Asia-Pacific Natural Gas Vehicles Association
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The Secretary
Senate Rural and Regional Affairs and Transport
Parliament House
Canberra ACT 2600
(Transmitted via email to rrat.sen@aph.gov.au)

Re - Inquiry into Australia's future oil supply and alternative transport fuels

23 February 2006,

Dear Secretary,

Please find attached a submission from the Asia-Pacific Natural Gas Vehicles Association (ANGVA) to the *"Inquiry into Australia's future oil supply and alternative transport fuels"*.

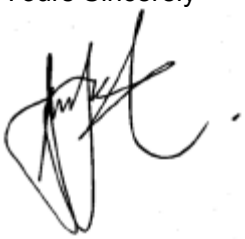
ANGVA represents stakeholders, including fleet operators, energy suppliers, vehicle and engine manufacturers, government agencies, and natural gas conversion and component suppliers throughout the Asia-Pacific region, including Australia.

As the matters within points a., c. and d. of the Inquiry's Terms of Reference are outside of the scope of our organisation, our submission focuses on point b. -

> *"potential of new sources of oil and alternative transport fuels to meet a significant share of Australia's fuel demands, taking into account technological developments and environmental and economic costs; "*

Our Secretariat is available to assist with any enquiries arising from the submission including the provision of material referenced within our submission. We also welcome the opportunity of representation before the Senate Committee for any hearings relating to this Inquiry.

Yours Sincerely



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Submission by the Asia-Pacific Natural Gas Vehicles Association (ANGVA) to the Australian Senate, "Inquiry into Australia's future oil supply and alternative transport fuels".

February 23, 2006

Introduction

The Asia-Pacific Natural Gas Vehicles Association (ANGVA) submits that adopting a range of alternative fuels, rather than attempting to find one particular solution to be applied across the board, will provide the best solution to future fuel supply problems in Australia.

The European Commission has adopted just this approach with its 2020[i] program, which proposes that by the year 2020, 20% of Europe's transport fuels will come from sources other than crude oil. The proposed total fuel mix is 10% natural gas, 5% biofuels, 5% hydrogen and the balance in crude oil derivatives. This is despite the fact that the majority of EC countries rely on imported natural gas. Brazil, though well known for its extensive use of ethanol, is also a major user of natural gas vehicles (NGVs), with more than one million NGVs now operating on Brazil's roads. Thailand has also adopted a range of fuels, principally natural gas, in its efforts to reduce diesel and petrol imports by 10% by 2008. Other examples can also be provided.

We recommend that Australia adopt a similar diversified approach. As conditions in Australia are ideal for natural gas as a transport fuel, we will demonstrate sound reasons for natural gas to be among the major fuels chosen.

Benefits of natural gas for transport in Australia

Originates from a range of indigenous fossil and renewable sources

Australia has an abundance of in-ground natural gas, with known reserves estimated to last at least 70 years.

Natural gas is also a bio-fuel as it may be derived from renewable sources, in the form of biogas or bio-methane (purified biogas). Sources include agricultural waste, animal waste, landfill decomposition, forest waste and dedicated crops. This use creates a significant greenhouse gas benefit as it uses methane that would otherwise be dispersed to the atmosphere.

Bio-methane produces a very high-energy yield from agricultural sources when compared with biomass to liquid (BTL) fuels such as bio-diesel or ethanol. A hectare of land can provide 22% more 'kilometres driven' from bio-methane than it can from BTL fuels[ii].

Methane production also consumes less energy than the production of BTL fuels (available research[iii] indicates 73% efficiency when maximising methane in conjunction with BTL, but only 55% efficiency for BTL fuels alone).

Using assumptions that could be applied to most developed countries, estimates suggest that bio-methane could produce as much as 23% of EU transport needs[iv]. Bio-methane is actively used as an alternative transport fuel on a commercial basis or blended with natural gas networks in several countries, particularly Sweden (where it is used on trains), the United States and Switzerland.

Both fossil derived natural gas and bio-methane provide a significant energy security benefit because they are sourced locally, making Australia more self reliant for its energy needs.

Stable pricing

Natural gas pricing in Australia is not tied to world markets. Natural gas vehicle users therefore enjoy stable fuel prices. Fleet operators in some cases have fixed natural gas pricing contracts as much as 10 years in advance (subject to CPI increases). Widespread use of NGVs in commercial, government and private fleets in Australia would thus provide an effective buffer for the economy from the effects of international crude oil pricing.

Well-established natural gas distribution network in Australia

Australia has a world-class natural gas distribution network that reaches as much as 77% of the population, and lies within easy access of Australia's major transport routes.

High-quality gas in Australia

Australia is known for its high quality and consistent standard of natural gas. This results in higher fuel efficiencies and lower polluting emissions with positive financial benefits (both short and long term).

Applicable to all classes of vehicles

Natural gas can and is being used in a vast range of vehicles throughout the world - small engines, cars, vans, trucks, buses, and even ferries, ships and trains. As the technology can be applied to vehicles already in use in Australia, the opportunity exists to apply an inclusive transport fuel solution that accommodates a range of vehicle types and ages.

Mature technology

NGV technology is mature and unlike many 'emerging technologies', natural gas engines have passed beyond the development stages and are commercially operable. Engine reliability is such that oil change intervals are often doubled in comparison to diesel engines.

In terms of emissions, natural gas vehicles are ahead of their time, consistently achieving emission standards beyond the reach of most other internal combustion fuels. While diesel engines are only just making 2007 emission standards with some difficulty, natural gas engines reached this threshold many years ago and in some cases are already reaching 2010 standards.

Success and Opportunity

Australia has been at the forefront of this technology development, both in the past through its early adoption of compressed natural gas (CNG) buses, and presently through world-first in-service adoption of heavy vehicle liquefied natural gas (LNG) technology. Australian conversion technology has also been adopted heavily in other parts of the world, particularly in Asia where it has contributed the massive air pollution reduction in cities such as Delhi and Mumbai. This is in spite of a relatively modest local market for natural gas vehicles. A more vibrant local market would accelerate technology development and grow export opportunities for Australia.

Lower operating costs

Recent studies[v] from the United States confirm that as diesel energy technology becomes more complex, the cost differentials of natural gas and diesel engines are reducing (i.e. natural gas engines or conversions are becoming cheaper relative to diesel). Coupled with lower fuel and maintenance costs, the result is an increased net economic benefit for fleet operators. This then flows through to other sectors of the economy due to lower transport costs.

Greenhouse benefits

As well as the bio-methane greenhouse benefits outlined earlier, standard NGVs can deliver significant greenhouse benefits over petrol and diesel. Compared with petrol vehicles, NGVs reduce

greenhouse emissions by 20% or more. Comparisons with diesel vehicles vary, but technology advances are increasing the advantage that NGVs have. This is due to the more extensive processing required to produce lower sulphur diesels, and the aftertreatment required on diesel engines to achieve emissions standards. Greenhouse benefits of between 10% and 20% relative to diesel engines are becoming increasingly common.

Air pollution benefits

NGVs reduce particulate and Nitrogen Oxides emissions over diesel and petrol vehicles by as much as 98%. Where comparisons are made between NGVs and equivalent diesel vehicles, NGVs have lower or equal emissions of both regulated and unregulated emissions[vi]. In practical terms, replacing one diesel powered garbage truck with a natural gas powered one is equal to taking 325 cars off the road in terms of pollution reduction[vii]. Air quality improvements have a direct effect on health of Australian citizens and quantifiable reductions in health care costs.

Noise pollution reductions

Noise levels from heavy vehicles are significantly reduced when operated on natural gas, in some cases by more than 50%. In many cities this has enabled a shift of heavy vehicle loads from daytime to night time traffic. Gas-fuelled garbage trucks and heavy delivery vehicles are now permitted to operate through the night due to reduced noise levels, at the same time increasing efficiency and reducing daytime traffic congestion.

Safety & standards

The characteristics of natural gas make it one of the safest transport fuels available. Specific conditions must be met before natural gas vapours ignite and, being lighter than air, natural gas generally disburses very easily in the event of an accident. Liquid fuels (including LPG) are inherently heavier and tend to 'pool' at ground level, thus carry more risk of explosion than natural gas.

Natural gas is also non-toxic, meaning it can be accidentally inhaled without harm (provided sufficient oxygen is present for normal breathing).

The natural gas vehicle industry has developed strict and uncompromising standards to ensure safety. These high standards are now being used as a basis for hydrogen vehicle standards worldwide.

Hydrogen pathway

Though estimates vary on when hydrogen fuel cell vehicles will become commercially and commonly available, natural gas vehicles are often referred to as the pathway to hydrogen economy, thus an investment in NGV infrastructure is an investment in hydrogen infrastructure. Technology being applied in the development of hydrogen vehicles often has its source within the NGV industry, particularly in relation to fuel production, dispensing and storage. Natural gas is also often used as a feedstock for hydrogen (which is only an energy 'carrier' and not an energy source) due to the high ratio of four hydrogen atoms to one carbon atom in the methane molecule (CH_4).

Natural gas and hydrogen blends (HCNG) are already being used or introduced in commercial applications in several countries around the world, most notably the United States[viii] and China[ix].

Recommendations

The following recommendations offer possible approaches to increasing the use of natural gas vehicles (and other alternative fuels), "*to meet a significant share of Australia's fuel demands*". They are mostly based on policies already successfully implemented in other countries around the world.

Establish diversified fuel targets

A solution such as the European 2020 model (outlined earlier) will provide Australia with a range of options while at the same time reducing dependence on crude oil. As Australia does not have the same natural gas supply restraints as Europe, it would be realistic and desirable for Australia to set targets higher than 10% for the use of natural gas as a transport fuel.

Ensure fuel price advantages for alternative fuels are sustained

A critical component of the success of any alternative fuel introduction is that the end user is not disadvantaged financially for making use of these fuels. Experience overseas shows that a 'payback period' for any costs associated with switching fuels must be less than 18 months to be attractive to a fleet operator. This can be done either through maintaining or improving existing fuel excise strategies, rebates or other schemes.

A key component of fuel rebates is that they must be based on energy content and should be 'absolute' rather than 'relative', ensuring a specific price advantage for fleet operators.

Provision of conversion grants, subsidies or low cost loans

The existing Alternative Fuels Conversion Programme (AFCP) should be boosted and have its scope extended beyond greenhouse emissions benefits. While the greenhouse benefits are important, in many cases several other energy security, financial and emissions benefits are not currently being realised because the proposed application may be greenhouse 'neutral', i.e. not producing a greenhouse benefit of more than 5%.

By shifting responsibility for a conversion funding programme to the Energy or Transport Ministry or the broader Environment Ministry, the scope of a conversion programme could be extended significantly, thus realising more of the benefits outlined in this submission.

Support for refuelling infrastructure

A key impediment to the widespread adoption of natural gas vehicles is the lack of refuelling facilities and the market risk associated with establishing them. Due to a number of factors, the Australian Government's CNG Infrastructure Program (CNGIP) was not successful in achieving its objectives. This was in a large part due to the restrictions placed on that program and the lack of coordination with other sectors of the industry, in particular vehicle manufacturers and transport operators.

As well as a renewed infrastructure program (which should include CNG, LNG and HCNG), initiatives which have been successfully implemented overseas include funding support, tax rebates and concessions, and even mandates requiring the installation of natural gas refuelling infrastructure on service station forecourts. Such mandates are currently being established in Sweden.

As the heavy transport sector is likely to be a high-volume user of natural gas for transport in Australia, any infrastructure support should also be made available to private heavy vehicle fleet operators (including bus fleet operators).

Technology approvals assistance

Market size and high homologation costs make it difficult for auto manufacturers and importers in Australia to supply natural gas engines and vehicles. While most OEM research and development is conducted overseas, there are still significant costs associated with bringing products to market here in Australia, particularly in relation to obtaining Australian Design Rules (ADR) approvals. Specific grants or tax concessions to offset these costs would reduce the risk for importers and distributors to supply natural gas vehicles and engines. This in turn would reduce purchase costs for the end user and increase uptake rates.

Mandated use in Government & commercial fleets

A commitment to the use of natural gas vehicles in a sizable portion of government fleets (i.e. at least 15%) or mandated use in large commercial fleets, would stimulate demand from OEM vehicle manufacturers and refuelling providers, and provide a flow through effect as vehicles are retired to the open market.

Conclusion

Australia will best be served by adopting a range of alternative fuels to meet its transport needs.

Of all the alternative transport fuels available to Australia, natural gas is among the most important. Australia has **abundant local supplies** and a **world-class natural gas distribution network** contributing to **increased energy security** for the country. Australia could meet a vast quantity of its needs from **renewable sources**, returning a **higher energy yield** than BTL fuels at a **lower energy cost**.

The use of alternative fuels will produce **significant economic benefits** and **insulate Australia from crude oil price fluctuations**. Any support required to increase the use of NGVs would be more than offset by **reducing Australia's imports of crude or refined oil**.

Increased conversion to natural gas vehicles would also help Australia reach its **greenhouse gas emissions** targets and **reduce air and noise pollution** at the same time.

Because of its vast local supplies and potential renewable sources of natural gas, Australia could comfortably set targets well in excess of 20% of it's transport fuels being met by natural gas by 2020.

Additional reading

European Commission EU Contact Group – Market Development of Alternative Fuels. 2003. Includes Well to Wheels analysis and recommendations for achieving the outcomes of the EU 2020 Alternative Fuels policy. http://europa.eu.int/comm/energy_transport/envir/2003_report_en.pdf

Endnotes:

[i] http://www.euractiv.com/Article?tcmuri=tcm:29-138101-16&type=LinksDossier

[ii] Austrian Energy Agency – "Gas. Die Alternative zu Benzin und Diesel? November 2005 http://www.eva.ac.at/publ/energy/e3-05.htm (German Language)

[iii] Swedish Gas Centre – Johan Reitz. 2005

[iv] Boisen – "Mobilizing Waste into the Integrated Fuel Chain" – 2003.
Tentscher – "Biogas in the internal market of gas. Compensation for Biogas injected into the Gas Grid. New Possibilities" - Oct 2002. www.eurosolar.org/download/Amsterdam_paper-Biogas.pdf
Wuppertal Institute – "Analyse und Bewertung der Nutzungsmöglichkeiten von Biomasse" – Jan 2006. www.wupperinst.org/download/1110-report.pdf (German Language)

[v] Tiax LLC. "Comparative Costs of 2010 Heavy-Duty Diesel and Natural Gas Technologies" – July 2005. http://www.cngvp.org/HDDV_NGVCostComparisonFinalr3.pdf

[vi] VTT Finland – Transit Bus Emission Study: Comparison of Emissions from Diesel & Natural Gas Buses. Oct 2004. http://www.vtt.fi/inf/pdf/jurelinkit/VTT_Nylund.pdf

[vii] Source - NGVAmerica

[viii] Sunline Transit Agency. California USA.

[ix] Beijing (2008 Olympics). Hythane Company. USA