FCAI COMMENTS ON DEH DISCUSSION PAPER ON STANDARDISING DIESEL/BIODIESEL BLENDS DECEMBER 2006

INTRODUCTION

The Federal Chamber of Automotive Industries (FCAI) is the peak industry body that represents the majority of Australia's manufacturers and importers of passenger and light commercial vehicles, and motorcycles.

The FCAI acknowledges the need to consider biofuels as a legitimate alternative fuel for Australia. We would emphasise the need to have fuels available that conform to recognised standards that ensure a vehicle's operability and performance. In this way, the outcomes for the customer and the environment are assured and confidence in the biofuels industry continues to grow.

Steps to encourage the use of biodiesel must recognise the nature of the Australian automotive industry. Australia is one of the most competitive automotive markets in the world with more than 50 brands, 350 models from 20 source countries. While new vehicle sales are approaching 1 million units annually, this still only represents less than 1% of the global market. Currently, some 25% of new vehicles are manufactured locally and about 75% are imported.

It needs to be appreciated also that no diesel engines are currently manufactured in Australia. All diesel engine vehicles are imported and consequently, any steps to encourage the use of biofuels must recognise the advice of the design source for these engines/vehicles. **Therefore recommendations under the World Wide Fuel Charter (WWFC) must be followed.**

Australia has a policy to harmonise the Australian Design Rules (ADRs) with international standards as specified in the UN ECE Regulations. New vehicles certified to these standards will increasingly use advanced emission control technologies and steps to encourage the use of biodiesel must not undermine the emissions outcomes expected with this modern diesel technology. Similarly, such steps should not limit the availability of even more advanced diesel technology which delivers improved fuel consumption and emissions performance in the future.

As a broad philosophy, decisions on fuel quality should not compromise vehicle environmental performance or vehicle operability.

JAMA/METI DIESEL/BIODIESEL BLEND STUDY

In 2004, the Japanese Automobile Manufacturers' Association (JAMA) and the Japanese Ministry of Economy, Trade and Industry (METI) began work on a Japanese B5 diesel/biodiesel blend specification. METI, the Japanese equivalent of DITR, is responsible for setting the fuel quality regulations in Japan.

The outcomes of the JAMA/METI study were presented by a representative of JAMA to the FCAI's Technical Committee on 6 December 2006. Members of DEH and DITR were present, including the acting Chair of the Fuel Standards Consultative Committee,

Mr Paul Kesby. A copy of the JAMA presentation is provided separately as Appendix 1 to this submission. In addition, JAMA provided separate comment on the DEH discussion paper, which is Attachment 1 to this submission.

In Japan, it is proposed to incorporate the B5 biodiesel blend standard into the diesel fuel specification that is regulated. Table 1 below shows the additional parameters to be specified in the Japanese diesel standard:

TABLE 1

Specification	Level
FAME content	5 mass% max. *a)
Methanol	0.01 mass% max.
Triglyceride	0.01 mass% max.
TAN	0.13 mg KOH/g max. *b)
Individual Organic Acid	30 ppm max. *1)
Oxidation Stability (sludge)	- *2)
Oxidation Stability (acid)	0.12 mgKOH/g as growth

*a) Different feedstock will produce FAME biodiesel with different densities. At audit, it is not possible to know the biodiesel density, therefore the specification is expressed in terms of % mass instead of % volume.
*b) The WWFC specifies a maximum of 0.08 mg KOH/g, but the higher TAN maximum acknowledges the acidic nature of oxidation stabilisers.

*1) Total Formic, Acetic and Propionic Acid
*2) Continuing to develop new method

It is expected that the revised Japanese diesel standard incorporating the above additional parameters will be issued in January 2007 and come into effect from March 2007.

It should be noted that the WWFC recommends against the addition of ethanol in diesel and any diesel standard should make this clear by specifying that the presence of ethanol is down to “non-detectable” levels.

Therefore the FCAI suggests that DEH consider adding the above parameters to the diesel standard as a means of specifying a B5 biodiesel blended fuel.

BIODIESEL BLENDS USING FAME

Both the Duncan Seddon report and JAMA/METI study note that the type of feedstock has a significant influence on the oxidation stability and cold flow properties of the resultant biodiesel. Pages 12 of the Seddon report states:

“Most feedstock in the US is soybean with a relatively high degree of unsaturation, hence relatively poor oxidative stability but good cold flow properties. In Europe rapeseed is the main source of biodiesel. This has better oxidative stability whilst maintaining good cold flow properties. In many parts of South East Asia, particularly Malaysia, palm oil is used for producing biodiesel. Crude palm oil has a high level of saturation which imparts good oxidative stability but poorer cold flow properties.”

Regarding animal fats (tallow), page 15 states: "… good oxidative stability but poor cold flow properties."

It seems clear from the literature, and particularly the recent JAMA/METI work, that there are concerns over the oxidation stability of biodiesel blends. The formation of undesirable break-down products will have an adverse effect on the performance and durability of fuel system componentry.

The Engine Manufacturers' Association (EMA) has made recommendations to use ASTM D2274 (modified) and EN14112 as part of their test specification for biodiesel fuel to facilitate testing and evaluation of the performance of B20 biodiesel blends.

The FCAI believes that oxidation stability must be addressed as part of any standard on biodiesel blends, regardless of the percentage of biodiesel contained in the blend.

The current automotive position as set out in the World Wide Fuel Charter is that Fatty Acid Methyl Esters (FAME) including vegetable derived esters (VDE) is generally acceptable when blended with conventional diesel fuel up to 5% (vol/vol) (so called B5). The FAME(s) on which the biodiesel is based must comply with either EN14214 or ASTM D6751 standards. When blended with diesel conforming to EN590, the resultant biodiesel (B5) blend must also conform to EN590.

At the same time, the WWFC enunciates that engine and auto manufacturers have concerns about introducing biodiesel into the marketplace, especially at higher levels. Specifically:

- Biodiesel may be less stable than conventional diesel fuel, so precautions are needed to avoid problems linked to the presence of oxidation products in the fuel. Some fuel injection equipment data suggest such problems may be exacerbated when biodiesel is blended with ultra-low sulphur diesel fuels.
- Biodiesel requires special care at low temperatures to avoid an excessive rise in viscosity and loss of fluidity. Additives may be required to alleviate these problems.
- Being hygroscopic, biodiesel fuels require special handling to prevent high water content and the consequent risk of corrosion and microbial growth.
- Deposit formation in the fuel injection system may be higher with biodiesel blends than with conventional diesel fuel, so detergent additive treatments are advised.
- Biodiesel may negatively impact natural and nitrile rubber seals in fuel systems. Also, metals such as brass, bronze, copper, lead and zinc may oxidize from contact with biodiesel, thereby creating sediments. Transitioning from conventional diesel fuel to biodiesel blends may significantly increase tank sediments due to biodiesel's higher polarity, and these sediments may plug fuel filters. Thus, fuel system parts must be specially chosen for their compatibility with biodiesel.
- Neat (100%) biodiesel fuel and high concentration biodiesel blends have demonstrated an increase in NOx exhaust emission levels.
- Biodiesel fuel that comes into contact with the vehicle's shell may be able to dissolve the paint coatings used to protect external surfaces. In view of the high level of interest in this fuel, including among auto and engine manufacturers, biodiesel specifications and test methods will continue to be investigated.

Therefore the FCAI does not generally support the use of biodiesel blends greater than B5, including 100% biodiesel fuel (B100), in engines unless the manufacturer of such

engines recommends it. Such engines would need to be specifically designed to use such fuels.

Importantly, biodiesel blended fuels need to be properly refined and produced to meet high quality standards and it is **mandatory that all aspects of legislated national fuel quality standards for diesel and vehicle manufacturer recommendations are maintained at all times and locations.**

BIODIESEL BLENDS USING ETHANOL (E-DIESEL)

In line with the WWFC, FCAI is opposed to the addition of ethanol to diesel fuel (E-diesel) not only on the grounds of safety concerns but also vehicle operability issues. The minimum flashpoint of conventional diesel is 61.5^{o}C which classifies it as a "combustible material". However, the addition of ethanol (i.e. to produce E-diesel) which has an extremely low flashpoint of 13^{o}C, reduces the flashpoint of the blend to below 61^{o}C, which alters the blend's classification to a "flammable material". There are safety risks to engines, vehicles and fuel distribution facilities, which raises serious safety concerns (such as explosions) for fuel handling, storage and use. Vehicle and engine manufacturers are concerned that E-diesel may damage vehicle parts, especially fuel injectors, and cause other types of vehicle failure due to low lubricity. The fuel's compatibility with the vehicle in other ways, its impact on vehicle emissions and its health effects remain unknown. There is also the impact on fuel consumption because of the lower energy content of ethanol compared to diesel fuel. Therefore, until the many safety, performance and health concerns are resolved and sufficient peer-reviewed research is undertaken, FCAI does not support the practice of adding ethanol to any category of diesel fuel.

LABELLING

In addition to the technical points listed previously, labelling of fuels containing biodiesel is important for consumers, not only for personal choice and transparency but also to ensure that vehicle manufacturer recommendations are met. The exact nature of the labelling needs to be discussed and considered depending on the blend.

SUMMARY

FCAI's position regarding biodiesel is summarised as follows:

- Fatty Acid Methyl Esters (FAME) including vegetable derived esters (VDE) are generally acceptable when blended with conventional diesel fuel up to 5% (vol/vol). The FAME(s) on which the biodiesel is based must comply with either EN14214 or ASTM D6751 standards.
- The diesel to which this FAME biodiesel is blended must conform to EN590.
- FCAI recommends that any National Standards for Biodiesel blends must comply with EN590 and also include the issue of oxidation stability, regardless of the percentage of biodiesel contained in the blend.
- FCAI recommends that DEH consider adding the additional parameters from the JAMA/METI study to the National Diesel Standard as a means of specifying the requirements of a B5 biodiesel blended fuel.
- FCAI does not generally support use of 100% biodiesel fuel (B100).

- FCAI members will not warrant damage caused by using biodiesel blends greater than B5, unless such use is sanctioned by a manufacturer.
- FCAI members do not support the use of E-Diesel (Diesohol) and will not warrant damage caused by its use.
- Adoption of WWFC recommendations is particularly relevant in Australia where diesel engine technology comes entirely from overseas sources.
- There needs to be a transparent process, including appropriate labelling, to allow consumers to make an informed choice on whether their vehicles can use biodiesel.
- The FCAI preferred management option for biodiesel blends is Option 1 – B5 limit, but with the additional parameters specified in Table 1 of this submission.

Attachment 1

JAMA's Comment to the DEH of Australia on BDF

< Diesel Oil with 5% FAME (B5) >

* The prerequisite for the introduction of FAME-mixed diesel oil is to test its effects on vehicles so as to verify that the FAME-mixed diesel oil does not cause problems with regard to the safety, emission and running performances of vehicles.

* Japan conducted tests on B5 but has not carried out any systematic studies on BDF with FAME content exceeding 5%. Under this circumstance, we considered B5 to be the highest recommendable biological fuel at present.

* Nevertheless, even B5 is not totally problem-free, as Japan's test data show some cases of vehicle malfunctions attributable to B5 quality deterioration caused by oxidation. To prevent such deterioration, Japan has established a standard for the chemical properties of B5. When a B5 fuel is to be introduced into the Australian market, JAMA hopes that the B5 will be in agreement with Japan's amended diesel standard which includes the new B5 standard.

* Although a neat FAME (B100) standard is essential for the production of FAME, a B100 standard alone will not be able to ensure the quality of B5 at the service station level. A B5 standard (such as Japan's amended diesel standard) is imperative to prevent B5 quality deteriorations which may occur during the distribution process from the mixing of diesel oil with neat FAME to the storing of B5 at service stations. Additionally, there should be a monitoring scheme to check if the B5 fuels at the service stations are conforming to the B5 standard. As Japan's regulation makes the B5 standard and monitoring mandatory, the neat FAME standard is left as a voluntary standard within the JASO/JIS framework.

* While Australia is reportedly considering a BDF standard which will exempt density specification, we would like to advise not to exempt any items of BDF properties including density. For example, if a density specification is exempted, there will be the risks that an excessive-density BDF may be supplied by mixing FAME into a diesel oil measuring at the upper limit of diesel density. As similar risks are valid for other items of BDF properties, we are opposed to the exemption of any item.

< Diesel Oil with More Than 5% FAME (B5) >

* With a lack of test data on BDF exceeding 5% FAME, we believe that B10, B20, etc. should be treated as substitute fuels to be used only by certain qualified users under certain controlled conditions.

* In view of Japan's mandatory B5 standard, the draft B20 specifications shown by DEH do not include all the necessary items of properties. Consequently we cannot have any assurance that the draft specifications will make B20 problem-free.

* Although Japan lacks test data on the properties of BDF exceeding 5% FAME, it is imperative to test and verify each property item of B10, B20, etc. in order to ensure that the use of BDF with a higher FAME content will not cause vehicle malfunctions.

< Labeling >

* When an appropriate B5 standard is established, the B5 fuels complying with the standard can be regarded as identical with the existing diesel oil. Accordingly there will be no need to introducing a labeling for B5.

* In the case of BDF exceeding 5% FAME, however, they cannot be treated as identical with the conventional diesel oil. A labeling is therefore necessary to prevent misfueling.

END OF FCAI COMMENT