

Select Committee on Electric Vehicles Inquiry into the use and manufacture of electric vehicles in Australia

27 July 2018



About VACC

The Victorian Automobile Chamber of Commerce (VACC) is Victoria's peak automotive industry association, representing the interests of more than 5,000 members in over 20 retail automotive sectors that employ over 50,000 Victorians.

VACC members range from new and used vehicle dealers (passenger, truck, commercial, motorcycles, recreational and farm machinery), repairers (mechanical, electrical, body and repair specialists, i.e. radiators and engines), vehicle servicing (service stations, vehicle washing, rental, windscreens), parts and component wholesale/retail and distribution and aftermarket manufacture (i.e. specialist vehicle, parts or component modification and/or manufacture), and automotive dismantlers and recyclers.

In addition to VACC, its sister organisations – the Motor Trade Associations, represent the automotive industry for their respective states.

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Terms of Reference

Inquire into and report on the following matters:

- a) the potential economic, environmental and social benefits of widespread electric vehicle uptake in Australia;
- b) opportunities for electric vehicle manufacturing and electric vehicle supply and value chain services in Australia, and related economic benefits;
- c) measures to support the acceleration of electric vehicle uptake;
- d) measures to attract electric vehicle manufacturing and electric vehicle supply and value chain manufacturing to Australia;
- e) how federal, state and territory Governments could work together to support electric vehicle uptake and manufacturing, supply, and value chain activities; and
- f) any other related matters.

Executive summary

The following submission provides a response to the Select Committee on Electric Vehicles inquiry into the use and manufacture of electric vehicles in Australia. The Victorian Automobile Chamber of Commerce (VACC) welcomes the opportunity to comment on the likely impact electric vehicles (EVs) will have on Australia's automotive industry and economy. The Inquiry is also a timely initiative given the transformation being felt across the entire automotive industry, both locally and globally.

VACC's submission focusses on the anticipated effects of both high and low levels of EV uptake in Victoria, and by extension Australia. This includes the impact on specific automotive businesses, employment, government revenue, the skills base, end-of-life vehicle disposal and energy requirements.

Intelligence gathered by VACC, indicates there will be disruption to the industry as a whole. Specifically, the number of businesses trading and levels of employment are likely to decline. Cost continues to be a significant factor in the uptake of EVs, with current models commanding around a 25 per cent price premium.

This submission considers the effect of both high and low levels of adoption. A low uptake is modelled on the assumption that there will be a one per cent adoption rate in 2021, rising to 10 per cent by 2030. Based on this, an estimated aggregate reduction of 1,064 automotive businesses in Victoria by 2030 is forecast. An estimated 3,222 people across the industry will also lose their employment.

A high up-take scenario assumes an EV uptake of two per cent in 2021, rising to 20 per cent by 2030. VACC modelling suggests this equates to projected reduction of around 2,000 automotive businesses in Victoria by 2030 and almost 6,000 job losses.

Automotive sectors likely to be affected by EV uptake have been identified as:

- Automotive repair and maintenance
- Car wholesaling
- Motor vehicle used parts wholesaling and dismantling
- Car retailing
- Motor vehicle parts retailing
- Fuel retailing.

Considering impending changes to the industry in the wake of EV adoption, VACC believes it would be prudent to consider the implications on related public policy issues, specifically:

- Fuel excise and road user charging
- Infrastructure requirements and costs

Policy certainty, and a framework outlining the regulatory responsibilities of automotive businesses should be developed as a matter of priority.

Powering EVs is also an important consideration. Given current energy woes, VACC argues that more analysis be undertaken to assess the real energy requirements needed to support an increased uptake of such vehicles. This includes the energy mix required to attain environmental benefit.

Consideration should also be given to the disposal of EVs at the end of their life span. Life expectancy is closely related to the shelf life of the lithium-ion battery, which to date, is under warranty for eight years. Government must consider how such batteries will be disposed through a viable end-of-life vehicle policy.

An investment in new technical skills and training is also necessary to service and maintain EVs. Specialist training will be required around safety and effective de-powering of EVs due to the batteries' high voltage

The Australian Government can also learn from international EV policies. VACC cautions the implementation of significant financial incentives (offered by many countries), as they are largely unsustainable and distort markets.

Finally, VACC argues that EV uptake can be of benefit to the national economy, in the form of new opportunities for business. For example, the inspection, safety, maintenance, repair, disposal and replacement of lithium-ion batteries will need to be provided. Further, due to EVs having fewer components than traditional internal combustion engines (ICEs), opportunities for the manufacture of EVs in Australia should be investigated, along with policies aimed at stimulating such investment.

Recommendations

Recommendation 1:

VACC recommends that the Government provide policy clarity with respect to electric vehicles. A policy framework that provides a clear roadmap for business regarding their regulatory responsibilities would be beneficial, assisting automotive businesses make transitional arrangements towards the service, repair and sale of electric vehicles and facilitate appropriate investments.

Recommendation 2:

Both Federal and State Governments should collaborate to investigate the feasibility of electric vehicle assembly in Australia, including policy measures to attract appropriate investment and facilitate the establishment of electric vehicle manufacturing operations.

Recommendation 3:

VACC asserts that for most consumers, it is the price competitiveness of an electric vehicle that is the most important factor in the uptake and overall sustainability of the EV market. Government policies aimed at providing price support and other financial incentives to encourage EV purchases by consumers are viewed to be unsustainable and can distort the EV market.

Recommendation 4:

VACC recommends that Governments should be explicit regarding the terms of road user charging or other measures that will be utilised to fund the declining proportion of fuel excise revenue associated with the uptake of electric vehicles.

Recommendation 5:

VACC recommends that the Government instigate a detailed study into the impact of electric vehicles on the nation's energy network, including emission reductions and their overall viability based on a growing mix of renewable energy sources.

Recommendation 6:

VACC recommends that an end-of-life policy for EV batteries is of critical environmental importance. In this respect, the EU model should be investigated for possible adoption.

Recommendation 7:

VACC recommends the development of appropriate skill sets that encapsulate safety protocols and the effective de-powering of electric vehicles.

VACC recommends the development of a new Certificate 3 level apprenticeship training qualification specifically for emerging electric vehicle technician job roles. This qualification should include appropriate theory and training in electrical and battery systems, diagnostics, programming and other core requirements pertaining to the service and repair of electric vehicles.

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Introduction

VACC welcomes the opportunity to provide a response to the Select Committee on Electric Vehicles inquiry into the use and manufacture of electric vehicles in Australia.

The emergence of electric vehicles (EVs) as a real alternative to internal combustion engines (ICEs) is fast becoming a reality. On a daily basis, new literature is produced espousing the merit of EVs, their technical components and environmental benefits.

The EV debate often centres on the environmental benefits of low or zero emissions, however, until such time that EVs can be powered entirely by renewable energy, this argument alone does not suffice.

For these reasons, the Victorian Automobile Chamber of Commerce (VACC) has focused on the very real impacts a high and low EV uptake would have on the automotive industry and economy. The following submission gives consideration to the effect on automotive businesses, employment, government revenues, the existing skills base, battery disposal and energy requirements.

a. The potential economic, environmental and social benefits of widespread electric vehicle uptake in Australia

Australia's automotive industry encompasses a wide variety of sectors. In aggregate, the industry employs 379,365 people across 69,365 individual businesses, and contributes \$37.1 billion in industry value-added to Australia's economy (Table 1).

The uptake of electric vehicles by consumers over time is anticipated to have a disruptive influence on key sectors of the automotive industry. Industry intelligence compiled by the VACC suggests there will be some negative impacts, including a reduction in the number of businesses trading and in employment.

Table 1: Australian Automotive Economic Summary – 2015/16

Automotive Sector	Employment year ending June 2016	Number of businesses as at 30 June 2016	Industry Value Added (\$m)
Motor Vehicle and Parts Manufacturing	43,627	3,054	3,826
Motor Vehicle and Parts Wholesaling	22,081	5,282	5,871
Motor Vehicle Retailing	66,002	5,752	7,707
Motor Vehicle Parts and Tyre Retailing	28,295	4,288	2,211
Fuel Retailing	34,728	4,136	2,851
Automotive Repair and Maintenance	142,632	37,406	9,452
Passenger Car Rental and Hiring	7,997	1,624	1,705
Bicycle Retailing	4,500	987	950
Marine Equipment Retailing	3,365	829	219
Outdoor Power Equipment Retailing*	4,670	1,290	250
Towing Services	3,052	2,465	203.8
Agricultural Machinery Retail and Repair*	6,916	1,403	n/a
Other specialised machinery manufacturing	11,500	849	1,900
Total Automotive Industry	379,365	69,365	37,148

Source: VACC - Directions in Australia's Automotive Industry: An Industry Report 2017

Uptake of electric vehicles

The impact of electric vehicles on Australia’s economy and automotive industry will vary according to the adoption rate of electric vehicles by consumers. VACC has undertaken analysis of the respective impact for Victoria, and in this respect two scenarios are presented in this submission:

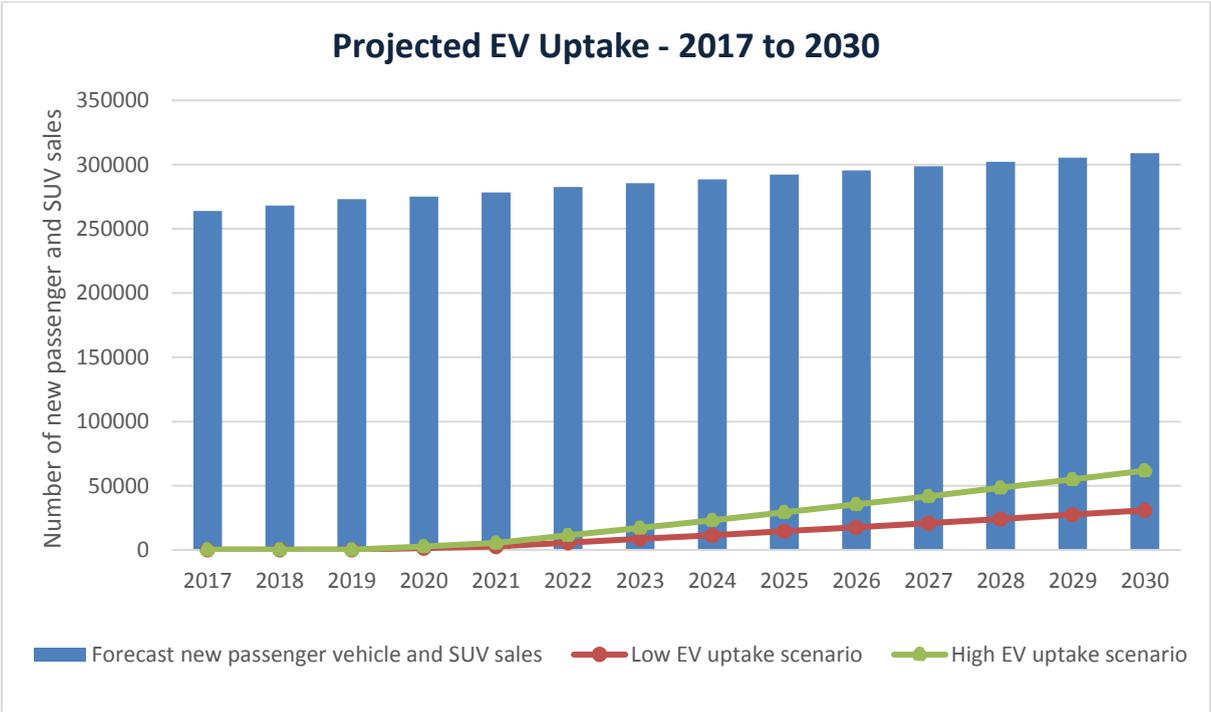
- a low electric vehicle (EV) uptake scenario over the period 2017 to 2030 for Victoria, and;
- a high EV uptake scenario over the period 2017 to 2030.

Chart 1 displays the projected annual number of new passenger vehicles and SUV sales between 2017 and 2030 for Victoria. This is based on trend new vehicle sales data supplied by the Federal Chamber of Automotive Industries (VFACTS data), along with a low and high EV uptake scenario over the same period.

The low EV uptake scenario assumes an EV uptake rate of one per cent of new passenger car and SUV sales in 2021, rising to 10 per cent by 2030. This scenario would result in 30,878 new electric vehicles sold in 2030, out of a projected total of 308,781 new passenger car and SUVs sold in Victoria.

The high EV adoption scenario assumes an EV uptake rate of two per cent in 2021 rising to 20 per cent by 2030. This translates into 61,756 new EVs sold in 2030, out of the same projected total of 308,781 new passenger car and SUVs sold in Victoria.

Chart 1: Projected EV Uptake as a percentage of new passenger vehicle and SUV sales – Victoria



Source: ABS and VFACTS modelled data

Whilst both scenarios are plausible, a key factor influencing the uptake of electric vehicles is their cost. Evidence shows that electric vehicles command a price premium of around 25 per cent¹ over internal combustion engine (ICE) vehicles within the mass market segment (new vehicles costing up to \$40,000). The mass market segment represents approximately 63 per cent of the total new vehicle market in Victoria. This premium relates to the cost of lithium-ion batteries, which represent around half the cost of an electric vehicle.

¹ Bloomberg, *Electric Cars to Reach Price Parity by 2025*, June 23, 2017

However, battery costs are rapidly declining, dropping by an estimated 19 per cent per cumulative doubling of manufactured capacity. Based on this trend, electric vehicles are forecast to reach price parity with ICE vehicles around the year 2025-26. At this stage, EV battery costs are expected to reach \$100 per kilowatt hour. All things being equal, by 2030 it is estimated that battery electric vehicles may be up to 15 per cent cheaper than equivalent ICEs, potentially accelerating their uptake.

Automotive sectors affected by electric vehicles

Industry intelligence compiled by VACC suggests that the following automotive sectors will most likely to be impacted by the growing uptake of electric vehicles by consumers. These include:

- Automotive repair and maintenance
- Car wholesaling
- Motor vehicle used parts wholesaling & dismantling
- Car retailing
- Motor vehicle parts retailing
- Fuel retailing

The progressive uptake of electric vehicles is anticipated to have disruptive consequences on the above sectors to varying degrees. Experience from countries who have already experienced higher EV uptake to date, supports this assumption.

In both the United Kingdom and the United States (US), declining trends in the number of fuel station outlets have been observed relative to growing EV sales. This is despite record lows in the price of petrol. Growing numbers of EVs on-road displace conventional petrol-powered vehicles; progressively reducing the viability of many fuel retail businesses. This trend is also anticipated to occur in Victoria and Australia as the number of EVs increases.

Electric vehicles typically have around 17 moving parts or less, as opposed to around 2,000 moving parts in an ICE vehicle. This will have negative implications for the motor vehicle parts retailing, automotive repair and maintenance and car retailing/wholesaling sectors.

The greater reliability of electrical vehicles, in conjunction with fewer moving parts, will impact on vehicle parts retailing businesses, reducing current profitable income streams from the sale of catalytic converters, engine components and many other ICE vehicle parts and consumables. This will likely result in a significant contraction in investment within the sector, along with large numbers of business closures or consolidation.

These same factors will also reduce the volume of work for automotive mechanical repair businesses given the greater reliability of EVs and their need for less servicing and maintenance. The technical sophistication of electric vehicles will also require investment in upskilling within the sector. Diagnostics, programming and coding skills for vehicle technicians will be essential to remedy vehicle faults – including the customisation of EVs. Given the high voltages inherent with EVs, there will also be greater occupational health and safety compliance required to protect both staff and the general public. These cost pressures and the imminent decline in volume of repair work, is anticipated to reduce the number of operators and employment within the sector, as EVs establish a greater presence in the vehicle fleet.

It is also the case that many car dealerships will be adversely affected through the increased uptake of electric vehicles. Data from the Australian Bureau of Statistics shows that car dealerships have amongst the lowest profit margins within the automotive industry (2.6 per cent). Profit margins are typically much higher on the vehicle service and maintenance side, often subsidising the losses experienced in other areas of the business – such as the sale of new vehicles. Fewer servicing and maintenance requirements for EVs will significantly affect these key revenue streams and reduce the viability of many dealerships and employment within the sector. This has been observed in the US and other markets around the world and is likely to be an inevitable consequence for car dealerships in Australia.

Industry impacts of a low EV uptake scenario

According to VACC industry modelling (Chart 1), a low EV uptake is indicated by EVs representing one per cent of new passenger car and SUV sales in 2021. This is expected to rise by one per cent each year totaling 10 per cent of sales by 2030.

The industry and economic impacts forecast with this scenario are:

- an estimated aggregate reduction of 1,064 automotive businesses in Victoria by 2030
- an estimated decline of 3,222 people employed in Victoria's automotive industry by 2030.

To place these results into perspective, this outcome is similar to the employment downturn observed through the closure of a major vehicle manufacturing plant locally, such as Ford.

These outcomes highlight a moderate disruption to Victoria's automotive industry if a 'low and slow' uptake of EVs takes place. Table 2 shows that these overall impacts are concentrated within the retail and repair sectors of the industry. However, the results do not incorporate other trends affecting automotive industry sectors. They also assume an EV policy status quo by government, i.e. that there are no significant policy interventions to incentivise the uptake of EVs for consumers over the period.

This scenario does not suggest the need for urgent action by the automotive industry over the short to medium term. This adoption rate provides sufficient time for automotive businesses to plan for and transition towards the new EV environment. Nevertheless, it would be prudent for businesses to increase their awareness of impending changes and receive appropriate training and/or advice to make appropriate transitional arrangements.

Table 2: Low EV Uptake - Impacts by Automotive Sector, Victoria

BUSINESS POPULATION				
Automotive Sector	Yr 2022	Yr 2025	Yr 2030	Cumulative Total
Car Wholesaling	No change	-10	-30	-40
Motor Vehicle used parts wholesaling & dismantling	-11	-15	-52	-78
Car Retailing	No change	-74	-80	-154
Motor Vehicle Parts Retailing	-12	-40	-100	-152
Fuel Retailing	-40	-100	-120	-240
Automotive Repair and Maintenance	-80	-120	-200	-400
TOTAL – ALL SECTORS	-143	-339	-582	-1,064
EMPLOYMENT				
Car Wholesaling	No change	-54	-120	-174
Motor Vehicle used parts wholesaling & dismantling	-36	-70	-162	-268
Car Retailing	No change	-200	-220	-420
Motor Vehicle Parts Retailing	-40	-220	-480	-740
Fuel Retailing	-100	-180	-250	-530
Automotive Repair and Maintenance	-90	-400	-600	1,090
TOTAL – ALL SECTORS	-266	-1,124	-1,832	-3,222

Source: ABS data and VACC industry modelling

Economic impacts of a high EV uptake scenario

Table 3 describes the economic impact of a high EV uptake scenario on Victoria's automotive industry. This scenario assumes an EV uptake rate of two per cent of new passenger car and SUV sales in 2021, rising incrementally by two per cent per annum to 20 per cent of new passenger and SUV sales in 2030.

The industry and economic impacts forecast with this scenario are:

- a projected loss of around 2,000 automotive businesses for Victoria by 2030
- a loss of almost 6,000 people employed within Victoria automotive industry by 2030.

These results are broadly equivalent to the employment reduction observed through the closure of two major vehicle manufacturing plants, such as Ford and Holden.

These results indicate a more aggressive impact on Victoria's automotive industry, with Table 3 showing the main reductions affecting the retail and repair sectors of the industry. These results do not incorporate other trends affecting automotive industry sectors and assume the current government EV policy status quo remains over the period.

Whilst these economic impacts are manageable, changes in government policy that incentivise electric vehicle purchases can accelerate their uptake. Such a phenomenon has been observed in Norway, Denmark and Sweden. It is important to note that such policy actions could expedite the number of business exits and employment losses.

Therefore, it is critical that the government provides policy clarity with respect to EVs for the benefit of both automotive businesses and the broader community. Such certainty would signal the government's commitment to an electric vehicle future to automotive businesses and provide the certainty needed for businesses to prepare for a new operating environment.

Table 3: High EV Uptake - Impacts by Automotive Sector, Victoria

BUSINESS POPULATION				
Automotive Sector	Yr 2022	Yr 2025	Yr 2030	Cumulative Total
Car Wholesaling	-9	-30	-60	-99
Motor Vehicle used parts wholesaling & dismantling	-13	-52	-104	-169
Car Retailing	-70	-80	-150	-300
Motor Vehicle Parts Retailing	-35	-100	-170	-305
Fuel Retailing	-80	-120	-250	-450
Automotive Repair and Maintenance	-100	-200	-380	-680
TOTAL – ALL SECTORS	-307	-582	-1,084	-2,003
EMPLOYMENT				
Car Wholesaling	-50	-120	-210	-380
Motor Vehicle used parts wholesaling & dismantling	-58	-162	-302	-522
Car Retailing	-200	-220	-400	-820
Motor Vehicle Parts Retailing	-190	-480	-700	-1,370
Fuel Retailing	-160	-250	-500	-910
Automotive Repair and Maintenance	-300	-600	-1,000	-1,900
TOTAL – ALL SECTORS	-958	-1,832	-2,987	-5,902

Source: ABS data and VACC industry modelling

Recommendation 1:

VACC recommends that Government provide policy clarity with respect to electric vehicles. A policy framework that provides a clear roadmap for business regarding their regulatory responsibilities would be beneficial, assisting automotive businesses make transitional arrangements towards the service, repair and sale of electric vehicles and facilitate appropriate investments.

b. Opportunities for electric vehicle manufacturing and electric vehicle supply and value chain services in Australia, and related economic benefits

The uptake of EVs by consumers can also present new growth opportunities for automotive businesses. Lithium-ion batteries have a limited lifespan (approximately 8 years) and this has the potential to raise new business service offerings pertaining to their inspection, safety, maintenance, including their repair, disposal and replacement.

Whilst passenger car manufacturing has now ceased, it is not beyond possibility that the assembly of EVs may become a viable business option. EVs have fewer components than traditional ICE vehicles, thus eliminating the need for many costly manufacturing processes such as engine casting, tooling and the creation of component parts. Given the inherent residual engineering capacity that is available in Victoria and other states, business models involving the importation of electric motors and the assembly of EVs from Completely Knocked Down packs (CKDs) using robotics and other automated processes may be viable. This represents a business opportunity that should be considered by Federal and State Governments.

It should also be noted that concise and clearly communicated policy statements in relation to EVs, as witnessed in countries such as the UK, the EU and China, assist considerably in manufacturers' plans for automotive investments in design, plant and machinery.

Recommendation 2:

Both Federal and State Governments should collaborate to investigate the feasibility of electric vehicle assembly in Australia, including policy measures to attract appropriate investment and facilitate the establishment of electric vehicle manufacturing operations.

c. Measures to support the acceleration of electric vehicle uptake

In an attempt to meet CO2 emission targets, many countries have adopted policies designed to incentivise consumer uptake of electric vehicles. These incentives include tax credits, rebates and price subsidies for electric vehicles, often amounting to many thousands of dollars per driver. This is evidenced in the United States, the UK, Germany, Denmark, Norway, Sweden and many other countries. Further initiatives include exemptions from registration and road taxes, parking fees and other motor vehicle charges. Such policies have contributed to an early surge in the global uptake of EVs.

VACC asserts that significant financial incentives of the magnitude offered by many countries, are largely unsustainable and distort the market for EVs respectively. There is also the risk that once such price supports and financial incentives are removed, sales of EVs could stall or go backwards. This is evidenced by the dramatic fall of EV sales in Denmark, dropping 60.5 percent in the first quarter of 2017 following the phasing out of its tax incentives on EVs in 2016 (Chart 2). This dramatic reduction suggests clean-energy vehicles are not currently attractive enough to compete against ICEs, without some form of subsidy.

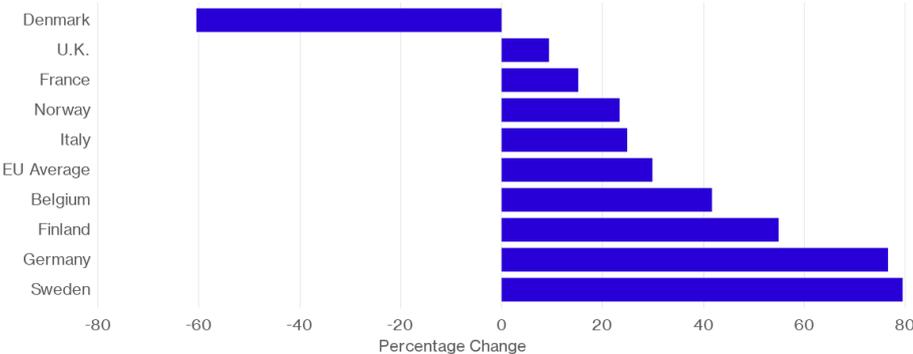
Furthermore, the cost of policies designed to accelerate the uptake of EVs, including subsidising the cost of home or public EV charging infrastructures, can potentially translate into billions of dollars and this warrants both careful consideration and budgetary planning, including an assessment of the wider impacts on the community.

Chart 2: Decline of Denmark’s Electric Vehicle sales

Reverse Gear

Denmark is the only major European market where sales of electric cars are slowing

■ ECV sales in 1Q 2017 vs 1Q 2016



Source: ACEA

Bloomberg

Overall, the international experience suggests, that whilst financial incentives towards the purchase of EVs have helped motivate the EV market in many countries, fundamentally, it is the cost competitiveness of EVs versus conventional ICE vehicles that will ultimately sway consumers in the mass vehicle market over the longer term. Based on the evidence presented, this price competitiveness is expected to occur between 2025 and 2030.

Recommendation 3:
VACC asserts that for most consumers, it is the price competitiveness of an electric vehicle that is the most important factor in the uptake and overall sustainability of the EV market. Government policies aimed at providing price support and other financial incentives to encourage EV purchases by consumers are viewed to be unsustainable and can distort the EV market.

d. Other related matters

Government policy implications

VACC argues that the mass uptake of electric vehicles has much wider implications for society and the role of government at a state and federal level. Key considerations include:

- diminishing fuel excise revenues over time
- the possibility of new taxes and charges on road users to balance the decline in fuel excise revenues
- implications for the nation’s energy network associated with the charging of electric vehicles
- an end of life vehicle policy for old-fleet and electric vehicles
- investment in new workforce skills training and qualifications for electric vehicle technician roles.

Fuel excise and road user charging

The progressive and cumulative uptake of EVs over the next decade, even under a low EV uptake scenario, will substantially affect fuel excise revenues and significantly more according to a higher uptake scenario.

A key consideration for government and the broader community is what measures will be taken by government to offset declining fuel excise revenues as electric vehicles displace ICE vehicles on the road over the next decade.

In this respect, VACC believes that Federal and State Government should be transparent on this issue. Should Governments intend to encourage the uptake of electric vehicles, then it is necessary to make explicit, that additional road taxes or charges may be levied as a consequence. VACC argues that the uptake of electric vehicles should not be viewed as an opportunity to gouge road users with extra taxes and charges. Such policy may act as a major disincentive to the purchase of electric vehicles.

Recommendation 4:

VACC recommends that Governments should be explicit regarding the terms of road user charging or other measures that will be utilised to fund the declining proportion of fuel excise revenue associated with the uptake of electric vehicles.

The energy network and electric vehicles

VACC believes that insufficient analysis has been undertaken concerning the energy requirements of a mass uptake of electric vehicles, including the mix of energy sources that will effectively deliver the expected benefits in terms of emissions reductions for the community.

Primarily, substantial reductions in emissions through the greater uptake of electric vehicles can only realistically be achieved through the use of renewable energy sources. The capacity of renewable energy sources to meet the added power requirements of millions of electric vehicles in future, is yet to be proven. VACC advises that this represents an area of business and public concern, and further analysis of these issues is necessary.

Recommendation 5:

VACC recommends that the Government instigate a detailed study into the impact of electric vehicles on the nation's energy network, including emission reductions and their overall viability based on a growing mix of renewable energy sources.

End-of-life electric vehicle policy

The lifespan of electric vehicles is closely associated with the life expectancy of their component lithium-ion batteries. Most manufacturers warrant the lithium-ion batteries contained in EVs for eight years and generally, this is considered to be their life expectancy. An unanswered environmental question, however, is what happens to the approximately half-tonne of lithium-ion batteries in each vehicle when they wear out?

EV batteries carry a risk of giving off toxic gases if damaged, and the extraction of core ingredients such as lithium and cobalt can lead to water pollution and other negative environmental consequences. Furthermore, given their sheer size, EV batteries cannot be stored at home and landfilling is an undesirable option. This necessitates the introduction of a suitable end-of-life EV policy.

The European Union (EU) enforces regulation that requires the makers of batteries to finance the costs of collecting, treating and recycling of all collected batteries. This has encouraged partnerships between carmakers and recyclers. For example, Umicore, who has invested €25m into an industrial pilot plant in Antwerp to recycle lithium-ion batteries, has deals in Europe with Tesla and Toyota to use smelting to recover precious metals such as cobalt and nickel.

Recommendation 6:

VACC recommends that an end-of-life policy for EV batteries is of critical environmental importance. In this respect, the EU model should be investigated for possible adoption.

Investment in new workforce skills training for EVs

EVs present new skill requirements for the automotive industry. Essentially, there are two streams of specialist training required to meet the emerging needs of battery electric; hybrid and fuel cell vehicles.

These include:

- skill sets around safety and the effective de-powering of electric vehicles
- new technical training in the field of diagnosis, service and repair of electric vehicles and the rebuilding of electric batteries.

EVs contain high voltages that have the potential to kill persons untrained in the safe de-powering of their electrical systems. Whilst there is skill-set training available for hybrid vehicles, it is recommended that specific units of competency be developed for the safe work on battery electric vehicles for vehicle technicians.

In terms of diagnosis, service and repair, there are currently no stand-alone qualifications specifically designed for electric vehicles. Due to the specialist nature of these vehicles, VACC recommends the development of a new Certificate 3 level qualification, specifically for electric vehicle technicians. It is envisaged that this qualification would encompass personal and shop safety procedures, specialised electronics and battery system training, diagnostics, programming and other core requirements for the service and repair of electric vehicles.

Recommendation 7:

VACC recommends the development of appropriate skill sets that encapsulate safety protocols and the effective de-powering of electric vehicles.

VACC also recommends the development of an appropriate Certificate 3 level training qualification for emerging electric vehicle technician job roles. This qualification should include appropriate theory and training in electrical and battery systems, diagnostics, programming and other core requirements pertaining to the service and repair of electric vehicles.