Australia is striving to reach net zero carbon emissions by 2050. A key part of this is the transition to renewable and decentralised electricity systems and the electrification of transport. In addition to substantially reducing carbon emissions, this energy transition offers other potential benefits for individuals and communities, as well as creating new challenges.

One such challenge is meeting a large increase in electricity demand using electricity generated from renewable energy sources, which are intermittent and can change unpredictably. In this context, promoting household behaviour change that supports more efficient use of the electricity system is key for future energy security, sustainability, and affordability. Another key challenge is integrating new technologies, such as rooftop solar, battery storage, and electric vehicles into our electricity systems.

These new technologies enable households to play an active role in the smart electricity grids of the near future, and how they use them will determine whether they have a positive or negative effect. For example, the Australian Renewable Energy Agency (ARENA) has estimated sharing the benefits of these new technologies could save up to $18 billion in electricity system upgrades. The cost of these upgrades will otherwise flow onto all households as long-lasting electricity bill increases.

There is increasing awareness among policymakers that the neo-classical economic assumptions about consumer behaviour conventionally applied in policymaking often fail to predict household behaviour. For example, households often don’t undertake financially beneficial actions, such as increasing home energy efficiency or changing when they use electricity in response to time-varying prices.

Designing initiatives to successfully encourage households to support the transformation of our electricity systems will require policymakers to build a more nuanced understanding of what drives household energy decisions. What do households want from their electricity system? How would they prefer to engage, be engaged with, and by whom? What motivates, deters, enables, or impedes their engagement? Do the answers to the above vary depending on the decision, technology, or behaviour under consideration by households with diverse values?

The challenges the Department of Climate Change, Energy, the Environment and Water (DCCEEW) is presenting for Nudgeathon 2023 reflect two of the most crucial aspects of electricity system transformation: integrating electric vehicles into the grid; and building the new electricity system infrastructure required to connect Renewable Energy Zones to the grid. We are all looking forward to seeing your proposals to help us engage households to support the transformation of Australia’s electricity systems.
CHALLENGE ONE
ENGAGING HOUSEHOLDS WITH VEHICLE-TO-GRID (V-2-G) TECHNOLOGIES

In a vehicle to grid (V2G) arrangement, plug-in battery electric vehicles (EVs) can provide electricity to the grid as well as consume electricity to charge their batteries. This technology has the potential to keep electricity prices lower by charging EVs when plenty of electricity is available and using them to provide electricity to the grid when electricity is scarce.

Demonstrate effective ways to encourage and support public engagement with electric vehicle to grid (V2G) arrangements as this emerging technology is rolled out in Australia, using key theories from behavioural economics in conjunction with empirical evidence.

Australia’s existing coal power plants provide consistent output and are generally unable to ramp up or down quickly to respond to changes in energy supply or demand. They are therefore often considered “baseload” generation sources that excel at managing predictable fluctuations but respond poorly to variable supply and demand, which are features of networks with extensive variable renewable energy generation. To maintain stability, large amounts of energy storage must be integrated into electricity systems as Australia transitions to a zero-emissions economy and away from carbon-intensive baseload power sources. V2G technology could make an important contribution in this respect by reducing the amount of storage capacity required in the grid from other sources, such as network batteries.

In a V2G arrangement, EV smart chargers can provide electricity to the grid as well as consume electricity in response to forecast grid conditions. To participate in a V2G arrangement, EV owners will need to install a smart charger and allow a third party to remotely manage its operation. It will also require the coordinated effort of government, energy utilities, and regulatory bodies to facilitate a distributed energy market which includes V2G.

Most Australian EV owners live in urban areas, and this is likely to remain the case as population growth in capital cities continues to outpace regional areas. Many EV owners may already have significant energy storage capacity available to participate in a V2G arrangement without affecting their EV use. For example, passenger vehicles travelled an average of 30.4 km/day in 2020, around 6% of the distance a Tesla Model 3 (the most popular EV in Australia) can travel on a fully charged battery. In the 2022 Australian Energy Market Operator’s Integrated System Plan modelling, between 92% (Progressive Change scenario) and 99% (Step Change scenario) of all vehicles are expected to be EVs by 2050. Some degree of V2G services is assumed in all Integrated System Plan (ISP) scenarios.

There are concerns that engagement with V2G technology by EV owners will fall short of expectations. The current rate at which consumers change retailers to find better electricity deals is relatively low, as are the number of consumers shifting their energy use to off-peak times to take advantage of time of use tariffs. Additionally, research has identified a lack of awareness of V2G technology, higher desire for flexibility in car use, and consumer perceptions of battery degradation risk due to increased charging cycles as barriers to widespread adoption of V2G. As EVs represent considerable consumer investment these concerns are a significant barrier to public engagement with V2G technology. Considering the low rate of participation in relatively straightforward and inexpensive energy market mechanisms, how can barriers to consumer engagement with complex V2G services be overcome to support adoption of V2G technology by the general public?

With energy reforms underway across the country and Australian EV sales predicted to rapidly increase in the next decade, now is the time to find the best ways to encourage and support public engagement with V2G technology.

SUGGESTED FURTHER READING

Maria Lagomarsino, Mart van der Kam, David Parra, Ulf J.J. Hahnel, Do I need to charge right now? Tailored choice architecture design can increase preferences for electric vehicle smart charging, Energy Policy, Volume 162, 2022, 112818, ISSN 0301-4215, https://doi.org/10.1016/j.enpol.2022.112818. (https://www.sciencedirect.com/science/article/pii/S030142152200043X)


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BACKGROUND
Rewiring the Nation is the $20 billion centrepiece of the Australian Government’s Powering Australia plan and a key pillar of its 2022–23 Budget. It will provide low-cost finance to upgrade, expand and modernise Australia’s electricity grid and drive down power prices. It will entail one of the biggest national building projects Australia has ever seen. Thousands of kilometres of transmission lines will be built to carry renewable energy from generation sites to communities who will ultimately use it.

Harnessing the endless supply of sun and wind is an elegant solution to the world’s energy needs and for combatting the growing danger of climate change. Building the needed infrastructure requires understanding, support and cooperation of diverse local communities all across the nation. However, a range of individuals and different interest groups oppose renewable energy activities as they grow, which threatens both individual and collective efforts.

In recent years several individuals and groups have been spreading misinformation, mostly on social media and in local or town council meetings. While some concerns raised are legitimate, opposing views are often based on incomplete and/or invalid information.

The situation is not always as simple as someone opposing seeing a wind turbine in their backyard or transmission lines as they drive down the street. Many people feel an emotional response, sometimes even fear, over the safety of their family and community. This is often a result of misinformation based on poor or un-supported evidence. Some examples of misinformation include sleep disturbances caused by wind turbines or elevated cancer risk linked to transmission lines. These points are false and not based in any scientific fact. Other concerns, like visual pollution or bushfire risk, may have some legitimacy. However, they are often presented in an exaggerated manner.

We have seen how the application of behavioural science principles to communication and education campaigns can effectively counter misinformation efforts. For instance, the OECD, in partnership with behavioural science experts from the Canadian and French governments, launched a first-of-its-kind international research collaboration. This study tested the impact of two behaviourally informed interventions on intentions to share true and false news headlines about COVID-19 on social media:

• an attention accuracy prompt; and
• a set of digital media literacy tips.

CHALLENGE TWO
ADDRESSING MISINFORMATION RELATING TO CLEAN ENERGY INFRASTRUCTURE
Identifying, targeting, and combating misinformation regarding clean energy infrastructure (such as solar panels, transmission lines and wind turbines) is a key objective of DCCEEW. Circulation of misinformation could delay or entirely derail Australia’s clean energy transition.

Apply behavioural economic tools to address misinformation relating to clean energy infrastructure. Solutions should focus on preventing as well as challenging existing misinformation.
The policy paper (the key output from the research) outlines key behavioural insights gained to help improve policy responses and stop the spread of misinformation, including:

- Some individuals report sharing news that they themselves do not believe;
- Shifting attention (increasing salience) of information accuracy significantly increases the quality (accuracy) of information shared;
- Individual differences in trust and information consumption patterns shape sharing of and belief in misinformation of COVID-19; and
- Providing digital literacy media tips had the greatest impact on intentions to share false information online by 21%.

Similar trials have taken place all over the world, including in Australia.

FURTHER READING:

- Landmark Rewiring The Nation deal to fast-track Clean Energy jobs and security In NSW | Prime Minister of Australia (pm.gov.au)
- APS Net Zero Emissions by 2030 | Department of Finance
- BIT Working Paper No. 001 / Two Interventions for mitigating the harms of Greenwashing on consumer perceptions. | The Behavioural Insights Team
- 2021 Annual Report | aec
- From Fake News to Echo-Chambers: On The Limitations of New Media for Environmental Activism in Australia, and “Activist-Responsive Adaptation”: Environmental Communication: Vol 16, No 4 (tandfonline.com)
- The psychological drivers of misinformation belief and its resistance to correction | Nature Reviews Psychology
- Behavioral Sciences | Special Issue : The Psychology of Fake News (mdpi.com), transcript-bi-connect-2021-covid-19-misinformation.docx
- How behavioural sciences can promote truth, autonomy and democratic discourse online | Nature Human Behaviour