



# Democracy, economic development and low-carbon energy: When and why does democratisation promote the energy transition?

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It is often assumed that democracies are better at delivering higher environmental quality than non-democracies. In particular, many empirical studies suggest that democracy is associated with more ambitious climate mitigation policies and outcomes. Meeting the temperature targets set out in the 2015 Paris Agreement necessitates stringent and rapid action to transition from fossil fuels to low-carbon energy technologies reinforces the importance of understanding the effect of democracy on national energy portfolios, particularly in relation to the share of renewable energy sources of the total energy mix.

Conventional wisdom suggests that democracy should have positive consequences for decarbonisation. According to this perspective, democracies should be more likely to embrace the energy transition because of the higher value that they allegedly place on human life, increased opportunities they provide for environmental and local interests to influence energy policy, political incentives for elected politicians to deliver sustainable energy policy and democratic commitment devices that incentivise decarbonisation. On the other hand, democracies may also allow local residents or groups to mobilise to oppose rapid rollout of new technologies or deploy large-scale infrastructure.

Yet surprisingly little effort has been made to test whether or not democratic political regimes result in more sustainable energy outcomes. The empirical evidence on the implications of democratic political regimes for energy transition is quite varied, with a number of cases suggesting that democracy can sometimes inhibit decarbonisation. Contradictory empirical findings have led some authors to conclude that democracy's effect on transitions might be contingent on certain facilitating conditions or moderating factors such as, for example, a nation's level of trade openness or fossil fuel endowment.

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We contribute to this literature by exploring whether and, if so, how the influence of democracy on the use of four key low-carbon energy sources for electricity generation – hydro, nuclear, wind and solar energy – depends on a nation's level of economic development. The first two sources are large-scale, centralised technologies that typically require a significant degree of top-down regulation and a number of years to deploy (typically because of the time needed for permitting and building a new plant). In contrast, the latter two options are smaller-scale, more decentralised sources that are often heralded as more democratic technologies that can facilitate citizens becoming more directly involved in the planning, production, consumption and regulation of energy. By analysing these four options simultaneously, we can explore whether the effect of democracy varies across different low-carbon options that differ in terms of their level of centralisation and scale. Using data from the International Energy Agency World Extended Energy Balances and Summary, V-Dem Correlates of Democracy, Freedom House and Polity IV democracy indices and World Bank Development Indicators, we conduct a large-N investigation of the low-carbon energy portfolios of 135 countries from 1980 to 2020. We go beyond most existing quantitative studies, which rely on ordinary least squares regression by employing a two-level hierarchical model consisting of country-years nested in countries that allows us to test whether democracy is an important driver of low-carbon energy shares once country-level clustering is accounted for. We arrive at a more sophisticated understanding of the effect of domestic fluctuation in the level of democratic institutions and processes by building a random coefficient model (RCM) that allows the effect of democracy to vary between countries. We add further nuance by employing RCM with interaction terms and conduct second-order analysis of Bayesian country-specific democracy effects to explicitly test the role of economic development in moderating the democracy effect on low-carbon energy usage.

Our results provide strong evidence that democratisation has distinct, and often contradictory, effects on the use of low-carbon energy sources between and within countries: while democracies tend to employ higher shares of low-carbon energy sources than non-democracies, increasing levels of democracy within the same country are associated with *diminishing* shares of solar, wind and hydro (but not nuclear) energy. Our findings also suggest that the effect of democracy on small scale low-carbon technologies varies significantly between countries at different levels of economic development – increasing wind and solar energy shares in developing economies, but inhibiting them in advanced economies. By contrast, we find that democracy and economic development interact differently in relation to large-scale low-carbon options as democratisation appears to promote nuclear use in advanced economies, while inhibiting it in weaker economies. These divergent moderating effects appear to suggest important advantages for small-scale energy technologies over centralised (both high- and low-carbon) energy sources for weak economies: That is, by bypassing the need for the state apparatus, which is required to plan, implement and finance large-scale energy projects, solar and wind energy might facilitate developing countries overcoming energy poverty and meeting future rising energy demand at lower cost than via conventional, large-scale options.