

Energy Centre Energy Research Briefings

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The Energy Centre's research team targets top international peer-reviewed journals as their benchmark. The Energy Research Briefings series translates their work into plain language summaries for businesses, government agencies and the community, highlighting the impacts for practice and policy.

Installing rooftop solar at home as a way to boost EV uptake: A case study of Auckland

Kiwis are likelier to buy electric vehicles (EVs) if they first instal rooftop solar at home. So concludes a lateral-thinking case study* of Auckland. To tackle New Zealand's (NZ's) low EV uptake – including hybrids, EVs make up just 1.2% of light vehicles despite a concerted policy push – the research team applied their expertise in space-and-time econometric methods. They matched official EV fleet data with figures for coverage of this sunny city's 5600 km² by photovoltaics (PV), the commonest form of solar, supplied confidentially by Auckland's main electricity distributor. They then broke down that unique dataset into standardised micro areas for fine detail. They also factored in distance to the CBD, a popular destination. The results showed PV-EV complementarity and bore out predicted positive/negative links, lags and ripple effects.

First, for every unit that PV coverage rose, EV uptake historically rose by 1.021, with a lag. Why? Households that go solar often do so as part of an overall energy rethink. Sooner or later, that can extend to putting an EV in the garage. The EV then doubles as storage via a kind of neat microgrid. Surplus PV energy charges the car overnight after powering the home by day. Plus, some of that stored energy can be returned to the home when needed or else sold to the main grid.

Second, a one-unit rise in EV charger installation in neighbouring areas turbocharged EV uptake by a whopping 41 units. The researchers had predicted such a spatial ripple, since would-be buyers worried about venturing far from home should care more about chargers in neighbouring areas than their own. Third, for every unit rise in early EV adoption, mainstream uptake rose two years later by between 1.047 and 1.049. That lag bore out a predicted temporal ripple: early adopters effectively "road-test" EV ownership and trigger a trend. The more conventional EV uptake factor of consumer characteristics was also studied.

Having a tertiary education increased purchase likelihood, and households with more than one car were also likelier to own an EV, effectively as the second car to a hassle-free (but environmentally less friendly) vehicle running only fossil fuels.

How can the study help NZ and Auckland policymakers decarbonise transport? First, EV and PV incentives ought to exploit their complementarity. Educating consumers about PV may well boost EV uptake, too. In any case, this city of 1.7 million has high solar potential; earlier work cited suggests solar capacity is NZ's best safeguard against climate change drying up summer hydro supply; and PV prices have tumbled. Second, defusing range anxiety requires better public charging infrastructure. Public-private partnerships could ease the cost burden. Third, to make the most of social influence, information exchange platforms and handy digital data could encourage communications between "already adopted" and "likely" groups, in both PV and EV.

Finally, to reconfirm overseas results and be doubly sure that PV, not EV, uptake comes first, the researchers recommend a further specific method if other datasets allow it. They also hope to conduct a more detailed study with comparisons across NZ as smart energy meters come onstream.

** For the full article by Le Wen, Mingyue Selena Sheng, Basil Sharp, Tongyu Meng, Bo Du, Ming Yi, Kiti Suomalainen, and Konstantina Gkritza, see "Exploration of the nexus between solar potential and electric vehicle uptake: A case study of Auckland, New Zealand", Energy Policy 173 (2023) 113406.*