

SETTING NATIONAL FUEL QUALITY STANDARDS

Proposed Management of Diesel/Biodiesel Blends

POSITION PAPER

January 2008

Executive Summary

The Australian Government is considering management options for standardising diesel/biodiesel blended fuels to help provide certainty to the market. A discussion paper *Setting National Fuel Quality Standards - Standardising Diesel/Biodiesel Blends* was released in November 2006 to obtain stakeholder views on the development of an appropriate position on the issue of diesel/biodiesel blends.

The Government has now developed a preferred management approach to diesel/biodiesel blends which takes into account the wide range of stakeholder views received. The preferred approach is set out in this position paper which is open for public comment until 14 March 2008.

The Government's preferred position on standardising diesel/biodiesel blends is to:

- amend the Australian diesel standard (the *Fuel Standard (Automotive Diesel) Determination 2001*) to allow the addition of up to 5% by volume of biodiesel¹, with the biodiesel component required to meet the biodiesel fuel quality standard (the *Fuel Standard (Biodiesel) Determination 2003*). The resulting blend will be required to be fully compliant with the fuel quality standard for diesel (the *Fuel Standard (Automotive Diesel) Determination 2001* as amended); and
- in the short term, accommodate the supply of higher diesel/biodiesel blends (e.g. B20) through the *Fuel Quality Standards Act 2000* section 13 approvals process.

This approach takes into consideration three key factors:

1. The use of B5 diesel/biodiesel blends is generally accepted by Original Equipment Manufacturers (OEMs) as not requiring modifications of standard diesel engines².
2. Allowing up to 5% biodiesel in the diesel fuel standard is consistent with current international practice.
3. The need for certainty and confidence for both retail and commercial consumers.

It is recognised that there are circumstances where supply of diesel/biodiesel blends greater than 5% biodiesel is appropriate. In the short term supply above 5% can be accommodated through existing procedures within the *Fuel Quality Standards Act 2000*. It is proposed that this approval process will only be available where fuel is supplied for use in vehicles where individual OEMs have sanctioned use at higher concentrations e.g. in captive and/or commercial fleets.

The Government acknowledges that in the longer term, with further developments in biofuel production and application, there may be a need to consider changes to the process for authorising the supply of blends above 5%. Any review of the section 13

¹This specification would be listed in the *Fuel Standard (Automotive Diesel) Determination 2001* as Fatty Acid Methyl Ester (FAME) content – 5 % (vol/vol) max.

²The Federal Chamber of Automotive Industries recommend that the resultant blend meet the *Fuel Standard (Automotive Diesel) Determination 2001*.

approvals process, and its longer term applicability to biofuels, would be undertaken in consultation with the biofuels industry.

Further, recognising the consideration of 10% biodiesel/90% diesel blends (B10) by the European Commission, the Australian Government will establish a working group under the Fuel Standards Consultative Committee (FSCC) to monitor developments and consider issues relating to the use of higher blend levels in the current fleet, under Australian conditions.

The Australian Government is not proposing to require labelling of B5 diesel/biodiesel blends.

Call for submissions

Comments are requested on the position paper by no later than **Friday 14 March 2008** and should be submitted electronically to: fuel.quality@environment.gov.au

or sent to:

Fuel and Used Oil Policy Section
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GPO Box 787
CANBERRA ACT 2601
(John Gorton Building, PARKES ACT 2600)

Unless marked as confidential, all submissions will be treated as public documents and posted on the Department's website. The Department will not post any personal details (such as email addresses) on the website. Please ensure that your submission is attached as a separate document when replying by email.

Introduction

Biodiesel is a biofuel used as a direct replacement for, or blend stock component with, petroleum based diesel fuel. Biodiesel can be made from a variety of vegetable oils and animal fats.

Biofuels include ethanol, biodiesel and renewable diesel. It is important that any unnecessary barriers preventing the development of an alternative fuels market in Australia be removed to allow consumers to make decisions based on sound economic, environmental and social signals.

To encourage continued development of the biodiesel industry, and continued growth of consumer confidence in biodiesel, it is vital to ensure only diesel/biodiesel blends of the highest quality are available and that blends are fit-for-purpose.

In November 2006, the then Minister for the Environment and Heritage, the Hon Ian Campbell MP released a discussion paper^(a) on setting Australian fuel quality standards for diesel/biodiesel blended fuels.

The discussion paper sought stakeholder comment on management options for standardising diesel/biodiesel blended fuels as well as issues relating to labelling.

Forty-three submissions were received from stakeholders including biodiesel producers and suppliers, major oil companies, vehicle and engine manufacturers, consumer groups, individuals and state government agencies. The submissions are available at: www.environment.gov.au/atmosphere/fuelquality/publications/diesel-biodiesel-submissions.html

Stakeholder feedback

The discussion paper indicated that, even though there are no quality standards for diesel/biodiesel blends; various blends of diesel and biodiesel are currently available on the market in Australia^(a). Submissions on the discussion paper supported this observation. Information was provided by stakeholders on higher blends (above B5) currently being marketed and used across a range of sectors including retail, commercial and captive fleets (bus fleets, off-road vehicles, mining etc).

Biodiesel industry

Submissions from biodiesel producers/suppliers varied in terms of their views on the management options put forward in the discussion paper. Overall the biodiesel industry would prefer to be able to continue supplying blends of various levels into the market.

The Australian biodiesel industry association stated that the introduction of diesel/biodiesel blend standards that restrict blend levels would be counterproductive to achieving the objectives of the *Fuel Quality Standards Act 2000*, and that “they would have a negative effect on the development of the Australian biodiesel industry at this crucial and formative stage and inhibit the industry’s innovative potential to increase the environmental performance of blended fuels”.^(b)

The South Australian Farmers Fuel (SAFF) position is that biodiesel blends need not be standardised in Australia. “SAFF’s opinion is that customers need to be made aware of the maximum biodiesel content of any given blend, and for blends of over 20% biodiesel the customer needs to be informed of the potential performance and operability differences associated with biodiesel.”^(c)

Gull Petroleum strongly recommended that all biodiesel blends containing any percentage of biodiesel should be required to meet the regulated automotive diesel specification.^(d)

ARFuels strongly discouraged the introduction of B5 and B20 biodiesel/diesel standards that would require additional testing requirements. In response to biodiesel blends being capped at B5 and a requirement to meet the diesel standard ARFuels stated that this would significantly limit the market size in an industry that is already finding difficulty growing. “We believe that this could only be considered if Australia places a mandate on B5 or employed some other means to offset the imposed limit to the market size, plus provide protection from imports. It should be pointed out that biodiesel currently does not enjoy the protection from imports that ethanol does. Imported biodiesel enjoys the same assistance as does biodiesel produced locally.”^(e)

Freedom Fuels does not support any of the management options in the discussion paper and stated that they “are unacceptable as we support the current guidelines of either you met the Diesel standard or not.”^(f)

Gardner Smith proposed that “a volumetric level of B100 should not be used to create a standard, but that whatever volume of B100 is used, the finished product must meet the Australian Fuel Standard (Automotive Diesel) Determination 2001, as amended September 2006.”^(g)

Australian Biodiesel Group recommended “that for fuel meeting the diesel standard sold through retail outlets that such fuel should require labelling if it contains more than x% biodiesel where x is the lowest level that a material supplier of diesel vehicles in Australia market currently provides warranties. ABG expects that x will increase rapidly over the next year or so to 20% or more, but recognizes that it is probably lower than 20% at present.”^(h)

Petroleum industry

Most current users of biodiesel in the Australian market are sourcing biodiesel and/or blended fuel from independent operators. Two of the major oil companies responded to the paper.

Caltex Australia is currently marketing a 2% (B2) blended fuel. Caltex Australia stated that blends “as low as 2% could fail to meet the diesel standard (although Caltex’s 2% blend fully meets the standard)” and that “a 5% cap should apply at retail initially.”⁽ⁱ⁾

Mobil Oil Australia stated that a “cap should be set on biodiesel blend rates for normal on-road and off-road use, at a level acceptable to vehicle manufacturers. This

should be a level at which biodiesel blends can be used without modifying engines, and at which the energy loss is manageable.”^(j) Mobil added that fuels should be fit-for-purpose in the application for which they are used.

Both companies indicated that higher blends should be allowed to be supplied to dedicated vehicle fleets that can satisfactorily operate on those fuels and that higher blends should be managed differently for these applications i.e. retail supply vs. captive fleet/niche and off-road use. When higher blends are used for these applications, the interests of consumers and impact on economic and regional development are clearer and more easily quantified.

Vehicle and engine manufacturers

The Federal Chamber of Automotive Industries (FCAI) is the peak body that represents the majority of Australia’s manufacturers and importers of passenger and light commercial vehicles, and motorcycles. The FCAI submission advised that its members will not warrant damage caused by using biodiesel blends greater than B5, unless such use is sanctioned by a manufacturer^(k).

The FCAI referred to harmonisation of fuel quality standards and the Australian Government’s policy of harmonising Australian Design Rules (ADRs) for vehicles with international standards. The FCAI stated that “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.”^(k)

The FCAI submission noted that no diesel engines are currently manufactured in Australia and that any steps to encourage the use of biodiesel must recognise the position of the design source for these engines/vehicles. The FCAI view is that the recommendations of the Worldwide Fuel Charter (WWFC) must be followed.

The WWFC represents the positions of the following OEM organisations, their member companies and associate members:

- European Automobile Manufacturers Association (ACEA);
- US Alliance of Automobile Manufacturers;
- US Engine Manufacturers Association; and
- Japan Automobile Manufacturers Association.

The WWFC provides information about the types of fuel needed to minimise vehicle emissions and obtain the best vehicle performance. The Charter was “first established in 1998 to promote greater understanding of the fuel quality needs of motor vehicle technologies and to harmonise fuel quality worldwide in accordance with engine and vehicle needs. Importantly, it matches fuel specifications to the needs and capabilities of engine and vehicle technologies designed for various markets around the world.”^(l)

The WWFC does not represent manufacturers of fuels or government agencies.

The Truck Industry Council (TIC) represents the major truck and diesel OEMs in Australia. TIC state that “Across the TIC membership, there are differing views on the level of biodiesel that is acceptable, ranging from B5 to B100, however all members accept that a B5 blend is acceptable....”^(m)

Other industry associations

The Australian Trucking Association is the peak representative body for the trucking industry in Australia - a major user of diesel in the Australian market. The ATA submission requested that blends be acceptable to manufacturers of trucks and preferably reflect international standards.⁽ⁿ⁾

The Australian Petroleum Agents and Distributors Association (APADA) “consider successful development of the biodiesel industry over the short term would best be achieved through low-level blends of less than 5% biodiesel (B5), where the biodiesel is certified to comply with the biodiesel fuel standard and where the blend is certified to comply with all requirements of the automotive diesel standard, including density”.^(o)

The Australian Automobile Association (AAA) stated that “a maximum limit must be applied based on advice from vehicle manufacturers (and any independent testing conducted) to ensure engines or fuel supply systems are not damaged, experience undue wear or vehicle warranties are voided”.^(p)

The Motor Trades Association of Australia indicates concern over adoption of B20 and supported a B5 blend limit.^(q)

State Governments

State government departments that responded to the discussion paper were the Western Australian Departments of Environment and Conservation and Consumer and Employment Protection, EPA Victoria, the NSW Department of Environment and Conservation and the Queensland Environment Protection Agency. All were supportive of either a B5 standard or 5% biodiesel limit to be incorporated into the current diesel standard. They had mixed views on the issue of higher blends.

Feedback on labelling

Positions on labelling from the biodiesel industry (producers/suppliers) varied, in particular whether labelling should be applied to levels below B5 and also whether labelling should be required for higher blends.

OEM representatives and the petroleum industry strongly support labelling of B5 and higher blends.

The state government departments that responded were generally supportive of labelling of blends. One department suggested that labelling should only be required if there were issues with OEM acceptance and warranties, while another suggested further consultation on the issue of labelling.

Rationale for preferred management approach

The rationale for the Australian Government's preferred management position is based on the objective of ensuring that fuel quality allows for optimum vehicle and environmental performance.

The Australian Government recognises that the Australian biodiesel industry is currently experiencing challenging market conditions with factors such as:

- drought;
- the cost and availability of feedstock;
- concern over the use of palm oil and suggested links to deforestation;
- lack of market take-up and consumer confidence; and
- uncertainty about carbon benefits and the treatment of biodiesel and diesel/biodiesel blends in any emissions trading scheme.

These factors have led to the scaling down and, in some cases, the closure of Australian biodiesel production facilities.

Whilst the Australian Government acknowledges current concerns from the biodiesel industry relating to any changes to the treatment of diesel/biodiesel blends (such as a B5 limit on retail supply), the quality of supply of diesel/biodiesel blends must be in line with the objectives of the *Fuel Quality Standards Act 2000*. To allow blends that do not meet these objectives, that do not meet vehicle operability and emission requirements, would have serious negative impacts. Consumers must have confidence in the quality and performance of blended fuels and fuels must be fit-for-purpose in all applications.

1. The use of B5 blends is generally accepted by all OEMs.

Several biodiesel producers/suppliers in Australia claim that blends higher than 5% (B5) meet the diesel standard, and are therefore suitable across the diesel vehicle market. Further, diesel/biodiesel blends containing a low level of biodiesel up to 5% can provide some benefits to vehicle operation, in particular with lubricity when blended in low sulfur diesel.

However there are important chemical and physical differences between biodiesel and conventional diesel fuel.

The WWFC⁽¹⁾ identifies concerns from engine and vehicle manufacturers about introducing biodiesel into the marketplace especially at higher blend levels.

The concerns include:

- 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 result in increased NO_x exhaust emission levels.
- Biodiesel fuel that comes into contact with the vehicle's shell may dissolve the paint coatings used to protect external surfaces.⁽¹⁾

The Worldwide Fuel Charter states that there are several unresolved technical concerns with the use of biodiesel **in amounts greater than 5%** and with the most advanced emission control technologies.

In markets where blends greater than B5 are allowed, such as in the US, there are specific detailed handling and use guidelines for biodiesel. These guidelines are published by the U.S. Department of Energy – Energy Efficiency and Renewable Energy. They note that “Blends of biodiesel higher than B5 require special handling and fuel management as well as vehicle equipment modifications, such as the use of heaters and changing seals/gaskets that come in contact with fuel, according to the National Renewable Energy Laboratory (NREL). The level of care needed depends on the engine and vehicle manufacturer.”^(r) The NREL is the U.S.'s primary laboratory for renewable energy and energy efficiency research and development.

In light of these concerns there is currently limited acceptance internationally of blends over 5% (B5) by OEMs (vehicle, engine and fuel injection equipment) and government agencies.

In Australia, the FCAI does not generally support the use of biodiesel blends greater than B5, unless such use is sanctioned by a particular manufacturer. The FCAI states that when biodiesel is used, either as a pure fuel, or at higher levels in diesel fuel, vehicles need to be adapted to the fuel, and particular care is needed to avoid fuel system component and engine performance problems. Oxidation stability of biodiesel blends is a key issue, as the formation of undesirable break-down products would

have an adverse effect on the performance and durability of fuel system components.^(k)

On March 20, 2007 the heavy engine manufacturer Cummins (United States and Canada) announced the approval of biodiesel B20 blends for use in its 2002 and later emissions-compliant ISX, ISM, ISL, ISC and ISB engines. This includes recently released 2007 products. Cummins reviewed their previous position based on several key factors including testing and evaluations to ensure that customers could reliably operate their equipment using B20 fuel.³

With regard to the fuel quality requirements, the Cummins website states that: “B100 biodiesel must conform to the American Society of Testing Materials (ASTM) specification - ASTM D6751. ASTM D6751 has been revised to now include a stability requirement which was not included in the previous specification. This is a critical requirement when B100 is blended with petrodiesel to produce a B20 blend. B20 needs to conform to the Engine Manufacturers Association (EMA) recommended test specification for B20. There is currently no ASTM specification for B20 blends. It is expected that ASTM will issue a specification for B20 in the near future.”
(www.everytime.cummins.com/every/customer/faq_biodiesel.jsp)

2. Allowing up to 5% biodiesel in the diesel fuel standard is consistent with current international practice.

Allowing up to 5% biodiesel in diesel fuel is in line with the Australian Government’s policy of harmonising with international fuel quality standards. Also, the Worldwide Fuel Charter recommendation is particularly relevant in Australia where diesel engine technology comes entirely from overseas sources.^(k) Australia’s automotive diesel technology predominantly comes from Europe, the U.S. and Japan.

The OEM’s position to support up to 5% blends is reflected in other countries’ current blending limits set internationally as set out in the table below.

*Current Biodiesel Blending Limits^{*4}*

Blend	Country
1%	Philippines
2%	Brazil, Bolivia
5%	Europe ^{**} , Republic of Ireland, Scandinavia, USA ^{**} , Canada, Ecuador, Chile, Argentina, South Africa, Japan, Thailand, New Zealand.
10%	Indonesia
20%	Mexico, Paraguay

* Some of these countries have mandated the use of a certain percentage blend e.g. the Philippines.

** Higher blends, including B100, are used in Germany and in the USA where there is agreement between supplier and user.
(Source: IFQC Global Biofuels Centre presentation to the 15th International Biomass and Bioenergy Conference and Exhibition, Berlin, May 2007.)

In Europe the EN590 automotive diesel standard has been amended to allow for inclusion of 5% biodiesel (FAME - Fatty Acid Methyl Ester).

³ <http://www.everytime.cummins.com/every/news/release99.jsp>

⁴ From time to time a mandated biofuel level or regulated limit for biofuels may be referred to as a biofuel quality standard. However a quality standard, as set out in determinations under the *Fuel Quality Standards Act 2000*, refers to the physical and chemical characteristics of a certain fuel type.

In the U.S. blends up to B5 are accepted in the marketplace and blends up to 20% (B20) biodiesel are used where agreements between suppliers, users and vehicle/engine manufacturers have been established.

The Japanese Government is in the process of incorporating a B5 biodiesel blend standard into the regulated diesel standard which will include several additional parameters to manage the 5% biodiesel content.

3. The need for certainty and confidence for both retail and commercial consumers.

Specifying a level of biodiesel in diesel which is in line with the OEM warranty positions will build confidence in the use of diesel/biodiesel blended fuels and remove current concerns and uncertainties associated with general use of higher blends.

Management of biodiesel blends in the future

Several submissions stated that there are genuine uses of blends of greater than 5% which should be allowed where vehicles are designed or adapted to use higher blends and where individual OEMs support this use in particular, the use of higher blends in commercial and captive fleet applications such as buses, off-road vehicles and mining.

The Government's preferred position would allow higher blends to be supplied in specific circumstances. In the short-term, supply of diesel/biodiesel blends greater than 5% biodiesel for specific uses could be accommodated through existing procedures within the *Fuel Quality Standards Act 2000*.

Under section 13 of the *Fuel Quality Standards Act 2000* the Minister for Environment, Water, Heritage and the Arts may grant an approval that varies a fuel quality standard with respect to specified supplies of fuel and for a specified period of time.

This approval could apply where fuel is supplied for use in vehicles where individual OEMs have sanctioned use at higher concentrations e.g. in captive commercial fleets and/or niche markets. With this approach, environmental impacts, OH & S and other supply considerations can be managed. Labelling of higher blends would likely be a condition of any approval.

The use of section 13 approvals in the short-term would be particularly useful to manage higher blends already being used in Australia, especially in the heavy vehicle market.

If management of higher blends were undertaken through this process, administrative procedures would be developed and introduced to coordinate with the amendments to the diesel standard.

The Government acknowledges that in the longer term there may be a need to respond to further changes in the biofuels industry, including new feedstocks, the development of new biofuel blends, new engine technology and new applications.

Future work on biofuels

Earlier this year the European Commission made proposals for a new Energy Policy for Europe, including a binding 10% target for the share of biofuels in petrol and diesel in each Member State by 2020, to be accompanied by the introduction of a sustainability scheme for biofuels. The European standard setting body, CEN, is considering the technical barriers to increasing the allowable percentage of biodiesel to 10% to assist with meeting these targets in the future.

The Government is proposing to pursue two activities to inform future management of biofuels:

1. A review of the applicability to biofuels of the section 13 approvals process, and the management approach to biofuel blends under the *Fuel Quality Standards Act 2000*.
2. Recognising the European Commission's consideration of 10% biodiesel/90% diesel blends (B10), the Government will establish a working group under the FSCC to monitor developments and consider issues relating to the use of higher blend levels in the current fleet, under Australian conditions.

REFERENCES

- (a) Setting National Fuel Quality Standards – Standardising Diesel/Biodiesel Blends – Discussion Paper, November 2006.
- (b) BAA and RFA submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (c) Australian Farmers Fuel (SAFF) submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends February 2007.
- (d) Gull Petroleum submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (e) ARFuels submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (f) Freedom Fuels submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (g) Gardner Smith submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (h) Australian Biodiesel Group submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (i) Caltex Australia submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (j) Mobil Oil Australia submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (k) FCAI submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (l) Worldwide Fuel Charter, 4th Edition, September 2006.
- (m) TIC submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (n) ATA submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (o) APADA submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.
- (p) AAA submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.

(q) MTAA submission to DEH Discussion Paper on Standardising Diesel/Biodiesel Blends December 2006.

(r) National Renewable Energy Laboratory - U.S. Department of Energy.