
FCAI Submission in response to Discussion Paper – Technology Investment Roadmap



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INTRODUCTION

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 make this submission to the Department of Industry, Science, Energy and Resources concerning the Technology Investment Roadmap. FCAI's feedback will only concentrate on the issues relating to light vehicle transport. In that context it is important to point out that the Technology Investment Roadmap refers to the National Electric Vehicle Strategy being one of the six key identified technology needs which is at present not yet released.

FCAI member organisations are at the cutting edge of innovation, according to Boston Consulting Group 2019 Most Innovative Companies Report¹, six (6) vehicle manufacturers are in the top fifty (50) most innovative companies. Vehicle manufacturers are expending extraordinary amounts of money on research and development to commercialise and introduce the latest technologies with advances that will bring quantum changes to the way in which new vehicles will interact with the environment providing innovative mobility solutions whilst enhancing safety for all.

Globally automotive manufacturers have and are responding to the challenges of both reducing their vehicle Co₂ emissions. As well they are responding to the enormous challenges of developing zero emission vehicles whilst still maintaining the capabilities for Australians to access to personal mobility with levels of comfort, convenience and security that we have all come to enjoy and has enabled the prosperity of Australia as a nation. Of course Australia has many parallels with other international jurisdictions such as large populated cities and urban centres however we also have some unique characteristics such as vast inland areas that are sparsely populated by comparison, with considerable distances between population centres – of course requiring appropriate transport solutions.

Putting Australia in context, light vehicle sales in Australia represent 1.062 million sales out of an estimated global production volume of 92 million vehicles in 2019 or around 1.1% and in fact the largest selling vehicle in the Australian market has sales of only 50,000 vehicles annually. The vehicle mix in Australia has evolved over time with a general trend away from the traditional passenger sedan or wagon to typically small hatchbacks, Sports Utility Vehicles (SUV) and the utility vehicles favoured by many in the trades professions due to their versatility and load carrying capacity. These trends are not all necessarily reflected globally and therefore introduce additional challenges given our small (by worldwide standards) automotive market.

¹ <https://www.bcg.com/en-au/publications/2019/most-innovative-companies-innovation.aspx>

² FCAI - Vfacts

The average age of the Australian vehicle fleet has been increasing and is now estimated at 10.2 years³. New vehicle sales as at June 2020 have seen 26 consecutive months of decline due to several economic and confidence factors. If new advanced vehicle powertrain technologies are to have a more immediate and significant effect on Australia's emissions performance, governments at all levels will have to consider what policy measures may be required to:

- a) remove barriers to new vehicle purchases and;
- b) encourage existing owners to switch to newer Low or Zero Emission Vehicles (LZEV) and retiring older vehicles permanently.

At an average age of over 10 years in Australia, new vehicle low and zero propulsion technologies will only penetrate the market; assuming that all new vehicle sales will incorporate LZEV technologies, to approximately 50% after 10 years without some market intervention.

Transport emissions are Australia's third largest source of carbon pollution, at 100.2Mt₄ of Co₂ in 2019 which corresponded with an overall decrease of 1.1 per cent over the year to December 2019 reflecting a 2.7 per cent decrease in petrol consumption. This decrease is despite there being an overall 1.5 per cent increase in vehicle population from 19.2m to 19.8m⁵, largely reflecting Australia's population growth. With an increase in the vehicle population corresponding with a decrease in emissions means that the vehicle fleet is already achieving some results replacing high emitting vehicles with lower or zero emission vehicles.

Whilst Zero Emissions Vehicles (ZEV) are the only path to completely decarbonizing transport there are a range of options that governments need to consider on the path to achieving CO₂ reduction goals. At present, Australia is the only country in the OECD that does not have vehicle and fuel efficiency standards that provides for broader policy direction and certainty for all concerned.

The Australian automotive industry needs a sensible emissions target to plan for model cycles with the most appropriate technology between 2020 and 2030.

Zero-emission vehicles, including battery electric vehicles and hydrogen fuel cell vehicles, will play a significant role in Australia's future vehicle mix, according to authoritative sources the take-up of this technology is unlikely to rise beyond 4% of sales of passenger motor vehicles (not including SUV and light commercial vehicles) until the mid-late 2020s without significant government intervention. Some forecasts estimate that traction batteries will attain price parity by 2025, however this is considered overly optimistic and does not take into account global demand combined with raw material restrictions that are likely to have detrimental effect on battery pricing and therefore a price of US\$124/kWh by 2030 may be more accurate according to the Massachusetts Institute of Technology⁶.

In the meantime, a robust yet realistic vehicle CO₂ emissions target is necessary to manage the transition to lower-emission internal combustion engine technologies and this can only be achieved through considerably improving fuel standards to allow Australia to take advantage of the latest advances available.

³ National Road Safety Strategy <https://www.roadsafety.gov.au/performance/measurements>

⁴ <https://www.industry.gov.au/sites/default/files/2020-05/nggi-quarterly-update-dec-2019.pdf>

⁵ ABS 9309.0 - Motor vehicle census, Australia, 31 Jan 2020

⁶ MIT Energy Initiative. 2019. Insights into Future Mobility. Cambridge, MA: MIT Energy Initiative. <http://energy.mit.edu/insightsintofuturemobility>

Finally, for the light vehicle fleet in Australia to contribute its share to meeting CO₂ reduction targets in accordance with the Paris climate agreement, a range of technological measures will be required encompassing a broad mix of Low and Zero Emission Vehicle (LZEV) technologies. It should be noted that in line with a healthy and competitive market environment, manufacturers will choose different paths to achieve great outcomes – therefore FCAI recommends governments adopt a principles approach that encompasses a range of technologies.

An international focus

The global automotive market has a strong focus on future technology, with a high emphasis on LZEV vehicles given the announcements by many international jurisdictions concerning significant CO₂ emission reductions proposed as well as the announced restrictions concerning internal combustion engines in certain areas. Manufacturers are working to address these challenges and are currently prioritising production of these advanced products to those markets that have outlined long term plans.

The practical steps international jurisdictions have put in place toward the lowering of transport emissions in light vehicles are encouraging the adoption of:

1. More efficient internal combustion engine vehicles (requires improving fuel standards).
2. Hybrid electric vehicles (HEV) - that typically reduce emissions by 40-50%.
3. Plugin Hybrid Vehicles (PHEV) - that further reduce emissions over Hybrid vehicles.
4. Battery Electric Vehicles (BEV) - zero emissions, range increasing and cost gradually reducing.
5. Fuel Cell Electric Vehicles (FCEV) - zero emissions with developing infrastructure globally.

There are more than 17 international manufacturers identifying over 200 new HEV, PHEV or BEV models scheduled for production by 2025.

BEVs in their various forms are being rapidly developed and deployed in markets where governments have put in place environmental policies and regulations to support the uptake of these products.

At the same time, and again with a strong focus on a pollution-free driving future, the automotive industry has been examining longer term low emission technologies that can replicate similar motoring conditions and hydrogen fuel cell electric vehicles have received strong funding for research, development and production.

Many brands have developed partnerships to share the research and development costs in efforts to fast-track their products to market and enhance accessibility and affordability of the product. These brands include, but are not limited to, manufacturers such as Audi, BMW, Daimler, Hyundai, Ford, Nissan, Mitsubishi, Toyota, Renault, and Volkswagen.

Prominent in the hydrogen fuel cell field have been Toyota Motor Corporation (TMC), and Hyundai Motor Group (HMG). These companies currently offer hydrogen fuel cell vehicles for sale in international markets, and there are ambitious plans to produce more vehicles in the future. In December 2018, HMG released their long-term roadmap 'FCEV Vision 2030' plan, outlining plans to boost their annual fuel-cell systems production capacity to 700,000 units by 2030. There are several other brands who are developing Hydrogen Fuel Cell Technology including Honda, BMW and Daimler and each of these companies have individually announced their own product plans.

QUESTION 1: WHAT ARE THE CHALLENGES, GLOBAL TRENDS AND COMPETITIVE ADVANTAGES THAT SHOULD BE CONSIDERED IN SETTING AUSTRALIA'S TECHNOLOGY PRIORITIES,

The most significant challenge for any new technology is industrialising the technology to a mass market acceptance level which involves:

- Price competitiveness with similarly available products
- Consumer understanding, acceptance, and confidence in the technology
- Infrastructure provision to ensure similar ongoing or improved convenience from that currently enjoyed.

Globally vehicle manufacturers are prioritising LZEV products to those jurisdictions that have implemented long term strategic goals and policies to reduce transport emissions. In this context FCAI encourages the Government to adopt a sensible framework that encourages pragmatic, achievable emissions and carbon reduction targets.

As stated previously the trends that international jurisdictions have put in place toward the lowering of transport emissions in light vehicles are encouraging the adoption of:

1. More efficient internal combustion engine vehicles (requires improving fuel standards).
2. Hybrid electric vehicles (HEV) - that typically reduce emissions by 40-50%.
3. Plugin Hybrid Vehicles (PHEV) - that further reduce emissions than Hybrid vehicles
4. Battery Electric Vehicles (BEV) - zero emissions, range increasing and cost gradually reducing
5. Fuel Cell Electric Vehicles (FCEV) - zero emissions however, requiring commercial refuelling infrastructure and supply chains in Australia.

QUESTION 2: THE SHORTLIST OF TECHNOLOGIES THAT AUSTRALIA COULD PRIORITISE FOR ACHIEVING SCALE IN DEPLOYMENT THROUGH ITS TECHNOLOGY INVESTMENTS (SEE FIGURE 7).

The Technologies identified in Table 7 that Australia could prioritise for achieving scale in deployment are in the opinion of the FCAI and its members, be prioritised as follows:

More efficient internal combustion engine vehicles

Given that 93.7% of light vehicles sold in Australia today are petrol or diesel vehicles, introducing more efficient internal combustion engines into the vehicle fleet could have a marked positive effect on Australia's vehicle emissions.

Manufacturers globally have invested in a range of advanced technologies that can substantially reduce emissions from vehicles. Many of these advanced technologies will require Australia to improve its fuel quality to meet internationally recognised fuel standards so that these systems can operate reliably over the life of the vehicle.

Given the projected gradual uptake of advanced technologies such as HEV, PHEV, BEV, and FCEVs without some government stimulus to encourage electrified powertrains, then improving fuel quality will most likely achieve the greatest percentage reduction given the volume of vehicles involved in the short to medium term.

Of course, were the Government to consider some form of retiring older vehicles from the road this would have an extremely positive effect on ridding the Australian environment of emissions from high polluting older vehicles.

Battery, Plugin Hybrid and Hybrid electric vehicles

HEV, PHEV and BEV vehicles are technologies that are currently available and many FCAI members have these products available for sale. FCAI members also have plans to bring several varying types of these vehicles to market with an expansion expected in the various electrified powertrain vehicles certainly in the short to medium term. At present these vehicles currently constitute the following mix of sales in the Australian market:

Vehicle Type	% Sales May YTD⁷	Emissions
• Hybrid Vehicle Sales	5.9%	% reduction w/ ICE
• EV & PHEV Sales	0.4%	EV no emissions / PHEV >% reduction w/ICE
• Fuel Cell Electric Vehicles	Trial vehicles only	No emissions

Currently the primary issue negating the adoption of Electric Vehicles is affordability. In international markets where this has been recognised, a range of policies and support mechanisms have been adopted which has incentivised the consumer to adopt these Zero Emission Vehicles (ZEV). In fact, just recently the German and French governments considerably increased their levels of support in conjunction with their economic stimulus packages.

Germany

ZEV Vehicle List Price	Federal Grant	OEM Contribution	Total (net)
<40,000€	6,000€	3,000€	9,000€
40,000-65,000€	5,000€	2,500€	7,500€

In addition to a range of other taxation measures.

France

ZEV Vehicle List Price	Federal Grant
<45,000€	7,000€

Conversion grants to trade up from older vehicles

EV or Plugin Hybrid	5,000€
ICE meeting latest emissions	3,000€

⁷ Vfacts May 2020

For reference

The average purchase costs of vehicles sold in Australia 2019/20 as compared to specific BEV prices⁸:

Passenger Vehicle	\$36,460 (ICE)	versus	\$48,970 (Electric)	→	\$12.5k premium
SUV	\$47,729 (ICE)	versus	\$60,745 (Electric)	→	\$13k premium

The cheapest battery electric vehicle in Australia at present retails for approximately \$49k meaning that there is a considerable financial hurdle for most consumers at the present moment – of course this financial hurdle is somewhat mitigated by the vehicle operational costs in the longer term. However, whilst the initial purchase price premium is significant, it will be challenging for consumers to accept the initial EV premium despite the overall cost of ownership reducing and therefore savings increasing over time (excluding the costs of finance if applicable).

Australians are tech savvy and tend to take to new technologies readily, however not at any cost. There continues to be a high price of entry to own an EV over an equivalent ICE vehicle that will not be recovered over the average ownership period when offset against energy cost savings. EV ownership presently provides the customer with no economic parity or benefit.

Unless this disparity is addressed, EV uptake will simply progress gradually according to market economic forces. Averages of course can be misleading, the two most popular small passenger vehicles in the market are the Hyundai i30 and the Toyota Corolla and between them they represent 42%⁹ of small passenger vehicle sales. With driveaway prices commencing from \$22k – \$28k, this results in an even greater disparity for the vast majority of consumers for this type of vehicle. As evidenced above, this fact has been understood by most OECD countries where financial support has been made available to accelerate uptake and consumer acceptance in addition to facilitating the infrastructure required to support electrified powertrains.

Plugin Hybrid Vehicles (PHEV)

Six brands in Australia currently have PHEV vehicles on sale although the proliferation of PHEV products in overseas markets is significant with more products being planned and made available due to their versatility. However, many of the European vehicles in this category are not being made available to the Australian market due to the requirement for the onboard ICE requiring fuel in line with the current European fuel standards.

Fuel Cell Electric Vehicles (FCEV)

As stated earlier in this submission, many brands have developed partnerships to share the research and development costs in efforts to fast-track their products to market and enhance accessibility and affordability of the product. These brands include, but are not limited to, manufacturers such as Audi, BMW, Daimler, Hyundai, Ford, Mitsubishi, Nissan, Renault, Toyota, and Volkswagen.

Prominent in the hydrogen fuel cell field have been Toyota Motor Corporation (TMC), and Hyundai Motor Group (HMG). These companies currently offer hydrogen fuel cell vehicles for sale in international markets, and there are ambitious plans to produce more vehicles as well as bring these

⁸ Website price search @18/06/20 Victorian pricing

⁹ Vfacts May 2020

vehicles to the Australian market in the future. In December 2018, HMG released their long-term roadmap 'FCEV Vision 2030' plan, outlining plans to boost their annual fuel-cell systems production capacity to 700,000 units by 2030. There are several other brands who are developing Hydrogen Fuel Cell Technology including Honda, BMW and Daimler and each of these companies have individually announced their own product plans.

Fuel cell vehicles show considerable potential to replicate many of the features that make ICE vehicles attractive to current consumers if some of the fundamental issues can be addressed most of which are similar to other advanced technologies such as:

- Price competitiveness with similar available products
- Consumer understanding, acceptance, and confidence in the technology
- Infrastructure provision to ensure similar ongoing or improved convenience from that currently enjoyed.
- Provision of the fuel at a competitive price – we note the roadmap indicates a wholesale price of \$2/kg – of course the commercial retail supply price would need to be comparable with existing fuel source costs to promote consumer uptake assuming the vehicle price parity issues can be resolved.

Given the above, the key issue that is unique to FCEVs is that there is no commercial refuelling infrastructure available in Australia at present although it is expected that there will be 2-3 public stations open by the end of 2020. This current lack of infrastructure has limited the use of available FCEVs to trials around locations where H2 has been made available. Several FCAI members have conducted trials and are supporting programs nationwide both with industry and government. There is a substantial role for government to consider the multiple uses of hydrogen in the community and to strategically position and make available refuelling infrastructure.

QUESTION 3: GOALS FOR LEVERAGING PRIVATE INVESTMENT.

N/A

QUESTION 4: WHAT BROADER ISSUES, INCLUDING INFRASTRUCTURE, SKILLS, REGULATION OR, PLANNING, NEED TO BE WORKED THROUGH TO ENABLE PRIORITY TECHNOLOGIES TO BE ADOPTED AT SCALE IN AUSTRALIA.

The FCAI is technology neutral and supports the introduction of all low and zero emission vehicles as part of the industry's support for a light vehicle emissions standard, including a CO₂ target. As the carbon-intensity of Australian vehicle fleet reduces, the take up of low and zero-emissions technologies such as HEV, PHEV, BEV and FCEV will represent increasingly greater proportions of the total vehicle fleet over time.

HEV, PHEV, BEV and FCEV are technologies that all utilise an electric motor. Each technology has the capacity to play a key role in the long-term transition from traditional internal combustion engines.

FCAI would like to summarise the requirements for the various transport related technologies and will only concentrate on those technologies where significant broader issues are involved:

Infrastructure

Battery Electric Vehicles

Whilst it is understood that the vast majority of charging of BEV's will occur at home or at the workplace in line with their general commuting requirements, consumers do want the capability to be able to travel longer distances and not be encumbered by the inability to charge their vehicles. In the main there will be three types of charging requirements:

AC charging usually accomplished during vehicle downtime. Some infrastructure requirements exist for use cases where there is no off-street parking and for scenarios involving apartment buildings and commercial parking arrangements.

Fast DC Charging usually required where top up charging is required and the owner has some time to allow for the process such as when shopping, at a restaurant or café.

Ultrafast DC Charging usually required to enable the operator to undertake continuous longer trips such as intrastate or interstate travel. Ultrafast charging permits a significant charge to be accepted in a relatively short time frame subject to the capabilities of the battery management system to manage the heat generated and consequently the long-term effect on battery capacity and durability.

Commercial operations are being deployed where business cases are likely to support or are in line with agreed partnerships. Government support is required to assist with the development of the infrastructure where the volume or frequency of use does not yet support a robust business case to provide consumers with the confidence that they will not end up stranded. All business cases should of course have sustainability as an integral requirement.

Fuel Cell Electric Vehicles

As identified in the roadmap there is presently no commercial retail infrastructure (and limited hydrogen refuelling infrastructure) in Australia at this time although 2-3 retail sites are expected in 2020. Clearly for this technology to be adopted this needs to be planned for and made available. There is a large amount of planning work to be undertaken to identify the most appropriate locations that considers the multiple uses that hydrogen could be utilised for, as well as those beyond the light vehicle fleet. Due to the emerging nature of this sector, the initial capital expense is high in comparison to other technologies. Putting aside the lack of infrastructure, the drive and refuelling experience is similar to that of an ICE vehicle.

Skills

Motor vehicles are increasingly complex, particularly through the further development of electrified powertrains and the forthcoming deployment of FCEVs. These technologies, amongst others rely on cutting-edge systems that, if not administered correctly, pose risks to motorists, passengers, bystanders, and technicians. These systems require the necessary training and the tooling to ensure adequate safety of all involved. It is not possible to consider that the general repairer has the skills or capabilities to safely manage or repair these vehicles. Electrified vehicle powertrains contain significant voltages

often in excess of 600V DC which is enough to cause serious harm to an untrained or non-certified individual.

Current FCEV's hydrogen systems include storage pressures at the industry standard of 700 bar (10,152 psi). These fuel pressures require a thorough system understanding and level of care and expertise that can only be provided through adequate training and certification. Of course, while there is certainly plenty of industry experience dealing with liquid fuels such as petrol and diesel, there is little if any experience with understanding the properties and therefore handling techniques of a volatile gaseous fuel such as hydrogen. Governments at all levels need to consider the level of support provided to training institutions, and organisations leading the development of these cutting-edge capabilities to ensure that trades can specialise in servicing these technologies safely.

In relation to repairers there is also a need to develop uniform national standards for repairers in terms of facilities that can safely manage H2 fuel repairs. There are many aspects to consider such as:

- Planning controls and restrictions at all levels of government
- Safe building design and venting requirements
- Building regulations
- Fire hazard management
- Emergency services management / identification
- Emergency management plan guidelines

Re-use & Recycling

As the industry continues to develop strategies to reduce particularly CO₂ emissions in the light vehicle fleet, there will be an increasing requirement to develop electrified powertrains in the various forms that have been described previously. Traction batteries in vehicles will require development of industries to be able to handle initially the re-use of these batteries once they are no longer suitable for high discharge operation in automotive applications. The batteries at the end of their automotive lives may well be useful for other electrical storage requirements that do not require the high current discharge capabilities typically associated with traction battery requirements.

Ultimately recycling of these batteries in some volume will be necessary. Currently the recycling available in Australia typically recycles metals and plastics locally, separating cells and internal componentry for shipping to overseas destinations. It would be preferable to ensure the domestic capability exists to appropriately recycle the components without resorting to exporting which amongst other undesirable attributes will add to the lifecycle CO₂ emissions.

Regulations

FCAI is extremely concerned that vehicle importation safeguards that have previously been in place that ensured emerging product technologies are correctly introduced to the market following considerable government engagement and forethought being undertaken to consider risk mitigation strategies. Recent changes to the Road Vehicle Standards Act have allowed for a hydrogen fuelled vehicle to be approved for import under the Specialist and Enthusiast Vehicle import Scheme (SEVS). This ill-considered decision will be replicated in the new Motor Vehicle Standards Act when released. For all of the challenges (previously identified in this submission) that are involved in bringing this FCEV

technology to market, it is inconceivable that regulators would approve of this importation approach that may well have the effect of damaging the public perception of the technology prior to market infrastructure development for commercialisation in Australia.

QUESTION 5: WHERE AUSTRALIA IS WELL-PLACED TO TAKE ADVANTAGE OF FUTURE DEMAND FOR LOW EMISSIONS TECHNOLOGIES, AND SUPPORT GLOBAL EMISSIONS REDUCTIONS BY HELPING TO DEEPEN TRADE, MARKETS AND GLOBAL SUPPLY CHAINS.

N/A

CONCLUSION

Australia imports vehicle technologies from international markets and represents around 1% of global vehicle production and as such we are technology takers.

For Australia to meet its obligations to the Paris Climate Agreement, FCAI members will be required to adopt a range of technologies with varying focus technologies prioritised by brand. It will not be possible for the industry to prioritise one technology over the other – all CO₂ reducing technologies will play an increasing or decreasing role over time as follows.

1. Low emission internal combustion engines
2. Hybrid vehicles
3. Plugin Hybrid Electric Vehicles
4. Battery Electric Vehicles
5. Fuel Cell Electric Vehicles

Certainly, electrified powertrains will be the dominant technology in the near term. Above all else affordability is the primary issue and whilst there are varying expectations of price parity with internal combustion engines, most forecasts that consider the Australian environment expect that BEV vehicle sales without government intervention will be extremely limited in volume until at least the late 2020's.

FCAI is concerned that BEV technology which is available now, could with the right government policy settings allow this technology to be expanded in the Australian market whilst we are developing and nurturing other solutions which would stand Australia in good stead in the future.

Considering that Australia accounts for only one per cent of global new vehicle market, it is important that Australia's regulatory requirements closely aligns with the emerging international regulatory environment covering all low emission technologies for light vehicles.

FCAI Recommendations

The FCAI recommends the following initiatives, which will assist in the encouragement, growth and sale of low emission vehicles, be considered:

1. A long-term environmental policy from the Government, including pragmatic and achievable emissions and carbon reduction targets
2. Support of all low and zero emission technologies in both a policy and a regulatory context
3. Adoption of innovative technologies in Government fleets and Government agencies
4. A structured approach to planning and construction of infrastructure, including extensive refuelling networks that are technology agnostic.
5. Consideration of incentives to encourage the uptake of new low and zero emission technologies which could include:
 - a. Tax and duty relief
 - b. Other financial incentives in line with global trends
 - c. Lower registration costs
 - d. Removal of LCT on all vehicles as LCT stifles new technologies to Australian market
 - e. Priority transit lanes, parking
6. Clear and regular communication to all stakeholders, including consumers, regarding the Government's intent in terms of endorsement and adoption policies

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