



Original research article

Who's controlling our energy future? Industry and environmental representation on United States public utility commissions[☆]

Jared Heern

Institute at Brown for Environment and Society, Brown University, 135 Angell St., Providence, RI, 02906, United States of America



ARTICLE INFO

Keywords:

Public utility commissions
Regulatory politics
Appointments
Climate policy
State-level

ABSTRACT

Public utility commissions (PUCs) are small state-level regulatory institutions in the United States adjudicating conflicts over electrical power rates, energy generation, electric vehicle infrastructure, and energy efficiency among other issues. PUCs are critically understudied institutions given their central role in addressing climate change. This is partially due to a lack of data related to public utility commissioners. What are the characteristics of these energy system regulators? I make an initial contribution with expansive original data on the professional backgrounds of the over 800 commissioners who served from 2000 to 2020. Particular attention is given to ties to the utilities PUCs regulate, the fossil fuel industry, and environmental positions in government, business, and advocacy. Utility industry backgrounds have become more frequent, but there has been a greater increase in environmental connections in recent years. These data and findings can stimulate additional research on the increasing environmental responsibilities of PUCs.

1. Introduction

Until the recent adoption of the *Inflation Reduction Act* by the U.S. Congress, there had been few major (and successful) steps towards addressing climate change by the federal government. This has left much of the responsibility to the states. Most media and scholarly attention has been dedicated to state legislatures taking actions like adopting renewable energy mandates and net metering programs to stimulate the installation of rooftop solar panels. However, the final design and implementation of these policies—among many other decisions relevant to climate change—is largely handled by the public utility commissions (PUCs) in all 50 states. These small, generally three or five member, independent regulatory commissions scarcely rise to public awareness, and when they do it is usually only in contexts like the California blackouts and wildfires and the near failure of the Texas electric grid during the February 2021 winter storm. However, when the vast majority of Americans flip on a light switch or breathe the air they are interacting with decisions made by their PUC. Less visible, but perhaps more significantly, the concentration of carbon in the atmosphere is influenced by PUCs. What are the characteristics of these commissions and how do those characteristics influence their policy decisions? Do utilities, fossil fuel generators, and environmental organizations impact PUC proceedings by having individuals connected to their groups selected to commissions?

PUCs have a central and unappreciated role to play in the energy system transition. This is a role that will only become more significant as the hundreds of billions of dollars appropriated by the *Inflation Reduction Act* will be partially managed by PUCs in their capacity to approve generation and transmission projects, expand rooftop solar panel programs, increase energy efficiency, coordinate the integration of electric vehicles to roadways and the electric grid, and ultimately make decisions that contribute to the necessary decarbonization and decentralization of the U.S. energy system.

Research on PUCs in an environmental context is highly underdeveloped. Revealing connections between the characteristics of utility regulators and their decisions can contribute to multiple research programs through better understanding of the conditions that facilitate or hinder the adoption of policies relevant to climate change. One of the long-standing research questions in regulatory politics is how the “revolving door” between regulatory institutions and the industries that they regulate tilts policy outputs in favor of the industry [1–4]. As will be shown, it is common for public utility commissioners to be appointed out of the utility industry, and even more common for them to leave the public sector to work in or adjacent to the industries they were just regulating. The fossil fuel industry is generally resistant to policies meant to stem climate change. Electric utilities have a more nuanced relationship with decarbonization and decentralization

[☆] The author wishes to thank Steven Balla, Sarah Binder, David Konisky, Eric Lawrence, J. Timmons Roberts, Christopher Warshaw, workshop participants at George Washington University, and three anonymous reviewers for valuable feedback. All mistakes are the author's sole responsibility.

E-mail address: jared_heern@brown.edu.

<https://doi.org/10.1016/j.erss.2023.103091>

Received 19 October 2022; Received in revised form 10 April 2023; Accepted 12 April 2023

Available online 1 June 2023

2214-6296/© 2023 Elsevier Ltd. All rights reserved.

that has at times led to obstruction in many areas of climate change mitigation [5–8].

This study is an initial step towards discovering how the selection of public utility commissioners with various professional backgrounds may advance or hinder efforts to address climate change. It first discusses the expected influence of work experience on the policy preferences of public utility commissioners, with a particular focus on the preferences of the utility and fossil fuel industries. Expansive original data regarding the backgrounds of public utility commissioners in all 50 states from 2000 to 2020 is detailed. The predominantly descriptive empirical analysis first examines the professional backgrounds of commissioners aggregated across time and states, showing that the most common path to a PUC is through utility regulation, followed by elected office, governors' personal networks (e.g., senior staffers), the utility industry, and finally environmental positions. Democrats are significantly more likely to have environmental experience. It is also shown that there are significant differences across these categories for commissioners in elected versus appointed states, who are much more likely to come from purely elected office backgrounds, without professional utility regulation or industry connections.

The analysis continues by breaking down states individually, showing that there are various appointment cultures across the states that favor some backgrounds over others, and that some states have shifted over time. Extra attention is devoted to utility industry and environmental backgrounds, and time-series cross-sectional modeling is used to test potential determinants of PUC composition, finding little influence of governors' parties and other state characteristics. PUCs are independent regulatory bodies, but are currently appointed by governors and legislatures in 41 states. Prior research has shown a strong influence of governors on the partisan composition of PUCs through appointment [9]. What are the determinants of commissioner characteristics past partisanship? The appointment process can be opaque, and this study begins to investigate the factors that potentially influence the appointment of regulators predicted to be more friendly to industry or to the environment, who wield significant control over state energy policies in high complexity/low salience proceedings [10]. This can reveal an overlooked climate policymaking role of governors, an avenue of industry influence in the regulatory process, and how other state energy characteristics affect the policymakers that subsequently shape them.

Finally, the shifts in the proportion of commissioners from each category are traced over time, showing that environmental experience on PUCs has increased substantially in recent years. This is postulated to be the result of the recognition of the crucial environmental policy decisions with which PUCs are more frequently engaging. The data collected and findings from this study are valuable for improving the understanding of the characteristics that may influence the policy decisions of PUCs, and the conditions under which they may be more or less effective institutions for adopting and implementing significant climate policies.

2. Professional backgrounds and policy preferences

There is strong reason to believe that the professional backgrounds and experiences of public utility commissioners are valuable characteristics for understanding their policy decisions. First, the choice of profession may reveal existing policy preferences. For example, individuals who choose to work for environmental non-profits or with renewable energy businesses may do so out of a prior commitment for addressing climate change. Second, occupation has been found to influence the political preferences of the general public and the behavior of government actors. This can be the result of affective identity influence or more economic self-interest, such as in cases of market liberalization, immigration, and job security [11]. Professions play a dominant role in most people's lives, costing substantial time and effort in exchange for resources and stability. Policies that threaten those resources and stability will naturally be met with opposition.

Individuals also learn from their professional experiences and transfer the reasoning and problem-solving skills they develop to relevant political contexts [12]. It is sensible that when a person invests significant time into a profession, aspects of that profession will spill over into other parts of their life. Public utility commissioners coming out of environmental professions will be more likely to see the environmental implications of utility regulation decisions. Even if they are not overtly environmentally progressive, the time and focus they dedicated to environmental issues will make those considerations more accessible than for individuals without that same experience [13]. Conversely, a commissioner who previously spent time sitting in conference rooms at a utility will have spent more time considering regulatory issues from that unique perspective, and it is more likely that will at least nudge their approach to policy decisions in a direction more favorable to utilities.

Studies of elites have shown that characteristics like working-class backgrounds impact legislative voting [14–16], and professional backgrounds can explain variation in voting behavior within the parties [17]. Identities, personal experiences, and professional backgrounds also affect other activities like legislators' bill sponsorship and time allocation [18], the spending priorities of executives [19], and how judges decide cases [20]. In a review of judicial politics literature, Harris and Sen (2019) write, "research suggests more women on the courts would lead to more decisions favorable to women, more people of color on the courts would lead to more decisions favorable to people of color" ([20], 243). To stretch their conclusion, if more commissioners are selected that have worked with the environment [utility industry], and developed identities related to those professions, it could be expected to lead to more decisions favorable to the environment [utility industry].

Former industry employees that become regulators tend to make more decisions that benefit the industry. Lobbying for the industry is effectively internalized in the regulatory agency [1–4]. This effect is particularly strong in the final year of a regulator's tenure if they are hoping to leave the public sector for the private [21]. On the other side of the revolving door, former regulators that enter the industry carry valuable knowledge of the regulatory process [4], and tend to secure disproportionate benefits for their firms [22].

Counter to the negative implications of industry capture, careerists that vacillate between industry and regulatory agencies cultivate expertise that can lead to more efficient regulatory outcomes [4,23–25]. From the perspective of transactional bureaucracy, instead treating PUCs as the principals and utilities as the agents, mutually cultivated expertise, information sharing, and trust on both sides can yield greater durability of the relationship for repeat play and improved formal and informal agreements [26–28]. Laws that restrict the revolving door lead to lowered expertise and shorter tenures on PUCs—though also a lower proportion of commissioners that move into the industries they regulated [29]. However, improved expertise and long-term relationships from industry–bureaucratic exchange have been argued to represent a more nuanced form of industry capture [30]. Interviews with public office holders and political observers confirm that they "question the true allegiance of newly appointed public officers arising from the private sector" ([4], 316).

Commissioners with ties to electric utilities, that still feel somewhat connected to the industry, maintain contact with, or have aspirations of returning to it, may be more inclined to approach policy decisions with the interests of the utility more salient than commissioners without those connections. It is important to consider the preferences of electric utilities. The primary motivation of an investor-owned utility is to increase its profits for the benefit of their shareholders. The specific generation technologies used to do so and their environmental implications are less of a factor [31]. They primarily receive revenues as a return on their investment in large capital expenditures like generation and transmission infrastructure. This has traditionally favored large, centralized coal and gas generation systems, but—especially more recently—can include utility-scale renewable technologies.

Utilities have been shown to share some agreement with environmental groups on hydro- and wind power [7], and other renewable developments [5–8]. In some instances, utilities and environmental groups have collaborated to pass clean energy legislation [32]. However, utilities often oppose the expansion of distributed generation/net metering (e.g., rooftop solar panels) and micro grids [5–8,33]. Utility preferences for generation sources and other policies related to climate change are influenced by individual characteristics like existing generation fuel mix [8]. Some utilities are better positioned to rapidly decarbonize without threatening revenues, while others have significant investments in coal and natural gas infrastructure and face more risk from aggressive climate change policies. Another consideration is the degree of electrical power sector deregulation in the state[s] in which the utility operates. Traditionally, electric utilities were vertically integrated monopolies that owned and operated the generation, transmission, and distribution of power in their service territories. Deregulation movements in the 1990s led to varying degrees of deregulation, almost always including a divestment from generation assets. Electric utilities in these contexts have less at stake in generation technology decisions. Basseches et al. (2022) [8] conclude “the degree to which utilities undermine climate policy is unclear” (8), so while some commissioners coming from electric utilities may be expected to hold preferences hostile to pro-climate policies, others may not.

A clearer connection between professional characteristics and energy policy preferences might be found for commissioners who have worked directly in the fossil fuel industry. Anticipation of economic consequences [34], emotional considerations of identities and redistributive anxieties [35], and rhetorical in-group vs. out-group identities [36] have all been related to preferences for energy sources in areas involved with the energy industry. For example, a study of Norwegian fossil fuel industry workers found that, relative to the general public, the workers are less supportive of climate change mitigation policies that will impose costs on the fossil fuel industry, while supporting climate change mitigation policies that do not directly threaten the fossil fuel industry [37]. In a purely descriptive analysis of public utility commissioner-level roll-call votes on environmental decisions in Montana, the second most anti-environmental of 23 commissioners worked in the oil and gas industry prior to their election to the PUC and returned to the industry afterwards [9]. The most pro-environmental voting commissioner had been a state legislator well known for sponsoring green legislation and joined an environmental advocacy group after the PUC.

To be clear, simply having worked in the utility industry or with environmental issues does not guarantee a more conservative or progressive set of environmental policy preferences. In addition to the heterogeneous preferences for generation technologies across the utility industry, there are other characteristics that may overshadow professional backgrounds in PUC decisions, such as partisan identification [1,2,9,10]. It can be difficult to disentangle the correlation between professional backgrounds, partisanship, and policy views [2,21]. PUCs also operate in constrained spaces—they exist somewhere between purely bureaucratic, legislative, and judicial institutions. They must often wait for cases to be brought before them—limiting opportunities for activism. Their proceedings are technical and complex, guided by legal, economic, accounting, and engineering realities. However, there is ample reason to predict that professional backgrounds will inform the preferences and behavior of public utility commissioners, and the data and descriptive analysis provided in this study contributes an initial step, as part of a broader research program, towards improving our understanding of how the various characteristics of PUCs influence their policy decisions related to climate change.

The other contribution of this study is assessing the drivers of PUC composition. Selection of commissioners is important. From 2000 to 2020, 38 states had gubernatorial appointment, 10 states directly elected their electric utility regulatory body, and in two states the legislatures appointed commissioners. Research on the effects of PUC

selection methods has been extensive and inconclusive. There are several studies indicating elected PUCs set lower rates/better represent public interest, as elected commissioners are forced to be more responsive to the public that keeps them in office [38–42]. However, there is also empirical support for the theory that election leads to higher rates/worse public representation because utilities can influence election campaigns through monetary contributions [43–46]. There is also ample evidence that selection method may not actually have much of an effect at all [10,40,43,47]. The data presented here can assess if selection method leads to different PUC compositions.

In states that appoint their PUCs, the preferences of the governor are predicted to be crucial. Governors will want appointees who are not only effective regulators, but who can advance their energy and environmental policy agendas. One of the clearest signals of environmental and climate policy preferences is party affiliation [48–53]. It is predicted that Democratic governors will be more likely to appoint commissioners with environmental backgrounds and less likely to appoint those connected to the electric utility and fossil fuel industries. In elected PUC states, candidates will likely emerge more from prior elected offices like the state legislature and local office. PUC races occur statewide in five states and in large districts in the other five that require a fundraising network, campaign infrastructure, and name recognition. The low salience of PUC races likely downplays the importance of utility regulation backgrounds, and utilities do not need to get individuals connected to the industry elected as campaign contributions may provide another avenue of influence not present in states with gubernatorial appointments.

3. Data collection

The initial roster of the 818 commissioners who served in all 50 states from 2000 to 2020 was assembled from several sources starting with the Advanced Energy United Insight Engine that also provided information like partisanship and appointing governor.¹ Once contemporary commissioners were established, I began working backwards through PUC or state government rosters (“blue books”) if available, archived PUC webpages, PUC annual/biennial reports to the legislature, election results, news articles, and, as a last resort, signatures on individual PUC orders across time.

Collecting data on professional backgrounds began with surveying a few states and quickly identifying five common pathways to PUCs: utility regulation, elected office, the utility/energy/telecommunications industry, governors’ personal networks, or working with environmental issues. Utility regulation backgrounds most commonly included working for a PUC or serving on the utility regulation oversight committee in the state legislature. Elected office backgrounds are self-explanatory, but overwhelmingly come from serving in the state legislature with some county and municipal councils and courts.

Coming out of a governor’s personal network is more amorphous, but required some sort of direct personal connection between a commissioner and a governor—usually professional, such as being appointed to the PUC from senior staff or another gubernatorially appointed position like department executive or another statewide commission. Arguably, most appointees to a PUC are somehow connected to a governor’s network for the governor to be aware of them, but this remains a category as many commissioners had these clear and direct connections to a governor and this connection was the most apparent reason for their appointment (and sometimes the only apparent reason). Commissioners matching these backgrounds were usually working directly with or for the governor on a regular basis. There are a few cases of apparent patronage with relatives, family friends, and donors being appointed. Admittedly, there are network connections that may not be as explicit

¹ Proprietary platform free for academic use. <https://powersuite.aee.net/portal>.

to be able to be coded, like members of the legislature who may work with the governor behind the scenes.

Utility industry and environmental backgrounds are particularly interesting. These two categories were further subdivided into three sub-categories each. General utility industry backgrounds are derived from working in a for-profit private sector position in or adjacent to the industries regulated by the PUC, like general counsel for a utility. These were secondarily coded as being connected to the fossil fuel industry, working for an electric utility, or for another type of utility (water or telecommunications). As discussed previously, electric utilities have heterogeneous preferences for climate policies [8], whereas it can be expected that fossil fuel industry connections should lead to more explicit disapproval of pro-climate policies.

Environmental backgrounds are established by working in a position that deals with environmental issues. This category was further divided into the sub-categories of environmental government (e.g., working for a state department of natural resources), environmental education (i.e., possessing a degree or having conducted research in an environmental academic field), and finally environmental advocacy or business (e.g., working for environmental non-profit groups, renewable energy developers, chairing a chapter of the Sierra Club). Environmental government positions may have less of an effect on climate policy preferences—even pro-fossil fuel administrations have environmental protection department executives. Conversely, commissioners who chose to work with non-profit environmental advocacy groups or even for-profit renewable energy developers are more likely to have pro-environmental climate policy preferences.

Once the background categories and a coding scheme were established, each commissioner was researched online and it was determined if they met the criteria for each of the five categories (and six sub-categories). It was common for commissioners to have moved between positions in multiple categories or to have held positions that simultaneously satisfied the criteria for multiple backgrounds. Thus, one commissioner may be coded in multiple categories. These five categories are certainly not exhaustive of all of the possible professions held by PUC members. However, they seem to be highly relevant with roughly 90% of the commissioners satisfying the criteria for at least one if not multiple backgrounds.²

The most useful sources were official commissioner biographies on PUC websites (including archived versions) and some have LinkedIn profiles that provided detailed professional histories. Many others have biographies on other professional websites that also cover pre-PUC positions. If backgrounds could not be established through those sources, then general web searches often turned up state news articles discussing appointments/elections and included short biographies that revealed enough information about relevant professional highlights to establish if commissioners met the criteria for each of the five background categories. Through these methods, biographical data was collected for 805 of the 818 commissioners.³

There are important nuances in professional histories that are not captured by this coding scheme. The chronology and time spent at each position may condition effects that professional backgrounds have on regulatory decisions. The most proximate positions and/or those held for the longest period of time prior to selection to a PUC may disproportionately influence commissioner behavior relative to others. For example, a commissioner that begins their career as an analyst at a utility, but then quickly moves to work for a PUC where they ascend

² A detailed coding scheme with examples and a table of selected California commissioners coding decisions are provided in **Appendix A**.

³ There is a small group of commissioners that served multiple non-consecutive terms and are counted multiple times, as their professional experience might have changed between terms (e.g., having previously served on a PUC will grant utility regulation experience for the second non-consecutive term).

the hierarchy to commissioner over decades could be more influenced by pursuing “good regulation” than favoring utilities, compared to a commissioner who had a short PUC career followed by a long utility career prior to appointment. Under the current coding scheme, both of these commissioners meet the criteria for both categories equally. Unfortunately, gathering this additional data effectively requires a full resume, which is not available for most commissioners. While possible for some, this data collection process would be time-intensive and most likely yield uneven, incomplete data. However, the potential theoretical nuances are necessary to recognize, and future research examining the relationship between utility commissioner characteristics and behavior should pursue this further.

Professional histories after sitting on a PUC were also collected for many commissioners. This was simply coded as whether or not a commissioner worked in the private sector in one of the industries regulated by the PUC after leaving the commission. This adds descriptive data to the fifty year-old research program on the revolving door between commissions and the industries they regulate [1–4,21,25,54,55]. Post-PUC data was found for 473 of the 818 commissioners, the decline attributable to many commissioners retiring and/or professionally dropping off of the internet after serving. Of these 473 commissioners, exactly 50% of them worked in or adjacent to the industries they regulated after leaving the PUC. Many of them started their own independent utility consulting/government relations firms, many others took positions like senior counsel or executive vice president at a firm, and some were appointed to more symbolic/hands-off positions like corporate boards. This percentage was higher for appointed commissioners (51%) than for elected commissioners (42%), as many elected commissioners go on to pursue political careers (e.g., U.S. Senator Ben Ray Lujan (D-NM)). Of the commissioners who did not move into the private utility sector after their service, many retired, others stayed in state or local government, some went into academia teaching about utility regulation, energy economics, etc., and others simply returned to their previous profession (e.g., attorney, accountant, engineer), but outside of the utility industry. This data does not immediately facilitate any hypothesis testing about the revolving door, but does indicate that it is certainly present, and more research is warranted in this area.

4. Results

Fig. 1 displays the aggregated proportion of commissioners matching each background category and broken down by their partisanship (1a) and selection method (1b). The most common commissioner background is to have worked with utility regulation (42%), followed by elected office (33%), being a gubernatorial staffer or appointee to another position (30%), the utility/fossil fuel industry (25%), and then the environmental field (19%). Only 10% of commissioners did not match at least one of these categories.⁴

It seems normatively positive that the most common path to a public utility commission is to have previously worked with the regulation of utilities. It also seems positive that this is not a polarized situation, both Democratic (44%) and Republican (40%) commissioners possess this experience in similar levels. In fact, partisanship does not seem to be a determining factor in the background experience of commissioners in most categories: Republicans hold a slight advantage with elected office backgrounds (4% higher), governor’s networks (2% higher), and utility industry experience (3.5% higher)—but overall these are relatively even distributions and none of the differences are statistically significant (Table B1 in the Appendix).

The one category where it is apparent there is a partisan trend is that 30% of Democratic commissioners have environmental backgrounds compared to only 10% of Republican commissioners. This difference

⁴ 84 of the 805 commissioners for which data was found.

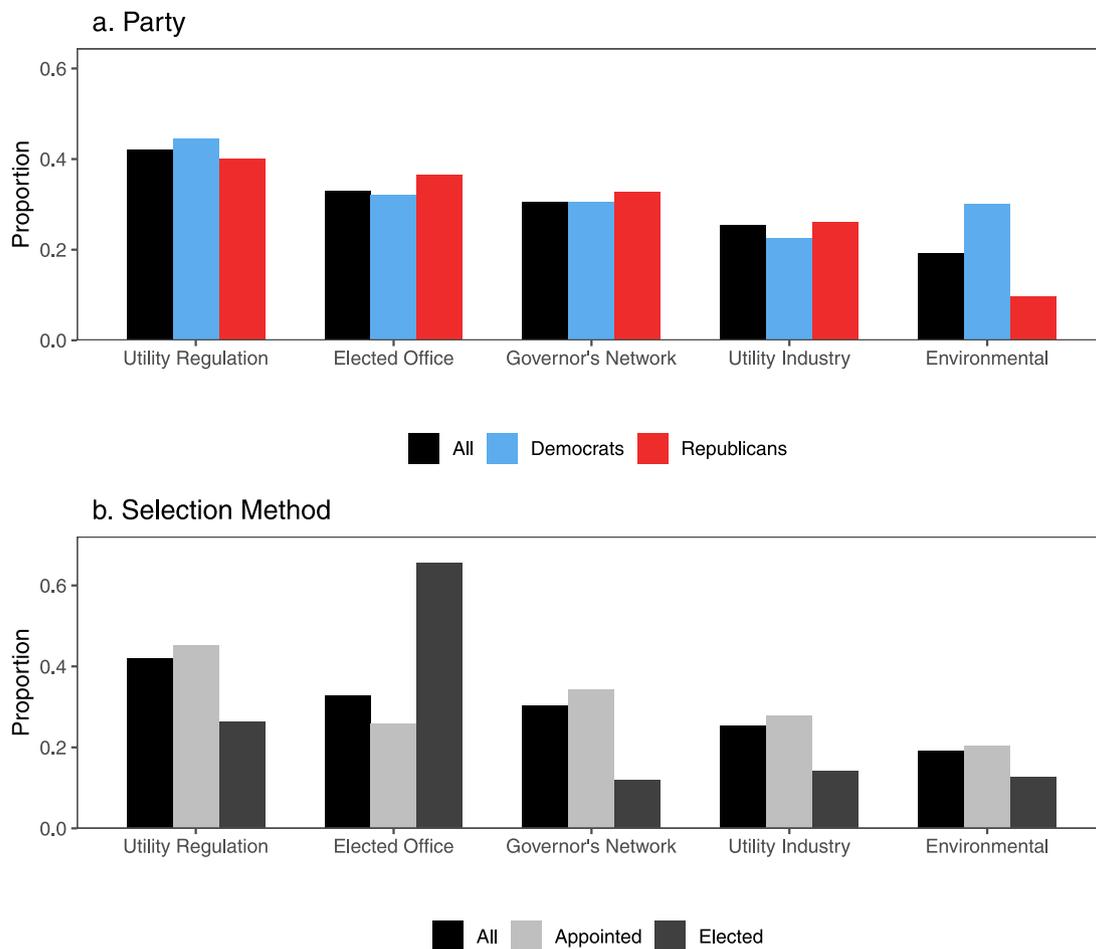


Fig. 1. Background Experience of Public Utility Commissioners separated by party and selection method. n = 663 appointed and 142 elected commissioners from 2000–2020. Many commissioners had background experiences in multiple categories so the total of all categories exceeds 1. Roughly 90% of all 805 commissioners with data match at least one category.

is statistically significant. Intuitively, this makes sense given the energy and environmental policy preferences of each party. Republicans can appoint co-partisans that generally focus on regulation without environmental protection considerations, while it may be a higher priority for Democratic governors. Given the relative similarity across backgrounds between the parties—except for environmental experience—PUC decisions that have environmental implications may be those where partisanship is an important explanatory factor [9].

The selection method of PUCs appears to affect the pool of candidates that emerge to serve on the commission. Fig. 1b shows that much larger disparities are present between commissioners in appointed states versus elected states. The largest difference clearly makes sense: 65% of commissioners in elected states have experience with electoral politics compared to only 26% in just appointed states.⁵ Conversely, elected commissioners are much less likely to come out of a governor's personal network (34% for appointed and 12% for elected commissioners). Being professionally or personally connected to a governor will probably not hurt a campaign for a seat on a PUC (unless the governor is unpopular), but is not nearly as influential as if the governor has the direct authority to appoint a connection.

Relationships with the utility industry and experience with utility regulation are also much lower for elected commissioners. 45% of

appointed commissioners have utility regulation experience compared to only 26% of elected commissioners. 28% of appointed commissioners have worked in the utility industry compared to only 14% of elected. It seems the potential appointees to PUCs are drawn from these pools more extensively than the emerging candidate pool for PUC elections. Even commissioners with elected office backgrounds in appointed states are much more likely to have served on a utility regulation oversight committee in the legislature or to have overseen municipal utilities on a city council. Commissioners in elected states are much more likely to come from general political backgrounds.

This adds a new dimension to the longstanding debate in PUC research on the merits of appointed versus elected commissions. If citizens and other political officials prioritize utility regulators with utility regulation experience, they should prefer appointed PUCs. It is difficult to specify what makes a “good” regulator, however previous utility regulation experience is the most likely path to have cultivated relevant expertise. It is also possible that commissioners coming from the utility industry will be more influenced by industry interests, and a higher proportion of utility industry commissioners are appointed compared to elected. However, the utility industry is active in PUC campaigns, and may actually exert more influence over sitting elected commissioners who need to raise re-election funds compared to those appointed commissioners who previously had, but no longer have, direct ties to the industry they are regulating.

It remains to be tested if these background experiences inform policy outcomes and other important decisions—e.g., staffing and agendas. There are also other areas where selection methods can be connected to

⁵ All of the differences between elected and appointed commissioners are statistically significant, with the exception of the environmental category—the inverse of the differences between the parties (Table B2 in the Appendix).

Table 1
Proportion of commissioners appointed from each background across highest and lowest states.

Utility regulation		Elected office		Governor's network		Industry		Environmental	
ID	0.857	MO	0.600	AR	0.813	CO	0.588	WA	0.556
VT	0.714	ID	0.571	NV	0.667	ME	0.571	OR	0.500
CO/MA	0.706	NJ	0.556	TX	0.667	AK	0.526	HI	0.471
MI/OR	0.667	NC	0.444	KY	0.571	MD	0.520	CA	0.435
OH	0.619	WV	0.417	CA	0.565	OH	0.476	VT	0.429
FL	0.615	OH	0.381	NJ/WA	0.556	MA	0.471	MN/NV	0.333
NY	0.579	IN	0.368	HI	0.529	KS	0.429	NC	0.296
WA	0.556	CT	0.357	CT/NH/RI/UT	0.500	IA	0.412	CO	0.294
WI	0.533	IA	0.353	KS/ME	0.429	PA	0.400	ID/KS	0.286
HI	0.529	MN/OR	0.333	MO/WI	0.400	NY	0.368	NJ	0.278
...
MN	0.333	AK	0.158	MD	0.280	RI	0.200	IA	0.176
AR	0.313	PA	0.150	NY	0.263	FL/WY	0.154	IN	0.158
MO	0.300	ME	0.143	NC	0.259	ID/VT	0.143	IL	0.154
NC	0.296	MI	0.133	OR	0.250	DE	0.125	CT/ME/NH	0.143
KY/ME	0.286	AR	0.125	IA/MA	0.235	IL	0.115	NE/WI	0.133
NE	0.267	WY	0.077	IL	0.231	NJ/WA	0.111	AR	0.125
DE	0.250	MA	0.059	MN	0.190	NC	0.074	AK	0.105
TN	0.235	NV	0.056	CO	0.176	CT	0.071	MO	0.100
RI	0.200	CA	0.043	VT	0.143	AR	0.063	KY/OH	0.095
WV	0.167	TX	0.000	AK/DE/ID/NE	0.000	MO	0.050	DE/TN/TX/UT/WV	0.000

the nascent research on PUCs' roles in addressing climate change—such as the influence of campaign contributions in PUC elections on access, agendas, and policies, as well as the ability of renewable energy and environmental groups to have representation in the process under different selection systems. These are valuable avenues for future research to explore.

5. State-level characteristics

The previous discussion considered commissioners aggregated at the national level, it is also useful to consider state-level characteristics of commissioner backgrounds. Table 1 shows the proportion of commissioners from each background across the top and bottom ten of the 38 appointed states.⁶ It is important to note that some of the states have had relatively few commissioners over the last 20 years (seven, eight, or nine commissioners), while others have had close to 30. As a result, some of the percentages can be heavily influenced by the backgrounds of one or two commissioners in smaller states, while changing one or two commissioners in others would only shift a proportion by .04–.06.

Many states tend to have a dominant path to PUCs. For example, Missouri is the highest elected office background state where former elected officials (primarily state legislators) are appointed about 60% of the time. Conversely, Missouri is in the bottom ten states for utility regulation and environmental backgrounds, and the bottom state in utility industry backgrounds. Colorado is the state with the highest proportion of commissioners from the utility industry and the third highest state for utility regulation. However, it is also in the bottom ten states for appointees coming out of the governor's administration.

Appointment cultures can shift within states over time based on the preferences of the governor or some other shock to the system. In California, two of the three Pete Wilson (R) appointees who remained on the commission into the 2000s did not match any of the five common background categories (compared to about one out of ten nationally). Then, four out of five Grey Davis (D) appointees reached the PUC primarily through Davis' personal network, only the fifth appointee had utility regulation experience. Arnold Schwarzenegger (R) had three out of five appointees with utility regulation experience, four out of five with private industry experience, and only one out of the five came

from his direct network. Then an environmental shift took place and 63% of Jerry Brown's (D) appointees had environmental backgrounds compared to only 23% of the appointees from the previous three governors. 63% also came out of Jerry Brown's network compared to 20% of Schwarzenegger's. Only 20% had industry backgrounds relative to 80% of Schwarzenegger's.

California serves as an example of governors having PUC appointment tendencies rather than an overarching state norm, but there are also states with relatively constant cultures. In Arkansas, across the previous three governors the proportion of commissioners appointed out of the governor's network (generally former senior staffers) are 83%, 80%, and 75% (through 2020). In Missouri, previous governors have appointed commissioners with elected office backgrounds 80%, 67%, and 100% (through 2020) of the time.

Focusing events can also shift appointment culture. From the early-1990s until 2009, 75% of Florida's public utility commissioners had utility regulation experience—most of them were PUC staffers who were elevated to commissioner. A series of scandals in the late-2000s brought negative attention to the Florida PUC due to reported unethical connections between commissioners, PUC staff, and members of the regulated utilities. Governor Crist (R) forced the resignation of multiple commissioners and appointed two who did not match any of the five common commissioner background categories used in this analysis (a newspaper editor and a county government accountant). This was done purposively to reduce any potential connections between commissioners and the utility industry.⁷ Since those appointments, the proportion of commissioners with utility regulation experience has decreased from 75% to 40%, and none of those with utility regulation experience were from the PUC itself—instead from the legislature's utility regulation committee, city councilors with municipal utility regulation experience, and an assistant attorney general for utility issues.

When a governor has the opportunity to fill an open seat on a public utility commission they will likely fall into one of a few categories on the pool of candidates they will consider. In some states, there are long-standing norms that point the governor towards potential appointee pools durable across administrations. In other states, there is no long-standing norm, but instead each governor appears to have appointment preferences. Finally, there is a category of states where there is not a clear appointment norm or even within-governor trends. Governors in

⁶ This information is presented graphically for all 50 states in Appendix A. Elected PUC states are omitted from Table 1 for space, and their distinctive distribution would take up many of the top and bottom positions in most categories.

⁷ Troxler, Howard. 2009. "NOT ONE OF THE USUAL SUSPECTS FOR PSC". *Tampa Bay Times*. December 31. <https://www.tampabay.com/archive/2009/11/05/not-one-of-the-usual-suspects-for-psc/>.

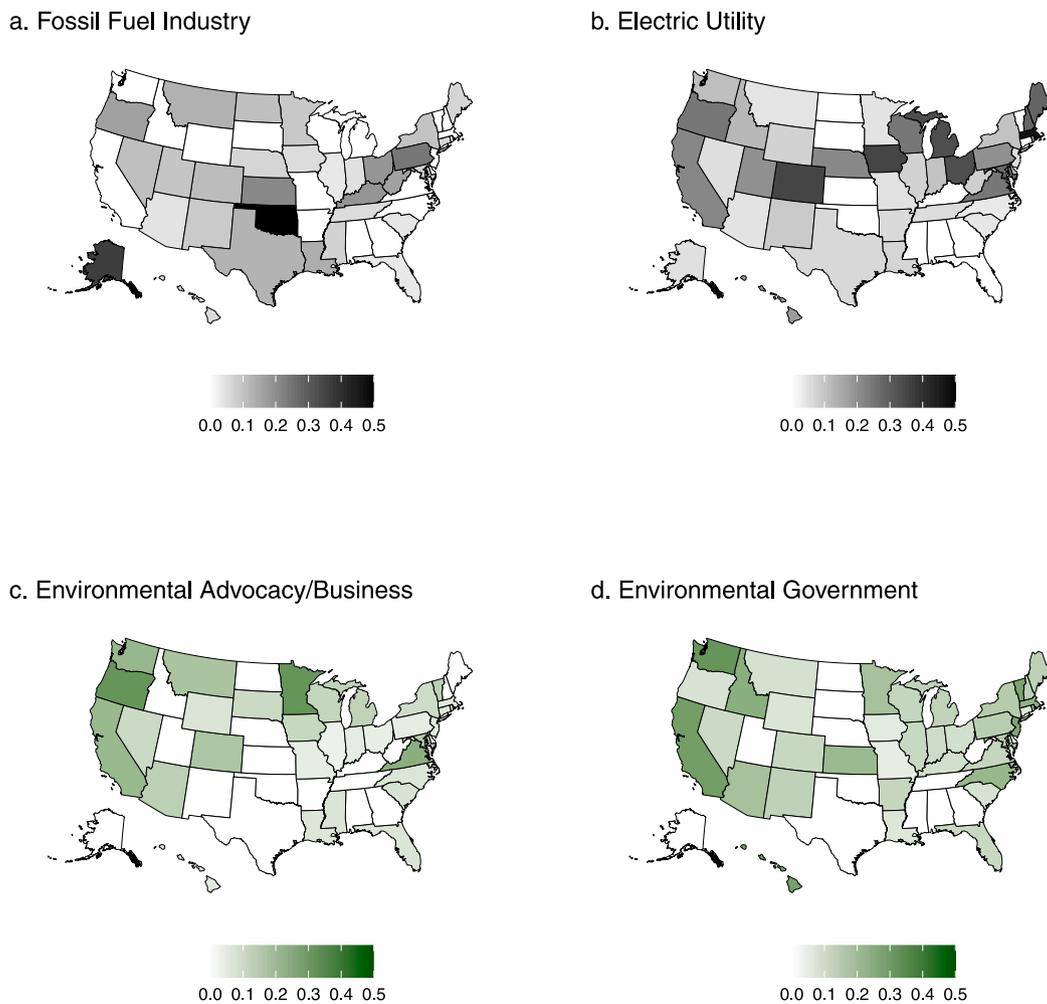


Fig. 2. Proportion of Commissioners with Utility Industry and Environmental Background Sub-Categories Across States, 2000–2020.

these states appoint commissioners from a variety of backgrounds—likely just reviewing available candidates whenever there is an opening and taking the decision on an appointment-by-appointment basis.

6. Utility industry and environmental backgrounds

Of the five categories used in this analysis, there are no *prima facie* expectations for how elected office and governor’s network backgrounds would influence the policy preferences and behavior of public utility commissioners. Both categories differ from the other three in that they are just general characterizations of a commissioner’s prior employment that may involve heterogeneous areas of experience or specializations unrelated to utility issues. The narrow focus of utility regulation backgrounds suggests a familiarity, if not expertise, in the proceedings of PUCs, but are more neutral in their expected effects on ideology.

Utility industry and environmental backgrounds are the categories most likely to have a substantive impact on climate policy outcomes. As discussed earlier in the paper, the representation of utility interests through prior employees serving on regulatory commissions leads to policy outcomes that more frequently favor the industry [1–4]. Commissioners with environmental protection and renewable energy experience may be similarly affected by the preferences of the interests with which they previously worked, or it may be a less conscious but more consistent sampling of environmental considerations in regulatory decisions that other commissioners do not possess [13]. As such, this final empirical section gives greater attention to the proportion of

commissioners with utility industry and environmental professional backgrounds across states and time, the influence of governors and other state-level characteristics on their appointment, and highlights some general conclusions that may stimulate future research.

Fig. 2 maps the proportion of commissioners in each state with the two most theoretically interesting industry and environmental background sub-categories across states aggregated from 2000 to 2020. Fig. 2a and b show the proportion of commissioners with direct professional connections to the fossil fuel industry and electrical power utilities. Fossil fuel backgrounds are more common in areas that have stronger fossil fuel industry ties—Alaska, Oklahoma, Kansas, Texas, Louisiana, Kentucky, Ohio, West Virginia, and Pennsylvania. There is some difference with states that have greater electric utility connections, with California, Colorado, Iowa, Michigan, Wisconsin, and much of New England having higher proportions without many ties to the fossil fuel industry. This is an important finding considering the heterogeneous positions of utilities on decarbonization and other climate change issues. Fossil fuel connections may be more uniformly opposed to aggressive climate change mitigation actions, while electric utility connections may be more ambiguous.

Fig. 2c and d show the geographic distribution of the environmental background sub-categories of non-profit environmental advocacy/for-profit green business (e.g., renewable energy development) and commissioners that held government positions with an environmental purview. Industry and environmental background distributions are not perfectly inverse (nor should that necessarily be expected). A few states—Alaska, Ohio, and Iowa—are in the top ten states for overall

industry backgrounds and bottom ten for environmental. Generally, the fossil fuel producing Southern Plains and Appalachian coal producers exhibit the expected relationship with high fossil fuel industry shares and virtually no environmental advocacy/business. However, in some states there are substantial representation of both backgrounds. Colorado has the highest proportion of commissioners with connections to the utility industry, and the eighth highest proportion of environmental commissioners. The Colorado PUC has pursued exceptionally progressive environmental and climate change policies during the last 15 years.⁸

To systematically test the potential drivers of the utility industry and environmental composition of PUCs, a series of two-way fixed effect dynamic panel models were estimated similar to those used by De Boef and Keele (2008) [56]. The models regressed the proportion of commissioners with industry and environmental backgrounds (and the three sub-categories of each) in a given year on the party of the governor. Leveraging the panel structure of the data, the two-way fixed effects account for time-invariant confounders between states and the variation attributable to temporal forces affecting all units similarly (e.g., global market conditions, economic recessions, federal energy subsidies, a global pandemic). The dynamic panel models include a lagged dependent variable that controls for time-varying confounders and potential autocorrelation in the outcome [56]. Robust standard errors were clustered at the state level.

A series of time-varying control variables were included to test other characteristics of states potentially related to PUC appointments. First, original ideal points for all energy and environmental roll-call votes for members of Congress were estimated from 2000 to 2020. This was done using dynamic item response theory scaling (IRT) similar to Bergquist and Warshaw (2020) [53]. The IRT scores arrange all members of Congress on a one-dimensional spectrum from the most liberal to most conservative based on their weighted voting histories. These scores were averaged for the members of Congress in each state in each year as a rough proxy for the environmental policy preferences of the state—higher values equal more conservative voting. Second, the proportion of jobs attributable to the fossil fuel industry in a given state-year, collected from Census Bureau North American Industry Classification System (NAICS) employment data, was used to capture the strength of fossil fuel interests in a state past generation portfolio. Third, similarly, the proportion of a state's generation capacity attributable to fossil fuels was included. Fourth, legislative professionalization was included to account for potentially different appointment cultures within states and available resources. Finally, the total revenues that electrical power utilities received from all customer classes measures the relative influence of utilities based on the resources they may have available to devote to regulatory affairs, lobbying, and other activities.

Ultimately, no substantively significant effects were found for either industry or environmental background outcomes across the models. As shown in **Tables B3 and B4** in the Appendix, the only statistically significant relationship is that Democratic governors are associated with an increase in commissioners with environmental advocacy/green business experience. This aligns with the theoretical predictions of the study. However, the magnitude of this effect is a 1.7% shift in the composition of the commission. This is a fraction of one seat on even one of the rare seven member commissions, and the effect is much smaller than the effect of Democratic governors on the proportion of commissioners that are Democrats (20% or roughly one seat on a five

member commission) [9]. Further, this result does not hold up to more rigorous testing with PanelMatch estimation [57] (Figure B1).⁹ There are no expected relationships between any of the independent variables and industry backgrounds.

The models were also broken out into regulated states with vertically integrated utilities that possess generation portfolios and states with deregulated utilities. The significant relationship between Democratic governors and increased environmental advocacy appointments appears to be driven by vertically integrated states. Theoretically, governors may view these appointments as more valuable for PUCs that make more decisions related to generation sources. However, similar to the primary model the effect size is 1.7%. In deregulated states there is a negative relationship between Democratic governors and proportions of “other” utility industry appointments. Though again, the small effect size of a 2.6% shift in commission composition indicates this is not substantively meaningful, and this outcome is of lesser theoretical interest.

Democratic governors do not seem to prioritize environmental experience for public utility commissioners. Similarly, they do not appear to significantly move away from utility industry candidates. Using the measures described above, there are no expected substantively significant influences of the environmental ideology, the strength of the utility and energy industries, or government professionalism on the selection of commissioners across the subcategories of background dependent variables. The full context of commissioner selection is expected to be complex and difficult to capture with large-n quantitative methods. The party and energy policy preferences of the governor, combined with the preferences of the legislature, strength of utilities and energy generators and their preferences and strategies (which are challenging to fully assess [8]), and public demand for action on climate change all likely combine to exert intricate influences on the appointment process and elections for public utility commissioners in the rapidly developing context of their role in climate change mitigation. This is an area where additional data collection and improved modeling combined with qualitative approaches should be able to illuminate more of the forces that may be driving energy policymaking across the states.

6.1. Changes in backgrounds over time

Aggregating backgrounds across all years hides interesting temporal variation. Four of the five categories have seen substantial shifts from 2000 to 2020. **Fig. 3a** shows that experience with utility regulation is the highest category in all years, and the number of commissioners with this experience has increased from about one in three in 2000 to one in two by 2020. Again normatively positive, not only is this the highest category, but an increasing percentage of commissioners are being selected that have direct familiarity with utility regulation. It is a proposition that should be empirically tested, but regulators with regulatory experience might be expected to make “better” decisions and decrease the influence of external actors (e.g., the utility industry). As the proportion of PUC members with this experience increases, outcomes such as electrical power reliability may improve. Elected office largely remains constant. The governor's personal network (e.g., former senior staffers, appointed department heads, in a few cases seemingly unqualified relatives and donors, etc.) is the only category that has decreased during the time period.

The number of commissioners that have worked for the industries they are now regulating has almost doubled from 15% to 28%. Discussed earlier, the industry capture literature has generally found industry background regulators more frequently rule in favor of their previous employers [1–4]. Breaking industry backgrounds down by sub-category in **Fig. 3b**, electric utility backgrounds have increased from 7.5% to 14%, while fossil fuel industry backgrounds increased

⁸ Order C07-0829, Sept. 28, 2007, overhauled the long-term resource planning process and prioritized renewable energy and energy efficiency resources over the “lowest cost” (generally fossil fuel) options prioritized in most states. Order C10-1330. Dec 15, 2010, established major NO_x emission reductions that resulted in a transition away from coal towards natural gas and significantly more renewable energy development. Since 2010 their renewable energy development has tripled (EIA State Profile).

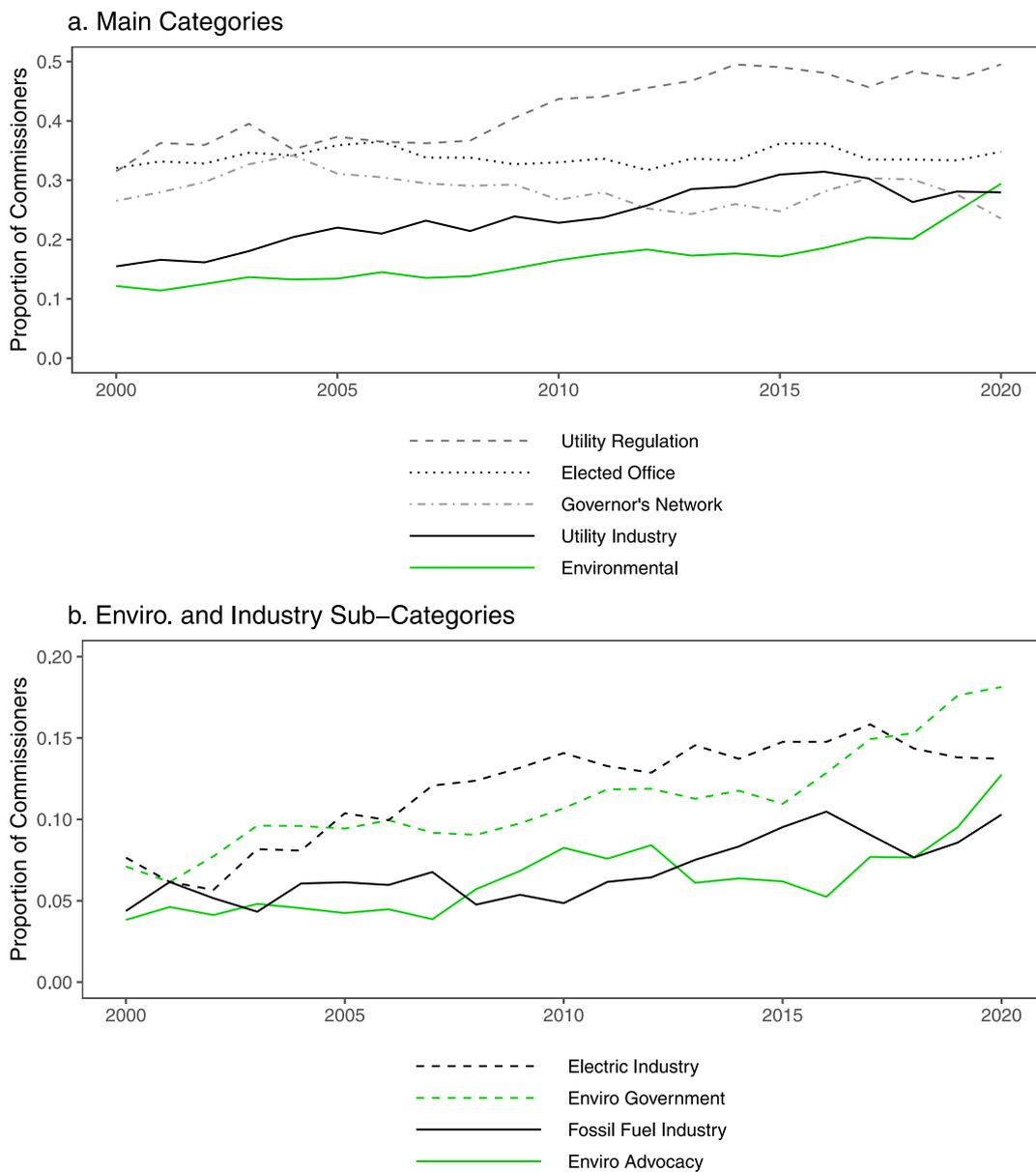


Fig. 3. Changes in Background Categories Over Time, 2000–2020. Environmental backgrounds have more than doubled and grown the most rapidly. The subcategories show that environmental government and advocacy/business experience have overtaken electric utility and fossil fuel industry connections, respectively.

from 4% to 10% (though, not pictured, water and telecommunications connections decreased from a peak of 13% in 2014 to its original 6%).

As the pace of the decarbonization transition quickens to address climate change, utilities may be placing higher value in having actors more sympathetic to the status-quo of large, centralized, primarily fossil fuel generation sources that utilities can maintain in their rate-base to earn more revenue, as well as advance their opposition to the expansion of solar energy and distributed generation [5–8,33]. The research program on the environmental policy decisions of PUCs is still nascent, but closer scrutiny of the potential for utility and fossil fuel industry capture of climate change regulations is warranted to determine potential sources of obstruction through increased industry representation on PUCs.

The number of commissioners that have previously worked with environmental issues has more than doubled from 12% in 2000 to

29% in 2020. This has been the most rapidly increasing category in recent years—jumping over 12% from 2015 to 2020 and 9% from 2018 to 2020. Environmental policymaking is not one of the traditional roles of PUCs. They have primarily been tasked with ensuring reliable electrical power service, at the lowest rates to consumers, with a reasonable return on investment to utilities. PUCs are much more frequently engaging with renewable energy, distributed generation, smart grid development, and other issues with significant connections to climate change and the environment. PUCs have become de facto environmental policymaking venues with these additional responsibilities “layered on” to their traditionally non-environmental mission [58]. The sub-category growth has occurred in environmental advocacy (9% increase, 6% since 2015) and environmental government (11%, 8% since 2015). Environmental government is now the highest of these six sub-categories, overtaking electric utilities. Environmental advocacy is the third highest, surpassing fossil fuel industry backgrounds in 2018 and was only 1% behind electric utilities in 2020.

⁹ Full regression results for all models are available in Appendix B, including fractional response regression and PanelMatch [57] robustness tests.

Parallel to the theory that increased policy demand from the utility and fossil fuel industries may have increased the selection of commissioners with utility industry experience, growing demand for climate change responses¹⁰ and the burgeoning recognition of PUCs as potential institutions to adopt significant climate change regulations [59,60] has plausibly led to the greatly increasing selection of commissioners who can approach decisions with more relevant experience. Governors, legislatures, and other stakeholders might be recognizing the value of environmental perspectives in utility regulation that has long been dominated by more technocratic and formulaic approaches to setting rates, selecting generation sources, and directing regulatory and technological innovation. It is difficult to claim with certainty given these relatively recent developments, but if there is an institutionalization of PUCs as environmental policymakers, they will only become more valuable for understanding potential pathways for addressing climate change and limiting obstruction from interests that have a stake in maintaining the status quo.

7. Conclusions

Expansive original data collection shows that the most common path to a PUC is to have utility regulation experience (about 42% of all commissioners from 2000 to 2020), followed by elected office, governors' personal networks, the utility industry, and finally experience working with environmental issues. Only 10% of the over 800 commissioners did not have experience in one of these broad categories.

There is little difference in the share of commissioners from each background between the two parties. The one exception is environmental protection, where Democrats possess that experience significantly more frequently than Republican commissioners. If professional backgrounds are representative of the types of individuals that emerge to serve on PUCs (similar to Thompson (2019) [61]), then commissioners from both parties may make most decisions similarly. Possibly with the exception of issues that have more direct environmental implications.

While the background characteristics of utility commissioners do not vary much between the parties, the institutions that determine how they are selected do matter. Commissioners that are directly elected by the public tend to come from general political backgrounds, and are more likely to continue on that path after PUC service. Commissioners that are appointed by governors come from a more diverse array of utility regulation, industry, elected office, and government service backgrounds, and the majority are expected to pass through the revolving door to work in or adjacent to the industries they were regulating once they leave the public sector.

The appointment of commissioners with utility regulation, utility industry, and environmental experience have all increased from 2000 to 2020—with environmental appointments increasing the most during the previous five years. It could not be established that the partisanship of the governor, the utility and energy industries, and other state characteristics significantly affect the selection of commissioners with environmental or utility industry backgrounds. However, the aggregate trends suggest the rapid changes to the electrical power system in the face of climate change may be precipitating an improved recognition from stakeholders on both sides of the transition that PUCs are going to be central actors in decarbonization, the expansion of distributed generation, and other avenues to stem climate change. This may be leading to the increased selection of utility industry and environmental commissioners, and may situate PUCs to be increasingly contentious sites of environmental policymaking in the coming decades. More work

¹⁰ Tyson, Alec and Brian Kennedy. 2020. "Two-Thirds of Americans Think Government Should Do More on Climate". *Pew Research Center*. <https://www.pewresearch.org/science/2020/06/23/two-thirds-of-americans-think-government-should-do-more-on-climate/>.

is needed to understand the determinants of these crucial public utility commissioners selection decisions.

This paper has presented novel, expansive data on the professional characteristics of U.S. state public utility commissioners. The descriptive analyses presented here have revealed interesting trends that can inform our understanding of the pool of candidates that emerge for election and gubernatorial appointment to PUCs, the revolving door in regulatory institutions, and the evolving role of PUCs in environmental policymaking. This study is limited in only considering one characteristic of public utility commissioners, and doing so by merely placing commissioners dichotomously into broad categories. Factors like partisanship [1,9,10], age, gender, race/ethnicity, and others potentially explain variation in the behavior of PUCs. Heern (2022) [9] found that partisanship influences the environmental policy outcomes of PUCs: Democratic PUCs issue slightly more pro-environmental orders per year and Democratic commissioners individually vote more liberally/pro-environmentally than Republicans. However, the influence is not as clearly defined as in legislatures and other institutions. It is expected that other commissioner-level characteristics—like industry or environmental experience, commission-level characteristics—like professionalism, staff, and authorizing statutes, and conditions surrounding the PUC-like legislatures and interest groups—all contribute to PUC environmental policy outcomes.

These data and analyses should stimulate increased scholarly attention to PUCs, utilities, other adjacent political institutions and stakeholders, and the policies that are adopted by PUCs with implications for climate change. Under certain conditions, both endogenous and exogenous, PUCs could significantly facilitate or hinder efforts to address anthropogenic climate change. Understanding these conditions is a crucial research task that can also inform our understanding of energy and environmental politics and regulatory policymaking more broadly.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.erss.2023.103091>.

References

- [1] J.E. Cohen, *The dynamics of the revolving door on the FCC*, *Am. J. Political Sci.* 30 (1986) 689–708.
- [2] W.T.J. Gormley, *A test of the revolving door hypothesis at the FCC*, *Am. J. Political Sci.* 23 (1979) 665–683.
- [3] H. Tabakovic, T.G. Wollmann, *From Revolving Doors to Regulatory Capture? Evidence from Patent Examiners*, National Bureau of Economic Research, 2018, <http://www.nber.org/data-appendix/w24638>.
- [4] S. Yates, É. Cardin-Trudeau, *Lobbying from within: A new perspective on the revolving door and regulatory capture*, *Can. Public Adm.* 64 (2021) 301–319.
- [5] R.J. Brulle, *The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016*, *Clim. Change* 149 (2018) 289–303, <http://dx.doi.org/10.1007/s10584-018-2241-z>.
- [6] S. Eun Kim, J. Urpelainen, J. Yang, *Electric utilities and American climate policy: lobbying by expected winners and losers*, *J. Public Policy* 36 (2016) 251–275, <http://dx.doi.org/10.1017/S0143814X15000033>.
- [7] T. Culhane, G. Hall, J.T. Roberts, *Who delays climate action? Interest groups and coalitions in state legislative struggles in the United States*, *Energy Res. Soc. Sci.* 79 (2021) <http://dx.doi.org/10.1016/J.ERSS.2021.102114>.

- [8] J.A. Basseches, R. Bromley-Trujillo, M.T. Boykoff, T. Culhane, G. Hall, N. Healy, D.J. Hess, D. Hsu, R.M. Krause, H. Prechel, J.T. Roberts, J.C. Stephens, Climate policy conflict in the U.S. states: a critical review and way forward, *Clim. Change* 170 (2022) <http://dx.doi.org/10.1007/s10584-022-03319-w>.
- [9] J. Heern, *Partisanship and the Environmental Policy Decisions of State Public Utility Commissions and Implications for Climate Change* (Doctoral Dissertation), George Washington University, 2022.
- [10] W.T.J. Gormley, *The Politics of Public Utility Regulation*, University of Pittsburg Press, 1983.
- [11] P.P. Balestrini, How citizens' education, occupation, personal economic expectations and national identity interact with one another to sway public opinion on the EU, *Swiss Political Sci. Rev.* 18 (2012) 371–384, <http://dx.doi.org/10.1111/J.1662-6370.2012.02068.X>.
- [12] H. Kitschelt, P. Rehm, Occupations as a site of political preference formation, *Comp. Political Stud.* 47 (2014) 1670–1706, <http://dx.doi.org/10.1177/0010414013516066>.
- [13] J.R. Zaller, *The Nature and Origins of Mass Opinion*, Cambridge University Press, 1992.
- [14] N. Carnes, Does the numerical underrepresentation of the working class in congress matter? *Legis. Stud. Q.* 37 (2012) 5–34, <http://dx.doi.org/10.1111/J.1939-9162.2011.00033.X>.
- [15] J.M. Grumbach, Does the American dream matter for members of congress? Social-class backgrounds and roll-call votes, *Political Res. Q.* 68 (2015) 306, <https://journals.sagepub.com/doi/pdf/10.1177/1065912915572902>.
- [16] T. O'Grady, Careerists versus coal-miners: Welfare reforms and the substantive representation of social groups in the british labour party, *Comp. Political Stud.* 52 (2019) 544–578, <http://dx.doi.org/10.1177/0010414018784065>.
- [17] T. Makse, Professional backgrounds in state legislatures, 1993–2012, *State Politics Policy Q.* 19 (2019) 312–333, <http://dx.doi.org/10.1177/1532440019826065>.
- [18] B. Burden, *Personal Roots of Representation*, Princeton University Press, 2007.
- [19] S. Borwein, Do ministers' occupational and social class backgrounds influence social spending? 2021, <http://dx.doi.org/10.1080/21565503.2020.1854792>.
- [20] A.P. Harris, M. Sen, Bias and Judging, 22 (2019) 241–259. <http://dx.doi.org/10.1146/annurev-polisci-051617-090650>.
- [21] E. Dal Bó, Regulatory capture: A review, *Oxf. Rev. Econ. Policy* 22 (2006) <http://dx.doi.org/10.1093/oxrep/grj013>.
- [22] S. Hong, J. Lim, Capture and the bureaucratic mafia: does the revolving door erode bureaucratic integrity? *Public Choice* 166 (2016) 69–86, <http://dx.doi.org/10.1007/s11127-016-0315-x>.
- [23] S. Gailmard, J.W. Patty, *Learning While Governing Expertise and Accountability in the Executive Branch*, University of Chicago Press, 2012.
- [24] D.E. Lewis, Testing pendleton's premise: Do political appointees make worse bureaucrats? *J. Politics* 69 (2007) 1073–1088, <http://dx.doi.org/10.1111/j.1468-2508.2007.00608.x>.
- [25] D.J. Salant, *Behind the revolving door: A new view of public utility regulation*, *Rand J. Econ.* 26 (1995) 362–377.
- [26] J. Brehm, J.T. Hamilton, Noncompliance in environmental reporting: Are violators ignorant, or evasive, of the law? *Am. J. Political Sci.* 40 (1996) 444, <http://dx.doi.org/10.2307/2111632>.
- [27] D. Carpenter, G.A. Krause, Transactional authority and bureaucratic politics, *J. Public Adm. Res. Theory* 25 (2015) 5–25, <http://dx.doi.org/10.1093/jopart/muu012>.
- [28] V.L. Nielsen, C. Parker, Testing responsive regulation in regulatory enforcement, *Regul. Gov.* 3 (2009) 376–399, <http://dx.doi.org/10.1111/j.1748-5991.2009.01064.x>.
- [29] M.T. Law, C.X. Long, Revolving door laws and state public utility commissioners, *Regul. Gov.* 5 (2011) 405–424, <http://dx.doi.org/10.1111/J.1748-5991.2011.01119.X>.
- [30] S. Hong, T.K. Kim, Regulatory capture in agency performance evaluation: industry expertise versus revolving-door lobbying, *Public Choice* 171 (2017) 167–186, <http://dx.doi.org/10.1007/s11127-017-0402-7>.
- [31] Y. Zheng, J. Stanton, A. Ramnarine-Rieks, J. Dedrick, Proceeding with caution: Drivers and obstacles to electric utility adoption of smart grids in the United States, *Energy Res. Soc. Sci.* 93 (2022) 102839, <http://dx.doi.org/10.1016/J.ERSS.2022.102839>.
- [32] D. Gray, D. Bernell, Tree-hugging utilities? The politics of phasing out coal and the unusual alliance that passed oregon's clean energy transition law, *Energy Res. Soc. Sci.* 59 (2020) 101288, <http://dx.doi.org/10.1016/J.ERSS.2019.101288>.
- [33] L. Guliasi, Toward a political economy of public safety power shutoff: Politics, ideology, and the limits of regulatory choice in california, *Energy Res. Soc. Sci.* 71 (2021) 101842, <http://dx.doi.org/10.1016/J.ERSS.2020.101842>.
- [34] D. Bidwell, The role of values in public beliefs and attitudes towards commercial wind energy, *Energy Policy* 58 (2013) 189–199, <http://dx.doi.org/10.1016/j.enpol.2013.03.010>.
- [35] N. Cass, G. Walker, Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects, *Emot. Space Soc.* 2 (2009) 62–69, <http://dx.doi.org/10.1016/j.emospa.2009.05.006>.
- [36] J. Barry, Cool rationalities and hot air: A rhetorical approach to understanding ddebates on renewable energy, *Glob. Environ. Politics* 8 (2008) 67–98.
- [37] E. Tvinnereim, E. Ivarsflaten, Fossil fuels, employment, and support for climate policies, *Energy Policy* 96 (2016) 364–371, <http://dx.doi.org/10.1016/j.enpol.2016.05.052>.
- [38] S.E. Atkinson, C. Nowell, Explaining regulatory commission behavior in the electric utility industry, *South. Econ. J.* 60 (1994) 634–643, <http://dx.doi.org/10.2307/1060572>.
- [39] G.L.F. Holburn, P.T. Spiller, Interest Group Representation in Administrative Institutions: The Impact of Consumer Advocates and Elected Commissioners on Regulatory Policy in the United States, *University of California Energy Institute*, 2002, <https://escholarship.org/uc/item/5cg3d8q0>.
- [40] S. Ka, P. Teske, Ideology and professionalism: Electricity regulation and deregulation over time in the American states, *Am. Politics Res.* 30 (2002) 323–343, <http://dx.doi.org/10.1177/1532673X02030003006>.
- [41] T. Besley, S. Coate, Elected versus appointed regulators: Theory and evidence, *J. Eur. Econom. Assoc.* 1 (2003) 1176–1206.
- [42] S. Parinandi, M.P. Hitt, How politics influences the energy pricing decisions of elected public utilities commissioners, *Energy Policy* 118 (2018) 77–87, <http://dx.doi.org/10.1016/j.enpol.2018.03.044>.
- [43] K.W. Costello, Electing regulators: The case of public utility commissioners, *Yale J. Regul.* 83 (1984) 83–105.
- [44] R.J. Cavazos, The political economy of electricity deregulation: Appointed vs. elected utility commissioners, *Rev. Policy Res.* 20 (2003) 255–262, <http://dx.doi.org/10.1111/1541-1338.t01-1-00005>.
- [45] J.A. Sautter, K. Twaite, A fractured climate? The political economy of public utility commissions in an age of climate change, *Electr. J.* 22 (2009) 68–76, <http://dx.doi.org/10.1016/j.tej.2009.05.010>.
- [46] L. Stokes, *Regulatory capture thwarts feedback*, in: *Short Circuiting Policy*, Oxford University Press, 2020, p. 164, <http://dx.doi.org/10.1093/oso/9780190074265.001.0001>.
- [47] H. Yi, R.C. Feiock, Renewable energy politics: Policy typologies, policy tools, and state deployment of renewables, *Policy Stud. J.* 42 (2014) 391–415, <http://dx.doi.org/10.1111/psj.12066>.
- [48] J.T. Carmichael, R.J. Brulle, Environmental Politics Elite cues, media coverage, and public concern: an integrated path analysis of public opinion on climate change, 2001–2013, *Environ. Politics* 26 (2016) 232–252, <http://dx.doi.org/10.1080/09644016.2016.1263433>.
- [49] R.E. Dunlap, A.M. McCright, J.H. Yarosh, The political divide on climate change: Partisan polarization widens in the U.S., *Environ.: Sci. Policy Sustain. Dev.* 58 (2016) 4–23, <http://dx.doi.org/10.1080/00139157.2016.1208995>.
- [50] S.E. Kim, J. Urpelainen, The polarization of American environmental policy: A regression discontinuity analysis of senate and house votes, 1971–2013, *Rev. Policy Res.* 34 (2017) 456–484, <http://dx.doi.org/10.1111/ropr.12238>.
- [51] A. Mayer, Partisanship, politics, and the energy transition in the United States: A critical review and conceptual framework, *Energy Res. Soc. Sci.* 53 (2019) 85–88, <http://dx.doi.org/10.1016/J.ERSS.2019.02.022>.
- [52] P. Bergquist, D.M. Konisky, J. Kotcher, Energy policy and public opinion: patterns, trends and future directions, *Prog. Energy* 2 (2020) 032003, <http://dx.doi.org/10.1088/2516-1083/ab9592>.
- [53] P. Bergquist, C. Warsaw, Elections and parties in environmental politics, in: D. Konisky (Ed.), *Handbook on U.S. Environmental Policy*, Edward Elgar Publishing, Cheltenham, UK, 2020.
- [54] P. Gabel, G.N. Swartz, R.D. Zeitlin, Utility rates, consumers, and the New York state public service commission, *Albany Law Rev.* 39 (1975) 707, <http://dx.doi.org/10.3868/s050-004-015-0003-8>.
- [55] P.L. Joskow, Inflation and environmental concern: Structural change in the process of public utility price regulation, *J. Law Econ.* 17 (1974) 291–327.
- [56] S. De Boef, L. Keele, Taking time seriously, *Am. J. Political Sci.* 52 (2008) 184–200, <http://dx.doi.org/10.1111/j.1540-5907.2007.00307.x>.
- [57] I.S. Kim, A. Rauh, E. Wang, K. Imai, PanelMatch: Matching methods for causal inference with time-series cross-sectional data, 2021.
- [58] M. Mildemberger, The development of climate institutions in the United States, *Environ. Politics* 30 (2021) 71–92, <http://dx.doi.org/10.1080/09644016.2021.1947445>.
- [59] W. Boyd, Public utility and the low-carbon future, *UCLA Law Rev.* 61 (2014) 1614, <http://dx.doi.org/10.3868/s050-004-015-0003-8>.
- [60] W. Boyd, A.E. Carlson, Accidents of federalism: Ratemaking and policy innovation in public utility law, *UCLA Law Rev.* 63 (2016) 810.
- [61] D.M. Thompson, How partisan is local law enforcement? Evidence from sheriff cooperation with immigration authorities, *Am. Political Sci. Rev.* (2019) 222–236, <http://dx.doi.org/10.1017/S0003055419000613>.