***Democracy AND electricity: institutions, industrial representation and technology deployment rates***

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## Overview

Deployment of electricity generation technologies can depend on many factors including the economics of different options, but also on political factors such as support (or opposition) of politicians, interest groups and the wider publics, as well as the interaction of political and economic factors in the form of subsidies and other support mechanisms. We investigate empirically the joint effects of the democratic attributes of countries’ formal political institutions and the political influence of industry on electricity preferences and deployment rates. Electricity generation and consumption account for almost half of greenhouse gas emissions worldwide, but is also widely seen as critical to decarbonising other sectors such as transport, domestic heat and some parts of industry, putting the power sector at the centre of efforts to mitigate global climate change (IEA and IRENA 2017). It is, therefore, widely agreed that significant emissions cuts need to be undertaken in the electricity sector to meet the targets adopted in the Paris Agreement (IPCC 2018).

Yet despite its urgency, the path of global energy transition has been uneven; while some countries, such as EU member states, have pledged to achieve a carbon neutral economy (EC 2018), many emerging economics (as well as the United States) have not yet committed to a shift away from fossil fuels in the power sector, leading to widespread concern that the international community will fail to meet its shared mitigation target. Moreover, any transition will involve a shift from fossil fuels to low-carbon energy sources such as renewables or nuclear power, but the political economy of nuclear power (Hultman, 2011), will be radically different from the political economy of a renewable option such as solar power (Mulvaney, 2019).

Countries’ divergent energy preferences have been attributed to several factors such as, for example, the political influence of interest groups (Marques et al. 2010; Cadoret and Padovano 2016), repercussions of the energy transition on employment and the national economy (Bogdanov 2019; IEA 2017; Greenpeace International 2015; Teske et al. 2018; Pursiheimo et al. 2018; Brown et al. 2018), the quest for energy security (Gan et al. 2007; Chien and Hu 2008) and the unequal positions that countries occupy in the world economy (Parks and Roberts 2006, 2007, 2010; Betsill et al. 2007). Yet all of these explanations originate from the assumption that political actors design energy policy with one fundamental goal in mind - to remain in power by deploying the most politically expedient energy sources. We contribute to this literature by investigating the effects of two observable sources of political returns attached to electricity deployment decisions - the level of democracy in countries’ formal political institutions and the strength of industrial interest groups.

## Methods

While numerous studies have found evidence that political factors influence electricity deployment (e.g. Henisz and Zelner 2006; Marques et al. 2010; Cadoret and Padovano 2016; Bogdanov 2019; Teske et al. 2018; Bobrow and Kudrle 1979; Gan et al. 2007; Chein and Hu 2008; Parks and Roberts 2010), most quantitative work focuses on cross-sectional differences between countries (e.g. Bayer and Urperlainen 2016; Menz and Vachon 2006; Carley 2009; Yi and Feiock 2014), which creates the possibility that observed correlations might be due to other (unmodelled) factors such as national culture and public environmental awareness that vary between countries or (supranational) regions rather than political drivers. To explore such possibilities, we employ a three-level hierarchical model consisting of country-years, countries and regions, to isolate the effects of fluctuations in the levels of democracy and industrial strength within the same country and region, thereby eliminating the possibility for country and regional confounding. We draw on the leading indices in the political science literature (namely: the V-Dem, Freedom House and Polity IV indices) for country-year data on various democratic attributes such as freedom of expression, civil society participation in policymaking, government accountability, corruption and fair election.

We make two novel contributions, one theoretical and the second empirical. We examine how two elements of the domestic political setting influence political actors’ energy preferences and ensuing deployment rates: (i) the democratic attributes of the formal political institutions, which shape the political incentives (and disincentives) attached to different energy sources; and (ii) the role of industrial energy consumers as a key interest group that can influence policymakers, thereby increasing the sensitivity of energy deployment to the political process. Second, we subject two of the leading political explanations of electricity deployment – regime type and interest group pressure – to rigorous quantitative tests by investigating whether they continue to wield explanatory power when the possibility for country and regional confounding is eliminated.

We test our hypotheses on the worldwide electricity sector using country-year energy deployment data spanning 136 countries from 1990 to 2018 (IEA 2019). Specifically, we investigate the joint effects of the democratic attributes of a country’s formal political institutions and political influence of industrial energy consumers on the annual deployment rate of solar, wind, hydro, geothermal, gas, coal, oil and nuclear energy for electricity generation, ceteris paribus.

## Results

Our findings indicate that even when country and regional clustering are accounted for, democracy does indeed have a significant effect on the deployment of most energy technologies (namely: solar, wind, hydro, gas and nuclear). However, we also find that the direction and magnitude of democracy’s effect vary substantially across countries, suggesting that international generalisations about the influence of democracy on energy preferences could be misleading. Furthermore, we find strong evidence that industrial strength significantly increases the positive effect of democracy on the deployment of all electricity technologies investigated; as industrial representation rises, the positive marginal effect of democratization (or an increase in the level of democracy in a country’s formal political institutions) becomes more pronounced as stronger interest groups take better advantage of the opportunity for non-governmental interests to influence energy policy. Conversely, when industrial representation is weak, the positive marginal effect of an increase in democratic institution falls as weaker interest groups exert less pressure on energy preferences through democratic platforms.

## Conclusions

While largely understudied, political context is an important driver of (and impediment to) electricity technology deployment. In particular, democracy plays a significant role in shaping the deployment rates of solar, wind, hydro and nuclear energy and industrial representation increases the positive marginal effect of democracy on all major electricity sources. The results of our multilevel approach also suggest that international generalisations about the drivers and obstacles to electricity deployment could be misleading, supporting the need for more detailed country-specific analysis.