Building Climate Policy in the States

Large-scale carbon emissions reductions in the United States likely require national-level policy, but political and institutional constraints restrict the scope of policy that can be enacted in Washington. State governments, on the other hand, have demonstrated a remarkable willingness to enact climate policies, despite the global nature of the problem. Although it is limited in directly reducing carbon emissions, state policy has the potential to make the terrain of U.S. climate politics more fertile for future policy. I discuss mechanisms by which climate *policies* enacted at the state level can influence climate *politics* across the states and at the national level. Finally, I make policy and political strategy recommendations that take these multilevel policy feedback dynamics into account.

Keywords: climate change; subnational; state policy; policy feedback; multilevel feedback; federalism

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The scientific evidence is clear: policy choices in the next decade will be crucial to averting the worst effects of climate change (Masson-Delmotte et al. 2018). Because it is both a large emitter and a global leader, the United States will play a key role in either driving a global response or impeding one. Recent developments at the national level do not inspire optimism. Even with control of the presidency and a supermajority in Congress in the early Obama years, the Democrats were unable to push through substantial climate legislation (Skocpol 2013). What is more, the Trump administration has rolled back Obama's modest executive actions on climate (Milman 2018).

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Climate optimists look to the state and local levels, where governments have been highly active in enacting policies to mitigate climate change despite the global nature of the problem. Indeed, since 1990 twenty-eight states have adopted renewable portfolio standards (RPS). Liberal-leaning states have responded to federal climate inaction in the Trump era by further ramping up policy and declarations. In addition to passing a slew of state-level policies, twenty-four governors have agreed to implement policies to advance the goals of the Paris Agreement through the U.S. Climate Alliance (Wallach 2019).

The optimism is tempered, though, by concerns about the effectiveness and sustainability of relying on subnational policy to address climate change. Even as advocates press for policy advances at the state and local levels, there is general agreement that large-scale carbon emissions reductions in the United States will require national-level policy (e.g., Saha 2014). Because national-level policy is needed to address climate change, it is crucial to consider the feedback effects of subnational policies on politics at multiple levels of government.

Although state policy is, for reasons I discuss, generally an inefficient mechanism for directly reducing carbon emissions, state policies have the potential to make the terrain (Hacker and Pierson 2014) of U.S. politics more fertile for large-scale climate policies in the future. In this article, I highlight the particular ways in which climate *policies* enacted by one state can influence climate *politics* in that state, in other states, and at the national level. These types of *multilevel* policy feedback effects can help to counteract the collective action problems inherent in addressing climate change. They also help to resolve the mismatch between the economically optimal level of policy—the national or international level (Nordhaus 2015)—and the more politically feasible level of policy—the subnational level.

In addition to highlighting mechanisms of positive feedback, I also highlight potential for backlash, or negative feedback (Jacobs and Weaver 2015). As Eric Patashnik discusses in this volume, the intense partisan politics of the current era makes policies more vulnerable to backlash, so policy designers should consider mechanisms of negative feedback. Finally, I highlight a number of empirical questions. At this point we have only qualitative and anecdotal evidence for many of the policy feedback dynamics I discuss, since scholars have not developed strategies for quantitatively evaluating policy feedback effects in climate, much less estimated cross-state and state-national feedback effects. That said, lack of empirical evidence should not be interpreted as evidence of a null effect, especially given the challenges of causal identification in policy feedback research.

A Turn to the States

In an ideal political scenario, reducing carbon emissions would be addressed through policy almost entirely at the national and international levels. The drive for an international response stems from the reasoning, derived from economic models of collective action, that national or subnational actors would be reluctant

to reduce emissions absent an international agreement (Nordhaus 2015). Yet international negotiations have failed to produce binding emissions restrictions, and the international climate framework has shifted from "top-down" to "bottom-up" with the 2015 Paris Agreement (e.g., Robiou du Pont and Meinshausen 2018).

If a political solution is not to come from the international level, the next best alternative is the national level. Large nations such as the United States contribute enough to global emissions that, according to rational choice models that account for the costs and benefits of emissions reductions, they have an incentive to reduce emissions despite the collective action problem (Nordhaus 2015).[1] This collective action problem might then be mitigated at the international level through "pledge and review" processes or climate clubs (Victor 2011).

However, in the U.S. case, large-scale national-level climate policy seems far out of reach. While overall public support for addressing climate change is strong, it has not improved considerably over time.[2] Meanwhile, other political trends, layered on the United States's unique political institutions, are unfavorable to large-scale national-level climate policy. First, Congress is increasingly gridlocked. While American political institutions were designed to privilege the status quo, polarization expands the "gridlock interval," preventing Congress from addressing major issues like climate change (Binder 2015).

Second, the institutional structure of Congress is biased against proclimate interests. In addition to privileging the status quo, the design of Congress privileges rural areas, which have grown more opposed (relative to urban areas) to climate policy over time.[3] The rural bias of the Senate, with its overrepresentation of small-population states, is well-known. However, as Democrats have become clustered in urban areas, the House has also developed a rural bias, in many cases worsened due to partisan gerrymandering (Chen and Rodden 2013).

These institutional barriers would not be so prohibitive if climate change were less divisive along partisan lines. But consistent with general polarization, while the Democratic Party has grown more bullish on addressing climate change, the Republican Party is increasingly responsive to groups opposed to addressing it (Skocpol 2013). This was not always the case. The parties took similar stands on general environmental issues until the mid-1990s. Moreover, as recently as 2008, leading Democrats and Republicans jointly called for climate action.[4] Since then, the parties, both at the elite and individual levels, have moved ever further apart on climate policy (Kim and Urpelainen 2017; Egan and Mullin 2017). Greater climate polarization makes national-level policy less likely, both due to gridlock and rural bias in representation.

Moreover, due to the overwhelming power of party attachments and elite cues, large-scale shifts in public sentiment are unlikely to occur absent signals from Republican Party elites (Green, Palmquist, and Schickler 2004; Lenz 2013). Indeed, Skocpol (2013) argues that a major mistake of climate advocates in the cap and trade push of 2010 was the failure to account for the power of anticlimate forces within the Republican Party.

Unable to win national-level legislation, climate advocates have turned much of their attention to the state (and local) level. While the Democrats' federal-level

cap and trade proposal crashed in former President Obama's first term, California and a coalition of Northeast states have grown their respective carbon trading schemes. Meanwhile, a growing number of governors have responded to President Trump's withdrawal from the Paris Agreement by acting as U.S. climate representatives in international talks.[5] State-level climate action, however, has generally been restricted to states controlled by Democrats, while Republican-controlled states have generally stagnated and in some cases retrenched climate policies (e.g., Stokes 2015).

While Democrat-controlled states have led the way, survey evidence supports the notion that most citizens, in both Democrat- and Republican-controlled states, want their state governments to do more on climate. According to the Yale Program on Climate Change Communication's 2018 survey data, more than 54 percent of respondents in states under Democratic governors supported their governors doing more (compared to just over 53 percent in states under Republican governors), while only between 15 and 16 percent of respondents in both Democrat- and Republican-governed states advocated for their governors to do less. Meanwhile, the percentage of respondents advocating additional action was an even higher 57 percent in unified Democrat-controlled states—the states currently doing the most on climate.

Limitations of State Policy

While states have shown a remarkable willingness to adopt aggressive climate policies, state policy is inherently limited in addressing climate change. First, states are limited by the collective action problem. It is unclear what costs citizens in liberal states will be willing to bear in the long run to reduce emissions while coal plants fire off in other parts of the country. Indeed, legislative efforts to establish a carbon tax have stagnated in liberal strongholds such as Vermont and Massachusetts, while a high-profile ballot initiative establishing a carbon tax failed in Washington State in 2018 (Meyer 2018).

In addition to the collective action problem, there are other more direct barriers to effective state climate policy. One is carbon leakage, a dynamic by which emissions regulations introduced in one jurisdiction lead to increases in emissions in other jurisdictions (e.g., Fowlie and Reguant 2018). Scholars generally recognize two mechanisms of leakage: first, where carbon-intensive industrial activity is shifted to regions with less stringent regulation; and second, where regulations reduce demand for carbon intensive inputs, lowering their price, increasing their consumption, and thereby raising emissions elsewhere.

Carbon leakage is particularly worrisome for subnational policy. In an integrated electricity market, if one state requires more of its electricity to be sourced through renewable power sources, this might increase the availability of existing dirtier power sources for states with less aggressive policy, a dynamic known as "resource shuffling" (Cullenward 2014). Moreover, the common national market makes it easier for energy intensive industry to shift production and emissions to

lagging states. Research suggests leakage continues to erode the effectiveness of state climate policies, despite the actions states have taken to mitigate it (Caron, Rausch, and Winchester 2015; Rabe 2018).

Finally, even if state policy were highly effective in reducing carbon emissions, it is unlikely that enough states will be controlled by climate policy–friendly politicians in the near future to make a serious dent in U.S. emissions. One reason is that the areas of the country where liberal candidates tend to perform well are not highly carbon intensive. In the 2018 elections, the number of Democratic "trifectas" (where one party controls both chambers of the legislature and the governor's office) grew to fourteen states. While these fourteen states account for around 35 percent of the population and 35 percent of GDP, they only contributed 25 percent of total emissions as of 2015.

State Policy as a Political Tool

The optimal level at which government should intervene for effective climate policy—the national level—does not align with the level of government at which there is political capacity for addressing climate change—the state and local levels.[6] How should climate advocates respond to the mismatch? One way is to consider the ways that state climate policies can help to build political capacity for policy expansion within states, across states, and at the national level.

Depending on their design, public policies can reshape future politics, a dynamic that political scientists call "policy feedback" (e.g., Pierson 1993). For instance, Campbell's (2003) seminal work demonstrated that the advent of Social Security markedly increased the participation of seniors in politics, redirecting the trajectory of U.S. politics and policy.

Scholars have long recognized the vital role of these types of path dependencies in energy systems. Unruh's (2000) influential paper coined the phrase *techno-institutional complex* to describe the various feedback mechanisms between technology and society that make it difficult to move away from a carbon-intensive production system. More recently, scholars have considered how policy can produce political feedback that chips away at fossil fuel's techno-institutional complex (e.g., Levin et al. 2012). Building on these theoretical advances, scholars have proposed strategic policy sequencing to leverage policies like green industrial supports, which are politically attractive but not particularly effective in reducing emissions, into policies like carbon pricing, which are politically unattractive but effective at reducing emissions (e.g., Meckling et al. 2015; Pahle et al. 2018). This strand of literature has recognized that resolving a long-term issue like climate change requires policy that is not only sustainable but also capable of ratcheting up over time. Therefore, policies designed to promote positive feedback are essential.

This general feedback framework must be tweaked for the particular institutional context of the U.S. states. State policy is limited in its effectiveness at emissions reductions, so exploiting feedback processes to ramp up policy in one state

is likely to have a minor overall effect on emissions. On the other hand, feedback effects from state policy could be quite powerful to the degree that they influence politics in other states and nationally.

There are several reasons why cross-state and state-national feedback are particularly consequential in this context. First is decreasing marginal returns. Ratcheting up an already-strict carbon pricing scheme is likely to carry a high cost per ton of emissions abated, while introducing a modest carbon pricing scheme might price out coal plants, abating a large amount of emissions at a low cost. As a result, policies in leading states that influence politics (and ultimately, policy) in lagging states would be particularly impactful. Second, cross-state feedback can reduce carbon leakage, sharpening the emissions-abating effects of policies in the leading state. For instance, to the degree that California's policies produce positive political feedback in Arizona, they might lead to the adoption of stricter climate policies there. If Arizona adopted stricter policies, less carbon would "leak" from California to Arizona. Third, cross-state feedback effects could jump-start within-state feedback processes. Green industrial policy in California might encourage the adoption of green industrial policies in Arizona, mobilizing Arizonan renewable interests that subsequently advocate for policy maintenance or expansion.

Although climate is a global public good, due to the institutional and political factors discussed, U.S. policy progress on climate change is more feasible at the subnational level. To the degree that state climate policies make the terrain (Hacker and Pierson 2014) of national politics more fertile for broader climate action, they might have effects on the long-term trajectory of climate change that go far beyond direct emissions reductions.

Policy Recommendations

Utility-scale green industrial policy

Policies like RPS or feed-in tariffs (FiT) that mandate or incentivize adding renewable generation capacity have played an important role in driving growth in wind and solar generation (Carley et al. 2018). By promoting the development of renewable capacity, these policies can produce within-state, across-state, and state-national positive feedback.

Green industrial policies can construct and empower political interests like clean energy firms that often advocate to defend and expand those policies that benefit them (Meckling et al. 2015). This feedback mechanism is not necessarily limited to the states where policies are passed. RPS are satisfied through the purchase of renewable energy credits (RECs), which are submitted to regulators by load-serving entities (generally utilities). Most states allow a certain percentage of RECs to be submitted "unbundled," or purchased separately from the associated electricity produced (Carley et al. 2018). Strict RPS policies increase the demand for RECs, which can spur the development of renewables projects in other states (Hollingsworth and Rudik 2019). For instance, it seems that the

strong RPS in California has spurred the growth of wind power in Wyoming (Barringer 2008).

To the degree that local wind energy interests are active in Wyoming politics, this is a clear mechanism of cross-state policy feedback. Moreover, since states are subject to national law, the green industries constructed through state policy also have a stake in national-level policy debates. While they are still vastly outmuscled by fossil fuel interests in Washington, state green industrial policies have undoubtedly enhanced the power of the clean energy lobby in Washington.

Another mechanism by which green industrial policy can produce multilevel positive feedback is the development of technology. Recent evidence suggests that market-stimulating policies were a key factor driving down the cost of solar panels (Kavlak, McNerney, and Trancik 2018). Expanding green industrial policies in leading states can lead to efficiency gains in technologies like solar panels, in addition to other technologies like advanced storage and smart grids that allow a power system to accommodate significant intermittent renewable resources. The development of these technologies reduces the cost to other states of adopting strict RPS policies. For instance, to the degree that a strong RPS in California drives the development of more efficient storage technology, this would lower the cost to other states of imposing a stricter RPS.

Advocates must exercise caution, though, since green industrial policies might also generate negative political feedback. The biggest potential source of negative feedback is constituent backlash to higher electricity prices. Policies like RPS and FiT (as generally designed) tend to increase electricity rates, especially at higher levels of penetration (Weiss 2014). One way to mitigate this effect is by sequencing green industrial policies after energy efficiency policies that reduce electricity usage overall. Lower electricity usage means that price increases are less likely to lead to large increases in electricity bills.[7]

These dynamics motivate several recommendations, which are presented in Table 1. First, in general, policies that promote the development of green energy should be pursued or ratcheted up whenever possible. In addition, in "leading states," loosening within-state generation requirements can reduce the economic cost of ratcheting up RPS, while potentially generating positive cross-state feedback.

Different strategies might be required in "lagging," more conservative states, where RPS requirements are generally nonexistent, weak, or under attack (Stokes 2015). In these states, advocates might consider a feed-in tariff instead. While RPS requires a specified proportion of total electric power to come from renewable sources, feed-in tariffs set a price (generally higher than wholesale electricity rates) at which renewable generators can sell power to the grid. Since they tend to encourage the development of generation from independent power producers (IPPs), as opposed to utilities, FiT may be more likely to produce a supportive constituency, especially in rural areas (Bayer and Urpelainen 2016).

Distributed generation policy

In addition to promoting the development of utility-scale renewable generation, state policies also have huge implications for the development of distributed

TABLE 1
Green Industrial Policy Recommendations

Recommendation	Positive Feedback	Negative Feedback	Empirical Question
Loosen within-state generation requirements	Build renewable interests in lagging states	Less within-state generation might reduce within-state feedback	Do renewable producers advocate in states where located even if benefit from policies in another state?
Ramp up RPS	Build renewable generation; incentivize development of complementary technologies like storage	Higher electricity prices	Magnitude of positive feedback from building renewables? Sensitivity of consumers to prices?
Advocate for FiT in lagging states	Build renewable generation more likely to be owned by IPP's vs. utilities	Higher electricity prices	Magnitude of positive feedback from building renewables? Sensitivity of consumers to prices?

generation (DG), mainly rooftop solar. There are two key policy levers by which states can influence the development of DG.[8] First is pricing. In many states, rooftop solar is promoted through a pricing scheme known as net energy metering (NEM), which allows individuals and businesses that install distributed power (like rooftop solar) to sell any excess electricity generated to the utility at the full retail rate. Opponents argue that NEM produces a cross-subsidy from general ratepayers to owners of rooftop solar systems, although estimates of the size of the subsidy are disputed and depend on the amount of distributed generation on the grid (Barbose 2018). Regardless, policies like NEM that value electricity produced behind the meter at a high rate are essential to the growth of rooftop solar (Carley 2009).

Second is interconnection, or the rules for how a distributed generation system can connect to the grid.[9] Consistent, rooftop solar–friendly interconnection standards are essential to the development of rooftop solar (Carley 2009). In addition to declines in the price of solar panels, rooftop solar–friendly state policies have led to rapid growth in rooftop solar installations.[10]

The most basic potential feedback mechanism from pro–rooftop solar policy is mobilization of program beneficiaries (rooftop solar owners) to protect and expand those policies that benefit them. However, there are reasons we might expect a minimal effect in this case. First, NEM pricing is generally not highlighted in utility bills, so people may not see themselves as beneficiaries (Mettler 2011). Moreover, a large portion of installations are leased to customers by firms such as Sunrun and Vivint, which, depending on the terms of the lease, would bear the cost of policy changes. More research is required to determine how rooftop solar affects the political behavior of policy beneficiaries. This research

TABLE 2
Distributed Generation Policy Recommendations

Recommendation	Positive Feedback	Negative Feedback	Empirical Questions
Maintain or expand NEM, especially in high-potential, low-penetration states	Beneficiary and employee feedback; industry feedback (especially cross-state)	Electricity prices	Individual and employee beneficiary? Magnitude of cross-state feedback from industry? Sensitivity of consumers to prices?
In leading states, introduce designs to reduce rate impacts, like allocating general revenue or revenue from carbon pricing	Electricity prices		Sensitivity of consumers to prices?
Expand community solar programs	Construct beneficiaries		Advocacy of beneficiaries?

might pay particular attention to organizations working to mobilize rooftop solar owners such as the Solar Rights Alliance. Advocates might also consider strategies to increase the salience for beneficiaries of policies like NEM that support rooftop solar.

Pro–rooftop solar policies might also influence politics by mobilizing those employed in the sector. The rooftop solar industry generates considerable employment.[11] Anecdotal evidence suggests those employed in the sector will mobilize to defend policies that keep business flowing. Furthermore, there is some evidence that employment in rooftop solar might increase support for climate policy more broadly (e.g., Tvinnereim and Ivarsflaten 2016).

Pro–rooftop solar policies also support business interests that have been strong advocates for the maintenance and expansion of these policies. These effects can take hold at multiple levels and sites of government. The most profitable territory for large installer firms such as Sunrun and Vivint are sunny states with prosolar policies. Since the number of viable homes is limited in these states, long-term expansion for rooftop solar companies requires the take-up or maintenance of prosolar policies in other states. For this reason, large installers have been on the front lines of battles to preserve or expand policies like NEM in Arizona, Nevada, and South Carolina. These companies were empowered by aggressive renewables policies in early adopting states such as California and Hawaii, but spend resources lobbying for policy maintenance and expansion elsewhere (e.g., Whieldon 2015).

The feedback framework suggests several broad recommendations, which are laid out in Table 2. To start, climate advocates might push for expansion of pro–rooftop solar policies, especially in low-penetration, high-potential states.

Focusing on low-penetration states reduces the risk of large increases to electricity rates, which might produce negative feedback. Moreover, expanding the policy to low-penetration states might allow clean energy interests to get a foothold.

In leading states, advocates might consider design changes that reduce rate impacts of policies such as NEM at higher penetrations. For instance, instead of financing the program through a ratepayer cross-subsidy, states might allocate revenue from carbon trading programs or severance taxes on oil and gas extraction to fund rooftop solar supports.

Advocates might also focus on promoting community solar programs, which allow individuals to invest in a local solar generation facility and receive credits on their energy bills (Coughlin et al. 2010). These programs tend to be more cost-effective than NEM, since community solar sites capture economies of scale (Brehm, Koch Blank, and Mosier 2018). Moreover, community solar allows renters and homeowners without suitable roofs to participate, expanding the pool of potential beneficiaries.

Carbon pricing

Carbon pricing policies have been more difficult to enact than green industrial policies at the state level. Unlike green industrial policies, carbon pricing tends to impose concentrated costs while delivering diffuse benefits (Rabe 2018). Despite this, California has established and expanded its cap and trade program, while the Regional Greenhouse Gas Initiative (RGGI), the northeast states' cap and trade program for power plants, has grown over time. In addition to reducing emissions,[12] carbon pricing (in the form of either a carbon tax or cap and trade) has the potential to produce within-state, across-state, and state-national positive feedback.

First, carbon pricing schemes that produce revenue and fund programs can generate beneficiaries (Marron and Morris 2016). Research shows that program beneficiaries often mobilize politically to defend those policies that produce their benefits (e.g., Pierson 1996). Revenue from carbon pricing programs is, in many cases, directed toward organizations working in clean energy and energy efficiency.[13] For instance, in Connecticut, RGGI funds are invested in energy efficiency and renewable energy programs managed by organizations such as the Connecticut Green Bank. In California, revenues from the cap and trade program established under Assembly Bill (AB) 32 have funded a number of community organizations throughout the state.[14] It is not hard to imagine that these groups would advocate for the continuation and expansion of cap and trade programs, although research documenting these effects is needed.

In addition to eroding the power of the fossil fuel industry, evidence suggests carbon pricing programs can also soften business opposition over time. Once a business has incurred the costs of adapting to an unfavorable policy, its preferences might change to neutral or even favorable (Meckling 2015). Eric Biber documents this process with respect to Proposition 23 in California (Biber 2013). Proposition 23, brought up in 2010, would have suspended the implementation

TABLE 3
Carbon Pricing Policy Recommendations

Recommendation	Positive Feedback	Negative Feedback	Empirical Questions
Expand where possible, focusing on states with strong green industrial policy	Soften business opposition; change preferences for national policy; erode opposition power	Electricity prices	How does carbon-intensive industry respond to carbon pricing? Sensitivity of consumers to prices?
Visible spending of auctioned permits	Construct beneficiaries		Advocacy of beneficiaries?

of AB 32—legislation that established California's cap and trade program. The proposition ended up losing badly in both Democratic- and Republican-voting parts of the state. Biber (2013) discovers a remarkable difference in the interest group landscape between AB 32 and Proposition 23. The California business community, led by the Chamber of Commerce and the large California-based oil company Chevron, mobilized strongly against AB 32. Four years later, though, the business community was mostly neutral. The process of adapting to AB 32 led California businesses to soften their opposition to climate policy down the road.

Moreover, state-level carbon pricing schemes can influence the preferences of firms for national level policy in a multilevel feedback dynamic. California utilities such as Pacific Gas and Electric (PG&E), while not always supportive of within-state climate policies, supported Obama's failed national-level carbon pricing initiative. The preference of California utilities for stricter national-level regulation is consistent with an economic motive. Carbon pricing policies increase electricity rates, which is harmful for large customers such as manufacturers. These customers may be inclined to shift production to other states, threatening utilities' business in the long run. Having stricter national-level policy reduces the disparity in policy stringency across state lines, which makes fleeing leading states for lagging states less appealing. These avenues of feedback motivate the recommendations put forth in Table 3.

An important and unresolved question is how best to use revenues from carbon pricing programs to generate positive feedback. It is clear that policy-makers should avoid using revenue in a nonvisible way, like paying down debt (Mettler 2011). But it is less clear whether revenues should be used to fund programs with concentrated beneficiaries (Oye and Maxwell 1994), or to fund diffuse (but visible) benefits like a per-capita dividend. A recent review article argues that the optimal choice might vary based on political context. According to Klenert and coauthors (2018), revenues can be tailored to address obstacles to climate policy expansions. For instance, where the main obstacles are distributional concerns, revenues can be transferred to the poor; but where the main obstacles are efficiency and competitiveness, reimbursing firms might be preferable.

Product standards

Product standards have proven in the past to generate powerful positive cross-state and state-national policy feedback. For instance, California's auto emissions standards have been adopted by a number of other states and strongly influenced the standards set by the Obama administration (Sullivan 2009).[15] Due to the size of California's vehicle market, manufacturers are inclined to produce a line of vehicles that satisfy its requirements. Preferring a unified market, those manufacturers are then more likely to advocate for the harmonization of standards at the stricter level (Vogel 1997). California's appliance and equipment efficiency standards on a variety of other products have also become national standards through similar processes.

Climate advocates can use product standards strategically to take advantage of the political geography of climate change in the United States. While Democrat-controlled states do not emit much carbon, they account for a sizable portion of economic output. As mentioned previously, Democratic "trifectas" account for around 35 percent of GDP but 25 percent of total emissions (as of 2015). By influencing standards in these locales, climate advocates can influence the preferences of manufacturers, who then can become allies in advocating for the diffusion and upward migration of standards. Moreover, product standards shift a substantial portion of the cost of emissions reductions to producer regions (e.g., Bolwig et al. 2013). Strategically shifting the cost of compliance to other states is one way of dealing with the collective action problem inherent in addressing climate change.

Bureaucracy

Successful policy can rely on strong administrative capacity, which itself is often produced as a result of prior policy decisions (e.g., Skocpol and Finegold 1982). The development of the California Air Resource Board (CARB) exemplifies the key role of policy in building bureaucratic capacity. Originally formed in 1967 to implement air quality policies, CARB's capacity grew as California adopted increasingly aggressive air quality measures. As California politicians have grown more concerned with climate change, CARB's mission and expertise has evolved accordingly (Vogel 2018). California's landmark 2006 carbon pricing law delegated the nuts and bolts of the policy to CARB, specifying only the timetable for emissions reductions and the requirement that market mechanisms be used to produce those reductions. A similar pattern occurred in the Northeast, where, as Barry Rabe (2018) argues, the long history of state coordination on air quality standards through Northeast States for Coordinated Air Use Management (NESCAUM) provided an important base for the development of RGGI. By stimulating the development of administrative capacity, state policies can open doors for more complex or administratively burdensome policies down the road.

Moreover, administrative capacity developed by one state can be used by other states through regional compacts. For instance, establishing a regional emissions trading program lowers the costs for other states in the region to price emissions.

According to a conversation with a Vermont program administrator, it is very unlikely Vermont would have priced its power plant emissions without the regional establishment of RGGI.[16]

While the national government is perhaps less likely to borrow administrative capacity from the states, development of administrative capacity in the states can also matter to the extent that state bureaucracies act as lobbyists and sites of policy expertise. For instance, CARB has emerged at the center of the political and legal battle against the Trump administration's plans to terminate California's ability to set its own fuel economy standards (Marshall 2018). This battle has consequences for California policy as well as policy in the thirteen states, plus Washington, D.C., that have adopted California's standards.

This suggests that, in crafting state policy, climate advocates should not necessarily advocate for solutions that minimize bureaucracy (Morgan and Campbell 2011). Moreover, advocates might promote policies that build bureaucratic capacity in environment-focused agencies, even if they have negligible direct effects on climate change mitigation.

Climate education

Climate education is another policy area that does not directly influence emissions but might affect climate politics in the future, in this case by influencing public receptivity to climate science. The states have recently been active sites of policymaking regarding climate education. In 2017, Idaho lawmakers removed parts of science education standards that referred to climate change, while similar bills have passed in Alabama and Indiana (Worth 2017). Climate advocates should be attentive to laws targeting climate education in lagging states and defend against them when possible. Climate advocates in liberal states might consider advocating for the addition of climate-change-related material to educational curricula and making sure teachers are sufficiently prepared to provide students with an understanding of the gravity of the issue (Kirk 2017).

Severance taxes

Severance taxes, longstanding policies in many states, levy taxes on the extraction of natural resources such as oil and gas (Rabe and Hampton 2015). While severance taxes can have meaningful effects on emissions (Erickson and Lazarus 2018), current levels seem mostly nonpartisan, with California's rate lower than Texas's. This may change, though, as California lawmakers have come under increased pressure to sharpen supply-side carbon policies (Wheeling 2018).

While severance taxes do not have the same potential to build interests that green industrial policies do, they can erode the power of entrenched opposition like oil companies, thereby generating positive feedback for the climate movement. Moreover, revenue can be used to fund programs and potentially generate political allies. Severance taxes should be expanded where possible, but climate advocates should be careful to avoid negative feedback from loss of employment

TABLE 4
Other Policy Recommendations

Recommendation	Positive Feedback	Negative Feedback	Empirical Questions
Expand and defend product standards	Firms advocate for diffusion and upward migration		Firm responses to product standards in U.S. for various products?
Administer programs publicly	Increases scope for future policy; regional compacts; national-level lobby		Amount of federal lobbying by state bureau- crats?
Develop and promote climate education curricula. Be attentive to reverse in lagging states	Improve receptivity to climate communication in future	Parental resistance	Effects of climate education on receptivity to communication/attitudes
Expand and defend severance taxes	Erode power of fossil fuels; program beneficiaries	Employment effects	

in highly extractive areas. Harmful employment effects may be softened through geographically targeted economic development programs. Policy recommendations in the areas of severance taxes, climate education, bureaucratic capacity, and product standards are laid out in Table 4.

National Policy

The feedback framework has implications for national policy in addition to state policy. In this volume, Jonas Meckling discusses the potential for policies like a national clean energy standard to mobilize business support for future climate policy advances. In addition, climate advocates might consider the ways in which national policy can complement state policies to produce multilevel cycles of positive feedback. Existing policies like the investment tax credit (ITC) and production tax credit (PTC), by subsidizing renewable generation, reduce the cost to states of enacting green industrial policies. State-level green industrial policies, in turn, can produce positive political feedback at the national level. Indeed, anecdotal evidence suggests that one reason the PTC and ITC were preserved in the 2017 tax bill was the importance of green industry in states such as Iowa and Nevada (Plumer 2018). Green industry would not be as strong in these states absent state policies; but, also, perhaps states would have been less likely to adopt strong green industrial policies absent incentives offered from the federal government through the PTC and ITC.

Conclusion

While state climate policies have limited capacity to directly reduce emissions, the structure of U.S. federalism means that they have significant potential to make the terrain of national-level politics more fertile for future large-scale climate policy. In this article, I outlined a number of mechanisms by which different types of climate-related state policies might "feed back" into the political system in the states in which they are enacted, in other states, and at the national level. Due to a lack of empirical research, a number of questions remain regarding how systematic and how large these potential effects are. Limited existing empirical work makes it difficult to provide confident estimates of effect sizes, but theoretical work allows for some general hypotheses.

First, I would expect group-level effects to be stronger than individual-level effects. Climate policies, because they generally do not engage directly with individual citizens, might be less likely to mobilize individuals than, for instance, health policies (Clinton and Sances 2018). Moreover, even to the degree that they do engage directly with citizens, they may not do much to change people's attitudes on climate. Especially on polarized issues like climate, political attitudes are so strongly tied to partisan identity that policy experiences may not move them (Green, Palmquist, and Schickler 2004). What is more, to the degree that policy uptake is itself polarized (Lerman, Sadin, and Trachtman 2017), Republicans might be less likely to put themselves in a position to benefit from climate policy. Finally, even if policy beneficiaries mobilize to protect those policies that benefit them, it is unclear the degree to which beneficiaries would mobilize more broadly for climate policies (Galvin and Thurston 2017). For instance, we might expect rooftop solar owners to mobilize to protect NEM, but not to establish carbon pricing.

On the other hand, the nature of climate policy and the energy transition suggests interest group (including business) effects might be quite impactful. While the energy system remains dominated by fossil fuels, renewable sources like wind and solar have grown rapidly in recent years (Weaver 2019). Successful climate policy will entail at least partially replacing fossil-fuel intensive energy production systems with renewable energy production systems (e.g., Huberty and Zysman 2010). This replacement will both dislodge entrenched anticlimate interests such as fossil fuel companies and empower interests such as renewable power producers that stand to benefit from stricter carbon controls, a powerful combination for sustainable reform (Patashnik 2008).

To the degree that empirical work supports the potential effects discussed, the proposed framework has important implications for political strategy around climate policy in the United States. Different types of climate policies will be feasible in different types of states. Policies that lead to marginal emissions reductions, especially in conservative-leaning states that have lagged behind, might have significant political implications in the future. Taking forward-looking policy action in the states can help to ensure that the next time climate-friendly lawmakers have power in Washington, advocates will be successful in promoting the strong national-level policy likely needed to avoid climate crisis.

Notes

1. The collective action problem stems from the fact that the global climate is a public good, so each individual country would, absent an international agreement, reduce emissions less than the socially optimal amount.

2. See "American Public Opinion on Global Warming" (Political Psychology Research Group at Stanford University), available from https://pprggw.wordpress.com/fundamentals/.

3. "Visualizations & Data" (Yale Program on Climate Change Communication, n.d.), available from http://climatecommunication.yale.edu/visualizations-data/.

4. "Pelosi and Gingrich Unite for Climate Protection," *Grist* (2008), available from https://grist.org/article/nancy-newt-sittin-on-a-couch/.

5. "Seventeen Governors in U.S. Climate Alliance Mark One-Year Anniversary with New Wave of Climate Actions" (United States Climate Alliance, 2018), available from https://www.usclimatealliance.org/publications/oneyearanniversary.

6. I mainly consider state policy here, although a similar analysis could be performed for local policies. Local policies are potentially less powerful since localities have less constitutional authority than states and can be preempted by states.

7. This is one reason why aggressive climate policies in California have not generally led to large bill increases (Daniels 2017).

8. Although other policies like incentive schemes and RPS carve-outs are also important.

9. IREC Editors, "IREC Released Update to Highly Influential Interconnection Model Procedures" (Interstate Renewable Energy Council, 26 April 2019), available from https://irecusa.org/2013/04/irec-releases-update-to-highly-influential-interconnection-model-procedures/.

10. "Solar Industry Research Data" (Solar Energy Industries Association, 2019), available from https://www.seia.org/solar-industry-research-data.

11. A survey by the Advanced Energy Economy Institute found over 500,000 jobs in advanced energy in California (Nichols 2017). While this figure could be an exaggeration, the number is likely quite large regardless.

12. Although some recent evidence suggests the emissions-reducing effects of carbon taxes, at current rates, are marginal (Pretis 2019).

13. "The Investment of RGGI Proceeds in 2016" (The Regional Greenhouse Gas Initiative, 2018).

14. "CARB Awards $10 Million in Cap-and-Trade Funding to Help Communities Curb Air Pollution," (California Air Resources Board, 2018), available from https://ww2.arb.ca.gov/news/carb-awards-10-million-cap-and-trade-funding-help-communities-curb-air-pollution.

15. The Clean Air Act grants California a waiver to establish its own auto emissions standards, which other states are permitted to follow. The 1990 amendments allowed other states to adopt California's standards.

16. Conversation with Vermont administrator in January 2019.

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