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Is the Debate on Net Zero Emission Targets in Australia Aligned with Political Preference Bias?

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ABSTRACT: Net Zero emission targets have become a politically sensitive policy in many, but not all, countries. It is suggested that they are not achievable and are potentially misaligned with energy security as Net Zero becomes intertwined with the move towards renewables and away from fossil fuel energy sources, where the latter is widely seen as the baseload for many nations. Australia is embroiled in a political debate on whether Net Zero as a target will achieve its emission objectives in the presence of escalating energy prices and uncertainty in respect of cost and damage to an economy, given a wealth of fossil fuel resources, as well as some support for nuclear power which currently is not sanctioned by the Federal government. There has been a lot of media attention to Net Zero (CO2) or greenhouse gas emissions, and it is unclear whether it is well understood, and what it might mean for Australia, given there are views that it is either a great idea or a bad idea. This paper draws on a new survey in Australia to gain an appreciation of public understanding of Net Zero and what the public thinks it might mean for Australians, and how their preferences are aligned with support for political parties. We estimate a hybrid logit choice model of support for political parties that encapsulates the endogeneity of "soft" variables such as latent attitude variables that are driven by observable "causes," and unobservable heterogeneity, which together with contextual and socioeconomic characteristics provide evidence on preference bias for or against Net Zero associated with political affiliation.

KEY WORDS: ***Net zero emissions, political support, community preferences, Australian survey, hybrid logit, elasticities***

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1. Introduction

Climate change and associated weather events are front and centre of much of the debate on the future of the planet, and the role that human interaction has played in contributing to the main emission gas – CO_2. There are many views on the extent to which human intervention is a significant cause of climate change, with extreme weather events often being the most cited (although it is suggested that there are fewer such events in recent times). Climatic impacts measured over at least 30 years suggests that the planet is not at risk, with evolution, unrelated to human intervention, being a natural phenomenon that results in the dominant variations in CO_2.

While the previous commentary will be controversial for some (the science is far from clear)[1], it is the perceptions of individuals in all walks of life that are the main drivers of what the community thinks about climate change and what we need to do to if we believe it needs attention. The debate is dominated by political agendas and media interpretations (including fake news). There are many views, centred not only on whether climate change is a serious issue (even if we all agree that the climate does change), but how it is used to claim an environmental solution through a switch out of fossil fuels to clean energy, frequently under the heading of renewables (notably wind and solar). This is accompanied by growing evidence of escalating energy (mainly electricity) prices, and in some countries increased costs of living as local energy sources linked to coal and gas are discouraged and even banned by some political parties in power.

A key feature of setting targets to achieve specific outcomes is the notion of net zero emissions (or net zero-NZ) which refers to a state where the amount of greenhouse gases (GHGs) emitted into the atmosphere is balanced by the amount removed or offset, resulting in no net increase in atmospheric GHG levels. That is, emissions produced equal emissions removed. This can be achieved by reducing emissions from sources like energy, transport, and industry, and/or removing or offsetting emissions through carbon sinks (forests, soil), carbon capture technologies, or verified offset projects.

To gain a more informed appreciation of what the general public thinks about the debate on NZ, given that it has become the flagship of the heterogeneity of views in Australia, and how such views are mapped into the political agenda as reflected in the preferences of support for each political party at the Federal level in Australia, we interviewed over 1,500 residents throughout Australia. The focus is on whether the sample had heard of the term Net Zero (NZ) and what they think it means, as well as seeking views on what energy sources should be in the future mix in Australia. Respondents are asked to consider a series of statements representing the most common views cited in the media and other sources on NZ, and to indicate their position of agreement and disagreement (including having no idea) on each statement. Together with contextual and socioeconomic variables, we explore the relationship between future voting intentions and preference positions on NZ, providing new evidence on the 'bias' associated with NZ views that appears to be driven by political allegiance. This link is crucial in where the NZ debate is likely to go when a specific political party is in power.

2. Literature Review

2.1 Political polarisation and public attitudes on climate

Researchers in politics have identified the close connection between elite partisan polarisation and public opinions and political support beyond the context of environmental issues. The elite polarisation is often based on great ideological distances across a broad range of issues. The "elites", such as politicians, officials and those who have strong public influence, can significantly impact public attitudes on specific issues via framing, party endorsement and other approaches (McCarty et al. 2006; Druckman et al. 2013). Party polarisation drives mass partisanship because it helps to clarify public

[1] See one position in https://www.sydney.edu.au/business/news-and-events/news/2024/11/04/climate-change--it-is-real-but-are-we-misreading-or-over-reactin.html

choices and generate closer party attachments (Lupu 2015). The most recent example of this phenomenon in play was clearly shown during the 2024 US Presidential Election.

The environmental issues were considered as "valence" issues, which could often gain bipartisan and public support before they were elevated to the climate change and NZ debates in recent decades. Political polarisation and the public attitudes on environmental issues are closely associated, as shown in a cross-national analysis using 92 surveys across 42 countries (Birch 2020). While in countries like the US, where political polarisation is heated, public attitudes towards climate change and NZ are also polarised or even amplified by elite polarisation. The mass-level divide on environmental and NZ issues can be seen across nations, where views are ideological and partisan. Climate politics and party politics are even more closely connected in Western countries, and party supporters can clearly identify with their parties' positions on climate and NZ (Carter et al. 2018; Carter & Little 2021).

The political polarisation on climate policy is rooted in ideological and reflected in policy design. On ideological differences, a six-country survey found a strong association of neoliberal beliefs (with individualistic worldview, free market and less government intervention as the fundamental tenets) and less support of climate policies.[2] Bretter and Schulz (2025) conducted a large-scale survey of three Global North countries (Germany, the UK, and the USA) and three Global South countries (Brazil, China and South Africa). They found that ideologies play a more dominant role in Global North countries, and polarisation is sharper on climate policies. Overall, Global South countries have more support for institutions, and climate policies suffer less impact from ideologies. These findings are supported by other studies. A study by Caldwell et al. (2025) found substantial growth of partisan polarisation of climate policy in 36 countries from the 1990s to 2020 in the US, Anglophone countries and Western Europe, but not in other countries. Lewis et al. (2019) also found that party identification and ideology on climate change are only strong in the US and Western countries based on Pew's Global Attitude Survey data. The ideological impact on climate policy support is not only salient on the country level but also significant within the same country across different areas, as identified by a study in the UK, which found that residents in London and regional areas hold different beliefs across ideologies like free market and they support different climate policies (Bretter & Schulz 2024).

In general, the "greener" environmental policies are advocated by more left-leaning governments, emphasising social wellbeing and equity. NZ policies have clear economic, industrial, and even lifestyle costs and consequences. Setting different emission reduction phases and targets involves government and industries, and investments and costs across many public and private sectors, as well as individuals, as shown in NZ policy reports (Net Zero Australia, 2025a, 2025b). Some NZ policies, such as carbon pricing-driven taxes, lack political feasibility as they have negative impacts on the economy and industries and can cause public backlash, which may lead to electoral losses and toppling of climate policies (Benedetto et al. 2025). Unfortunately, gaining more climate-related knowledge does not change the level of public support for unpopular NZ policies. The public will continue to support the policies which they identify with. In Australia, the supporters of Labor and Greens parties would provide even more support with more climate-related knowledge, while the L/NP supporters would not change their views despite extra climate knowledge (Tranter 2020). However, the left-leaning governments support NZ policies but do not promote green technology innovation, which is often the approach advocated by conservative and right-leaning parties. Tawiah & Zakari (2024) found the negative relationship between governments' environmental ideology and green innovation numbers in OECD countries. Left-leaning governments are more concerned that technology may influence jobs, wellbeing and equity. In contrast, right-leaning governments often advocate green innovation over regulation and emissions caps.

In an extensive survey run by UNDP and the University of Oxford (2024) covering 77 countries, the response of people in each country, despite their differences, is that they want their government to do more in tackling the climate problem. This consensus is across both small and large, developed and developing nations. However, the support for climate policies is conditional. A cross-national analysis

[2] https://theconversation.com/people-with-neoliberal-views-are-less-likely-to-support-climate-friendly-policies-new-research-253478

of 74 countries reveals that the wealth of countries matters greatly in attitudes towards climate policies. Climate policies that are growth-impeding or wealth-sacrificing could face strong public opposition followed by greater political polarisation, which is not present in non-wealthy countries (Cichocki et al. 2024). Political polarisation is the strongest in the US and is high in affluent and environmentally better-performing Western countries. Further willingness to sacrifice for the environment at the cost of impact on way of living could meet strong public resistance (Gugushvili 2025).

2.2 The politics and support for Net Zero policies

The overall positive attitude towards climate change does not directly translate to support for NZ policies. NZ polices that produce winners and losers or influence people's lifestyles may gain support, but nuanced views can tell that it has become increasingly divided and polarised over time on policies such as taxing industries, increasing prices of fossil fuels and turning to renewable energies. On the other hand, NZ policies that tend to only give benefits such as market incentives and improving fuel efficiency can gain universal support (Stoutenborough et al. 2014). Politicians are increasingly holding a "pragmatism" doctrine in designing NZ policies to maintain a weak consensus among the public, including their supporters and non-supporters (Westlake & Willis 2025). The pragmatic political approach to NZ policy is not only seen between competing political parties but is also seen within different factions of the same party, with more ambitious NZ policies and investment giving way to traditional economic and stability goals (McDaniel 2025). Instead of promoting more radical policies, governments focus more on communicating the implications of less radical NZ policies on their economic and other benefits and energy security. This is crucial in winning conservative electorates. Large-scale surveys on public support for NZ policies in the UK confirm that the public tends to support specific NZ policies more when there are clear benefits, such as economic or health benefits, but gives less support when it involves lifestyle and financial cost implications (Poortinga et al. 2023). A study on the Conservative Party in the UK shows that centre-right parties facing challenges and competition from the radical right do not necessarily abandon their climate commitments. Instead, forming NZ policies requires a delicate balancing act between various measures and targets within the party and across a broad political spectrum (Carter & Pearson 2022).

In Australia, climate policy faces a paradox of long-term "climate security" and short-term "economic security" (McDonald 2015). The long-term climate policy, which will ensure the national interests of both climate and economic security, is often challenged by short-term economic security, with climate policy often viewed as a cost or burden. Crowley (2021) reviewed the climate policies during the Turnbull to Morrison's Coalition governments between 2015 and 2020 and concluded that Australia's climate policy is structurally constrained by both reliance on fossil fuels and intra-party conservative factions within the Coalition government. The discourse of the two types of security and NZ policy constraints continues to impact Australian politics to the present day, despite many changes in the governments since the Rudd-Gillard years before 2015, as demonstrated in the most recent debates on NZ and energy sources.

Due to political polarisation on inconsistent and vulnerable climate and NZ policies at the federal level, Australia's climate institutions are underdeveloped and lack the resources and power needed to perform as strong and durable players, even though they have achieved limited successes in creating policy spaces (MacNeil 2021). At the public support level, two large surveys conducted in Australia show that left-wing voters in Australia overestimated the political polarisation issue in climate policy and in contrast, right-wing voters underestimated polarisation. Left-wing voters showed more support for climate policy than right-wing voters. However, even the right-wing voters have shown the level of support for the 11 NZ policies tested beyond the mid-point. Examples of the NZ policies include increasing investment in renewable energy sources and increasing investment in public transport (Leviston et al. 2024). Ideology-driven political polarisation in Australia shows a clear focal point on energy sources and transition. Supporters of left-leaning parties are more supportive of renewables and against fossil fuels, biomass and nuclear, and the pattern is totally opposite for supporters of right-leaning parties (Clulow et al. 2021). The importance of climate action appears to be heavily divided along party preference in Australia. However, there is a clear sign that the younger Australians have much stronger support for faster climate action, so a position of further delay on NZ action will unlikely last in future elections (Colvin & Jotzo 2021).

2.3 Net Zero transition process and policy design

The public does not follow the political parties they affiliate with blindly. Instead, beliefs on NZ policies (such as their perceived effectiveness) and preferences on policy attributes can predominantly predict their levels of support for policies (Simon 2023). This requires the government and policymakers to carefully consider the NZ transition process and policy design. The current state of NZ policy contains an extensive level of complexity, uncertainty and lack of transparency across the commonly recognised two phases of identification of vulnerabilities in Greenhouse Gas Removal (GGR) strategy (Phase A), and identification of alternative strategies and scenarios, performing modelling and formulating new NZ policies (Phase B) (Workman et al. 2024). The public is often not involved and plays no role in these phases. Moreover, NZ strategies and policies are vulnerable to political cycles when governments change. NZ policies need to acquire both public support and bipartisan backing to ensure policy durability and continuity. This may suggest that it is crucial to incorporate political feasibility metrics into scenario planning and modelling to predict implementation risks.

Rosenbloom and Meadowcroft (2022) proposed pathways to accelerate NZ transitions by driving niche and promising innovations, promoting NZ alternatives and phasing out carbon-intensive policies. However, the acceleration could be difficult and politically vulnerable. For example, as mentioned earlier, left-leaning governments prefer to set NZ targets instead of relying on green innovation. In contrast, right-leaning governments advocate technology innovation and avoid setting NZ targets (Tawiah & Zakari 2024). There is little doubt that the NZ transition is a process of great complexity because it is beyond a technical transition, but a far more complex societal transition, involving multifaceted governance from framework to strategy and policies. Policy mixes and leverage transition involve both public and private sectors, industries, and other players (Meadowcroft & Rosenbloom 2023). Bloomfield and Steward (2024) examined systematic transformation across five industries of transport, housing, industry, food and power beyond technology transition, including governance and policy development to target societal and economic impacts. However, it remains to be seen how this line of research on policy framework can guide policymaking practice in designing NZ policies. A strong governance framework providing accountability, transparency, and stakeholder engagement would be beneficial to policymakers.

The success of an NZ policy is closely related to public perceptions of distributive fairness, which is crucial for implementation and the durability of the policy. Multiple NZ policies were put to the test on public support, and perceptions of distributive fairness have been identified as the predominant predictor. The distributive fairness does not mean equality and need-based justice. Instead, it refers to expected impacts on future generations, low-income, and rural communities (Hoyle & Rhodes 2025). For example, NZ policies that may cause economic harm in resource-dependent regions would face strong resistance from the local community in those regions. NZ policies need to consider transition strategies across societal and economic implications, such as job retraining, regional development and economic diversification, well beyond a technical transition. This may explain resistance to renewables in Australia's regional areas, such as among the supporters of the National Party. The Net Zero Authority in Australia should engage with disadvantaged communities and involve them in the NZ transition in a more constructive way, as proposed by Colvin (2023) for Australia's coal communities.

The international NZ agreements have likely generated prisoners' dilemmas that countries often defect against other countries to gain short-term advantages. Deep cooperation among countries on NZ policies is rarely seen. Domestic and geopolitical issues often make international cooperation difficult. International cooperation requires socio-political acceptance on the international and each country's path to NZ, with the emission targets updated dynamically through a feedback loop (Perri et al. 2023). Global coordination and emission adjustments across borders are fundamental because no country can achieve the global NZ targets alone. Domestic NZ targets and policies that align with the international framework are more likely to gain success in emissions cuts. International cooperation on NZ policies has support from the public across countries. A large survey with 40,000 samples across 20 countries has shown that three-quarters of the respondents in European countries and half of the respondents in the US show strong support for international schemes such as a global carbon price funding equal cash transfer scheme (Fabre et al. 2025).

This review has recognised the importance of the political machine in recognising the positions on climate change and Net Zero targets of the voting population. The modelling framework set out below adds new evidence on the relationship between the views of the Australia population on Net Zero and the voting preferences, revealing what are key drivers of political party support and suggesting communication, policy and planning strategies that should be considered where a political party desires to reinforce and /or change the quantum of support for their position on Net Zero[3].

3. Modelling Framework for Political Support – Hybrid Logit

Opinions and attitudes of individuals are an important feature of the debate on NZ. To behaviourally capture the role of attitudes, they are best treated as latent psychological constructs rather than directly observed choices, so they require a separate structural treatment to capture their indirect influence on decision-making through measurement equations and latent variable integration. This interpretation has seen a growing interest in encapsulating the endogeneity of such "soft" variables such in discrete choice models. The literature on this topic dates back to at least 1997, and we have since seen an explosion of papers on the topic, which has become known in broad terms as hybrid choice models to incorporate psychometric measures, other background covariates and choice attributes (Ben Akiva *et al.* 1997, 1999; Swait 1994; Walker and Ben Akiva 2002; Bolduc and Daziano 2008, McFadden 1986; Rose et al. 2023). Greene and Hensher (2026) have reviewed the contributions and extended the approach to estimation which we implement in this paper using Nlogit6.

The structural relationships represented by people's attitudes in psychometric measurements can be seen as inputs into a choice model to identify the role that a set of variables linked to positions and views on net zero emission targets play in revealing preferences for political parties in Australia. In a hybrid choice model, selected latent constructs are defined as indicators that are subsequently embedded in the utility functions for political party support choices.

The hybrid choice model is logically recursive. The "attitudes" are formed by a data generating process that operates outside and before the discrete choice process. The form of the integrated model is:

Joint likelihood (Indicators, Choices) = Marginal Likelihood (Attitude Indicators) *
Conditional Likelihood (Choices|Indicators). (1)

Some of the observed heterogeneity in observed choices can be attributed to variation in latent attitudes about the choice framework with two channels for latent attitudes to enter the choice process:

- Through individual specific random effects (error components) that directly impact the utility functions – so-called "error components" or "logit kernels.
- Through heterogeneity in taste parameters

We define a latent attitude variable A_i^* that is driven by observable "causes," $\mathbf{z}_i$, and unobservable heterogeneity v_i. It is the attitude variable that plays a role in the choice model. Since A_i^* is latent, it is not directly observable; however. there are some observable indicators, such as the survey questions related to measuring opinions and views.

The $M \geq 1$ observed *indicators* can be denoted $m = 1,\ldots,M$. The observation mechanism that translates latent attitudes, A_i^* into observed indicators, $A_{i,m}$ is denoted as (2), a transformation function that maps the latent attitude, A_i^*, to observed indicators.:

$$A_{i,m} = T[q_m A_i^* | \boldsymbol{\mu}_m, \varepsilon_{i,m}] \quad (2)$$

where

T[…] is the observation mechanism through a Likert style scale such as ordered probit/logit.

[3] MS-Pilot (9 January 2026) reports that "I couldn't locate any studies explicitly using hybrid (integrated choice–latent variable or nested) logit models to analyse political support for net-zero targets."

q_m is an indicator-specific scale parameter.
$\boldsymbol{\mu}_m$ = indicator-specific parameters of the transformation function.
$\varepsilon_{i,m}$ = indicator/individual specific individual heterogeneity, with mean 0 and standard deviation 1.

A random utility based ordered probit (or logit) model, can be estimated to build off the latent utility:

$$A_{i,m}^* = q_m A_i^* + \varepsilon_{i,m} = q_m \mathbf{g}'\mathbf{z}_i + q_m\alpha + q_m\sigma v_i + \varepsilon_{i,m}. \quad (3)$$

The scale factor q_m is specific to the particular indicator. We adopt the ordered probit formulation, so $\varepsilon_{i,m} \sim N[0,1]$. Suppose the M observed indicators are responses on 5-point Likert scales, so that for each indicator, the mapping of the underlying attitude to the observed indicator is

$$\begin{aligned}
A_{i,m} &= 0 \text{ if } -\infty < q_m A_i^* + \varepsilon_{i,m} \leq 0,\\
A_{i,m} &= 1 \text{ if } 0 < q_m A_i^* + \varepsilon_{i,m} \leq \mu_{m,1},\\
A_{i,m} &= 2 \text{ if } \mu_{m,1} < q_m A_i^* + \varepsilon_{i,m} \leq \mu_{m,2},\\
A_{i,m} &= 3 \text{ if } \mu_{m,2} < q_m A_i^* + \varepsilon_{i,m} \leq \mu_{m,3},\\
A_{i,m} &= 4 \text{ if } \mu_{m,3} < q_m A_i^* + \varepsilon_{i,m} < +\infty.
\end{aligned} \quad (4)$$

The three thresholds, (μ_1,μ_2, μ_3) suffice (with zero) to partition the real line into 5 parts. The likelihood for the observed indicators, $A_{i,m}$ is formed from (3) and (4)

$$\begin{aligned}
A_{i,m} &= 0|\mathbf{z}_i,v_i \text{ if } -\infty < \varepsilon_{i,m} \leq 0 - q_m A_i^*. \text{ Prob} = \Phi(- q_m A_i^*).\\
A_{i,m} &= 1|\mathbf{z}_i,v_i \text{ if } 0 - q_m A_i^* < \varepsilon_{i,m} \leq \mu_{m,1} - q_m A_i^*. \text{ Prob} = \Phi(\mu_{m,1} - q_m A_i^*) - \Phi(0 - q_m A_i^*).\\
A_{i,m} &= 2|\mathbf{z}_i,v_i \text{ if } \mu_{m,1} - q_m A_i^* < \varepsilon_{i,m} \leq \mu_{m,2} - q_m A_i^*. \text{ Prob} = \Phi(\mu_{m,2} - q_m A_i^*) - \Phi(\mu_{m,1} - q_m A_i^*).\\
A_{i,m} &= 3|\mathbf{z}_i,v_i \text{ if } \mu_{m,2} - q_m A_i^* < \varepsilon_{i,m} \leq \mu_{m,3} - q_m A_i^*. \text{ Prob} = \Phi(\mu_{m,3} - q_m A_i^*) - \Phi(\mu_{m,2} - q_m A_i^*).\\
A_{i,m} &= 4|\mathbf{z}_i,v_i \text{ if } \mu_{m,3} - q_m A_i^* < \varepsilon_{i,m} < +\infty. \text{ Prob} = 1 - \Phi(\mu_{m,3} - q_m A_i^*).
\end{aligned} \quad (5)$$

We use a *minimum distance estimator* to obtain a weighted average contribution of each of the attitudinal variables associated with a particular latent indicator. For example, assume there are M scale parameters, q_m, K = 3 characteristics, age, education and gender and 3 elements in $\mathbf{g}$, plus one α parameter and one σ parameter. Assume there are M = 2 indicators and K = 3 characteristics, thus three slopes plus the constant, α, plus σ. There are 5 common parameters in each of the two equations, $(g_1,g_2,g_3,\alpha,\sigma)$, or 10 in total, and the 10 parameters are functions of the 5 common parameters, $(\mathbf{g},\alpha,\sigma)$ and the two scale parameters, q_1 and q_2 for 7 structural parameters in total. The models also contain ancillary parameters, $\boldsymbol{\mu}_m$, that are directly estimated.

In this example, each of the two indicator equations is a *5-outcome, random constant term, ordered probit/logit model*. Parameters of the models are estimated by the general maximum simulated likelihood procedure and initial estimates are based on these random parameter (random constant term) models. With two or more indicators, estimation of the random parameter models produces an excess of estimates of $q_1, q_2,...,q_M,g_1,g_2,...g_K, \alpha, \sigma$.

The minimum distance approach reconciles the different estimates and reduces the model results to single estimates of the parameters. Greene and Hensher (2026) redevelop the minimum distance procedure so that the indicator equations do not have to be estimated using random constant approaches and can be fit without simulation. For purposes of our example, assume there are two indicators labelled 1 and 2, and three causes, labelled $\mathbf{z}$ = age, gender, educ. Estimators of the indicator equation parameters are as follows, where there are five parameters (plus the μs) estimated. In the list in (5), interpret "=" to mean "is an estimator of …" Thus, in the first ordered probit indicator equation, $c_{1,age}$, the slope

parameter on age is an estimator of q_1 times g_{age}. The full set of such "moment equations" are (Greene and Hensher 2026)

$$\begin{aligned}
c_{1,age} &= q_1 \times g_{age}, & c_{2,age} &= q_2 \times g_{age} \\
c_{1,educ} &= q_1 \times g_{educ}, & c_{2,educ} &= q_2 \times g_{educ}, \\
c_{1,sex} &= q_1 \times g_{gender}, & c_{2,sex} &= q_2 \times g_{gensder}, \\
c_{1,alpha} &= q_1 \times \alpha, & c_{2,alpha} &= q_2 \times \alpha, \\
c_{1,sigma} &= q_1 \times \sigma. & c_{2,sigma} &= q_2 \times \sigma,
\end{aligned} \tag{6}$$

There are 10 parameter estimates but only 7 parameters to be estimated. One intuitive way to view this is that with two indicator equations, we estimate the five parameters (g_{age},g_{educ},g_{gender},α,σ) twice. After estimation, we combine the two estimates, and we reconcile them with a *minimum distance estimator* using a simple quadratic criterion function for the distance measure (Greene and Hensher 2026):

$$\begin{aligned}
\text{Minimise } \Sigma_{m=1,2} \{&[c_{m,age} - q_m g_{age}]^2 + [c_{m,educ} - q_m g_{educ}]^2 + [c_{m,gender} - q_m g_{gender}]^2 + \\
&+ [c_{m,alpha} - q_m \alpha]^2 + [c_{m,sigma} - q_m \sigma]^2\}.
\end{aligned} \tag{7}$$

This is a type of GMM estimator. The quadratic distance metric is chosen for simplicity. Equating the seven derivatives to zero produces the implicit solutions

$$\hat{\gamma}_k = \frac{\Sigma_{m=1}^{M} c_{m,k} \hat{\theta}_m}{\Sigma_{m=1}^{M} \hat{\theta}_m^2}, \; k = \text{age,educ,gender}; \quad \hat{\alpha} = \frac{\Sigma_{m=1}^{M} c_{m,alpha} \hat{\theta}_m}{\Sigma_{m=1}^{M} \hat{\theta}_m^2}; \quad \hat{\sigma} = \frac{\Sigma_{m=1}^{M} c_{m,sigma} \hat{\theta}_m}{\Sigma_{m=1}^{M} \hat{\theta}_m^2} \tag{8}$$

$$\hat{\theta}_m = \frac{\left(\Sigma_{k=age,educ,gender} c_{m,k} \hat{\gamma}_k\right) + c_{m,alpha} \hat{\alpha} + c_{m,sigma} \hat{\sigma}}{\left(\Sigma_{k=age,educ,gender} \hat{\gamma}_k^2\right) + \hat{\alpha}^2 + \hat{\sigma}^2}, \; m = 1,\ldots,M. \tag{9}$$

The solution is obtained iteratively. We begin with starting values of 1.000 for q_1 and q_2 and use (8) to obtain solutions for ($\mathbf{g}$, α, σ). With these in hand, the new solutions for q_m are now obtained via (9). With updated qs, we return to (8) to recompute ($\mathbf{g}$, α, σ) and so on. The estimates generally converge in two or three iterations. Convergence is assumed when the estimates of q_m stabilise. Each of the M estimates of ($\mathbf{g}$,α,σ,q_m) is a limited information maximum simulated likelihood estimator. The averages in (8) are consistent minimum distance estimators based on the MSL component estimators

The utility function for choice *j* by individual *i* in item *t* of a sequence of choice tasks might appear in a random parameter error components logit model such as

$$U_{j,i,t}^* = \mathbf{b}'\mathbf{x}_{i,j,t} + \mathbf{\Lambda}\mathbf{z}_i + b_{i,P} \text{Heard } NZ_{j,i,t} + \lambda \hat{A}_i + b_{Hinc} \text{Income}_i + \omega_{j,i,t} + \sigma_E E_i \tag{10a}$$

where

$$\begin{aligned}
b_{i,P} &= b_{0,P} + b_{A,P} A_i^* \\
&= b_{0,P} + b_{A,P} (\alpha + \mathbf{g}'\mathbf{z}_i) + b_{A,P} \sigma v_i \\
&= b_{0,P} + b_{A,P} \hat{A}_i + \sigma_{A,P} v_i \\
&= b_{0,P} + b_{A,P} \hat{A}_i + e_{i,P}
\end{aligned} \tag{10b}$$

Figure 1 illustrates the overall configuration of a hybrid choice model.

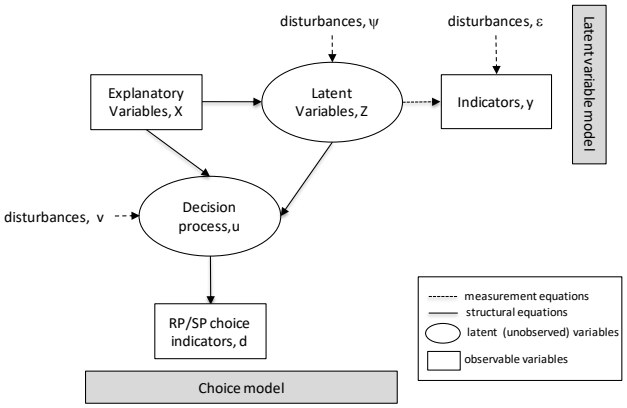

Figure 1 The integrated latent variable/construct and discrete choice-modelling framework

We have seven indicators grouped into three behaviourally meaningful classes (see below), and each is associated with a number of socioeconomic and contextual characteristics, with parameters obtained through estimated ordered probit models. The hybrid choice model consists of six political party alternatives: Labor, Liberal/National Party, Greens, One Nation, Independent (Teal + Non-Teal, and 6 Other Voters (minor parties or not decided). The utility functions for the alternatives are of the general form given in equations 10a and 10b.

4. The Empirical Setting- Survey details

An online survey titled "Survey to gain a community sense of net zero" was designed and implemented in early December 2025[4], with 1,500 randomly sample participants from all states and territories in Australia. Participants are panel members of Pureprofile[5], a leading Australian online research panel provider and a widely used research panel by Australian researchers.

A series of questions established whether a respondent had heard of the term net zero and what they think it means as well as seeking views on what energy sources should be in the future mix in Australia. Views are then sought on a five-point Likert scale (strongly disagree to strongly agree plus having no idea), on 21 statements shown in Table 1.

[4] The timing is important since it is before the 14 December Bondi antisemitic massacre and the death of 15 individuals plus many injured. This catapulted into very negative view of the current Labor party government, and especially the Prime Minister who was accused of neglect after the October 2023 in Israel.

[5] It is also a key member of the Australian Research Society (https://www.researchsociety.com.au).

Table 1. Statements associated with the Likert scale response

1.	Net Zero Means No Emissions
2.	We Can Offset Our Way to Net Zero
3.	All Net Zero Pledges Are Credible
4.	Net Zero Is Just About Carbon
5.	Technology Will Fix It
6.	Net Zero Is a 2050 Problem
7.	Net Zero Is Just a Climate Issue
8.	Net Zero is just about targets
9.	Net Zero is something for politicians to argue about
10.	Affordability and reliability of energy supply are what matters and not Net Zero
11.	The Federal government is throwing taxpayers money at renewable energy suppliers to entice a switch, but it is just given profits to the businesses, many of which are not Australian businesses
12.	Energy security is the priority and should use all energy sources to ensure Australia has electricity at competitive prices for industry and households and businesses
13.	The Federal government is misleading us with its ridiculous commitment to het zero at any cost just to claim some questionable global goodie-goodie warmth with the climate change doomsday countries
14.	Many countries have woken up to false claims by countries claiming we are doomed without net zero. India, China, USA, NZ and many Asian economies have rejected net zero.
15.	It has resulted in significant increases in electricity prices
16.	It has increased the cost of living significantly
17.	It is a crazy idea that is being used by politicians who want to be seen as 'good' global environmentalists
18.	It is forcing us to think that Australia can reduce its emissions by moving away from fossil fuels (including gas) to renewables (wind, solar) while still ensuring baseload electricity at an attractive cost
19.	Coal fired power stations are going to continue to be essential to ensure we generate and distribute enough electricity to avoid blackouts and burnouts
20.	Many nations do not support Net Zero since they see it as degrading their economy and having almost no impact on the climate
21.	My electricity bill has increased in the last year

The next section includes13 quotes from public figures, and we ask whether the respondent trusts each of the quotes or not in respect of climate change and net zero. We also asked whether the quote from each person influenced their response, and whether the respondent had heard of the public figure. Table 2 lists the 13 public figures and the quotes (with the source).

Table 2. Comments from public figures

1. Katharine Hayhoe (Climate Scientist)
   "Our carbon emissions have to eventually go to zero. We have to. Otherwise we're never going to have a stable climate and that's what our goal is for human civilization to thrive."[azquotes.com]
2. Elon Musk (Tesla CEO)
   "The overarching goal of Tesla is to help reduce carbon emissions... proving that the technology really works and customers want to buy electric vehicles." [azquotes.com]
3. Dennis Prager (Commentator)
   "That's a phenomenon of the Left: You don't fight evil. You fight carbon emissions." [azquotes.com]
4. António Guterres (UN Secretary-General)
   "We are on a highway to climate hell with our foot on the accelerator." [weforum.org]
5. Joe Biden (Former US President)
   "The climate crisis is about human security, economic security, environmental security, national security, and the very life of the planet." [weforum.org]
6. Ursula von der Leyen (European Commission President)
   "Let us not take the 'highway to hell' but let's earn the clean ticket to heaven." [weforum.org]
7. Richard Lindzen (Atmospheric Physicist)
   "The influence of mankind on climate is trivially true and numerically insignificant." [quotlr.com]
8. David Suzuki (Environmental Activist)
   "If we want to move towards a low-polluting, sustainable society, we need to get consumers to think about their purchases." [trvst.world]

9. Rick Santorum (Former US Senator)
   "CO2 is a pollutant? Tell that to the plants." [quotlr.com]
10. Vinod Khosla (Venture Capitalist)
    "Electric cars are coal-powered cars. Their carbon emissions can be worse than gasoline-powered cars." [azquotes.com]
11. Michele Bachmann (Former US Congresswoman)
    "Carbon dioxide is portrayed as harmful. But there isn't even one study that can be produced that shows that carbon dioxide is a harmful gas." [quotlr.com]
12. Ronald Reagan (Former US President)
    "Approximately 80% of our air pollution stems from hydrocarbons released by vegetation, so let's not go overboard in setting and enforcing tough emission standards from man-made sources." [quotlr.com]
13. Bill Gates
    "Climate change will not lead to humanity's demise"
    [https://www.nytimes.com/2025/10/28/climate/bill-gates-climate-change-humanity.html]

Two additional questions sought opinions on whether, if the Federal liberal party drops NZ, you think this is a good decision? and would the Liberal party be better politically to suggest a policy position focused on energy security and reducing energy prices instead of Net Zero? These questions reflect the growing pressure on the coalition (Liber al/National party) to announce their position on net zero, given that the Nationals had already announced they would scrap it[6]. The final section is a series of demographic questions including an important question used in the hybrid choice model on what political party a respondent would support if a federal election was held today.

5. Descriptive Profile

Nearly 86% of the respondents have heard of the term "Net Zero" although their understanding of its definition varied. 29% thought it meant "your ability to reduce your own CO_2 emissions"; 56% believed it meant "the amount of CO_2 produced is balanced by the amount removed from the atmosphere, effectively preventing net additions to the atmosphere"; and 46% believed it means "an agreement in various countries to comply with some future year target (or aspiration) whether it can be achieved or not".

Figure 2 summarises the energy source preferences, where respondents could choose more than one source, with clean energy renewables such as solar, wind and hydro the most popular, although the mix clearly is one involving existing dominant energy sources such as gas and clean coal, arguably necessary to secure baseload electricity. The volatility of solar and wind was mentioned as a key consideration in the selection of the energy mix. In the formal modelling, we are particularly interested in seeing if the energy source preference is driven by a bias associated with support for a political party, given that there are well documented positions linked to each party, with Labor having a non-negotiated stand of promoting wind and solar, although in late December 2025 Labor agreed to introduce a limited amount of new gas in the mix as part of the transition plan, and it appears as a recognition that the roll out of the renewable plan was not achievable within the targeted period.

[6] The Liberal Party of Australia formally agreed to drop the net zero emissions target on November 13, 2025, after a meeting of the shadow ministry confirmed the decision. This followed a wider party room meeting the day prior where a majority of members voted to abandon the goal. The party's new energy and emissions policy prioritises energy affordability and reliability while still committing to the Paris Agreement and reducing emissions in line with comparable countries through a technology-led approach. Reaching net zero in the future was described as a "welcome outcome" if achievable without imposing mandated costs or taxes.

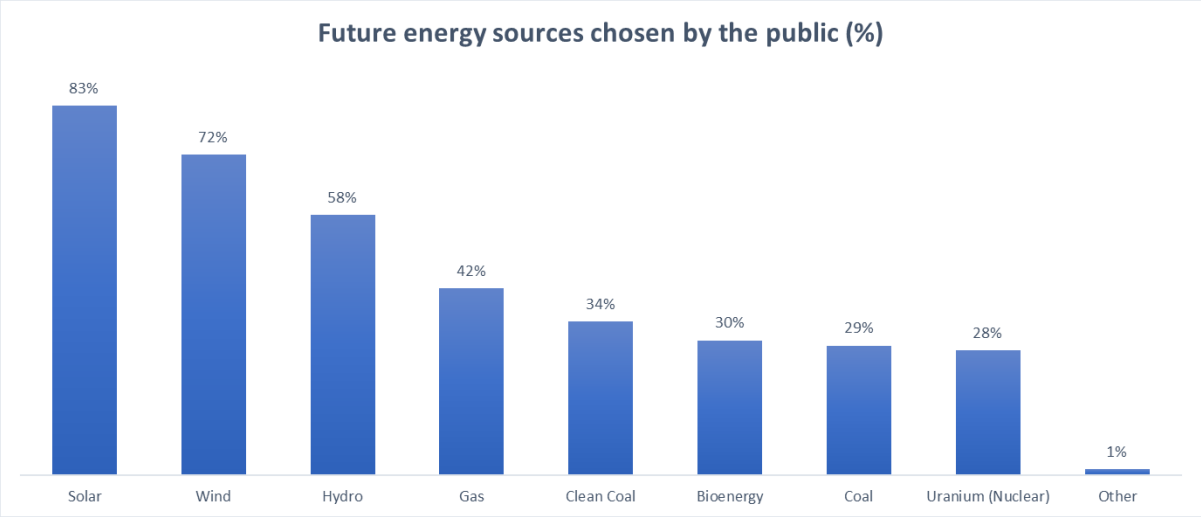

Figure 2. Future energy sources chosen by the public (N=1526)

Looking at support for particular political parties (Figure 3), if an election were held at the time of the survey, the coalition (Liberal/National Party or L/NP) has a much-reduced primary vote of 16.3%. in contrast to the current Labor government who has 36.6%. One Nation's primary vote is 15.3%, showing those who are unsatisfied with L/NP (probably the National party) is shifting to the right/far right. Teal[7] and non-Teal independents are holding a 5.5% primary vote. This translates into a likely trend of Labor and the Greens under the 'two party preference' allocation having a 47.8% primary vote; and even if the L/NP and One Nation would join forces, as two conservative parties, they only achieve 31.6% of the primary vote. If this ever occurred, the views of the independents are such that further support for the L/NP can be expected to decline given that the centre and slightly centre left voters will not support the L/NP, and will most likely shift to the independents. 13.1% of voters either have not made up their minds or are silent on who they will support.

[7] Teal independents, also known as teals and community independents, are various centrist, independent or non-party politicians in Australian politics who have been grouped together for convenience of discussion by the Australian media and who have found electoral success contesting seats with a history of representatives coming from the Liberal Party of Australia. They have been characterised as strongly advocating for increased action to mitigate climate change by reducing greenhouse gas emissions along with improved political integrity and accountability. See https://en.wikipedia.org/wiki/Teal_independents

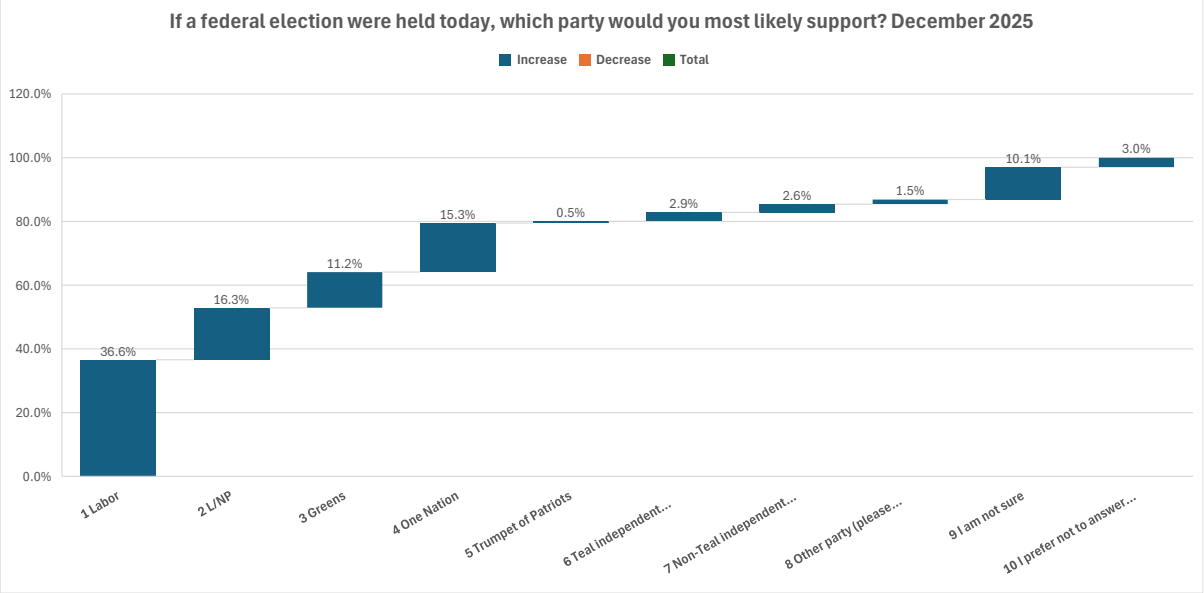

Figure 3. Support for political parties

27.2% of the public think that the L/NP dropping NZ is a good idea, with 33.4% thinking it is a bad idea. Nearly 40% of voters are not sure; however, 40.6% of voters think that focusing on energy security and reducing energy prices instead of NZ is a good idea for the L/NP, and 14.9% think they should do this together with including NZ. 14.4% of the sample think it is not a good focus, and 30% do not have an idea to either support/not support this focus.

The levels of trust or otherwise, and awareness of each of the 13 public figures, associated with the quotes in Table 1, is summarised in Table 3. The level of trust associated with climate change is slightly greater than that associated with Net Zero, although the differences are very small. The average level of trust is 45% re comments on climate change and 41% on NZ, with David Suzuki (a well-known environmentalist) scoring the highest number of respondents trusting his comment, although only 35% of the sample have heard of him; in contrast, Elon Musk receives the lowest trust response, with 83% of the sample having heard of him, presumably will less favourable views. Levels of awareness of the public figure are very low with the exception of Elon Musk, Joe Biden, and Bill Gates (with a former US President Ronald Regan having a 69% awareness rating).

Table 3. Levels of trust, influence and awareness of the people and their quotes

	Trust %			Influence (%)			Awareness (%)
	Climate change	Net Zero	Both	Positive	Negative	No Influence	Heard of the person
Katharine Hayhoe	58%	50%	52%	32%	10%	58%	9%
Elon Musk	35%	31%	30%	18%	34%	48%	83%
Dennis Prager	36%	30%	31%	16%	19%	65%	10%
Antonio Guterres	53%	46%	47%	28%	19%	53%	37%
Joe Biden	56%	50%	52%	32%	18%	50%	82%
Ursula von der Leyen	49%	46%	46%	25%	15%	60%	29%
Richard Lindzen	45%	41%	40%	24%	17%	59%	10%
David Suzuki	60%	56%	56%	34%	12%	54%	35%
Richard Santorum	35%	31%	33%	18%	23%	59%	15%
Vinod Khosla	37%	36%	37%	17%	22%	62%	8%

Michele Bachmann	33%	31%	31%	17%	24%	60%	11%
Ronald Reagan	38%	36%	37%	22%	24%	54%	69%
Bill Gates	44%	41%	42%	25%	23%	52%	81%
Average	**45%**	**40%**	**41%**	**24%**	**20%**	**56%**	**37%**

The mean responses on the Likert scale for the 21 statements listed in Table 1 are summarised in Table 4, with the 'no idea' response removed. They are ordered in terms of the average scale value, with the higher value suggesting greater agreement. This evidence provides one basis of selecting the main statements to include in the hybrid choice model. It is clear that high energy prices and their link to cost of living and affordability and reliability of energy supply are the greatest concern. Energy security and risk associated with degrading the economy are also high agenda matters to respondents. The other feature that is generally agreed to is a concern associated with government commitment to NZ at any cost, and the view that it is a bad idea used by politicians to promote their claimed environmental credentials. We have selected seven statements to be used in formal (hybrid choice) modelling, discussed below, with additional commentary on why and how we have arrived at the selection.

Given the 21 statements from the survey, our interest is in identifying candidate statements that have a plausible correlation with the political party support question, the choice variable in the hybrid logit model. We initially identified the partial correlations between the political parties (defined as dummy variables) and the 21 statements and selected all with a partial correlation greater than 0.2. There were seven statements that qualified, and then we identified the correlated relationships between each of the seven statements and used this to pair or triple them in a behaviourally meaningful grouping in the estimation of the latent attitude parameters in the choice model. This resulted in three very intuitive groupings:

Att = ***Cost implication at respondent level (2 statements)***: It has resulted in significant increases in electricity prices, and it has increased the cost of living significantly.

Att1 = ***Political spin (2 statements):*** The Federal government is misleading us with its commitment to net zero at any cost in order to claim some debatable global warming impact promoted by climate activists and other agencies such as the United Nations (UN); and it is a bad idea that is being used by politicians who want to be seen as 'good' global environmentalists.

Att2 = ***Energy security and economic impact (3 statements)***: Coal-fired power stations are going to continue to be essential to ensure we generate and distribute enough electricity to avoid blackouts and burnouts; Energy security is the priority and should use all energy sources to ensure Australia has electricity at competitive prices for industry, households, and businesses; and many nations do not support Net Zero since they see it as degrading their economy and having almost no impact on the climate.

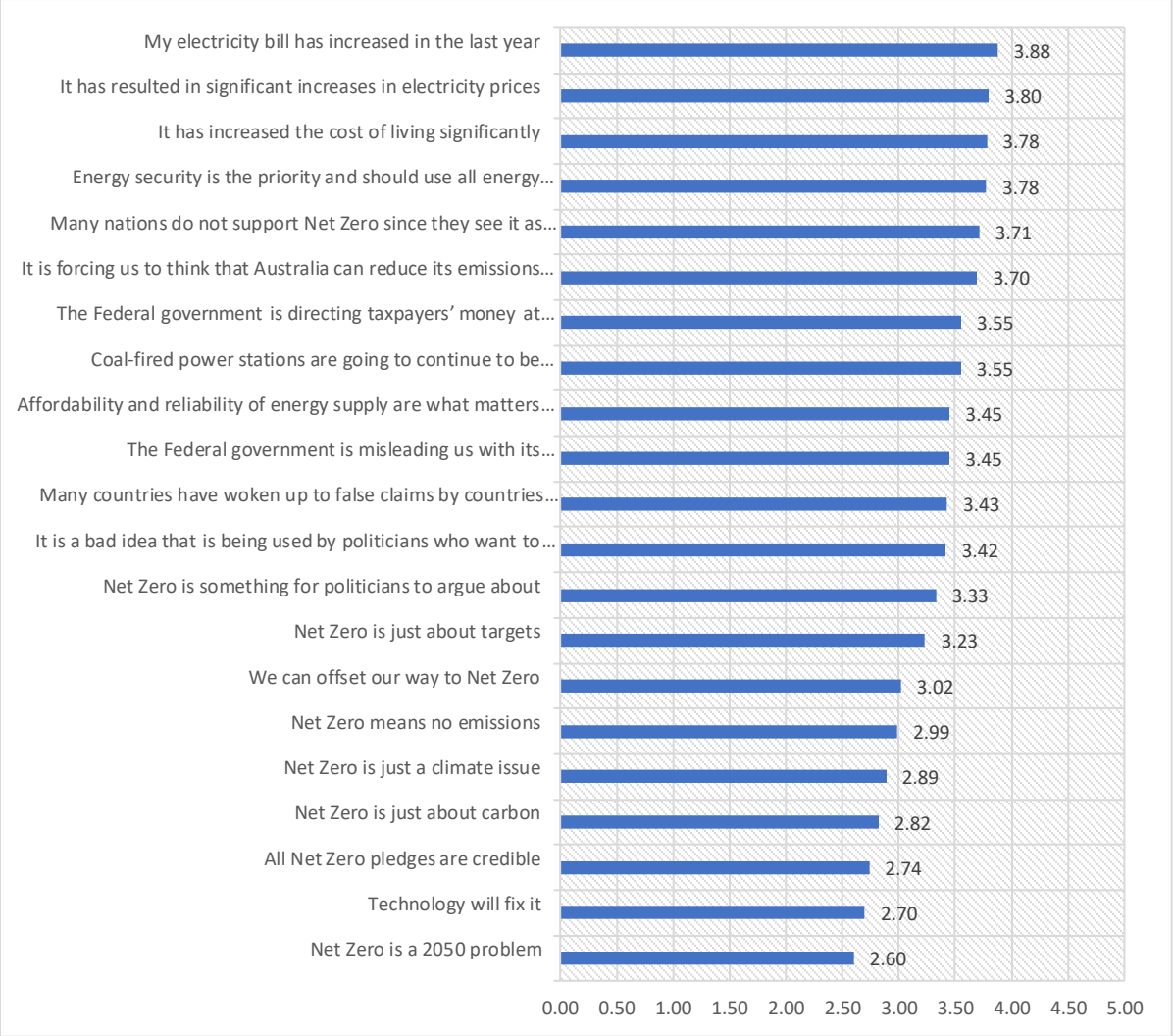

Figure 4. Mean scores for agreements on Net Zero related statements

Finally, Table 4 provides a descriptive profile of the socioeconomic and spatial context of the sample. The incidence on representation by State is based on the population of each State, with NSW, Victoria and Queensland having the largest populations. As of late 2025, approximately 64.0% of the total Australian population has a paid job[8], which is the same as our sample. The average age of 47.6 years is higher than the Australia's median age of 38 years in 2024.[9] However we know that the population is aging and so the directional change is consistent. The typical full-time worker earned about $90,416 annually in 2025, whereas our sample average is $75,721. The average gross household income in Australia varies by source, but recent figures suggest around $116,000 to over $121,000 annually, and our $121,186 fits nicely in this range at the upper level.

Australia's average household size in 2025 is around 2.5 people with a sample average of 2.6, a figure that has remained relatively stable, but recently saw a slight uptick due to cost-of-living pressures pushing people into shared or multi-generational homes, returning towards levels seen in 2021 after a dip post-pandemic. This trend reflects a long-term decline from the 1980s, driven by smaller family sizes but complicated by increased numbers of single-person households and recent economic factors. Overall, we conclude that in aggregate the sample is representative of the Australian population.

[8] This figure is also referred to as the "employment-to-population ratio" by the Australian Bureau of Statistics (ABS).
[9] Australian Bureau of Statistics (ABS)

Table 4 Summary statistics of socio-demographics and context of the sample

	N	%
Total Sample Size	1526	100%
State and territory		
ACT	41	2.7%
NSW	465	30.5%
NT	11	0.7%
QLD	306	20.1%
SA	115	7.5%
TAS	28	1.8%
VIC	399	26.1%
Residential status		
Citizen	1391	91.2%
Permanent resident	119	7.8%
Other	16	1.0%
Age group		
18 to 24	149	9.8%
25 to 34	260	17.0%
35 to 44	311	20.4%
45 to 54	224	14.7%
55 to 64	261	17.1%
65 to 74	231	15.1%
75+	90	5.9%
Gender		
Female	769	50.4%
Male	752	49.3%
Other	5	0.3%
Employment status		
I have a paid job	986	64.6%
I do not have a paid job and looking for work	60	3.9%
Student/Home maker	124	8.1%
Retired	296	19.4%
Retired and doing casual work	35	2.3%
I have an unpaid job / Volunteer	25	1.6%
Highest education		
Postgraduate degree	235	15.4%
Graduate diploma/Certificate from university	117	7.7%
Bachelor's degree	438	28.7%
Diploma/certificate from university/college/TAFE	310	20.3%
High or Senior school	405	26.5%
Prefer not to answer	21	1.4%
Household type		
Family household	212	13.9%
Couple family without children	227	14.9%
Couple family with children no longer at home	218	14.3%
Couple family with children living at home	363	23.8%
One parent family	84	5.5%
Other family	14	0.9%
Single person household	297	19.5%
Group household (i.e., shared)	84	5.5%
Prefer not to answer	27	1.8%
Descriptive statistics	**N**	**Mean (SD)**
Age	1526	47.6 (16.6)
Annual personal income	1410	$75,721 ($48,459)
Annual household income	1381	$121,186 ($81,568)
Household size	1526	2.6 (1.3)
Petrol/diesel cars in household	1353	1.6 (0.8)
EV cars in household	79	1.1 (0.4)
Hybrid cars in household	137	1.1 (0.3)
Pushbikes in household	452	1.8 (1.1)
E-bikes in household	94	1.3 (0.7)
E-scooters in household	78	1.2 (0.5)

Heard of net zero	1526	88%
Your ability to reduce your own CO_2 emissions	1526	29%

6. Modelling Results

The seven latent variables, as influenced by the evidence and assumptions in the previous section, are the dependent variables in the ordered probit models. The latent attitude variable A_i^* is driven by observable "causes," $\mathbf{z}_i$, which are socioeconomic and location characteristics, and unobservable heterogeneity v_i. It is the attitude variable that plays a role in the choice model. The final ordered probit models are given in Table 5. We have removed responses with missing values for the dependent variable. Many of the observable influences are common across the seven latent attributes but with different marginal utility impacts. We use a *minimum distance estimator* to obtain a weighted average contribution of each of the attitudinal variables associated with a particular latent indicator, as explained in section 3 above, reconciling the different estimates, reducing the model results to single estimates of the three parameters of interest. The result, for input into the choice model, is three parameter estimates for the attitude indicators, referred to as 'Att' for cost implications, 'Att1' for political spin, and 'Att2' for energy security and economic impact.

We controlled for what hardware was used to complete the survey – desktop, mobile phone or a tablet, but it was found to only influence the response for electricity prices (negative for desktop and positive for mobile phone relative to zero for a tablet). Age has an influence across all seven models with increasing age related to a higher probability of agreement. The other socioeconomic characteristics found to have some amount of influence, given the full set assessed from Table 4, are whether an individual does not have a paid job and are looking for work, and four household stage in lifecycle variables. The negative sign for not having a paid job for the cost implications latent attitude is suggestive of a lower probability of agreement compared to the other occupation classes.

State-based influences vary and are not included for all seven models, with the ACT, NSW and Victoria the only States that show some amount of statistical difference, with a negative sign for the ACT and a positive sign for NSW and Victoria. As expected, the threshold marginal utility parameters are all positive and increase as we move between the Likert scale levels, with a greater influence on the agreement score level. Finally, the question seeking a response on whether a respondent had heard of net zero was statistically significant only for two of the three statements associated with energy security and economic impact, both of which have been extensively reported and discussed in the mainstream media during recent times.

Table 5 The summary of ordered logit models for the latent attributes and seven statements

	Cost implication (Att)		Political spin (Att1)		Energy security and economic impact (Att2)		
	It has resulted in significant increases in electricity prices	It has increased the cost of living significantly	The Federal governme nt is misleadin g us with its commitm ent to net zero at any cost in order to claim some debatabl e global warming impact promoted by	It is a bad idea that is being used by politicians who want to be seen as 'good' global environmen talists	Coal-fired power stations are going to continue to be essential to ensure we generate and distribute enough electricity to avoid blackouts and burnouts	Energy security is the priority and should use all energy sources to ensure Australia has electricity at competitiv e prices for industry, household s, and businesse s	Many nations do not support Net Zero since they see it as degrading their economy and having almost no impact on the climate

			climate activists and other agencies.				
Constant	0.8858 (1 .47)	1.2578 (10.84)	0.9014 (7.26)	0.7699 (6.42)	0.9762 (8.27)	0.9747 (8.62)	1.0047 (8.67)
Age	0.0132 (7.21)	0.0092 (4.81)	0.0050 (2.59)	0.0072 (3.78)	0.0051 (2.71)	0.0100 (5.23)	0.0094 (4.89)
I do not have a paid job and looking for work	-0.2108 (- 1.76)	-0.1878 (- 2.24)	---	---	---	---	---
Completed survey using desktop	-0.0471 (- 1.80)	---	---	---	---	---	---
Completed survey using mobile phone	0.0468 (1.99)	---	---	---	---	---	---
Live in ACT	-0.2913 (- 1.69)	-0.5451 (- 3.18)	-0.3504 (- 1.96)	-0.4068 (- 2.25)	---	---	---
Live in New South Wales	0.1084 (1.57)	---	0.0888 (1.29)	0.1023 (1.50)	0.1330 (1.98)	---	---
Live in Victoria	0.1819 (2.53)	---	0.1860 (2.59)	0.1628 (2.29)	0.1865 (2.66)	0.1634 (2.51)	0.2273 (3.44)
Couple family without children	---	-0.2158 (- 2.57)	-0.1295 (- 1.51)	---	---	---	---
Couple family with children no longer at home	---	0.1518 (1.61)	0.2496 (2.62)	0.2903 (3.16)	0.2475 (2.70)	0.1391 (1.52)	0.2515 (2.69)
Couple family with children living at home	---	0.1534 (2.1)	0.1499 (2.04)	0.1947 (2.87)	0.2092 (3.03)	0.1791 (2.62)	0.1204 (1.75)
One parent family	---	---	0.2315 (1.75)	---	0.2199 (1.68)	---	---
Have heard of the term “Net Zero”	0.1089 (1.2)	0.0180 0.2)	0.0647 (0.7)	0.0301 (0.3)	0.0865 (1 .0)	0.182 (2.1)	0.2486 (2.7)
Mu(01)	0.5770 (16.5)	0.6628 (18.5)	0.5837 (18.8)	0.5971 (19.5)	0.6071 (18.8)	0.5522 (15.6)	0.6369 (17.0)
Mu(02)	1.2685 (38.3)	1.3237 (39.8)	1.2716 (39.3)	1.2665 (39.5)	1.3065 (40.4)	1.3607 (41.2)	1.4623 (42.8)
Mu(03)	2.1077 (54.6)	2.1721 (56.1)	1.9940 (51.2)	1.9587 (50.8)	2.1832 (55.4)	2.2126 (57.8)	2.4693 (60.5)
Model fits							
N	1411	1414	1371	1392	1402	1427	1367
Log-Likelihood	-1976.45	-1990.057	-2091.61	-2135.32	-2080.55	-1988.90	-1886.12
AIC	3976.9	4002.1	4209.2	4292.6	4183.1	3995.8	3790.2
AIC/N	2.818	2.83	3.07	3.084	2.984	2.809	2.773
McFadden R2	0.0172	0.0168	0.0109	0.0127	0.009	0.0149	0.0192

Table 6 provides the aggregate descriptives for the three latent attitudes that enter the hybrid choice model. There is a significant amount of heterogeneity within the sample associated with the estimates.

Table 6 Summary statistics of latent variables and choice

	Mean	SD	Minimum	Maximum
Cost implication (Att)	49.94	17.49	19.56	78.87
Political spin (Att1)	41.91	14.62	16.55	66.13
Energy security and economic impact (Att2)	47.11	16.28	18.84	74.05

The choice model for ‘support for political parties’ is summarised in Table 7, with summary statistics for attributes for all and each alternative (party) are summarised in Table 8. The overall goodness of fit is within the range typical of advanced choice models. After estimation of a considerable number of models with variations in the selected random parameters and distribution assumption, we found that the alternative-specific constants, as constrained triangular distributions, were statistically significant for the mean and standard deviation parameters except for the Greens party.

In addition, the error component parameters for the standard deviation of latent random effects are all statistically significant (noting we set the estimate for ‘other’ parties to zero). The higher value for the standard deviation is an indication of a spread of unobserved random heterogeneity captured through the error components which can further be linked to potential systematic sources of influence. To model systematic heteroskedasticity in random effects, we introduce parameters that capture how the variance

of the error components changes with respect to covariates. These parameters appear in a variance function $\mathrm{Var}(u_i) = \sigma^2 \cdot \exp(\delta z_i)$ where $u_i$is the random effect or error component, $z_i$is a covariate influencing heteroskedasticity, and $\delta$is the parameter of interest. The covariate effects we found reside in the trust response to quotes provided by Elon Musk and Bill Gates (given in Table 2). The selected variable is a dummy variable taking the value =1 for positive trust related to both climate change and NZ, and zero otherwise. A positive sign $(\delta > 0)$ suggests that as the covariate z_i increases, the variance of the error component increases, exhibiting more variability in the random effect. A negative sign $(\delta < 0)$ suggests that as the covariate $z_i$increases, the variance of the error component decreases.

Turning to the three latent attributes, we see varying influences across the alternative political party alternatives. For the Labour party, the negative sign on Att1, representing political spin, is suggestive of a lack of agreement with the statements that portray a misleading federal government associated with a commitment to NZ, and that it is a bad idea used to promote a claim of good environmental outcomes. This is no surprise, with Att2 having a positive sign which suggests that respondents tend to support energy security and electricity at competitive prices although it is cushioned by the need for coal-fired power stations to be able to deliver on this security objective. This is an important finding which might suggest that Labor supporters believe that a renewable-only future is not sustainable, something that appears not to be the labour party position.

The liberal/National Party coalition alternatives have statistically significant Att and Att2. The negative sign for the cost implications parameter tells us that when we see a significant increase in electricity prices and cost of living then the support for the L/NP declines. Another way of interpreting this fining is that supporters of the L/NP increase when we see an improvement in electricity prices and the cost of living. Energy security and economic impact (Att2) has a positive parameter, reinforcing the L/NP announced position on coal-fired power stations and energy security (see footnote 3). The only other alternative with a statistically significant latent attitude parameter is One-Nation for Att2, which aligns with their strong support for maintaining coal-fired power stations and preserving energy security.

Support for specific energy sources is shown to have a statistically significant relationship with support for particular political parties. As shown in the descriptive evidence (Figure 3), respondents identify the Labor party with positive support for wind and solar and opposed to nuclear (uranium) power. In contrast, the L/NP coalition is seen as a strong supporter of nuclear power as is One-Nation; however, the Greens are a party that is supportive of wind but negative towards gas. Oen-Nation voters support coal but are opposed to wind. The evidence suggests a statistically significant 'bias' towards a particular political party linked to its position on energy sources, and hence any information to clarify the 'truth' about specific energy sources is likely to garner some adjustment in support for particular political parties and will require careful consideration of the evidence (with appropriate policy implications) which is often seen by opponents of a particular party as misinformation.

The decision by the L/NP to drop NZ appears to be a good decision, increasing the probability of voting for the L/NP. When combined with the evidence on the latent attributes, the focus on protecting baseline electricity (with extending and improving coal-fired powered station) and energy security can be a vote winner, although it may not be enough to compete with the support for Labor[10].

Table 7 Results of the hybrid choice model

	Coef.	t-stats
Alternative specific constants – Random Parameters Mean (triangular)		
ASC for Labor	-3.3568	-2.33
ASC for LN/P	-25.4523	-3.95
ASC for Greens	-0.7561	-0.66

[10] Although such support has dropped since polling post the Bondi massacre.

ASC for One Nation	-5.8154	-2.99
ASC for Independents	-4.4103	-3.14
Labor (utility function)		
Political spin (Att1)	-2.3031	-2.30
Energy security and economic impact (Att2)	2.0349	2.34
future energy sources - Wind (0/1 N/Y)	0.1110	1.18
future energy sources - Solar (0/1 N/Y)	1.4249	2.16
future energy sources - Uranium (Nuclear) (0/1 N/Y)	-0.5042	-2.82
Have heard of the term "Net Zero" (0/1 N/Y)	5.6035	2.18
Your ability to reduce your own CO2 emissions (0/1 N/Y)	0.2169	0.50
An agreement in various countries to comply with some future year target whether it can be achieved or not (0/1 N/Y)	-0.5247	-1.35
L/NP (utility function)		
Cost implication (Att)	-6.5871	-2.62
Energy security and economic impact (Att2)	7.4164	2.68
The Federal Liberal Party has decided to drop NZ. Do you think this is a good decision? (0/1 N/Y)	6.3907	3.09
future energy sources - Uranium (Nuclear) (0/1 N/Y)	5.0457	2.89
Have heard of the term "Net Zero" (0/1 N/Y)	5.5588	2.04
Your ability to reduce your own CO2 emissions (0/1 N/Y)	1.6835	1.55
Greens (utility function)		
future energy sources - Wind (0/1 N/Y)	0.7885	1.19
future energy sources - Gas (0/1 N/Y)	-1.1882	-2.46
Have heard of the term "Net Zero" (0/1 N/Y)	4.7863	1.92
One Nation (utility function)		
Energy security and economic impact (Att2)	0.0817	3.17
future energy sources - Wind (0/1 N/Y)	-3.0135	-2.96
future energy sources - Coal (0/1 N/Y)	2.2078	2.71
future energy sources - Uranium (Nuclear) (0/1 N/Y)	2.6554	2.90
Have heard of the term "Net Zero" (0/1 N/Y)	6.4767	2.37
Independent incl Teal (utility function)		
Your ability to reduce your own CO2 emissions (0/1 N/Y)	1.0712	1.63
future energy sources - Clean Coal (0/1 N/Y)	-1.3313	-1.82
future energy sources - Hydro (0/1 N/Y)	1.2975	1.93
Have heard of the term "Net Zero" (0/1 N/Y)	5.9444	2.15
The amount of CO2 produced is balanced by the amount removed from the atmosphere, effectively preventing net additions to the atmosphere (0/1 N/Y)	1.3612	2.17
Other parties (utility function)		
Annual person income ($)	-0.00001	-1.48
Device - desktop (0/1 N/Y)	1.1394	1.33
Alternative specific constants - Random Parameters limits of triangular		
Labor	1.6784	2.33
LN/P	12.7262	3.95
Greens	0.1890	0.66
One Nation	2.9077	2.99
Independent	2.2052	3.14
Error Component's: SD of latent random effects		
Standard deviation - Labor	2.6974	1.99
Standard deviation - L/NP	5.5362	3.79
Standard deviation - Greens	2.1979	2.35
Standard deviation - One Nation	4.0216	3.19
Standard deviation - Independent	2.3939	2.68
Standard deviation - Other parties	8.7776	2.47
Heteroskedasticity of random effects by trust of quotes from Elon Musk and Bill Gates		
Labor | Trust of Elon Musk quote	5.3313	2.20
L/NP | Trust of Elon Musk quote	0.5833	2.32
Greens | Trust of Elon Musk quote	1.3680	2.29
One Nation | Trust of Elon Musk quote	-0.5429	-1.34
Independent | Trust of Elon Musk quote	-0.6666	-0.71

Other parties | Trust of Elon Musk quote	0.1402	0.74
Labor | Trust of Bill Gates quote	-1.7083	-1.69
L/NP | Trust of Bill Gates quote	0.3282	1.65
Greens | Trust of Bill Gates quote	-0.6976	-1.38
One Nation | Trust of Bill Gates quote	-0.0897	-1.44
Independent | Trust of Bill Gates quote	0.2574	1.17
Other parties | Trust of Bill Gates quote	-0.0587	-1.54
Model fit statistics		
N	1361.000	
Log-Likelihood	-1932.127	
AIC	3968.300	
AIC/N	2.916	
McFadden R^2	0.208	

Table 8 Summary statistics of attributes for all and each alternative (political party)

Labor (utility function)	**Mean (all)**	**SD (all)**	**Mean (Labor 1)**	**SD (Labor 1)**
Political spin (Att1)	42.082	14.600	41.046	14.575
Energy security and economic impact (Att2)	47.298	16.252	46.167	16.214
future energy sources - Wind (0/1 N/Y)	0.722	0.448	0.821	0.383
future energy sources - Solar (0/1 N/Y)	0.833	0.373	0.904	0.295
future energy sources - Uranium (Nuclear) (0/1 N/Y)	0.285	0.452	0.159	0.366
Have heard of the term "Net Zero" (0/1 N/Y)	0.872	0.334	0.890	0.314
Your ability to reduce your own CO2 emissions (0/1 N/Y)	0.288	0.453	0.321	0.467
An agreement in various countries to comply with some future year target whether it can be achieved or not (0/1 N/Y)	0.465	0.499	0.406	0.492
L/NP (utility function)	**Mean (all)**	**SD (all)**	**Mean (LN/P 1)**	**SD (LN/P 1)**
Cost implication (Att)	50.133	17.469	58.638	15.948
Energy security and economic impact (Att2)	47.298	16.252	55.245	14.791
The Federal Liberal Party has decided to drop NZ. Do you think this is a good decision? (0/1 N/Y)	0.278	0.448	0.581	0.494
future energy sources - Uranium (Nuclear) (0/1 N/Y)	0.285	0.452	0.550	0.499
Have heard of the term "Net Zero" (0/1 N/Y)	0.872	0.334	0.941	0.235
Your ability to reduce your own CO2 emissions (0/1 N/Y)	0.288	0.453	0.270	0.445
Greens (utility function)	**Mean (all)**	**SD (all)**	**Mean (Greens 1)**	**SD (Greens 1)**
future energy sources - Wind (0/1 N/Y)	0.722	0.448	0.829	0.378
future energy sources - Gas (0/1 N/Y)	0.423	0.494	0.204	0.404
Have heard of the term "Net Zero" (0/1 N/Y)	0.872	0.334	0.822	0.383
One Nation (utility function)	**Mean (all)**	**SD (all)**	**Mean (One Nation 1)**	**SD (One Nation 1)**
Energy security and economic impact (Att2)	47.298	16.252	50.792	14.401
future energy sources - Wind (0/1 N/Y)	0.722	0.448	0.445	0.498
future energy sources - Coal (0/1 N/Y)	0.288	0.453	0.517	0.501
future energy sources - Uranium (Nuclear) (0/1 N/Y)	0.285	0.452	0.512	0.501

Have heard of the term "Net Zero" (0/1 N/Y)	0.872	0.334	0.928	0.259
Independent incl Teal (utility function)	**Mean (all)**	**SD (all)**	**Mean (Independent 1)**	**SD (Independent 1)**
Your ability to reduce your own CO2 emissions (0/1 N/Y)	0.564	0.496	0.730	0.447
future energy sources - Clean Coal (0/1 N/Y)	0.350	0.477	0.203	0.405
future energy sources - Hydro (0/1 N/Y)	0.594	0.491	0.716	0.454
Have heard of the term "Net Zero" (0/1 N/Y)	0.872	0.334	0.905	0.295
The amount of CO2 produced is balanced by the amount removed from the atmosphere, effectively preventing net additions to the atmosphere (0/1 N/Y)				
Other parties (utility function)	**Mean (all)**	**SD (all**	**Mean (Other 1)**	**SD (Other 1)**
Annual person income ($)	$75,721	$48,459	$68,899	$51,674

5.1 Elasticity Impacts

The behaviourally meaningful link between the probability of supporting a political party and the statistically significant variables associated with each alterative are best summarised as mean elasticity estimates. Comparing the parameter estimates is not straightforward given the nonlinearity form linking utility with probability of political support, with direct elasticities presented for continuous variables and arc elasticities for binary variables (both relatively inelastic and elastic). Individual direct elasticities are calculated as the change in the probability of choosing the political party alternative *m* (P_m) given a marginal change in an explanatory variable X_j, as follows:

$$E_{m,x_j} = \frac{\partial P_m}{\partial x_j} \cdot \frac{x_j}{P_m} = \beta_j \cdot x_j \cdot \left(1 - P_m\right) \tag{11}$$

Individual arc elasticities are calculated as the difference in the probability of choosing the political party alternative *m* due to a change from 0 to 1 in the binary explanatory variable X_j, relative to the probability of it being zero (baseline), as follows:

$$E_{m,x_j} = \frac{P_m\left(x_j = 1\right) - P_m\left(x_j = 0\right)}{P_m\left(x_j = 0\right)} \tag{12}$$

To calculate the sample-mean elasticities, we used the model-predicted probabilities of each alternative to calculate weighted averages and standard deviations. Direct elasticities represent how much the probability of choosing an alternative would change, *ceteris paribus*, given a 1% variation in the attribute of interest.

The elasticities of most interest are given in Table 9. All mean estimates are statistically significant[11] with the energy sources all relatively inelastic using an arc elasticity formula, with the signs in line with the respondent support for one or more energy sources aligned to political party support. For example, given a 100% increase in support for wind the probability of voting for the Labor party is predicted to increase by 1.2%, with solar being 17.3% but any support for nuclear power would reduce the voting propensity by 1.5%. The equivalent mean changes for the Greens associated with wind and gas are respectively a 19.7% increase and 10.2% decrease. The strong positive support for the L/NP and One Nation associated with nuclear power engender a 16.4% and 20.9% increase in the probability of supporting these two parties respectively.

[11] Full details available on request

The latent attitude elasticities are continuous variables, and hence a 1% increase in Att1, *ceteris paribus,* results in a 12.9% reduction in the probability of supporting the Labor party if there was a vote today. Att2 has a 13.4% increase in the probability of supporting the Labor party.

The elasticity response associated with 'having heard of the term Net Zero' as 100% change (from 0 to 1) is substantial for all parties, giving us confidence in the sample being able to assess the survey questions with a background knowledge of Net Zero, regardless of what it might mean to each respondent. Over 88% of the sample had heard of Net Zero.

Table 9 The elasticities of probability in choosing parties and candidates

	Labor	LN/P	Greens	One Nation	Independents
Latent attitudes:					
Cost implication (Att)		7.631			
Political spin (Att1)	-12.945				
Energy security and economic impact (Att2)	13.408	32.563		0.859	
Awareness and meaning of Net Zero:					
Have heard of the term "Net Zero" (0/1 N/Y)	0.688	0.437	1.242	1.260	2.068
Your ability to reduce your own CO2 emissions	0.008	0.039		0.068	
An agreement in various countries to comply with some future year target / aspiration, whether it can be achieved or not (0/1 N/Y)	-0.033				
Energy sources preferred:					
future energy sources - Wind (0/1 N/Y)	0.012		0.197	-0.395	
future energy sources - Solar (0/1 N/Y)	0.173				
future energy sources - Gas (0/1 N/Y)			-0.102		
future energy sources - Coal (0/1 N/Y)				0.187	
future energy sources - Clean Coal (0/1 N/Y)					-0.127
future energy sources - Hydro (0/1 N/Y)					0.335
future energy sources - Uranium (Nuclear) (0/1 N/Y)	-0.015	0.164		0.209	

7. Discussion

The accumulated evidence from the descriptive and formal modelling analysis is suggestive of a number of forwarding-looking challenges for political parties associated with the way that individuals view and express opinions on net zero emission targets. There is clear evidence of a strong link with support for particular political parties, and that recognising this is a central issue to consider in how net zero is promoted and promulgated. Arising out of the evidence are a series of policy implications of the net-zero debate, and while the focus is on an Australian sample, the evidence can be generalised to nations where similar differences between political parties exist.

The research has reinforced the view that political preference bias in policy modelling is very strong, and that current models must not ignore ideological friction. It becomes necessary to include political feasibility metrics into future promotion and planning to account for implementation risks. Most importantly, net-zero targets are vulnerable to political cycles. Without bipartisan backing, commitments risk rollback when governments change. This is likely to be the case in Australia, but embedding targets in legislation with cross-party oversight and independent monitoring bodies to ensure continuity may be a challenge given the diverse opinions on the energy mix and what this means for energy security and electricity prices.

Governance frameworks are critical with clear accountability, transparency, and stakeholder engagement; however, this is questionable in many jurisdictions where political spin tends to dominate the debate, often it seems with claims of inaccurate factual evidence[12]. Ideological divides seem to amplify misinformation and scepticism. Creating an independent climate commission and integrating

[12] There is a large amount of commentary, not only in Australia but in other countries as to whether evidence is reliable or not. See Evli et al. 2022.

net-zero into long-term planning laws while appealing, may not have the backing of all parties. Targeted communication strategies emphasising the full systemwide economic costs and benefits and energy security, especially for conservative electorates in particular are required.

It is clear from our findings that economic transition is at the centre of the political debate, as shown by the role of latent attitudes. Resistance against net zero targets stem from perceived economic harm associated in Australia with escalating electricity prices and reduced energy security, with greater dependence on renewable energy sources.

Right-leaning conservative governments such as the L/NP and One-Nation favour their well-documented position on innovation over regulation (highlighted by the support for nuclear power); in contrast, left-leaning governments such as the Labour party and the Greens prioritise their well-documented position on emissions caps. The challenge is to find a pathway of hybrid policy packages that can combine incentives for innovation with enforceable emissions limits.

8. Conclusions

This paper has reported on views and opinions on net zero targets and climate change of over 1,500 individuals living in Australia, with a mapping of such opinions into support for each political party at the Federal level. An understanding of the role that latent attitudes together with observable variables play in impacting the probability that an individual will support each political party if an election was held at the time of the survey (early December) provides a context within which to recognise preference bias that is a challenge in wooing individuals away from and/or towards a particular position on net zero emission targets, and the role of each energy source in achieving such targets.

There are clear differences in support for specific priorities in respect of net zero as identified in influencing statements used to obtain latent attitudes that have been grouped as (i) cost implication at the respondent level (2 statements), (ii) political spin (2 statements), and (iii) energy security and economic impact (3 statements), as well as view on energy sources in the future mix. This support has to be overlaid by known views of each political party on whether they support net zero targets or not, as captured to some extent in the hybrid choice model through the influence on the estimated parameters and elasticities including the alternative-specific constants and the error components and covariate heterogeneity. While we cannot identify the exact role that the political parties position on net zero has in individual preferences, we can confidently assume that it is well reflected in the preferences of the sampled respondents.

In ongoing research, we are analysing the data to see if there are any other influences related directly to views on net zero, especially statements that are not included in the seven analysed herein as latent attitudes. By interacting the views on net zero statements with socioeconomic and context characteristics, we will be add further evidence on the Australian population's positions in respect of how they see net zero, with an added layer of evidence on why individuals support particular political parties.

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Appendix

Table A1. Summary statistics of the 21 statements about Net Zero

Statements	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Mean	SD	N
Net Zero means no emissions	14%	25%	20%	28%	12%	2.99	1.26	1412
We can offset our way to Net Zero	13%	19%	30%	29%	9%	3.02	1.17	1366
All Net Zero pledges are credible	19%	25%	28%	22%	7%	2.74	1.19	1398
Net Zero is just about carbon	12%	29%	32%	20%	7%	2.82	1.10	1349
Technology will fix it	18%	27%	28%	20%	6%	2.70	1.16	1386
Net Zero is a 2050 problem	23%	27%	25%	16%	9%	2.60	1.25	1407
Net Zero is just a climate issue	14%	25%	29%	23%	9%	2.89	1.17	1405
Net Zero is just about targets	9%	20%	24%	32%	15%	3.23	1.19	1400
Net Zero is something for politicians to argue about	9%	17%	24%	31%	19%	3.33	1.22	1432
Affordability and reliability of energy supply are what matters and not Net Zero	8%	14%	28%	27%	24%	3.45	1.21	1417
The Federal government is directing taxpayers' money at renewable energy suppliers to entice a switch, but it is just delivering huge profits to businesses, many of which are not Australian businesses	6%	12%	28%	29%	25%	3.55	1.16	1351
Energy security is the priority and should use all energy sources to ensure Australia has electricity at competitive prices for industry, households, and businesses	4%	8%	24%	32%	31%	3.78	1.11	1427
The Federal government is misleading us with its commitment to net zero at any cost in order to claim some debatable global warming impact promoted by climate activists and other agencies such as the United Nations (UN)	9%	14%	25%	26%	26%	3.45	1.27	1371
Many countries have woken up to false claims by countries claiming we are doomed without net zero.	8%	15%	26%	29%	22%	3.43	1.20	1354
It has resulted in significant increases in electricity prices	5%	9%	21%	31%	34%	3.80	1.15	1411
It has increased the cost of living significantly	5%	11%	20%	32%	33%	3.78	1.15	1414
It is a bad idea that is being used by politicians who want to be seen as 'good' global environmentalists	10%	15%	24%	25%	26%	3.42	1.29	1392
It is forcing us to think that Australia can reduce its emissions by moving away from fossil fuels (including gas) to renewables (wind, solar) while still ensuring baseload electricity at an attractive cost	4%	8%	26%	38%	24%	3.70	1.04	1401
Coal-fired power stations are going to continue to be essential to ensure we generate and distribute enough electricity to avoid blackouts and burnouts	7%	12%	24%	32%	25%	3.55	1.19	1402
Many nations do not support Net Zero since they see it as degrading their economy and having almost no impact on the climate	4%	9%	25%	37%	26%	3.71	1.07	1367
My electricity bill has increased in the last year	4%	6%	20%	37%	33%	3.88	1.07	1321