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Beyond the urban commute: Why we should be powering up for electric vehicle holidays

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ABSTRACT

To date, most of the research considering adoption of electric vehicles (EVs) has focussed on their use in urban areas, and primarily for routine or habitual travel, such as commuting. This paper argues that any substantial adoption of EVs will see their use extend well beyond these relatively easy to forecast and manage trip profiles. Indeed, this paper argues that the real benefits of EV technology are in the use of EVs outside of urban areas and for less routine trips, such as those associated with domestic holidays. However, at present we know relatively little about how to maximise the benefits and minimise the costs of non-routine extra-urban EV trips. This paper sets out why we should explore EV holidays and outlines some of the early opportunities and challenges associated with such trips.

Keywords: Electric vehicles, tourism, holidays, commute, routine

1. INTRODUCTION

Governments around the world have introduced policies to encourage a shift from internal combustion engine (ICE) vehicles to electric vehicles (EVs), primarily as a way to reduce the climate impacts of transport. Some have announced deadlines for terminating sales of ICE vehicles and many have incentivised the purchase of EVs (Sperling, 2018; Zarazua de Rubens, 2019). In New Zealand, the government has introduced a range of (albeit contentious) proposals intended to speed the uptake of vehicles with lower tailpipe emissions (Ministry of Transport, 2019).

Most research considering the adoption and use of light private EVs (such as personal cars) has been limited to urban contexts and for regular, often habitual travel, like commuting. This appears to be largely because urban areas are considered easy test cases for EVs, with high population density supporting cost-effective provision of charging infrastructure, and routine trips supporting easy planning of recharging and low risk of encountering range limitations (Pagany, Ramirez Camargo, & Dorner, 2019). However, a gradual move away from ICE vehicles will result in EVs being used in more challenging contexts. It is important, then, to consider these more challenging use cases so as to provide the insights necessary to proactively plan for more than just the most straightforward EV adoption scenarios.

In this paper, I focus on domestic holidays; the kinds of trips that involve family members and friends packing up a car they already own and heading away from home. Domestic holidays can include overnight and weekend trips to a single destination, as well as longer duration trips, and trips that include more than one destination. In New Zealand, domestic holidays often include trips out of urban areas, to engage in outdoor leisure in mountains, coasts, lakes, rivers, and forests (see for example Collins & Kearns, 2010). I acknowledge that many of the factors

discussed below may influence trips taken by international visitors, and trips in rental cars or cars from sharing schemes, but here I start with domestic holidays in privately owned vehicles.

When I talk about EVs, I am referring to battery electric vehicles (BEVs) that need to be plugged in and charged in order to function, but again, I note that some of the same considerations may apply to hybrid vehicles that operate with both ICE and electric propulsion, and even to hydrogen or other alternative fuel vehicles.

This paper starts by considering the suitability of EVs for different kinds of journeys, including commuting and tourism trips. It proceeds to consider some of the present challenges associated with EV use by holiday makers. The paper concludes with a call to extend EV research beyond the easy, routine, urban use cases that have been its focus to date, and to devote more serious research to exploring EV holiday travel.

2. WHY EVs MAY NOT BE BEST SUITED TO COMMUTING

Although urban areas and routine trips may provide easy test cases for EVs, they do not provide the ideal environment for long-term uptake of private electric cars. EVs are primarily promoted as a low-carbon alternative to the use of ICE cars and they do have benefits in this regard (ARUP & Verdant Vision, 2015). What is often not acknowledged, however, is that the use of private cars (including EVs) is associated with a much larger range of negative impacts, especially in urban environments

The use of private vehicles is associated with congestion. Congestion in Auckland alone has been estimated to cost the country's economy over one billion New Zealand dollars a year (not including liveability impacts) (Leung, Destremau, Pambudi, & Bealing, 2017). Some commentators advocate building more roads to reduce congestion, but it has been demonstrated that road building often increases traffic volumes through a process of induced demand (Downs, 1962; Dunkerley, Laird, & Whittaker, 2018; Litman, 2019; Schneider, 2018). Roads also bisect human and animal communities resulting in community severance and leading to negative impacts in terms of safety and community cohesion (Anciaes, Boniface, Dhanani, Mindell, & Groce, 2016; Appleyard, 1980; Boniface, Scantlebury, Watkins, & Mindell, 2015). Road crashes are responsible for 1.35 million deaths per year, the eighth leading cause of death globally (World Health Organisation, 2018). Car dependence can lead to sedentary lifestyles and consequent poor physical and mental health (Douglas, Watkins, Gorman, & Higgins, 2011), and can result in the exclusion of groups that, for whatever reason, are unable to drive or to access a car (Parkhurst et al., 2014; Shergold, Lyons, & Hubers, 2015).

The use of private vehicles also (regardless of fuel type) influences the development of built environments. More car use leads to increases in paved land surfaces (including for roads and parking provision), which subsequently increases flash flooding risks, reduces biodiversity, and diverts land from other, more socially useful purposes (Frazer, 2005). Car dependence also promotes urban sprawl (Bruegmann, 2005; Newman & Kenworthy, 1996), with negative implications in terms of all of the metrics already mentioned but also in terms of non-transport service provision, such as, for example, the provision of costly freshwater infrastructure covering increasing urban areas and leading to greater system losses (Speir & Stephenson, 2002).

Although these negative impacts have, to date, been largely driven by the use of ICE vehicles, switching from ICE vehicles to electric vehicles will not prevent these impacts from occurring. Indeed, indications that early adopters drive more after purchasing an EV (Haustein & Jensen, 2018; Kester, 2018; Langbroek, Franklin, & Susilo, 2018) suggest that shifts to electrification of the vehicle fleet could drive deteriorations in some of these metrics if later uptake follows similar patterns. Accordingly, it is important to see the potential consequences of an adoption of EVs (and a possibly associated continued reliance on private vehicle travel) in terms of more than just emissions reduction possibilities. Although EVs reduce emissions, other options like

walking, cycling and use of public transport could reduce emissions *and* reduce many of the other negative impacts detailed above. This means that better options than private vehicle travel exist (or could be developed) for much of our urban, routine travel. Such options may not be perfect for every use scenario, but they should be seriously explored prior to investing in urban EV use in most cases (Jones, 2019).

A huge volume of research exists on how to encourage the use of public and active transport and numerous test cases have demonstrated that where policy and investment support these modes, extensive benefits can be observed. Despite this, reorientation away from car dependence is challenging. Consequently, there is some validity in arguments that a shift to EVs in urban areas would at least ameliorate climate concerns. The counter-argument—that prioritisation of EVs can divert attention (and much-needed investment) away from more broadly beneficial active and public transport—also has some validity. While this debate continues, the use of EVs outside urban areas receives much less attention.

3. WHY EVs MIGHT BE MORE SUITED TO TOURISM TRIPS

Although private vehicle travel can have a variety of negative impacts in densely populated areas, these impacts may be less severe in areas of lower population density. Congestion is often lower and so less problematic outside of dense urban centres and their access corridors. Likewise, proportions of land given over to paved surfaces are lower, reducing localised flooding, biodiversity loss, and land availability impacts. Human and animal communities may also be more easily circumnavigated with minimal road infrastructure or provided with safe connection corridors where there are fewer roads and less traffic. Similarly, sedentarism and exclusion are least likely to be promoted by increased car use in areas with geographically dispersed populations that would be unlikely to connect through active transport in the absence of motorised options. Certainly, increasing car use can still have negative impacts outside urban areas, and alternative strategies—such as reducing the absolute quantum of travel through holidaying closer to home, using staycations, and a reduction in touring holidays—are worthy of consideration. However, if there is a positive use case for EVs, it is most likely to exist outside urban areas.

Further, where there often is (or could be) a suitable alternative to private car travel for routine urban trips, that may less often be the case for holiday travel. For example, although average commuting distances may be appropriate to active travel modes in many urban centres, travel for holiday trips often covers longer distances, which can mean fewer travel alternatives. (It is important to note, however, that walking and cycling holidays are popular in their own right and—depending on the distance and means of travel to start and end points—may offer more environmentally and socially benign holiday options than trips where travel involves use of a motor vehicle).

Where active travel is unlikely to be a distance-appropriate mode for many holiday trips, public transport can provide an alternative. Many positive examples of holiday-making using public transport exist but there are numerous challenges that are not always easy to overcome. For example, commuting is routine and predictable but holiday travel can be much less so, with short-term factors (such as weather forecasts) having more substantial impacts and complicating public transport schedules. Indeed, a desire for the flexibility to change travel plans in response to things like the weather can act as a disincentive to making holiday trips by public transport, especially when public transport services are not frequent or when flexible tickets incur a price premium. Geographically dispersed destinations, particularly those where natural landscape features and remoteness are part of the appeal, can be difficult to serve with cost effective and timely public transport services (Langbroek et al., 2018; Martín Martín, Guaita Martínez, Molina Moreno, & Sartal Rodríguez, 2019) as can destinations with low visitor numbers.

Alongside these very instrumental barriers to holiday travel using public transport, there exists a range of cultural barriers. These might include perceptions of bus travel as low status (Fitt, 2018), a dislike for communal travel with unknown others (Kent, 2015), and a desired feeling of independence and getting 'off the beaten track' (even if the holiday destination is actually popular with holiday makers and travel could practically be shared). Some holiday practices are also associated with both practical and cultural luggage requirements. Certain sporting and leisure trips require bulky equipment, and kiwi family camping practices are recognised as often entailing the transportation of diverse camping paraphernalia. People with lots of baggage often prefer private transport (Yang & Ho, 2016) and most commercial modes of transport have strict luggage limits that could pose a challenge for those who are more used to packing the car to bursting (and possibly adding a roof box, trailer, caravan, or boat as well).

The likely lower negative impacts of EV use outside urban areas, along with the challenges to undertaking holiday travel using non-car modes, suggest holiday travel could be a more appropriate use scenario for EVs than routine urban commuting. However, existing studies commonly describe EVs as most suitable as a household's second car (Halbey, Kowalewski, & Ziefle, 2015; Khayati & Kang, 2019). As such, EVs are described as primarily used for the routine, urban trips for which they are least suitable, while they are passed over in favour of ICE vehicles for longer tourism trips (Haustein & Jensen, 2018; Langbroek et al., 2018; Liao, Molin, & van Wee, 2017). Kester (2018, p. 210) notes that people often "buy a car with the specifications (range and towing power) for those few trips a year to holiday destinations, instead of a smaller and lighter car for their daily routines".

4. BARRIERS TO EV TOURISM

Although EVs might ultimately be better suited to holiday travel than to urban commuting, there are some (often reported) barriers to their widespread use in that context. First, the range that most EVs can travel without stopping to recharge their batteries is currently considerably shorter than the range that most ICE vehicles can travel without needing to refuel. Differences in range mean that it is currently much easier to get off the beaten track in an ICE vehicle. The New Zealand government is close to meeting its target of having EV fast-chargers no further than 75km apart on the entire State Highway network (NZ Transport Agency, 2020), but some holiday destinations are well off the highway network and often at the end of lengthy sections of unsealed metal road. Popular, but more remote, destinations like Milford Sound, French Pass, and Lake Waikaremoana remain out of reach of the range of some EVs. Other destinations may be in-range but require multiple charging sessions along the way, adding to total journey time. Charging poses particular issues for the holiday makers (domestic as well as international) who undertake touring, rather than single destination, holidays. Even where vehicle range is sufficient for a trip, range anxiety may deter holiday makers from choosing an EV for longer journeys (Halbey et al., 2015; Langbroek et al., 2018).

The availability of charging facilities in popular holiday destinations, and en-route, is rapidly improving, and many accommodation properties could allow overnight charging on the same basis as home charging. However, destinations such as unpowered campsites, and car parks (at which holiday makers may leave their car for several nights while going off for a longer trip into the backcountry) are unlikely to be able to offer overnight charging in the foreseeable future. Despite ongoing improvements, then, range, charging locations, and the time needed to recharge likely remain disincentives to travelling on holiday by EV. Further, although EV technology is progressing, there are few EVs that have a tow rating, meaning that hitching the boat or caravan is rarely an option.

Second, the capacity of the electricity distribution network to deliver electricity for vehicle charging is not evenly distributed (Page, Fitt, & Moreham, 2020). This can contribute to differences in the number and capacity of public EV charging stations around

the country. It is possible that the availability of charging stations (and the speed at which they will recharge a vehicle battery) will influence holiday makers' travel plans. Charging considerations could influence destination choices, holiday types (such as touring or destination holidays), and activity choices while a vehicle is charging (such as whether visitors pop to the public toilet or opt for a sit-down meal). Each of these decisions (as more and more holiday makers start to make them) could have much wider influences on things like patterns of regional tourism and economic development. Strategic decisions can be made about upgrades to the electricity transmission and distribution networks and to EV charging infrastructure to pre-empt or influence these changes but such actions—like many parts of effective planning—require forethought, potentially contentious priority decisions, financial investment, and time for implementation. Infrastructure investments will also need to take account of variation in holiday makers' EV charging requirements over different seasons, different days of the week, and even different times of day (Helmus & van den Hoed, 2015; Page et al., 2020).

Third, large events pose challenges for the management of EV holiday making. Planning how to charge the vehicles of, for example, the 20,000 annual visitors to the Rhythm and Vines festival near Gisborne, or the 50,000 visitors to Warbirds over Wanaka, adds another level of complexity to planning appropriate EV infrastructure. There is a developing portable EV charger industry that aims to commercialise solutions to these challenges (see, for example, evsafecharge.com), but the size of the challenges emphasises the need for proactive planning.

5. WHERE TO FROM HERE?

There has been surprisingly little research into the use of EVs for extra-urban holiday trips. There is some existing basic research exploring the charging needs and patterns of holiday makers (Helmus & van den Hoed, 2015; Lee & Park, 2018), some investigating aspects of EV rentals (Langbroek et al., 2019; Martín Martín et al., 2019), and some work modelling the proportion of existing trips (including the routine and the unusual) that could be accomplished by EV (Chlond, Weiss, Heilig, & Vortisch, 2014; Eisenmann & Plötz, 2019). However, most of what we know (or think we know) about EV holidays comes from extrapolations from research that is focussed on the use of EVs in routine urban situations. Many questions remain unanswered, especially in a New Zealand context. For example:

- How are consumers' vehicle choices influenced by actual vehicle range and capability, range anxiety, and holiday preferences? Consequently, what interventions (infrastructure, marketing, trip decision support tools etc.) would be likely to be most effective in encouraging EV holiday making?
- How do the demographics of EV uptake map to holidaying preferences? Should we be focusing on installing EV chargers at accommodation facilities, or working out how to serve destinations popular with hunters, fishers, trampers, skiers, campers, and others keen to stay in more remote areas?
- Does travelling by EV change the experience of holidaying? If so, does that influence the patterns of trips taken, including the ratio of touring to destination holidays, and the travel patterns of people based at a destination but undertaking excursions?
- If EV uptake is uneven across groups of holiday makers, where might we first need upgrades to electricity transmission and distribution networks?

Extrapolations from other research can give us some hints about the kinds of dynamics we might expect to see in EV tourism, but the more we can develop our specific understandings of EV holidays, the more effectively we are likely to be able to plan for them. What we really need now, then, is to extend EV research beyond the easy, routine, urban use cases, so that we can also extend our understandings of how EVs can be integrated into different parts of our lives and societies, including our holidays.

6. CONCLUSION

The wide range of research that has explored the use of EVs for routine trips in urban areas has extended our understanding of potential EV uptake and issues. However, if widespread EV uptake is to be expected (and continues to be encouraged by global governments) it is time to start considering more complex use scenarios, such as the use of EVs by domestic holiday makers.

Research on the use of EVs in extra-urban areas would facilitate understandings of how to plan for such scenarios. In addition, it could help to change the way we think about the future potential of EVs. Current research and discourse may well leave a legacy of consumer concern that EVs are suitable only for relatively short-range trips close to the security of home charging. This paper has argued that these trips are not the most appropriate use of EVs. Although EVs are sometimes presented as a pain-free solution to the climate impacts of private motorised travel, increasing use of EVs is not without negative impacts, particularly for urban areas. These impacts may be much less damaging outside urban areas, and EVs may be most useful for travel for which public transport and walking and cycling cannot easily substitute. As EVs with greater range become increasingly available, charging infrastructure coverage increases, and the time required to charge a vehicle reduces, it is appropriate to think about how we move beyond considering EVs as a solution for the urban commute and into how we power up for their use by holiday makers.

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