Kristian Cruickshank

Queensland
Australia

[redacted]

08 Apr 2016

Vehicle Emissions Working Group

The Department of Infrastructure and Regional Development
Canberra, ACT
2601

Dear **Vehicle Emissions Working Group**:

I am writing in response to your request for public comment on the Vehicle Emissions Discussion Paper. Please find my submission enclosed.

Thank you for the opportunity to respond to a public topic of growing importance. While additional time and effort should have been afforded to this submission on my part, I am convinced that the most effective means of curtailing emissions, and in parallel enhancing the Australian economy and job creation, has been overlooked in this Discussion Paper. My submission has focused on only a couple of points from the entirety of the Discussion Paper (Electric Vehicles and Intelligent Transport Systems), but I believe them to be the most critical to the topic of 'reducing negative impact to the environment as a result of road vehicles' while at the same time generating wealth and job creation for Australia.

Please feel free to contact me [redacted] should you have any questions, comments, or requests.

Sincerely,

Kristian Cruickshank

Digitally signed by Kristian Cruickshank
DN: cn=Kristian Cruickshank, o, ou, email=kristian.cruickshank@gmail.com, c=AU
Date: 2016.04.08 16:28:26 +10'00'

Kristian Cruickshank

Enclosure - Submission

Australian Government Vehicle Emissions Discussion Paper

Submission – Mr Kristian Cruickshank

Introduction

I do not claim to be a vehicle emissions expert, nor an Electric Vehicle expert (as the key focus of my submission), however, I have significant experience in the aviation industry which forms the basis of my expertise as an adaptive Systems Engineer with specific skills in autonomous systems, system safety, regulation, software-intensive systems, and evidence-based compliance. The underlying reason for my submission is a passion for innovation and, in particular, system automation and Electric Vehicles. For further details on my qualifications see - https://au.linkedin.com/in/kristian-cruickshank-ba492234.

I believe that Australia's 'Ideas Boom' is no less important to Vehicle Emissions reductions, Electric Vehicles, and vehicle system automation industries than any other. To that end, there is an undeniable need for innovative solutions in Australia (that will contribute to reductions in greenhouse gases), unique to Australia. I will address these in my submission below, however, it is important to note that the flow on effect of innovation related to this particular problem space (vehicle emissions) has potential to be far more beneficial to the nation than that indicated by many of the referenced reports in the discussion paper.

This submission is made by myself as an individual and not necessarily reflective of my current or past employers.

I have chosen to focus on Electric Vehicles and Intelligent Transport Systems as the primary means of vehicle emissions reductions due to:

- A global push to move away from fossil fuels (it is unlikely that fossil fuels will be the dominant source of energy for future vehicles);
- More innovation opportunity existing for Australian industry compared with the traditional fossil fuel vehicle industry; and
- Significant ground swell from the likes of Tesla, Nissan, Ford, GM, Audi, Google and other vehicle manufacturers toward Electric Vehicles and Autonomy.

Submission Comments

It is noted that the section of the Discussion Paper on 'Electric Vehicles' (pg 25) appears to paint a relatively negative picture with respect to the future of Electric Vehicles. While a balanced position is required that makes the most economic sense for Australia's future, this section of the discussion paper falls short in terms of being forward-looking and seeking to instil an innovative culture in Australian industry.

Due to the challenges of predicting the future of such a complex industry, while best efforts and the most factual information possible is likely to have been used for the referenced reports by Energeia, there will be almost certainly have been a number of assumptions made that will prove to be incorrect. A good indicator of the types of industry changes that the Energeia report will not have accounted for is the popularity of the Tesla Model 3 announcement and subsequent ~320,000 reservations raising Tesla over $320million for a car not due until late 2017. This kind of positive market reaction was not previously predicted, nor expected. In addition to this, there are both cross-market considerations and intangible benefits to be understood that the Energeia report would likely not have considered. For

example, large scale deployment of Electric Vehicles may, in fact, lead to job increases across the utilities sector as a result of increased electricity usage.

In addition to other claims made by the Energia report, I refute the claim that peak demand increases by the use of Electric Vehicles will result in increases in energy prices. On the contrary, there is a reasonable likelihood that increases in the use of Electric Vehicles may in fact bring about reductions in electricity prices compared to without Electric Vehicles. There are a number of factors at play here, but ultimately demand is likely to drive the price of electricity more than any other factor. With the decreases in cost of battery technology (which will only be exacerbated by large scale production of Electric Vehicles globally), home energy storage will continue to rise. Coupled with being one of the largest adopters of solar power world-wide, there is a very real possibility that electricity consumption, for traditional applications (i.e. not Electric Vehicles) will decrease rapidly over the next couple of decades. This *will* result in increased cost of 'on-grid' electricity if no other types of demands increase.

To that end I make the following recommendation:

Recommendation 1: The future of an industry as large as the potential for Electric Vehicles in Australia cannot be accurately assessed by any one consulting company, nor should its fate be determined by one consulting company. The Federal Government should fund a multi-organisation, multi-disciplinary study to more accurately determine the net impacts across multiple domains (jobs, innovation opportunity, carbon reductions, waste management, infrastructure requirements, etc) associated with Electric Vehicles. There will be a necessary overlap with Intelligent Transport Systems, and, therefore, it is recommended that the study also consider autonomous vehicles and Intelligent Transport Systems as well. In order to ensure Australia's future as an innovative country, the study must be inclusive of a Market Assessment and make recommendations to the Federal Government on those areas that would be most advantageous for increasing Australia's wealth and job creation, part of which will include Australia's responsibility to reduce carbon emissions. Additionally, the study should consider all practicable methods of accelerating the introduction of Electric Vehicles to the Australian market (e.g. subsidies/incentives). Timeliness is a large factor in the effectiveness of this study and therefore I recommend that the study be completed prior to the end of 2016.

I am confident that the accelerated introduction of Electric Vehicles to the Australian market would result in a net positive impact to the Australian economy and industry, particularly in the generation of new jobs through high-end technology development and infrastructure enhancements.

In addition to the likely benefits of Electric Vehicles, Intelligent Transport Systems (ITS) will lead to both significant reductions in emissions, and significant opportunity for local industry. In fact, out of all opportunities discussed in this submission, the likelihood of Australian design, manufacture, integration, verification and validation, maintenance, and upgrade, of local ITS infrastructure and backend systems, is high. There will be significant effort required to introduce and integrate highly (if not fully) autonomous vehicles into Australian roadways. There will be significant opportunity for local start-ups and job generation, particularly with respect to ITS infrastructure interfaces and sub-systems. Additionally, if played correctly, there will be opportunity for export of these systems to other nations integrating and developing Intelligent Transport Systems.

Technologies such as Vehicle 2 Vehicle communications may prove to be predominantly 'Original Equipment Manufacturer' (OEM) driven, but there may also be avenues for Australian industry to develop retrofit packages, and/or become part of the OEM supply chain. Vehicle to Infrastructure solutions, on the other hand, are prime for significant Australian industry involvement, design, and manufacture to ensure effective, safe, and efficient autonomous and automated vehicle operation

throughout Australia. Advanced traffic monitoring systems, and intelligent traffic management systems also have potential for local design and development.

With respect to ITS, I make the following recommendations:

Recommendation 2: The Federal Government should sponsor, as part of Recommendation 1 study, studies into opportunity for Australian industry with respect to design, manufacture, integration, verification and validation, maintenance, and upgrade, of local ITS infrastructure and backend systems. The study should take into account potential for job creation, overall impact on economy, net advantages and disadvantages to current and future industry, potential for export, and (as most relevant to the Vehicle Emissions Discussion Paper) potential for carbon emissions reduction.

Recommendation 3: The Federal Government should consider methods for encouraging innovation and R&D, both short and long term, with respect to Intelligent Transport Systems infrastructure and sub-systems. This option may already exist under extant funded programs, but, with respect to seeking lowering of vehicle emissions, the Federal Government should consider targeted campaigns that provide Australian industry with the opportunity to present innovative ITS solutions that would result in economic and environmental benefits to Australia.