FCAI Response to Inquiry into Automated Mass Transit

House of Representatives Standing Committee on Infrastructure, Transport and Cities

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14 December 2018

The Federal Chamber of Automotive Industries (FCAI) is the peak industry organisation representing the importers of passenger vehicles, light commercial vehicles and motorcycles in Australia. The FCAI welcomes the opportunity to comment on the Inquiry in to Automated Mass Transit by the House of Representatives Standing Committee on Infrastructure, Transport and Cities.

The FCAI member companies support the overarching objective of making Australia's build environment more livable. Whilst several Australian cities already rank highly in global livability indexes, there is further scope for our cities to reach their full potential. Australia today is one of the most urbanised countries in the world, with our population growing at a greater rate than comparable advanced countries.

With much of Australia's population growth concentrated in our large cities, greater population density is placing greater strain on both private and public forms of transport. Whilst increasing population density delivers benefits to the economy, if not managed properly it risks an increased likelihood of greater urban congestion and other traffic-related issues.

There is no instant solution to managing traffic congestion, however new transport technologies will play a key role in easing future congestion and mobility challenges. Whilst mass public transport will play a key role, emerging connected and autonomous vehicle technologies have the potential to increase the utility and accessibility for public transport across major urban centres.

The evolution of connected and automated vehicles in the future transport mix

Modern vehicles[1] are complex machines with a range of sophisticated mechanical and electrical components and electronic modules that are integrated to deliver the performance, safety and emissions expected by customers and governments. Vehicle manufacturers are researching, developing and progressively introducing new technologies to make vehicles more automated and connected.

The technology for automated driving systems to deliver levels 3, 4 and 5 (conditional driving automation, high driving automation and full automation – see figure 1) will continue to evolve rapidly over the next few years. Even with this rapid development, mass market introduction of vehicles with high or full driving automation systems (i.e. levels 4 or 5) are unlikely to be available until at least 2030.

A small number of vehicles with level 4 or 5 systems may be introduced before 2030. However, it is expected that these will be either niche products (e.g. Navya shuttle) and/or in limited numbers as part of a closed fleet. These vehicles will not be "mass market" (i.e. available to be purchased by the general public) and will be operated under restricted conditions.

[1] In this submission, the term 'vehicle' refers to light vehicles (passenger cars, SUVs and light commercial vehicles) and motorcycles.

Figure 1 – Society of Automotive Engineers – Automation Classification Levels[2]

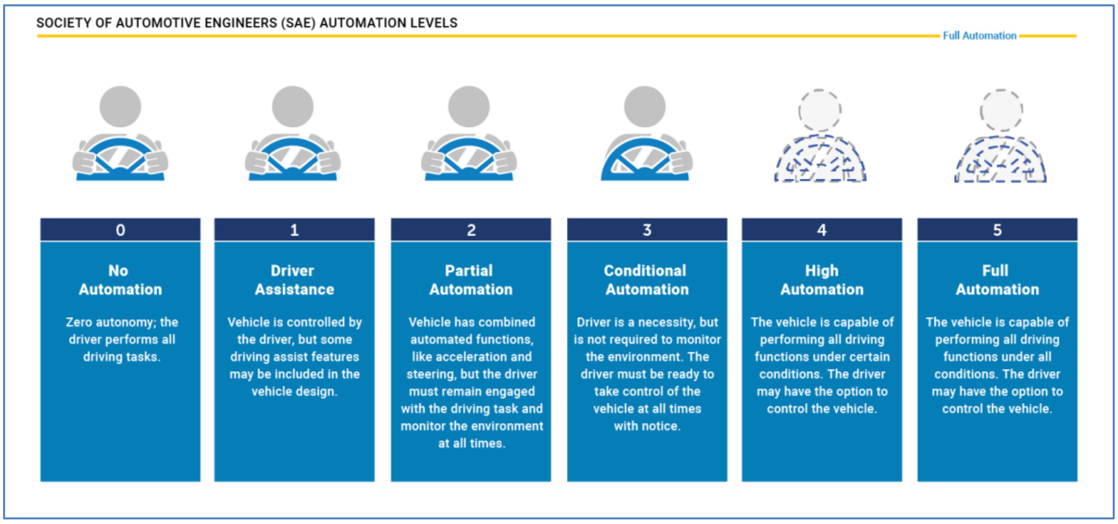
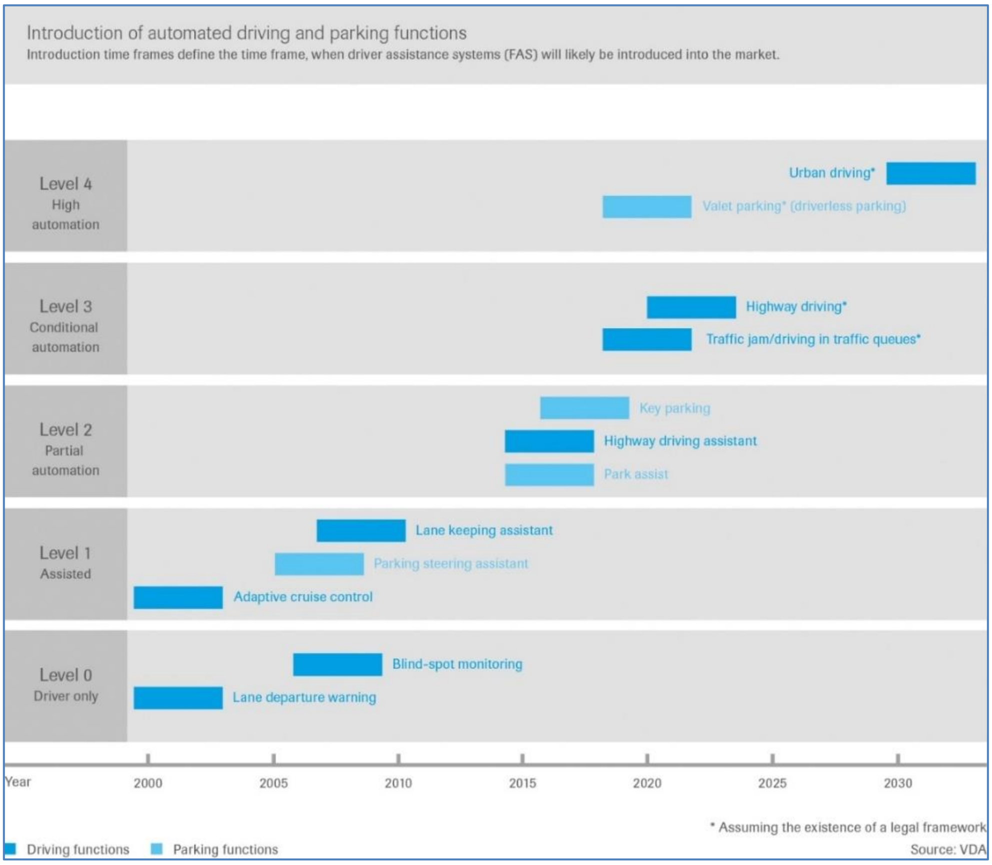


Figure 2 provides examples of the types of vehicle automation systems meeting in each of these levels and expected introduction timing into new vehicles.

Figure 2: Introduction of Automated Driving Systems[3]



Fully-automated vehicles have the potential to interact with public transport to cover the 'last mile' of transit – such as from home to a railway station. However as demonstrated in

[2] Society of Automotive Engineers (SAE) J3016, from www.nhtsa.gov [downloaded 7 December 2018]
[3] Verband der Automobilindustrie, (VDA). www.vda.de/en

Figure 1 and Figure 2, full automated driving (level 5) still requires considerable technological development.

An important enabler to facilitate the introduction of increasing levels of automated driving systems, and especially high (level 4) and full (level 5) automated driving is the need for widespread compatible communications and road infrastructure. It must be recognised that provision of the necessary infrastructure will require significant financial investment over a very long period of time and will need to be rolled out in conjunction with the introduction of highly and fully automated vehicles.

Clearly the wide-spread introduction of the necessary infrastructure in regional and rural areas of Australia will be a challenge which in turn means that operation of connected vehicles with high or full automation system (i.e. levels 4 or 5) in regional and rural areas are also unlikely in the short term.

Road regulations and vehicle regulatory standards will gradually develop on the back of the lead from the international market, and regulatory authorities will develop the necessary regulatory approaches for automated driving over time. Development of both road and vehicle regulations is underway at the international level via the United Nations (UN) Working Party 1 (WP.1) and Working Party 29 (WP.29) with changes to the Vienna Convention and the UN Regulations.

Further benefits of intelligent vehicle technology in meeting urban mobility challenges

The FCAI's member companies recognize the potential for automated and connected vehicles to provide significant safety and environmental benefits to Australia through reductions in both congestion and vehicle collisions. New light vehicles (passenger cars, sport utility vehicles (SUVs) and light commercial vehicles (LCVs)) entering the Australian market contain increasing levels of automation. Emerging features are able to facilitate vehicle connectivity – in terms of vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communications.

Collectively referred to as Cooperative-Intelligent Transport Systems (C-ITS), this group of technologies offer fundamental, long-term economic benefits and mobility solutions which will lead to environmental benefits. C-ITS also offers the prospect to improve road safety during the transport of people and freight by providing an important tool to assist with reducing urban congestion and deliver the '30 minute city'.

Implementation of C-ITS will provide benefits in terms of:

- Reduced traffic accidents with reductions in injuries and fatalities;
- Reduced traffic congestion;
- Reduction in energy consumption in road transport (leading to a reduction in CO_2 and pollutant emissions);
- Reduced transport costs with economic benefits;
- Maximise the use of the existing road infrastructure and substantially reduce the investment required for additional infrastructure;
- Improved inter-modal transport with reduction in transport costs and traveller benefits; and
- Improved connectivity with public transport and parking.

Australia has a dynamic and highly-competitive new passenger vehicle market. However, given that Australia accounts for just over one per cent of global new vehicle market, it is important that Australia align with the emerging international regulatory environment (as outlined earlier). Any Australian regulations in relation to C-ITS must be consistent with European regulations and standards so as not to impede the introduction and correct operation of these new technologies.

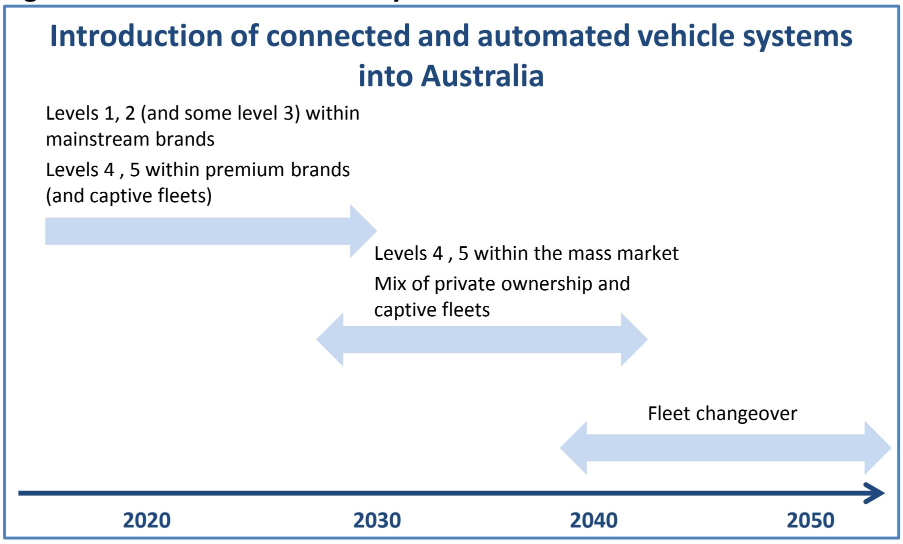
Introduction Timing in Australia

Australia currently has more than 19 million registered vehicles, with the majority (17.5 million) are light vehicles.[4] Australians currently purchase approximately 1.2 million new vehicles per year,[5] leading to an average age of registered vehicles is just over 10 years. This means it will take at least ten years for any new technology, such as an automated driving system or alternative powertrain, to comprise at least half of the in-service fleet.

New technology such as alternative powertrains and automated systems will be introduced with new models. Passenger cars normally have a model life of five years, while large SUVs and light commercial vehicles can have a significantly longer model life of between eight and ten years. Therefore, it will take a significant period of time for significant numbers of vehicles with levels 3, 4 and 5 (conditional driving automation, high driving automation and full automation) to penetrate the in-service fleet (Figure 3);

- Between now and the early 2030s expect new models to be offered with increasing levels of automated systems. A small number of premium models will be offered with high driving automation systems, but these will not be widely available in the mainstream models.
- From late 2020s throughout the 2030s systems with high levels of automation currently under development are likely to be offered with mainstream models.
- The fleet changeover to reach significant numbers of in-service vehicles with high levels of automation will continue into the 2040s.

Figure 3 – Introduction of CAV Systems into Australia



[4] ABS9309.0 – Motor Vehicle Census, Australia, 31 Jan 2018
[5] 2017 Vfacts

In addition to the automation of transport technology, this inquiry is also examining the role of new energy sources such as hydrogen power in land-based mass transit. In parallel to increasing autonomy and connectivity, alternative powertrain sources will be introduced into Australia over a similar timeframe and then penetrate into the in-service fleet.

The role of zero-emission power sources

The global automotive industry is presently transitioning to a range of lower-emissions powertrain technologies to lower overall carbon dioxide (CO_2) and noxious vehicle emissions. Automotive manufacturers around the world are developing innovative technologies within government emissions reduction policy frameworks. Current and emerging low-emissions powertrain technologies will play an ever-increasing role in this shift.

The FCAI is technology-neutral and supports the introduction of all low emissions vehicles as part of the industry's support for a light vehicle emissions standard, including a CO_2 target. As the carbon-intensity of Australian vehicle fleet reduces, new low and zero-emissions technologies such as hybrid and fully-electric vehicles (including battery electric vehicles and hydrogen fuel cell electric vehicles) will represent a greater proportion of the total vehicle fleet. Battery electric vehicles and hydrogen fuel cell electric vehicles are technologies that both utilise an electric motor. Battery electric vehicles store electricity in battery form, whilst hydrogen fuel cell electric vehicles produce electricity on board and on demand via the fuel cell. Each technology will play a key role in the long-term transition from traditional internal combustion engines.

Automotive manufacturers around the world are developing innovative technologies within government emissions reduction policy frameworks. Current and emerging low-emissions powertrain technologies will play an ever-increasing role in this shift. Future mass transit vehicles such as trains and buses will have unique challenges in developing and utilising electric motors to carry heavy loads over long distances between refueling.

The global automotive industry is playing a key role in developing and commercialising low and zero-emission heavy transport solutions. For example, global research and development for hydrogen fuel cell technology is taking place in parallel for buses, material handling (fork lifts) – in addition to passenger motor vehicles. Given Australia's abundance of natural and fossil fuel energy resources, the country is well-placed to play a significant role in the development of future technologies throughout the hydrogen supply chain.

Hydrogen as an energy source

The FCAI welcomes the development of hydrogen as a future commercial-scale energy source to power zero emission vehicles. Australia stands at the forefront of new hydrogen energy technologies. Collaboration between government and industry, both within Australia and with international partners, is critical to establishing a viable and sustainable hydrogen supply chain.

FCAI member companies are amongst several across the energy economy who are heavily investing in research and development to further commercialise technology utilising hydrogen as a zero emission energy source. Hydrogen is well placed to power future mass-transit vehicles, with hydrogen fuel cell development taking place globally for a range of vehicle types including buses, trains, heavy trucks, material handling vehicles (such as fork lifts), as well as conventional motor vehicles.

With Australia's abundance of 'conventional' (fossil fuel) energy reserves and increasing renewable energy production, the country is well-placed to be a leader in future hydrogen production.

Hydrogen can be produced from both means:

- *Steam-methane reforming (SMR) or gasification:* which extracts hydrogen from natural gas or coal; and
- *Electrolysis of water:* which utilises electricity (from either renewable sources or energy supplied from the grid) to split hydrogen and oxygen.

Governments in Australia have partnered with industry to further pioneer both fossil fuel-based technologies (utilising carbon capture and storage to sequester CO_2 emissions) and electrolysis technologies. The FCAI encourages further government engagement and investment in Australia, building on the recent work of the CSIRO's *National Hydrogen Roadmap*[6], the Australian Renewable Energy Agency's (ARENA) report into hydrogen export opportunities[7] and the briefing prepared by the Chief Scientist for the Council of Australian Governments (COAG) Energy Council[8].

The FCAI encourages each level of government in Australia to ensure the development of future mass transit technologies in parallel with the development of future zero-emission energy sources such as, but not limited to, hydrogen.

Conclusion

Australia's automotive industry is actively engaged in developing future mobility technologies and services that better-integrate urban transport services. The FCAI encourages policy makers across Australia to work with industry to assist the transport sector's transition to a more connected, automated, and lower-emission future and a long-term strategy out to 2050.

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[6] CSIRO, National Hydrogen Roadmap, https://www.csiro.au/en/Do-business/Futures/Reports/Hydrogen-Roadmap, August 2018.
[7],ARENA, https://arena.gov.au/assets/2018/08/opportunities-for-australia-from-hydrogen-exports.pdf, August 2018
[8] Office of the Chief Scientist, https://www.chiefscientist.gov.au/wp-content/uploads/HydrogenCOAGWhitePaper_WEB.pdf, August 2018