Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Regulation Impact Statement

Fuel Quality Standard: Ethanol (E85) Automotive Fuel

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Contents

GLOSSARY

AAA	Automobile Association of Australia
ACT	Australian Capital Territory
ASTM	American Society for Testing and Materials
BAA	Biofuels Association of Australia
CEN	European Committee for Standardisation
DVPE	dry vapour pressure equivalent
E10	Petrol that contains between 1 and up to 10 per cent ethanol
E100	Pure ethanol fuel
E85	A blend of between 70 to 80 percent ethanol with 15 to 30 percent petrol
EU	European Union
Feedstock	Raw material for industrial processing
FFV	Flexible-fuel vehicle or Flex-fuel vehicle
FSCC	Fuel Standards Consultative Committee
Green choice	considered to inflict no or minimal harm to the environment
km	kilometres
kPa	kiloPascals
max	maximum
mg/kg	milligram per kilogram
mg/L	milligram per litre
min	minimum
m/m max	mass by mass maximum
ML	million litres
MON	Motor Octane Number
MTBE	methyl tertiary-butyl ether
NSW	New South Wales
NT	Northern Territory
Qld	Queensland
rBOB	Reformulated blendstock for oxygenate blending
RIS	Regulation Impact Statement
RON	Research Octane Number
SA	South Australia
Tas	Tasmania
US	United States of America
Vic	Victoria
% v/v	per cent volume by volume
v/v max	volume by volume maximum
WA	Western Australia

EXECUTIVE SUMMARY

Ethanol (E85) automotive fuel is a blend of between 70 and 85 per cent ethanol, with the remainder petrol. It is suitable for use in vehicles that are specifically built or modified to use it. Recent growth in the Australian market for E85 has identified a need to manage the quality of the fuel. As the market for E85 grows and more suppliers begin to supply E85, there is a risk that inferior fuel may enter the market if specific quality measures are not in place. Additionally, if the fuel is not labelled when it is supplied, there is a risk of misfuelling in vehicles not designed to use E85. These problems, if left unmanaged, may pose several risks including environment and health risks, engine damage, consumer inconvenience and safety risks, loss of consumer confidence in the fuel and risks to competition and trade.

The objectives of this proposal are to ensure that the quality of E85 supplied in Australia allows for optimum vehicle operability and protection of human health and the environment from pollutants and emissions arising from the use of the fuel. A further objective is to address the risk of misfuelling.

In this Regulation Impact Statement (RIS), options identified for managing E85 fuel quality are the status quo, industry self-regulation, State and Territory regulation and setting a fuel quality standard and information standard under the *Fuel Quality Standards Act 2000*.

This RIS outlines a consideration of each option and identifies a recommended option that is most likely to achieve the desired objective. The RIS also details the consultation processes undertaken, and discusses possible implementation and review of the preferred option.

1. BACKGROUND

1.1 Ethanol automotive fuel and E85

Internationally, ethanol has a long history of use as a petrol extender, octane improver and alternative fuel. At present it is being widely promoted as a clean and renewable fuel that could reduce global warming, air pollution and reliance on diminishing reserves of fossil fuel. In 2010, worldwide biofuel production reached 105 billion litres, 17 per cent more than the previous year[1]. Of this figure, 86 billion litres was ethanol, with a production increase of 18 per cent from 2009[1]. In 2010, biofuels (mainly ethanol and biodiesel) provided 2.7 per cent of the world's fuel for road transportation, an increase from 2 per cent in 2009[1].

In Australia, renewable fuel grade ethanol is predominantly made from residual (waste) wheat starch. Other feedstock includes the by-products of sugarcane (molasses) and sorghum processing. As at 1 July 2010, there are three ethanol plants in Australia with a total ethanol production capacity of 440 ML (Table 1). In 2010, ethanol production in Australia was 250 ML[2].

Table 1: Australian ethanol plants and production capacity as at 1 July 2010[3]

Ethanol Plant	Location	Owner	Total Installed Capacity (ML)	Feedstock
Dalby Bio-Refinery	South QLD	United Petroleum[4]	80	Red sorghum
Manildra Ethanol Plant	Coastal NSW	Manildra Group	300	Waste starch
Sarina Distillery	Central QLD	Sucrogen	60	Molasses
TOTAL CAPACITY (ML)			**440**	

[1] Vital Signs Worldwatch Institute: http://vitalsigns.worldwatch.org/vs-trend/biofuels-regain-momentum Accessed on 28 October 2011.

[2] Renewable Fuels Association: http://ethanolrfa.org/pages/World-Fuel-Ethanol-Production Accessed on 19 September 2011.

[3] Table adapted from http://www.biofuelsassociation.com.au/images/stories/pdf/ethanolmap.pdf Accessed on 19 September 2011.

[4] United Petroleum announced their purchase of Dalby Bio-Refinery on 20 May 2011: http://www.unitedpetroleum.com.au/media/united-petroleum-purchase-dalby-bio-refinery Accessed on 28 September 2011.

Ethanol is commonly blended up to 10 per cent by volume with petrol (known as E10) and is widely used in the United States (US), Canada, Europe and Australia. Fuel consisting of pure ethanol ('E100') can only be used in warm climates because below 15°C vehicles using such fuels suffer cold start problems. E85, as it is commonly known worldwide, is a blend of between 70 and 85 per cent by volume ethanol and the remainder petrol. In summer, internationally, E85 contains 85 per cent ethanol. In mild climates, such as much of Australia, E85 usually contains 70 per cent ethanol in the winter months as the larger petrol component allows cold starts. For very cold winters overseas, the ethanol proportion is lowered to 50 per cent. Despite the seasonal variation in the ethanol proportion, the fuel is still typically referred to internationally as 'E85'.

E85 can only be used in vehicles that have been designed or modified to use it. Flexible-fuel vehicles (FFVs) can operate on neat petrol or fuel that contains 85 per cent ethanol by volume, or any blend of ethanol and petrol from 0 per cent to 85 per cent ethanol. The main differences between FFVs and petrol vehicles are the materials used in the fuel management system and modifications to the engine calibration system. As at June 2011, 25.1 million FFVs (automobiles, motorcycles and light duty trucks) had been sold worldwide, with markets concentrated in Brazil (14.3 million)[5], the US (10 million)[6], Canada (more than 600, 000)[7] and Europe, led by Sweden (226, 089)[8]. Several vehicle manufacturers including Ford, Chrysler and General Motors (GM) produce FFVs. E85 is not suitable for motorcycles, lawnmowers, boats or light aircraft.

E85 is commonly used in the US, Canada and Europe (particularly Sweden). In the US, E85 usage is currently limited by the level of ethanol production and by the small number of E85 fuel outlets (2827 E85 outlets as at 21 September 2011[9]). However, US government policies mandate an increase in the use of biofuels to the year 2022[10] and support the sale of FFVs[11], and these drivers could cause E85 production and use to increase further. Recent years have seen significant increases in ethanol production for fuel in the US (derived from corn) and Brazil (sugarcane), and pilot plants for lignocellulosic ethanol (using non-food sources such as trees and grasses) in the US and European Union (EU)[12].

5 http://www.anfavea.com.br/cartas/Carta302.pdf (Portugese) Accessed on 17 October 2011.
6 http://www.journalgazette.net/article.20110527/BIZ/305279966/1100/BIZ03 Accessed on 17 October 2011.
7 http://www.canada.com/vancouversun/news/story.html?id=45fc61c1-56ba-4b5d-8ef0-405d3acf5b3e Accessed on 17 October 2011.
8 http://www.baff.info/english/ Accessed on 17 October 2011.
9 http://e85prices.com/ Accessed on 21 September 2011.
10 The US *Energy Independence and Security Act 2007* sets a target for the amount of biofuel that must be mixed with gasoline (petrol) sold in the US to 36 billion US gallons (about 136 gigalitres) by 2022.
11 The US *Energy Policy Act 2005* requires that the Federal Fleet vehicles capable of operating on alternative fuels be operated on these fuels exclusively.
12 O'Connell D, Batten D, O'Connor M, May B, Raison J, Keating B, Beer T, Braid A, Haritos V, Begley C, Poole M, Poulton P, Graham S, Dunlop M, Grant T, Campbell P and Lamb D (2007) *Biofuels in Australia* –

Until recently, E85 has been supplied by independent fuel suppliers in a small number of locations and only a small number of FFVs have been marketed in Australia. The first FFVs available in Australia were the Saab BioPower 9.3 and 9.5 models, and their 2007 Australian launch coincided with United Petroleum's announcement that two of their service stations, in Sydney and Melbourne, would sell E85[13]. United Petroleum currently sell their E85 product (named "Ethanol 85" and containing 85 per cent ethanol) at three service stations, located in Sydney, Melbourne and Adelaide[14].

In August 2010, Caltex Australia launched their E85 product (containing 70 to 85 per cent ethanol) named Bio E-Flex[15], designed for use specifically in FFVs. At the same time GM Holden announced that Bio E-Flex would be suitable for vehicles within the new Holden Commodore VE Series II range, launched in September 2010[16]. As at 19 September 2011, Bio E-Flex was available at 36 metropolitan locations[17] in Australia (spread throughout Adelaide, Brisbane, Canberra, Melbourne and Sydney) and Caltex Australia plans to have Bio E-Flex available in 100 metropolitan and regional locations throughout New South Wales (NSW), South Australia (SA), Queensland (Qld) and Victoria (Vic) by 2012. In September 2011, Caltex Australia reported an approximate 7 per cent increase in E85 sales each month in the past ten months[18]. GM Holden has committed to locally manufacturing vehicles that can use these fuels and since September 2011 all new Commodore vehicles have been flex-fuel capable[19]. Commodore models are generally popular in the Australian market, accounting for 51 per cent of the large car market and GM Holden have reported strong consumer support for the VE Series II vehicles since their September 2010 release[20-21].

1.2 Policy environment

1.2.1 Fuel Quality Standards Act 2000

The *Fuel Quality Standards Act 2000* (the Act) provides the legislative framework for setting national fuel quality standards and fuel quality information standards, providing a nationally consistent approach to improving the quality of fuel in Australia.

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issues and prospects. A report for the Rural Industries and Development Corporation. Publication number 07/071. Available at: http://www.rirdc.gov.au.

13 http://www.unitedpetroleum.com.au/media/united-petroleum-launch-e85-sydney-and-melbourne Accessed 28 September 2011.

14 http://www.unitedpetroleum.com.au/store-locator/fuels/E85 Accessed 28 September 2011.

15 http://www.caltex.com.au/LatestNews/Pages/NewsItem.aspx?ID=13192 Accessed 18 October 2011.

16 http://media.gm.com/media/au/en/holden/news/news_archive.year.2010.month.08.html 'VE Series II - the future friendly Commodore'. Accessed 29 September 2011.

17 Source: www.http://www.ethanolanswers.com.au/ethanol.locator Accessed on 19 September 2011.

18 Personal communication, Caltex Australia, September 2011.

19 News release: http://www.media.gm.com/content/media/au/en/holden/news.detail.html/content/Pages/news/au/en/2011/Sep/0901_ImprovedFuelEconomyandFlexFuelCapabilityforMY12Comm

20 http://www.autocarfinance.com.au/news/102-holden-strong-in-small-and-large-car-sales-

21 http://www.caradvice.com.au/97059/holden-commodore-australias-favourite-car-for-15-years/

The development of fuel quality standards is an important part of the Australian Government's continuing work to improve air quality.

The objects of the Act are to:

(a) regulate the quality of fuel supplied in Australia in order to:
    (i) reduce the level of pollutants and emissions arising from the use of fuel that may cause environmental and health problems; and
    (ii) facilitate the adoption of better engine technology and emission control technology; and
    (iii) allow the more effective operation of engines; and
(b) ensure that, where appropriate, information about fuel is provided when the fuel is supplied.

Fuel standards have been set for petrol, automotive diesel, biodiesel and liquefied petroleum gas (autogas). Monitoring is undertaken to ensure compliance with the standards and penalties apply if standards are not met.

In Australia, fuel grade ethanol is currently allowed to be blended with petrol up to 10 per cent by volume (E10) under the Fuel Standard (Petrol) Determination 2001 (the petrol standard). The petrol standard covers quality requirements for unleaded petrol and premium unleaded petrol, and sets out the quality requirements for fuel grade ethanol that is used for blending with petrol. These quality requirements for blending for E10 do not constitute an ethanol standard (ie. there is no standard for E100, or 100% ethanol, under the Act). Petrol blended with up to 10 per cent ethanol is also subject to the Fuel Quality Information Standard (Ethanol) Determination 2003 (the information or labelling standard), ie. it must be labelled at the point of sale to inform consumers that the petrol contains up to 10 per cent ethanol.

There is currently no fuel quality standard that captures high ethanol blends such as E85, so at present E85 can be sold without reference to the Act.

1.2.2 Other Policies

In Australia, vehicle emissions standards are set via the Australian Design Rules, legislated under the *Motor Vehicles Standards Act 1989*, and these standards aim to harmonise, where possible, with the international standards established by the United Nations Economic Commission for Europe. In regulating fuel quality, the Act complements national actions to strengthen vehicle emissions to reduce urban air pollution from the road transport sector and deliver associated health benefits. The Australian Government recently announced that all new light vehicles in Australia will be required to meet stricter Euro 5/6 emissions standards (with respect to hydrocarbons, nitrogen oxides and particulate matter) with implementation commencing in 2013 and full

implementation by 2018[22]. Consideration of carbon dioxide emissions standards are currently the subject of a separate regulatory assessment process[23].

Australian Government support for fuel ethanol includes the Ethanol Production Grant program and the Energy Grants (Cleaner Fuels) Scheme which offer grants to producers to offset excise. A $15 million Second Generation Biofuels Research and Development Program supports current research in ethanol production from alternative feedstocks, and the $20 million Australian Biofuels Research Institute announced in the 2011 budget is also designed to drive down the costs of next generation biofuels technologies. A Research, Development and Extension (RD&E) plan for biofuels and bioenergy under the National Primary Industries RD&E framework is currently being finalised. The purpose of this plan is to implement a national approach to RD&E and explore research capabilities for the biofuels and bioenergy industries, to facilitate the development of economically and environmentally sustainable biofuels in Australia.

Several state governments, including NSW, Qld and Vic, promote ethanol blending to varying degrees while other state governments, including SA and WA, are working to introduce biofuels through research and development funding initiatives. NSW has a fuel ethanol mandate under the *Biofuels (Ethanol Content) Act 2007* which required that fuel ethanol comprise at least two per cent of the total volume of petrol sold in the state from October 2007. This was subsequently raised to four per cent, and has now since been raised to six percent from October 2011[24]. The governments of Victoria and Queensland have also considered ethanol mandates.

1.2.3 International Harmonisation

Australian Government policy is to harmonise fuel standards with international or internationally accepted standards, where appropriate and applicable in the Australian context, in order not to impede competition and trade.

E85 fuel quality standards have been set in the US, Canada, the EU, Sweden, Brazil, Paraguay and Thailand.

Two key international E85 standards informed the parameters in the government's position paper (see Section 6) on setting an E85 fuel quality standard (E85 standard) in Australia:

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[22] Announcement available at: http://www.minister.infrastructure.gov.au/aa/releases/2011/June/aa106_2011.aspx Accessed September 2011.

[23] Available at: http://www.infrastructure.gov.au/roads.environment/co2_emissions/index.aspx Accessed September 2011.

[24] http://www.biofuels.nsw.gov.au/__data/assets/pdf_file/0019/162901/Minister_Hartcher_med_rel_-_Ethanol_Mandate_28Sep11.pdf Accessed on 29 September 2011.

- The *US ASTM D5798 Ethanol Fuel Blends for Flexible-Fuel Automotive Spark-Ignition Engines*, most recently revised in 2011, (ASTM International develops and delivers international voluntary consensus standards, including fuel quality standards), and
- The European *Automotive Fuels – Ethanol (E85) – Automotive fuel – Requirements and test methods* technical specification, CEN/TS 15293:2011, approved in September 2010.

2. THE PROBLEM

All E85 currently being sold in Australia is unregulated, including both the ethanol and the petrol components.

Until recently, only very small volumes of E85, from six bowsers at most for regular motorists, were sold and there were very few vehicles in Australia that were able to use it, namely some Saab models and vehicles that had been modified by their owners. Very small quantities of 85 and 90 per cent ethanol fuel are also sold in drums by racing fuel suppliers.

The E85 market is now rapidly expanding. Announcements in mid-2010 by Caltex Australia to begin supply of their E85 product Bio E-Flex and GM Holden, which is locally manufacturing vehicles that are suited to use E85, have led to rapid growth in the supply and use of E85 fuel in Australia - from six bowsers to over 30 in less than a year - and from a handful of modified or imported cars to the entire Holden Commodore range from September 2011.

2.1 Unregulated E85 fuel poses risks

Consultation has indicated that the E85 currently being supplied is of generally high quality, meeting most of the parameters in the proposed E85 fuel quality standard (see Section 4, Option 4 and Appendix 1). However, as the market for E85 grows and more suppliers begin to supply E85, inferior fuel may enter the market as there would be no benchmark for quality. This poses several risks, especially as the market for the fuel expands.

2.1.1 Environmental and health risks

Human health and environmental risks can arise from either the petrol or the ethanol components of the blend.

The Australian petrol standard limits the amounts of certain compounds in petrol for human health and environmental reasons, namely sulfur, benzene, lead, phosphorus, two ethers, olefins, aromatics and a higher alcohol.

Ethers are persistent and mobile in water and can easily contaminate groundwater. Lead has long been known as causing a wide range of adverse biological effects. Reduced sulfur levels in petrol have been shown to reduce deaths from respiratory disease, avoid respiratory cases in children, and significantly reduce asthma symptoms and a large number of other respiratory problems. Combustion of aromatics can lead to the formation of toxic benzene in exhaust gas. The key health concern related to benzene exposure is leukaemia. Olefins contribute to ozone formation; ozone in urban areas is

considered a damaging air quality pollutant. The combustion of olefins can produce 1,3-butadiene, a known human carcinogen. Phosphorus needs to be limited to protect automotive catalyst systems from deactivation; catalysts remove other pollutants from vehicle exhaust. For further details of these human health and environmental impacts, see *Setting national fuel quality standards - Paper 2A Proposed management of petrol octane enhancing additives/products*[25].

Levels of most of these compounds were higher in petrol before the petrol standard was introduced in 2001, and there is a cost to industry to limit the concentrations to meet the current standard. Without a standard in place for E85, as the market grows these pollutants may begin to appear in higher levels in the petrol component in E85, which constitutes up to 30 per cent of the blend, with corresponding health and environmental impacts.

Of those that can be controlled by a fuel standard, sulfur is the only compound in the *ethanol* component of the fuel that can cause human health and environmental impacts. Its impacts are identical to those mentioned above for petrol.

Emissions of other pollutants, such as aldehydes, that cannot be controlled by the composition of the fuel blend are outside the scope of this document.

2.1.2 Risks to vehicle engines

A range of substances that can be present in E85, such as acids, inorganic chlorides and methanol, can lead to engine problems such as increased wear, deposits and filter blocking. Contamination of fuel ethanol with metal ions such as copper, iron and sodium and inorganic anions such as chloride and sulfate can affect engine performance since salts and sediments that form can block nozzles and filters and induce corrosion in vehicle components in contact with the fuel. Chloride ions present in chemically polar motor fuels such as E85 are known to be one of the primary species involved in general pitting corrosion, galvanic corrosion and stress corrosion cracking of automotive components[26].

While E85 currently being supplied is of generally high quality, meeting most of the parameters in the proposed E85 fuel quality standard (see Section 4, Option 4 and Appendix 1), there would be expected to be some issues arising with any expansion in the use of E85 with respect to inorganic chloride levels and vehicle/motor longevity, and the willingness of vehicle manufacturers to continue local manufacture and/or imports of E85-compatible vehicles.

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[25] Department of the Environment and Heritage, *Setting national fuel quality standards – Paper 2A Proposed management of petrol octane enhancing additives/products*, Canberra, 2000.

[26] Clarke S and Studzinski W (2010) *Flex fuel vehicle performance and corrosion study of E85 fuel with chloride addition.* Society of Automotive Engineers Powertrain Fuels and Lubricants Meeting, USA 2010. Available at: http://papers.sae.org/2010-01-2088/.

As the E85 market expands, inferior quality fuel may enter the market (as a cost-saving incentive for suppliers). Consumers are subject to asymmetric information, whereby fuel producers and retailers may be aware of the quality of the fuel supplied but consumers have no cost effective means of observing that quality. This could lead to engine damage, inconvenience to consumers (vehicle breakdown, time costs, repair costs), and potentially, risks to consumer safety.

2.1.3 Risks of misfuelling for consumers

E85 can only be used in vehicles specially designed or modified for it. Misfuelling with E85 may occur in the marketplace due to a lack of consumer awareness and primarily because the price of Bio E-Flex and other E85 automotive fuel products are expected to be significantly below that of regular unleaded petrol by approximately 20 cents per litre[27]. With a growing market for E85, the risk of misfuelling is also expected to increase if left unmanaged. Misfuelling could lead to engine damage, inconvenience to consumers (vehicle breakdown, time costs and repair costs) and, potentially, risks to consumer safety.

2.1.4 Risk of loss of consumer confidence

Without an E85 standard, consumers could be affected by either using inferior quality E85 or, without an information standard in place, accidentally using E85 in engines not designed for the fuel. As the market for E85 increases and the likelihood of these events occurring increases, consumer backlash and loss of confidence in the fuel and the alternative fuels industry in general could eventuate.

This was demonstrated in the early 2000s before ethanol was included in the petrol standard and the labelling standard put in place. Some higher ethanol blends, up to 30 per cent, were supplied without labelling which lead to widely publicised allegations of vehicle damage and significant loss of consumer confidence[28].

Should inferior quality E85 or misfuelling with E85 cause serious damage to vehicles, consumer backlash could affect vehicle manufacturers (eg. warranty issues, loss of sales and reputation, no development of the FFV market), fuel suppliers/retailers (loss of sales and reputation), and the ethanol fuel/alternative fuels industry (loss of support and consumer confidence).

[27] http://www.raa.com.au/page.aspx?TerID=1314 Accessed 19 October 2011.

[28] Australian Government Biofuels Taskforce, *Report of the Biofuels Task Force to the Prime Minister*, Commonwealth of Australia, Canberra, 2005.

2.1.5 Risks for competition and trade

Australian Government policy is to harmonise fuel standards with international or internationally accepted standards, where appropriate and applicable in the Australian context, in order not to impede competition and trade.

Achieving international harmonisation is an important government objective for fuel standards. Globally, FFVs are designed to meet the requirements outlined in international E85 fuel standards. If vehicle manufacturers are unsure of the quality of E85 being supplied in Australia, they may re-evaluate their business programs and decide not to produce or supply FFVs for the Australian market, and consumers may have a reduced range of cars to choose from. Harmonisation of fuel standards also allows Australia to meet international health and environmental standards.

2.2 Why is government action required?

With the current industry push for development of the E85 and FFV markets in Australia, there is a clear need to ensure that, as is the case for mainstream fuels, the quality of E85 being produced addresses health and environmental concerns while meeting the requirements of vehicle manufacturers and consumers.

3. OBJECTIVES OF GOVERNMENT ACTION

The objectives of government action are as follows:

- to further the objects of the Act, namely to:
    - regulate the quality of fuel supplied in Australia in order to:
        - reduce the level of pollutants and emissions arising from the use of fuel that may cause environmental and health problems; and
        - facilitate the adoption of better engine technology and emission control technology; and
        - allow the more effective operation of engines; and
    - ensure that, where appropriate, information about fuel is provided when the fuel is supplied.
- to complement existing related government standards, where appropriate.
- to harmonise where possible with international fuel standards, while taking into account specific Australian conditions.
- to minimise risks of misfuelling.

4. OPTIONS TO ACHIEVE OBJECTIVES

4.1 Option 1: No change (maintain the status quo)

There is currently no fuel quality standard that captures high ethanol blends such as E85, so E85 can be sold without reference to the Act. Although suppliers must ensure that they comply with any consumer protection requirements under the *Competition and Consumer Act 2010*, this does not regulate the quality of the fuel supplied.

In maintaining the status quo, inferior quality E85 may enter the Australian market, with risks to health and the environment, vehicle engine operability and consumers. The impacts of this option are examined in Table 2 (Section 5).

4.2 Option 2: Voluntary (Industry) regulation

A second option would be for voluntary (industry) regulation of E85, and this might occur at the point of the ethanol producers, the fuel suppliers (those blending the ethanol with petrol) or the retailers (fuel outlets).

Should ethanol producers set a voluntary standard, this would only consider the ethanol component of E85 and would not address the full scope required, including health risks which are derived from the petrol component.

Fuel suppliers (blenders) do not necessarily have the market power to dictate the quality of the ethanol produced or its individual parameters (eg. inorganic chloride level). Blenders may also consider using inferior quality petrol for blending to save costs, without considering the costs to health and the environment.

Retailers would not necessarily have the incentives to establish and maintain a self-regulatory system.

Prior to the introduction of the petrol standard, petrol quality was managed by the Australian Standard (AS 1876), which was essentially an industry guideline with no legislative basis. This standard focussed on minimising difficulties in engine function associated with petrol use and did not address all parameters relating to petrol engine performance[29]. The actual properties of Australian petrol differed in part both from the specifications in the guideline and between refineries[29]. It is likely that similar issues could arise if E85 were subject to voluntary regulation.

Overall, a voluntary system does not provide a legislative instrument to formalise current production methods and standards and will not ensure that future E85 producers,

[29] Department of the Environment and Heritage, *Setting National Fuel Quality Standards Paper 2 - Proposed Standards for Fuel Parameters (Petrol and Diesel)*, Canberra, 2000.

suppliers or retailers continue to meet these standards. Emerging producers, suppliers or retailers may not agree with the voluntary industry standard and would have no reason or requirement to produce high quality E85. Furthermore, they may not be inclined to ensure high quality E85 as some of the negative effects on vehicles may not always be attributed to the fuel used, as engine deterioration takes time and it is often difficult to diagnose a specific cause.

A voluntary industry standard would not guarantee that information on fuel quality would be made available to consumers. Consumers would remain subject to asymmetric information, with no cost effective means of observing fuel quality.

A voluntary industry standard would not provide an enforceable quality standard for the supply of E85 in Australia. As with Option 1, inferior quality E85 may enter the Australian market, with risks to health and the environment, vehicle engine operability and consumers. The impacts of this option are examined in Table 3 (Section 5).

4.3 Option 3: State and Territory government regulation

A third option would be for State and Territory governments to introduce E85 fuel quality standards.

Some States and Territories have fuel quality standards to regulate single fuel characteristics not covered by the Australian Government standards, eg. maximum petrol volatility which contributes to local smog. In addition, States have consumer affairs legislation that could be used to require labelling or to prosecute retailers that misrepresent the quality of their fuel (eg. *NSW Fair Trading Act 1987*, *Victoria Fair Trading Act 1999*).

Current State fuel quality legislation is not nationally consistent and at present there are no State or Territory regulations regarding the quality of E85. While some States have either introduced or considered introducing a mandate to promote the use of ethanol (Section 1.2.2), the department is unaware of any jurisdiction’s intention to introduce legislation to regulate the quality of E85 supplied.

Given that a national framework for fuel quality management exists, introducing additional separate and duplicative legislation in each state is unnecessary, would incur considerable time and cost, and could be seen as inefficient.

The impacts of this option are examined in Table 4 (Section 5).

4.4 Option 4: Set an E85 fuel quality standard and information standard under the Act

In Australia, the quality of several fuels including petrol, diesel, biodiesel and autogas is regulated by the *Fuel Quality Standards Act 2000* and related regulations and

determinations. A fourth option is to introduce a fuel quality standard for E85 (an E85 standard) and an E85 information standard under the Act that will specify parameters and ensure consistency in E85 quality, and provide information about the fuel at the point of sale. Setting these standards will provide for the availability of E85 fuel that meets the objects of the Act and best addresses the government's objectives. It is also the option supported by industry and State and Territory governments, as shown during consultation (Section 6). For the above reasons, Option 4 is the preferred option. The impacts of this option are examined in Table 5 (Section 5).

The E85 standard technical parameters, test methods and information standard are listed in Appendix 1.

5. IMPACT ASSESSMENT

The impacts of each option are examined against the baseline option of no change (Option 1, Table 2). The impacts of Option 2 (voluntary regulation) and Option 3 (State and Territory government regulation) are examined in Tables 3 and 4, respectively. The impacts of the preferred option, Option 4 - setting a fuel quality standard and an information standard for E85 automotive fuel under the *Fuel Quality Standards Act 2000* - are examined in Table 5.

5.1 Who will be affected?

Any of the four options will affect a number of groups. These include:

- fuel suppliers and retailers: most significantly Caltex Australia which currently supplies the majority of E85 on the Australian market, but also other fuel suppliers and importers;
- ethanol producers: there are currently three ethanol producers in Australia (Sucrogen BioEthanol, Manildra Group and Dalby Bio-Refinery);
- vehicle manufacturers: most significantly GM Holden which currently produces the only Australian-manufactured FFVs, but also future imports;
- the motor racing community: primarily specialty fuel suppliers;
- feedstock producers;
- the Australian, State and Territory governments;
- motorists; and
- the environment and the health of the wider community.

5.2 Anticipated impacts of each option

Under Options 1 and 2, no fuel quality standard or information standard for E85 would be set. E85 may continue to be produced and supplied to existing industry specifications that may not meet the requirements of all stakeholders, or, should the market for E85 grow and more suppliers begin to supply E85, there is a risk that inferior quality fuel may enter the market. Furthermore, the absence of an information standard may lead to risks to consumers, including misfuelling and loss of confidence in the fuel and alternative fuels industry in general.

Under Option 3, State-specific legislation has the potential to result in different standards for each jurisdiction. This may give rise to competition issues, by creating barriers for suppliers and importers to interstate markets and raising compliance costs.

Under Option 4, a fuel quality standard for E85 and an information standard would be set under the *Fuel Quality Standards Act 2000*.

Consultation with stakeholders (Section 6) has revealed that the main costs of Options 1 and 2 would be to vehicle manufacturers and consumers while the main costs of Options 3 and 4 would be to ethanol producers and fuel suppliers/retailers. However, overall, stakeholders have shown strong support for the introduction of an E85 standard (Option 4) in preference to no standard (Option 1), a voluntary (industry) standard (Option 2) or State and Territory regulation (Option 3).

The costs and benefits of each option, drawn from the consultation process, are summarised in Tables 2 to 5. Due to significant commercial-in-confidence considerations around competitive business operations, key stakeholders have not provided quantitative estimates of costs and benefits to their business of introducing the E85 standard. Therefore, the impact assessment of each option is necessarily qualitative by nature.

Table 2: Costs and benefits of Option 1: No change

Who is affected?	Option 1: No change	
	Costs	**Benefits**
Fuel suppliers/retailers	• Not a 'level playing field' for business competition. • Inferior fuel may enter market resulting in poor reputation for E85 and affecting those suppliers who supply quality fuel.	• No costs of labelling. • No infrastructure and tankage costs to segregate ethanol to be used for E10. • No costs of testing for compliance with a standard. • No reporting requirements. • No costs associated with maintaining documentation.
Ethanol producers	• No certainty in quality requirements.	• No costs of production, infrastructure and testing to meet more stringent parameters.
Vehicle manufacturers	• No confidence in quality and consistency of E85. • Local FFV manufacturing and/or imports affected. • Customer backlash if engine damage results from use of inferior quality E85 in FFVs. • Impacts on business - warranties, sales.	• None
Motor racing community (fuel suppliers)	• Reliance on niche fuel supplier for quality. • No market certainty for ongoing supply of E85 - impacts on racing motorsport events.	• Current arrangements for fuel supplies remain. • No costs associated with compliance with a standard, reporting requirements and any additional handling requirements.
Feedstock producers	• No market certainty for supply of feedstock for ethanol production.	• None
Governments	• Criticism for failing to set an E85 standard and meet objects of Act, especially if engine damage occurs. • Failure to harmonise with other government policies, especially "green choice" policies.	• No cost of monitoring quality and compliance testing.

Who is affected?	Option 1: No change	
	Costs	**Benefits**
Motorists (consumers)	• Engine damage due to inferior E85 or misfuelling: o safety risks o costs of repair o costs in time o loss of confidence in E85 and alternative fuels in general.	• None
Environment and community health	• Air pollution caused by ineffective operation of vehicles on inferior E85 or by operation of vehicles not suited to use E85. Examples of air pollution limited by a standard include benzene, lead and sulfur. • Opportunity cost of loss of development of an industry that could, in the future, deliver lower greenhouse gas emissions. • Investment in future second generation feedstock development not supported without confidence in the fuel quality.	• None

In summary, Option 1 does not meet the needs of industry for assured quality and does not meet the objects of the Act or the government's objectives.

Table 3: Costs and benefits of Option 2: Voluntary (industry) standard

Who is affected?	Option 2: Voluntary (industry) standard	
	Costs	**Benefits**
Fuel suppliers/retailers	• Business costs of establishing a voluntary standard. • No legislative instrument to formalise production methods. • No assurance that ethanol producers would meet, or continue to meet, the ethanol requirements in the voluntary standard. • No assurance that future suppliers of E85 would meet, or continue to meet, a voluntary standard. • Not a 'level playing field' for business competition. • Inferior fuel may enter market resulting in poor reputation for E85 and affecting those suppliers who supply quality fuel. • Possible costs of testing for compliance with a voluntary standard. • Costs and any restrictions involved in meeting a voluntary standard set by other industry involvement, eg. ethanol producers.	• No requirement to change current quality of fuel supplied. • Parameters could be set to suit production capabilities. • No requirements to change current fuel handling. • No reporting requirements. • No costs associated with maintaining documentation. • No labelling costs.
Ethanol producers	• Business costs of establishing a voluntary standard - standard may not consider petrol component. • No assurance that future producers of ethanol would meet, or continue to meet, a voluntary standard. • Costs (eg. compliance testing) and any restrictions	• No costs of production, infrastructure and testing if meeting current industry standards.

Who is affected?	Option 2: Voluntary (industry) standard	
	Costs	**Benefits**
	involved in meeting a voluntary standard set by other industry involvement, eg. E85 suppliers (blenders). • No certainty in quality requirements if not all suppliers wish to meet the voluntary standard.	
Vehicle manufacturers	• No confidence in quality and consistency of E85. • Local FFV manufacturing and/or imports affected. • Customer backlash if engine damage results from use of inferior quality E85 in FFVs. • Impacts on business - warranties, sales.	• None
Motor racing community (fuel suppliers)	• Reliance on niche fuel supplier for quality. • No market certainty for ongoing supply of E85 - impacts on racing motorsport events.	• Current arrangements for fuel supplies remain. • No costs associated with compliance with a standard, reporting requirements and any additional handling requirements.
Feedstock producers	• No market certainty for supply of feedstock for ethanol production.	• None
Governments	• Criticism for failing to set an E85 standard and meet objects of Act, especially if engine damage occurs. • Failure to harmonise with other government policies, especially "green choice" policies.	• No cost of monitoring quality and compliance testing.
Motorists (consumers)	• Engine damage due to inferior E85 or misfuelling: o safety risks o costs of repair o costs in time o loss of confidence in E85 and alternative fuels in general.	• None

Who is affected?	Option 2: Voluntary (industry) standard	
	Costs	**Benefits**
Environment and community health	• Air pollution caused by ineffective operation of vehicles on inferior E85 or by operation of vehicles not suited to use E85. Examples of air pollution limited by a standard include benzene, lead and sulfur. • Opportunity cost of loss of development of an industry that could, in the future, deliver lower greenhouse gas emissions. • Investment in future second generation feedstock development not supported without confidence in the fuel quality.	• None

In summary, Option 2 does not provide an enforceable legislative instrument in an industry where the negative impacts of fuel on engines are not immediately apparent and are difficult to attribute to the fuel after some time has passed. This option does not necessarily protect human health and the environment from toxic emissions and therefore does not meet the objects of the Act or the government's objectives.

Table 4: Costs and benefits of Option 3: State and Territory government regulation

Who is affected?	Option 3: State and Territory government regulation	
	Costs	**Benefits**

Fuel suppliers/retailers	• Requirement of suppliers to meet state specifications, affecting (where specifications differ between states):
	  ○ production processes
	  ○ supply networks
	  ○ fuel handling (storage, tankage, outlets).
	• Meeting disparate specifications may force unfavourable business decisions to supply only to select state(s).
	• If set, cost of requirements for:
	  ○ testing
	  ○ reporting
	  ○ labelling
	  ○ maintaining documentation.
		• Provides legislative requirement to produce high quality E85, but on a state-by-state basis.

Ethanol producers	• Costs of production, infrastructure and testing to meet more stringent and/or state-specific parameters.	• Certainty in quality requirements would facilitate/streamline production processes if quality parameters align between jurisdictions. • Quality product would find a market.
Vehicle manufacturers	• None	• Confidence in quality and consistency of fuel. • Supports local business program - FFV manufacturing/imports. • Customer satisfaction.
Motor racing community (fuel	• Costs associated with compliance, labelling and any additional handling requirements.	• Standard may assist market certainty for ongoing supply of quality fuel.

Who is affected?	Option 3: State and Territory government regulation	
	Costs	**Benefits**
suppliers)	• Different state specifications may impact on expected fuel performance.	• Promotion of "greener choice" fuel at motorsport events. • Consistency in fuel performance - meets expectations (may be based on state specifications).
Feedstock producers	• None	• Market certainty. • Alternative market for product.
Governments	• Cost of setting and implementing standards which may not align with each other (in terms of specifications or timing). • Viewed as inefficient and unnecessary (eg. waste of resources) when a national fuel quality framework already exists. • Costs of monitoring quality and compliance testing. • State-specific legislation has the potential to result in different standards for each jurisdiction. This may give rise to competition issues, by creating barriers for refiners and importers to interstate markets and raising compliance costs. • Could be viewed unfavourably if fuel suppliers make business decisions to supply to select state(s), resulting in E85 shortages in other states.	• Supply of quality E85 fuel ensured, at least for that state. • Stakeholder concerns partly addressed.
Motorists (consumers)	• Inconvenience/lack of choice if fuel suppliers make business decisions to only supply E85 to select state(s). • Fuel specifications in a given state may not meet performance expectations of consumer in that state.	These may vary state-by-state but include: • Fuel performs as expected. • Customer satisfaction: o fuel quality o "green choice". • No repair or time costs due to damage from inferior quality

Who is affected?	Option 3: State and Territory government regulation	
	Costs	**Benefits**
		E85. • No misfuelling. • Customer safety risks reduced. • Confidence in the fuel. • Availability of advanced engine technology.
Environment and community health.	• None	• Standards set parameters that reduce level of pollutants and emissions that may harm the environment or affect health (benzene, lead and sulfur). • Existence of standards foster growth of an industry that could, in the future, deliver lower greenhouse gas emissions. • Having standards could foster the ethanol fuel industry, encouraging investment in second generation feedstock development.

In summary, Option 3 is duplicative and inefficient given that a national framework for fuel quality already exists.

Table 5: Costs and benefits of Option 4: Set fuel quality and information standards for E85

Who is affected?	Option 4: Set fuel quality and information standards for E85	
	Costs	**Benefits**
Fuel suppliers/retailers	• Labelling. • Possible infrastructure and tankage costs to segregate ethanol to be used for E10. • Testing requirements. • Reporting requirements. • Maintaining documentation.	• Level playing field for business competition. • Certainty in product supports sales and maintains/builds reputation.
Ethanol producers	• Costs of production, infrastructure and testing to meet more stringent parameters.	• Certainty in quality requirements would facilitate/streamline production processes. • Quality product would find a market.
Vehicle manufacturers	• None	• Confidence in quality and consistency of fuel. • Supports local business program - FFV manufacturing/imports. • Customer satisfaction.
Motor racing community (fuel suppliers)	• Costs associated with compliance, labelling and any additional handling requirements.	• Standard may assist market certainty for ongoing supply of quality fuel. • Promotion of "greener choice" fuel at motorsport events. • Consistency in fuel performance - meets expectations.
Feedstock producers	• None	• Market certainty. • Alternative market for product.
Governments	• Costs of monitoring quality and compliance testing.	• Objects of Act met. • Harmonisation with other government policies.

Who is affected?	Option 4: Set fuel quality and information standards for E85	
	Costs	**Benefits**
		• Ease of implementation as legislative framework already exists. • Supply of quality E85 fuel ensured. • Nationally consistent standard. • Stakeholder concerns addressed.

Motorists (consumers)	• None	• Fuel performs as expected.
		• Customer satisfaction:
		  ○ fuel quality
		  ○ "green choice".
		• No repair or time costs due to damage from inferior quality E85.
		• No misfuelling.
		• Customer safety risks reduced.
		• Confidence in the fuel.
		• Availability of advanced engine technology.

Environment and community health	• None	• Standard sets parameters that reduce levels of pollutants and emissions that may harm the environment or affect health (benzene, lead and sulfur). • Existence of a standard fosters growth of an industry that could, in the future, deliver lower greenhouse gas emissions. • Having a standard could foster the ethanol fuel industry, encouraging investment in second generation feedstock development.

In summary, Option 4 best meets the objects of the Act and the government's objectives and is the preferred option for stakeholders. It provides the best outcome for human health and the environment by limiting air pollution. It assures consumers of a quality fuel that will not damage engines, and consumer confidence will allow growth of the industry. It assures vehicle manufacturers and importers of the availability of

consistently high quality fuel and provides a level playing field for fuel producers. It harmonises with other major overseas approaches and will be straightforward to implement given the existence of the fuel quality legislative framework.

6. CONSULTATION

6.1 The Process

Extensive consultation on both setting an E85 standard and on the technical parameters within the E85 standard itself was undertaken.

A discussion paper outlining possible parameters and limits was circulated to members of the Fuel Standards Consultative Committee (FSCC)[30] in 2009, giving them the opportunity to provide input into the development of the E85 standard. The department provided updates on the progress of the development of the E85 standard at FSCC meetings. A list of FSCC members is at Appendix 2.

The department has also consulted directly with those groups that will be most affected by the introduction of an E85 standard. These key stakeholders include: Caltex Australia (the main supplier of E85 fuel in Australia), GM Holden (currently the only local manufacturer of FFVs in Australia), ethanol producers (Sucrogen BioEthanol, Manildra Group and Dalby Bio-Refinery), and the Biofuels Association of Australia (BAA). Technical advice on the parameters and test methods was further sought from a testing laboratory under contract with the department.

Overall these stakeholders showed strong support for an E85 standard.

The department released a position paper entitled *Setting National Fuel Quality Standards – proposed Fuel Quality Standard – Ethanol (E85) Automotive Fuel* on 17 June 2011 for a six week public consultation period, which closed on 29 July 2011. The position paper was circulated directly to the key stakeholders described above, the FSCC and to the following government departments and organisations:

- Australian Competition and Consumer Commission
- Commonwealth Scientific and Industrial Research Organisation
- Department of Agriculture, Fisheries and Forestry
- Department of Climate Change and Energy Efficiency
- Department of Foreign Affairs and Trade
- Department of Health and Ageing
- Department of Infrastructure and Transport (via their FSCC membership)
- Department of the Prime Minister and Cabinet
- Department of Resources, Energy and Tourism (via their FSCC membership)
- Department of the Treasury
- National Measurement Institute

[30] A statutory committee established under the Act to advise the Minister in his or her decision to make or amend national fuel quality standards and information standards.

- State and Territory jurisdictions with key interests in the development of an E85 fuel quality standard (via their FSCC membership).

Advertisements were placed in nationally circulated newspapers (The Weekend Australian on 18 June 2011 and The Australian Financial Review on 20 June 2011) and on the department's website to maximise opportunities for responses on the position paper. This public consultation was in addition to the requirement under the Act that the minister consult the FSCC before making the decision to set a fuel quality standard.

The position paper specified technical parameters that would need to be met if an E85 standard were to be set in Australia and recommended the test methods that would be used to determine compliance. It proposed labelling requirements to address misfuelling concerns. As Australian Government policy is to harmonise fuel standards with international standards where appropriate, taking into consideration local conditions, the position paper also compared the E85 standard with E85 fuel quality standards already in place in the US and the EU.

Many of the issues canvassed by the position paper were technical in nature. For this reason, and reflecting the small number of key stakeholders, the department held two teleconferences (on 22 June 2011 and 28 July 2011) with the key stakeholders to address some technical issues.

6.2 Submissions received

The department received eleven submissions from various non-government groups (Table 6). FSCC members were also consulted via email out-of-session on the proposed labelling requirements.

Two groups (GM Holden and Fuel Control Pty Ltd) marked their submission as confidential. Submissions from FSCC members are also treated as committee-in-confidence.

The content of the remaining submissions is publicly available at: www.environment.gov.au/fuelquality.

Table 6: Non-government submissions received during public consultation

Group	Submissions
Ethanol producers	1 (represented by the Biofuels Association of Australia)
Fuel suppliers • general • racing	 2 (Caltex Australia, BP Australia) 2 (Race Fuels Pty Ltd, Fuel Control Pty Ltd)
Car manufacturers	2 (GM Holden, Saab Car Australia Pty Ltd)
Consumer groups	1 (represented by the Australian Automobile Association)
Motor Sport group	1 (Confederation of Australian Motorsport Ltd)
Member of public	1
International	1 (ASTM International USA – who develop and deliver voluntary and consensus standards, including fuel standards)

6.3 Views expressed

Overall there was strong support for setting a fuel quality standard for E85. Stakeholder reasons for favouring the introduction of an E85 fuel quality standard included:

- supporting the development of the ethanol fuel industry in Australia and the alternative fuels industry in general
- ensuring certainty and consistency in the E85 product, especially for vehicle manufacturers (for calibrating engines) and consumers (motorists)
- developing and maintaining consumer confidence in E85 as an alternative fuel.

There was general support for the technical parameters required to be met under the E85 fuel quality standard and the recommended test methods to determine compliance with the standard.

Concerns raised by stakeholders and how they have been considered are presented in Table 7.

As a result of the consultation process, some changes have been made to the standard since its release in the position paper. These changes are summarised in Appendix 3.

Table 7: Stakeholder concerns and how they have been addressed

Concern	Feedback	How considered
E85 terminology	The term 'E85' could lead to consumer confusion because the fuel contains 85 per cent ethanol, not 70 to 85 per cent ethanol. Consumer expectations may not be met if they purchase E85 that does not contain 85 per cent ethanol. The recently revised US E85 standard now refers to the fuel as "ethanol fuel blends" that may be marketed as "ethanol flex-fuel". This is intended to address misconceptions that the fuel contains 85 per cent ethanol.	The name of an E85 standard would be 'Ethanol (E85) Automotive Fuel Quality Standard'. This title is chosen for simplicity, and because it is the internationally accepted term for a blend with a maximum of 85 per cent ethanol, but that can be as low as 50 per cent in the EU and the US. The ethanol content for Australia, 70-85 per cent, would be defined in the standard. An information standard for E85 would require that the fuel must be clearly labelled to reflect that it contains 70 to 85 per cent ethanol, reducing the risk of consumer confusion. The 70 and 85 per cent ethanol range is required to address cold start problems during winter. It would not be feasible to provide the exact ethanol content of E85 fuel on the label each time a different ethanol percentage is supplied. Several options for wording may be provided. Caltex Australia currently markets their E85 product as "Bio E-Flex" and uses "Contains 70 - 85% ethanol" on the label and United Petroleum markets "Ethanol 85" and uses "85% ethanol" on the label.
Definition of the petrol component.	The definition of E85 should be changed to those words used in the US E85 standard ASTM D5978-10a, which are: "*It is proposed that Ethanol (E85) automotive fuel be*	There are stakeholders for and against allowing rBOB to be used for blending E85. To best meet the objects of the Act, to protect the environment and ensure engine operability, the petrol component of E85 will be required to meet the petrol standard. rBOB does not meet the petrol standard.

Concern	Feedback	How considered
	defined as a fuel blend, nominally 70-85 volume % denatured fuel ethanol and 30 to 15 additional volume % hydrocarbons for use in ground vehicles with automotive spark-ignition engines." This would allow reformulated blendstock for oxygenate blending (rBOB) to enter the market with the increasing use of ethanol in petrol. rBOB is widely used in the US. It saves energy and resources by avoiding the use of more octane than necessary, improving refinery viability and being produced to ensure that the relevant fuel standards are met when blended with ethanol. Conversely: rBOB should not be allowed since the chemical composition and properties of an rBOB that may change pre-ignition properties of high ethanol blends is a concern. Environmental losses would be incurred (efficiency and mileage) and higher levels of environmentally toxic emissions produced than if the petrol component met the petrol standard.	
Seasonal supply of summer and winter blends.	Seasonal classes should be regulated to ensure consistency and harmonisation across suppliers and to protect consumers (from cold-start problems).	The precedent with other fuel standards under the Act has been to allow industry to determine seasonal classes. The advantages of this include: • blends can be tailored to local conditions which may

Concern	Feedback	How considered
	Industry should determine seasonal classes to enable the supply of the fuel for specialists, particularly the racing community, who require 85 per cent ethanol all year round. The two volatility classes proposed will be adequate to manage Australian temperatures. However, if field experience reveals a need for a third volatility class, with an ethanol content as low as 60 per cent, a future amendment to the E85 standard would be required.	vary from the state average on which a mandatory supply is based • there are no costs associated with unsold fuel at the end of the winter season • current industry fuel distribution networks, which are based on terminal locations rather than geographic or state borders, may still be used • racing fuel suppliers can supply premium 85 per cent ethanol blend all year round • no costs of regulation. The main disadvantage of industry determining which seasonal class to supply is the possibility of cold-start problems. Engine manufacturers have provided assurance that these are unlikely until -10°C, and they can in any case be addressed by alerting motorists.
Additives	Due to serious environmental consequences from spills of additives such as methyl tertiary-butyl ether (MTBE), steps should be taken to minimise the risks associated with such substances. While specifying inclusion limits for additives might be difficult to enforce, consideration should be given to make an entry in the Register of Prohibited Fuel Additives to prohibit the use of substances such as MTBE.	MTBE is limited by the ether parameter.
Appearance	Colouring dye should be permitted in this parameter for a variety of purposes including product identification for correct fuelling of race vehicles, safety (eg. identification of spills), and adding to the atmosphere of race events by	Due to testing difficulties, there will not be an appearance parameter in the standard, so colouring dyes can be used.

Concern	Feedback	How considered
	enabling spectators to more easily see the fuel when race cars are being re-fuelled.	
Copper (0.10 mg/kg max)	There should be a lower copper content similar to that in the US E85 standard (0.07 mg/L).	The proposed limit is identical to the EU limit and equivalent to the US limit when units are converted.
Density	Inclusion of a density specification similar to the range in the European E85 standard CEN/TS 15293:2011 may benefit consumers since liquid automotive fuels are sold by volume but the energy content is dependent on mass.	There was only one call for a density parameter. This is not included in US standard and is not considered necessary at this time.
Inorganic chloride limit (1 mg/kg max)	Capital expenditure would be required by ethanol producers to meet the limit and costs would be passed onto both E85 and E10 consumers. Without the 1 mg/kg limit, damage to FFVs that use E85 could occur, resulting in risks to consumer safety, costs to vehicle manufacturers (warranties, reputation, sales/imports), and loss of confidence in the fuel.	Ethanol producers tested their product with a method agreed during the first teleconference and established that they could immediately meet an inorganic chloride limit of 3 mg/kg and, after a one year phase-in period, will be able to meet the 1 mg/kg limit[31]. No cost estimates for meeting this limit were provided. The one year phase-in period was requested to allow further testing to be undertaken at different times of the year with different weather conditions and feedstock conditions to allow for absolute certainty in the E85 product.
RON and MON	Minimum targets for RON and MON should not be set. The variability of tests above 100 RON becomes too high and thus problematic to test. Publicising RON and MON should not be permitted for safety reasons; attractively high octane levels may lead to misfuelling and consumers may compare the fuel with	As technical advice has indicated that there are issues with testing octane in E85, it will not be possible to set an enforceable lower limit in the standard. Minimum targets of 100 RON and 87 MON are likely to be much lower than actual levels, but serve as an interim target until testing difficulties can be resolved. Setting a minimum

[31] The department received this advice on 14 August 2011, so a one-year phase-in period from this date would result in a 1 mg/kg inorganic limit being effective from 14 August 2012 at the earliest.

Concern	Feedback	How considered
	motorspirit such as avgas and assume the fuel is appropriate for use in aircraft. A minimum target RON and MON of 100 and 87, respectively, should be set to support engine development and validation.	target level allows for engine calibration and the possibility of mandating a minimum, once technical and testing issues are resolved. This target would appear in the standard and not at the point of sale, unless the retailer wished to promote the known actual levels and was certain of the methods used to obtain them.
Sulfate limit (4.0 mg/kg max)	Cautions that the limit is too high. During 2009, sulfate levels in ethanol shipments used for E85 correlated with an increase in the number of fuel injectors being replaced (due to clogging and deposits) on the Swedish market. The new Swedish E85 standard (SS 155480:2011) has lowered the sulfate limit from 4.0 mg/kg to 1.7 mg/kg.	The proposed limit is identical to the EU standard and also to the Australian petrol standard. No other comments were received during consultation on this limit. The main producer of the majority of cars currently using E85 in Australia is comfortable with 4.0 mg/kg, and in the absence of any other data, this is the proposed limit.
Water	Maximum water content should be set at 0.5% in the interests of improving fuel economy and power for the consumer and to harmonise with the European E85 standard CEN/TS 15293:2011.	In the absence of any data supporting this proposal, the limit will remain 1.0%.
Ethanol parameters in the petrol standard.	These concerns relate to the more stringent limit on inorganic chloride of 1 mg/kg in E85 compared to 3.2 mg/kg in E10[32]. If the E85 standard was introduced with a 1 mg/kg inorganic chloride limit, the petrol standard (E10) should be adjusted to ensure fuel grade ethanol is suitable for blending into E85. Investment costs required by ethanol producers would be passed on to both E85 and E10 users.	Since ethanol producers can meet inorganic chloride levels of 3 mg/kg immediately and 1 mg/kg within a year, this ethanol would already meet the 3.2 mg/kg inorganic chloride limit set under the petrol standard, and the infrastructure and tankage requirements used for ethanol for blending E85 could be used for ethanol for blending E10 (although not conversely). Therefore there will be no impact on the petrol standard by setting an E85 standard with a more stringent limit on inorganic chloride levels.

[32] The more stringent limit of 1 mg/kg inorganic chloride for E85 is necessary since a higher proportion of ethanol in the fuel results in more contact of inorganic chloride with engine components.

Concern	Feedback	How considered
	Without a single standard for ethanol that would permit blending into either E85 or E10, retailers would incur segregation (infrastructure and tankage) costs out of proportion to the availability of the fuel.	Producers can make a commercial decision to supply only the E10 market to lower production costs, or to supply to the E85 market and meet the more stringent inorganic chloride limit.
Information standard (labelling requirement).	Labelling should not be mandatory because the *Competition and Consumer Act 2010* provides general provisions covering the same area. Only products with 85 per cent ethanol should be marketed as E85 while other ethanol blends should be compulsory labelled and marketed as "ethanol blend". The proposed wording "for use in flex-fuel vehicles only" cannot apply to E85 produced for race and competition vehicles built or modified to use that particular E85. There is a degree of consumer confusion and misfuelling with a range of automotive fuels, including E85, and a consistent and coordinated approach to labelling of fuels in general should be considered.	Setting an information standard for E85 would: • meet the objects of the Act • be consistent with the precedent of labelling ethanol blends (E10) already available in Australia • reduce the risk of misfuelling by consumers at the point of sale. In light of the concerns raised about the use of E85 in vehicles other than FFVs, flexibility has been built into the required wording on information labels (see E85 Information Standard in Appendix 1).
Other concerns: • Feedstock	Feedback: • Increased demand for E85 causing competition for feedstock with meat and dairy producers, leading to increased food and feed prices and impacting Australia's international competitiveness in food and animal-based products.	All outside of scope of RIS except cold starts (addressed above).

Concern	Feedback	How considered
	• Global warming and ability to grow feedstock needed for E85. • Greenhouse gas production.	
• Ethanol industry	• Future ethanol production capacity/skills set. • Price hike if producers incur costs to meet standard. • Ethanol shortages for uses other than fuel blending. • Export/imports.	
• E85 market	• Price increases if market takes off. • Older stations' capacity to manage new fuel. • Fuel lifespan (use-by-date). • Cold starts.	

7. CONCLUSION

Option 4, setting a fuel quality standard and information standard for E85 best meets the objects of the *Fuel Quality Standards Act 2000* and government objectives, and is the preferred option of stakeholders.

Option 4 provides the best outcome for human health and the environment by limiting air pollution. It assures consumers of a quality fuel that will not damage engines, and consumer confidence will allow growth of the industry. It assures vehicle manufacturers and importers of the availability of consistently high quality fuel and provides a level playing field for fuel producers. It harmonises with other major overseas approaches and will be straightforward to implement given the existence of the fuel quality legislative framework. Setting a fuel quality information standard for E85 will address the risk of misfuelling.

Option 1, no standard, does not meet the needs of industry for assured quality and does not meet the objects of the Act. Option 2, voluntary industry regulation, does not provide an enforceable legislative instrument in an industry where the negative impacts of fuel on engines are not immediately apparent and are difficult to attribute to the fuel after some time has passed. This option does not necessarily protect human health and the environment from toxic emissions and therefore does not meet the objects of the Act. Option 3, State and Territory legislation, is duplicative and inefficient given that a national framework for fuel quality already exists.

8. IMPLEMENTATION AND REVIEW

The drafting of a new fuel quality standard under the Act would be required to implement the preferred option. This standard would outline the parameters and limits that will regulate the quality of E85 fuel in Australia, and it would list the test methods that will be used to determine compliance with the E85 standard. An information standard setting out how E85 fuel must be identified to consumers would accompany, or be introduced soon after, the E85 standard.

The Act permits electronic lodgements of annual reports, significantly reducing the cost of compliance to industry. There will be minimal impact on current compliance monitoring.

The Minister must cause an independent review of the operation of the Act to be undertaken at intervals of not longer than five years. The first review of the Act was tabled on 14 June 2005. A second review will likely begin in the near future.

If Ministerial approval is given for this standard, it is likely that the proposed fuel quality standard for E85 could be implemented in mid-2012.

APPENDIX 1: E85 Standards

E85 Quality Standard: technical parameters and test methods

Ethanol (E85) automotive fuel is defined as a fuel blend, 70-85% fuel ethanol with the remaining volume consisting of petrol that meets the requirements of the Fuel Standard (Petrol) Determination 2001.		
Environmental parameters		
Parameter	**Specifications**	**Test methods**
Benzene	0.35% v/v max	ASTM D5580
Ethers (5 or more C atoms)	1.0% v/v max	ASTM D5501
Lead content	5 mg/L max	ASTM D3237
Phosphorus	1.3 mg/L max	ASTM D3231
Sulfate	4.0 mg/kg max	ASTM D7319
Sulfur	70 mg/kg max	ASTM D5453
Operability parameters		
Parameter	**Specifications**	**Test methods**
Ethanol	70-85% v/v	ASTM D5501
Vapour Pressure (DVPE)	38-65 kPa at 37.8°C	ASTM D5191
Acidity (as acetic acid)	0.006% m/m max	ASTM D1613
Copper	0.10 mg/kg max	EN 15837 (as modified in CEN/TS 15293)
Final boiling point (distillation)	210°C max	ASTM D86
Higher alcohols (C_3-C_8)	2.0% v/v max	ASTM D5501
Inorganic chloride	1 mg/kg max from 14 August 2012 (3 mg/kg interim limit from commencement of standard).	ASTM D7328
Methanol	0.5% v/v max	ASTM D5501
Oxidation stability	360 minutes min	ASTM D525
pHe	6.5-9.0	ASTM D6423
Solvent washed gum	5 mg/100 mL max	ASTM D381
Water	1.0% m/m max	ASTM E1064
Research Octane Number	100 min	-
Motor Octane Number	87 min	-

E85 Information Standard

The following words must be clearly displayed on any service station pump that dispenses E85, as close as practicable to each nozzle that dispenses that fuel.

Standard labelling	Alternative
"Contains 70-85% ethanol" *"Not Petrol or Diesel"*	*"Contains x% fuel ethanol"* *"Not Petrol or Diesel"* *(where x is a number between 70 and 85)*

These words must also be provided to a buyer of this fuel in a document or a label on a container if the sale is other than from a service station, and be provided in a document by a supplier to a retailer at the time of the supply of the fuel.

APPENDIX 2: FSCC Membership

Group Represented	Membership
State/Territory	NSW Department of Environment, Climate Change and Water
	Qld Department of Environment and Resource Management
	SA Environment Protection Authority
	Tasmanian Department of Primary Industries, Parks, Water and Environment
	Environment Protection Authority Victoria
	WA Department of Environment and Conservation
	ACT Department of the Environment, Climate Change, Energy and Water
	NT Department of Planning and Infrastructure
Australian Government	Department of Infrastructure and Transport
	Department of Resources, Energy and Tourism
Fuel producers	Australian Institute of Petroleum
Non-government body with an interest in the protection of the environment.	Clean Air Society of Australia and New Zealand
Consumers	Australian Automobile Association (AAA)
Light vehicle manufacturing industry.	Federal Chamber of Automotive Industries
Independent fuel importers and suppliers.	Independent Petroleum Group
Truck manufacturing industry.	Truck Industry Council
Alternative and renewable fuels industry.	Biofuels Association of Australia (BAA)

APPENDIX 3: Changes to the E85 Standards following consultation

Parameter	Change	Rationale for change
Acidity	Specification changed from 0.005% v/v max to 0.006% m/m max.	Technical advice suggested the amount should be 85 per cent of the limit set for ethanol in the petrol standard (0.007% m/m) and units should be mass by mass.
Appearance	Removed from standard.	Test method ASTM D4801 is not descriptive enough to be considered a test method (technical advice) and is unlikely to lead to a prosecution under the Act. Its removal also allows for colouring to be added, eg. for race fuel.
Benzene	Specification added: 0.35% v/v max.	This parameter was not included in the position paper released for public consultation but was proposed by technical advisors during consultation. Benzene content is a measure of whether petrol compliant with the petrol standard has been used in the blend. Benzene is a known carcinogen and is limited to 1% maximum in the petrol standard to reduce health exposure risk to the community. The maximum proportion of petrol in an E85 blend is 30% and the 0.30% v/v limit for benzene is the corresponding proportion. An additional 0.05% is included as an error margin, hence the limit is 0.35% v/v max.
Copper	Added '(as modified in CEN/TS 15293)' to the test method.	The necessary modification had been omitted in the position paper.
Ethanol	Deleted '(modified)' from the test method.	To align with US ASTM D5798.
Ethers (5 or more carbon atoms)	Deleted '(modified)' from the test method.	To align with US ASTM D5798.
Final Boiling Point	Specification added: 210°C max.	This parameter was not included in the position paper released for public consultation but was proposed by technical advisors during consultation. The final boiling point is a measure of whether petrol compliant with the petrol standard has been used in the blend, protecting catalytic converters

Parameter	Change	Rationale for change
		from longer chain hydrocarbons and thereby protecting air quality.
Higher alcohols	Deleted '(modified)' from the test method.	To align with US ASTM D5798.
Inorganic chloride	Test method ASTM D7319 removed. An interim limit of 3 mg/kg will apply until 14 August 2012, from when 1 mg/kg will apply.	Technical advice supports test method ASTM D7328. Aligns with recently revised US E85 standard which removed other test methods. Ethanol producers have agreed to use this method and have advised that they can meet the 1 mg/kg limit within one year (by August 2012, see Table 7).
Lead	Specification added: 5 mg/L max.	This parameter was not included in the position paper released for public consultation but was proposed by technical advisors during consultation. Lead content is a measure of whether petrol compliant with the petrol standard has been used in the blend, protecting catalytic converters from deactivation and thereby protecting air quality.
Methanol	Deleted '(modified)' from the test method.	To align with US ASTM D5798.
Oxidation stability	Test method ASTM D525 added.	Technical advice.
Phosphorus	Specification changed from 0.0013 g/L max to 1.3 mg/L max.	Same phosphorus limit but units consistent with those in the test method.
RON/MON	Indicative targets added: 100 RON and 87 MON.	The parameters of 100 RON and 87 MON are likely to be much lower than actual levels, but serve as interim targets. Allows for engine calibration and the possibility of mandating a minimum, once technical and testing issues are resolved.
Labelling	Alternative wording for race fuels added. Removal of reference to vehicle type.	Addresses requirements of race fuel suppliers. Removal of vehicle type avoids tying the legislation to a specific vehicle technology and name..
E85 volatility classes for Australian	Removal of proposed volatility classes and government guide for seasonal supply of E85 volatility classes. Replaced	Fuel must be fit for purpose and industry is best positioned to determine the seasonal supply and vapour pressure of E85 in any given month (see Table 7). Defining two classes is not necessary if they are not being

Parameter	Change	Rationale for change
climatic zones.	with a single vapour pressure range. Removal of the statement: “The maximum vapour pressure shall be whichever is the lower of the limit stated above or that set by the State or Territory government.”	regulated by the government. Removal of the guide avoids potential confusion with supply responsibilities and avoids any future need for updating in the standard. The statement was unnecessary since the Act (under section 9) already provides that the Act does not override state-based legislation that prescribes a higher standard for fuel. Some States restrict maximum Reid Vapour Pressure of petrol (including E10) in summer in urban areas to reduce air pollution from evaporation. Where such regulations exist and apply to E85, the fuel will need to comply with both those standards and the E85 standard (ie. conform to the lower maximum of the two).