

**Ethical Rights**

Submission in response to the

# Better Fuel for Cleaner Air Draft Regulation Impact Statement

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# **1. EXECUTIVE SUMMARY**

1. This submission is written in response to the 2018 draft regulation impact statement ‘Better Fuel for Cleaner Air’, which considers the adequacy of Australia’s fuel quality standards. The draft RIS is a very good document, which discusses the major problems and analyses preferred policy options. Its cost benefit analysis indicates that the 2022 implementation of option C (introduction of Euro 5/V fuel quality standards while retaining 91 RON petrol) has the greatest NPV, which is acceptable outcome from a technical perspective.

2. The draft RIS identified problems, made some assumptions and identified options that do not address all problems. In slight contrast, this submission considers the principles underlying a consideration of fuel quality issues, and from a perspective outside government, considers the problems and offers a 12-point plan that can facilitate the adoption and public acceptance of new fuel quality standards.

3. This submission develops principles for fuel quality standards analysis similar to the selection criteria in the RIS. They include:

- meeting the objects of the Fuel Quality Standards Act 2000
- that fuel quality improvements are necessary to reduce vehicular emissions
- that Australian fuel quality standards must align with international standards for the most efficient Euro 5/V, 6/VI vehicles to be imported (which require Euro 5/V, 6/VI fuel)
- that fuel quality changes should be timely, or otherwise Australia forgoes more than \$370 million of avoided health costs each year
- that net national benefits should be optimised, which can occur through options that allow motorists to purchase the necessary fuels for their vehicles (via market competition in fuel quality) and so achieve emissions, operability and performance outcomes.

4. Importantly, these principles allow market and price-based solutions that avoid direct regulatory pressure on Australian refineries, so preventing or limiting job losses at Australian refineries. Other options that reflect what other countries are doing to remove aromatics and enhance petrol’s octane rating can also be used.

5. This submission identifies some problems with the draft RIS. These might not be serious, unless regulatory change is made without considering their implications. They include:

- the unrealistic assumption that all refineries remain open under all options. If option C is implemented in 2022, then, according to the AIP, it is possible that some refineries will close. Alternatively, if the Government does not implement option C or a more stringent fuel quality standard by 2022 (presumably delaying implementation to protect refineries), it would be seen as rejecting its own economic analysis. From an economic perspective, if this assumption is invalid, then the net benefits for options C and B will increase, as some refineries could convert to import terminals and avoid the large costs involved in upgrading to produce lower sulfur petrol
- the lack of emphasis on a competitive market as a means of delivering Euro 5/V, 6/VI fuel quality standards
- lack of recognition of the maxim that fuel quality externalities should be borne by the fuel quality supply chain from motorists to oil refiners and suppliers, not by the health budget.

6. To address these problems, and building on the draft RIS (which noted that Australian fuel quality standards do not align internationally), this submission goes further. It considers which technical elements of overseas standards should be incorporated in Australian standards to ensure that better vehicles, with better emissions, operability and performance profiles, can be imported, consistent with consumer choice.

7. Consequently, a number of innovative technical, market and jurisdictional options have been included in the 12-point plan, some of which were discussed in the draft RIS, but not necessarily subjected to analysis. There are innovative

- technical solutions, including
  - ◊ the use of ethanol as the main petrol oxygenate and octane enhancer as in the USA, which is necessary to reduce aromatic content
  - ◊ the use of blendstocks for oxygenate blending to facilitate the supply of cheaper higher octane petrol
  - ◊ the use of 95 RON E10 petrol to lower prices of premium petrol, given that its production costs using blendstocks for oxygenate blending will only be fractionally more than regular unleaded 91 RON petrol.
- economic and jurisdictional solutions, including
  - ◊ the use of market forces to drive demand for higher quality Euro 5/V, 6/VI fuel.
  - ◊ recognising that jurisdictions can stipulate more stringent fuel quality standards than the Australian Government
  - ◊ the option of fuel excise increases to cover the cost of refinery upgrades
  - ◊ the use of 95 RON E10 to reduce demand for 94 RON E10 and 91 RON petrol, which would further drive demand for higher quality fuels and aid distribution networks.

8. Some key observations about Australian fuel quality (see next section: Key Messages) include

- in a market economy, retaining Australian refineries does not mean that they should be protected from spirited international fuel quality competition
- Australian vehicles are probably not meeting regulated Euro 5/V emission standards now and Australian fuel needs to be fit for purpose
- Euro 5/V, 6/VI fuel quality standards must be mandated for all Euro 5/V, 6/VI certified vehicles; in particular 95 RON petrol must be mandated for all Euro 5 vehicles as soon as possible, otherwise vehicle emission standards cannot be met
- the additives in the draft RIS (and not approved by the FCAI) should be placed on a Register of Prohibited Additives under the Act
- Australian oil refineries should not be given approvals to vary a standard so that they do not need to meet current diesel standards

9. This submission's recommendations include implementing option C in 2022, including all the non-petrol options discussed in the draft RIS, as an element of the 12-point plan. Other elements could be implemented as soon as possible, while market competition in the supply of fuel could be implemented from 2020. Options include that

- technical changes and economic measures (market and price-base) would facilitate the rapid take-up of 95 RON petrol, and hence Euro 5/V, 6/VI vehicles

- motorists would be encouraged to use, and would need to be educated about, the fuel quality necessary for their Euro 5/V, 6/VI vehicles
- Euro 5/V, 6/VI vehicles must use the appropriate, corresponding quality fuels
- the Government works with stakeholders to make changes to benefit motorists, including offering fuel options that lower prices
- if the Government wishes to extend the life of Australia's refineries then they should fund them from industry funds, rather than the health budget.

10. Ultimately the choices for the Government are straightforward. If emissions are to be reduced and Euro 5/V, 6/VI emission standards met, then changes are required. Adverse impacts need to be mitigated. The 12-point plan, with its innovative market, jurisdictional and technical elements, includes options that will permit the introduction of the highest quality fuel at the earliest possible time, so that motorists can choose the fuel appropriate for their vehicles, and without directly adversely affecting Australian oil refineries. It will be up to Australia's leaders, our politicians, to legislate as appropriate to achieve rational, ethical and desirable outcomes.

## **1.1 KEY MESSAGES**

11. This submission's key messages have been boxed throughout the submission and listed below as a summary.

1. The objects of the Fuel Quality Standards Act should be met to the maximum extent possible.
2. High quality fuel is necessary to meet complex and internationally recognised vehicle emission standards, as well as maximising fuel efficiency. This is not so much a policy requirement, but a principle borne of fundamental engineering necessity.
3. Australia's fuel needs to be internationally harmonised for it to be fit for purpose.
4. If fuel quality changes are to be implemented, it should be done as soon as possible to maximise environmental and health benefits. Delays for many years will forfeit economic benefits.
5. In a market economy, retaining Australian refineries does not mean that they ought to be protected from spirited international fuel quality competition.
6. Fuel importers and retailers should supply fuels required by Australian motorists. This will not place direct pressure on refineries, but competitive pressures will drive innovation in the supply of higher quality fuels.
7. Regulatory impacts on industry, energy security, probable changes in global energy and fuel development, including greater take-up of electric vehicles, are countered by emission reductions, health benefits, and vehicle performance and consumer choice. Globally, the scales have been tipping in favour of health benefits, emission reductions, and cleaner, better performing vehicles.
8. There is an opportunity for the Australian Government to work with fuel suppliers, vehicle manufacturers, consumer groups and motorists to develop and implement changes to achieve desirable health and environmental outcomes.

9. Australian fuel does not meet the chemical and physical specifications necessary to ensure compliance with Euro 5/V, 6/VI emission standards. It cannot be guaranteed that any Australian petrol and diesel vehicles are meeting regulated Euro 5/V emission standards: petrol is not Euro 5 quality, and the Australian Government has effectively granted oil companies exemptions from meeting Euro V diesel quality.
10. If the Government is to mandate Euro 6/VI vehicle emission standards, or retain Australia's current Euro 5/V standards, then it must require that Euro 5/V, 6/VI certified vehicles use fuel meeting the corresponding Euro 5/V, 6/VI fuel standard (or best fuel available). Otherwise, it is pointless mandating emission standards.
11. If more stringent Australian vehicle emission standards are to be met then there are three options: vehicles could be re-engineered overseas, better quality fuel could be produced locally, or Australia imports more of its fuel.
12. Option F in the draft RIS is nothing but a diversion, and options C and B can be achieved promptly if sulfur extraction can be effected and if technical elements in the 12-point plan are used.
13. Australia will be viewed as an international laggard if there is an appreciable delay in reducing maximum sulfur levels in petrol to 10 ppm.
14. If the Government doesn't act promptly to improve fuel quality standards, the almost \$400 million of health costs per year that could have been avoided would be a needless national tragedy.
15. A minimum 95 RON petrol must be required to be used in all Euro 5, 6 certified vehicles, as early as possible and from a date to be specified.
16. An octane enhancer other than aromatics must be available for all petrol.
17. The choice is clear. Australia either uses harmful aromatics in petrol and does not meet Euro 5, 6 emission standards, or it uses ethanol as petrol's octane enhancer, as occurs in the USA. From a health and environmental perspective, ethanol is the only viable octane enhancer for Australian petrol.
18. The Government could approve the use of blendstocks for oxygenate blending to allow premium quality petrol (95 RON) to be produced at about the same cost as current regular unleaded petrol (91 RON).
19. Australians would have a reasonable expectation that the Government requires compliance with their regulated fuel quality standards, and should not readily give approvals to vary a standard.
20. Consideration could be given to banning diesel vehicles in due course.
21. Any additive that vehicle manufacturers state should not be in a fuel should be on the Register of Prohibited Additives.
22. The health budget is effectively propping up large multinationals so they do not need to upgrade their refineries to produce Euro 5/V, 6/VI fuel. If they upgrade their refineries, then the health budget will be reduced by over \$371 million each year.

23. A 1 c/L excise surcharge on all petrol and diesel retailed in Australia (raising of the order of \$400 million per year) could be hypothecated over three years to cover the cost of refinery upgrades.

24. The Government should implement the draft RIS's option C in 2022 because it provides the fuel quality necessary for the introduction of Euro 5/V, 6/VI vehicles and it has the greatest NPV.

25. Motorists would be disappointed to learn that the fuel they are now purchasing, or had recommended to them, might not be delivering the vehicle emission, operability and performance outcomes they had expected.

26. The 12-point plan should be implemented, given that it proposes implementation of option C, and employs innovative market, technical and jurisdictional mechanisms to drive better vehicle choice and achieve operability and performance benefits for motorists and health outcomes for Australians. Such a plan is consistent with the Government's free enterprise philosophy.

## 2. INTRODUCTION

12. This submission has been prepared as a response to the 2018 draft regulation impact statement (RIS), ‘Better Fuel for Cleaner Air’, produced by the Australian Government Department of the Environment and Energy. I would like to thank the Government, the Minister for the Environment and Energy, and the officials in the Department for releasing this draft RIS for comment. The opportunity to make a substantial difference to air quality through reductions in vehicular emissions, as well as to vehicle operability and performance from the use of fuels in vehicles is timely, should not be forgone.

13. I am a scientist, ethicist, public policy analyst and director of Ethical Rights. I have an appreciable knowledge of fuel standards, fuel chemistry and the role of fuels in achieving desirable environmental, health, and policy outcomes. I am pleased that the Australian Government is aiming to achieve environmental and health outcomes for Australians. However, implementing desirable options could have impacts on refineries and some refinery jobs. All of these priorities can clash and need to be balanced.

14. The draft RIS covers the most significant regulatory, environmental, health, technical and other fuel quality related issues in Australia. I acknowledge the outstanding work on the draft RIS<sup>1</sup> itself, and on the particularly thorough cost benefit analysis, which has provided a sound economic basis for changes to fuel quality standards.

15. This submission is not concerned with a rigorous examination of the cost-benefit analysis, but does make comments about its underlying assumptions. This submission’s analysis is flavoured by the conflation of the three RISs on fuel quality standards, vehicle emission standards and fuel efficiency. It also proposes a 12-point plan to improve fuel quality through the implementation of a number of innovative policy concepts. If implemented according to the proposed prompt timetable, the 12-point plan will help reduce vehicle emissions, improve vehicle operability and performance, maximise fuel efficiency, give motorists choice in vehicle and fuel purchases, without placing direct regulatory pressure on Australia’s four main oil refineries.

16. If the Government is unable deliver the appropriate environmental, health and fuel quality (and related vehicle choice) outcomes in a timely manner, other options remain. I contend that the health and environmental arguments for changes to fuel quality in Australia are compelling and will drive change in a free enterprise environment, although Government action is highly desirable and can facilitate or complement this through remedying market failures. I will, in a consultative capacity, choose to work with the Government, governments in select jurisdictions, fuel suppliers and others to provide motorists with choice in fuel and vehicle quality and help protect Australians’ health from high environmental emissions, through market, technical and jurisdictional mechanisms. Such work is possible because the development of more stringent fuel quality standards, or the supply of fuel meeting higher quality standards is not limited by the *Fuel Quality Standards Act 2000* (the Act); indeed it is permitted.

17. This remainder of this submission is structured as follows.

17.1. Section 3 discusses the fuel quality policy principles, essentially the criteria outlined in Table 14 of the draft RIS. As well as the objects of the Act, technical, international,

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<sup>1</sup> It is important to acknowledge the excellent work of the many government officials who would have worked so diligently and professionally over many months to finalise the draft RIS.



vehicle and industry issues are considered. These principles establish how any changes to the fuel quality standards should be assessed.

17.2. Section 4 examines the issues raised in the draft RIS, in particular the options that would address the current technical and economic problems relating to fuel supply while aligning with the fuel quality policy principles.

17.3. Section 5 lists the proposed recommendations for action by the Government and other bodies. It also includes details of the 12-point plan.

17.4. There are two appendices, providing:

- more detail on the integrated system of vehicle emissions and fuel quality linkages
- more detail on market and price-based approaches to drive changes to fuel quality.

18. I wish the Government well as it considers the submissions on these fuel quality standards, vehicle emission standards and fuel efficiency RISs. Much work needs to be done, given that Australian fuel quality standards and regulations sunset on 1 October 2019.

19. I am available to expand on my submission if required.

### **3. FUEL QUALITY POLICY PRINCIPLES**

20. The principles relating to any changes in fuel quality must be clear because policy outcomes can and should be developed consistent with these principles. Some policy principles, such as achieving outcomes consistent with the Act's objects, are assured. The other policy principles developed in this submission are similar to the policy assessment criteria used in the draft RIS. From a perspective outside government, slight changes are necessary and desirable. These changes lead to innovative solutions, including the 12-point plan (see section 5 Recommendations).

21. The major fuel quality principles that guide this submission's proposed changes to fuel quality are discussed below. The application of these and other principles, are discussed in section 4.

#### **3.1 PRINCIPLE 1. THAT THE OBJECTS OF THE FUEL QUALITY STANDARDS ACT BE ACHIEVED TO THE MAXIMUM EXTENT POSSIBLE**

22. The objects of the Fuel Quality Standards Act should be met to the maximum extent possible, unless there are conflicting policy considerations. The fuel quality standards should:

- best reduce the levels of pollutants and emissions arising from the use of fuel that may cause environmental and health problems
- facilitate the adoption of better engine technology and emission control technology
- allow the more effective operation of engines.

23. The 2016 Act review found that these objects, together with the Act's object relating to the provision of appropriate information, are appropriate.

24. The Australian Institute of Petroleum (AIP) proposed option F in the draft RIS. Options F proposed only that petrol's sulfur content—the element that most impacts on the effectiveness of a vehicle's three-way catalyst, and affecting noxious emissions—be reduced to maximum of 10 ppm<sup>2</sup>. This is a good start, but could not be considered sufficient to meet these objects. Australia lags behind the rest of the world in petrol quality, which is apparent from the fact that Australia's petrol quality is the worst in the OECD and has a world ranking of 70, based on sulfur content. Australia would continue to fail to meet these objects if, as proposed by the Australian Institute of Petroleum (AIP), option F were to be implemented from 2027.

*1. The objects of the Fuel Quality Standards Act should be met to the maximum extent possible.*

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<sup>2</sup> A ppm is a part per million, equivalent to 1 mg/kg.

### **3.2 PRINCIPLE 2. THAT FUEL QUALITY IMPROVEMENTS ARE NECESSARILY REQUIRED BECAUSE THEY CAN DIRECTLY REDUCE VEHICLE EMISSIONS**

25. High quality fuel is necessary to both meet complex and internationally recognised vehicle emission standards and to maximise fuel efficiency. The three RISs strongly acknowledge this causal relationship. This is why a reduction in emissions is stated in the Act's objects and why fuel quality legislation, given that it has a direct impact on vehicular emissions into the environment that consequently affects people's health, is administered by an environmental agency.

26. There are scientific and engineering underpinnings to this principle. Vehicle designers and engineers use fuel quality as an input to design and develop a vehicle's powertrain, emission and other vehicular systems necessary for vehicles to meet noxious emission and fuel efficiency standards. This is not so much a policy principle, but a principle borne of fundamental engineering necessity. The Federal Chamber of Automotive Industries (FCAI) has strongly advanced this point in its many submissions to the Government. Its position is a strong one.

27. The United States, which adopted its Tier 3 vehicle and fuel standards in 2017, as well as vehicle manufacturers, understands this principle. The US considered its vehicle and fuel systems as an integrated vehicle fuel system because of these engineering and technical requirements. Consequently, it is of little value regulating emission standards if the fuels required to achieve these are unavailable.

28. In addition to reductions in noxious emissions (particularly nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOCs) and particulate matter (PM) that should occur with Euro 5/V and Euro 6/VI fuel quality standards (to be denoted here as Euro 5/V, 6/VI), there should be a concomitant reduction in the emissions of the greenhouse gas carbon dioxide (CO<sub>2</sub>). That is, any fuel quality changes should aid in maximising improvements in fuel efficiency and reductions in CO<sub>2</sub>—an eminently desirable and achievable environmental outcome. Figure 1 shows the more significant relationships between sulfur, octane and aromatics in petrol and the outcomes arising from their improvement, including reductions in emissions. Appendix 1 gives further detail on Australia's fuel quality, compared to that elsewhere.

*2. High quality fuel is necessary to meet complex and internationally recognised vehicle emission standards, as well as maximising fuel efficiency. This is not so much a policy requirement, but a principle borne of fundamental engineering necessity.*

### **3.3 PRINCIPLE 3. THAT IT IS NECESSARY FOR AUSTRALIA'S EMISSION AND FUEL STANDARDS TO ALIGN WITH THOSE OVERSEAS**

29. Alignment with the better emission and fuel standards overseas is necessary for Australians to have choice in purchasing high performing, low emission vehicles, and purchasing the fuel appropriate for these vehicles. If Australian fuel does not align with fuel quality overseas then:

- Australians using low quality fuel will not achieve the emission reductions and realise the performance gains from high quality vehicles (see principle 2) or

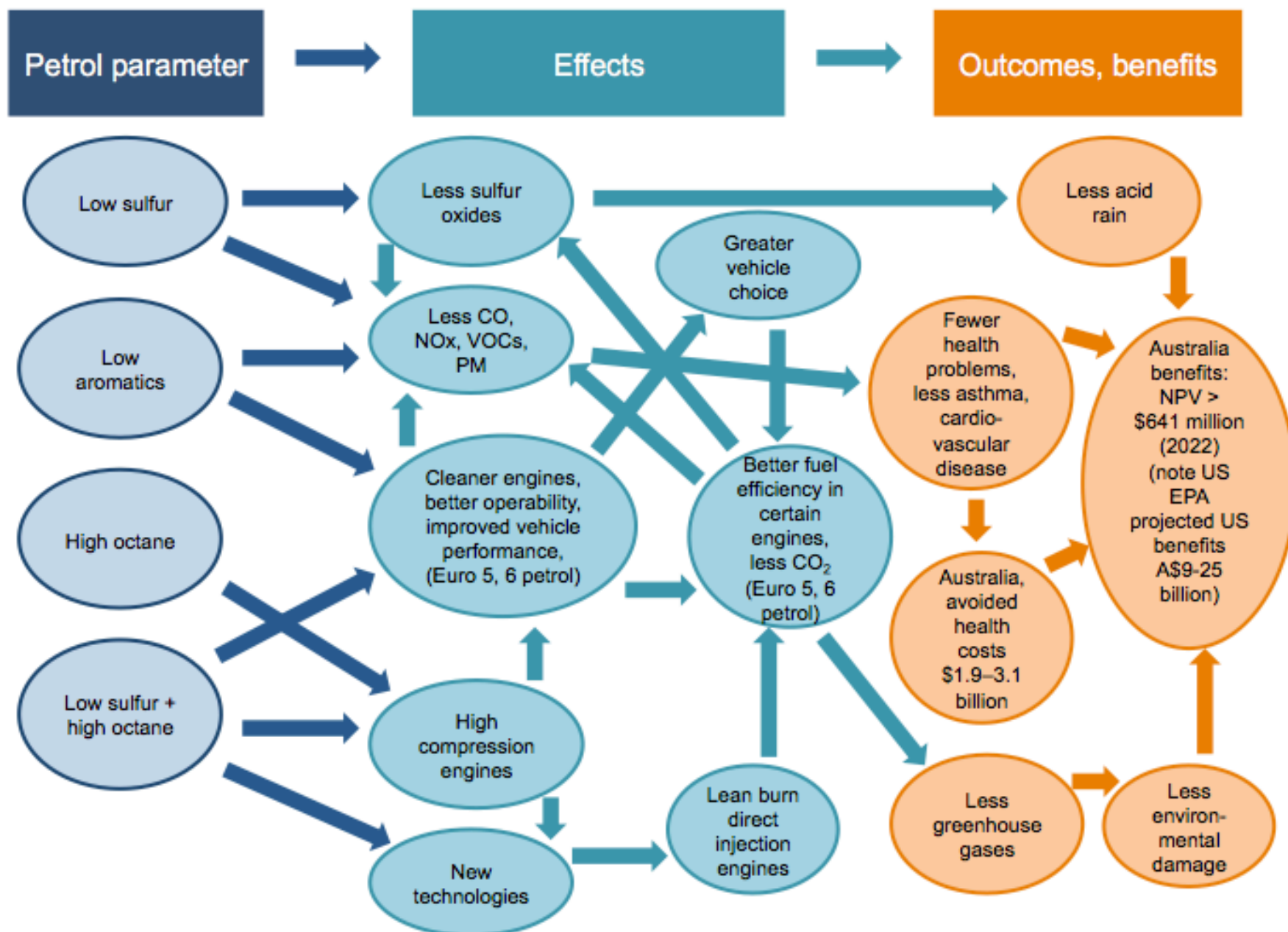


Figure 1. Some environmental and health outcomes arising from the use of low sulfur, low aromatics, high octane petrol.

- vehicle manufacturers will not import the best Euro 5/V, 6/VI vehicles fearing brand reputational damage.

30. Australia's fuel needs to be internationally harmonised for it to be fit for purpose, however it is currently inadequate to meet current Euro 5/V emission standards, let alone more stringent Euro 6/VI standards. Vehicle manufacturers and environmentalists state that:

- a maximum 10 ppm sulfur in petrol and diesel is necessary to meet Euro 5/V, 6/VI emission standards, and for new Euro 6 vehicles to be imported
- a minimum 95 RON<sup>3</sup> petrol is necessary to meet Euro 5, 6 emission standards
- a maximum of 35% aromatics in petrol is required to avoid combustion chamber deposits and increases in harmful emissions, and for new Euro 6 vehicles to be imported
- most organometallic fuel additives are harmful to humans and engines, and additives such as N-methylaniline (NMA) are incompatible with vehicles meeting Euro 5/V, 6/VI emission standards
- low concentrations of some oxygenates (oxygen containing octane enhancers) such as MTBE (methyl tert-butyl ether) and ETBE (ethyl tert-butyl ether) can make water non-potable.

31. It follows that those fuels with chemical components and physical properties not meeting specifications should be banned from use in vehicles. These fuels do not, according to the Act, 'allow the more effective operation of engines'.

*3. Australia's fuel needs to be internationally harmonised for it to be fit for purpose.*

### **3.4 PRINCIPLE 4. THAT THE TIMING OF ANY CHANGES TO FUEL QUALITY STANDARDS SHOULD BE OPTIMISED**

32. The draft RIS's cost benefit analysis reveals the earlier fuel quality improvements are implemented, the greater the benefit. Hence, if fuel quality changes are to be implemented, it should be done as soon as possible to maximise environmental and health benefits. According to the draft RIS, delays for many years will forfeit appreciable economic benefits.

33. The timing of changes to fuel quality should align with other leading, and similar, OECD nations, in particular those in Europe, where many higher quality vehicles are manufactured and fuel standards are already high. Australian motorists can then choose to purchase vehicles with the same emission reduction, performance and operability characteristics as those overseas.

*4. If fuel quality changes are to be implemented, it should be done as soon as possible to maximise environmental and health benefits. Delays for many years will forfeit economic benefits.*

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<sup>3</sup> RON denotes the research octane number, a measure of a spark ignition engines' resistance to knock.

## **3.5 PRINCIPLE 5. THAT NET NATIONAL BENEFITS SHOULD BE MAXIMISED**

### **3.5.1 Market factors**

34. A principal objective of Australian governments is to minimise net adverse impacts on the Australian economy, including the workforce. Politically, job losses and even refinery closures are bad news. Notwithstanding, changes in demand for goods and services are a necessary and ongoing process in a free market economy. Some industries will succumb to technological and regulatory developments and market forces, while other industries will flourish. This feature has particular application to how changes to fuel quality standards might affect Australia's four oil refineries.

35. This changing market dynamic would surely be acknowledged by the Minister for the Environment and Energy, the Hon Josh Frydenberg MP, whose worldview includes 'freedom of speech, free enterprise and the power of the individual over the collective'<sup>4</sup>. His emphasis on free enterprise and market forces could be influential in developing palatable policy options. The power of the individual could be a signal that consumers should have the right to purchase vehicles of their choice and fuel that meets their vehicles' engineered requirements, rather than having a non-compliant fuel being supplied to them as a second-best option by local refineries. The word 'local' is telling. The free enterprise element suggests a desire for open competitive markets.

36. A significant challenge for governments and companies in a burgeoning economy is to facilitate change, while increasing productivity. If job retention at oil refineries were a major priority, then perhaps no fuel quality changes would ever be made in Australia. Australians' health would be adversely affected, but refineries would operate, albeit inefficiently. This scenario is of course a simplistic, unsophisticated view. If applied generically to other areas of the economy, we would never have advanced from the horse-drawn carriage, given the impending unemployment of carriage drivers when vehicles were entering the market. It is generally beneficial to take advantage of technological opportunities when they arise, because they offer productivity improvements.

37. In a market economy, retaining Australian refineries does not mean that they ought to be protected from spirited international fuel quality competition. Indeed, the Australian vehicle manufacturing industry was supported for many years, but ultimately it succumbed to collapsing demand and poor economies of scale. Some prescient knowledge would be useful to forecast the likely future for Australia's oil refining industry, given likely fuel quality changes (the extent and timing to be determined), rising competition from electric vehicles, and competition from increasing Asian supply.

*5. In a market economy, retaining Australian refineries does not mean that they ought to be protected from spirited international fuel quality competition.*

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<sup>4</sup> See <https://www.smh.com.au/politics/federal/everywhere-man-josh-frydenberg-the-minister-who-could-make-or-break-the-turnbull-government-20170713-gxaix5.html>, accessed 28 February 2018.



38. Fuel importers and retailers should supply fuels required by Australian motorists. The market failure arises through motorists' ignorance about the fact that current fuels are unable to meet Euro 5/V emission standards, or the performance and operability standards they would expect of quality motor vehicles. As seen in section 4, there are options that will not place direct pressure on refineries. Competitive pressures can be used to drive demand for, and innovation in, the supply of higher quality fuels.

*6. Fuel importers and retailers should supply fuels required by Australian motorists. This will not place direct pressure on refineries, but competitive pressures will drive innovation in the supply of higher quality fuels.*

### **3.5.2 Balancing opposing factors**

39. The balance between opposing factors affecting fuel quality must be analysed. Regulatory impacts on industry, energy security, probable changes in global energy and fuel development, including an increasing penetration of electric vehicles into the market, are countered by emission reductions, health and environmental benefits, vehicle performance and consumer choice. The draft RIS discussed many of these factors. Globally, the scales have been tipping in favour of health benefits, emission reductions, and cleaner, better performing vehicles for some time. The issue for the Government is whether and when Australia should follow suit.

*7. Regulatory impacts on industry, energy security, probable changes in global energy and fuel development, including greater take-up of electric vehicles, are countered by emission reductions, health benefits, and vehicle performance and consumer choice. Globally, the scales have been tipping in favour of health benefits, emission reductions, and cleaner, better performing vehicles.*

### **3.5.3 Other changes**

40. Energy security, in its many forms, is a priority for the Government. In a global economy that will increasingly see the uptake of hybrid and electric vehicles, the demand for refined hydrocarbons will inevitably fall. While electric vehicles are not a short-term threat, vehicle manufacturers internationally have been announcing moves away from the use of carbon-intensive internal combustion engines.

41. Governments often profess that (after defence, and depending on the month, jobs) education and health are their most significant considerations. The health gains from improved fuel quality have been well expressed in the draft RIS. Given the reluctance by Australian oil refineries to refine fuel meeting more rigorous fuel quality standards, there is an opportunity for the Australian Government to work with fuel suppliers, vehicle manufacturers, consumer groups and motorists to develop and implement changes to achieve desirable health and environmental outcomes.

*8. There is an opportunity for the Australian Government to work with fuel suppliers, vehicle manufacturers, consumer groups and motorists to develop and implement changes to achieve desirable health and environmental outcomes.*

42. There are two fundamental principles that can shine light on the tensions between the health, environmental, technical, and other benefits arising from the use of high quality fuel in quality vehicles and the presumed desire to mitigate regulatory pressure on refineries.

43. First, fuel quality policy has departed from the sound economic maxim that the externalities arising from economic activity should be borne by producers, suppliers and consumers of goods. When it does, the economy and market are askew. Second, the free enterprise principle of encouraging market competition, as currently occurs with vehicle manufacturing, is a worthy principle that should given free rein in fuel industry. If motorists demand newer higher quality fuels, they should be made available. If local producers are unable to meet demand, then fuels could be imported, as already happens in much of Australia, including most of New South Wales.

44. These principles suggest that market interventions and pricing options could offer elements of acceptable policy options, see section 4.2 and the 12-point plan.

45. If the economics are uncertain (though positive net present values (NPVs) for some options in the draft RIS are encouraging), the options developed in section 5 will prove valuable. Section 5 Recommendations presents the 12-point plan, including options for achieving desirable health outcomes, consistent with an appropriate consideration of the principles in this section.



## **4. ISSUES ARISING FROM THE DRAFT RIS**

46. The draft RIS identified many issues arising from the use of Australian fuels. The major issues with Australia's current fuel quality are that:

- the fuel quality principles 1, 3 and 5 are not being met, that is:
  - ◊ fuel quality doesn't meet the objects of the Act
  - ◊ Australian fuel quality lags behind international fuel quality
  - ◊ Australian fuel quality prevents the generation of health, environmental and economic benefits.
- it is unsuitable for Euro 5/V, 6/VI vehicles from an emissions, operability and performance perspective
- it does not allow fuel efficiency to be maximised.

47. The Government should be able to appease many motorists, vehicle manufacturers, consumer groups, environmentalists, health advocates and probably most Australians' concerns (on all issues other than possibly price) if it specifies fuel quality standards compatible with Euro 5/V, 6/VI certified vehicles. The major concerns in the draft RIS relate to possible adverse impacts on Australian refiners, the extent of any fuel price rises and whether the net benefits will justify fuel quality improvements. The draft RIS considered these matters, and suggested that early implantation of option C would produce the greatest net benefits. To assess that option, the fuel quality principles derived in the last section can be used as a lens through which fuel quality issues can be examined. These issues are of two types:

- technical—relating to a fuel's chemical compounds and physical properties, as well as engineering considerations, as certain engine technologies necessarily require certain fuel types
- economic—including those issues relating to maximising the net national benefit arising from a fuel's use.

48. After consideration of these issues, the options in the draft RIS and other recommendations and alternative options can be assessed.

### **4.1 TECHNICAL ISSUES**

#### **4.1.1 Australian vehicles are not currently meeting Euro 5/V emission standards, because Australian fuel quality does not meet the corresponding fuel quality standards**

49. As noted in the draft RIS, Australian fuel does not meet the chemical and physical specifications necessary to ensure compliance with Euro 5/V, 6/VI emission standards. For Euro 5 vehicles, petrol with a maximum 10 ppm sulfur, 35% aromatics and minimum 95 RON is required. However, Australia's petrol's sulfur levels exceed 10 ppm (a maximum 150 ppm sulfur is currently permissible in Australia's Euro 3 quality petrol), aromatics can be higher than 35%, and some vehicle manufacturers are even stating that Euro 3 91 RON petrol can be used in their

Euro 5 certified vehicles<sup>5</sup>. The Government permits major oil refiners to supply diesel that does not meet the specified Euro V diesel standard<sup>6</sup>. Australia's fuel quality does not align with fuel quality principles 1, 2 and 3. Clearly, if the intention is to embrace the fuel quality principles (or like criteria), fuel quality changes are required promptly.

50. To summarise the state of Australian fuel quality, it cannot be guaranteed that any Australian petrol and diesel vehicles are meeting regulated Euro 5/V emission standards for two reasons:

- petrol is not Euro 5 quality, and
- the Australian Government has effectively granted permission (under section 13 of the Act, grants to vary a standard) to oil companies to not supply diesel meeting Euro V diesel quality.

*9. Australian fuel does not meet the chemical and physical specifications necessary to ensure compliance with Euro 5/V, 6/VI emission standards. It cannot be guaranteed that any Australian petrol and diesel vehicles are meeting regulated Euro 5/V emission standards: petrol is not Euro 5 quality, and the Australian Government has effectively granted oil companies exemptions from meeting Euro V diesel quality.*

51. The unfortunate realisations above follow from the views of vehicle manufacturers' representatives, including the FCAI. They have argued strongly that only fuel of the appropriate quality can ensure that vehicles meet emission, operability and performance standards. Conversely, they could not guarantee that every Euro 5/V vehicle could meet current Euro 5/V emission standards on the road. Although current vehicles must meet emission standards when they are certified as Euro 5/V compliant, it is a different matter in-service (on the road) when Euro 5/V fuel is not available.

52. A sensible outcome is if the Government is to mandate Euro 6/VI vehicle emission standards, or retain Australia's current Euro 5/V standards, then it must require that Euro 5/V, 6/VI certified vehicles use fuel meeting the corresponding Euro 5/V, 6/VI fuel standard (or best fuel available). Otherwise, it is pointless mandating emission standards.

*10. If the Government is to mandate Euro 6/VI vehicle emission standards, or retain Australia's current Euro 5/V standards, then it must require that Euro 5/V, 6/VI certified vehicles use fuel meeting the corresponding Euro 5/V, 6/VI fuel standard (or best fuel available). Otherwise, it is pointless mandating emission standards.*

#### **4.1.2 Meeting more stringent standards**

53. If Australian vehicles are to meet Euro 5/V or even Euro 6/VI vehicle emission standards then there are three options:

<sup>5</sup> This would seem contrary to advice from the FCAI that minimum 95 RON petrol (as well as maximum 10 ppm sulfur and 35% aromatics) is necessary to ensure Euro 5 compliance.

<sup>6</sup> See <http://www.environment.gov.au/system/files/resources/7b3b7f74-5061-4de8-a01a-cca7d824d704/files/fuel-quality-approval-granted.pdf>, accessed 22 February 2018.

- vehicles need to be re-engineered to meet higher quality vehicle standards on lower quality fuel (difficult given that Australia imports vehicles, and prohibitively expensive)
- Australia supplies better quality fuel (hopefully, from a nationalistic perspective, but the AIP indicates only sulfur can be reduced in petrol, and then only by 2027)
- Australia obtains its fuels elsewhere, i.e. imports higher quality fuel.

*11. If more stringent Australian vehicle emission standards are to be met then there are three options: vehicles could be re-engineered overseas, better quality fuel could be produced locally, or Australia imports more of its fuel.*

#### **4.1.3 Petrol**

54. As indicated in the draft RIS, maximum sulfur content, minimum octane number and maximum aromatics content are the three main parameters of concern in petrol, having the greatest impact on a vehicle's emissions and performance.

55. The draft RIS's options C and B specify parameters for fuels that are compatible with Euro 5/V, 6/VI vehicles. These fuels are the minimum quality fuels that should be available at service station forecourts for these vehicles. Such fuel should be made available at the earliest opportunity (the draft RIS suggests that greater benefits increase if the timing for a fuel quality change is brought forward). This can be done without directly adversely affecting Australian oil refiners, see section 5 Recommendations.

56. Regarding option F, it should be noted that only the reduction in petrol's sulfur content is costly. It is a straightforward matter for any competent chemist or chemical engineer to modify other petrol parameters, including octane and aromatics, to align with option C (i.e. Euro 5, 6 quality petrol) if the technical options in the 12-point plan are used. Option F is nothing but a diversion, and option C can be achieved promptly if sulfur extraction can be effected and if technical elements in the 12-point plan are used. Moreover, option B can also be achieved if the options in the 12-point plan are implemented and perhaps without any additional cost over option C.

*12. Option F in the draft RIS is nothing but a diversion, and options C and B can be achieved promptly if sulfur extraction can be effected and if technical elements in the 12-point plan are used.*

##### **4.1.3.1 Sulfur**

57. The environmental and health benefits of reduced sulfur in fuels have been well made in the draft RIS. Sulfur compounds are well-known to be responsible for poisoning vehicle catalysts. Consequently, given Australian petrol quality is the worst in the OECD, Australia will be viewed as an international laggard if there is any appreciable delay in reducing maximum sulfur levels in petrol to 10 ppm. Reputational damage could be inconsequential.

*13. Australia will be viewed as an international laggard if there is an appreciable delay in reducing maximum sulfur levels in petrol to 10 ppm.*

58. However, if the Government doesn't act promptly to improve fuel quality standards, the almost \$400 million of health costs per year that could have been avoided would constitute a needless national tragedy.

*14. If the Government doesn't act promptly to improve fuel quality standards, the almost \$400 million of health costs per year that could have been avoided would be a needless national tragedy.*

59. Until fuel quality improves (particularly reducing sulfur and aromatics in petrol) vehicle manufacturers probably will not consider importing vehicles with the best performance and emissions outcomes, as brand reputations will suffer because performance and emissions outcomes cannot be achieved with non-compliant, poor quality fuel. Australian motorists will only have access to second best vehicles, and Australians will suffer from health problems arising from the greater vehicular emissions.

#### *4.1.3.2 Octane number*

60. Octane is a key performance parameter for petrol vehicles. Not only is a 95 RON petrol required to reduce engine knock, but it can also increase performance outcomes and fuel efficiency. In many engines, a high octane petrol's resistance to knock allows it to:

- produce more power because ignition timing can be advanced, or
- be used in higher compression engines, which are more thermodynamically efficient.

61. Many chemical compounds contribute non-linearly to petrol's octane number. Higher concentrations of aromatics, heavily branched aliphatic hydrocarbons, oxygenates such as alcohols and ethers, and other octane enhancers can increase petrol's octane number.

62. As noted, some of the world's best-known vehicle manufacturing groups do not import their best quality vehicles into Australia because Euro 5 quality petrol is unavailable. The presence of cheaper regulator unleaded 91 RON (low octane) petrol exacerbates the problem. As noted, its availability means some vehicle manufacturers modify their imported vehicles to run on 91 RON petrol (though minimum 95 RON petrol is required to guarantee compliance with Euro 5 emission standards), and others import lesser quality engines into Australia. A quick survey of local car dealers will attest to this.

63. These engine modification and importation policies are not a direct fault of the manufacturers, but they are not blameless. It's simple to understand why manufacturers do not import their higher quality, more expensive engines: the engines would yield little or no benefits and the manufacturers would suffer costly reputational damage because Australia's fuel is not fit for purpose. Vehicle manufacturers will only consider importing their better quality vehicles if the appropriate fuel types are available. The implementation of options C or B from the draft RIS, or the 12-point plan presented in section 5, would remove any reason manufacturers might have had for not importing better quality vehicles. A not-insignificant issue with option C is that some vehicle manufacturers, or rental companies, could nonetheless direct motorists to use

cheaper lower octane petrol, as occurs. This issue can and has been addressed in the 12-point plan.

64. An economic dimension to this technical anomaly arises from a market failure. As soon as manufacturer A requires that their vehicles must use 95 RON petrol, manufacturer B would urge consumers to buy B's vehicles instead, as A's vehicles would require more expensive petrol. The market needs re-balancing. Consequently, a minimum 95 RON petrol must be required to be used in all Euro 5, 6 certified vehicles, as early as possible and from a date to be specified. Older Euro 5 vehicles should be encouraged to use this fuel too. There is no impediment here, aside from a change in the recommended fuel in the users' manual for each vehicle, as Euro 5 vehicles are, by certification, designed to be Euro 5 compliant.

*15. A minimum 95 RON petrol must be required to be used in all Euro 5, 6 certified vehicles, as early as possible and from a date to be specified.*

#### *4.1.3.3 Aromatics and octane enhancers*

65. Many aromatic compounds in crude oil are retained in refined petrol to preserve a high octane rating. However, many aromatics are carcinogenic—the simplest aromatic compound, benzene, is limited to 1% in the petrol standard for this very reason. However, it is clear from a scientific, engineering and vehicle manufacturer perspective that aromatic content should be limited. A maximum aromatic content of 35% is the required engineering specification for vehicles to meet Euro 5, 6 vehicle emission standards. Given the data in the draft RIS and available elsewhere, such a restriction should be straightforward to meet for 91 RON or 95 RON petrol. Any competent chemist, and the excellent chemical engineers employed at oil refineries, should be able to achieve this lower aromatics outcome.

66. The balance between achieving 98 RON petrol while limiting aromatic content to 35% is more problematic. Reformate can be used, but that is expensive, and if used overseas, seems to be done in combination with another octane enhancer. An innovative solution is available, and the Government has two clear options:

- it can develop fuel quality standards with maximum 35% aromatic content (consistent with options B or C in the draft RIS) to achieve Euro 5, 6 emission outcomes for Euro 5, 6 certified vehicles
- it can reject changes to aromatic content and accept that Euro 5, 6 emission standards could not be guaranteed.

67. If the first option is the more palatable—and it should be—then an octane enhancer other than aromatics must be available for all petrol. Every other OECD country, and other countries that have better quality petrol than Australia (to the best that could be determined) uses an octane enhancer as follows:

- European countries generally use MTBE, but also ethanol
- Japan uses ETBE
- the USA uses ethanol
- lead and other organometallics are generally banned overseas

- independent Australian suppliers often use NMA, and MMT<sup>7</sup> is available as an additive.

*16. An octane enhancer other than aromatics must be available for all petrol.*

68. MTBE and ETBE are excellent octane enhancers but even low concentrations of these chemicals from leaking Australian underground storage systems might contaminate Australian groundwater reserves rendering them non-potable. MTBE has been banned in much of the USA for this reason. ETBE might not be as harmful as MTBE, but should still be unacceptable given the paucity and value of Australia's groundwater. The inherent health dangers of NMA and MMT would be well known to chemists and the FCAI recommends against their use. The use of tetraethyl lead (lead) should be banned and is effectively banned in petrol (a maximum content of 0.005 g/L would cover residual lead only), and other compounds such as ferrocene and polychlorinated n-alkanes can damage engines and result in harmful emissions.

*4.1.3.4 Ethanol options*

69. Petrol with 10% ethanol (E10) is used in 95% of petrol in the United States<sup>8</sup>. Australian oil refineries have raised that ethanol is not a preferred component of petrol for Australian motorists. For performance reasons, vehicle manufacturers would probably prefer MTBE's higher octane, energy density and other properties. Nevertheless, the choice is clear. Australia either uses harmful aromatics in petrol and does not meet Euro 5, 6 emission standards, or it uses ethanol as petrol's octane enhancer, as occurs in the USA. Some 95 RON non-ethanol fuel could also be made available, and could be sold at a premium price. From a health and environmental perspective, ethanol is the only viable octane enhancer for Australian petrol.

*17. The choice is clear. Australia either uses harmful aromatics in petrol and does not meet Euro 5, 6 emission standards, or it uses ethanol as petrol's octane enhancer, as occurs in the USA. From a health and environmental perspective, ethanol is the only viable octane enhancer for Australian petrol.*

70. Ethanol, as a high octane blending component in petrol, has the following properties:

- a higher octane value (blending octane rating of about 113) than unblended petrol
- when blended as 95 RON E10 petrol, it can be used in higher compression engines typically found in Euro 5, 6 certified vehicles
- a lower energy density than petrol, which means that vehicles will travel perhaps 3–4% less on a given volume of 95 RON E10 compared to unblended 95 RON petrol.
- when used in a 95 RON E10 blend it could generate fuel efficiency benefits of about 0–6% over petrol used in a similar lower compression engine (requiring 91 RON petrol), possibly slightly more than countering the reduction in energy density.

71. The technically practical use of ethanol in all petrol raises options that were not considered in the draft RIS. With ethanol as the octane enhancer:

<sup>7</sup> MMT denotes methylcyclopentadienyl manganese tricarbonyl, an organometallic octane enhancer (the same class of compounds as tetraethyl lead).

<sup>8</sup> See <https://www.eia.gov/todayinenergy/detail.php?id=26092>, accessed 28 February 2018.



- premium quality (95 RON E10) petrol can be produced for about the same price as regular unleaded
- demand for 95 RON E10 petrol will not be marginalised (because ethanol would be the major octane enhancer in all petrol—non-ethanol fuels could instead demand a premium price, probably at least 4% higher than ethanol blends)
- perhaps 7–8% of aromatics could be removed from 98 RON petrol (thus reducing its aromatics content below 35%), and blended with 10% ethanol to replace the lost octane. All 98 RON petrol could then meet Euro 5, 6 octane and aromatics requirements
- the use of blendstocks for oxygenate blending can facilitate the previous options.

72. All stakeholders should wholeheartedly welcome these outcomes. The Government could please oil refiners and approve the use of blendstocks for oxygenate blending. This would mean that premium quality 95 RON petrol could be produced at lower cost, and at about the same cost as current regular unleaded (91 RON) petrol. Aromatics can be removed from 98 RON petrol and added to 91 RON petrol, while ensuring appropriate octane ratings and a maximum 35% aromatics for all petrol.

*18. The Government could approve the use of blendstocks for oxygenate blending to allow premium quality petrol (95 RON) to be produced at about the same cost as current regular unleaded petrol (91 RON).*

73. Such technical changes are significant and can positively shake the petrol market. It will allow 95 RON petrol to be produced at low cost, saving motorists money through the use of blendstocks for oxygenate blending (pleasing refineries), ethanol (pleasing farmers) and provide a means of producing 98 RON with reduced aromatic content. The details, including possible cost implications, are as follows:

- a 91 RON petrol blended with ethanol (becoming 91 E10) currently has a minimum combined 94 RON (and is usually marketed as such). Additional aromatics will mean that the 91 RON petrol, with ethanol and additional aromatic content, would become 95 RON E10, i.e. be premium quality petrol.
- as identified in the draft RIS, an additional retail price of 2.4 cents per litre (c/L) for reduced sulfur and aromatics content (maximum 10 ppm sulfur, 35% aromatics), in addition to that for current 94 RON E10 would produce a Euro 5, 6 compliant petrol (maximum 10 ppm sulfur, 35% aromatics and minimum 95 RON) at a production cost of about 1 c/L more than current 91 RON E10 petrol (noting that 94 RON E10 petrol retails for about 1–2 c/L less than 91 RON petrol).
- although it is difficult to determine retail prices from petrol's production price, consumer groups would be interested in any spurious explanations the oil retailers might use to hike retail prices for 95 RON E10.
- this desirable outcome could only be achieved if the petrol standards permitted the use of blendstocks for oxygenate blending—such blendstocks are not currently used. This means that the petrol component in the 95 RON E10 blend would not need to meet the petrol standard (it would perhaps have 93 RON), but the blend would need to meet the standard after the addition of the ethanol component.
- in this scenario, demand for 94 RON E10 and 91 RON would fall, given that most vehicles that could take advantage of the fuel efficiency benefits of higher octane petrol, including

those engines with high compression ratios, would use it. The draft RIS did not consider this scenario. As noted, while retail prices are difficult to estimate, it is with little doubt that the difference in the production cost of current Euro 3 quality 91 RON petrol and a Euro 6 quality 95 RON E10 blend would be of the order of 1 c/L. This means that if option C were to be implemented, then demand for regular unleaded 91 RON and 94 RON E10 petrol could fall as a result of competitive market operating on an innovative regulatory and technical solution.

#### **4.1.4 Diesel, biodiesel, ethanol E85, Autogas (LPG), B20**

74. The fuel quality standards for diesel, biodiesel, ethanol E85 and autogas (LPG) should be updated or retained as indicated in the draft RIS. A new B20 standard (a blend of 5–20% biodiesel in diesel) should be similarly developed. Aside from the issues relating to diesel cetane numbers, the concentration of polycyclic aromatic hydrocarbons (PAHs) and perhaps density, there should be no contentious fuel parameters.

75. Again, the choice is clear. If Euro V, VI compliance is required, then diesel needs to meet EN590 or similar specifications. There are no half-way measures.

76. Diesel's cetane index or derived cetane number is to diesel as octane number is to petrol. Although Australian diesel currently specifies a cetane index of 46 for mineral diesel (diesel produced from petrochemicals without biodiesel—effectively a B0 blend), the diesel standard has never specified a derived cetane number, which is the main cetane parameter used elsewhere. One reason for this is that when the Australian diesel standard was developed, equipment was not readily available to measure the derived cetane number.

77. The diesel fuel quality standard does however specify a minimum derived cetane number of 51 for diesel blends containing biodiesel, which is a high cetane blending component. An incongruity occurs because Australian oil refiners produce diesel meeting a minimum cetane index of 46, but as soon as biodiesel is added to create a blend, a minimum derived cetane number of 51 must be met.

78. For many years, Australian oil refiners have been seeking approval under section 13 of the Act to vary the standard (effectively an exemption under the Act) to meet a derived cetane number of 46 for their diesel/biodiesel blends. A standard exists for a reason, and a system that allows large oil refineries to continually reject the standard—presumably because meeting the standard might be costly—is contrary to the concept of standards. Exemptions should be considered for an occasional plant failure, but an ongoing and systemic desire to seek exemptions and not meet the regulated standard should not be tolerated.

79. The Australian diesel standard should specify a minimum derived cetane number of 51 for all diesel, regardless of biodiesel content, for reasons of international harmonisation and engine operation. Australians would have a reasonable expectation that the Government requires compliance with their regulated fuel quality standards and should not readily give approvals to vary a standard.

*19. Australians would have a reasonable expectation that the Government requires compliance with their regulated fuel quality standards, and should not readily give approvals to vary a standard.*



80. Consideration could be also given to banning diesel vehicles in due course. The International Agency for Research on Cancer has recognised diesel vehicle emissions as a class 1 carcinogen. In recognition of this health and environmental danger:

- German cities can now ban diesel vehicles<sup>9</sup>
- Paris, Madrid, Athens and Mexico City will ban diesel vehicles from their congested city centres by 2025.
- France has also begun encouraging car makers to not sell diesel (or petrol) vehicles by 2040.

81. Although the penetration of electric vehicles may be slow in Australia, international trends suggest a move away from liquid hydrocarbon fuel. Refineries might not have long lifetimes, especially if they do not have good economies of scale.

*20. Consideration could be given to banning diesel vehicles in due course.*

#### **4.1.5 Prohibited additives**

82. The prohibited substances suggested in the draft RIS should be listed on a Register of Prohibited Additives established under the Act. Any additive that manufacturers state should not be in a fuel should be on that register.

*21. Any additive that vehicle manufacturers state should not be in a fuel should be on the Register of Prohibited Additives.*

83. Most additives are used for octane enhancement in petrol:

- tetraethyl lead has effectively been banned through a regulated (residual) maximum concentration of 0.005 g/L
- other organometallics, with similar octane enhancing properties (ferrocene, MMT), other aromatics (NMA), as well as polychlorinated n-alkanes should also be banned because they are harmful to health or engines or both
- the FCAI has indicated that all of these compounds are undesirable fuel additives.

84. NMA could be problematic. Some Australian independent fuel suppliers use NMA as an octane enhancer. If they are not permitted to use NMA, they could import fuels from Singapore or elsewhere in Asia as currently occurs. While specific details are commercial-in-confidence, it seems that 91 RON petrol and NMA are currently used and blended to produce 95 RON and 98 RON petrol. If NMA is not used, then additional tankage may be required at a number of import terminals. There are options for these fuel suppliers to develop innovative and commercially acceptable solutions.

<sup>9</sup> See <http://www.abc.net.au/news/2018-02-28/diesel-cars-could-be-banned-from-german-cities/9491680>, accessed 28 February 2018.

## **4.2 ECONOMIC ISSUES**

85. Freedom of choice and free enterprise should be fundamental elements of Australia's market economy. With vehicle and fuel choices, motorists should be able to choose the highest quality (Euro 5/V, 6/VI certified) vehicles (in terms of emission reductions, vehicle operability, and performance enhancement). These vehicles require Euro 5/V, 6/VI quality fuels.

86. If Governments do not wish to regulate new fuel quality standards for early implementation, then Australia's market economy can assist. Some work (especially education) may be required to break down any barriers to entry for new fuels, however the market could be allowed to operate with both new fuels and the existing fuels. The draft RIS did not consider such options. No direct pressure would be put on refineries to upgrade, but one could only suspect that large oil refining companies, as companies that have prospered in competitive markets, would welcome the challenge provided by the availability of new fuels in the market.

87. The 12-point plan in section 5 outlines the technical, market, jurisdictional and other steps necessary to achieve environment and health, operability and performance outcomes without regulatory fiat directing oil refineries' production and upgrade schedules.

88. It might be that new fuel quality standards might be unpalatable for the Government, for whatever reasons. The 12-point plan offers not only a complementary set of initiatives, but a fall back plan philosophically aligned to the individual choice and free enterprise world view of the Minister for the Environment and Energy.

89. Australia's oil refining industry consists of three large multinational corporations (BP, Exxon Mobil and Viva) and Caltex Australia. All are large companies; all have watched companies overseas upgrade refineries to meet more stringent emission standards. One would suspect that contingency plans regarding the production of Euro 5/V, 6/VI fuel would have been developed years ago. Nonetheless, these companies, through the AIP, indicated in 2017 that they cannot upgrade their refineries for 10 years. Companies overseas can upgrade in 3 years (that was the timeframe for US refineries).

### **4.2.1 Externalities**

90. Consistent with good economic principles, externalities arising from the use of poor quality fuel, such as the cost of health care, should be borne by fuel suppliers (oil refiners and importers) and users (motorists). This is not currently the case. The draft RIS states that option C would avoid health costs of \$371 million p.a. in 2022. If no change to the petrol standard occurs by this time, the question should be asked as to why governments are using the health budget, funded by taxation on all Australians, to pay for the externalities arising from one sector of the economy.

91. The health budget is effectively propping up large multinationals so they do not need to upgrade their refineries to produce Euro 5/V, 6/VI fuel. If they upgrade their refineries, then the health budget will be reduced by over \$371 million each year. See the 12-point plan and Appendix 2 for details.

*22. The health budget is effectively propping up large multinationals so they do not need to upgrade their refineries to produce Euro 5/V, 6/VI fuel. If they upgrade their refineries, then the health budget will be reduced by over \$371 million each year.*

92. If the Government wanted to assist refineries with their sulfur extraction upgrades so that fuel quality and emissions standards could be met, a 1 c/L excise surcharge on all petrol and diesel retailed in Australia (raising of the order of \$400 million per year) could be hypothecated for this purpose. The net cost would be small if any, given savings to the health budget. Over three years, motorists would effectively be assisting large oil companies cover the cost of four refinery upgrades that require of the order of \$1 billion.

*23. A 1 c/L excise surcharge on all petrol and diesel retailed in Australia (raising of the order of \$400 million per year) could be hypothecated over three years to cover the cost of refinery upgrades.*

#### **4.2.2 Economic assumptions**

93. The economic analysis in the draft RIS all is predicated on the assumption that Australian refineries will continue to operate, regardless of which option (B, C, F), if any, is adopted. According to expert advice, the likelihood that Australia's four refineries would remain open if faced with a combined bill of about \$1 billion to reduce sulfur levels in petrol in the next few years would seem slim. Australia's refineries are small on the global scale; combined output is less than the Jamnagar refinery in India. With the pressure to produce higher quality fuel, and the increasing though currently small, presence of hybrid and electric vehicles, Australia's small refineries might not be economically favoured over the relatively cheaper option of operating import terminals.

94. Conclusions regarding the undesirability of option B may then be unfounded. There will be no upgrade costs if refineries close, but there will costs to convert to import terminals, or sell prime real estate for other purposes. Regardless, these are financial decisions for refinery operators, and in many cases, their overseas corporate parents may direct them.

95. It could well be that the AIP's firm rejection of a reduction in petrol sulfur content before 2027 could be because at least one Australian refinery might have indicated an intention to close by 2027. As the AIP represents the unanimous view of its members, a refusal by even one refinery to upgrade by one refinery must be reflected by the AIP as a whole. The options in section 5 remain valid independent of refinery closure.

96. In the draft RIS, the implementation of option C in 2022 has the greatest NPV (\$641 million). The Government should implement the draft RIS's option C in 2022 because it provides the fuel quality necessary for the introduction of Euro 5/V, 6/VI vehicles and it has the greatest NPV. Questions could be asked though about whether even earlier adoption of new fuel quality standards (for example in 2020) would yield even greater benefits.

*24. The Government should implement the draft RIS's option C in 2022 because it provides the fuel quality necessary for the introduction of Euro 5/V, 6/VI vehicles and it has the greatest NPV.*

97. A logical deduction from the analysis above is that if the Government does not implement option C in 2022 or earlier, then it would suggest that its own draft RIS, and possibly the assumptions on which it is based, are invalid.

98. Some assumptions in the draft RIS have limited the extent to which innovative policy solutions could be developed. The draft RIS:

- made an explicit assumption that all refineries would continue to operate under all options. According to the AIP, this would not be possible. The net benefits arising from options B and C must therefore be (perhaps greatly) understated, as some refineries might convert to import terminals at a cheaper cost than installing sulfur extraction plant
- must not, however, be rejected on the basis that implementing option C in 2022 would result in refinery closures or adverse outcomes for Australia's energy security. To do so would be contrary to the Government's assumption that refineries remain open. If this wasn't a realistic assumption, it ought not to have been made
- did not consider the production of 95 RON petrol with the following elements, including
  - ◊ the use of an octane enhancer (ethanol) for all petrol, as used in the United States and some of Europe.
  - ◊ the use of blendstocks for oxygenate blending to produce 95 RON, 95 RON E10 and 98 RON petrol at significantly lower production cost
  - ◊ the transfer of aromatics from 98 RON to 91 RON E10 to produce 95 RON E10 petrol at minimal additional production cost over that of regular unleaded 91 RON petrol
  - ◊ the reduction in demand for 91 RON and 94 RON E10 petrol that would inevitably occur with the introduction of 95 RON E10
- did not consider the effective cross-subsidisation of Australia's oil refineries by Australia's health budget, and how an excise surcharge of 1 c/L over 3 years could help refineries to upgrade and produce better quality fuel
- could have placed greater emphasis on the requirement that only Euro 5/V, 6/VI fuels can guarantee that the corresponding emission standards can be met: the choices are then to consider emission and fuel standards as an integrated system and upgrade them both, or do neither
- did not consider consumer choice as a primary driver in Australia's market economy.

99. These issues might not have necessarily affected the economic analysis, but could have been useful in massaging likely options.

100. Consequently the analysis in the draft RIS did not consider a comprehensive package of measures including the use of market mechanisms, in conjunction with government regulation, consumer education and vehicle manufacturer guidance, to facilitate the take-up of better quality fuel. The 12-point plan in section 5 emerges naturally from such consideration.

101. The issues in the draft RIS are not failures of the analysis or meant as criticism. The draft RIS is a very good document, which has been the foundation on which this submission, and those of other stakeholder groups, has been built. Market-based solutions, building on the solid

evidence provided in the RIS for a change to Euro 5/V, 6/VI quality fuels, should please all Australians, particularly motorists, consumer groups, vehicle manufacturers, oil refineries, and health and environmental advocates.

102. Economic modellers and policy analysts would appreciate the substantial amount of work undertaken in the cost-benefit modelling and the analysis in the draft RIS. They would acknowledge that uncertainty due to the (almost chaotic) nature of variable relationships would cause fluctuations perhaps of the order of 30–50% in the calculation of costs and benefits. The sensitivity analysis in the draft RIS confirms this uncertainty, recognising that NPV values can vary by billions of dollars as assumptions are varied within acceptable ranges.

## **5. RECOMMENDATIONS**

### **5.1 THE DIMENSIONS OF NATIONAL BENEFITS**

103. The draft RIS's arguments for fuel quality improvements would seem compelling to all but those with an interest in keeping Australia's refineries open. Refinery jobs and energy security issues are legitimate concerns. Health, environment, vehicle operability and consumer choice reasons also abound. The regulatory and political question to be answered is the following: how and when should Australian fuel quality be improved consistent with the section 3 principles (similar to the selection criteria in the draft RIS)? This requires consideration of:

- an integrated vehicle and fuel system
- the international alignment of Australian vehicle and fuel quality standards to facilitate the importation of new vehicle and emission reduction technology
- a reduction in emissions, with concomitant health and environmental benefits
- the improvement in vehicle operability and performance
- the improvement in vehicle choice for consumers
- the timing of any changes
- how policy options addressing all of the above issues can maximise net national benefits.

104. The difficulty in assessing the occasionally nebulous concept of net national benefits is in determining the relative weightings given to the conflicting elements in the analysis. These can vary significantly from environmental advocate to refinery shareholder, but an ethical dimension can offer some guidance in reaching a political outcome. Any satisfactory outcome would need most if not all stakeholders on board, and it will mean motorists will need to appreciate that possibly paying a little more for fuel might be necessary to avoid potentially serious health problems and costs. That initiative will require political fortitude, but it is achievable.

105. To study an ethical dimension, consider which of the following hypothetical situations would be less desirable:

- a friend or neighbour who lost a refinery job because of fuel quality standards changes, or
- a friend or neighbour who had a medical condition a few times per month that was exacerbated by poor air quality as a consequence of poor quality fuel causing high motor vehicle emissions?

106. What then might the situation be if the refinery job could be kept as a result of motorists paying perhaps 1 c/L more for their fuel (over 3 years)? Refineries would probably pass these costs on to motorists, or the Government could instead increase fuel excise and hypothecate it for refinery upgrades. A related consideration is whether the oil refining industry warrants more support than the Government provided to Australia's vehicle manufacturing industry. One friend would retain their job and the other would now not be ill.

107. Surely, if free enterprise is valued and the economic rationale was that Australian vehicle manufacturing should be subjected to market forces, then that principle should also apply to Australian refineries (energy security issues aside). If there are energy security reasons for keeping refineries, energy security support programs should support refineries, not an incursion into the health budget. In a market economy, options such as this constitute one of many middle

ground options that could be adopted. The 12-point plan builds on this fundamentally sound economic approach in order to achieve significant outcomes.

108. Some advantages and disadvantages of some possible fuel quality change scenarios are shown in Table 1.

109. Moreover, to add gravity and a sense of real anticipation to the Government's consideration of the three RISs relating to fuel quality, vehicle emissions and fuel efficiency, the Government must make a decision on fuel quality standards well in advance of October 2019 or risk all legislative instruments under the Act, including all fuel quality standards, sunseting.

110. While any Government decision will affect oil refiners, importers and suppliers, and vehicle manufacturers, ultimately the humble motorist will reap the benefits or suffer the consequences of any Government decisions.

111. Although motorists might expect that their fuel, particularly petrol, is of good quality, they would be disappointed to learn that the fuel they are now purchasing, or had recommended to them, might not be delivering the vehicle emission, operability and performance outcomes they had expected.

*25. Motorists would be disappointed to learn that the fuel they are now purchasing, or had recommended to them, might not be delivering the vehicle emission, operability and performance outcomes they had expected.*

112. Motorists should be able to purchase the appropriate Euro 5/V, 6/VI fuel for their Euro 5/V, 6/VI vehicle. They should not be required to purchase a locally refined fuel, especially if it is not fit for purpose.

113. The typical and humble owner of a petrol or diesel vehicle would probably have no idea what is in their fuel, and similarly, would not appreciate what their fuel's octane or cetane number represents. They would not know what impacts their vehicle's fuel would have on vehicle emissions, operability or performance. They might only complain about fuel when their vehicle has problems, or they are alerted to emissions, operability or performance issues by, for example, representative consumer groups such as the Australian Automobile Association (AAA). Clearly, motorist education will be important whatever option is chosen, and the AAA, FCAI and AIP will all have a role to play in this process.



**Table 1. Advantages and disadvantages for a range of possible fuel quality implementation scenarios.**

| <b>Fuel quality scenario</b>   | <b>Advantages</b>  | <b>Disadvantages</b>  |
|--|--|---|
| 1. Refineries continue to operate, or option F implemented in 2027   | Refineries operate for as long as they can (with no guarantees). No additional costs to motorists, though realistically costs of upgrading refineries will be passed on to motorists eventually. Some health and operability benefits from 2027.       | Euro 5/V emission standards would be meaningless, as they could not be met. Euro 5/V, Euro 6/VI vehicles might not be imported. No vehicle emission or fuel efficiency standards until at least 2027, probably longer. No improvement in vehicle choice. In extreme situation, Australia is refuge of B-grade engines/vehicles to match B-grade fuel. |
| 2. Option C implemented in 2022  | Euro 5/V standards could be met in 2022. Refineries won't close (assumed in RIS). Ethanol used as octane enhancer. Health, operability and performance benefits.   | Possible small costs for motorists to cover upgrades. Presence of 91 RON petrol might mean manufacturers still don't import best vehicles.  |
| 3. 12-point plan introduced as soon as possible (option C/B with innovative market and/or jurisdictional elements) | In addition to scenario 2, motorists can purchase fuel for their Euro 5/V, 6/VI vehicles from 2020 (demand dependant pre-2022). Fuel quality competition to flourish. Innovative refineries reap benefits of upgrades. Demand for 91 RON petrol falls. | In addition to scenario 2, possibly some confusion about fuels in market, to be addressed by labelling scheme and education. Non-competitive refineries might be impacted.  |
| 4. Option C implemented in 2022, but draft RIS assumption that refineries continue to operate is flawed            | In addition to scenario 2, except that price of imported fuel could be cheaper than locally produced fuel (because refineries close rather than upgrading).  | In addition to scenario 2, some refineries might convert to import terminals (disadvantage for jobs). Possible impact on energy security if all refineries close.   |
| 5. New Euro 6/VI fuel quality standards introduced and option B implemented as soon as possible                    | Euro 5/V vehicles could take advantage of fuel quality, fuel would be imported, possibly cheaper, some disruption to supply chain. Health, operability and performance benefits.   | Possible cost to motorists, though imported fuel could be cheaper, some local refineries could close.   |



## 5.2 THE 12-POINT PLAN

114. Section 3 listed the principles through which fuel quality options should be considered. The analysis of the policy issues in section 4 identified issues and some conclusions that follow logically from the nature of the fuel quality challenge.

115. Earlier in this section, the many dimensions to net benefits were discussed and that proffered the option of a middle ground scenario. The outcome, which was not considered in the draft RIS, is the establishment of new fuel quality standards as soon as possible, but leaving it to market forces to determine when Australia's current Euro 3 and Euro 4 quality petrol disappears from service station forecourts. Other factors would be involved, and motorists would need to be instructed that new Euro 5, 6 vehicles must use the corresponding high octane, low sulfur, low aromatics petrol, lest there be environmental, operability or performance impacts on your vehicle. One of these three compelling reasons should appeal to almost every Australian sociodemographic grouping.

116. There are other options available that are consistent with the section 3 principles, are permitted by the Act, and will achieve environmental, health and performance outcomes for motorists, and commercial outcomes for the fuel suppliers. These will not be discussed further here, for commercial reasons. I am prepared to work with the Government, appropriate fuel suppliers and others to assist in achieving positive health, environmental, vehicle operability and commercial outcomes that benefit Australians.

117. The elements of the 12-point plan are described in Table 2. The 12-point plan should be implemented, given that it proposes implementation of option C. It uses innovative market, technical and jurisdictional means to improve vehicle choice and achieve operability and performance benefits for motorists and health outcomes for Australians. Such a plan is consistent with the Government's free enterprise philosophy.

*26. The 12-point plan should be implemented, given that it proposes implementation of option C, and employs innovative market, technical and jurisdictional mechanisms to drive better vehicle choice and achieve operability and performance benefits for motorists and health outcomes for Australians. Such a plan is consistent with the Government's free enterprise philosophy.*

118. The 12-point plan can complement option C. Some elements of the 12-point plan might need to be modified, as occurs in any policy development process, depending on how some stakeholder groups might respond to it.

119. If motorists demand a fuel other than the fuel Australian refineries produce, then they should be able to obtain it. The 12-point plan's use of market mechanisms to ensure engineering and scientific compliance with international standards and so achieve health and environmental outcomes is not one that commercial refineries should be able to reject.

**Table 2. The 12-point plan for changes to Australian fuel quality standards**

| Action   | Comments  | Rationale   | Date  |
|--|---|---|---|
| 1. Government to introduce new standards for Euro 5/V, 6/VI compliant fuel (option C) for 1 January 2020 while retaining current standards. Option C to be mandated from 2022 (from RIS analysis). | Government to regulate new fuel quality standards, and retain existing standards. Market will determine what fuel is supplied.  | Retaining current standards means refineries can supply current fuel if demanded. Innovative refineries can upgrade and provide better quality fuel sooner. | 1 January 2020, Current fuel standards to be abolished in 2022 (or to be tweaked depending on market mechanisms). |
| 2. Vehicle manufacturers to ensure that all new Euro 5, 6 certified vehicles use 95 RON petrol, for any vehicles purchased after 1 January 2019.   | Government and vehicle manufacturers require that new petrol vehicles use 95 RON, and encourage all current Euro 5, 6 certified vehicles to use 95 RON petrol (the petrol their vehicles were designed to use). | 95 RON petrol is required to meet Euro 5, 6 emission standards, only change to vehicle users manual required. Drives necessary demand for 95 RON.           | As soon as possible.  |
| 3. Jurisdictions, fuel suppliers etc. to consider introducing more stringent standards than required by the Australian Government.   | Demand for higher quality vehicles and fuels will drive take-up of higher quality fuel in some areas. No effect on refineries in jurisdictions that import fuel.  | In areas that import fuel, or where there is high demand for higher quality fuel, jurisdictions can stipulate higher quality standards.                     | As soon as possible.  |
| 4. Fuel importers and suppliers can supply the fuel demanded by the market. For all new petrol vehicles, this must be 95 RON (and Euro 5, 6 compliant) petrol.                                     | Fuel importers and suppliers can provide Euro 5/V, 6/VI fuel now. See Table 3 for other market and price-based options.   | Minimum 95 RON petrol is required to meet Euro 5, 6 emission standards, with performance and efficiency benefits.   | Determined by market.   |

| Action  | Comments  | Rationale   | Date   |
|---|---|---|--|
| 5. Australian oil refiners continue to produce the fuel that the market demands. Government also considers better mechanisms for helping refineries upgrade   | Oil refiners can produce better quality fuel when they can, knowing that the market will determine demand for different fuel types. See Table 3 for other market and price-based options.   | Free market determines what fuel is provided. Demand for Euro 5/V, 6/VI compliant fuel from all new cars will drive refinery innovation.  | Ongoing, to be changed by market demand and refinery upgrades. Inefficient refineries convert to import terminals. |
| 6. Government, vehicle manufacturers, consumer groups and oil refiners to announce the use of ethanol as the proposed octane enhancer for all Australian petrol.  | Refiners, importers and suppliers need to make arrangements. Options for renewable ethanol production, including from sugar cane.   | Aversion to ethanol irrelevant. Essentially all petrol will have ethanol (or pay a premium).  | As soon as possible.   |
| 7. Government, vehicle manufacturers, consumer groups and oil refiners to announce that Euro 5, 6 petrol (all with maximum 10 ppm sulfur, 35% aromatics) to be supplied will include the petrol blends: <ul style="list-style-type: none"> <li>• 95 RON (ethanol)</li> <li>• 95 RON (no ethanol)</li> <li>• 98 RON (with or without ethanol), leave to market</li> </ul> In addition, the following can be supplied as the market demands: <ul style="list-style-type: none"> <li>• 91 RON (no ethanol)</li> <li>• 94 RON (ethanol).</li> </ul> | <ul style="list-style-type: none"> <li>• 95 RON petrol with ethanol meeting 10 ppm sulfur and 35% aromatics (using blendstocks for oxygenate blending) can be produced for 2 c/L more than 91 RON petrol.</li> <li>• 98 RON fuel will need ethanol if aromatics are reduced to 35%.</li> <li>• There would be no demand for 94 RON E10 if 95 RON E10 were available.</li> </ul> | <ul style="list-style-type: none"> <li>• No new (Euro 5, 6) vehicles will be permitted to use 91 RON petrol.</li> <li>• Only 95 and 98 RON petrol to be used by new post 2013 petrol vehicles.</li> </ul> | As soon as possible.   |

| Action  | Comments   | Rationale  | Date   |
|---|--|--|--|
| 8. Government and consumer organisations to indicate to motorists, oil refiners and importers that 95 RON petrol with ethanol, using blendstocks for oxygenate blends, can be produced for about the same price as 91 RON regular unleaded petrol, and that the Government would expect that it could be provided at about the same retail cost as 91 RON petrol. | Retail prices uncertain, but low production costs of 95 RON E10 using excess aromatics from 98 RON make this a viable and cheap alternative for motorists. | Means of driving take-up of 95 RON petrol.   | As soon as possible.   |
| 9. Government to consider bans on diesel vehicles   | Need to work with vehicle manufacturers, consumer groups. Diesel vehicles to be banned in Paris, Madrid, Athens, Mexico City from 2025                     | Diesel emissions are recognised as carcinogenic  | As appropriate, ban from 2025 onwards.                         |
| 10. Government to reject any further routine extensions of section 13 approvals by large multinational oil companies to require them to meet diesel and other fuel standards.   | 'Exemptions' to meeting the specified legal standard have been granted to the major oil companies for many years.  | Australian oil companies have had many years to produce fuels meeting fuel quality standards. They should not be given exemptions because they don't want to spend money to meet the Australian standards. | Immediately.   |
| 11. Government to place NMA, organometallic compounds (including MMT, ferrocene, tetraethyl lead), MTBE, ETBE and polychlorinated n-alkanes on the Register of Prohibited Additives.  | Impact would be on independent suppliers and auto stores.  | Many additives are harmful, adversely affect engine operability and are rejected by the FCAI. MTBE, ETBE affect water.   | To be determined, immediately to no later than 1 January 2020. |

| Action  | Comments | Rationale   | Date                     |
|---|----------|---|--------------------------|
| 12. Governments, consumer organisations, vehicle manufacturers to encourage investment in and promote the benefits of hybrid and electric vehicles. |          | Less fuel usage means fewer emissions, fewer or no fuel costs (other than the cost of electricity) for motorists. | As appropriate, ongoing. |

## **5.3 RECOMMENDATIONS**

### **5.3.1 Recommendation 1. The Government should improve all nine legislative instruments under the Act by adopting Option C or B (in conjunction with other appropriate options) and abolish existing fuel quality standards by 2022.**

120. According to the draft RIS, the implementation of option C in 2022 has the greatest NPV at \$641 million. Earlier abolition of the current standards might even be economically preferred, given that the trend in the analysis was that earlier adoption of new Euro 5/V, 6/VI fuel and emission standards generated greater net benefits. It would have been interesting to have analysed the earlier implementation of options. A new standard for B20 should also be developed.

121. If option C were not to be adopted, then that would seem to undermine the excellent work presented in the draft RIS. If it was thought that the implementation of option C would result in the conversion of some Australian refineries to import terminals (possibly good from an economic perspective, possibly poor from the perspective of the immediate job prospects of refinery employees), then stakeholders would wonder why that specific assumption was made in the draft RIS.

### **5.3.2 Recommendation 2. The Government should ensure that Euro 5/V, 6/VI certified vehicles use the corresponding quality fuel (Euro 5/V, 6/VI fuel is available under options C or B). Specifically, 95 RON petrol must be specified for all Euro 5, 6 certified vehicles.**

122. If the Government wants vehicles to comply with Euro 5/V, 6/VI emission standards on the road, then it must ensure that fuel meets Euro 5/V, 6/VI fuel quality requirements. That is, petrol will require a maximum 10 ppm sulfur, 35% aromatics, and minimum 95 RON and diesel will require a minimum 51 derived cetane number and maximum 8% PAHs.

123. Conversely, if fuels meeting these specifications are unavailable, the Government cannot expect vehicles to meet emission standards. With current fuel quality, Euro 5/V emission standards cannot be guaranteed to be met on the road.

124. In addition, as the octane rating for Euro 5, 6 certification fuel is 95 RON, vehicle manufacturers should require that 95 RON petrol is used in all Euro 5, 6 certified vehicles as soon as possible. Vehicle manufacturers should not be permitted to recommend the use of 91 RON petrol in their Euro 5 certified vehicles. That this has not happened is a result of the market failure discussed in section 4.

125. Logically, this means that option F must not be implemented while Euro 5/V, 6/VI vehicle emission standards are in place: option F does not meet Euro 5/V, 6/VI fuel requirements, and will not allow Euro 5/V, 6/VI vehicles to meet their vehicle emission standards.

### **5.3.3 Recommendation 3. The Government should make additional changes to benefit motorists and the environment.**

126. The Government should act so that:

- fuel prices do not escalate unnecessarily
- ◊ cheaper premium petrol can be produced by specifying 95 RON E10 petrol (containing ethanol and utilising blendstocks for oxygenate blends), noting oil companies make their margins on non-base products (margins could in a future market be made on 95 RON E10 and 98 RON petrol (with or without ethanol)
- oil companies must not routinely gain approvals to vary fuel standards under the Act.

**5.3.4 Recommendation 4. These recommendations should be implemented as soon as possible, as the draft RIS indicates net benefits reduce with time.**

127. The draft RIS indicates net benefits decrease after 2022. The Government should give effect to new fuel standards by 1 October 2019, for implementation in 2022, or earlier if the 12-point plan is adopted (by 1 January 2020).

**5.3.5 Recommendation 5. The Government should be transparent in its actions.**

128. At the appropriate time, the Government should announce:

- what it is trying to achieve with new vehicle emission and fuel quality standards
- what this means for fuel quality, health, vehicle operability and performance, refinery infrastructure etc.
- that ethanol should be the preferred octane enhancer in all Australian petrol.

129. Any changes to fuel quality standards will be easier to sell if the Government and stakeholders explain the underlying rationale. A collegiate effort, a ‘vehicles and fuel compact’, with involvement from the Government, AAA, FCAI and AIP would be desirable. This could extend into explaining the role of ethanol (a considerably better alternative from operability, emissions and health than aromatics, but the average motorist would be unaware of this) that would also drive demand for Australian sugar cane and second-generation sources of ethanol.

**5.3.6 Recommendation 6. Any additives not approved by the FCAI need to be placed on the Register of Prohibited Additives.**

130. No fuels should contain compounds that ought not be in fuels because they harm engines or increase emissions. Additives including organometallic compounds (tetraethyl lead, ferrocene, MMT), polychlorinated n-alkanes, NMA, and oxygenates such as MTBE and ETBE should be placed on the Register of Prohibited Additives. If Australia is to require Euro 5, 6 vehicle emission and fuel quality standards and given that of an octane enhancer needs to be recommended—ethanol is the only acceptable option, as in the USA.

**5.3.7 Recommendation 7. Consideration should be given to banning diesel vehicles in city centres in due course, perhaps by 2027.**

131. Diesel exhaust emissions are classified as a class 1 carcinogen. Diesel vehicles are soon to be banned in some large cities overseas. Similar consideration of diesel exhaust emissions, and how they could be mitigated in Australia, would be appropriate and highlight the dangers of diesel emissions.

**5.3.8 Recommendation 8. The Government, if it wishes to extend the economic lifetime of Australia's refineries, should consider options that cover the cost of refinery upgrades.**

132. The Government could consider:

- imposing a 1 c/L fuel excise increase for 3 years, to cover the cost of refinery upgrades
- supporting refineries or covering the cost of upgrades with industry support programs, such as those used previously for the vehicle manufacturing industry. This would be preferable to hiding fuel quality externalities in the health budget.

**5.3.9 Recommendation 9. The 12-point plan should be implemented.**

133. The 12-point plan should be implemented, whether it is to complement or replace the above recommendations, as soon as possible. Market competition for Euro 5/V, 6/VI could begin from 1 January 2020.

134. The 12 point plan, in summary, allows the introduction of new standards, through market forces or jurisdictional means, the retention of current standards (subject to demand), mechanisms to keep petrol prices lower, as well as action by the Government, the FCAI, consumer groups such as the AAA, and the AIP as appropriate. It does not place a direct regulatory impost on Australian oil refineries.

135. The 12-point plan is consistent with the current Government's desire for minimal regulatory intervention, but intervenes only to the extent of addressing a market failure (in the information asymmetry relating to fuel quality standards) by encouraging amongst other things, the free market supply of fuel meeting Euro 5/V, 6/VI fuel quality standards.



## **APPENDIX 1. AUSTRALIA'S REGULATED FUEL AND EMISSION STANDARDS**

136. Australian Euro 5/V vehicle emissions standards are specified in ADR 79/04 and ADR 80/03. These in turn need to be well aligned with UN Regulation 83, which defines the pollutant emission levels for light vehicles. These Australian vehicle emission standards are drawn from European standards.

137. Europe has excellent fuel quality and emission standards: EN228 is the European petrol standard (including minimum 95 RON, maximum 10 ppm sulfur<sup>10</sup> and 35% aromatics, and other parameters) and EN590 is the European diesel standard (minimum derived cetane number 51, maximum 8% polycyclic aromatic hydrocarbons and other parameters). From a scientific and engineering perspective, it is impossible to meet emission standards if the input parameters, the physical properties and chemical components of a fuel, do not meet design requirements.

138. Principles 2 and 3 (see section 3) require that petrol meeting EN228 and diesel meeting EN590 (particularly for the most significant parameters) must be available for Euro 5/V, 6/VI vehicle emission standards to be met. These high quality fuels can also be used to improve fuel efficiency.

139. Option F in the draft RIS should be rejected when this principle is applied (unless other principles are in play). Only options B, C and the options developed in this submission are the only options that could be realistically considered if Australia regulates new fuel quality standards.

140. The absurdity of Australia using non-fit-for-purpose fuel becomes apparent through an analogy. Australia would not countenance electrical wiring, heart medication, child car seat restraints or food quality that did not meet rigorous specifications. Similarly, it should not approve fuel quality that does not meet rigorous engineered specifications.

141. As noted in the draft RIS, Australia's petrol quality, based on the concentration of sulfur is the worst of the member countries in the Organisation for Economic Cooperation and Development (OECD). Other OECD nations have or will soon adopt Euro 6/VI or equivalent standards. The United States has recently adopted Tier 3 vehicle emission and fuel quality standards (comparable to Euro 6/VI), and these are predicted to produce monetised health benefits of between A\$9–25 billion by 2030<sup>11</sup>. Significantly, the United States considers the vehicle and fuel as an integrated system.

142. Australia lags behind the world, as Australia's regular unleaded petrol is currently of Euro 3 quality (maximum 150 ppm sulfur) and Australia's premium petrol is of Euro 4 quality (maximum 50 ppm sulfur). If Australia were to import Euro 5/V, 6/VI quality vehicles, then it must:

- specify the equivalent fuel quality standards (reflected in Options B and C of the draft RIS, or in the 12-point plan)

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<sup>10</sup> ppm (parts per million) is a measure of concentration equivalent to 1 mg/kg.

<sup>11</sup> See <https://nepis.epa.gov/Exc/tiff2png.cgi/P100HVZV.PNG?-r+75+-g+7+D%3A%5CZYFILES%5CINDEX%20DATA%5C11THRU15%5CTIFF%5C00000612%5CP100HVZV.TIF>, accessed 3 March 2018.

- require that all Euro 5/V, 6/VI certified vehicles use the appropriate Euro 5/V, 6/VI fuel.

143. As Euro 5, 6 petrol requires a minimum octane rating of 95 RON, it follows that all Euro 5, 6 certified vehicles must use 95 RON fuel. That is, the use of regular unleaded 91 RON petrol should be restricted to those pre-2013 vehicles designed for low octane petrol. Petrol with a minimum 95 RON is one of the many engineering requirements for Euro 5, 6 emission standards to be met.

144. It would be pointless for Australia to mandate Euro 5/V, 6/VI emission standards and yet still permit vehicles to use fuel incapable of achieving those outcomes. This is the unfortunate situation now:

- Euro 5 vehicles are being imported, but Euro 5 petrol is unavailable
- Euro V vehicles are being imported, but the Government is permitting fuel companies to supply diesel that does not meet Euro V standards.

145. A few years ago, Volkswagen was involved in an emissions scandal affecting some of their diesel vehicles. There was international condemnation of Volkswagen's behaviour. Although the current situation is not the fault of any car manufacturers, events have conspired to produce the same outcome. Essentially no current Euro 5/V Australian vehicles can be guaranteed by manufacturers to meet emission standards. It cannot be overemphasised: current vehicle emission standards are probably not being met.

146. The demand for current Australian fuel is not only being diminished through its quality. The Minister for the Environment and Energy, the Hon Josh Frydenberg MP, has extolled the virtue of electric vehicles in supporting a decreased demand for refined fuel<sup>12</sup>. He said that 'Australian consumers are set to be the big beneficiaries' with the global revolution in electric vehicles.

147. Applying this same logic to any improvements in fuel quality standards, the significant gains to Australians consumers from health benefits and vehicle choice should be favoured over any imperative to support the large companies operating Australia's oil refineries. Australia has four refineries with small economies of scale, so external factors, including trends towards electric vehicles with no liquid fuel requirements, will certainly hit the long-term economic viability of Australia's refineries harder than any changes to fuel quality standards.

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<sup>12</sup> See <http://www.joshfrydenberg.com.au/guest/opinionDetails.aspx?id=262>, accessed 28 February 2018.

## **APPENDIX 2. MARKET AND PRICE BASED APPROACHES TO DRIVE FUEL QUALITY CHANGES**

148. A market-based approach to fuel quality could give motorists access to Euro 6 quality petrol<sup>13</sup>, that is petrol with ultra-low sulfur content (maximum 10 ppm), low aromatics content (maximum 35%) and minimum 95 RON octane rating. This could occur before any regulatory requirement for Australian refineries to refine and supply such petrol.

149. Under this proposal, the new Euro 6 petrol standard will complement, and be in addition to maintaining, the current Euro 3 and 4 equivalent petrol standard<sup>14</sup>. Australian refineries could still produce their Euro 3 and 4 quality petrol until such time that the Ministerial Forum on Vehicle Emissions and the Government determines is appropriate.

150. If this high quality Euro 6 petrol is available, the FCAI and individual vehicle manufacturers have indicated they could import and market higher quality Euro 6 vehicles. Those vehicles would be required to use the correct fuel.

151. It is desirable that Euro 6 petrol be available as soon as possible. Preliminary economic analysis from the draft fuel quality RIS indicates that health and associated economic benefits decrease each year that the introduction of Euro 6 compliant fuel is delayed after 2020.

152. A market-based approach, possibly implemented in conjunction with other consumer-led or price-led approaches (see Table 3) would allow the early introduction of Euro 6 fuels and support the introduction of the latest available vehicle emissions and engine management technology.

153. Importantly, there would be no pressure on Australian refiners, other than that provided by market forces, to refine Euro 6 petrol earlier than 2027 or another specified date. It would be improbable that large oil refining companies, including three large multinational companies, could complain about market competition.

154. Fuel importers could choose to import current Euro 3 and 4 quality petrol or the new 95 and 98 RON Euro 6 quality petrol. Australian refineries could still produce petrol meeting current specifications until a date to be specified, whether 2027 or earlier.

155. Government and industry stakeholders would need to inform the public if a proposal were to be implemented. The Government could meet with vehicle importers, the FCAI, AAA, AIP and independent fuel importers (Puma, United, and Freedom Fuels). They would need to inform the market about the new fuels, their benefits in reducing emissions, and the circumstances necessary to introduce Euro 6 vehicles into Australia. Importantly, vehicle manufacturers would be required to assert that new Euro 6 vehicles would be required to use the new 95 and 98 RON Euro 6 petrol.

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<sup>13</sup> Euro 5, 6 quality petrol is used in Europe and, when used in certified Euro 5, 6 vehicles, significantly reduces noxious emissions and improves fuel efficiency over Australia's current petrol.

<sup>14</sup> Australia's current 91 RON petrol (150 ppm sulfur) is Euro 3 equivalent, and 95 RON petrol (50 ppm sulfur) is Euro 4 compatible.

156. An education campaign and/or new labelling requirements at service stations could provide information to consumers on the appropriate petrol for Euro 6 vehicles.

157. Fuel excise rates could be varied to encourage take up of Euro 6 fuel. Changes could be designed to be revenue neutral. It is possible that the introduction of Euro 6 fuel could lead to avoided health costs of \$300–450 million per year. The costs of excise changes or rebate options for upgrading refineries could be offset against these avoided health costs.

**Table 3. The features of possible market and price based approaches in the 12-point plan**

| Proposal   | Features of proposal   | Advantages   | Disadvantages  |
|--|--|--|--|
| Market-based approach. Introduce new Euro 6 fuel quality standards, including for 95 and 98 RON Euro 6 petrol, and other options, in addition to maintaining current Euro 3 and Euro 4 petrol standards. | <ul style="list-style-type: none"> <li>• Revised Euro 6 petrol and other fuel standards could be introduced from 2020. Consumer demand for Euro 6 vehicles, and Euro 6 quality fuel, would drive take-up. It is likely that some fuel would be imported to meet the new Euro 6 standards.</li> <li>• Refineries could still refine existing Euro 3, 4 quality petrol, though demand for those fuels would fall if all new vehicles are required to use Euro 6 quality fuel—this must be the case if Euro 5, 6 emission standards are legislated.</li> <li>• Each refinery could introduce the Euro 6 quality petrol into its markets immediately after refinery upgrades. As refineries will not all upgrade at the same time, such a market driven and competitive approach could enable refineries that upgrade earlier to recover capital costs earlier.</li> <li>• Car manufacturers could import Euro 6 vehicles into Australia. Vehicle manufacturers must mandate the use of Euro 5, 6 fuel for imported Euro 5, 6 vehicles and provide consumer information to discourage motorists using higher sulfur, low octane Euro 3, 4 petrol in Euro 5, 6 vehicles.</li> <li>• This approach is no more complex in principle than the introduction of any new good into the market.</li> </ul> | <ul style="list-style-type: none"> <li>• Refineries could continue to supply existing markets (Victoria, most of Brisbane, Perth, Adelaide and some of Tasmania). A market-based approach does not mandate that they must supply Euro 6 petrol.</li> <li>• Motorists in regions where fuel is mainly imported (New South Wales, the Australian Capital Territory, Northern Territory, much of Queensland, Western Australia and South Australia, and some of Tasmania) could benefit from the introduction of Euro 5, 6 vehicles and fuels through reduced emissions and, in many cases, improved fuel efficiency.</li> <li>• Subject to the competitive market, refineries could voluntarily upgrade facilities or bring forward commercial decisions to meet market demand in areas serviced by locally refined petrol.</li> </ul> | <ul style="list-style-type: none"> <li>• Negotiating with vehicle importers, through the FCAI, on the circumstances necessary to introduce better quality (Euro 6) vehicles might be problematic if fuel quality varies across locations.</li> <li>• Consultations with the FCAI, AIP, AAA and Australian Competition and Consumer Commission would need to address warranty issues and consider whether means to reduce or prevent misfueling in new cars could be required.</li> <li>• There might not be ready availability of Euro 5, 6 fuel if motorists travel.</li> </ul> |

| Proposal  | Features of proposal   | Advantages  | Disadvantages  |
|---|--|---|--|
| Consumer-led approach.<br>New fuel labelling standards for all petrol at point of sale. | <ul style="list-style-type: none"> <li>• Current regular unleaded petrol could be labelled Euro 3 91 RON and current premium unleaded as Euro 4 95 RON.</li> <li>• Higher quality fuel could be labelled Euro 6 95 or Euro 6 98 where available (more market acceptable names could be developed (see below**)).</li> <li>• Labels could be negotiated with petrol suppliers and may include references to the performance or environmental benefits of the new specification petrol.</li> <li>• **[A naming convention could be used, for example, 95 RON E10 petrol could be designated as P95E, where 'P' indicates performance and 'E' indicates ethanol. New Euro 5, 6, petrol types could be designated as P95E, P95, P98E, or perhaps Euro6:95E, Euro6:95, Euro6:98. . A similar system could be developed for diesel and other fuels or alternatively, a colour coding system could be developed. Current fuels could remain as 91, 91 ethanol, 94 ethanol, 95, 98 . Alternatively, they could be renamed to Euro3:91, Euro3:91E, Euro3:94E, Euro4:95, Euro4:98.]</li> </ul> | <ul style="list-style-type: none"> <li>• New labelling requirements would provide information to consumers on the appropriate petrol for their cars. Euro 5, 6 vehicles would be required to use Euro 5, 6 fuel.</li> <li>• The market for better quality Euro 5, 6 petrol may develop as purchasers of new Euro 5, 6 cars seek out the appropriate petrol for new vehicles.</li> </ul> | <ul style="list-style-type: none"> <li>• Consumers may not be aware of the appropriate grade of petrol for their vehicle. This could create confusion in the market.</li> <li>• Inadvertent or deliberate misfueling may still occur, particularly for price conscious motorists.</li> </ul> |

| Proposal   | Features of proposal  | Advantages  | Disadvantages  |
|--|---|---|--|
| Price-led approach. Encouraging greater take-up of Euro 6 petrol through changes to the fuel excise rates. | <ul style="list-style-type: none"> <li>• A price-led approach was taken in 1994 to encourage the use of unleaded petrol by increasing the excise by 1 c/L and in 2003–2004 when the diesel excise was adjusted by 2 c/L to support the early introduction of low sulfur diesel under the Measures for a Better Environment program.</li> <li>• In both cases, the excise was raised on the fuel being phased out, with the additional cost levied for a set period.</li> <li>• Taxation treatments have been successful overseas in encouraging investment to improve fuel quality, in some cases ahead of regulatory schedules. For example: <ul style="list-style-type: none"> <li>• 10 ppm sulfur diesel was available in Japan two years ahead of schedule in 2005 with government assistance in the form of tax breaks, depreciation allowances and research sponsorships.</li> <li>• From 2004, all fuel in Germany has had 10 ppm sulfur in response to increased taxes on fuels containing more than 10 ppm.</li> <li>• Tax credits for small business refiners and incentives for purchases of advanced technology vehicles in the United States were combined to reduce the costs to consumers of meeting clean air targets.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• The transition to higher grade, less polluting, Euro 6 petrol could be further encouraged by reducing the price gap, currently around 12 c/L between 91 and 95 RON petrol. Changes to fuel excise arrangements could be temporarily introduced to encourage greater use of low sulfur Euro 6 fuel. This price difference is comprised of 3.8 c/L in the import parity prices, and about 8 c/L in wholesale and retail margins.</li> <li>• Changes could be revenue neutral if fuel excise was reduced by 1–2 c/L for Euro 6 petrol and increased by an offsetting amount for lower grade petrol.</li> <li>• Price-led approaches would need to be fully explored within the Government.</li> </ul> | <ul style="list-style-type: none"> <li>• An increase in the price of regular unleaded 91 RON petrol, even if by 1 c/L (albeit a small amount in the average monthly variation in fuel retail prices), may be resisted by motorists with older vehicles, and those from lower sociodemographic groups.</li> </ul> |



| <b>Proposal</b> | <b>Features of proposal</b>  | <b>Advantages</b>  | <b>Disadvantages</b>   |
|-----------------|--|--|--|
| A refinery levy | <ul style="list-style-type: none"> <li>• A levy, or fuel excise increase of only 1 c/L on all petrol and diesel sold, would raise of the order of \$400 million per year. Over 3 years this would recover \$1.2 billion, sufficient to cover the costs of all refineries being upgraded to produce low sulfur high octane petrol.</li> </ul> | <ul style="list-style-type: none"> <li>• A levy would ensure that fuel users pay for its externalities, rather than the health budget covering the health costs arising from the use of poor quality fuel.</li> <li>• Refineries would not have financial pressure to upgrade</li> <li>• The health and environmental benefits will be maximised by earlier (2021) refinery upgrades.</li> </ul> | <ul style="list-style-type: none"> <li>• Some refineries could nonetheless close and convert to import terminals, given Australian refineries do not have the economies of scale found elsewhere.</li> <li>• Some consumers will complain about petrol price rise, even if it means an attendant reduction in health costs.</li> </ul> |