

The Chair
CABINET ECONOMIC DEVELOPMENT COMMITTEE

REGULATING BIOFUEL QUALITY AND LABELLING REQUIREMENTS

PROPOSAL

- 1 This paper proposes amendments to the Petroleum Products Specifications Regulations 2002 to include biofuel specifications and retail petrol/ethanol blend labelling requirements.

EXECUTIVE SUMMARY

- 2 Petrol and diesel quality in New Zealand is regulated by the Petroleum Products Specifications Regulations 2002 (PPSR). Biodiesel, biodiesel blend and ethanol fuel quality is not currently regulated. This paper recommends specifications for these fuels for inclusion in the PPSR.
- 3 The recommended biodiesel specifications are largely consistent with the internationally recognised European Biodiesel Standard. The variations from the European Standard address parameters that restrict good quality biodiesel made from certain feedstocks from meeting the standard, and the concerns of the motor industry in regards to oxidation stability. Amendments to the retail diesel specifications (Schedule 3 of the PPSR) are recommended to allow the blending of up to 5% biodiesel. It is proposed that non-retail biodiesel blends be required to meet a limited combination of operability, safety and environmental parameters.
- 4 The recommended ethanol specifications are based on the ASTM¹ Standard, which applies in the United States, but includes several minor variations considered necessary for New Zealand's circumstances. Petrol/ethanol blend specifications are already provided for in the PPSR. Labelling requirements for retail petrol/ethanol blends are proposed to reduce the risk of unsuitable use.

BACKGROUND

- 5 With the introduction of biofuels and biofuel blends into the New Zealand fuel mix it is necessary that appropriate regulated specifications and labelling requirements are in place for biodiesel and ethanol. This will help to build and maintain consumer confidence in the quality of biofuels and ensure that compliant fuel is suitable for our vehicle fleet and other fuel users.
- 6 Petrol and diesel quality in New Zealand is regulated by the Petroleum Products Specifications Regulations 2002 (PPSR) made under the Energy (Fuels, Levies

¹ ASTM International – formerly the American Society for Testing and Materials

and References) Act 1989. Specifications for biodiesel, biodiesel blends and ethanol are not currently regulated. Cabinet agreed in February 2007 (CAB Min (07) 4/2 refers) that the current regulatory regime for fuel specifications, quality, fuel dispensing equipment, testing, consumer information, and advertising be amended or replaced, as appropriate, to provide for the suitable regulation of fuels used in engines, including biofuels, biofuel blends and synthetic fuels, including its suitable enforcement and provision for standards to be incorporated by reference where appropriate.

- 7 This paper uses the conventional nomenclature for describing biofuel blends, i.e. B100 is 100% biodiesel and B5 is a blend of 5% biodiesel and 95% petroleum diesel. Likewise, E100 is 100% ethanol and E10 is a blend of 10% ethanol and 90% petrol.
- 8 The discussion document 'Regulating Biofuel Quality – A discussion document outlining the proposed biodiesel and ethanol specifications' was publicly released in October 2007 and twenty seven submissions were received. Submitters were re-consulted on the final proposals in January 2008 to provide an opportunity for additional comments. All submitters agree that biodiesel and ethanol specifications should be regulated.

REGULATIONS FRAMEWORK

- 9 The PPSR includes an overarching 'fit for common purposes' requirement for petrol and diesel intended for retail sale. This strengthens the level of consumer protection, particularly in relation to fuel quality problems arising from properties not directly specified. The 'fit for common purposes' requirement will also apply to retail ethanol and biodiesel, and blends of these with petrol and diesel.
- 10 Petrol and diesel in New Zealand are currently monitored for compliance with the PPSR by the Fuels Quality Monitoring Programme, run by the Measurement and Product Safety Service within the Ministry of Economic Development. The quality of biodiesel and ethanol, and blends, will also be monitored under this programme.
- 11 It is anticipated that biofuel specifications will continue to evolve internationally and so it is proposed that a review be undertaken by 2010.

BIODIESEL AND BIODIESEL BLENDS

- 12 Biodiesel in this context refers to fatty acid methyl esters, which is the most common biodiesel fuel produced and used internationally. It is generally blended with petroleum diesel for use in diesel engines. To provide for the quality of biodiesel and biodiesel blends, the new regulations will need to include specifications for:
 - Biodiesel (B100) as a final fuel and as a blending component with petroleum diesel;
 - Biodiesel blends to be sold to an end user via a written contract or supply agreement (i.e. non-retail); and

- Biodiesel blends intended for retail sale.
- 13 A voluntary Biodiesel Standard 'Automotive Biodiesel: Specification for manufacture and blending' (NZS 7500) was published in New Zealand in 2005. This was prepared by a committee consisting of representatives from biodiesel manufacturing companies, the oil industry, government agencies and the motor vehicle industry. It includes specifications for B100, retail B5 blends and non-retail biodiesel blends. The B100 specifications are largely consistent with the widely recognised European Biodiesel Standard (EN14214).
- 14 The proposed biodiesel and biodiesel blend specifications are based on NZS 7500. Some minor divergences from the standard are needed to reflect recent research into vehicle compatibility and to allow for flexibility in feedstocks.

B100 Specifications

- 15 Annex 1 contains the recommended B100 specifications. These specifications will allow for good quality biodiesel to be produced from a number of feedstocks including tallow, soybean, rapeseed, palm, coconut and used cooking oil.
- 16 The specifications will apply to all biodiesel as a final fuel and as a blending component with petroleum diesel, for use in diesel engines, for automotive and non-automotive purposes. The scope of the specifications being for automotive and non-automotive purposes is a cautious approach given that non-automotive applications are often less sensitive to fuel quality. However this is considered appropriate, particularly while the industry is in its infancy and public confidence and awareness is low. All biodiesel should be able to meet the specifications proposed for B100 if the production process has been undertaken properly.
- 17 Parameters which are particularly important, or where views strongly diverge are discussed in more detail below.

Oxidation Stability

- 18 Oxidation of biodiesel produces organic acids which can corrode fuel system components. EN14214 has a limit of 6 hours induction period² (IP) minimum for oxidation stability. Many jurisdictions follow EN14214 for this parameter including Australia, South Korea, Thailand, Brazil, and Malaysia. The United States Biodiesel Standard was recently amended from 6 hours to 3 hours minimum IP.
- 19 The Japanese motor industry is particularly concerned about the impact that the oxidation of biodiesel blends has on the corrosion of fuel system components. A test programme undertaken by the Ministry of Economy, Trade and Industry (METI) in Japan showed that even when B100 meets an oxidation stability of 6 hours IP, the resultant B5 blend can cause corrosion. The outcome of the test programme was a recommendation that B100 should have a minimum of 10 hours IP.

² The induction period (IP) is the period of time passing before biodiesel, aged at 110°C under a constant air stream, is degraded to such an extent that the formation of volatile acids can be recorded.

- 20 It is recommended that the New Zealand specifications require a minimum 10 hours IP for biodiesel blended with petroleum diesel for retail sale. Fuel stability is a very important parameter and to build and maintain consumer confidence it is prudent to be stringent until more is known about biodiesel's characteristics and its effects on vehicles. The majority of submitters support a minimum of 10 hours IP. It should be noted, however, that this support is generally due to the stance of the Japanese Automobile Manufacturers Association (JAMA) on oxidation stability, rather than New Zealand based research or empirical evidence. This requirement should have minimal cost implications, even for those feedstocks with naturally poor oxidation properties (e.g. rapeseed).
- 21 For B100 as a final fuel and as a blending component with petroleum diesel for non-retail sale, the recommended minimum IP is 6 hours. This reflects that the nature of the retail market requires more rigorous fuel quality regulations than when fuel is being sold via a written contract or supply agreement.

Iodine Value, Cetane Number, and Viscosity

- 22 Several other divergences from EN14214 are recommended to give added flexibility in sourcing good quality biodiesel for the New Zealand market from a number of different feedstocks. These are as follows:
- Maximum iodine value be set at 140g iodine/100g rather than 120g iodine/100g (the limit in NZS 7500 and EN14214);
 - Minimum cetane number³ be 47 for biodiesel when used as a blending component with petroleum diesel, rather than 51 (the limit in NZS 7500 and EN14214). All end products (e.g. diesel/biodiesel blends) will continue to have to meet a minimum cetane number of 51; and
 - Viscosity range is 2.0 – 5.0 mm²/s for biodiesel as a final fuel, and 2.0 – 6.0 mm²/s for biodiesel when used as a blending component with petroleum diesel. The requirements in the NZS 7500 and EN14214 is 2.0 – 6.0 mm²/s and 3.5 – 5.0 mm²/s respectively.
- 23 The iodine value, cetane number and viscosity are vehicle operability parameters that, in biodiesel, are directly related to the feedstock. EN14214 was developed based on rapeseed oil, which has a naturally lower iodine value and higher cetane number than soybean or sunflower based biodiesel. Biodiesel from these feedstocks are unable to meet EN14214 because of the limits required for iodine value and cetane number. Biodiesel from coconut oil and some used cooking oil is unable to meet EN14214 because of the limits required for viscosity.
- 24 It is considered appropriate that the specifications are feedstock independent and performance-based, and there are valid technical reasons for relaxing the iodine value, cetane number and viscosity requirements in comparison to EN14214. This approach is consistent with New Zealand's obligations under the World Trade Organisation rules which require New Zealand to not discriminate

³ Cetane number is the measure of the fuel's ignition quality (suitable for spontaneous self-ignition in a diesel engine).

between 'like products' that are sourced from different countries, or between 'like products' that are domestically produced and those that are imported.

- 25 Relaxing the viscosity limits is supported by the majority of submitters. Likewise for iodine value and cetane number with the notable exception of some of the (existing or planned) domestic biodiesel manufacturers. These manufacturers have indicated a strong preference for aligning with EN14214, which would effectively exclude some sources of imported biodiesel, including soybean based biodiesel from the United States, large amounts of which are currently exported due to subsidies provided there (which is known as the "B99" trade).
- 26 Any divergences from EN14214 are also not supported by those submitters representing the European vehicle manufacturing companies. Many warranties for European vehicles specify that any biodiesel component in the fuel must meet EN14214 and be made from rapeseed oil. The reason for this is unclear. The divergences proposed should not make a material difference to vehicle operability, and it is not practical to limit biodiesel in New Zealand to one feedstock. It should be noted that large volumes of soybean based biodiesel that does not comply with EN14214 are currently being imported and sold in Europe.

Non-Retail Biodiesel Blends

- 27 It is recommended that the regulations allow for the sale of non-retail biodiesel blends, consisting of any proportion of diesel and biodiesel as agreed between seller and purchaser. This gives greater flexibility for supply by the biodiesel industry and use by consumers with contractual agreements.
- 28 It is recommended that the biodiesel component of non-retail biodiesel blends is required to meet the biodiesel specifications, and the diesel component is required to meet the current PPSR requirements for non-retail petroleum diesel, i.e. the limits for sulphur and polycyclic aromatic hydrocarbons, which are environmental parameters.
- 29 In addition, it is considered prudent to have requirements for the resultant blend because combining two on-specification fuels does not guarantee the fuel quality of the blend. It is recommended that non-retail biodiesel blends are required to meet the specifications for cetane number, colour, lubricity, sulphur, viscosity, total contamination and flash point provided in Schedule 3 of the PPSR and that all biodiesel blends that are not intended for retail sale must meet:
- An acid value of $0.1 + 100 \cdot X / 250$ mg KOH/g maximum when measured by ASTM D664, where X is the percentage by volume of biodiesel in the blend; and
 - A water content limit of $200 + 300 \cdot X$ mg/kg maximum when measured by IP 438, where X is the percentage by volume of biodiesel in the blend.
- 30 These recommended specifications are a combination of operability, safety and environmental parameters to ensure that all biodiesel blends supplied in New Zealand are of a reasonable quality, which will help protect the integrity of the

industry as a whole. The vast majority of submitters support these specifications for non-retail biodiesel blends.

Amendments to Schedule 3 of the PPSR (retail diesel specifications)

- 31 It is common internationally that low level biodiesel blends are required to meet the petroleum diesel specifications as they are considered interchangeable with diesel. It is recommended that retail biodiesel blends in New Zealand are required to meet the diesel specifications set out in the PPSR (Schedule 3). The following outlines the amendments necessary to Schedule 3.

Maximum allowable biodiesel content

- 32 It is recommended that the maximum allowable biodiesel to be blended with diesel for retail sale is 5% by volume (using test method EN 14078), and that this biodiesel must meet the B100 specifications. It is considered that biodiesel blends containing up to 5% by volume may be used in any diesel engine without modification, and thus a 5% limit is common internationally (e.g. Europe, Japan, United States, Canada, and is currently being proposed in Australia).
- 33 Several submitters do not support a limit of 5% by volume biodiesel in diesel for retail sale. These submitters want the flexibility to retail higher blends, which would enable greater demand for biodiesel, potentially providing more scope for a domestic industry, and give greater choice to consumers. However, there is a lack of vehicle manufacturers who will support biodiesel blends above 5% by volume. Allowing for the retail sale of higher biodiesel blends increases the chance of vehicle operability problems occurring, particularly while compatibility awareness is low, which could impact on consumer confidence in biofuels. As noted above, non-retail biodiesel blends will be able to contain any proportion of biodiesel.

Amendments to test methods

- 34 It is recommended that the particulates (otherwise known as total contamination) test method is amended from ASTM D6217 to IP 440. The current test method is not applicable to biodiesel blends. The majority of submitters support this amendment.
- 35 It is recommended that the test method ASTM D6890 is allowed as an alternative test method for cetane number. The current test method requires the use of a cetane engine which is relatively rare and old technology that is expensive and difficult to operate. Cetane index is commonly used for petroleum diesel, but this test method is not applicable to biodiesel blends. The majority of submitters support this amendment.
- 36 It is recommended that the water content test method be amended from ASTM D6304 to IP 438. This test method has greater precision and uses the same equipment.

Cold Flow Properties in Auckland/Northland

- 37 The current cold flow property⁴ requirements in the PPSR for summer and winter diesel apply to all areas of New Zealand. It is recommended that the Cloud Point⁵ (CP) for summer in Auckland and Northland (as defined in the PPSR) be relaxed from +4°C to +6°C. A review of the climate data showed that the current requirement is too stringent for these regions, which are warmer on average than the rest of New Zealand. Relaxing the CP specification in Auckland/Northland will also facilitate the blending of biodiesel into existing diesel stocks in this region, reducing the need for a separate diesel blendstock. In general, blending biodiesel into diesel at the 5% by volume level increases the CP of the fuel by 2 to 3°C.
- 38 Whilst Auckland and Northland are warm regions, the cold flow requirements here need to take into consideration those who travel from Auckland to cooler areas, such as the central volcanic plateau, on the same tank of diesel. Climate data indicates that there is a risk of waxing in the central volcanic plateau with diesel that meets the current regulated CP for summer (+4°C), let alone a relaxed CP. However, the regulated cold flow performance requirements do not aim to ensure all diesel is protected from waxing in all parts of the country in all seasons. Instead they specify absolute minimums and set an overriding 'fit for common purpose' requirement. In practice, the oil companies manage the cold flow performance of diesel to suit the given region and season, often applying more stringent requirements than in the PPSR.
- 39 The majority of submitters supported a relaxation of the CP requirements in summer provided that this is justified by climate data. Gull New Zealand Ltd do not, however, support having geographically different cold flow requirements, as they believe that it will place them at a disadvantage against the four major oil companies. Gull only draws fuel from one source (i.e. Mount Maunganui), and to continue to supply areas north and south of Auckland all fuel will need to meet the most stringent requirements (i.e. +4°C). Whereas the four major oil companies will have the option to supply separate stock to Auckland/Northland. The higher the cloud point, the lower the cost of the diesel. A report by Hale & Twomey (2006) into specification waivers for biofuel blends indicated that the cost for oil companies of producing diesel with cold flow properties 2°C lower would be about NZ 0.2c/l.

Filter Blocking Tendency

- 40 It is recommended that B5 blends for retail sale be required to meet all of the specifications for retail diesel, which includes a limit for Filter Blocking Tendency (FBT). The FBT test measures the filterability of fuel in order to ascertain what affect it will have on vehicle operability. It was included in the PPSR in 2002 in response to problems encountered with diesel fuel dosed with a cold flow improver. While it is a sensitive test method, petroleum diesel supplies have had

⁴ Cold flow properties indicate ability of the fuel to flow at low temperatures. Inadequate cold flow properties will result in high viscosity at low temperatures, leading to difficulties with starting and blockage of fuel filters.

⁵ The cloud point is the temperature at which wax crystals start to precipitate out and the fuel becomes cloudy.

no problem meeting the limit of 2.5. Australia is the only other jurisdiction that includes an FBT requirement in the diesel specifications (with a tighter limit of 2.0).

- 41 Some recent testing in New Zealand of biodiesel blends produced from either tallow or palm oil has shown the unexpected formation of particulate aggregates at room temperature which are causing the blends to often fail the FBT limit. Not enough is known at this time as to the cause of the poor FBT results. There have also been problems with fuel filter clogging from biodiesel blends in the United States. As a response to this, the United States is currently considering including a filterability test in its standard.
- 42 Several submitters are of the view that the FBT requirement should not apply to biodiesel blends due to the sensitivity of the test and the problems fuel made from tallow is experiencing in meeting this specification. However, there is not enough evidence to suggest that a FBT limit above 2.5 would not have a negative impact on vehicle operability. To build and maintain consumer confidence in biodiesel, and to protect the integrity of the biodiesel and fuel industry as a whole, it would be prudent to require biodiesel blends to meet the current FBT requirement until it is better known what the affects of a higher limit are on vehicle operability. Certain biodiesel manufacturing technology seems to have better results than others at producing product with satisfactory filterability properties. Thus, the filterability issues are not necessarily seen as being a limiting factor for domestic tallow biodiesel production.

ETHANOL AND PETROL/ETHANOL BLENDS

- 43 Petrol/ethanol blends for retail sale are already provided for in the PPSR. No regulated requirements exist, however, for the ethanol (E100) component of petrol/ethanol blends. It is recommended that the regulated ethanol specifications be based on the ASTM Standard for fuel ethanol, with several minor variations considered necessary for New Zealand's circumstances. Annex 2 contains the proposed ethanol specifications, which would apply to bioethanol and non-renewable ethanol.
- 44 The ASTM Standard for fuel ethanol applies in the United States and has been updated a number of times since first developed in 1988. It is the basis of the existing voluntary standard for ethanol developed by the Energy Efficiency and Conservation Authority, the draft Australian specification, and standards in other jurisdictions such as Canada and China. It is considered to have the most relevance for New Zealand as it is suitable for ethanol to be blended with petrol at up to 10% by volume ethanol, and New Zealand's fuel suppliers and testing laboratories have significant experience with ASTM test methods.
- 45 Most submitters supported the majority of parameters in the proposed ethanol specification. Two of the more important characteristics of the ethanol specifications are discussed below, these being the type of denaturant allowed and the requirement for corrosion inhibitor.

Denaturant

- 46 To be excise duty free, ethanol must be denatured in accordance with a formula approved by the Chief Executive of Customs. The addition of 1% by volume petrol is amongst the approved denaturants. Denatured ethanol is approved under the Hazardous Substances and New Organisms Act 1996 (HSNO) by way of the Denatured Ethanol Group Standard, which likewise includes up to 1% by volume petrol as an allowed denaturant.
- 47 The discussion document proposed that the ethanol specifications be for denatured ethanol and that only the addition of between 1% and 1.5% petrol be permitted for denaturing. Petrol is widely available and the use of petrol as the denaturant avoids the possibility of another denaturant not already used in vehicles having adverse impacts on fuel stability, fuel systems or engine operability.
- 48 Most submissions supported the specifications being for denatured ethanol and recognised the advantages of allowing only petrol as a denaturant. Some submissions however suggested that when imported ethanol is denatured overseas it will not be practical to use New Zealand specification petrol as the denaturant. To enable denaturing to occur overseas, it is proposed that the petrol used to denature must meet certain key parameters (unleaded, low sulphur etc) to ensure appropriate quality, but does not need to meet the full New Zealand petrol specification. Two oil companies also suggested that other petrol components should be able to be used as denaturants, however, as these are not consistent with Customs requirements or approved under the HSNO Denatured Ethanol Group Standard, it is not proposed that this be permitted.

Corrosion Inhibitor

- 49 Petrol/ethanol blends can be more corrosive than petrol because of their conductive properties and tendency to attract water. They will be subject to the existing copper corrosion test for petrol. However, there are concerns particularly from the Japanese motor vehicle industry that petrol/ethanol blends (notably those above 3% ethanol) could cause corrosion of some aluminium fuel system components.
- 50 Corrosion inhibitor additives can provide protection against corrosion of a number of metals and are widely used in petrol/ethanol blends internationally. The inclusion of corrosion inhibitors tends to be industry practice rather than being provided for in specifications and on this basis some oil companies suggested that it was unnecessary to regulate their inclusion. However, to address motor industry concerns it is proposed that corrosion inhibitor be required to be added to all ethanol blended with petrol so as to minimise any risks. There is a range of corrosion inhibitors available and it is considered appropriate for industry to determine the most appropriate additive type.
- 51 The Ministry of Transport is co-ordinating a test programme to determine whether the use of a corrosion inhibitor could avoid the aluminium corrosion found in tests undertaken in Japan with petrol/ethanol blends higher than 3% ethanol.

BIODIESEL AND ETHANOL LABELLING

- 52 The PPSR require that the dispensing pump or container of petrol and diesel being sold by retail sale must be clearly marked. In addition, if petrol is blended with ethanol for retail sale the dispensing pump or container must display the words “contains ethanol”. The PPSR does not specify labelling requirements for petrol and diesel for non-retail sale.
- 53 Cabinet has agreed (CAB Min (07) 4/2 refers) that diesel/biodiesel blends of up to 5% by volume do not require additional labelling, recognising that this fuel is essentially the same as petroleum diesel. As such the PPSR will not include specific labelling requirements for retail diesel/biodiesel blends.
- 54 Cabinet has also agreed that petrol/ethanol blends with more than 1% ethanol must be labelled. The recommended labelling requirements for retail containers or pumps dispensing petrol/ethanol blends of more than 1% ethanol by volume is as follows:
- The maximum percentage of ethanol by volume must be clearly displayed; and
 - The words “May not be suitable for all vehicles/engines. Check with the manufacturer before use” must be displayed.
- 55 No specific labelling requirements are proposed for non-retail petrol/ethanol blends, nor for non-retail diesel/biodiesel blends.
- 56 Submitters generally agreed that retail petrol/ethanol blends should be labelled but there were some divergent views on the appropriate wording. Gull is particularly against the proposed wording above (“may not be suitable...”) as they consider that this will undermine consumer confidence in the fuel and that it should only be required if it is proven that a significant proportion of the vehicle fleet is unsuitable for petrol/ethanol blends. However, it is considered necessary to take a cautious approach with labelling to reduce the risk of unsuitable use of petrol/ethanol blends leading to vehicle operability problems, which could significantly affect public confidence in biofuels.

CONSULTATION

- 57 The discussion document ‘Regulating Biofuel Quality – A discussion document outlining the proposed biodiesel and ethanol specifications’ was publicly released in October 2007. Twenty seven submissions were received from stakeholders, including representatives from biofuel manufacturing companies, the oil industry and the motor vehicle industry. Submitters were re-consulted on the final proposals in January 2008 to provide an opportunity for additional comments. Eighteen further submissions were received.
- 58 The Ministry of Transport, Ministry for the Environment, Energy Efficiency and Conservation Authority, Ministry of Foreign Affairs and Trade, the Treasury, New Zealand Customs Service and the Environmental Risk Management Authority

were consulted on this paper and agree with its contents. The Department of Prime Minister and Cabinet has been informed.

- 59 New Zealand has an international legal obligation to implement our commitments set out in the World Trade Organisation Agreement on Technical Barriers to Trade (TBT). This includes allowing at least 60 days for the international community to comment on new regulations or standards. No comments were received on the proposed biofuel specifications during the 60 day notification period.

FISCAL IMPLICATIONS

- 60 There are no fiscal implications from the proposals in this paper.

HUMAN RIGHTS

- 61 There are no human rights issues arising from the proposals in this paper.

LEGISLATIVE IMPLICATIONS

- 62 Implementing the recommendations in this paper will require amendments to the Petroleum Products Specifications Regulations 2002.

REGULATORY IMPACT ANALYSIS

- 63 The Ministry of Economic Development confirms that the Code of Good Regulatory Practice and the regulatory impact analysis (RIA) requirements, including the consultation RIA requirements, have been complied with. A Regulatory Impact Statement (RIS) was prepared and MED considers the RIS and the RIA analysis undertaken to be adequate. A draft RIS was circulated with the Cabinet paper for departmental consultation purposes.

PUBLICITY

- 64 The Associate Minister of Energy intends to issue a press statement announcing the agreed biofuel specifications and labelling requirements and will make this Cabinet paper publicly available.

RECOMMENDATIONS

- 65 It is recommended that the Committee:

- 1 **Note** that Cabinet agreed in February 2007 that the current regulatory regime for fuel specifications, quality, fuel dispensing equipment, and testing be amended or replaced, as appropriate, to provide for the suitable regulation of fuels used in engines, including biofuels, biofuel blends and synthetic fuels, including its suitable enforcement and provision for standards to be incorporated by reference where appropriate (CAB Min (07) 4/2 refers).
- 2 **Note** that all fuel for retail sale will continue to be required to be 'fit for common purposes'.

- 3 **Note** that there will be less stringent requirements for biofuels and biofuel blends not for retail sale.

Biodiesel (B100) specifications

- 4 **Agree** that the biodiesel specifications set out in Annex 1 apply to all biodiesel supplied in New Zealand, either as a final fuel or as a blending component with petroleum diesel, intended for use in diesel engines, and that:
- 4.1 Minimum oxidation stability is 10.0 hours induction period when biodiesel is used as a blending component with petroleum diesel for retail sale only.
 - 4.2 All biodiesel is required to meet a maximum iodine value of 140g iodine/100g.
 - 4.3 Minimum cetane number is 47 when biodiesel is used as a blending component with petroleum diesel for all biodiesel blends.
 - 4.4 Allowable viscosity is 2.0 – 5.0 mm²/s for biodiesel as a final fuel, and 2.0 – 6.0 mm²/s for biodiesel used as a blending component with petroleum diesel for all biodiesel blends.
- 5 **Note** the biodiesel specifications recommended will allow for the supply of good quality biodiesel from a number of feedstocks, including tallow, rapeseed, palm, soybean, coconut and used cooking oil.

Non-retail biodiesel blend specifications

- 6 **Agree** that diesel/biodiesel blends for non-retail sale may contain any proportion of biodiesel, and must meet the limits for cetane number, colour, lubricity, sulphur, viscosity, particulates and flash point as in Schedule 3 of the Petroleum Products Specifications Regulations (PPSR). In addition, non-retail diesel/biodiesel blends must also comply with the following limits (where X is the percentage by volume of biodiesel in the blend):
- 6.1 Acid value maximum of $0.1 + 100 \cdot X / 250$ mg KOH/g, when measured by ASTM D664.
 - 6.2 Water content maximum of $200 + 300 \cdot X$ mg/kg, when measured by IP 438.

Schedule 3 of the PPSR (retail diesel specifications)

- 7 **Agree** that diesel/biodiesel blends for retail sale must meet the requirements for retail petroleum diesel in Schedule 3 of the PPSR.
- 8 **Agree** that the following amendments be made to Schedule 3 of the PPSR:

- 8.1 Maximum biodiesel content is 5% by volume when tested by EN 14078, and that this must meet the biodiesel (B100) specifications.
- 8.2 The test method for particulates to be amended from ASTM D6217 to IP 440.
- 8.3 The addition of ASTM D6890 as an alternative test method for cetane number.
- 8.4 The test method for water content to be amended from ASTM D6304 to IP 438.
- 8.5 Cloud point for summer to be amended from +4°C to +6°C for Auckland and Northland.

Ethanol and petrol/ethanol blends

- 9 **Note** that petrol/ethanol blends are already provided for in the PPSR, with up to 10% ethanol by volume permitted in petrol.
- 10 **Note** that the PPSR do not currently provide specifications for the ethanol component of a petrol/ethanol blend.
- 11 **Agree** that ethanol used as a blending component with petrol must meet the specifications set out in Annex 2, including that:
 - 11.1 The ethanol specifications provided in the PPSR be for denatured ethanol; and
 - 11.2 Ethanol must contain corrosion inhibitor.

Biofuel blend labelling requirements

- 12 **Note** that Cabinet agreed that labelling requirements for biofuel blends be set out in regulations, with appropriate offence and penalty provisions, and that such labelling requirements will include that biofuel blends must be labelled as containing biofuel if the blend comprises by volume more than five per cent biodiesel or more than one per cent ethanol (CAB Min (07) 4/2 refers).
- 13 **Agree** that retail containers or pumps dispensing petrol/ethanol blends of more than 1% ethanol by volume must be labelled as follows:
 - 13.1 The maximum percentage of ethanol by volume must be clearly displayed; and
 - 13.2 The words “May not be suitable for all vehicles/engines. Check with the manufacturer before use” must be displayed.

Next Steps

- 14 **Invite** the Associate Minister of Energy to issue drafting instructions to the Parliamentary Counsel Office to amend the PPSR to give effect to the decisions referred to in the Recommendations above.
- 15 **Note** that the Associate Minister of Energy intends to issue a press statement announcing the agreed biofuel specifications and labelling requirements and will make this Cabinet paper publicly available.
- 16 **Agree** that the Associate Minister of Energy have the power to approve any minor changes to the agreed biofuel specifications.
- 17 **Note** that it is intended that the biofuel specifications be reviewed by 2010.

Hon Harry Duynhoven
Associate Minister of Energy

Date signed: _____

ANNEX 1 – BIODIESEL SPECIFICATIONS

| Property | Unit | Minimum | Maximum | Test Method |
|---|--------------------|---------|---------|-------------------------|
| Ester content | % mass | 96.5 | - | EN 14103 |
| Density at 15°C | kg/m ³ | 860 | 900 | ASTM D1298 |
| Viscosity at 40°C | mm ² /s | 2.0 | 5.0 | ASTM D445 |
| Flash point | °C | 100 | - | ASTM D93 |
| Sulphur content | mg/kg | - | 10 | IP 497 or ASTM D5453 |
| Carbon residue (on 100% distillation residue) <u>or</u> | % mass | - | 0.05 | ASTM D4530 |
| Carbon residue (on 10% distillation residue) ⁶ | % mass | - | 0.30 | ISO 10370 |
| Cetane number | | 51 | - | ASTM D613 or ASTM D6890 |
| Sulphated ash content | % mass | - | 0.020 | ASTM D874 |
| Water content | mg/kg | - | 500 | IP 438 |
| Total contamination | mg/kg | - | 24 | IP 440 |
| Copper strip corrosion (3 h at 50°C) | rating | class 1 | | ASTM D130 |
| Oxidation stability, 110°C | hours | 6.0 | - | EN 14112 |
| Acid value | mg KOH/g | - | 0.50 | ASTM D664 |
| Iodine Value | g iodine/100 g | - | 140 | EN 14111 |
| Linolenic acid methyl ester | % mass | - | 12.0 | EN 14103 |
| Polyunsaturated (>=4 double bonds) methyl esters ⁷ | % mass | - | 1 | |
| Methanol content | % mass | - | 0.20 | EN 14110 |
| Monoglyceride content | % mass | - | 0.80 | ASTM D6584 |
| Diglyceride content | % mass | - | 0.20 | ASTM D6584 |
| Triglyceride content | % mass | - | 0.20 | ASTM D6584 |
| Free glycerol | % mass | - | 0.020 | ASTM D6584 |
| Total glycerol | % mass | - | 0.25 | ASTM D6584 |
| Group I metals (Na+K) | mg/kg | - | 5.0 | EN 14108 and EN 14109 |
| Group II metals (Ca+Mg) | mg/kg | - | 5.0 | EN 14538 |
| Phosphorus content | mg/kg | - | 10.0 | ASTM D4951 |

⁶ ASTM D1160 shall be used to obtain the 10% distillation residue.

⁷ Suitable test method to be developed.

ANNEX 2 – ETHANOL SPECIFICATIONS

- (1) The ethanol must contain denaturant and the type and volume of the denaturant must be declared.
- (2) The ethanol must contain a corrosion inhibitor and the type and dose rate of the corrosion inhibitor must be declared.
- (3) The ethanol must conform to the parameters set out in the following table:

| Property | Unit | Minimum | Maximum | Test Method |
|---|-----------|------------------|---------|---|
| Ethanol | % volume | 95.6 | | ASTM D5501 |
| Methanol | % volume | | 0.5 | ASTM D5501 |
| Denaturant ¹ | % volume | 1 | 1.5 | ASTM D5501 |
| Water content | % volume | | 1.0 | ASTM E203 |
| Solvent-washed gum | mg/100 ml | | 5 | ASTM D381 |
| Inorganic Chloride content | mg/L | | 32 | ASTM D512-81 (1985), Method C (as modified in ASTM D4806) |
| Copper content | mg/kg | | 0.1 | ASTM D1688A (as modified in ASTM D4806) |
| Sulphate | mg/kg | | 4 | ASTM D7318, ASTM D7319, and ASTM D7328 |
| Sulphur | mg/kg | | 30 | IP 497 or ASTM D5453 |
| Acidity (as acetic acid CH ₃ COOH) | % mass | | 0.007 | ASTM D1613 |
| pHe | | 6.5 | 9.0 | ASTM D6423 |
| Appearance | | Clear and bright | | ASTM D4806 |

1. The denaturant contained in ethanol must be unleaded regular grade or premium grade petrol with the following minimum characteristics:
 - a. End point - 210°C maximum
 - b. Sulphur - 50 mg/kg maximum
 - c. Clear and bright

Regulatory Impact Statement

EXECUTIVE SUMMARY

Biodiesel and ethanol quality standards are not currently regulated in New Zealand. Biofuels as a proportion of the retail national fuel mix will increase in the coming years, as a consequence of the Biofuel Sales Obligation.

It is proposed to regulate specifications based on internationally recognised ethanol and biodiesel standards, but with some amendments to reflect New Zealand's circumstances. The proposed biodiesel regulations will enable good quality biodiesel made from all common feedstocks to be supplied in New Zealand.

In addition, retail fuel pumps dispensing petrol/ethanol blends will be subject to specific labelling requirements as petrol engines have varying degrees of compatibility with petrol/ethanol blends.

ADEQUACY STATEMENT

The Ministry of Economic Development has reviewed the RIS and considers that the RIS is adequate according to the adequacy criteria.

STATUS QUO AND PROBLEM

The Petroleum Products Specifications Regulations 2002 (PPSR) set out quality and labelling requirements for petrol and diesel. Biodiesel, ethanol and biodiesel blend specifications are not currently regulated in New Zealand. Biofuel as a proportion of the retail national fuel mix will increase in the coming years as a consequence of the Biofuel Sales Obligation, largely in the form of blends with petrol and diesel. It is considered necessary that biofuel specifications are provided for in regulations to ensure fuel quality that is suitable for New Zealand's vehicle fleet and other fuel users. This will help to build and maintain consumer confidence in the use of biofuels, and is consistent with the approach for petrol and diesel.

For biodiesel, there is a voluntary standard in place – 'Automotive Biodiesel: Specifications for manufacture and blending (NZS 7500:2005)'. This covers neat biodiesel (B100), retail diesel/biodiesel blends (up to 5% biodiesel), and non-retail blends that may contain any proportion of biodiesel. For ethanol, the Energy Efficiency and Conservation Authority (EECA) has developed voluntary specifications based on the American standard (ASTM D4806). The PPSR requires that pumps dispensing retail ethanol/petrol blends (of up to 10% by volume ethanol) display the words "contains ethanol".

Cabinet agreed in February 2007 (Biofuels Sales Obligation Cabinet paper – CAB Min (07) 4/2 refers) that the current regulatory regime for fuel specifications, quality, fuel dispensing equipment, testing, consumer information, and advertising be amended or replaced, as appropriate, to provide for the suitable regulation of fuels used in engines, including biofuels, biofuel blends and synthetic fuels, including its suitable enforcement and provision for standards to be incorporated by reference where appropriate.

OBJECTIVES

The objectives are to:

1. ensure appropriate protection for consumers purchasing biofuels and biofuel blends;
2. ensure biofuels and biofuel blends are suitable for New Zealand's vehicle fleet and other fuel users; and
3. maximise the affordability of biofuels.

ALTERNATIVE OPTIONS

Do nothing (Status Quo)

If the status quo is maintained, biodiesel, ethanol and biodiesel blends of any quality may be sold in New Zealand as long as the supplier complies with general consumer protection laws. This is inconsistent with the approach for petrol and diesel, and may lead to poor quality biofuel being sold which would negatively impact on consumer confidence.

Regulate the existing voluntary standards in their entirety

One option would be to mandate the existing voluntary standards for biodiesel (NZS 7500) and ethanol. This option is however not preferred for the following reasons:

- For biodiesel, NZS 7500 would limit the number of feedstocks able to be used. Some of the key players in the motor vehicle industry are also of the view that the oxidation stability parameter is not stringent enough in NZS 7500 to protect fuel system components from corrosion. NZS 7500 would also benefit in being amended to reflect recent international developments with biodiesel specifications.
- For ethanol, the EECA voluntary ethanol standard (based on ASTM D4806) is not considered stringent enough.

Regulate international standards by reference

There are no harmonised international specifications for either biodiesel or ethanol, and there are significant differences between country-specific fuel quality requirements. The most internationally recognised standards are the European Standard for biodiesel (EN14214), and ASTM D4806 for ethanol. An option would be for these to be referred to in the New Zealand regulations. This option is not preferred for the following reasons:

- For biodiesel, EN14214 was developed based on rapeseed oil as the feedstock and good quality biodiesel made from other feedstocks (e.g. soybean oil, sunflower oil, coconut oil) are unable to meet EN14214 due to limits placed on several of the feedstock-related parameters. In addition EN14214 has requirements for oxidation stability that are not considered stringent enough by some in the motor vehicle industry. Finally, where the same parameter is specified in diesel and biodiesel specifications, it is logical to align the test methods, and some of the test methods in EN14214 differ to those in the PPSR.

- For ethanol – as above.

PREFERRED OPTION

It is preferred that biofuel specifications are regulated to minimise the risk of poor quality biofuels being sold in New Zealand. This will help to protect consumers as well as the integrity of the biofuels industry.

The preferred option is for the regulated biofuel specifications to be largely consistent with EN14214 for biodiesel and ASTM D4806 for ethanol, but to modify some of the parameter limits. For biodiesel, these modifications will allow for a larger number of feedstocks and take into consideration the motor vehicle industries concerns around oxidation stability. For ethanol, the modifications are in-line with the draft Australian Ethanol Standard, which aim to reduce the possibility of undesirable components being present and ensure consistency with denaturing requirements.

The preferred option provides an appropriate level of protection for consumers while ensuring that the costs of compliance with quality standards for biofuel manufacturers and suppliers are reasonable. The costs being considered here relate only to biofuels meeting the quality standards, and not costs associated with wider biofuels policy, including the Biofuel Sales Obligation.

The biodiesel regulations are performance-based specifications and feedstock-independent. Feedstock independent specifications allow for the importation of good quality biodiesel made from feedstocks such as soybean oil and coconut oil.

Potential costs associated with the preferred specifications, include:

- More stringent oxidation stability properties for the B100 component of retail biodiesel blends will have cost implications for biodiesel manufacturers. These costs vary depending on the feedstock, as each feedstock has a different level of natural antioxidants. For example, rapeseed oil has a low level of natural antioxidants and may require up to 1100 mg/kg of antioxidant. This is estimated to cost up to \$0.014 per litre of biodiesel (or \$0.0007 per litre for B5 blends) and so is considered minor.
- Any existing small scale biodiesel manufacturers that do not meet the existing voluntary NZS 7500 will have difficulty in meeting the regulated specifications. In many cases it would be costly to change the technology used or the production process to meet the specifications.

The preferred option includes amending the diesel specifications to allow the blending of up to 5% by volume biodiesel for retail sale. Several other amendments to the diesel specifications are also necessary to reflect new information and ensure test methods are applicable to biodiesel blends. This includes an amendment to the cold flow requirements for diesel in Auckland/Northland as the current requirements are considered unnecessarily stringent. The relaxation will also facilitate the blending of biodiesel into existing diesel stock in the Auckland area.

The preferred option includes labelling requirements for retail petrol/ethanol blends that will allow consumers to identify the maximum amount of ethanol that the fuel

contains, and hence whether it is suitable for their engine. This is similar to the requirement in the PPSR to label petrol with the minimum research octane number (RON). It is also recommended that petrol/ethanol blends be labelled as “may not be suitable for all vehicles/engines. Check with the manufacturer before use”. This is a cautious approach considered appropriate to reduce the risk of operability problems, particularly given the low level of biofuel compatibility awareness consumers have at this time. The proposed labelling requirements will impact on current suppliers of retail petrol/ethanol blends (i.e. Gull) as they will need to re-label dispensing pumps.

Under the Trans-Tasman Mutual Recognition Arrangement (TTMRA), goods produced in or imported into Australia may be sold in New Zealand and vice versa. The biodiesel specifications proposed in this paper are more stringent than those in Australia, particularly for oxidation stability. It is considered unlikely that a product that meets the Australian standard would be unsuitable for general use in New Zealand. However, the motor vehicle industry may not support a product that meets the Australian standard as it deviates from EN14214 and the recommendations of the Japanese Automobile Manufacturers Association.

IMPLEMENTATION AND REVIEW

It is intended that the new regulations come into force before the Biofuel Sales Obligation commences (anticipated as 1 July 2008). This will ensure that biofuels supplied to meet the Obligation are of an appropriate standard. Once approved, this paper will be posted on the MED website. A targeted group of stakeholders (e.g. biofuel manufacturers, oil companies, motor vehicle manufacturer representatives) will be informed of the approved specifications and labelling requirements. It is important that, in particular, the oil companies and biofuel manufacturers know the intended specifications as far in advance of the commencement of the Obligation as possible.

Petrol and diesel supplied in New Zealand is currently monitored for compliance with the PPSR by the Fuels Quality Monitoring Programme, run by the Measurement and Product Safety Service within the Ministry of Economic Development. The quality of biodiesel and ethanol, and their blends, will be monitored under the same programme.

The process of standardising engine fuels (both petroleum and biofuel) is a dynamic process. The specifications will continually be updated in line with domestic and international developments. It is intended that a review of the biofuel specifications be undertaken in 2010.

CONSULTATION

The discussion document ‘Regulating Biofuel Quality – A discussion document outlining the proposed biodiesel and ethanol specifications’ was publicly released in early October 2007. Twenty seven submissions were received from stakeholders, including biofuel manufacturers, the oil industry and the motor vehicle industry. Submitters were re-consulted on the final proposals in January 2008 to provide an opportunity for additional comments. Eighteen further submissions were received. All submitters agree that biodiesel and ethanol specifications should be regulated.

Key issues on the biodiesel (and diesel) specifications raised in submissions are as follows:

- Two domestic biodiesel manufacturers and representatives of the European vehicle manufacturers do not support divergences from the EN14214. Adopting EN14214 in its entirety would restrict the available feedstocks, i.e. good quality soybean, sunflower and coconut oil biodiesel would not be able to meet the specifications. This is not consistent with the approach of having performance based specifications.
- Several submitters do not support a limit of 5% by volume biodiesel being placed on biodiesel blends for retail sale. These submitters want the flexibility to sell higher blends via retail sale, which would give consumers greater choice and support the uptake of biofuels. The preferred option is to impose a 5% limit as there are few vehicle manufacturers who support biodiesel blends above 5% by volume for general use. Internationally it is widely considered that biodiesel blends containing up to 5% by volume may be used in any diesel engine without modification. For those vehicle fleets that are compatible with higher biodiesel blends, the preferred option provides the flexibility to supply these vehicles with blends above 5%, as long as there is a written arrangement between the supplier and the end user (i.e. non-retail sale).
- Having geographically different cold flow requirements for diesel is not supported by one oil company (Gull) as they believe that it may place them at a disadvantage against their competitors due to their different supply arrangements. It is considered unlikely that the relaxation would significantly benefit the four major oil companies at the expense of Gull.

Key issues on the ethanol specifications raised in submissions are as follows:

- Several submitters did not support the proposal in the discussion document that the denaturant be limited to New Zealand specification petrol as this would make it difficult for denaturing to occur overseas for imported ethanol. Accordingly the preferred option is that the petrol used to denature must meet certain key parameters (unleaded, low sulphur etc) to ensure appropriate quality, but does not need to meet the full New Zealand petrol specifications.

Key issues on the labelling requirements raised in submissions are as follows:

- The discussion document proposed that labelling identifies whether ethanol is from a renewable or non-renewable source. This was not supported by several submitters, and has subsequently been removed from the preferred option as it is not necessary from a fuel performance and vehicle compatibility point of view.
- Two submitters support the labelling being required to show as close to the absolute percentage of ethanol as possible (rather than 'up to'). This is to address the differing compatibility levels of vehicles (e.g. E3, E5, E10), but this approach is not considered practical given that ethanol levels will vary. From a vehicle compatibility point of view, the maximum percentage of ethanol is of most importance for consumer information.

- One oil company is particularly against the proposed wording (i.e. “may not be suitable...”) as they consider that this will undermine consumer confidence in the fuel and that it should only be required if it is proven that a significant proportion of the vehicle fleet is unsuitable for ethanol/petrol blends. However, it is considered necessary to take a cautious approach with labelling to reduce the risk of unsuitable use of petrol/ethanol blends leading to vehicle operability problems, which could significantly affect public confidence in biofuels.

The Ministry of Transport, Ministry for the Environment, Energy Efficiency and Conservation Authority, Ministry of Foreign Affairs and Trade, the Treasury, New Zealand Customs Service and the Environmental Risk Management Authority were consulted on this Cabinet paper and agree with the recommended specifications and labelling requirements.