

Determinants of public preferences on low-carbon electricity: Evidence from the United Kingdom

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Decarbonising the global electric power sector is a necessary first step to achieve the goals of the 2015 Paris Agreement. As public concerns over the seriousness of climate change have grown, the social demand for alternatives to fossil fuels that have little negative impact on the environment is also growing. In this situation, identifying factors influencing public perception and preference for low carbon energy sources can be helpful in alleviating conflicts and confrontations surrounding the energy transition and enhancing the effectiveness of related government policies.

Previous studies on preferences regarding low-carbon energy sources have confirmed the influence of factors such as the level of knowledge and information regarding the energy technologies, the level of subjective perception of climate change risks, views of government or energy policy institutions, and demographic factors such as gender, age, education level, and political ideology. However, most studies have focused on the acceptance and preference of a single energy source or only renewables. Therefore, this study intends to complement the limitations of previous studies by considering the public perception of climate change and trust in the climate change response policies as major variables, and empirically derive factors that affect the public preference for major low carbon energy sources.

Carrying out an analysis of the influence of these different determinants can be challenging since there is often significant collinearity across multiple independent drivers, i.e., many of the nominally independent variables are actually correlated. Our study derives the determinants of public preferences for low-carbon energy sources using ridge, lasso, and elastic net regression models, which also act as variable selection models. The explanatory \

variables are classified into four main categories: demographic, knowledge of energy technologies, perceptions of the impacts of climate change, and views of government energy and climate policy.

for solar, wind, biomass, and nuclear energy, which are low-carbon energy sources that account for a large and growing proportion of the UK's power generation, are dependent variables. The analysis was performed based on data from a representative public survey of over 2000 British households carried out in May 2021.

We identify a number of drivers of support for different low-carbon energy sources. For example, men are more likely to prefer solar, wind, and nuclear energy while women prefer biomass energy. In addition, people with a higher level of scientific education are more likely to prefer to use solar energy. Respondents with a more right-wing political orientation tend to prefer nuclear and biomass energy but there is no relationship found between political ideology and wind or solar.

Apart from demographic determinants, knowledge, perception, and policy-related variables were also found to play important roles. First, the greater the professed knowledge about a specific low-carbon energy source, the more positive the view of that energy source. Thus, increasing public acceptance of low-carbon energy sources might benefit from government efforts to increase public awareness. Second, those who consider the potential impact of climate change to be catastrophic tend to favour renewable energy sources. On the other hand, those who prefer nuclear energy are relatively more optimistic about climate change damages and, unsurprisingly, think that government investment in nuclear energy should be a top priority. Given that climate policies will need to rely on more than only the minority that believes that climate damages will be catastrophic, this would argue for a portfolio of options. Third, public trust in the government's climate change response policies was not a significant determinant of preference for any low-carbon energy sources apart from biomass energy.

Thus, public perceptions of the potential risks of climate change (but not trust in government climate policy) has a significant effect on preferences for solar and wind energy whereas preferences for nuclear energy are not significantly affected by climate change-related variables. By contrast, both variables related to the public perception of climate change and public trust in government climate policies significantly affect preferences for biomass energy. Given the differences in the determinants of support, even if these are all nominally low-carbon energy sources, the policies that governments and developers should take to enhance public acceptance will need to be different for each source. In addition, the energy source preferred by the public may vary depending on how the government responds or is perceived to be responding to climate change issues.

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