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Who delays climate action? Interest groups and coalitions in state legislative struggles in the United States

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ABSTRACT

Gridlock and rollback in Washington have led to a turn to the states for action on climate change in the U.S. The state of Massachusetts presents a particularly puzzling case, since it was an early leader with binding emissions targets, but the succeeding dozen years saw most ambitious efforts stalled or watered down. We collected 1187 pieces of legislative testimony, 4126 reported lobbying visits, and interviews with and input from over fifty experts. Based on their lobbying reports and testimony in legislative hearings, we systematically characterize the legislative interests of nine main coalitions engaged in Massachusetts energy politics. We find that climate and clean energy advocates have few reliable allies and face four coalitions of opponents from the utilities, real estate, power generators, and fossil fuel and chemical industries. Our analysis indicates the central role utilities play in blocking the most ambitious clean energy legislation, and how they remodel those bills that survive the process into forms favorable to their interests.

1. Introduction: "Half measures and timidity"

As the 2018 Massachusetts state legislative session came to a close, prominent advocates registered their disappointment at the sparse attention paid to climate change. Leaders of the environmental groups Clean Water Action and Toxics Action Center protested that the legislature and the Governor had passed up another chance to expand renewable energy and block new fossil fuel infrastructure [1]. Emily Norton, then the Executive Director of the Massachusetts Sierra Club, argued that "[t]he world needs Massachusetts to be leading the transition to a clean energy economy, and instead we are offering half measures and timidity… Beacon Hill has sided with the status quo of fossil fuel and utility companies, over the innovation of clean energy and high tech economies" [2].

Even as the science of climate change becomes more precise and urgent [3,4], federal energy policy has been in a virtual stalemate for three decades, due in part to the waves of lobbying, public relations, and campaign contributions that ramp up every time new regulations appear possible [5–8]. Gridlock in Washington has made states critical battlegrounds for climate action, especially after the Senate failed to ratify the 1997 Kyoto Protocol and President Bush withdrew the U.S. from the agreement [9–12]. Promising initial clean energy policies passed in several states, but obstruction and rollback efforts blunted their effects, which surprised and frustrated advocates, scientists, and policy researchers [13]. This study seeks to contribute to an understanding of climate and clean energy public policy challenges in the United States by providing substantive findings and methodological tools at the state level.

Our research contributes to a growing but undervalued field of study on interest group influence in U.S. state legislatures, which are crucial sites of struggles over climate and clean energy public policy (e.g., [10,14,15]). Many studies in this area use a narrative or process-tracing methodology; this crucial arena largely lacks systematic quantitative research. Studies of interest group coalitions give critical information for understanding climate policy gridlock: some groups make more effective demands at lower levels of government like states and cities, and interest groups have increased their investment in state politics [9,16]. Anzia [17] calls for a return to the study of interest groups in American politics, and points to the need to work at the subnational level, where their impact can be better discerned.

U.S. states offer excellent research opportunities for theory building and testing, since the fifty cases provide varying combinations of

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potentially key factors such as fossil dependency, economic and political structures, party control, urban/suburban/rural characteristics, and sharply different vulnerabilities to climate change impacts. They offer unique access to leaders, staff, legislators, agency personnel, and social movement actors, including through engaged scholarship. At the state level, legislative committees allow open public testimony, as opposed to U.S. Congressional hearings where testimony is given by invitation only. Together, this evidence can reveal actors and coalitions and the arguments and strategies they use to attempt to influence public policy.

In the absence of major structural barriers identified in the literature in our case study state (Massachusetts) during our study period (three legislative sessions over 2013–2018), we turn to interest groups and process-based explanations to understand the state's climate policy slow-down. This period, which was partly constrained by the availability of lobbying records, included no major advances in the legislature on climate, and no obvious focusing events. It therefore provides an optimal setting to detect stable coalitions of relevant interest groups, characterize their activities, and weigh their relative importance in the policy process.

Our overarching question is: who is driving the slowdown in climate policy in seemingly green states, and how are they doing it? We divide this into three research questions. First, what actors make up the major coalitions for and against climate and clean energy legislation, and how do they interact? Second, are political alignments consistent across climate and clean energy issues? That is, do the same groups line up for carbon taxation or building energy efficiency requirements as lobby for renewable energy incentives and regulations? Third, who are the winners and losers, and how do the winners use the legislative process to get what they want? Understanding the interest groups and coalitions in this case suggests insights and directions for research on other sub-national venues in the U.S. Northeast and beyond, especially those without fossil fuel extraction and where Democrats control both legislative chambers.[2]

Here we develop a series of analytical techniques to systematically characterize the struggle in this state through lobbying data and legislative hearing testimony, and combine those with in-depth interviews of experts, advocates, and former legislators. To understand who is present and speaking publicly at the Statehouse, we sought to collect complete sets of oral and written testimony presented at every committee hearing on climate change and clean energy in six years of the Massachusetts legislature. We focused on 62 bills on priority lists of the top environmental coalitions in the state, which in six years netted 1187 pieces of testimony. We conducted twenty in-depth interviews with experts, activists, and former legislators and staffers, and received feedback on early findings from over thirty clean energy advocates. Finally, we constructed and analyzed a dataset of 4126 reported lobbying visits by professional and registered volunteer lobbyists on a broader set of all bills relating to climate change and clean energy over the period. This data was combined with a complete dataset tracking the legislative process for all bills placed before the state legislature. As we will see, state lobbying records can be extraordinary, in some cases allowing analysis which links positions taken on bills to their origins, changes and outcomes. We hope these research strategies might provide a model for studies elsewhere.

We begin by situating our study in the literature on state-level climate policy and advocacy coalitions, and then provide the background to understand the context in Massachusetts. We describe our methodology and then describe our four main findings, and finally discuss their implications for our understanding of state-level policy making, the prospects of climate action, and what we learn about coalitions advancing and resisting climate action in the United States.

2. Evolving understanding of state climate policy

Theories explaining climate and environmental policy adoption generally split between structural and process-based mechanisms [14]. We briefly review each line of explanation and their relation to climate policy change in Massachusetts, before discussing our focus on interest group coalitions.

Veto points comprise the central structural barrier to climate action: more veto points give opposition interest groups more chances to block new climate policies [12,19,20]. Corporatist governance systems[3] can reduce the risk from veto points by giving interest groups formal pathways to bargain over developing policies, and consequently climate policies often pass sooner in these systems than in pluralist ones [21]. However, Mildenberger [22] argues that pluralist systems can enact more ambitious climate policies. Beyond governance structures, left–right public opinion indicators and political party control increasingly predict policy outcomes in states, particularly on polarized issues like climate change [9]. Costly emissions reductions often emerge only from stable liberal governments unthreatened by conservative challengers and sheltered from interest group pressure [22,23]. Finally, theories of energy sector influence predict that fossil fuel importer states should seek to reduce their consumption, while exporters would likely oppose strong climate policies [14,24].

Structural theories do much to explain the slow and uneven uptake of climate policies in the U.S., but exceptions to structural constraints point to the importance of processes and actors to explain these cases [14]. Windows of opportunity or focusing events allow political actors and social movements to push through policies that previously seemed impossible [25–27]. Conversely, less ambitious laws can pass under what Stokes describes as the "fog of enactment," when powerful incumbent interests like utilities fail to block new and poorly understood policies such as renewable portfolio standards [13,15].

Structural and process theories need not exclude each other; often studies combine strands of each to ask what processes allowed particular policies to pass given wider structural conditions. We are particularly influenced by Basseches [28,29] who studied energy policy struggles in three state legislatures, including a case study of two major climate bills in Massachusetts outside of our sample period. He finds that the Massachusetts legislature's structure blunts and weakens social movement influence on outcomes, especially late in the legislative session. In most cases, only interest groups employing professional lobbyists with established connections to the legislature's leadership can influence these late-stage changes. Massachusetts advocates managed to pass two major pieces of climate legislation in 2008 by leveraging political opportunities—but even after passage, laws that lack strong enforcement mechanisms or place too much responsibility for implementation on legislators become vulnerable to manipulation and rollback by interest groups [30]. Basseches' work shows how windows of opportunity and motivated actors interact with structural constraints at the state level.

We now turn to theories about the political actors who influence climate politics and energy transitions. Different theories focus on broad coalitions centered on shared beliefs, political entrepreneurs who emerge during focusing events, or groups defined by shared public discourses [31]. We use similar framing assumptions as the Advocacy Coalition Framework (ACF), which posits that policy domains are home to coalitions of interest groups centered around shared beliefs and stable preferences; typically, one coalition dominates the others and translates its beliefs into policy [31–33]. However, the ACF is distinct from, and occasionally at odds with, an equally relevant literature on lobbying coalitions. Lobbyists often form active coalitions [34], and even more

[2] This was true of all six New England states until the November 2020 election, when both chambers in New Hampshire flipped from Democratic to Republican control [18].

[3] Corporatist governments give corporations, labor unions and other stakeholders formal, institutionalized roles in policy making. Pluralist governments allow interest groups not linked to the state to compete for influence.

often sort into "passive coalitions" of actors with shared preferences but no formal coordination [35]. Unlike the ACF, however, these coalitions shift frequently depending on the policy at hand and are centered less on shared beliefs than shared interests.

Researchers have taken different approaches to identifying coalitions active on climate and energy policy. One study explicitly based on the ACF used coding of national newspaper articles to identify the "economy," "ecology," and "climate science" coalitions [36]. Hess emphasizes the importance of a multi-coalition approach and identified several coalitions based on shared discourses and goals in a case study of the New York energy transition landscape [37]. Mildenberger used interviews and process tracing to define coalitions of fossil fuel business and labor groups which emerge in multiple countries to block climate action [22], and Stokes used a similar process tracing methodology to reveal the role of public utilities in blocking renewable energy development in four U.S. states [13,15]. Downie also found that utilities consistently oppose federal efforts to expand solar and net metering but tend to be divided on other climate policies [38,39]. These intra-industry preferences on energy policy can vary significantly based on the corporation's institutional environment and investments [38].

Despite significant and rigorous work done to identify interest group coalitions relevant to climate policy, few studies have done so quantitatively using systematic and exhaustive datasets. We take a novel approach by defining *passive* coalitions of interest groups using a network of policy preferences based on their lobbying behavior recorded in a state-mandated database. Scholars have proposed a number of models of political networks, including recent advances in modelling bipartite networks of lobbying interest groups and legislators [40–42]. However, many of these models only detect *communities* defined by common issue spaces rather than *coalitions* defined by (positive or negative) policy preferences – perhaps because federal lobbying disclosures do not reveal preferences. Since our issue space is predetermined and we further identify sub-issues by hand (Section 5.3), we focus on defining and analyzing coalition behavior.[4]

Finally, we assess *how* interest groups exercise influence at the state level, particularly through lobbying and testimony. Baumgartner et al. [43] emphasize that money plays only a small role in the success of lobbying efforts at policy change in Washington, in part because wealthy advocates often attract wealthy opponents, and because the status quo already represents the bias towards better-funded and well-organized groups. A growing literature further emphasizes that lobbying success, when it occurs, has more to do with *information*: interest groups win by persuading legislators that their preferred course of action will benefit the legislator's chance of reelection (or some other goal) [44]. While many studies struggle to find an impact from individual interest groups' lobbying [45], others have shown that coalitions can find more success under certain conditions, including when they represent a broad array of interests, although results in this area are still mixed [46]. This may be because broad coalitions signal important public support for particular policies.

In the space of climate politics, specifically, Meckling identifies four *approaches* that firms take to proposed environmental policies: vetoing policies (opposing them outright), hedging (seeking to minimize a policy's costs or ensure a level playing field), support (encouraging a policy based on perceived financial benefits), and non-participation [47]. At the federal level, Downie observed that most major fossil fuel companies seek to block new policies; however, utility companies vary in their approach: they support climate policies, hedge, or block new regulations depending on each firm's energy portfolio and institutional environment [39]. In addressing the three questions we pose in the introduction, the current study seeks to shed light on whether these patterns apply at the state level, where much of the struggle over American climate policy is now taking place.

3. Climate policy in Massachusetts, 2013–2020

The Commonwealth of Massachusetts presents a particularly puzzling case study. The state passed ambitious emissions targets in 2008 [48], but in the following twelve years it made piecemeal progress on those targets and fell behind other states despite facing none of the structural barriers to climate action uncovered by prior research. By the end of 2020, Massachusetts lagged behind leading states in both its renewable portfolio standard commitments [49] and in 100 percent net zero electricity (seven states, along with Washington D.C. and Puerto Rico, had legal commitments to 100 percent net zero electricity by 2050 [49–51]).[5] Why did policy slow? Which actors and coalitions seek to exert influence on clean energy and climate at the Statehouse? How do the winners play the game?

Massachusetts provides an illuminating test case for both procedural and structural theoretical strands. Both chambers of the Massachusetts State House have stable, veto-proof Democratic supermajorities [18]. Although Massachusetts has a pluralist government, and since 2015 a Republican governor, the top-down control of the legislature combined with veto-proof Democratic majorities means that there are *de facto* far fewer veto players than in contested bodies like the U.S. Senate [52]. The Massachusetts public is overwhelmingly liberal and at the beginning of our study period (2013) was among the most climate-aware in the nation [22,53,54] No fossil fuel production takes place in the state [55]. The state was a national leader when it enacted the Global Warming Solutions Act (GWSA) in 2008, which set a legal mandate for 80 percent reductions in greenhouse gas emissions from 1990 levels by 2050. During the same session, the Green Communities Act further expanded energy efficiency mandates and incentives, supported renewable energy development, and created a new greener state building code [28,56]. While the state meets many of the structural conditions for bold emissions reductions and passed landmark climate legislation in 2008, as the 2017–2018 legislative session ended it lagged behind other states' updated emissions plans [49,57].

Wind power was always at the center of the effort to meet the GWSA's goals. The Cape Wind Project, planned for Nantucket Sound, was expected to be the first major offshore wind farm in North America and a critical step towards meeting emissions deadlines. The project faced pushback from a coalition of wealthy Cape Cod area landowners and locals organized through the Alliance to Protect Nantucket Sound, and funded in large part by Bill Koch[6] with support from the libertarian Beacon Hill Institute [58]. Following public messaging campaigns and over two dozen lawsuits, Cape Wind failed to secure funding in time for construction [59,60]. Without Cape Wind, Massachusetts had to rely on imported renewable energy to meet its Renewable Portfolio Standards targets [61]. Importantly, the GWSA allowed four teenage plaintiffs supported by the Conservation Law Foundation to successfully sue to force the state to meet the 2020 emissions reduction targets after Cape Wind's failure, driving major offshore wind purchase agreements in 2017 and 2018.

Our study looks at three legislative sessions (the 188th through 190th) starting in 2013 on the tail end of Cape Wind's defeat.[7] The governorship shifted from Democrat Deval Patrick to Republican Charlie Baker at the start of 2015. In spite of environmentalists' claims that he

[4] In Section 4 we explain our methodology for finding these coalitions; further information is provided in Appendix C.

[5] An important climate roadmap bill advancing the state's targets to 100% by 2050 passed both chambers in January 2021 and was signed by the (Republican) Governor on March 26, 2021 after two vetoes and overrides.

[6] The Alliance received significant funding from family foundations and the New York Community Foundation and Boston Foundation (Foundation Grants Database, 2020).

[7] It is also a period determined in part by the availability of filed testimony in legislative committees, as discussed below.

has close ties with the natural gas and utilities industries and perception that he is out of step with the high public concern over climate change, Governor Baker retains very high popularity [62–64]. The Speaker of the House during our study period was Robert DeLeo, a moderate who replaced a more progressive Speaker in 2009 and ultimately became the longest-serving Speaker of the House in the state's history, retiring in late 2020.

The slowdown of climate action in the state reflects this conservative shift in leadership. While each session from 2013 to 2018 saw some progress, none of the bills which eventually passed matched either the ambition of the GWSA and GCA nor the scale of climate policy moving forward in currently leading states such as California, Hawaii and New York [57,65]. In 2014 House Bill 4164 passed, setting benchmarks for monitoring and addressing reporting issues on natural gas leaks (interview, Joel Wool, formerly at Clean Water Action). Modest advances came in the next two sessions, including renewable electricity procurement mandates and offshore wind procurements (House Bill 4568 *An Act to Promote Energy Diversity*, and House Bill 4587 *An Act to Advance Clean Energy*, in the 189th and 190th sessions). Each of these bills passed with widespread support from environmental organizations, but they fell far short of the goals set by advocates and their allied representatives. Environmental advocates in Massachusetts pressed for a variety of bills relating to carbon pricing (190 SB1821, *An Act combating climate change*), stricter emissions targets (189 SB1748, *An Act requiring the timely adoption of greenhouse gas emission limits for the year 2030*), and a ban on ratepayer subsidies for new gas pipeline expansions (189 HB2494, *An Act Relative to Consumer Protection With Regard to Pipeline Tariffs*), all of which failed. Justice-focused environmental advocacy groups have tried to unify over the past several years to increase their efficacy at the State House, but many organizational leaders still expressed frustration at the lack of legislative climate action over the period (Claire B.W. Müller interview July 25,2019) [2,66].

The relative stagnation of climate and clean energy policies in Massachusetts over this period no doubt derives from many sources including those just mentioned, but also many other completely unknown origins, such as the impacts of national and international politics. This study focuses on only a small subset of these causes: the influence of interest groups measured through lobbying and testimony. We do not seek to compare the influence of one factor against another or against those outside the set, since such work generally requires careful comparison of data from multiple states. Nonetheless, we argue that the interest groups identified should be central to understanding climate and energy governance in Massachusetts, and beyond.

4. Materials and methods

Our study is based on analysis of 1187 pieces of committee testimony on 53 priority bills and 4126 lobbying records on 314 pieces of legislation. We describe the process by which we collected and analyzed them, discuss difficulties that arose and the transparency issues they raise.

4.1. Testimony

4.1.1. Testimony Data Collection

In 2019 we compiled available lists of priority legislation from 2013 to 2018 related to climate and clean energy issues from four major environmental coalitions and groups in Massachusetts (Mass Power Forward, Environmental League of Massachusetts, Sierra Club - Massachusetts Chapter, and Clean Water Action). These organizations were selected because they consistently focus on influencing state level climate and energy legislation, and each provided publicly available priority bill lists with bill numbers for at least one of the sessions in the study period. We used this bill list, along with companion bills from the other chamber of the legislature, as the sampling frame for our testimony analysis. In 2019, we reached out to staff of the legislative Joint Committees handling these bills and visited their offices repeatedly to request testimony. We were able to collect written testimony on 39 of the 62 priority[8] pieces of legislation on which we requested testimony, with more testimony missing from earlier sessions. Additionally, we collected notes on oral testimony on 48 out of 62 pieces of legislation taken by InstaTrac, a private subscription service.[9] Taking written and oral testimony into account, we collected 1187 pieces of testimony on 53 of the 62 requested pieces of legislation. Anyone can give oral testimony in hearings, or submit written testimony, an important difference from the U.S. Congress.

4.1.2. Testimony Analysis

Testimony was categorized based on what type of organization testified, what kinds of bills the testimony addressed, and whether or not the testifier spoke in an official or leadership capacity for the organization. We characterized testimony as supporting or opposing environmentalists' positions by comparing testifiers' positions on legislation with bill positions taken by the four statewide environmental organizations' priority bill lists.[10]

Using the priority lists, we systematically identified 880 positions (support, oppose, or neutral) on priority legislation from written testimony and 572 positions on priority legislation from notes on oral testimony.[11] Testimony that supported legislation with amendments or opposed legislation with amendments was marked as support or oppose, in order to better identify sector and coalition-wide trends.

4.2. Lobbying

4.2.1. Lobbying Data Collection

The second novel dataset used in this study comprised all public lobbying records for the state of Massachusetts. This dataset outperforms federal lobbying records in at least two ways: (1) it includes not only interest groups' expenditures and employed lobbyists[12], but also the positions lobbyists recorded on each bill upon which they lobbied (support, oppose, neutral); and (2) bills receive new numbers each time they are referred to a new committee or substituted by a new text, so lobbying records correspond to *versions* of each bill, with each record pertaining to one well-defined text. We paired this dataset with the legislative records maintained by LegiScan, which tracks the sponsors, votes, amendments, outcomes, and progress through committee for every bill in the Massachusetts state legislature. Finally, using a keyword search we identified all bills relating to climate change and clean energy over the period. and then identified all interest groups who lobbied on them. The final dataset included 314 bills lobbied on by 160 interest groups, with 4126 reported lobbying visits. See Section C in the Supplementary materials for details on the assembly of the dataset and its possible limitations and biases, including underreporting and the ability to report lobbying positions as "neutral". Much of our analysis passes

[8] Earlier in the study we requested testimony on a larger body of testimony than the final testimony list. Of these, we received written testimony for 82 of the 116 bills we requested.

[9] Comparisons of InstaTrac notes with several available audio recordings of hearings revealed significant amounts of testimony missed entirely by InstaTrac. We compared notes reported by InstaTrac with our own for three hearings in 2017, and an additional hearing in 2019. InstaTrac captured 63 pieces of testimony out of 131 pieces of oral testimony we transcribed from audio recordings of hearings. The absence appeared random: there was no apparent bias in which testimony was missing. For those offering oral testimony, InstaTrac captured the main points of their testimony.

[10] See Appendix A for additional methodology used to analyze testimony.

[11] Testimony by state legislators was not included in the study.

[12] All lobbyists are required to report their lobbying activities if they contact at least one legislator, and either work on lobbying for more than 25 hours or are paid more than $2,500 over each reporting period. We assume that these standards capture the most relevant lobbyists.

over neutral lobbying by necessity, even though such activity likely includes efforts to defeat or influence revisions of the legislation.

4.2.2. Lobbying Analysis

We used this lobbying dataset to detect communities of interest groups with common preferences over the selected legislation.[13] We composed a network in which edge weights between actors A and B are defined as the count of their overlapping positions on bills (A and B both support or both oppose a given bill) minus the count of opposing positions. By summing over repeated agreements and disagreements, the resulting network highlights persistent alliances between interest groups, albeit at the cost of detailed information on shifting alliances around particular bills.[14] We then apply the Infomap algorithm to the network of interest groups. The Infomap algorithm models a network as a flow of information between nodes and attempts to find the coalition structure that allows this flow to be described most efficiently [67,68]. It has the benefit of making relatively minimal assumptions about the preexisting structure of the network, so that we do not need to develop a novel analytical model of lobbying to generate informative results. See mapequation.org for examples and explanation of the mathematics behind this algorithm; for details on our application of it and other candidate clustering methods, see Section D in the Supplementary materials.

4.3. Interviews

We conducted twenty in-depth interviews with experts, advocates, and former legislators in order to add to our understanding of the landscape and context of climate policy in Massachusetts. These semi-structured interviews were conducted over video call and in-person following an interview guide; interviewees were selected from major coalitions in the state and targeted based on their ability to fill knowledge gaps. These interviews, which focused on understanding how interviewees perceive the actors and power imbalances in the legislature, provided insights but not definitive answers to many of our questions. We used the knowledge gained from these interviews and background research we conducted on Massachusetts state climate politics to better understand and interpret findings.

4.4. Constraints and transparency barriers

A series of limitations merit mention. First, our study faces the "problem of preferences" - the challenge of identifying organizational preferences when there is a benefit to misrepresenting such preferences [69,70]. While this raises a greater issue in public hearing testimony than in rarely-scrutinized lobbying records, both present opportunities for interest groups to willfully distort their preferences. Lobbyists may use "neutral" lobbying reports to obscure their real actions; additionally, the complex aims of lobbying are lost in the "support-neutral-oppose" reporting schema. Nonetheless, we assume that "support" and "oppose" positions reliably indicate some level of preference for or against the passage of bills, and we constrain our quantitative analysis only to bill movement and passage (rather than textual changes), understanding that important nuance is lost in the process.

Other limitations result from severe transparency issues in the state legislature. It was difficult to track climate or energy-related clauses in large omnibus bills. The complex amendment process could radically change legislation. Massachusetts does not record committee votes; most bills end up sent to study and do not make it to the floor. Some floor votes are conducted by voice with no records, and some are recorded only by the number of "yeas" or "nays". There is a further lack of transparency in regard to public testimony. Committees do not provide public recordings, transcripts, or reports on their hearings. Joint Committees keep records from hearings at the discretion of their Chairs, and often discard them when a new Chair arrives.[15] These practices led to missing testimony on bills environmentalists identified as priority legislation. In addition, the bills we requested testimony on came from publicly available lists from environmental organizations, which were not consistently shared from the four priority organizations from year to year and represent a subset of the thousands of bills heard each session; that said, our bill list captures critical climate and energy issues debated by the legislature.

The opacity and top-down control of the Massachusetts state legislature points to a deeper constraint on our study: the problem of agenda setting. Interest groups lobby within the boundaries of a legislative agenda which, even in the most democratic governments, often falls under the direct control of a small number of politicians [71]. As we report in Section 5.4, popular support appeared to have little effect on that agenda: the two bills in our dataset with the most co-sponsors — both had slim majorities of their respective chambers — never even progressed to the Ways and Means committees. In this context one could convincingly argue that understanding the factors which contribute to define the State House's agenda would give a better sense of where power actually lies than studying the impact of lobbying. We give two responses: first, it is nearly impossible to determine the political agenda in a rigorous and reproducible way. This barrier does not lessen the importance of that agenda, but it does place it outside the bounds of our study. Second, our analysis detects coalitions and influence based on a wide range of bills, including over 200 introduced bills and dozens of proposed amendments and substitutions at all levels of the legislature. While the agenda set by State House leadership may set broad bounds on which bills ultimately pass, it likely does not have as strong an influence at such a fine-grained scale.

We attempted to analyze contributions to Massachusetts state government elections (available online at https://www.ocpf.us) campaigns but ultimately decided to remove these from the study.[16]

5. Results

Based on systematic collection of lobbying records, legislative committee testimony, and interviews with experts and advocates, we report four main findings concerning support and opposition to climate policies

[13] Most lobbying research attempts to assess the *effectiveness* of lobbying, but faces obstacles, including lack of variation in lobbying expenditures over time, omitted variables that affect political influence, and endogenous selection biases (interest groups lobby when they are more likely to be successful). Overcoming such obstacles lies outside the scope of this paper [45].

[14] In the Massachusetts system of legislation tracking, each bill code refers to only one text rather than the multiple evolving texts of a bill, which ensures that disagreements and agreements between actors over a piece of legislation are meaningful. Other legislative systems often keep the same identifier for a bill even as it moves through multiple committees and changes significantly, so that without knowing the precise time at which an interest group lobbied on the bill, it is impossible to know the particular language that they sought to influence.

[15] We were informed by one staffer that "we don't need to provide this information to you: there's no public records law here."

[16] There were three reasons for not analyzing campaign contributions. First, the vast majority of donations to state House and Senate races come from individuals without registered employment, making it impossible to trace support back to particular industries or organizations. Second, some of the largest inflows of money came from out-of-state super PACs to support Governor Baker's election campaign, and in this case, again, it would not be possible to straightforwardly trace support back to particular in-state interest groups. Finally, spending by business associations and corporations on lobbying efforts typically outweighs spending on campaign contributions by a factor of 2-5 to 1 at the federal and state levels [45]. Although the gap between yearly PAC contributions and lobbying expenditures has narrowed in recent years (http://opensecrets.org), it is still significant enough to grant *prima facie* reason for focusing on lobbying.

in Massachusetts. First, we describe the coalitions which emerge from the lobbying dataset and their spending patterns. Second, we describe the balance of testimony in committee hearings. We then characterize the policy preferences of the coalitions on both sides of the climate policy divide, and finally we identify those most successful in the legislative process.

5.1. Nine lobbying coalitions emerge; climate advocates were far outspent

Our first research question was: Who are the major coalitions for and against climate action at the state level, and how do they interact? Network analysis on the lobbying dataset reveals nine cohesive coalitions seeking to influence climate and energy legislation in Massachusetts. Full listings of member organizations in each coalition are given in Appendix D; the title given to each coalition corresponds to the sectors of the actors most central in that group, as measured by the PageRank algorithm (the list in Appendix D orders coalition members by descending PageRank value, although Infomap does not return the precise values). Nearly all of the progressive and environmental nonprofits identified as climate advocates and interviewed for this study fell into the *Social Green* coalition. As such, we often treat the *Social Green* coalition's interests as representative of the full range of pro-climate action policy preferences. Other coalitions, we found, typically lobbied on a very narrow subset of climate and energy legislation.

Four other coalitions identified by the Infomap analysis tend to align with the *Social Greens*' lobbying. These can be described as a broader "green coalition" (Fig. 1a). The *Social Greens*' most consistent allies were the *Conservation & Planning* cluster; the coalitions supported each other on 44 pieces of legislation. The *Auto* coalition reported lobbying on climate and energy-related bills almost entirely to do with tax credits for electric vehicles. The *Solar* and *Hydro & Wind* coalitions each reported lobbying which aligned with the *Social Green* coalition, but almost exclusively on bills related to their respective industries — although, as we discuss below, the coalitions identified do not map perfectly onto formal industry sectors, and the *Social Green* coalition includes some members of the solar industry.

Four interest group coalitions frequently opposed *Social Green* lobbying positions: *Power Generation*, *Fossil & Chemical*, *Real Estate*, and *Utilities* (Fig. 1b). Three of those groups lobbied and testified almost exclusively against legislation in our dataset: the *Fossil & Chemical* coalition, composed mostly of oil production and refining companies; the *Power Generation* coalition, most of whose members operate natural gas- and oil-fired power plants; and the *Real Estate* coalition, which, while not discussed in previous literature, reported 218 lobbying incidents on the bills in our dataset (Fig. 1b). The most important group in opposition to climate and clean energy legislation was the *Utilities* coalition, which had complex and shifting relationships with coalitions primarily involved in power generation (Fig. 1c). We encountered 484 instances in which *Utilities* lobbyists opposed positions taken by *Social Green* coalition members. *Utilities* also lobbied in favor of *Social Green* priorities 317 times, however, and they took a seemingly more nuanced and active approach to shaping outcomes throughout the legislative process, which we examine in depth below.

It is important to note again that the names of coalitions defined here are based on their most central actors, and some members are from different formal economic sectors. For instance, several solar industry organizations fall into the *Social Greens* coalition rather than the *Solar* coalition, because their lobbying is most aligned with that group, which is led by environmental organizations. Interest groups in the same formal industry sector may or may not share preferences [38]; lobbying coalitions, as opposed to sectors or industries, identify groups of actors who share policy preferences and may explicitly coordinate their lobbying efforts. Our method therefore offers potential insights, including important divisions within formal sectors and common interests across them, which would not be easily found by grouping interest groups deductively by their formal industrial sectors alone.[17]

In terms of lobbying expenditures, corporate actors far outspent nonprofits, both individually and when comparing aggregate coalition spending. The disparities are most obvious when comparing central actors in each coalition. Eversource and the Associated Industries of Massachusetts are two of the top three actors in the *Utilities* coalition by spending and lobbying count on this legislation, and each spent over $2 million on lobbying in Massachusetts over the period studied — the highest amounts among these interest groups.[18] Conversely, the Environmental League of Massachusetts and Clean Water Action, two of the most central actors among the *Social Greens*, spent $461,000 and $22,000 total over the same period, respectively.

5.2. A strong majority of testimony supports climate action bills

The profile of anti-green action is strikingly different in testimony than in lobbying. By rule, every bill introduced in the Massachusetts legislature is heard in a joint committee composed of Senators and Representatives. Any member of the public can submit testimony at these hearings. Ninety percent of written and oral testimony by non-legislators on priority bills supported the positions taken by key climate and clean energy organizations (Fig. 2; 1305 bill positions in support, 140 opposed, 7 neutral). This strong support for environmentalists' priority positions holds across legislative sessions and in notes on oral testimony taken by the firm InstaTrac and in written testimony we collected from legislative committees. Remarkably, of the 1187 pieces of testimony in our dataset, only one denied the existence of anthropogenic climate change.

Nearly all of the testimony submitted by utilities, fossil fuel companies, and the real estate sector opposed climate and clean energy initiatives. The New England Power Generators Association, which primarily represents fossil fuel-based generators in the state, submitted one piece of testimony in our dataset against carbon pricing. The heating oil and alternative fuels industry (Propane, LNG and other "delivered fuels") testified against efforts to tax or regulate their industry but was not a prevalent actor in lobbying.

A distinctive pattern in the identities of testifiers emerged which is not reported in the literature: individuals not officially representing an organization delivered a majority of testimony (58% of all testimony).[19] 92% of testimony delivered in a personal capacity against environmentalists concerned land-based wind turbine siting in the 2013–2014 legislative session (48 positions by individuals out of 52 against environmentalists).[20] In contrast, individuals submitted testimony in

[17] We use simple names to refer to each coalition despite the risk of obscuring this complexity. However, we also note that coalition assignments tend to make the most sense for the interest groups who lobbied on many bills. Most mismatches between coalition names and interest group sectors occur for interest groups which lobbied on few bills and therefore have lesser consequence in the lobbying analysis. We discuss some exceptions to this trend below.

[18] All monetary amounts in 2015 USD.

[19] 277 pieces of written testimony were form letters, concentrated on a small number of bills. In addition, much of the testimony submitted on bills with high amounts of testimony from individuals showed strong similarities between many of the individuals' testimony, including identical paragraphs, or similar formatting structures.

[20] Giordono et al. [72] have found that localized opposition to wind power, particularly moderate opposition through formal channels such as public hearings, is not uncommon across the U.S.

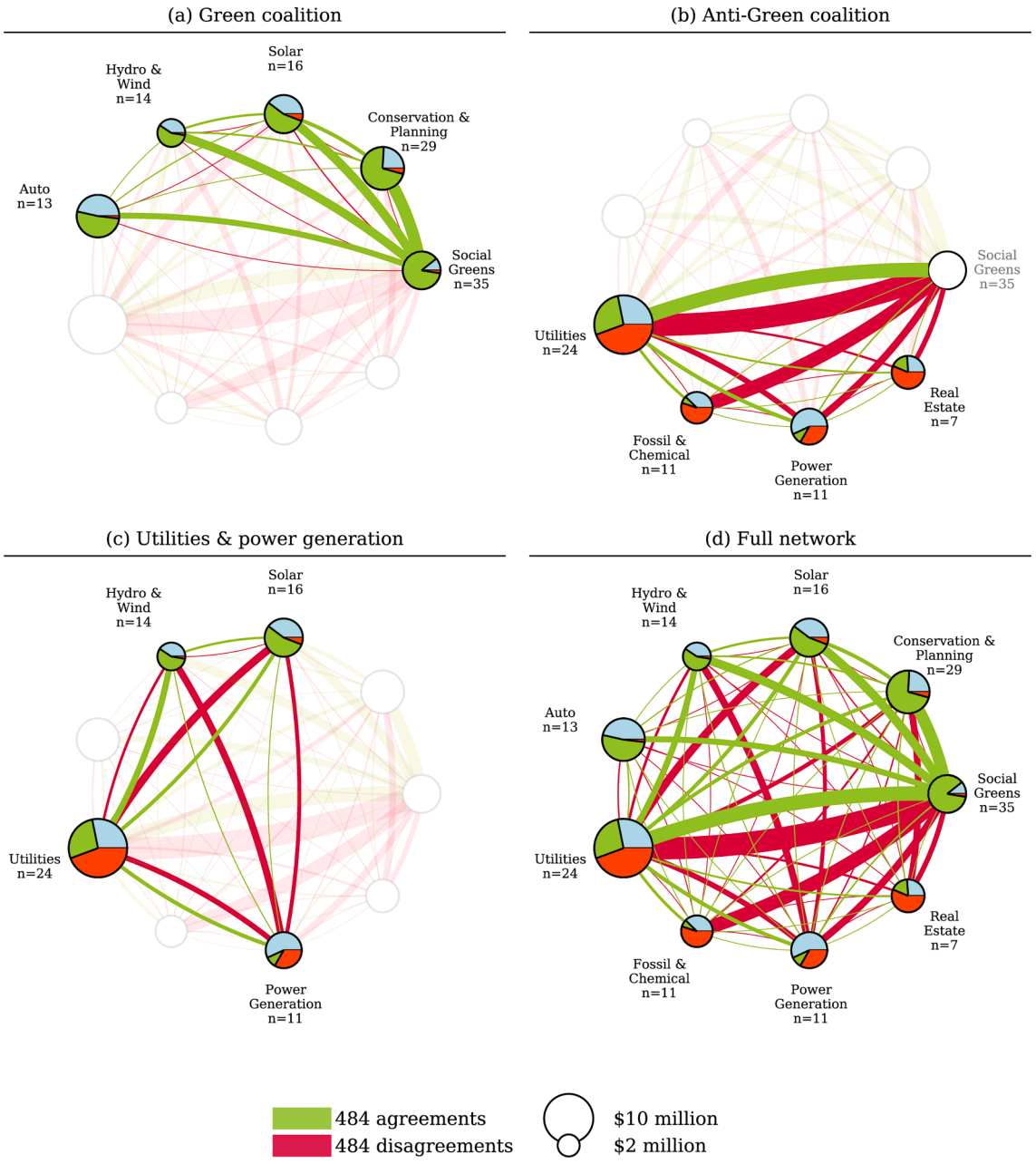

Fig. 1. Two *meta*-coalitions emerged from network analysis of lobbying records in Massachusetts: Green, and Anti-green. Inter-coalition relationships based on lobbying on 314 climate and energy bills in Massachusetts, 2013–2018. Nodes represent clusters of actors grouped using the Infomap algorithm and named according to the industries of the most prevalent actors in the cluster. Node size represents the sum total of lobbying spending (on any issue) by members of the group between 2013 and 2018. Pie charts show the distribution of each cluster's lobbying positions, where support = green, oppose = red, and neutral = blue. Colored lines (edges) represent the sum total of identical lobbying positions on bills (green) or opposing positions (red) between members of each pair of coalitions. (a) The Green Coalition contains the interest group clusters that have relationships of strong mutual support with the Social Greens cluster. (b) The Anti-Green Coalition contains the interest group clusters with the strongest opposition relationships to the Social Greens cluster (which is also shown in grey for clarity but is not in the Anti-Green Coalition). (c) Relationships between utilities and the coalitions primarily involved in power generation are complex and alliances shift. (d) The full network.

support of environmentalists on a wide variety of bill topics.

Nearly all environmental advocates we interviewed said that a strong showing in legislative committee hearings at best fulfills a necessary but not sufficient condition to pass a bill. Others went further: one reported that "It feels like the hearings are theater, like it doesn't matter how many people come or what they say, like decisions are made totally behind closed doors" (Claire B.W. Müller interview July 25, 2019). As a former state senator told us, "If you want to be effective, you have to accept and appreciate that a big chunk of it is theater. You have to accept it for what it is and figure out how to work within it. The important thing about a hearing is that it puts people on the record" (Ben Downing, interview, July 2019). Interestingly, one long-time observer reflected that "Some of the industries may be using that stage [committee hearings] less and less because they think they can't win" (Joel Wool, interview, July 2019).

5.3. *Political alignments vary by specific climate policies and issues*

5.3.1. *Lobbying coalitions by issue*

What do the different coalitions want? What *substantive interests* are they fighting for and against, and when do groups align or conflict? Are alignments consistent across sub-issues like carbon pricing or

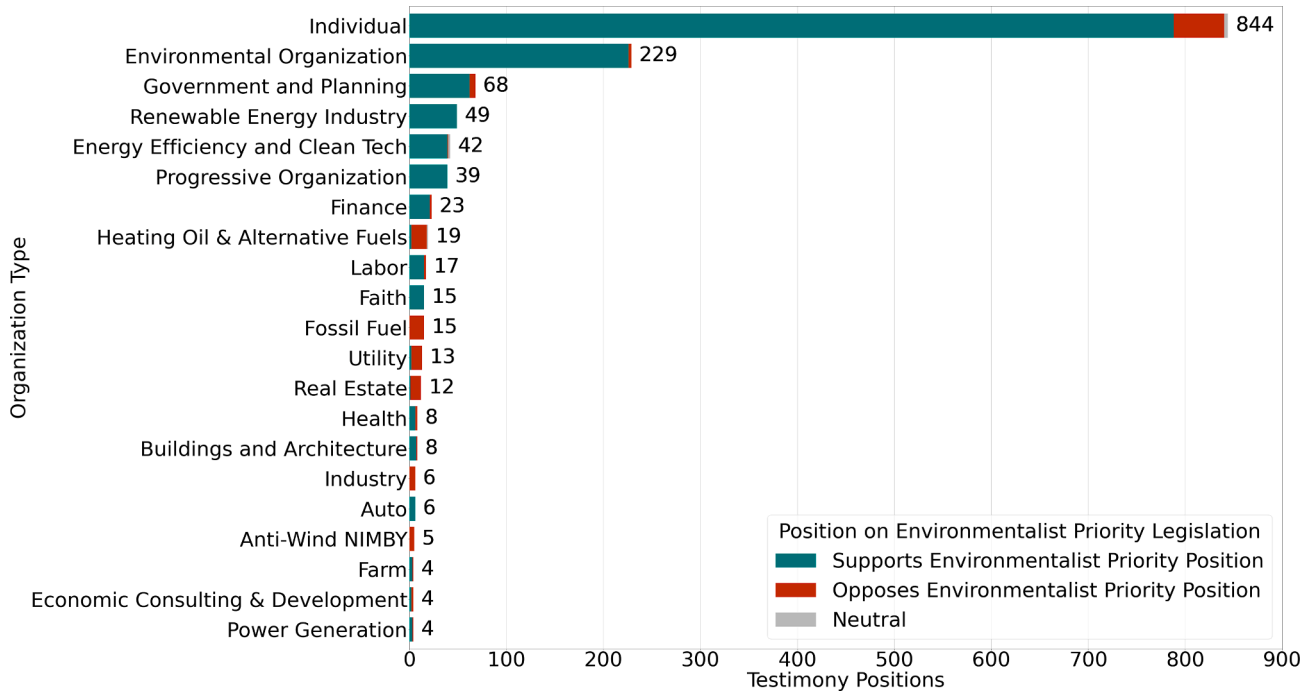

Fig. 2. Ninety percent of public testimony delivered in Massachusetts legislative committees on energy and climate change supports climate action legislation priorities. This figure summarizes 1452 bill positions in Massachusetts legislative testimony from 2013 to 2018, categorized by testifier type. Each N represents a piece of testimony on one piece of legislation; testimony which mentions multiple bills is counted for each bill. Testimony by state legislators was not included. Organization categories with three or fewer pieces of testimony excluded (N = 22: 19 support, 3 oppose).

renewables mandates? We systematically categorized the body of legislation in our dataset by issue, using a qualitative typology of the issues each bill addressed, informed by a Latent Dirichlet Allocation (LDA) (see Appendix E). We then examined lobbying on bills assigned to six issues over these three legislative sessions: carbon pricing, energy efficiency, natural gas infrastructure, solar and net metering, hydro and wind power, and transportation.

Fig. 3 shows lobbying networks similar to those in Fig. 1, but constraining the set of bills used to construct each network to those in each of the six issue spaces. The resulting graphs show that coalitions' policy preferences align and conflict depending on the issue at stake. The *Utilities* and *Social Green* coalitions mutually supported some energy efficiency and hydro and wind power legislation despite conflicting over most other issues; conversely, hydro and wind legislation brought the *Power Generation* coalition into conflict with *Utilities* despite both sharing opposition to solar and net metering bills. The *Auto* coalition lobbied almost solely to support incentive rebates for electric cars, against opposition from some *Fossil & Chemical* groups.[21] The *Fossil & Chemical* coalition directly conflicts with the *Social Green* coalition on carbon pricing, natural gas pipelines, divestment (not shown), climate targets (not shown) and solar and net metering. The *Real Estate* coalition primarily opposed climate legislation targeting energy efficiency. We discuss these factions in greater detail below.

5.3.2. *The Pro-Climate action coalition includes one generalist group and several single-issue factions*

Our analysis identified a *Social Green* coalition of 108 organizations in this state which lobbied together to advance climate and clean energy policy. Members of the pro-climate action coalition rarely testified or lobbied against each other. Core advocates in the *Social Green* coalition therefore have a large set of potential allies, but they receive only sparse support from the interest groups with substantial real and political capital to expend on lobbying — there are few large employers in the *Social Green* coalition.

Our disaggregated analysis showed that green coalitions often confine lobbying to specific issues. *Auto* companies and organizations only registered a significant amount of lobbying on legislation related to electric vehicles, and the *Solar* coalition recorded a significant amount of lobbying on net metering legislation. The *Hydro & Wind* coalition focused on omnibus bills containing mandates for hydropower and wind generation, primarily the 189th session's *An Act to Promote Energy Diversity* and the 190th's *An Act to Advance Clean Energy*, both of which passed. However, none of these groups recorded lobbying (including neutral positions) on carbon pricing and fossil fuel industry regulations that would have incentivized adoption of their technologies. The *Conservation & Planning* coalition focused on legislation such as the 189th session's S122: *An Act Promoting the Planning and Development of Sustainable Communities*. In contrast, the *Social Greens* coalition lobbied on a wide variety of issues, in many cases more actively than any of the other Green coalitions.

5.3.3. *The coalition opposing most clean energy bills has four pillars*

Utilities support hydro & wind but attack solar: Like the *Social Green* coalition, the *Utilities* coalition stands out as a group of generalists who lobby heavily in multiple areas. Their action on climate and clean energy bills follows a distinctive pattern. Early in the legislative process when bills entered specialized committees, *Utilities* lobbied against two-thirds (66%) of those supported by *Social Greens*. However, the preferences of the two groups, as expressed in reported lobbying, converged as legislation moved through the chambers. Members of the two coalitions disagreed half as often (35% of the time) over engrossed legislation, and less than one quarter of the time (23%) over the seven pieces of legislation that were passed by both chambers and signed into law by the

[21] The bills we examined from 2013–2018 primarily included bills regarding individual vehicle emissions tracking and electric vehicle incentives, not public transportation or broader transportation policy. The auto industry's support for electric vehicles may reflect a national trend - see the Alliance for Automotive Innovation's report calling for more government support for electric vehicles https://www.autosinnovate.org/InnovationAgenda.

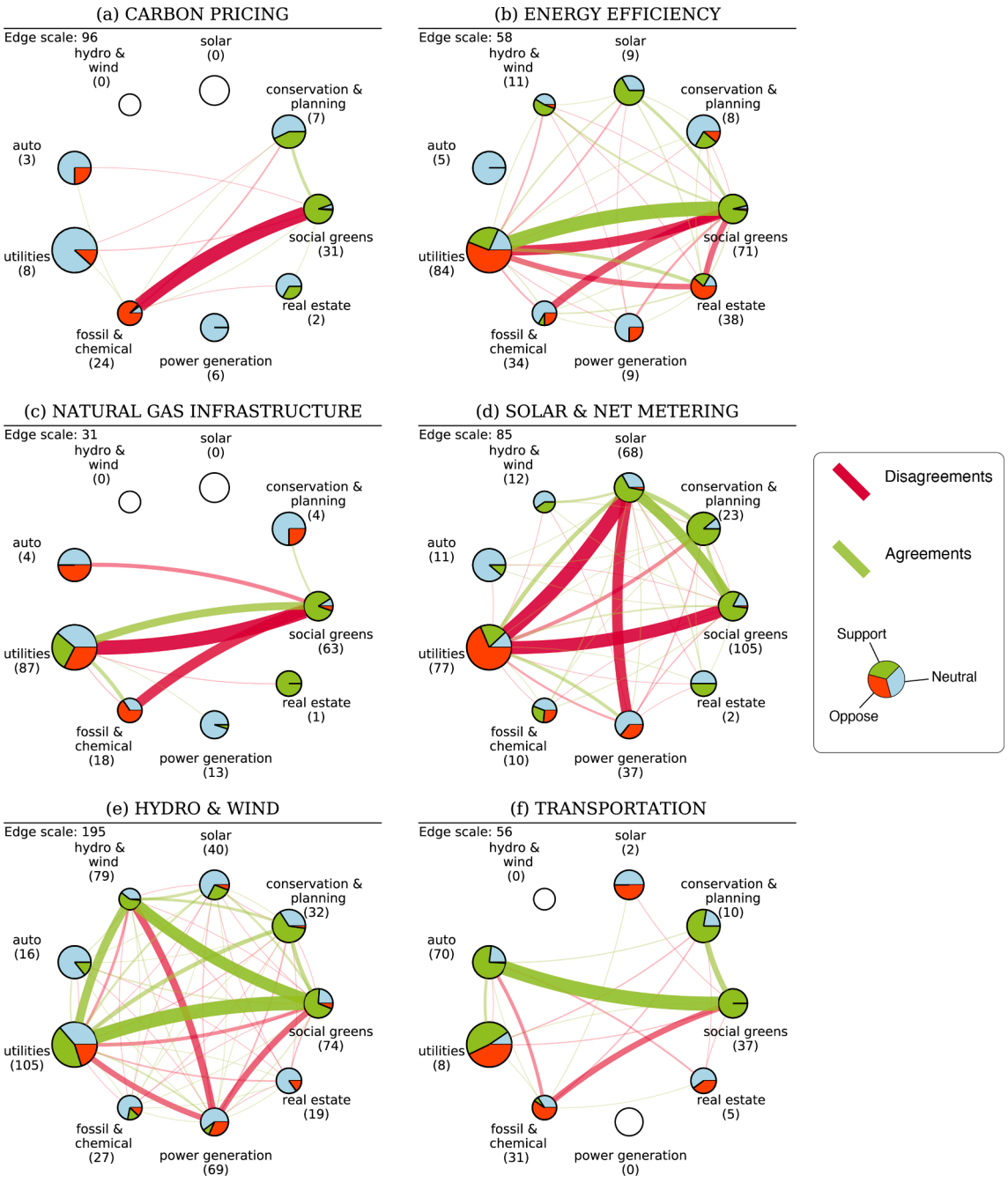

Fig. 3. Coalitions align and conflict, depending on the specific part of climate and clean energy policy at stake. Inter-coalition relationships by issue area. Pie charts show the distribution of within-coalition lobbying positions on the bills with at least one section relevant to each issue area (red = opposed; green = in favor; blue = neutral). Numbers below coalition names show the total number of lobbying instances by members of each coalition on each bill. Edge widths reflect cumulative agreements and disagreements between members of each coalition over the bills in each set. The number of interactions in the thickest edge in each chart is shown in the top-left corner.

Governor. In particular, *Utilities* lobbied in support of legislation to promote large-scale hydropower and wind energy, which generate electricity which they can sell (Fig. 3). In testimony, utilities positioned wind and hydropower as favorable renewable sources in contrast to solar energy, which they characterized as unreasonably expensive and lobbied heavily against (Fig. 3). Eversource argued in written testimony in 2015 that, "Since solar and wind have zero emissions, we can do the same for the environment but at a fraction of the cost with more wind than solar. […] So wouldn't it make sense from a customer and environment perspective, to let these resources compete for customer dollars rather than have the state mandate more of the higher cost resources?"[22]

The fossil fuel industry seeks to block threats to their industry:

[22] Eversource, September 29, 2015, written testimony on Senate Bill 1965, *An Act Relative to Energy Sector Compliance with the Global Warming Solutions Act*. This testimony was collected during our study, but testimony on S1965 was not included in the testimony analysis.

Fossil & Chemical coalition members lobbied most consistently against climate and clean energy. They opposed electric vehicle incentives and carbon pricing (both of which threaten demand for fuel), regulations on pipelines and fracking, and fossil fuel divestment. They lobbied far less on legislation relating to building new renewable energy capacity in Massachusetts. Among the oil and gas industry, the Massachusetts Petroleum Council (MPC), the state branch of the American Petroleum Institute (API), was the most frequent opposition testifier and most frequent lobbyist. Their testimony acknowledged the existence of anthropogenic climate change while positioning the fossil fuel industry as an irreplaceable part of the global economy and essential to solving climate change. For example, they wrote in testimony against a 2017 fossil fuel divestment bill that, "It has become somewhat fashionable to cast fossil fuels in a negative light. Yet there are enormous social benefits to using fossil fuels, such as poverty reduction and increased mass mobility of peoples and goods that continue to this day and will for the foreseeable future. If fossil fuel use were to end tomorrow, the economic consequences would be catastrophic (starvation would follow, for example, as tractors' fuel tanks ran dry)."[23]

The real estate industry opposes residential energy efficiency laws: The *Real Estate* industry, an actor scarcely mentioned in the literature on climate policy, lobbied and testified against efforts to regulate residential energy efficiency, and lobbied against climate adaptation bills that would limit where and how they could develop property. Their testimony frequently appealed to social justice and libertarian concerns, characterizing energy efficiency regulations as a threat to housing affordability that could jeopardize homeownership among less affluent residents. They argued that energy efficiency decisions, particularly those concerning whether sellers would have to disclose the energy efficiency of a home during a sale, should be a decision left to individuals, not regulated by the government. For example, the Greater Boston Real Estate Board testified against a home energy efficiency bill, writing that, "Our members strongly believe that homeowners should move in this direction at their own pace, without a mandate that causes them to incur substantial costs or impede their ability to afford the home they desire."[24]

Power generators oppose new utility-backed hydro and wind supply: During these six years, the *Power Generation* coalition lobbied almost exclusively against new large-scale renewable energy supply supported by the *Utilities* and *Social Greens* coalitions. The New England Power Generators Association represents both renewable and fossil fuel power supply companies, and their association argued against large-scale hydropower from Canada being included in the state's power procurement. They argued that the Canadian hydropower project would threaten competitive electricity pricing, jeopardize electricity reliability in New England, and negatively impact local jobs. In testimony against the proposal, Dan Dolan, President of the New England Power Generators Association, argued that the legislature should focus on other sectors because power generators are already reducing greenhouse gas emissions, stating that, "Since 2011, carbon dioxide emissions have been cut dramatically in New England. Massachusetts should be proud of this leadership, but also recognize the costs, challenges and consequences with attempting to dramatically exceed clearly set emissions goals through out-of-market mechanisms like Senate Bill 1965."[25]

5.4. Who wins and how?

Which coalitions emerged victorious from these three legislative sessions? Which failed to pass their own bills or stop those of their opponents? In other words, did outcomes correlate significantly with the interests expressed by different coalitions through lobbying? To answer these questions, we examine the correlations between bill movement and the summed position lobbied by each coalition on each bill. Here "summed position" refers to the sum of recorded lobbying positions by coalition members, with (support/neutral/oppose) encoded as (+1, 0, −1) on each bill. "Movement" refers to whether a bill progressed to the next stage in the legislative process or was signed.[26] Fig. 4 shows coefficients of a logistic regression between each coalition's summed positions on bills at each stage in committee, and whether those bills moved to the next stage. While this regression cannot confirm a causal relationship between lobbying and bill progression, it does indicate whether decisions made in the legislature match the preferences of certain coalitions with better-than-random frequency.

We find that *Utilities* have the largest and most significant positive correlation between their interests and bill movement ($p < 0.001$), followed by *Conservation & Planning* ($p < 0.001$), and *Fossil & Chemical* ($p < 0.05$). The *Hydro & Wind* coalition's lobbying positions have a significant ($p < 0.05$) negative correlation with bill movement. The other coalitions' correlations vary but are not statistically different from zero.

We can see that the legislative process systematically results in outcomes that benefit certain coalitions – most notably the *Utilities* – over others. Interest groups can see success in the legislature either because bills they opposed often failed or because bills they supported tended to pass. We find that the three coalitions above gain success through different combinations of oppositional and supportive lobbying. Individual members of the *Utilities* coalition lobbied against bills in this set 184 times and for bills 137 times, *Conservation & Planning* members lobbied in opposition 12 times and in support 200 times, and *Fossil & Chemical* groups lobbied against bills 164 times and for them 14 times. This difference indicates that while the legislature blocked bills contrary to *Fossil & Chemical* coalition preferences – such as carbon pricing and public pension divestment – and advanced bills favored by *Conservation & Planning*[27], it both blocked attacks on *Utilities* interests *and* advanced bills favored by *Utilities*.

Note that the regression only indicates whether coalitions' lobbying had any substantial relationship to bill progress, *not* whether those coalitions gained or lost anything from the few bills that passed. Hydro and wind power companies benefited from major purchasing mandates during this period, but the regression indicates that other coalitions' lobbying may have had a larger effect on that outcome than theirs (although it does not permit causal inference). Similarly, advocates in the *Social Greens* coalition supported nearly all of the bills in this dataset. In one sense, this means that every bill passed during this period also constituted a "win" for the *Social Greens* — but as Fig. 4 indicates, the *Social Greens'* preferences had no consistent correlation with legislative activity.

What, specifically, did the *Utilities* win? The major mitigation-

[23] David J. O'Donnell (Associate Director, Massachusetts Petroleum Council), October 10, 2017, written testimony on House Bill 3281, *An Act Related to Public Investment in Fossil Fuels*.

[24] Greater Boston Real Estate Board, June 30, 2015, written testimony on Senate Bill 1761, *An Act Relative to Home Energy Efficiency*.

[25] New England Power Generators Association, September 29, 2015, written testimony in opposition to Senate Bill 1965, *An Act Relative to Energy Sector Compliance with the Global Warming Solutions Act*. This testimony was collected during our study, but this bill was not included in the testimony analysis.

[26] For example: if five members of the *Utilities* coalition lobbied against Bill X, and one member for Bill X, while the bill was in joint committee, and Bill X then progressed to the House Ways and Means Committee, this would correspond to a point (-4, ..., 1) in the regression for figure 4. Since every bill has a unique identifier in each committee, we can measure interest group lobbying at multiple stages and on multiple iterations in the development of each bill.

[27] The bills passed which *Conservation & Planning* groups lobbied for were almost entirely sustainable development and adaptation bills, with small clauses relevant to climate mitigation. When these bills were removed from the study, *Conservation & Planning* either disappeared as a unique coalition or had a non-significant correlation with bill movement.

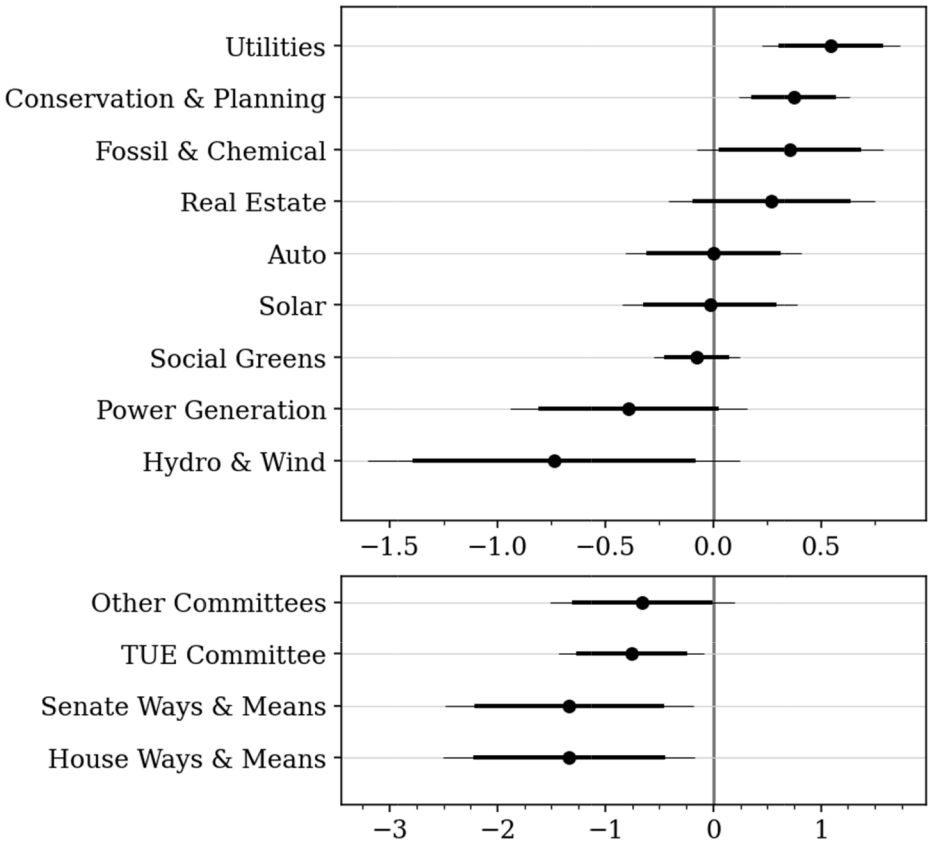

Fig. 4. Legislative progress correlates with *Utilities*, *Conservation & Planning*, and *Fossil & Chemical* coalitions' lobbying. The dots plot coefficients of logistic regression between coalitions' summed lobbying positions on every bill, and a binary variable indicating whether the bill moved out of its committee. Summed lobbying positions aggregate the individual interest groups' positions on each piece of legislation, encoded as + 1, −1, or 0, within each coalition. Thick and thin lines indicate 95% and 99% confidence intervals. The bottom panel shows coefficients estimated for dummy variables indicating the committee from which each bill does or does not progress.

focused climate and energy bills passed during this period were two omnibus bills, in the 189th and 190th legislative sessions, which defined and then doubled a mandate for utilities and regulators to bring 1600 MW of offshore wind power onto the Massachusetts grid. These procurements were strongly supported by National Grid and Eversource, the state's two largest utilities - who both stood to gain substantial financial benefits from marketing the electricity from these procurements or building new transmission lines for them. Additionally, a bill in the 188th session imposed regulations on the repair and reporting of gas leaks from decaying pipelines passed. In all three cases, members of the *Utilities* were split on the introduced bills, with some opposition and some support. As the legislation made its way from joint committees to Ways and Means, and then to engrossment, *Utilities'* opposition faded (Fig. 5).

Advocates, renewable energy industry leaders, and former legislators we interviewed emphasized the power of the utilities, with several stating that they are a larger obstacle to climate action in Massachusetts than the fossil fuel industry. Longtime policy directors for major environmental coalitions with whom we spoke lamented that utilities' opposition alone could kill a bill in committee; our evidence validates that

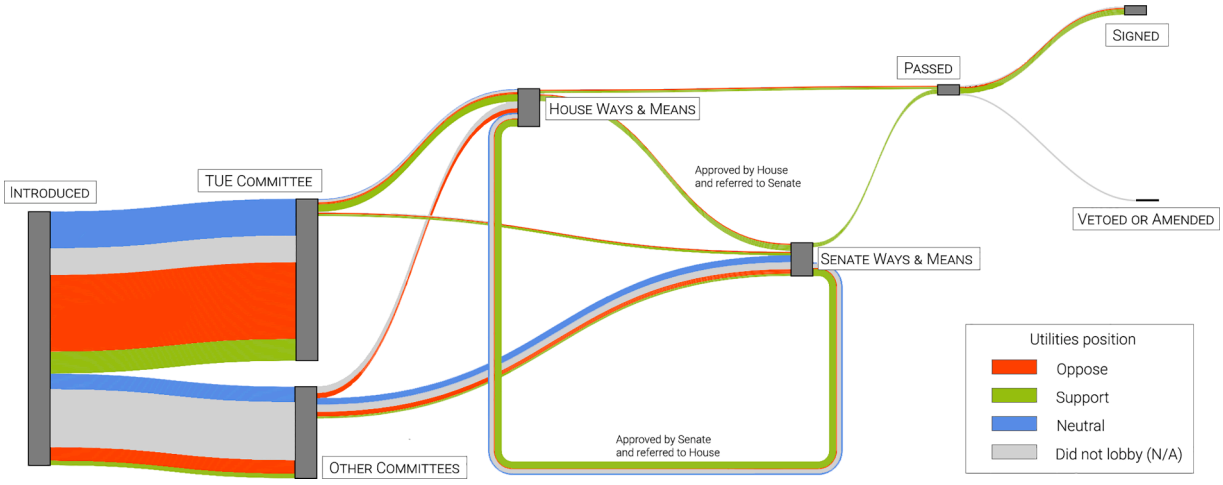

Fig. 5. *Utilities'* lobbying preferences reflect changes in legislation throughout the session. Sankey diagram showing the fate of climate and clean energy legislation in Massachusetts 2013–2018, and *Utilities'* summed position (support = green, oppose = red, neutral = blue, did not lobby = grey). Bills move from left to right: all bills introduced begin on the left margin. Only bills lobbied on by at least one member of the *Utilities* coalition are shown. "TUE" refers to the Joint Committee on Telecommunications, Utilities and Energy, in which most climate and energy-relevant bills are introduced.

claim. Ben Downing, former Massachusetts Senator, said "I've never been in a conference committee and heard someone say API [the American Petroleum Institute] can't get there on [a bill] so it's not gonna happen. But I've been in multiple shouting matches where utilities did determine the outcome. There's much more power there than people appreciate…When I talk to environmental advocates there's a belief that measures are being stopped by big oil and big coal. That's not the case in MA. The blocks are utilities… business groups like AIM [the Associated Industries of Massachusetts], and complacency." (Interview, July 2019).

Interviewees named several reasons why utilities hold such influence in the legislature: their perceived expertise on energy issues, their dominant position within powerful business organizations such as the Associated Industries of Massachusetts (AIM), and their relationships with the legislative leadership. A former state energy regulator who chose to remain anonymous argued that on energy issues, utilities "aren't just convincing; they're the experts. They have the electrical engineers that you're not going to find anywhere else." Perceived expertise allows utilities to set constraints on the policies considered feasible. A legislative staffer in the Telecommunications, Utilities and Energy committee commented that legislators are more likely to heed lobbyists requesting specific line changes on bills, rather than broad demands — and organizations without technical expertise can struggle to make such specific requests.

Utilities receive further support and legitimation from AIM and other business associations. Historically, these associations have promoted natural gas and opposed solar incentives on the grounds that doing so is necessary to keep energy costs manageable for businesses and ratepayers [73,74]. A state energy regulator interviewed in this study expressed agreement with AIM's reasoning and claimed that they "try to argue for their cause in a productive way," — as opposed to some environmental groups, which they characterized as "bomb-throwers." In interviews, environmental advocates and a former legislator voiced frustration at the legitimacy given to this reasoning, despite evidence to the contrary from organizations including the Massachusetts Office of the Attorney General [75].

Utilities' combination of large lobbying budgets, perceived expertise and support from core business associations makes them particularly influential among legislative leadership. The hierarchical and opaque structure of the Massachusetts legislature makes influence with the political leadership more important than it might be in a more democratized state. Interviewees named the trifecta of the House Speaker, Senate President, and Governor as the dominant influence on policy decision making in the state, with the House Speaker playing the most important role in determining what legislation moves to passage. The Speaker controls committee appointments, the budgeting process, party funds, the flow of information, and whether bills can move out of committee. Many votes either in committee or on the House floor go unrecorded, leaving few avenues for public pressure on Representatives to counter pressure from lobbyists and the Speaker. As one interviewee put it, "It does seem that the House is a dictatorship and not a democracy."[28] Within this context, established relationships by lobbyists with House leadership become especially valuable, as multiple interviewees in state government reinforced.

6. Discussion and conclusion

This study was guided by three core questions. First, *what actors make up the major coalitions for and against climate and clean energy legislation?* Our analysis of lobbying activity reveals a broad split between the coalition advancing climate and clean energy legislation (*Social Greens*, *Conservation and Planning*, *Hydro & Wind*, *Solar*, and *Auto*) and its opposition coalition (*Utilities*, *Power Generation*, *Fossil & Chemical*, and *Real Estate*). The utilities, similar to their role in key federal climate policy [39], opposed, hedged their bets on, or supported climate legislation in Massachusetts based on their ability to manage and profit from energy supply. These findings inform interest group coalitions research, showing that a broader set of coalitions are blocking climate change policy at the state level than have been previously reported. In particular, the real estate industry's consistent opposition to state-level climate legislation, particularly energy efficiency mandates and climate adaptation policy restricting building location, has not been found in previous studies. Given the importance of emissions reductions from buildings to meet overall climate goals [3], their role and preferences deserve further attention.

Second, we asked *are political alignments consistent across climate and clean energy issues?* Most coalitions consistently support or oppose environmentalists on climate and clean energy issues, but their participation varies significantly based on their interests and profit motives. Major utilities in the Northeast are an exception: members of the *Utilities* coalition agreed with *Social Greens* on some energy efficiency and large-scale wind and hydro project legislation, while opposing solar energy (utilities opposition to solar net metering has been documented nationally [38]) and other climate policies. Support between green coalitions was contingent and intermittent. Environmental and social NGOs spread support over a wide number of bills spanning issues from carbon pricing to green development and net metering. However, the higher-spending industrial sectors such as *Hydro & Wind* or *Solar* firms and their industry organizations rarely stepped outside of their narrowly defined interests, failing to support broader climate policy approaches that would tip the balance away from fossil fuels (including carbon pricing) and towards their own products and services. More research is needed to understand the extent of this disconnect. We believe this pattern, and the (related) imbalance in professional lobbying, are crucial issues that if unaddressed portend poorly for climate and clean energy progress in the states.

Our third question was *who are the winners and losers, and how do the winners use the legislative process to get what they want?* We find that the *Utilities* coalition is most successful in shaping climate and clean energy legislation in Massachusetts, and its preferences aligned with bill outcomes (as measured by movement through committees) more frequently than any other coalitions'. While the coalitions we identify are relatively consistent across lobbying and testimony datasets, the extent to which they participate in these arenas varies significantly: in public testimony, environmentalists and their allies outnumber their opponents nine to one, but in lobbying spending top environmentalist organizations and their allies are outspent by leading industrial interests by a ratio of 3.5 to 1. These findings mirror studies of federal lobbying, where business associations and corporations vastly outspend nonprofits (e.g., [45]). Lobbying professionals and their ties to legislative leadership are especially important during the crucial later stages of the legislative cycle [28]. Our analysis of the legislative process shows that the committees are critical veto gates where interest groups exert power. Bills that managed to be reported out of committees systematically were biased towards the interests of *Utilities* and, to a lesser extent, *Conservation & Planning* and *Fossil & Chemical* coalition members.

What implications do our findings have for research on climate politics and state-level policy development more broadly? The lobbying behavior of the *Fossil & Chemical* coalition appears to bear out the hypothesis that fossil fuel corporations work to maintain their status quo position [13,22]. The vast majority of these interest groups' lobbying efforts opposed climate and energy legislation, and they succeeded during this study period, in that the legislature did not move forward with any carbon pricing, divestment or fracking regulations. *Fossil & Chemical* groups as a whole were less engaged in blocking new renewable energy development than in protecting their status and legitimacy. Where Downie found that the coal industry almost uniformly opposed several important federal climate policies [39], we find similar unwavering opposition from the oil and gas industry in the state, suggesting a

[28] Interviewee chose to remain anonymous.

lack of avenues to mitigate climate opposition from the fossil fuel sector. In contrast to Mildenberger's findings at the federal level [22], we did not find a major presence of labor unions in opposing climate action, in either testimony or lobbying. This could be due to the lack of major fossil fuel sector facilities in the state, but other labor locals and coalitions were largely in favor of or quiet on climate bills.

Our study also reinforces recent qualitative research that utilities often dominate state-level climate politics [13]. We found that the *Utilities* coalition's preferences functioned almost as a *sine-qua-non* filter, allowing only those bills which they approved to progress.[29] Even powerful interest groups in Washington have a difficult time molding new policies to fit their preferences in this way [43]. Due in part to the *Utilities'* influence, offshore wind appears to have become a consensus issue among several major lobbying groups, despite conflict over many other elements of state decarbonization. Massachusetts is beginning to invest in the industry as a part of its industrial and regional development strategy, and there is substantial potential for "policy feedback" as wind power firms and industry organizations grow and spread across the region. While the solar industry is highly fragmented and rooftop arrays are often "behind the meter" [76], the offshore wind industry is concentrated in a handful of firms able to provide large-scale installations favored by utilities [77]. In this context, a transition towards large-scale wind power may do little to change the power relationships in Massachusetts or other states where utilities hold sway over energy policy.

Clean energy policies received an impressive amount of supportive testimony from both organizations and individuals (Section 5.2). Information-based theories of lobbying give *prima facie* reason to think this show of strong public support would lead legislators to pass more ambitious climate legislation. Our results (Section 5.4) indicate that testifying is not sufficient to overcome the significant advantages in power and influence afforded to opposition interest groups through the hierarchical and closed-door legislative process [28]. We believe legislative testimony, where available, to be a promising and under-utilized avenue for future research of interest group preferences and discursive strategies at the state level.

Our findings have broader implications for interest group studies and policy development, especially at subnational levels. Briefly, our work suggests the significant investment in lobbying, its value at producing legislative outcomes, the failure of testifying to change policy direction, and the complexity of interest group coalitions at the state-level. These patterns likely apply to other states and issue areas. Second, this study takes as given the absence of *structural* barriers to climate action in this liberal, non-extractive state [14]. It finds important power relations between interest groups, including splits between industry sectors, and documents the importance of *processes* such as "buffering" [28,29] in the back rooms and committees during late stages of the legislative session.

Third, many studies in this area are based on interviews and process tracing (e.g. [13,28,37]); our study sought to examine empirically who lobbies with whom and against whom, who shows up to publicly testify, and what they argue. We propose the value of systematic research on lobbying, testimony, and other datasets to understand interest group actors at the sub-national level. Transparency on testimony, lobbying and votes will be crucial for useful future research[30], but also for the likely fate of climate and clean energy legislation [66]. Our method of inductively discerning coalitions and their opponents by lobbying self-reports is novel and should be useful at all levels of government where such data is available. Linking that data with databases tracking the history of legislation opens a new avenue for observing the outcomes of influence efforts.

Further, future work should extend beyond state legislatures, which is but one key arena for contestation of climate and clean energy struggles at the sub-national level. More studies are needed of cities, counties, and key regulatory bodies like Energy Facilities Siting Boards, Public Utilities Commissions, and the Department of Public Utilities, where pipeline proposals, electrical grid modernization and gas leak prevention plans are heard and debated. In many of these arenas—there are 90,000 local governments in the United States alone [17]—the advantages of powerful interest groups and their coalitions will likely be yet more evident, but in each, different sets of countervailing factors matter significantly. There is much work to be done to understand who is delaying climate action.

Declaration of Competing Interest

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Appendix A. Supplementary data

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