



Considering the role of Transport Agencies in the Electro-Mobility Transition

Synthesis Briefing - Module 4

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Research Project: SBEnrc 1.74b - Implications of EV for Transport Agencies

Date: September 2021

Acknowledgements:

This research has been developed with support provided by Australia’s Sustainable Built Environment National Research Centre (SBEnc). SBEnc develops projects informed by industry partner needs, secures national funding, project manages the collaborative research and oversees research into practice initiatives. Core Members of SBEnc include ATCO Australia, BGC Australia, Government of Western Australia, Queensland Government, Curtin University, Griffith University, RMIT University and Western Sydney University. This research would not have been possible without the valuable support of our core industry, government and research partners.



Project partners



Department of
Transport



Public Transport
Authority



Citation: Hargroves, K. and James, B. (2021) Considering the role of Transport Agencies in the Electro-Mobility Transition. Project 1.74B – A Report to the Sustainable Built Environment National Research Centre (SBEnc), Australia.

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Introduction

It is clear that the level of uptake of electric vehicles (EVs) is directly affected by the level of ambition and support of a Nation's collective governments towards the electro-mobility transition. For instance a lack of effective vehicle emissions controls allows the internal combustion vehicle (ICV) market to operate without responsibility for related emissions, creating an uneven playing field for lower emission options that provide government, business and society multiple benefits. As of 2019 a number of developed nations' governments had announced plans to ban new ICV sales, as shown in Table 1, along with more recent commitments by the US Government to aim for zero ICV sales by 2030,¹ the Japanese Government by 2030 (allowing fossil-fuel hybrids),² and the UK Government by 2035 (including hybrid vehicles).³ Governments committed to supporting the transition to electro-mobility are using a number of mechanisms such as public policy, industry standards, financial incentives, taxation relief, infrastructure investment, and education and awareness programs.

Table 1: Targets for the phasing out of fossil fuel vehicles up as of 2019

Country	Policy target	Date target set
Austria	No new FFVs sold after 2020	April 2016
Britain	No new FFVs sold after 2040	July 2017
China	No new FFVs sold after 2040	September 2017
Denmark	5,000 Evs on road by 2019	2008
France	No new FFVs sold after 2040	July 2017
Germany	No FFVs on road by 2030	October 2016
India	No new FFVs sold after 2030	April 2017
Ireland	No new FFVs sold after 2030	July 2017
Israel	No new FFVs sold after 2030	February 2018
Netherlands	No new FFVs sold after 2030	October 2017
Scotland	No new FFVs sold after 2030	September 2017
Korea	Evs 30% of sales by 2020	June 2016
Taiwan	No new FFVs sold after 2040	December 2017

Source: BITRE (2019)⁴

The Norwegian Government plans to phase out all cars that produce emissions by 2025 (including hybrid vehicles) and has implemented a number of supporting mechanisms, such as reducing Value Added Tax (VAT) and parking fees for EVs,⁵ resulting in a world leading 56 percent annual new market share.⁶ However in Australia the uptake is just over 1 percent of market share, due in part to a lack of government ambition to support EV uptake, as well as poor emissions reduction strategies and progress to date.⁷ This will see the Australian vehicle fleet lag behind global uptake as shown in Figure 1, resulting in additional greenhouse gas emissions and reduced direct benefits to vehicle owners through improved health outcomes and significantly reduced costs, with the RAC estimating the average energy and servicing costs to be 60 percent lower for EVs.⁸

¹ Soat, R (2020) 'ICE Bans Begin to Take Shape in the US', Forbes, 04 November 2020.

² Kyodo, J (2020) Japan plans to ban the sales of new gasoline cars in mid-2030s, The Japanese Times, 03 December 2020.

³ Jolly, J (2021) Car industry lobbied UK government to delay ban on petrol and diesel cars, The Guardian, 15 March 2021.

⁴ BITRE (2019) Electric Vehicle Uptake: Modelling a Global Phenomenon, Australian Government Bureau of Infrastructure and Transport Research Economics (BITRE), 02 August 2019.

⁵ Norsk Elbilforening (2021) Norwegian EV policy, Norwegian Electric Car Association.

⁶ NMT (2021) 'Norway is Electric', Media Release, Norwegian Ministry of Transport, 22 June 2021.

⁷ Australian Government (2021) Future Fuels Strategy: Discussion Paper, Australian Government Department of Industry, Science, Energy and Resources.

⁸ RACQ (2020) 'Car running costs', Royal Automobile Club of Queensland, RACQ.

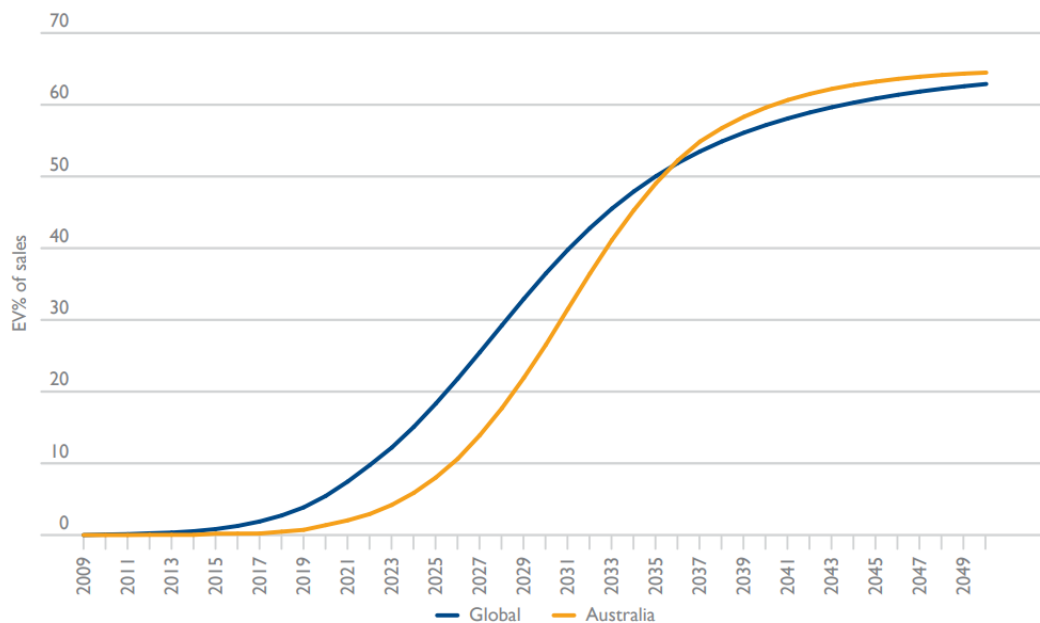


Figure 1: Global and Australian predicted EV sales as a percentage of annual new passenger vehicle sales.

Source: BITRE (2019)⁹

Considering the Level of Government Ambition

It is clear that a lack of government ambition sends the signal to EV manufacturers that a nation or state is an unfavourable market for EVs, which will limit access to the most advanced or affordable vehicles.¹⁰ For instance Kia has highlighted that lack of legislation to reduce carbon emissions is a direct deterrent to introducing more electric vehicles to the Australian market, stating “Kia’s policy is that the e-Niro goes to countries that have CO₂ regulations and have legislation in place.”¹¹ Furthermore, Australian buyers cannot access the most popular EV in Europe – the Volkswagen ID3 – due to the current lack of emissions reduction policies and associated perceived demand. According to the Volkswagen Group Australia they are holding off for “a firm signal from the Australian Government that it wants to cut carbon emissions from the transport sector by a set amount by 2030, and planning guidelines from state governments to ensure all new public buildings come with charging stations.”¹²

According to the Electric Vehicle Council the inclusion of appropriate charging facilities in buildings will be a key factor to support the uptake of EVs. The Council has developed a set of recommendations for Government that include: addressing gaps in standards and building regulations to ensure buildings are 'EV Ready'; a dedicated circuit for EV charging in all new standalone and semi-detached domestic dwellings with off-street parking; dedicated distribution boards in new multi-residential car parks for connection of future EV charging equipment; load management systems to support EV charging in multi-residential complexes; and appropriate cost allocation for energy used in charging electric vehicles in multi-residential buildings.¹³

Although the driving range of EVs is now close to comparable to ICVs and the associated running costs are far lower, government action is still required to support the uptake of EVs in Australia until price parity with ICVs is achieved in the near future. Analysis in 2018 commissioned by ARENA and CEFC identified a number of key policy

⁹ BITRE (2019) Electric Vehicle Uptake: Modelling a Global Phenomenon, Australian Government Bureau of Infrastructure and Transport Research Economics (BITRE), 02 August 2019.

¹⁰ EVC (2020) State of Electric Vehicles, Electric Vehicle Council, August 2020.

¹¹ Schmidt, B. (2019) Kia e-Niro delayed due to Australia’s failure to introduce CO₂ regulations, The Driven, 13 November 2019.

¹² O’Malley, N. (2021) ‘VW boss says ‘embarrassing’ rules stop cheap electric car imports’, Sydney Morning Herald, March 23, 2021.

¹³ EVC (2019) Achieving “Electric Vehicle ready” in the built environment – discussion paper and recommendations, Ai Group and Electric Vehicle Council, September 2019.

and regulatory levers and considered their likely impact on Australia’s EV uptake rate, as shown in Table 2.¹⁴ In 2021 the Australian Government initiated steps to implement such options with the release of the 'Future Fuels Strategy' discussion paper, aiming to generate discussion around the deployment of low emission vehicles.¹⁵ The paper covers topics such as joint-private investment in charging infrastructure, trials of EVs in the Commonwealth Car Service, a revised Green Vehicle Guide, and the engagement of energy agencies to consider options for managing potential congestion on the electricity grid.

Table 2: Estimated impacts from government commitments regarding electric vehicles

Government Commitment	Estimated Impacts
Vehicle Efficiency Regulations	200-300% increase (based on USA experience)
Third Party Import Regulations	200% increase in EV models available, 800% increase in uptake (based on NZ experience)
EV Purchase Incentives	Approximately \$4,000 increases EV model availability by 20%, increases uptake (based on UK experience)
Public Infrastructure Availability	Increases market size by 20%, increases rate of adoption by 50% (based on UK data and Dutch experience, respectively)

Source: ARENA and CEFC¹⁶

Despite limited Australian Federal Government commitment to vehicle efficiency regulations and third-party import regulations, the national level the State Governments are developing a range of mechanisms to support EV uptake. Currently EV market share per capita is highest in the ACT with 1 in 492 people owning an EV, and lowest in WA and the NT at 1 in 1800 and 1 in 6000 respectively.¹⁷ The ACT government has been an early mover by creating the 'Transition to Zero Emissions Vehicles Action Plan 2018-2021', which included transitioning the government fleet to 100 percent EVs, mandating planning laws to include vehicle charging infrastructure for all new mixed-use and multi-unit developments, eliminating EV stamp duty, and reducing EV registration cost by 20 percent.¹⁸ In May 2019, Canberra joined many cities and states globally in declaring a state of climate emergency and committed to urgent action, pledging to reduce ACT greenhouse gas emissions by 40 percent by 2020 (which has been achieved)¹⁹ and the aim to reduce emissions by 100 percent by 2045.²⁰

The South Australian Government has implemented a number of mechanisms to support EV uptake, such as the 'Electric Vehicle Action Plan' and the 'Motor Vehicles (Electric Vehicle Levy) Amendment Bill 2021'. The new bill includes a 3-year motor registration fee exemption for new 'battery electric vehicles' up until and including June 30, 2025, and the delay of a road user charge until July 2027 or 'when the sale of battery electric vehicles reaches 30 per cent of new motor vehicle sales in SA' and is likely to be 2 cents per km for plug-in hybrid vehicles, and 2.5 cents per km for any other electric vehicles.²¹

The Western Australian Government in 2021 released its electric vehicles strategy which includes a number of government commitments including "a minimum 25 percent electric vehicle target for all new light and small passenger, and small and medium SUV government vehicles by 2025/26", the deployment of charging facilities in government buildings to be 'EV Ready', the use of EVs in the construction sector, a trial of electric busses, updating guidelines and standards, and encouraging the Australian Government to "introduce vehicle CO₂

¹⁴ Energeia (2018) 'Australian Electric Vehicle Market Study', www.arena.gov.au.

¹⁵ Australian Government (2021) Future Fuels Strategy: Discussion Paper, Australian Government Department of Industry, Science, Energy and Resources.

¹⁶ Energeia (2018) 'Australian Electric Vehicle Market Study', www.arena.gov.au.

¹⁷ Corby, S. (2021) How many electric cars are there in Australia? EV Guide, 21 April 2021.

¹⁸ ACT Government (2018) The ACT's Transition to Zero Emissions Vehicles - Action Plan 2018-21, ACT Government.

¹⁹ ACT Government (2020) ACT meets nation-leading 40% emissions reduction, ACT Government, 04 December 2020.

²⁰ ACT Government (n.d.) Emissions Reduction Targets, Environment, Planning and Sustainable Development Directorate, ACT Government.

²¹ SA Government (2021) Government's Electric Vehicle Levy Bill passes Upper House, Media Release, Rob Lucas MLC, 28 October 2021.

emissions standards in line with other OECD countries".²² According to the Strategy, "The adoption of electric vehicles powered by increasing levels of renewable energy will be fundamental to reducing greenhouse gas emissions in the transport sector... The electric vehicle transition holds the promise of cleaner, more efficient transportation with a significant role for Western Australian industry." The Western Australian Government released its Electric Vehicle Action Plan in mid-2021, stemming from the goals outlined in the EV strategy. The plan offers a broad overview of expected actions from relevant government authorities in facilitating EV uptake in the state, and can act as a good foundation and checklist for future government support.²³

Informing Strategic Approaches by Transport Agencies

Given it is difficult – if not impossible – to predict the uptake of EVs to a level of assurance suitable to inform public policy and decision making, the question is not whether the transition will happen, as this is inevitable, but rather how quickly will nations, states, companies, and communities position themselves to take advantage of it. As outlined in the first synthesis report, the widespread adoption of EVs will present both risks and opportunities, risks for those slow to move and opportunities for those who prepare carefully and take early action.²⁴

The key consideration is the level of 'Government Ambition' as to how much risk and opportunity will be faced, with higher ambition leading to lower risk and greater opportunity given the current level of maturity of the industry. Hence rather than seeking to predict the level of uptake to inform decision making it is recommended that careful consideration is given to the relative risks and opportunities associated with different levels of ambition, namely:

1. *A Passive EV Approach:* As part of a passive approach the uptake of EVs would not actively be encouraged or discouraged and efforts to respond to industry and consumer led uptake would be held off until the associated risks of inaction present a suitable case to do so, understanding that this will likely result in limited opportunities to capture benefits, both economic, environmental and political. For transport related agencies this would likely involve monitoring the relative pressures applied by industry and the public to support the uptake of EVs that would require transport agency involvement along with careful consideration of the associated risks as they emerge.
2. *A Pre-Emptive EV Approach:* As part of a pre-emptive approach efforts to encourage or support the uptake of EVs would be measured closely against the level of uptake by industry and consumers so as not to lag behind but also no to exceed interest levels. Based on the industry and consumer uptake efforts to mitigate associated risks and prepare to capture associated opportunities would be developed. For transport related agencies this would likely involve careful monitoring of industry and consumer uptake and the development of a set of initial risk mitigation and opportunity development options to be at the ready for when interest grows to sufficient levels.
3. *A Pro-Active EV Approach:* As part of a pro-active approach the uptake of EVs would be actively encouraged and supported through a range of mechanisms that involve inter-agency cooperation for mutual benefit. Building on from efforts to mitigate short term risk and capture short term opportunities a more detailed set of risk mitigation and opportunity capture options would be developed to allow swift action at the appropriate time. For transport related agencies this would likely involve working closely with various agencies across the transport portfolio along with research and industry partners to identify appropriate risk mitigation and opportunity capture options to develop.

²² WA Government (2021) State Electric Vehicle Strategy for Western Australia: Steering Towards a Clean Energy Future, Department of Water and Environmental Regulation, Government of Western Australia.

²³ Energy Policy WA (2021) 'Electric Vehicle Action Plan' Government of Western Australia

²⁴ Hargroves, K. and James, B. (2021) Perception and Capacity Factors affecting the Uptake of Electric Vehicles in Australia, A Report to the Sustainable Built Environment National Research Centre (SBEnc), Australia.

Identifying Opportunities for Transport Agencies

One of the reasons it is difficult to effectively predict the uptake of EVs is due to the fact that there are a range of interconnected and influential factors to consider and it is not clear what the relative influence will be, hence there are wildly varying predictions. For instance it is not clear what level of public charging facilities will be needed to facilitate greater uptake, with some calling it a major constraint and others saying it will have negligible impact once vehicle range is comparable to ICVs. As the first synthesis report pointed out, given it is likely that the early majority of electric vehicles will be charged overnight at home using equipment provided with the vehicle, and some 70 percent of Australians are able to do so, EV charging is likely to initially take advantage of off-peak tariffs that provide the lowest cost and highest convenience.²⁵

Hence the risks for transport agencies from not being prepared to provide public charging is minimal in the short term given early adopters are likely to be able to charge at home and will wait until EV options are available with extended driving range (the median range of EVs is now over 400 km and maximum range over 600 km). However this 'Home-Range Scenario' may also present an opportunity with EVs wanting overnight charging which presents the need to store solar PV energy during the day which might be able to be done using public transport fleets and then made available to the grid overnight. However this is the least advantageous outcome for the energy sector with the batteries in EVs not being available to the grid during the day, but rather increasing the base load requirement.²⁶ This means that as the associated grid services will not be available at times that make sense to the grid, EV owners and operators would largely miss out on the opportunity to be compensated.

Hence as the uptake of EVs increases the opportunity costs associated with overnight charging will increase and this will very likely lead to a focus on shifting charging (and discharging) to periods where it can be of most utility to the electricity grid (also beneficial to the EV owner) – namely during the day, and especially during times of peak renewable generation and peak grid demand. In the longer term there will be a number of implications for Transport Agencies including:

- The *opportunity to provide day-time charging facilities*, mainly for slow-medium charging in car parking areas throughout the day for commuters (such as public transport parking areas), and for rapid charging at shorter stay destinations such as shopping centres and other hubs for those that cannot access home or work charging options.
- The *opportunity to provide grid services* using out-of-service vehicles such as buses, trains, and government agency fleets that can be connected to the grid to provide storage and balancing services at appropriate times to create value, such as contributing to overnight base load from home EV charging.
- The need to *develop effective road user pricing mechanisms* to allow EV users to contribute to costs associated with the road network that is currently supported through taxes on fossil fuel sales – which will decline over time as EV uptake increases.

However, seeking to shift charging times to the daylight hours to make EVs available to the grid will require careful consideration of a number of additional factors by a number of government agencies.²⁷ In particular for transport agencies bidirectional charging facilities will need to be effectively integrated into the transport network to supplement private charging and capture associated benefits (such as destination charging and long haul charging).

²⁵ Hargroves, K. and James, B. (2021) Perception and Capacity Factors affecting the Uptake of Electric Vehicles in Australia, A Report to the Sustainable Built Environment National Research Centre (SBEnc), Australia.

²⁶ Government of WA (2019) Distributed Energy Resources Roadmap, Energy Transformation Taskforce, Government of Western Australia.

²⁷ Hargroves, K. and James, B. (2021) Perception and Capacity Factors affecting the Uptake of Electric Vehicles in Australia, A Report to the Sustainable Built Environment National Research Centre (SBEnc), Australia.

The Use of Financial Incentives

Financial incentives are being seen as an effective measure to increase EV uptake in the short term, with a number of such incentives shown in Table 3. Research by the Australia Electric Vehicle Council suggests that each successful electric vehicle market that has been created has been underpinned by government provided financial incentives that lower the purchase price of the vehicles in order for customers to take advantage of the significantly lower running costs.²⁸ For instance Norway has the highest level of subsidies for EVs and this has resulted in the highest global uptake rate of just over half of all new vehicles purchased in 2020.²⁹

Table 3: Financial incentives applied to the purchase of EVs and associated new market share in 2020

Market	Level of Financial Incentive	AUD as of 31 December 2020	EV New Market Share
Germany	€6,000 ³⁰	\$9,240	13.5% ³¹
UK	£2,500 provided for cars; £6,000 for large vans; and £16,000 for trucks ³²	\$4,552; \$10,925; \$29,133	10.7% ³³
France	€7,000 ³⁴ plus €3,000 if scrapping an ICV, and an additional €6,000 by some local authorities	\$10,780 plus \$4,620 and \$9,240)	9.2% ³⁵
Italy	€4,000 plus €6,000 if scrapping an ICV	\$6,160 plus \$9,240	4.3% ^{36 37}
Canada	\$5,000 ³⁸ plus an additional \$8,000 in some provinces at point of sale ^{39,40,41}	\$5,375 plus \$8,600	3.5% ⁴²
USA	\$7,500 ⁴³ plus incentives in 45 States such as Colorado offering an additional \$4,500 (AUD\$5,985) and California offering an additional \$2,000 (AUD\$2,660) ⁴⁴	\$9,975	1.7% ^{45,46}
Japan	¥400,000 plus ¥400,000 if the EV will be charged using renewable energy only ⁴⁷	\$4,660 plus \$4,660	1.2% ⁴⁸
Australia	Nil	Nil	>1% ^{49,50}

Source: Electric Vehicle Council (2020)⁵¹

²⁸ EVC (2020) Submission to the House of Representatives Standing Committee on the Environment and Energy Inquiry, Electric Vehicle Council.

²⁹ NMT (2021) 'Norway is Electric', Media Release, Norwegian Ministry of Transport, 22 June 2021.

³⁰ German Government (2021) Energy, Energy Efficiency, Electromobility: Environmental bonus for battery electric or fuel cell vehicles, Federal Office of Economics and Export Control, German Government.

³¹ Trencher, G. and Achmed, E. (2021) 'Drivers and Barriers to the Adoption of Fuel Cell Passenger Vehicles and Buses in Germany', *Energies* 14, no. 4: 833.

³² UK Government (n.d.) Low-emissions vehicles eligible for a plug-in grant, UK Government.

³³ UK Government (2021) Statistical Data Set: Cars, UK Government.

³⁴ French Government (2021) Vehicle conversation bonus and 2021 ecological bonus, Ministry of Ecological Transition, French Government.

³⁵ INSEE (2021) New vehicle registrations in 2020; Regional and departmental comparisons, The National Institute of Statistics and Economic Studies, citing the Ministerial Statistical Service, French Ministry of the Ecological Transition.

³⁶ Motus (2020) Market Analysis: December 2020 - The revolution that never stops, Motus, 21 December 2020.

³⁷ Italian Government (2021) Vehicle Registrations, Ministry of Sustainable Infrastructure and Mobility, Italian Government.

³⁸ CAA (2021) Sustainability: Electric Vehicles: Government Incentives, Canadian Automobile Association.

³⁹ Quebec Government (2021) Electric Vehicles, Quebec Government.

⁴⁰ British Columbia (n.d.) Go Electric Passenger Vehicle Rebates, CleanBC, British Columbia.

⁴¹ EV Assist (2021) Rebates, EV Assist Nova Scotia, Natural Resources Canada, Nova Scotia Department of Energy and Mines, and Clean Foundation.

⁴² Statistics Canada (2021) Zero-emission vehicle registrations down slightly in 2020, Statistics Canada, 22 April 2021.

⁴³ U.S. Government (2021) Federal Tax Credits for New All-Electric and Plug-in Hybrid Vehicles, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

⁴⁴ NCSL (2021) State Policies Promoting Hybrid and Electric Vehicles, National Conference of State Legislatures, 20 August 2021.

⁴⁵ U.S. Government (2021) New and Used Passenger Car and Light Truck Sales and Leases, United States Department of Transportation, Bureau of Transportation Statistics.

⁴⁶ U.S. Government (2021) Transportation Energy Data Book, Edition 39, Table 6.2, Energy Vehicle Technologies Office, Oak Ridge National Laboratory.

⁴⁷ Nippon.com (2020) Japan to Boost Subsidy for Electric Vehicle Purchases, Nippon.com, 15 December 2020.

⁴⁸ JADA (2020) Monthly Statistical Data, Japan Automobile Dealers Association.

⁴⁹ FCAI (2020) Australia's new vehicle market, Federal Chamber of Automotive Industries.

⁵⁰ ABS (2021) Motor Vehicle Census, Australia, Australian Bureau of Statistics, 30 June 2021.

⁵¹ EVC (2020) Submission to the House of Representatives Standing Committee on the Environment and Energy Inquiry, Electric Vehicle Council, Australia.

The level of financial incentives to encourage the uptake of EVs in various locations will likely be adjusted based on the resulting level of uptake in order to match the level of government ambition. For instance after achieving the highest uptake of any nation in the world Norway will revise their incentive policies at the end of 2021,⁵² although it has been estimated that new EV sales would likely fall by just 5 percent if all financial incentives were removed.⁵³ Incentives can also be adjusted upwards as shown when Italy temporary increased the level of incentives between July and December 2020 from €4,000 to €6,000 as the primary subsidy and the additional payment if scrapping an ICV from €6,000 to €10,000 which resulted in a tripling of EV uptake.⁵⁴ However it will be critically important to adjust the level of financial incentives in a manner that underpins the overall transition rather than hinders it as was found in Denmark when EV sales dropped 60 percent in 2017 following the removal of tax incentives.⁵⁵ A number of non-financial incentives are also being used around the world such as priority for express lanes, free or priority parking.

When looking beyond government provided financial incentives the future is likely to include industry provided incentives based around tailored tariffs and rewards schemes for participation in grid energy storage and bidirectional charging and discharging programs. Hence the electricity networks around the world will need to seriously consider how such demand and supply conditions will affect the growth of networks, how this is funded and how it can be managed.

⁵² Norsk Elbilforening (2021) Norwegian EV policy, Norwegian Electric Car Association.

⁵³ BITRE (2019) Electric Vehicle Uptake: Modelling a Global Phenomenon, Australian Government Bureau of Infrastructure and Transport Research Economics (BITRE), 02 August 2019.

⁵⁴ Ombello, C. (2021) Italy's EV Market Tripled In 2020, Despite COVID: Can It Triple In 2021? Inside EVs, 04 February 2021.

⁵⁵ Jacobs, F. (2017) Danish EV sales down 60%, Fleet Europe, 05 June 2017.