designed for the modern Mercedes-Benz and BMW engines with a self regenerating diesel particle filter system according to EURO 5 standard.

By using this oil the intervals for an oil change can be expanded up to 30.000 km. It is sold at Q1 shops in 1 litre containers and suitable for vehicles with particulate filters and three-way catalytic converters.

The following cars can use the Q1 RUBIN SYNTHETIC D-B 5W-30 oil:

- Mercedes-Benz 229.3/229.31
- BMW Longlife-04
- API SL/CF
- ACEA A3/B4/C3
- VW 502.00/505.00



### 5.3. Q1 DIAMANT RACING 0W-40

The Q1 DIAMANT RACING 0W-40 oil is a synthetic low-viscosity motor oil with very low temperature viscosity.

It is sold at Q1 shops in 1 litre containers and suitable for Otto- and Diesel engines with and without turbo charging.

The following cars can use the Q1 DIAMANT RACING 0W-40 oil:

- BMW Longlife-01
- Mercedes-Benz 229.1
- VW 502.00/505.00
- API SL/CF
- ACEA A3/B3/B4



#### 5.4. Q1 DIAMANT SYNTHETIC 5W-40

The Q1 DIAMANT SYNTHETIC 5W-40 oil is a synthetic low-viscosity motor oil based on innovative HC-synthesis technology. It guarantees operational safety, minimum wear and tear, measurable fuel savings and good cold starting characteristics.

This oil is an all-rounder that can be used for several types of cars. It is especially suitable for most EURO 4 engines.

It is sold at Q1 shops in 1 l container. The following cars can use the Q1 DIAMANT SYNTHETIC 5W-40 oil:

- BMW Longlife-98
- Mercedes-Benz 229.3
- VW 502.00/505.00
- API SL/CF
- ACEA A3/B3/B4



#### 6. Consumer Acceptance of the CO<sub>2</sub>Star Label for Lubricants

The acceptance of a CO<sub>2</sub>Star Label for Lubricants is very difficult to measure. During the test period of the CO<sub>2</sub>Star label on lubricants, Q1 could monitor some awareness and reactions among their customers. However, the label had no effects on the sales numbers of the labelled lubricants.

The test labelling showed furthermore, that the most important criterion for purchase decisions of lubricants by consumers is to find the right oil which is proven by the car company in order not to lose 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<sub>2</sub> efficiency is not a driving motive for buying lubricants and thus, the effect of applying of a CO<sub>2</sub>Star Label is rather low.

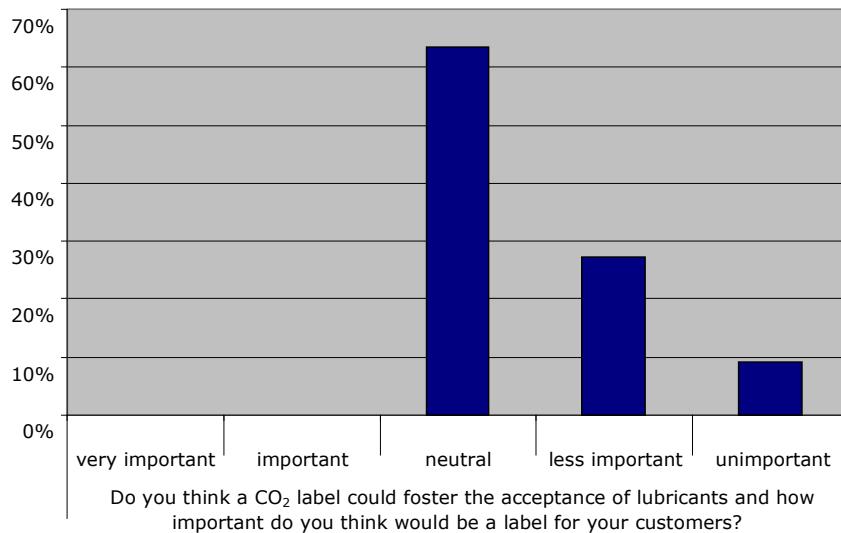
#### 7. Interest of Retailers in a Lubricant Labelling Programme

The interest of retailers in a lubricant labelling programme was investigated by Q1 in a survey on "Acceptance of CO<sub>2</sub> fuel and lubricant labels by retailers". The survey was based on the following question: "Do you think a CO<sub>2</sub> label could foster the acceptance of lubricants and how important do you think would be a label for your customers?" In total, 11 CEOs or managing Directors were interviewed. The results are shown in the graph below.

In general, it can be concluded that, among CEOs, the acceptance of a CO<sub>2</sub> label for lubricants is low. The interviewed experts argued that it would be very complicated to assess different lubricants in terms of CO<sub>2</sub> reduction. Furthermore, the direct benefit of such a label is not evident to the retailers since it is not clear if such label would be 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."*



## 8. Conclusion

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<sub>2</sub>Star 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 of the dena is focussing on consumer information in the Internet, as well as at fuel stations in Germany.

The CO<sub>2</sub>Star campaign showed that the awareness of the CO<sub>2</sub> 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. The interrelation between improved lubricants and the CO<sub>2</sub> reduction potential seems to be a very complex and not easily understandable issue for consumers. This result is underlined by a survey with retailers, which shows that lubricant producers and retailers see no benefit in lubricant labelling.

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