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# **FCAI Response to DEWHA Draft Discussion Paper; Review of LPG (Autogas) Fuel Quality Standard**

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## 1. INTRODUCTION

The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing manufacturers and importers of passenger vehicles, light commercial vehicles and motorcycles in Australia.

This submission outlines the FCAI's response to the Department of the Environment, Water, Heritage and the Arts (DEWHA) "*Review of LPG (Autogas) Fuel Quality Standard; Draft Discussion Paper*<sup>1</sup>."

The FCAI considers that fuel quality standards are critical for continued in-service delivery of improved vehicle emissions. Without fuel meeting the necessary fuel quality standards in the market any anticipated benefits from improved vehicle emission standards will not be achieved.

The FCAI supports harmonisation of Australian vehicle standard regulations with international regulations or standards where appropriate. Similarly the FCAI supports the intention to amend the Australian *Autogas Fuel Quality Standard* based on the changes to the EN 589, noting some differences may be necessary due to climatic conditions and that Australian vehicles are sourced from 20 different countries.

The FCAI also supports DEWHA's proposal to amend the standard in two tranches, with initially amending those parameters already identified in the draft Discussion Paper. The FCAI encourages DEWHA to consult closely with the vehicle manufacturers to understand the fuel quality requirements for new LPG technologies and notes that some FCAI member companies will provide individual responses to DEWHA based on the LPG technologies in their products.

## 2. DEWHA PROPOSAL

The Draft Discussion paper proposes to amend the autogas standard to align with EN 589 from June 2010.

DEWHA recognise that it is important to ensure any amendments facilitate the introduction of advanced LPG engine technology. Therefore the review may involve two tranches;

- Amend only those parameters that have been amended in EN 589 by June 2010 to harmonise the Australian autogas fuel quality standard with the European standard.

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<sup>1</sup> Review of LPG (Autogas) Fuel Quality Standard Draft Discussion Paper, The Australian Government, Department of the Environment, Water, Heritage and the Arts, January 2010

- Review and amend other parameters, if required, at a later date.

### 3. FCAI RESPONSE – GENERAL COMMENTS

LPG is a valuable and plentiful fuel source in Australia (natural deposits as well as by-product of refinery operations) with good re-fuelling infrastructure. It makes sense to utilise this fuel from an energy security perspective as well as the potential environmental benefits associated with this transport fuel (compared to the conventional petrol and diesel fuels).

The introduction of Euro 4 emission standards in ADR 79/02 for spark ignition engine vehicles for light vehicles (up to 3.5 tonnes GVM) from 1 July 2008 has encouraged the adoption of more sophisticated LPG systems. The on-board diagnostic (OBD) elements of Euro 4 emission standards will apply to LPG vehicles for the first time in Australia. These newer LPG systems also have the potential to deliver substantial improvements in emissions of carbon dioxide (CO<sub>2</sub>) compared to the earlier generation LPG equipment.

The FCAI supports the review of the LPG (Autogas) Fuel Quality Standard to support the adoption of the latest generation of LPG systems.

The particular issues raised in the Introduction of the draft discussion paper are addressed below:

**Comment:** In order to determine the impacts of any proposed amendments to the autogas standard, stakeholders are asked to provide an indication of potential costs to industry from the tightening of any parameters discussed in this paper.

The FCAI supports tightening of the parameters for LPG discussed in this paper as fuel quality standards are a pre-requisite to the introduction of more sophisticated LPG systems in vehicles and lack of action in this regard will be a cost to the vehicle industry.

As noted in “Section 3 Current Policy” of the draft Discussion Paper the Australian Government is examining the case for mandatory or voluntary regulation of CO<sub>2</sub> emission from motor vehicles. The FCAI considers that achieving a CO<sub>2</sub> emissions target depends on both vehicle technologies and fuel standards. Many FCAI member companies already have ambitious targets to reduce CO<sub>2</sub> emissions of their vehicles by up to 50% by 2020 with various strategies in place to meet these targets including the use of alternative fuels such as LPG.

**Comment:** Stakeholders are asked to comment on what they consider to be a reasonable timeframe for introduction of any amendments to the autogas fuel standard that result from this process.

The FCAI encourages an immediate introduction of any amendments of the LPG (Autogas) Fuel Quality Standard that results from this consultation process.

#### 4. REVIEW OF INDIVIDUAL PARAMETERS

The FCAI's responses to the particular issues raised in "Section 5 Fuel Quality Standard for Autogas" of the draft discussion paper are in this section.

**Comment:** Stakeholders are asked to provide information on developments with LPG vehicle technology since 2001, and current and potential fuel quality requirements. In particular, OEMs and equipment suppliers are also asked to provide views on the expected uptake of specific technologies in the near term (five years), particularly those technologies where performance is strongly linked to fuel parameters such as sulfur.

The Australian Government is currently considering the introduction of Euro 5 and Euro 6 emission standards for Light Vehicles.<sup>2,3</sup> The draft Regulatory Impact Statement (RIS) recommends introduction of Euro 5 emission standards from 1 January 2013 for LPG fuelled light vehicles.

The Euro 5 and Euro 6 emission standards introduce additional on-board diagnostics (OBD) requirements. Currently, many brands offer desensitized Euro 5 OBD systems due to the high (i.e. >10 ppm) sulfur levels in Australian fuel. Introduction of Euro 5 and Euro 6 emission standards would imply the need for the full OBD requirements which will require 10 ppm sulfur fuel to operate the full range of OBD requirements.

10 ppm sulfur fuel also enables and promotes the use of lean NOx traps. Sulfur will store on the lean NOx trap and high temperature regeneration is required to remove the sulfur. The higher the sulfur level in the fuel, more frequent regeneration is required with a higher CO<sub>2</sub> penalty, higher emissions and shorter life of the NOx trap.

**Comment:** OEM's and vehicle manufacturers are also asked to indicate when they will be in a position to comment confidently on the fuel quality requirements for the more advanced LPG vehicle technologies.

<sup>2</sup> Draft Regulation Impact Statement for Review of Euro 5/6 Light Vehicle Emission Standards, December 2009

<sup>3</sup> FCAI Interim Response to Draft Regulatory Impact Statement for Review of Euro 5/6 Light Vehicle Emission Standards, 15 March 2010.

Some vehicle manufacturers may provide specific information on their particular products; however, the FCAI is able to advise that the current information available is used as the basis for the industry comment on the particular issues below.

In general, vehicle manufacturers' support improved fuel standards as the in-service or market fuel is critical to the introduction of new engine technology. Additionally, existing LPG vehicles will be able to operate successfully on improved Autogas.

#### **4.1 Sulfur**

**Recommendation:** It is proposed that, from 1 June 2010, the current specification for sulfur in the autogas standard be reduced from 100 mg/kg to 50 mg/kg, to align with EN 589. If evidence suggests that a significant proportion of emerging LPG vehicle technology requires lower levels, further reduction to 10 mg/kg will be considered. Any move to lower sulfur levels to 10 mg/kg, however, would need to assess whether the industry can use an alternative odorant to ethyl mercaptan.

The FCAI supports this recommendation.

**Comment:** Stakeholders are asked to comment on the proposal to amend the sulfur specification in the autogas standard to 50 mg/kg and the proposed implementation date.

The FCAI would encourage an immediate introduction of amending the sulfur specification in the autogas standard to 50 mg/kg. This will align with the LPG certification fuel standard in ADR 79/02.

**Comment:** Stakeholders are also asked to comment on the potential for the industry to adopt an alternative odorant if sulfur levels were further reduced to 10 mg/kg in the future, a possible timeframe, and potential costs to industry.

The FCAI would support an alternative odorant to further reduce sulfur levels to 10mg/kg.

As noted above the Australian Government is considering the introduction of the Euro 5 emission standards for LPG fuelled light vehicles from 1 January 2013. The FCAI considers that fuel quality standards are critical for continued in-service delivery of improved vehicle emissions. Without fuel meeting the necessary fuel quality standards in the market any anticipated benefits from improved vehicle emission standards will not be achieved.

#### **4.2 Residue on Evaporation**

**Recommendation:** That from 1 June 2010, the specification for residue on evaporation in the autogas standard be revised to 60 mg/kg to align with EN 589, and that only one of the test methods specified in the revised EN 589 be adopted i.e. EN 15470 or EN 15471.

**Comment:** Stakeholders are asked to comment on the proposal to harmonise with the revised specification for evaporation residue in EN 589, and the implications for industry of adopting one or both of the revised test methods.

Given the history of residue problems within the Autogas market and the consequent problems this has caused for vehicle operation, the FCAI considers that residue on evaporation needs to be revised downward to 20 mg/kg. Advice from a major fuel supplier indicates that internally the company monitors to this level. The indicators are that 20 mg/kg residue can start to build up at faster rates and this may affect vehicle performance. The autogas industry has advised that it has set itself a limit of 20 mg/kg and will be able to supply autogas that meets this level.

This could be achieved in a two stage manner; revise the specification on evaporation in the autogas standard to 60 mg/kg from 1 June 2010 and then revise the specification to 20 mg/kg from 1 June 2011.

The FCAI has no objection to adopting either or both of the test methods specified in EN 589, provided the test method is comparable to the current test method, i.e. JLPGA-S-03.

#### **4.3 Test method for water content**

**Comment:** Stakeholders, and particularly LPG producers and suppliers, are asked to comment on whether there would be any issues from adopting the revised approach in EN 589 for testing water content.

The FCAI has no comment on the test method for water content.

#### **4.4 Propane and butane**

**Comment:** Stakeholders are asked to comment on the current approach in the autogas standard which does not directly set limits for the propane to butane ratios and indirectly controlling these through the vapour pressure limits and the MON specification. Advice is particularly sought on requirements for future LPG vehicle technology if this is available.

The automotive industry appreciates the flexibility inherent in the current autogas standard and how this is important for supply of autogas to the various regions around Australia.

A significant issue for a driver of an autogas vehicle is being able to refuel the vehicle under all types of scenarios. There are some (albeit relatively small in occurrences) times when refuelling is not possible. For example, on a very hot day (above 35°C) the vehicle gas cylinder contains autogas with a high propane content (leading to high tank pressures) and refuelling cannot start because the fuel bowser cannot overcome the internal tank pressure.

Either the fuel propane/butane mix needs to be moderated to avoid this scenario or the refueling infrastructure needs to be upgraded such that the fuel bowser can overcome the pressures involved. Moderating the fuel mix may be a more cost effective alternative.

#### ***4.5 Vapour pressure***

***Comment:*** Stakeholders are asked to comment on whether the current specification for vapour pressure in the autogas standard is adequate for existing LPG vehicle technology, and whether vapour pressure would need to be lowered to facilitate future vehicle technology (liquid injection).

In line with the consideration of the propane/butane mix the current vapour pressure standard of 1530 kPa needs to be reduced. To ensure correct operation and vehicle performance there is a requirement for seasonal limits for vapour pressure. Individual vehicle brands will offer more detailed information based on the performance of their own vehicles and any future product plans.

It also needs to be considered that autogas contains other constituents than propane and butane. With the introduction of new vehicle engine technologies there may be a need to limit other parameters (including olefins and MON) to achieve the expected vehicle operation and performance.

#### ***4.6 Olefins***

***Comment:*** Stakeholders are asked to comment on whether olefin levels in autogas should be directly controlled in the autogas standard and, if so, at what levels?

The FCAI considers that olefins should be directly controlled as olefins produce a residue in an LPG vehicles fuel system.



The FCAI considers that DEWHA should consider limiting olefins to 10% to facilitate operation of new technology such as high compression LPG engines that the vehicle industry is considering introducing to reduce CO<sub>2</sub> emissions. Individual vehicle brands will provide additional information on their particular products.

**Comment:** Stakeholders are asked to comment on whether any other parameters or test methods in the autogas fuel quality standard should be amended.

The FCAI has comments on motor octane number and dienes;

**Motor Octane Number (MON);** The EN 589 2008 standard for MON is 89.0 while the Australian autogas standard is 90.5 MON. The FCAI recommends the MON specification is maintained at 90.5. Individual brands will provide further information on the need to at least maintain autogas at 90.5 MON.

**Dienes;** The FCAI notes the EN 589 2008 standard for total dienes is 0.5 mole % total diene. The FCAI supports maintaining the current Autogas standard of 0.3 mole % total diene (including 1-3 butadiene) rather than aligning with EN 589 in this instance.

#### **4.7 Particulates**

**Comment:** Stakeholders are asked to comment on the merits of including a minimum level for particulates in the autogas standard, or whether it is more appropriate to control this issue through fuel dispenser filters?

Setting a minimum level of particulates in the autogas standard rather than relying solely on fuel dispenser filters is the FCAI's preferred approach.

The FCAI recognises that fuel dispenser filters range from 10 microns to 40 microns and while the FCAI's preference is adoption of 10 micron fuel dispenser filters at all bowser maintenance of the bower is critical to ensure effective operation. This becomes a critical consideration for LPG injectors as these are used in the later generation LPG systems.

#### **4.8 Next steps**

**Comment:** Stakeholders are asked to comment on the proposed approach and timeframe for implementation of amendments to the autogas standard and on any issues that would warrant urgent action in terms of when the amendments need to be in place.

The new *LPG (Autogas) Fuel Quality Standard* would support vehicles that have been designed to meet the Euro 4 emission standards that are effective from 1 July 2008. As such the FCAI would encourage the introduction of the amended autogas standard as

quickly as practical. In fact, there are currently many vehicles with LPG technology that can utilise the higher specification autogas already exist in the market.

The FCAI considers that fuel quality standards are critical for continued in-service delivery of improved vehicle emissions. Without fuel meeting the necessary standards in the market any anticipated benefits from improved vehicle emission standards will not be achieved.

## 5. CONCLUSION

The FCAI supports the intention to amend the Australian autogas fuel standard to align with EN 589 from June 2010, noting some differences may be necessary due to climatic conditions and that Australian vehicles are sourced from 20 different countries.

The FCAI also supports DEWHA's proposal to amend the standard in two tranches, with initially amending those parameters already identified in the draft Discussion Paper. The FCAI encourages DEWHA to consult closely with the vehicle manufacturers to understand the fuel quality requirements for new LPG technologies and notes that some FCAI member companies will provide individual responses to DEWHA based on the LPG technologies in their products.

## APPENDIX 1 – OVERVIEW OF THE AUTOMOTIVE INDUSTRY

The automotive sector is a globally integrated industry with many product lines sharing platforms and major components to achieve productivity gains from economies of scale. Even with more than one million new vehicles sold in 2008 and around 900,000 new vehicle sales in 2009, Australia comprises less than one and a half percent (1.5%) of the global market.

With growth expected to continue in the emerging economic markets of India, China, Russia and Brazil, Australia's share of the world market will decline.

Australia is one of the most open and competitive automotive markets in the world with more than 50 brands, 350 models and 20 source countries. In 2009, around 16% of new vehicles sold were manufactured locally with the remaining 84% of new vehicles imported from many countries and regions of the world including Asia (more than 60%), Europe, North America and Africa.

Table 1 below shows the major countries/regions of origin of new vehicles sold in Australia during 2009.

**Table A1.1 – Country/region of origin of new vehicle sales in 2009**

Country/Region of Origin	Percentage of new vehicle sales <sup>1</sup>
Australia	16%
Europe	13%
Americas	1.5%
Japan	36%
Korea	13%
South East Asia (predominately Thailand)	16%
Other (including China and South Africa)	4.5%

**Notes:**

1. Based on 2009 Vfacts

The motor vehicle is increasingly a global product and one of the most comprehensively regulated products. In considering regulations, the government's role is to balance social and economic benefits with safety and environmental performance.

As economies of scale are critical in the automotive industry all manufacturers have tended to limit the number of locations any one model is produced and that model is then cross-shipped to markets where there is demand. This approach initially benefits the manufacturer through reducing costs and ultimately benefits the consumer by improving affordability and increasing product choice.

## APPENDIX 2 - PRODUCT DEVELOPMENT IN THE AUTOMOTIVE INDUSTRY

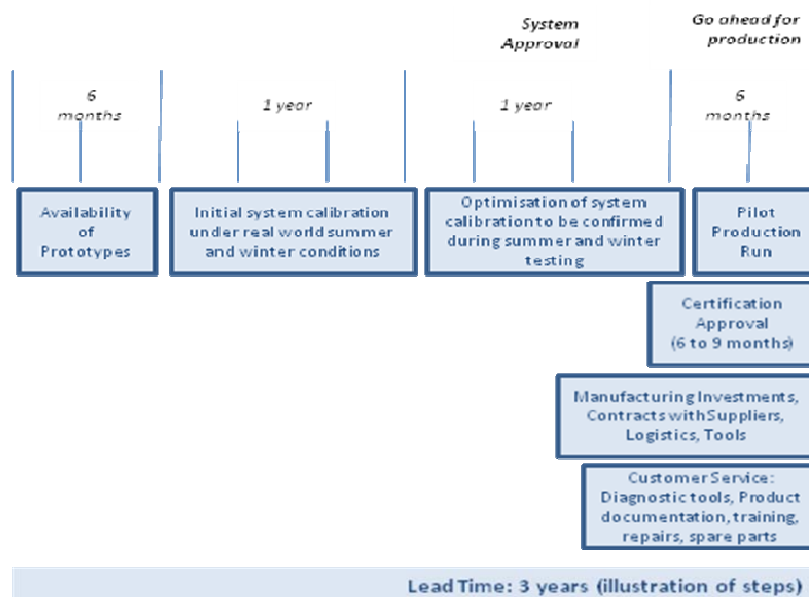
The vehicle industry is a global industry and product development plans are prepared to align with the introduction of international regulations.

Product development and research is a finite resource within each FCAI member. Even if a proven technology can be readily adapted to an existing model range, product development cycles, from concept to mass production of three years are typical. Due to the long lead times for product development, introduction of new technology are usually aligned with the introduction of new or upgraded models or the introduction of international regulations.

A generic three year product development period to fit proven technology to an existing model range typically comprises:

- Development of prototype – six months.
- Initial calibration of system in all weather and seasonal conditions – one year. It is important to undertake extensive testing to assess performance of a new system in all weather and seasonal conditions, especially in a country like Australia with a wide range of seasonal conditions and climates.
- Optimization of system in all weather and seasonal conditions – one year.
- Pilot production run – six months.

**Figure A2.1 – Generic Three Year Product Development Cycle to Fit Proven Technology to an Existing Model Range**



The above diagram also shows the activities undertaken during the last 12-18 months of system development to gain the necessary regulatory approvals invest in any manufacturing changes, enter into contracts with suppliers and the activities required for maintenance of the new system once in service.