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Introduction

In 1999, an innovative clean energy law passed in an unlikely state, known more for its abundance of fossil fuels than for leading on environmental policy: Texas. The policy was enacted through a large bill that reformed the entire electricity sector. This law, like many others that would follow it, required the state to meet timelines for building clean energy technology. It was good news for climate change, helping the state to reduce the amount of carbon its electricity system emitted. The policy was implemented well and led to rapid increases in clean energy in the state. The year the renewable energy law was passed, the state's electricity system was 88% fossil fuel–dominated—less than 1% came from renewable energy sources. A decade into the policy experiment, Texas got 12% of its electricity from wind energy, having built more wind energy than most countries (Hurlbut 2008).[1] When Texas governor George W. Bush ran for president in 2000, he trumpeted this law as one of his successes, vowing further action on climate at the federal level. Texas was leading the country in wind energy.

With this shift toward clean energy, advocates hoped that the stranglehold fossil fuel companies had over the political system would also begin to erode. Texas and other states across the country have long relied on coal, natural gas, and even oil to power their electricity grids. For a century, the companies using and supplying these energy sources—electric utilities and fossil fuel producers—exerted significant influence over energy policy, blocking progress on energy efficiency and renewables (Hirsh 1999a). Setting ambitious targets for clean energy was a new idea that held the promise of disrupting polluters' political influence. The idea caught on: from the mid-1990s to 2011, most American states passed at least one clean energy law.

Environmental advocates hoped that these laws would result in new interest groups—renewable energy companies and their industry trade groups—that would ally with environmentalists and drive the adoption of more ambitious climate laws. Many predicted a positive spiral upward, with the laws bolstering clean energy advocates, who in turn championed ever more ambitious laws. If

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successful, these state laws promised to make the United States a world leader in clean energy and create a pathway to addressing the climate crisis.

Initially, Texas's renewable energy laws developed in the way that advocates had hoped. The state's modest goals were quickly surpassed. Wind energy projects provided jobs and local revenue for school districts in rural, conservative parts of the state. Texas's first clean energy law built a strong coalition of interest group advocates and bipartisan politicians who pushed to expand the policy. In 2005, they won. A more ambitious clean energy target was enacted alongside a large investment in electricity transmission, to build the wires necessary to bring the wind energy to market. Texas would eventually spend $7 billion on transmission—a very large sum in a state known for tight purse strings. Environmental advocates' plan to build political power and clean energy through implementing the initial law seemed to be working.

But the good times didn't last. When the advocates pivoted to promoting solar energy, the fossil fuel industry mobilized to undermine their plans. Very little solar had been built in the Lone Star State. With no policy framework for solar energy, the industry struggled to gain traction. In 2005, a modest solar energy target passed in the same law that invested in wind energy and transmission lines. The advocates were ecstatic at their victory. As it had done for wind, Texas was poised to lead the country in solar energy. But this policy was never implemented. The fossil fuel industry ensured this outcome by increasing the ambiguity in the bill's language. Advocates believed the bill promised a new solar requirement, while opponents argued during implementation that it was a nonbinding plan. In Texas, fossil fuel companies successfully stymied solar energy for another decade.

Hence, the story of Texas's landmark clean energy laws is more complicated than many believe. Some estimate that Texas has the greatest potential for solar in the country (Lopez et al. 2012). Yet by 2018, it had only installed as much solar as Massachusetts—a much smaller and more northern state. By then, California had installed 10 times as much as Texas.[2] Nor did Texas continue to expand its wind energy policy after 2005. Despite its early efforts, Texas has fallen behind on clean energy. In the electric power sector, carbon emissions only declined 5% from 1999 to 2016.[3] In fact, Texas is a below average state in clean energy production. The state is not doing enough to clean up its electricity sector and contribute to solving the climate crisis.

This pattern is not unique to Texas. Progress on clean energy across the United States has been much slower than it needs to be. If we focus only on the current costs of clean energy, we miss a broader pattern. After more than three decades of climate denial, utilities have switched to promoting delay. And this delay matters not just for the climate's stability but also for utilities and other fossil fuel companies' balance sheets. These companies win by stalling—by keeping their coal plants open, or by digging up more fossil fuels. Delaying policy action provides these companies with money.

We can see climate delay across the states. Between 2008 and 2018, natural gas grew by almost 14 percentage points (p.p.)—an annual growth rate of 1.2 points. By contrast, renewables had an annual growth of around half that rate, at 0.74 points annually. They only increased by around 7 p.p. over the same decade. Since 2011, opponents have blocked clean energy laws from being passed in new places, leaving many states without any target. Others have begun to rollback or weaken clean energy policies. When these strategies failed, electric utilities and other polluting companies made the fight bigger, using the public, the parties, and the courts to short-circuit progress on climate policy.

How can we understand this loss of momentum for clean energy laws that were designed to ratchet up in ambition over time? To understand climate policy, we must put politics at the center of our theories (Victor 2011). On the one hand, policies do remake politics, through a pattern political scientists call "policy feedback" (Campbell 2003; Mettler 2005; Pierson 1993; Skocpol 1992). Policies can reshape politics by changing interest groups' and individuals' resources, identities, and preferences. Usually, policy feedback research shows how policies reinforce themselves over time: creating constituencies that drive positive feedback and policy expansion. This pattern is referred to as "path dependence" or "lock-in": once a policy course is set, it is difficult to reverse (Pierson 2000). In the case of clean energy laws, we would have expected this kind of self-reinforcing cycle to lock in the energy transition, with policies growing in ambition over time.

Yet, it's not clear that path dependence holds for many public policies. Instead, we often see policy reversals. As Eric Patashnik and Julian Zelizer put it, "the capacity of public policies to remake politics is contingent, conditional, and contested" (2013, 1072). Why do we see ongoing conflict over policy, even after policies are passed that we expect to generate feedback? I argue that we must place interest groups at the center of our theories of policy change.

While this view is somewhat out of favor today, earlier research in political science argued that interest groups are central to understanding conflict over policy (Dahl 1961; Schattschneider 1960). As E. E. Schattschneider put it, "Pressure politics is a method of short-circuiting the majority" (1942, 189). Most recently, this idea has been articulated by Jacob Hacker and Paul Pierson (2010a), who argue that policy change is a function of "organized combat" between interest groups. The status quo is shaped by the winners of past battles over policy, and for this reason, it favors incumbents (Baumgartner et al. 2009; Moe 2005, 2015). These vested interest groups often seek to prevent or reverse policy change. If we want policy to lock-in, and drive long term change, we have to destroy the political status quo (Patashnik 2008). This is not easy to do.

In this book, I place interest groups at the center of a theory of policy change, examining the conditionality of positive feedback and path dependence. My argument proceeds in several points. First, I show that ambiguity plays a central role in policy change. I call this dynamic the "fog of enactment"—the gap between actors' expectations and the policy's actual outcome. Second, I argue that implementation is a key step in policy feedback. Examining policy changes over long periods, we can see that ambiguity shrinks after implementation. As actors learn, they update their beliefs and come to attack policies they previously ignored or underestimated. Third, I show the mechanisms through which interest groups try to drive policy changes after implementation. Policy changes are contingent on interest groups' knowledge and networks, their direct lobbying of legislators and regulators, and their use of the parties, the public, and the courts.

To understand the limits of policy feedback and path dependence, we must examine cases that a theory of positive feedback fails to predict. To do this, I studied a policy that was enacted across numerous jurisdictions. The policy needed to be one that aimed to create positive, amplifying feedback. I could then look at several cases to see where and why the policy failed to produce lock-in. I chose four cases where clean energy policy has stalled or been reversed: Arizona, Kansas, Ohio, and Texas. These cases of retrenchment represent surprising developments. Clean energy laws are precisely the kind of policies we would expect to lock in over time because they create new industries. This detailed account of the internal statehouse politics shows how interest groups use a variety of mechanisms to change policy, even in cases where we would expect policy feedback to buffer laws from retrenchment.

Policies that involve dramatic redistribution of wealth across society do not lock in without a long fight (Aklin & Urpelainen 2013, 2018; Thelen 2004). Thinking of politics through the lens of organized combat reminds us that policy fights continue and that opponents do not disappear. Policies may prove less path-dependent than our theories would predict, particularly in an age of federated interest groups working across state lines and growing partisan polarization.

Battles over climate policy are fundamentally material: they are about who will get to own the assets of the energy system and the resulting profits. We should not expect the interest groups facing an existential threat from climate policy—fossil fuel companies and electric utilities—to go quietly into the night. For the past century, these companies have maintained vast amounts of carbon-intensive infrastructure and fossil fuel reserves—which they plan to continue to operate and extract, even if their actions erode climate stability. Along with their wealth, they have cultivated significant political power. It will take considerable time and effort for clean energy advocates to contest this power. This book tells the story of the clean energy battles playing out in statehouses across the country and, through it, tells us about our prospects for addressing the climate crisis.

A Theory of Interest Group–Driven Policy Change: The Book's Argument in Brief

In this book I develop a theory that places interest group conflict at the center of policy change. Tracing institutions and actors over time, I argue that organized combat between interest groups is at the heart of American politics (Hacker & Pierson 2010a). In policy battles, interest groups take sides—advocating either for or against policy. Yet advocate and opponent interest groups battle over policy on an uneven terrain. When advocates and opponents fight over proposals, they do not come with the same power. The incumbents—groups that "won" previous battles and gained their preferred policy—usually have greater sway than newcomers. Hence organized combat is often asymmetric: incumbent interest groups retain more power than new entrants. With sufficient relative influence over their adversaries, groups can capture the spoils from policy change. The prize is a change in legislation or regulation in that interest group's preferred direction. These battles continue through later rounds of policy enactment and implementation. Hence, there is an iterative relationship between policy and politics.

Still, new entrants who want to change policy can sometimes succeed in beginning a policy feedback process, despite vested opponents. New policies may be packaged as part of larger reforms, causing interest groups to have divided attention or an inability to block provisions. In addition, policies' potential outcomes are hard to predict, particularly with innovative laws that have not been trialed extensively in other jurisdictions. I argue that interest groups and politicians can struggle to forecast policies' likely consequences because of the fog of enactment. I identify four specific factors that increase this fog: novel policies that have not been implemented widely elsewhere; major reforms that involve complex and detailed rules; policies in technical domains; and policy areas that have overlapping jurisdictions across the state and federal government. These factors all held for early clean energy policies. Shrouded in a thick fog, carbon-intensive actors sometimes failed to invest adequately in policy battles, and reforms passed that later proved costly to their bottom line. Advocates in early-mover states were able to use ambiguity to their advantage before opponents learned and began resisting laws. But with each passing year, this became harder for advocates to pull off.

Opponents do not passively accept policy defeat. With experience, they become wiser to advocates' proposals. Working through interest group networks that cross state lines, opponents can gain new information and update their preferences. Using these networks, opponents can work to ensure that their adversaries' proposals will not be passed or implemented as easily in the future. These cross-state networks are increasingly important to understanding American politics (Hertel-Fernandez 2019; Hopkins 2018). The policy agenda across the country is more unified because interest groups work on the same policies in different states, crossing borders to lobby. Networks play three important roles: they help interest groups learn to anticipate policies' consequences, they help interest groups disseminate effective political strategies, and they facilitate collective action. Overall, networks help interest groups marshal their forces and reduce each individual member's cost in contesting policy. They can also create policy feedback spillovers: when one state acts to pass a law, it can create new interest groups that move into other states to lobby for policy expansion.

These networks of interest groups exist across the political spectrum. Important networks on the right include the American Legislative Exchange Council (ALEC), the State Policy Network (SPN), and Americans for Prosperity (AFP) (Dagan & Teles 2016; Hertel-Fernandez 2014, 2019; Skocpol & Hertel-Fernandez 2016). These groups have helped drive the Republican Party to more extreme policy stances including through the use of model bills, and they are particularly influential with junior legislators who lack capacity (Hertel-Fernandez 2014; Kroeger 2015; Skocpol & Hertel-Fernandez 2016). Overall the left has struggled to challenge the dominance of the right-wing networks in the American states (Hertel-Fernandez 2016, 2019). On energy and environmental policy, these groups have promoted climate denial and worked to undermine clean energy laws.

That said, historically environmental groups have managed to contest these right-wing anti-environment groups. From the mid-1990s onward, the Energy Foundation crafted a cross-state network to drive new clean energy laws. Their efforts found early success in several states, including Texas, California, and Massachusetts. As clean energy companies grew in these places, they crossed over into other jurisdictions to support renewable energy laws elsewhere. In Kansas, a cross-state network of wind advocates defended that state's laws. Similarly, solar companies from California worked to support clean energy laws in Arizona. Policy feedback did not just affect the early-acting states; it spilled over, as advocates took their policies and strategies elsewhere.

However, as opponent fossil fuel corporations and electric utilities realized these laws could add significant costs to their bottom lines and threaten their existing assets, their resistance grew. These interest group opponents undertook major efforts to block, weaken, or rollback climate policies. Opponents worked across state lines though networks, most notably ALEC and AFP, as well as the private electric utility association the Edison Electric Institute (EEI). Through a number of strategies described in detail in this book these right-wing groups put repealing clean energy laws on the agenda in many states. In 2012, the Koch-backed, climate-denying Heartland Institute drafted the "Electricity

Freedom Act" model bill alongside ALEC, and promoted it in legislatures across the country.[4] This bill aimed to repeal clean energy laws. In early 2014, ALEC, working with EEI, began promoting a new model bill on "Updating Net Metering Policies."[5] While advocates attempted to counter these efforts, crossing state lines to defend clean energy laws, they lost many policy battles.

Without opponents' effort, the forces of policy feedback would have succeeded in ratcheting up clean energy laws' ambition. Instead, we have seen many states fail to act and others weaken their laws. These dynamics mirror developments in other policy domains. Across state lines, interest groups have used well-established networks to push conservative healthcare and labor policies (Feigenbaum et al. 2018).

Interest Group Strategies to Drive Policy Change

After implementation of a new policy, interest groups working through networks can push for policy stability, expansion, or retrenchment. By "expansion" and "retrenchment," I mean changes to policy that strengthen or weaken it. To drive policy change, these actors can work either *directly* with politicians and regulators or *indirectly* through the parties, the public, or the courts. When interest groups are empowered with sufficient influence over legislators' or regulators' behavior, they will work directly, leveraging their relationships and using lobbying and campaign contributions to try to shift policy. They may also work directly through the regulatory system, resisting policies' implementation or capturing regulators. In some cases described in this book, fossil fuel companies and electric utility opponents had sufficient influence to work directly with legislators to weaken the policy. In others cases, they worked to capture state regulatory commissions and undermine bureaucratic interpretations of laws.

When opponents seek to reverse policy but lack direct access to legislators and regulators, they can work through three indirect channels: the parties, the public, and the courts. Here, I build on and update Schattschneider's (1960) conception of expanding the scope of conflict to include the parties, the public, and the courts as mechanisms through which organized combat over policy unfolds.

First, the parties are an important route for interest group influence in American politics. As the UCLA School of Political Parties has argued, interest groups are central to party agendas, acting as intense policy demanders (Bawn et al. 2012; Cohen et al. 2009). Building on this work, I argue that interest groups drive partisan polarization in state legislatures and, through it, drive policy change.[6] Asymmetric polarization has emerged as a central trend in American politics (Bonica 2014; Hacker & Pierson 2014; McCarty et al. 2006; Shor 2015). The states are an area of particularly pronounced polarization (Grumbach 2018a; Shor 2015). There is evidence that interest groups have also driven polarization on trade, infrastructure, healthcare, and other policies (Dar & Lee 2014; Hertel-Fernandez 2019; Hertel-Fernandez et al. 2016; McCarty 2007; Nall 2015; Sinclair 2014). In this book, I show that interest groups contribute to polarization by providing resources to politicians and primary candidates who are on the extremes on policy. Even if primary challengers prove unsuccessful or never come, I show that the threat of a primary or loss in campaign funds can drive an incumbent politician to change their position on policy.

The position of the Republican Party on clean energy and climate change is an excellent illustration of how interest groups have driven polarization. Renewable energy is good for economic growth and job creation, two outcomes that Republicans traditionally support. In the 1990s, Republicans actively supported clean energy. However, since 2010, support among Republican politicians has eroded. Fossil fuel companies have threatened to primary or successfully challenged Republican climate champions, shifting incentives within the party. The case of Senator John McCain, who was a climate champion until a serious primary challenge occurred in 2010, shows this dynamic. Similarly, Koch Industries successfully primaried Bob Inglis, a conservative South Carolina Congressman, after he started supporting climate legislation in Congress (Leonard 2019).

While early renewable energy laws had bipartisan support, today Republicans are driving retrenchment efforts. In many Republican-controlled states, opponent interest groups have used contributions and the primary system to convince the Republican Party and specific GOP politicians that opposing climate policies is more important than renewable energy job creation. This is not surprising given that the GOP has maintained fossil fuel corporations as a core part of its base (Karol 2019). By siding with climate deniers, the GOP is on the wrong side of history—ensuring a stable climate is foundational to society.

Second, organized opponents can use public opinion to undermine policy feedback and drive retrenchment. In this book, I emphasize how public opinion is a constructed phenomenon in American politics (Jacobs & Shapiro 2000). Organized interests can mobilize groups strategically and present biased versions of public preferences to legislators. While the public can try to communicate majority preferences, it is far less organized than interest groups (Olson 1965). Instead, the public is often a tool that advocates and opponents use to try to influence decision-makers.

One way that fossil fuel companies and electric utilities have constructed public opinion is by convincing Republicans that the climate crisis is a hoax. These corporations played a key role in spreading climate denial. They funded organizations that denied the scientific consensus on climate change from the

1980s to the present (Anderson et al. 2017; Oreskes & Conway 2010; Supran & Oreskes 2017). The exact language used in denial reports permeated the public discourse, ending up in the media and in presidential speeches (Farrell 2015). The steady drumbeat of this well-funded campaign eroded support for climate policy among Republicans, driving partisan polarization (Dunlap & McCright 2008; Mildenberger 2020).

In 2006, climate change and clean energy were bipartisan. Support for clean energy was extremely high. Yet, as the threat of climate action accelerated in 2007, interest groups ratcheted up their efforts to deny climate science as part of their campaign to block climate policy. Fossil fuel companies brought the public into a debate over climate science, successfully driving polarization. As Matto Mildenberger and Anthony Leiserowitz (2017) show, between 2008 and 2011, belief in climate change among Republicans fell precipitously. While some may believe that the financial crisis played a role in driving polarization, their careful causal identification shows this is not the case. Instead, they find evidence that elite polarization played a role. For example, the GOP presidential primary at that time involved many candidates changing their positions on climate.

Fossil fuel corporations and electric utilities played an important role in driving this elite polarization. Around 2007, ExxonMobil and Koch-affiliated groups began promoting the idea that CO_2 is good, as part of their climate denial efforts (Farrell 2016). Utilities and fossil fuel companies similarly began ramping up their spending on lobbying against climate action (Brulle 2018). The public responded to these campaigns, and support for renewable energy plunged between 2008 and 2013 (Figure 1.1). It is not surprising that public polarization took place at the same time that interest groups had increased their spending on climate denial and anti-renewables campaigns. Fossil fuel companies were not just trying to influence politicians and drive elite polarization—they were also trying to undermine public support for climate action. Among Republicans and Independents, this strategy paid off, with public support falling around 30 points.

In addition to these aggregate, national trends, we can see interest groups using public opinion as a weapon in their fights over state-level clean energy laws. In Kansas and Arizona, clean energy advocates and opponents tried to organize and mobilize the public. The opponents relied heavily on fake grassroots campaigns—sometimes called "astroturfing"—while advocates tried to bolster and communicate genuine support from rural and Republican parts of the state. Interest groups on both sides aimed to expand the scope of conflict. Yet clean energy companies have struggled to be as effective as their opponents. These advocates, who have far fewer resources, have often run less successful public campaigns.

While it is not the primary focus of this book, the courts are a third channel through which interest groups indirectly battle to shift policy. Interest groups

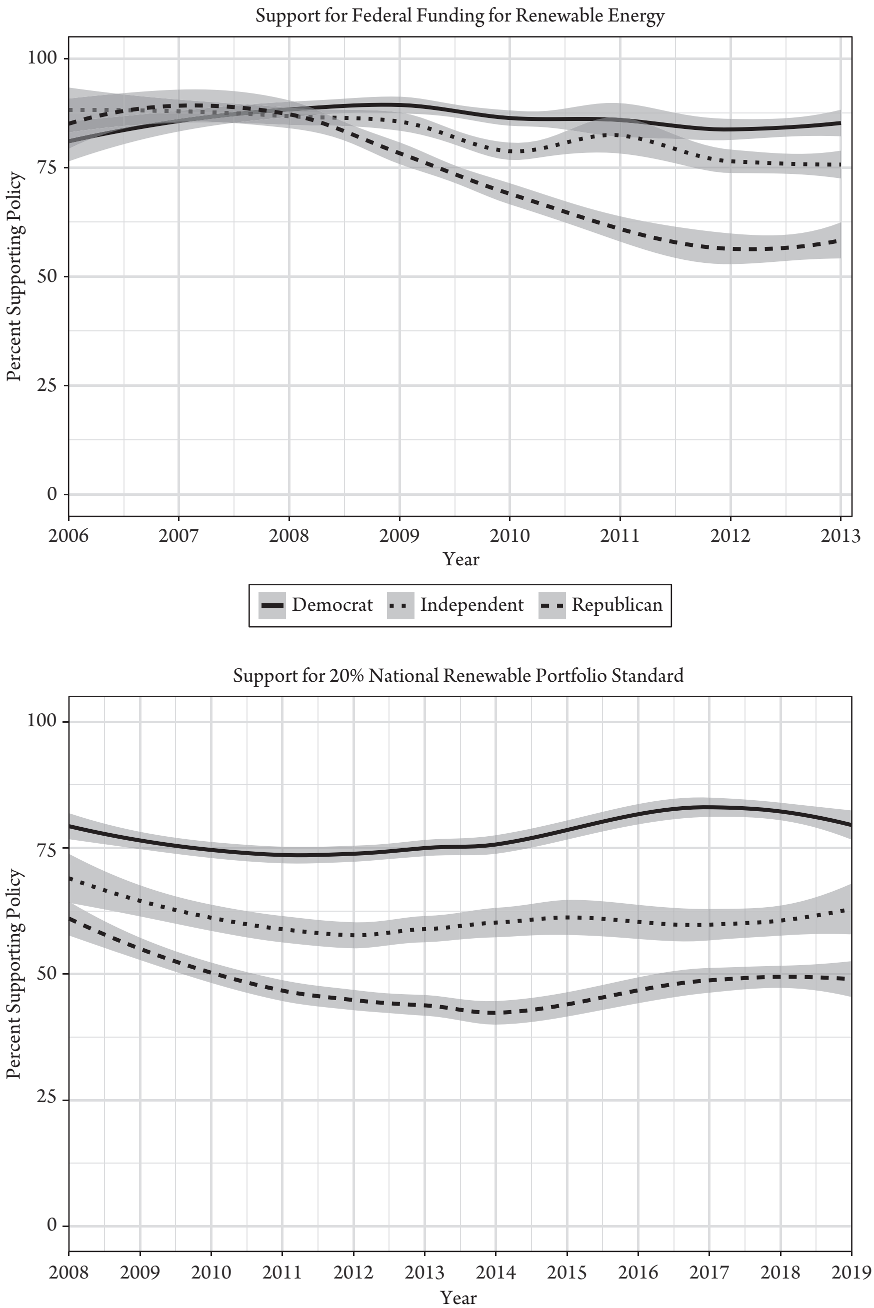

Figure 1.1 Polarization in Support for Renewables in the United States. (Data sources: Pew Research Center for the People and the Press Political Survey, 2008–2012, and Yale Project on Climate Change Communication, 2008–2019 [see Ballew et al. 2019].)

may use this approach as a last resort as it is riskier than working directly with legislators and bureaucrats or indirectly through the parties or the public. As Chapter 3 shows, the Supreme Court's decision to side with the Federal Energy Regulatory Commission (FERC) in important cases in the 1980s was crucial to kickstarting clean energy, helping to scale up the American renewables industry for the first time in California. These legal decisions empowered advocates and placed the United States in the lead globally in clean energy. More recently, opponents' attempts to undermine Colorado's clean energy laws through the courts have proven unsuccessful. Thus, in the case of clean energy retrenchment, the courts have not proven a successful strategy for opponents.

Identifying Interest Group Influence in the American States

Placing interest groups at the center of a theory of policy change in American politics is not without debate (Baumgartner et al. 2009; Baumgartner & Leech 1998; Kingdon 2011; Patashnik 2008). As many have argued, studying interest groups is challenging (Baumgartner & Leech 1998; Hojnacki et al. 2012). When scholars have looked for interest group influence at the federal level—for example, by studying the relationship between groups' campaign contributions and roll call votes—they have often struggled to show an effect (Ansolabehere et al. 2003). Yet, because this approach ignores the content of laws, non-decisions and anticipated reactions, it likely understates influence (Anzia 2018; Crenson 1971; Fairfield 2015; Hacker & Pierson 2010b). By contrast, new research is increasingly showing interest group influence in American politics at various scales and through a variety of mechanisms (Anzia 2011; Gilens & Page 2014; Fouirnaies & Hall 2018; Hertel-Fernandez 2018, 2019; Hertel-Fernandez et al. 2019; Kalla & Broockman 2016). As Sarah Anzia (2018) argues, studying interest group influence at the state level may hold particular promise—for one, it is easier for researchers to gain access to state politicians, their staff, and lobbyists.

In this qualitative study of state energy policy, I find strong evidence for interest group influence. Given the central role energy plays in the economy, incumbent electric utilities and other fossil fuel companies have been granted a privileged position at the policymaking table for over a century. As advocates attempted to push clean energy policy and climate action, these companies dragged legislatures, bureaucracies, the public, the parties, and the courts into a debate over climate science and the need for clean energy. And on balance, it is a debate they have won. Despite more than 40 years of effort from advocates, clean energy laws across the United States have barely shifted the needle. The American electricity system's carbon emissions remain dangerously high.

While the book's arguments are built from cases of energy policy, the theory travels to other policy areas, such as welfare and financial regulation.

For example, while the Dodd-Frank Act had the potential for lock-in through policy feedback (Patashnik & Zelizer 2013), Congress weakened the policy substantially in 2018. Similarly, changes to welfare policy in the mid-1990s did not shore up public support for the program as intended (Soss & Schram 2007). Ultimately, this book aims to build a general theory, describing the conditions and mechanisms through which interest groups are able to short-circuit policy by undermining policy feedback.

The Climate Problem and Clean Energy Solutions

It is hard to overstate the trouble we are in with the climate crisis. At the end of 2018, the main global scientific body on climate change issued a report that implicitly warned we had just 12 years to begin significant transformations to our energy systems. The end goal for many is for society to stop emitting carbon entirely by 2050, and limit warming to 1.5° C (Intergovernmental Panel on Climate Change (IPCC) 2018). Significant changes must happen by 2030 to put us on a path toward this zero carbon society—within this next decade we must aim to cut our emissions in half. Research has shown that building any new fossil fuel infrastructure is incompatible with limiting warming to 1.5° C (Tong et al. 2019). Further delay would mean exacerbating the deadly impacts we are already seeing: heatwaves, wildfires, droughts, extreme precipitation, and coastal flooding.

Economists and climate scientists have struggled to price the cost of climate inaction, but it is on the order of trillions globally (Burke et al. 2018; Ricke et al. 2018). And the costs and consequences will "happen faster than we think" (Xu et al. 2018). Why? First, as emissions accelerate, so too will warming. Second, efforts to clean up air pollution, for example, by closing coal plants, have the perverse impact of reducing the particulate matter in the air, which slows warming by reflecting sunlight back out to space. Third, the planet goes through natural climatic cycles, and there are signs we are entering a warming phase. All of this is on top of the fact that scientific assessments have tended to *underestimate* the pace of climate change (Brysse et al. 2013). This is not a problem for the future. Climate change is happening now, and impacts will only worsen if we continue to delay.

A big part of the changes necessary to address this crisis must come through our energy system (Hoffert et al. 2002; Jamieson 2011). Energy is fundamental to the functioning of modern industrialized societies: it powers our buildings, fuels our transportation system, and drives our industry. Without it, the world as we know it would grind to a halt. Unfortunately the energy source we have used to industrialize—fossil fuels—has a dirty little secret: it is destroying the stable climate that is just as fundamental for society.

Despite the threats climate change poses, we have not lost our appetite for fossil fuels. Hence, global carbon emissions continue to grow. In 2018, emissions both globally and in the United States rose at a faster pace than they had in almost a decade (Jackson et al. 2018; Rhodium Group 2019). Rather than *declining,* US greenhouse gas emissions went up by 3.4%. Even in the American electric power sector, considered the bleeding edge of climate action, emissions rose almost 2%. Why? Electricity demand grew, and even though coal plants retired, natural gas filled the gap more than clean energy. This pattern holds around the world as scientists have summarily captured in the title to one recent paper: "Global Energy Growth Is Outpacing Decarbonization" (Jackson et al. 2018). Removing carbon emissions from societies' energy system is and will remain an extremely difficult undertaking.

Despite calls for a clean energy transition since the 1970s, fossil fuels continue to dominate the world's energy supply. Coal, oil, and natural gas provided 81% of global primary energy production in 2017—a mere 13% decline from 1970—all while total fossil fuel consumption continued to rise.[7] Even in the best of years, dangerous greenhouse gas emissions have flattened globally, not declined.[8] In the United States, 95% of transportation energy and 64% of electricity came from fossil fuels in 2018.[9] There is still a long way to go to remove carbon from the electricity system.

Decarbonizing the electric power sector in the United States is arguably the first linchpin globally to solving the climate crisis. As the largest economy in the world, the technologies America develops will spill over to other markets. There are many clean energy technologies, but renewables—including wind, solar, biomass, and geothermal—are the most popular (Ansolabehere & Konisky 2014). Renewable energy is slowly increasing around the world: excluding hydropower, renewables produced 10.5% of electricity globally in 2018.[10] The US percentage is very close to the global level: excluding hydropower, in 2018 renewables produced around 10% of the electricity supply.[11] Given that these technologies have existed since the 1980s, these numbers are small. Even with hydropower included, renewables only provided 17% of the US electricity mix in 2018.

The pace and scale of cleaning up the electricity system are not secondary issues but the central challenge (Figure 1.2). Given significant delay in acting on the climate crisis, we must make dramatic reductions in the carbon intensity of the electricity system by 2030 to be on track toward zero emissions by 2050. At the same time we must also expand the electricity system dramatically, to "electrify" other sectors—transportation, buildings, and industry. This approach will allow the economy to decarbonize. But it will not be easy. On average, models suggest an increase of 50%–120% in the size of the US electric power sector by 2050 (Iyer et al. 2017; Jenkins et al. 2018; Williams et al. 2014).

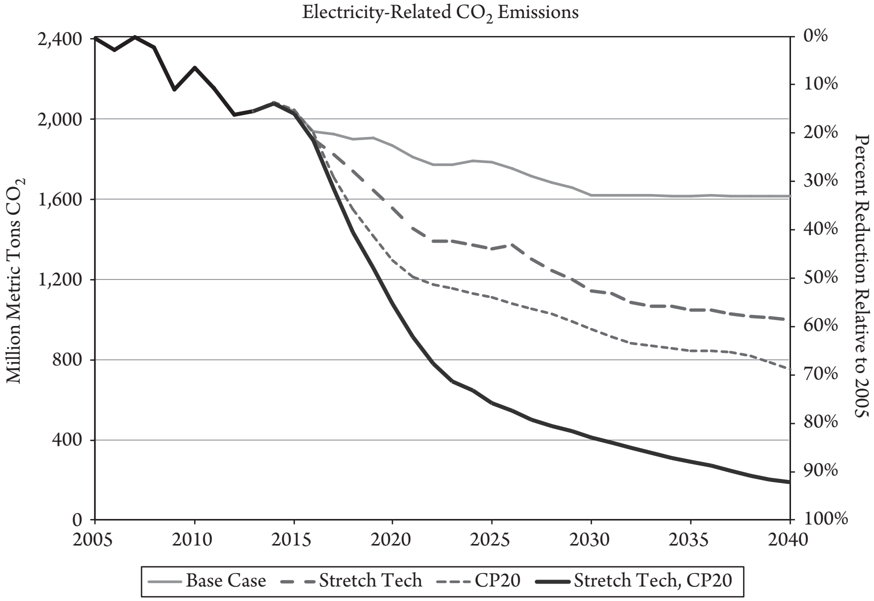

Figure 1.2 Decarbonization Trajectories for the US Electricity Sector, CP20 is a carbon price of $20/tonne (Adapted from: U.S. Department of Energy, "Energy CO2 Emissions Impacts of Clean Energy Technology Innovation and Policy," January 2017).

What would this dramatic change in the US electricity system look like in practical terms? Some estimates suggest that onshore wind energy must increase 10-fold—from around 1,000 projects in 2015 to 10,000 in the coming decades (Davis et al. 2013; Hawken 2017; Pacala 2004). And to move that electricity from where it is generated in the center of the country to where it is needed on the coasts will require a massive transmission network (MacDonald et al. 2016). Building wind energy offshore is another important piece of the puzzle, particularly since this resource is far more reliable. Yet, it too would require exponential growth—in 2019, only one offshore wind project was operating in the United States despite decades of efforts. The point is simple, if very difficult: we need to build an enormous amount of clean energy infrastructure over a very short time period to avert climate disaster.

To drive the clean energy transition, governments have used two policy levers: altering the relative *prices* or *quantities* of clean energy and fossil fuels (Breetz et al. 2018). More recently, these ideas have been combined through proposals like the Waxman-Markey bill or the Green New Deal. Prices can work to drive clean energy in a number of ways. Governments can raise the cost of fossil fuels, for example, through a price on carbon. While efforts at the federal level in the United States have consistently failed, some states have created limited carbon markets (Mildenberger 2020; Rabe 2018; Rabe & Borick 2012). Instead of taxing fossil fuels' for the harms they cause, significant subsidies remain in the

United States and globally (Ross et al. 2017; Victor 2009). If anything, fossil fuel subsidies are forecast to *increase* in the future from $2.2 billion in 2018 to $3.8 billion by 2028.[12] And in addition to direct subsidies, the health and environmental damages from fossil fuels in the United States alone amount to around $650 billion annually.[13] Given the political power of the fossil fuel industry, raising the cost of pollution has proven very challenging (Mildenberger 2020).

Governments can also reduce the cost of clean energy through research and development (R&D) funding, tax incentives and other policies. In the United States, total energy R&D expenditures at the Department of Energy (DOE) peaked in the 1970s at $8 billion annually and declined to around $2 billion by 2000. During the financial crisis, a 1-year spike occurred, where spending topped $13 billion.[14] But overall, the United States has failed to provide stable or adequate funding for energy R&D—particularly for renewables (Anadon et al. 2011). Between 1978 and 2018, renewable energy R&D accounted for 18% of the total spending—over the same time period 24% of R&D was spent on fossil fuel innovation.[15] One promising institution for innovation in clean energy is the Advanced Research Projects Agency-Energy (ARPA-E), created in 2007. The agency initially operated without funding, until it received $400 million in the 2009 stimulus (Bonvillian & van Atta 2011). Unfortunately, this was the high-water mark for ARPA-E funding—on average, the agency has received $250 million in annual funding. Still, in 2019, ARPA-E received over $350 million despite President Trump's calls to eliminate it.[16] Overall, the United States could spend significantly more money on clean energy R&D.

Deployment incentives are also crucial. The federal government's Production Tax Credit (PTC) and Investment Tax Credit (ITC) are both examples of this approach (Bird et al. 2005; Stokes & Breetz 2018). The PTC, enacted in 1992, provides a small tax credit per-unit-of-energy (cents per kilowatt hour) produced from clean energy sources. It has primarily supported wind energy projects. The ITC, enacted in 2005, allows companies to write off some of their tax liability if they invest in renewable energy projects. This policy has primarily benefited solar energy projects.[17] While fossil fuel subsidies are permanent, these renewable energy tax credits expire, leading to constant battles in Congress. At the time of this writing, the PTC was phasing out, and scheduled to expire in 2021 and the ITC was scheduled to begin phasing down on January 1, 2020. While there were efforts in Congress to extend these policies, they did not pass as part of a December 2019 spending bill. In 2019, the Treasury estimated that tax expenditures for renewable energy would decrease from $8.4 billion in 2018 to $3.5 billion by 2028.[18] Without stable policy, renewable energy deployment could slow rather than accelerate (Lewis & Wiser 2007; Stokes 2013).

Alternatively, government climate policy can focus on setting quantities—a minimum requirement for electricity from clean energy sources or a maximum limit on fossil fuels. In practice, governments have pursued clean energy requirements far more than bans on fossil fuels. Renewable portfolio standard (RPS) policies are the primary instrument used to set clean energy requirements in the United States. An RPS sets a requirement for the percentage of the state's electricity to come from renewable energy technologies by a certain date.[19] Efforts in the 1990s and 2000s to pass these policies at the federal level failed, forcing advocates to focus on the states to make progress (Laird & Stefes 2009).

Absent federal action to price carbon pollution or requirements for more renewables, states have proven the most important venues for climate policy in the United States. This book tells a political history of state-led clean energy laws, examining their genesis and how they have changed over time. In some ways, state leadership is not surprising. Since the early twentieth century, states have held primary jurisdiction over electricity markets through public utility commissions (PUCs) (Hirsh 1999a). Early efforts to support renewables in the 1970s and 1980s were small and short-lived. By the mid-1990s, however, a vibrant policy debate was unfolding in states across the country over the best way to spur growth in renewable energy.

An Energy Foundation–funded network of nongovernmental organizations (NGOs) fueled this debate. Beginning in the early 1990s, this foundation cultivated a long-term network of NGOs to shape and spread policy ideas and lobbying strategies across the American states. Within a given state, it relied on a two-pronged insider–outsider funding approach: supporting a technical policy-oriented insider NGO to work on negotiating policy details; and, funding a grassroots outsider NGO focused on public mobilization to get the policy on the agenda and passed. When policymaking windows of opportunity emerged—such as electricity restructuring—this strategy allowed advocates to drive policy change both directly through lobbying and indirectly through the public. Advocates succeeded in advancing two main policies: RPS and net metering.

After several decades of advocacy in statehouses across the country, by 2011 almost 80% of states had passed an RPS policy (Figure 1.3).[20] There were two major waves of RPS adoption: between 1994 and 2002, when they were packaged as part of electricity restructuring laws, and from 2003 onward, after electricity restructuring fell out of favor, when many states enacted stand-alone RPS laws.[21] In addition, from 2005 onward, several states enacted voluntary RPS policies, whose goals were not legally binding. Since Kansas passed its RPS in 2009, only one new state has adopted a mandatory policy—Vermont in 2015. While more than 20 states have expanded their RPS goals and a handful have passed ambitious 100% clean energy targets, a dozen have failed to ever enact a clean energy target, primarily states in the South. In 2018, only 55% of the US electricity supply was covered by an RPS policy (Barbose 2018).

Over the same time period, 44 states passed net metering policies, also called net energy metering (NEM) (see Figure 1.4). These laws set the rules

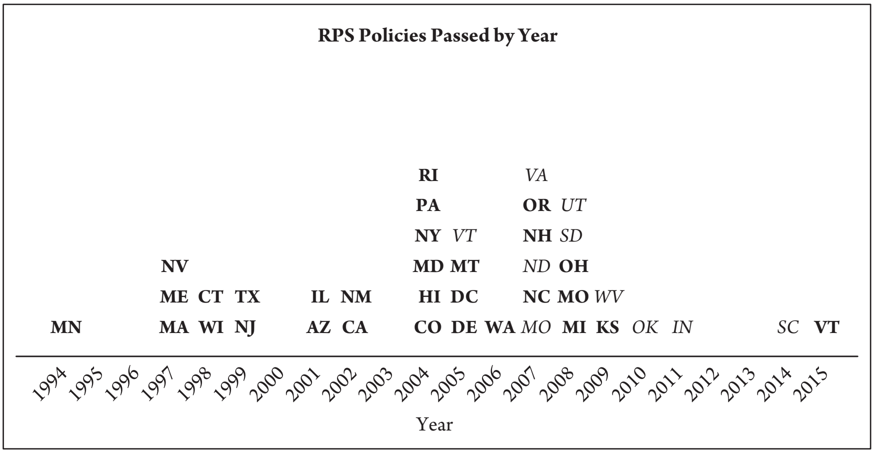

Figure 1.3 State Renewable Portfolio Standard (RPS) Policies, Enacted Post-1990
RPS policies are shown by year; non-binding goals are shown in italic font. MO is listed twice because a ballot initiative overturned a law with non-binding goals passed in 2007. IA is not shown since it passed its law in 1983. MN's first RPS only applied to Xcel Energy, until it was modified in 2008. AZ originally passed an RPS in 1996, along with restructuring; but when this process was frozen, the RPS did not proceed, hence 2001 is given as the date.

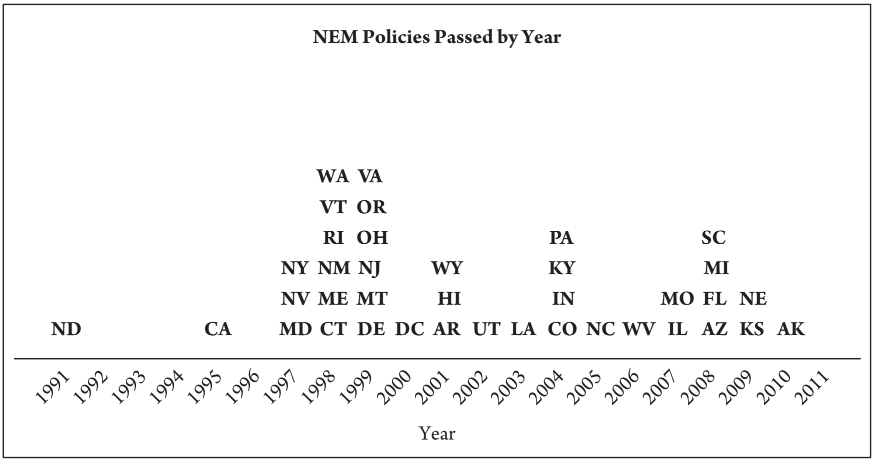

Figure 1.4 State Net Energy Metering (NEM) Policies, Enacted Post-1990
Six states that passed NEM policies before 1991 are not shown: MA and WI (1982), NH and MN (1983), IA (1984), and OK (1988). Although ME had a policy from 1987, it only applied to combined heat and power plants until 1998.

for how to compensate individuals and organizations that supply energy to the grid from small-scale, distributed generation—primarily through solar panels. Typically, net metering policies pay customers the same price that it costs them to purchase electricity. For example, if a citizen decides to put a solar panel on their roof and does not use or store all the electricity they produce, that citizen can provide excess energy to the grid. Full retail-rate NEM pays the customer the same amount for the electricity as the retail purchase price. In other words, the customer is billed the "net" amount of electricity that passed through the meter. Although several states passed NEM policies in the 1980s and early 1990s, California's 1995 law marked the beginning of a wave of modern NEM policy adoption across most states. As with RPS policies, no new NEM policies have passed since 2011. Instead, numerous legislatures have considered retrenching these laws—with many weakening or repealing them altogether. Nearly every state is revising its net metering program in the wake of massive solar growth—in 2018, 47 states plus DC engaged in some policy action around NEM.[22]

In summary, since the 1990s, a majority of US states have adopted RPS and NEM policies. In many cases, these laws created strong policy feedback—states expanded their laws over time as new industries grew and the public participated in the policy. Until the early 2000s legislative and public support was bipartisan. However, over time, electric utilities, fossil fuel corporations, large industrial companies, and other opponents sought to repeal clean energy targets and impose large monthly charges on net metering customers. At the same time that these interest groups lobbied for retrenchment and repeal, public opinion and legislators' positions on clean energy policy became increasingly polarized. Through lobbying politicians and regulators, and driving polarization in the parties, the public, and the courts, these opponents often succeeded in weakening clean energy laws. It is these cases, where policies have slid backward rather than spiraled upward, that this book explores in detail. Combined with the lack of strong action at the federal level, these paltry state efforts have left the US electricity sector behind on addressing the climate crisis.

Challenges to the Clean Energy Transition

Apart from opponents delaying the clean energy transition, there are other challenges to decarbonizing the electricity grid that we would be unwise to ignore. First, renewable energy technologies have some significant downsides. There are ongoing academic debates over exactly how much of the US and the global energy supply renewables can cost-effectively provide (Clack et al. 2017; Heard et al. 2017; Jacobson et al. 2017). Given abundant wind and solar resources, some academics argue that renewables can meet all of the United States and the world's electricity needs by 2050 (Delucchi & Jacobson 2011; Jacobson et al. 2015; Jacobson & Delucchi 2011). By contrast, papers with higher-resolution modeling suggest that renewables can likely supply around 80% of the electricity demand in that same time frame under reasonable cost limits (Clack et al. 2017; Jenkins et al. 2018; MacDonald et al. 2016).

One key challenge for renewable energy is intermittency: the wind does not blow and the sun does not shine all the time. For this reason, wind and solar are often referred to as "variable renewable energy sources." To address this problem, renewables need supportive infrastructure, including storage, transmission lines, and flexibility in both the supply and demand side. First, batteries or other storage technologies could be used to help balance the supply and demand of electricity. For example, a battery can store solar energy collected during the day for use at night. Second, transmission may be particularly important. Connecting geographically dispersed renewables allows for the variations in weather to be smoothed out, creating a more stable supply of electricity. Transmission would also allow high-quality resources in the center of the country to be connected to the coasts. One study shows that if a United States–wide transmission network is built, a combination of natural gas and renewable energy could reduce carbon emissions by up to 80% without increasing the cost of electricity (MacDonald et al. 2016). But new transmission has proven difficult to build because of costs, local resistance and overlapping federal and state jurisdiction (Klass & Wilson, 2012; Vajjhala & Fischbeck, 2007). Third, flexible low-carbon energy sources that can match the variability of wind and solar could be used—including nuclear, hydropower, geothermal, and bioenergy. Natural gas used in combination with renewables could provide backup power—although this approach results in carbon emissions. Fourth, the demand side could be made more flexible by deploying smart meters and appliances that shift their consumption to use more electricity when wind and solar power are abundant and reduce their consumption when the grid does not have adequate supply. Regardless of the solution to intermittency, these infrastructure investments will be very large, particularly given the need to expand the electricity sector to electrify other sectors.

In addition, renewable energy technologies often face problems with local acceptance (Stokes 2013, 2016). To produce the same amount of energy as conventional power plants, wind and solar energy require more land. Consequently, these technologies will need to be built in communities across the country. While solar is broadly popular,[23] both onshore and offshore wind energy often face backlash at the local level—and transmission capacity to support wind energy exacerbates siting challenges. When we consider that a 100% renewable energy system will need to be overbuilt so that it can supply electricity around the clock, every day of the year (Davis et al. 2018; Jenkins et al. 2018), the task and timeline become more daunting. For these reasons, an electricity grid powered exclusively from renewable energy sources likely has significant drawbacks.

What could we rely on if we struggle to deploy enough renewable energy and supportive infrastructure fast enough? There are several other options to reduce carbon in the electricity sector: energy efficiency, nuclear power, hydropower, fossil fuels with carbon sequestration, negative emissions technologies, and natural gas as a theoretically lower-carbon fossil fuel. Like renewables, each of these solutions has significant challenges.

Electricity consumption could be reduced through aggressive energy efficiency and conservation. Efficiency is particularly important in the short term since the electricity system is currently carbon-intensive (Trancik et al. 2014). However, this solution has proven remarkably difficult to unlock at scale, despite decades of optimistic forecasts that claimed untapped potential for profitable efficiency interventions (Charles 2009; Dietz 2010; Jaffe & Stavins 1994; McKinsey & Company 2009). Still, increasing the flexibility of the demand side may prove essential to balancing intermittency issues with high levels of renewable energy penetration (Jenkins et al. 2018).

Nuclear power is a second option. Once operational, nuclear plants do not generate greenhouse gas emissions. However, since it was first introduced in the United States in the 1950s, nuclear power has become expensive and politicized. As Chapter 3 discusses, many nuclear projects had large cost overruns. Since the Three Mile Island nuclear accident, new nuclear power plants have proven difficult to build in the United States. Concerns about environmental harms, including waste, continue to lead majorities of Americans to oppose new nuclear plants in their area (Ansolabehere & Konisky 2009).

That said, there is growing support for existing nuclear among environmental advocates, such as the World Resources Institute and the Union of Concerned Scientists, because it is the largest source of clean energy both in the United States and globally (Clemmer et al. 2018). And in the areas directly surrounding nuclear plants, public support can be higher (Aldrich 2008). In recent years, states have passed clean energy standards (CES), which include nuclear as an eligible technology. For example, Indiana passed a CES in 2011 that allowed 30% of the goal to be met with nuclear or "clean coal." Other states, such as Illinois and New Jersey, passed policies that offer financial incentives for struggling nuclear plants. New York similarly established a zero-emission credit program that stands alongside the RPS. In 2018, California's 100% CES policy theoretically opened the door for new, advanced nuclear reactors—even while the last plant in the state is currently slated for retirement in 2025.[24] Efforts are also underway to build a next generation nuclear plant at Idaho National Laboratory.

Unfortunately for climate mitigation efforts, more nuclear capacity is currently being removed from the US electricity system than added, after 20 years of no growth (Richards & Cole 2017). Shutting existing, safe plants is very problematic for climate mitigation efforts as 55% of clean power came from nuclear in 2018. One-third of the nation's nuclear plants are already closing or at risk of closing.[25] However, if nuclear operating costs remain high and natural gas prices remain low, nuclear could shrink by half by 2030 and drop down to a fifth by 2050.[26] Unless the politics and economics surrounding nuclear energy change dramatically, this technology will continue to struggle—and that is bad news for the climate.

Expanding hydropower would also prove useful for climate mitigation. But in the United States, most large hydro sites were developed by 1980, with little growth since 1995.[27] Even if all the remaining hydropower sources were developed, they would likely only supply an additional 5% of current US electricity consumption.[28] In addition, climate models predict drought for parts of the United States, with potentially negative impacts on hydropower generation (Christensen et al. 2004; Kao et al. 2015). These factors mean hydropower is unlikely to be a large part of the solution.[29]

Another option is to employ carbon capture and sequestration (CCS) technology—wherein carbon from fossil fuel combustion is captured and pumped into underground reservoirs. Scaling up this technology quickly will likely prove challenging—the scale of carbon sequestration necessary if fossil fuels continue to be burned is on the order of existing oil and gas infrastructure (Benson & Orr 2008). This solution has proven difficult to deploy in a cost-competitive way, despite significant government investment in R&D. In 2010, Secretary of Energy Steven Chu committed almost $5 billion for CCS R&D and deployment.[30] Most of the projects that the government supported never became operational.[31] There is now one major plant operating in Texas, Petra Nova, and several other smaller-scale industrial plants (Jenkins 2015). Apart from these sites, most CCS currently involves pumping CO_2 into oil fields to enhance oil recovery—a practice that many criticize as unproductive for climate mitigation. These efforts were further bolstered in 2018, when Congress passed the 45Q program, which provided a tax credit for carbon sequestration and utilization. That said, there is hope that innovation could come through these policies, which would ultimately lead to meaningful carbon reduction.

In addition, negative emissions technologies must play an important role in addressing the climate crisis. Most models that aim to meet a 2° C warming target rely extensively on negative emissions, including bioenergy with carbon capture and storage and direct air capture (Fuss et al. 2014; IPCC 2018; Rockström et al. 2017). Yet, these technologies are not commercially viable. At present, pilot projects do not remove carbon from the atmosphere long term. Still, if innovation enables these technologies to store significant carbon or displace fossil fuels by creating new synthetic fuels—for example by capturing carbon from the air—they would be revolutionary. Similarly, innovating new processes that allow carbon to be captured and stored in cement or other materials would be a huge breakthrough (Davis et al. 2018; Xi et al. 2016).

In addition to these technological approaches to negative emissions, afforestation—adding forests where they do not exist—and increasing carbon storage in soils may also help drive negative emissions (Griscom et al. 2017). The downside with these natural approaches, however, is that they do not permanently remove carbon from the atmosphere since forests can be cut down and soils can be disturbed. Climate change is already making forests even less stable sites for carbon storage (Griscom et al. 2017). And there is already strong competition for land use in other sectors, including for renewables. Some argue that if clean energy can grow fast enough, negative emissions technologies may not be necessary and indeed may be counterproductive (Anderson & Peters 2016). But, given the cases described in this book, that would require a politically unrealistic acceleration of clean energy.

Currently, natural gas is displacing coal in the United States—and, theoretically, this fossil fuel may have lower carbon emissions. It is also cleaner from a conventional air pollution perspective. Given the boom in hydraulic fracturing, the cost of natural gas has declined precipitously in the United States since 2008.[32] Still, there are significant concerns with increasing natural gas in the electricity sector. Leakage, wherein methane escapes into the atmosphere before being combusted, is problematic because methane is an extremely potent greenhouse gas. If natural gas leaks at a rate of 3.2% or higher, scientists estimate that this fuel source is worse than coal from a climate perspective (Alvarez et al. 2012).[33] Accurate leakage rates are very hard to estimate, but it is likely that the official Environmental Protection Agency estimates are too low and that leakage may be around 2.3% (Alvarez et al. 2018). While many see natural gas as a bridge fuel, given high leakage rates, it may prove to be a bridge to nowhere.

It's clear that there are trade-offs and challenges in transitioning our electricity system, whether we rely on renewables or other technologies. If we are serious about solving the climate crisis, we should be aware of these problems. Regardless of the approach taken, the fact is we must increase the rate at which we remove fossil fuel infrastructure from our energy system. This will involve building renewables; accelerating energy efficiency; keeping existing, safe nuclear plants open; maximizing hydropower capacity; investing heavily in R&D for low-carbon technology; deploying negative emissions technologies; protecting land for natural carbon storage; building batteries and transmission; and enacting and sustaining policies that support renewable energy technologies. Solving the climate crisis will require massive government investment and stable public policy. It requires doing everything possible to avert climate disaster. This is not a simple problem.

Case Selection, Methods, and Policy Effectiveness

Since this book aims to use an interest group–centered theory of policy change to understand the limits of path dependence, I examined cases that a theory of positive feedback fails to predict. Here, I study clean energy laws that were retrenched in some way, despite having the potential for lock-in. The empirical chapters construct a political history of clean energy policy across four states where clean energy retrenchment has already occurred: Arizona, Kansas, Ohio, and Texas. Despite the potential these laws had for path dependence, we saw rollbacks and delays. Studying these cases allows us to understand how interest groups engaged in organized combat over policy can undermine policy feedback.

Still, given concerns about selection on the dependent variable, I also include one case where policy feedback theory is predictive—Texas's wind energy laws. In related work published elsewhere, I have studied several states where policy feedback prevailed (Stokes 2015). For example, California has consistently ramped up its renewable energy targets. In that case, advocates worked over many years to build a formidable coalitions of labor, consumer groups and environmentalists. Overtime, opponents had lost significant power and influence in Sacramento. Similarly, in Colorado, despite legal challenges and other attacks on renewable energy laws, advocates were successful at resisting retrenchment. These cases, which are not developed in this book, are examples of when advocates overcame their opponents in organized combat. They are places where the patterns we expect from policy feedback theory do play out. I come back to these more hopeful stories, including other current developments in state clean energy laws, in the conclusion.

The book relies on process tracing to understand the causal relationship between actors and events. Process tracing draws on history, archives, interviews, news articles, and other sources "to see whether the causal process a theory hypothesizes or implies in a case is, in fact, evident in the sequence and values of the intervening variables" (George & Bennett, 2005, 6). To trace policy changes and their causes, I undertook in-depth, longitudinal case studies in the tradition of historical institutionalism. In each case, I examined multiple instances of policy enactment, implementation, and revision. I do not focus on comparing across cases, as other qualitative studies in political science often emphasize (King et al. 1994). Instead, I rely on *within*-case analysis, examining a sequence of events in a given case over time (Fairfield & Charman 2017). This approach is also distinct from policy analysis—it is more concerned with understanding the causes of policy change than with policy effectiveness.

I developed the historical case studies necessary for process tracing through semistructured interviews with political actors, bureaucrats, policy advocates, and policy opponents as well as by analyzing policy documents. Between 2013 and 2019, I conducted 108 interviews with experts on these five cases, as well as individuals involved in US clean energy policy more broadly. Political actors interviewed included state legislators, commissioners, political staff, utility executives and employees, bureaucrats in energy agencies and public utility commissions, interest groups, activists, and citizens. Interviews were largely conducted confidentially, and for this reason, a list of interview subjects is not provided. When specific quotations are given, they are not attributed to an individual or organization but, rather, the broader group that individual represents—such as a utility or a renewable energy advocate at an NGO. Full details on the interviews are given in the Appendix. The analysis also relies on primary and secondary archival documents on the legislative and implementation process. I drew on state legislatures' official records, such as bill versions, bill analyses, and roll-call votes. I also relied heavily on dockets from proceedings at state public utility commissions. During the research process, I gathered and analyzed several clean energy organizations' archives with thousands of pages of documents, including newsletters, emails, memos, and reports.

The goal was to reconstruct historical events, including political actors' behavior that took place publicly and in behind-closed-doors negotiations. In practice, there are serious challenges to studying interest group battles over public policy. It requires understanding interest groups' actions and motives in an environment where secrecy is a central political strategy. Not only is political spending often intentionally obscured, but negotiations inside a legislature are impossible for the public to see directly. Given that most policy negotiations happen in private, constructing accurate political narratives is more often the work of investigative journalists than political scientists or policy scholars. In addition to my interviews, I lean on the excellent work of these journalists throughout this project.

There are times when the evidence I have uncovered for interest group influence is strong. And there are times when the evidence is weaker—when I am less certain about who did what and why. I aim to be transparent about when there is uncertainty over who was in the room or what a given actor's intentions were. Hence, you will find words like "likely" or "may" or "conceivable" in the empirical cases—these are cues to the reader about where I am making informed judgments based on publicly available evidence as well as my confidential interviews. Readers can then judge for themselves whether they find the facts convincing in any given case. My goal is to not overstate the evidence but to provide it transparently alongside its limitations.

Policy Effectiveness and Clean Energy Benchmarks

While this book is focused on building a generalized theory of policy change via organized combat between interest groups, inevitably the reader will wonder, *what about policy effectiveness?* Here, we can think about outputs or outcomes (Fiorino 2011). Outputs concern whether a policy met its targets. However, when organized interests water down a policy's goals during the negotiation process, targets may be weak and ineffective at solving the problem. Thus, we must also consider outcomes: did the policy meaningfully solve the problem? When it comes to addressing the climate crisis, this question should be central to any policy analysis. It is not enough to pass symbolic policies and declare victory. Policies must bring us closer to addressing climate change—whether directly reducing greenhouse gas emissions or indirectly innovating low-carbon technology that can be used around the world. We must have solutions at the scale of the crisis.

States with RPS policies have deployed an order of magnitude more renewables than states without these policies. However, we do not know if this is a causal effect, given significant identification challenges. Some research has raised questions about RPS policies' effectiveness, particularly compared to hypothetical carbon taxes (Greenstone et al. 2019; Upton & Snyder 2017). Yet these research papers have flaws. For one, there are significant challenges with using econometric techniques to estimate policy effects when spillovers occur across jurisdictions. In the case of clean energy laws, as one state acts, it lowers the cost of other states acting. Further, the theoretical stringency and political acceptability of a carbon price are different from what a carbon price would look like in practice. Hence, comparing actual policies that were negotiated under organized combat between interest groups to hypothetical, economy-wide carbon pricing is an apples-to-oranges comparison. In addition, it is clear that there are substantial health benefits from clean energy adoption that these papers underestimate (Dimanchev et al. 2019).

Whether or not RPS policies work to drive new renewable energy adoption depends on how the policies were designed and implemented (Carley et al. 2018; Delmas & Montes-Sancho 2011). Arizona passed many renewable energy laws, beginning in the 1990s, that utilities simply ignored. When these policies are input into econometric models, they are deemed ineffective—when in fact their inability to deliver is a reflection of a broader problem of regulatory capture that a carbon price would also face. Similarly, in Texas, the solar target was written to be toothless. We will see throughout this book that policies are often designed for ineffectiveness because of powerful opponent interest groups.

Here, I take a different approach—thinking about the laws we need, rather than simply evaluating the laws we have. We can begin by setting simple benchmarks for low-carbon electricity, including wind, solar, geothermal, biomass, nuclear, and hydropower (Figure 1.5). If we start in 2000 with 100% dirty electricity and draw a straight line to 2050 when we have 100% clean electricity, we must grow clean energy 2 p.p. every year. With this metric, states should have been producing 36% of their electricity from clean energy sources by 2018.[34] On the surface, we appear to be on track—the United States got just over 36% of its electricity from low-carbon sources in 2018.[35] However, just 17% of the electricity supply came from renewables. Instead, 19% of the electricity system is nuclear energy—a problem given the slate of retirements scheduled and the lack of new plants being built. Renewable energy needs to grow fast enough to beat out retiring nuclear. Unfortunately, so far this isn't happening—natural gas is filling more of the new capacity needs than renewables.[36] Unless this trend reverses, we could see the US electricity system increase in carbon intensity, as has occurred in Germany.[37] In short, we have been living on borrowed time, relying on decades-old nuclear and hydropower plants as we slowly ramp up renewables (Figure 1.6). But we have run out of time to delay any longer.

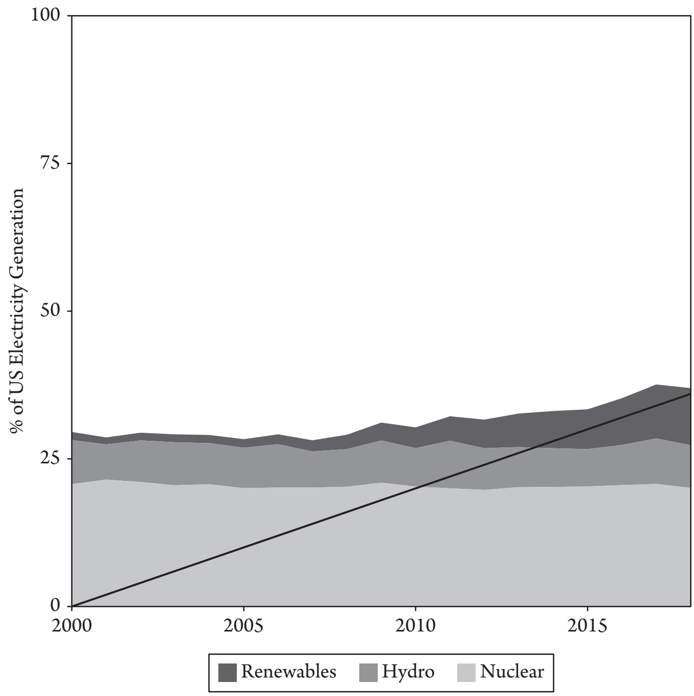

Figure 1.5 Clean Electricity Benchmark, 2000–2018

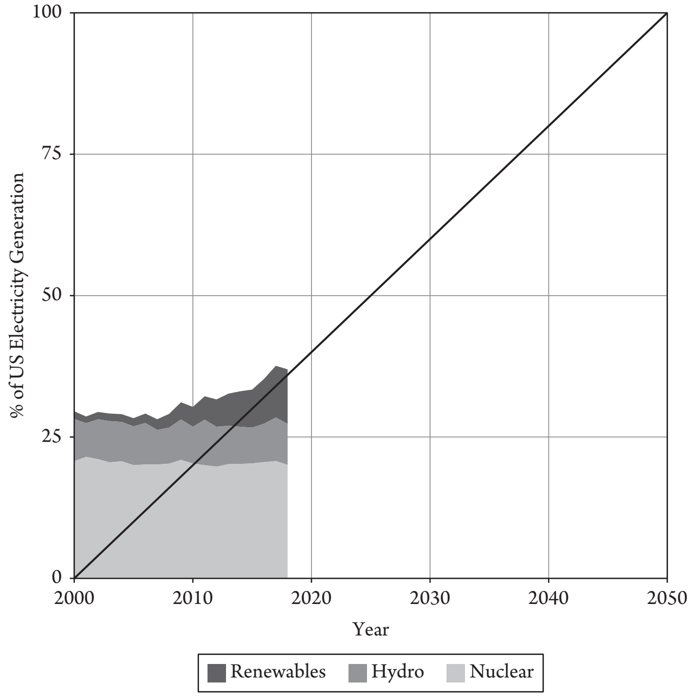

Figure 1.6 Clean Electricity Benchmark, 2000–2050

Even this 2050 benchmark may prove too lax, given the climate impacts we are already experiencing. Instead, we may want to set a goal of having 100% clean electricity by 2035 (Figure 1.7). In that case, if we start in 2000 and draw a straight-line out to 2035, we should already have just over 50% of the electricity supply from clean energy sources. By this benchmark, we are around 15 p.p. behind schedule. If we want to meet this 2035 target, then renewables must grow by more than 4 p.p. annually, to make up for lost time. Given the annual growth rate was just 0.7 p.p. over the past decade, this would represent an almost six-fold increase over historic rates.

Yet even this benchmark underestimates the challenge we face. To cut emissions in half by 2030, in line with what the IPCC has said is necessary to limit warming to 1.5° C (IPCC 2018), we need to make progress on cleaning up two sectors that combined made up 57% of US carbon emissions in 2018: electricity and transportation. In practice, this means making the electricity system about twice as big to electrify cars, trucks and other vehicles. Hence, the 2035 goal is perhaps better understood as a target of 200% clean electricity, compared to the electricity system of 2018. We can draw a straight line out from 2018 to 2035, when the electricity system is twice as large and only comprised of clean

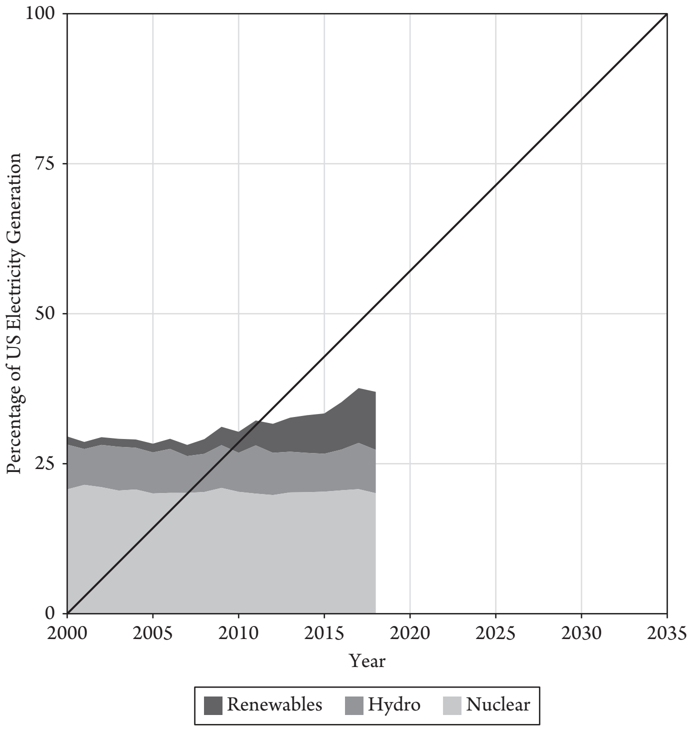

Figure 1.7 Clean Electricity Benchmark, 2000–2035

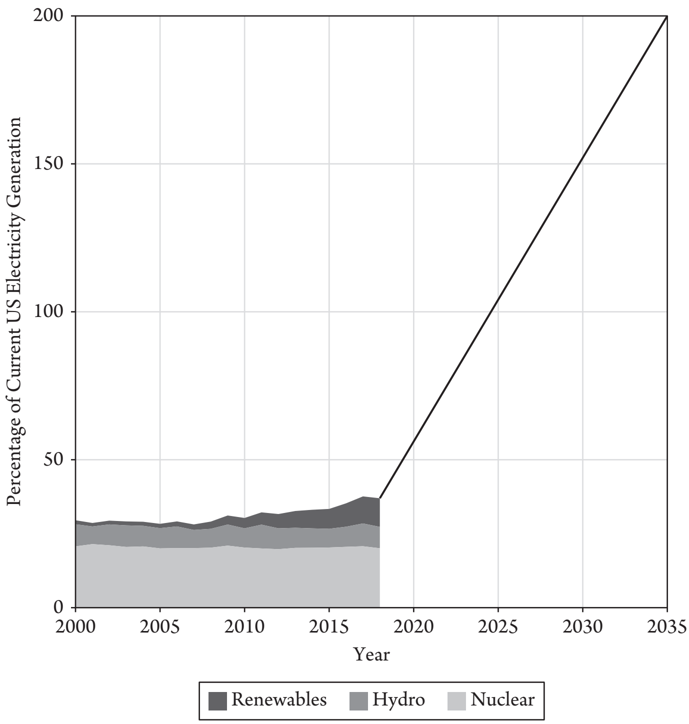

Figure 1.8 Narwhal Curve

electricity. The angle of the "narwhal tusk" in this figure gives a sense of the rate necessary (Figure 1.8). It is, to say the least, daunting. Of course, if we invest heavily in energy efficiency, the tusk will be less steep. And if we keep safe nuclear plants open, it will also be easier to make progress. But regardless the fact is clear: we have procrastinated on cleaning up the electricity system for too long.

How do the states in this book stack up against these benchmarks? By 2018, Texas and Ohio were clearly failing. Despite running ahead on clean energy, Texas was only producing 26% of its electricity from clean sources, putting it 10 and 24 points behind on the 2050 and 2035 benchmarks, respectively.[38] Ohio was doing even worse: at 17%, it was 19 points behind on the easier 2050 benchmark.[39] A quick comparison with California and Iowa shows that these states could have been further along the pathway toward the clean energy future. Respectively, these states had 53% and 43% clean energy by 2018, putting them ahead of their own goals as well as the 2050 benchmark.[40]

On the surface, Arizona appeared to be doing better: it had 39% of its electricity from clean sources in 2018, beating the 2050 goal by 3 points.[41] However, compared to a 2035 goal, the state is more than 10 points behind schedule. Worse, most of Arizona's clean energy came from one nuclear power plant built in 1986, which is slated for retirement beginning in 2045. This creates significant risk, if, for example, the nuclear plant faces problems before then. On renewables, Arizona is consistently behind on its own targets—in 2018, it only produced 5% of its utility-scale electricity supply from renewables.[42] If renewables continue to grow at their best pace in recent years, by 2045 when Arizona's nuclear plant is scheduled to retire, the state will only have around 40% renewable energy sources.[43] Clearly, the state lacks a plan for 100% clean electricity by 2050, particularly given the need to grow the electricity sector to support other parts of the economy decarbonizing.

The Kansas case, however, is much more hopeful. Despite concerted and successful efforts to repeal the state's clean energy law from the Wichita-headquartered Koch Industries and its affiliates, associated groups to repeal the clean energy law, we are still seeing progress in this windy state. By 2018, the state had 37% of its electricity from renewable energy sources alone and an additional 18% from nuclear, putting it a ahead of both the 2050 and 2035 benchmarks and well beyond the state's modest, repealed targets.[44] In Kansas, advocates were smart to sacrifice the RPS policy in exchange for forgoing a new tax on wind energy.

Looking at other states, we see there are many more clean energy laggards—in 2018, 24 states were beating the 2050 benchmark, while 26 were failing. For example, Florida only had 15% clean energy in 2018.[45] Utilities have spent decades beating back efforts to enact an RPS law in that sunny state. West Virginia, which repealed its RPS in 2015, was the second worst state in the country: only 5% of its electricity system was from low-carbon sources.[46] Taken together, these facts suggest that growing and decarbonizing the electricity sector is going to remain very challenging. Hence, the cases in this book are not outliers. More than half of the country is behind on clean energy, even if we count aging nuclear plants and ignore the need to massively expand the electricity system.

We can also see these facts playing out in the financials. New investment in clean energy in the United States peaked in 2011 at $62 billion. For the past half-decade, spending has been flat, hovering around $56 billion annually.[47] Consequently, US states are falling further behind in their efforts to address the climate crisis. Today, China and the European Union have pulled ahead of the United States in wind energy—both regions now have twice as much installed as the United States.[48]

We do not have the necessary laws in place at the state or national level to decarbonize the US electricity sector. While conflict rages in legislatures and public utility commissions, newspapers run a simple story: wind and solar energy are finally cheap enough. We are on a short path to powering our societies without pollution. States and cities in the United States are policy leaders, solving the climate crisis! It is true that renewables have declined dramatically in price over the past decade. But any student of politics and policy knows that economics are never the entire story. Just because a coal plant is uneconomic does not mean it will close: if utilities have debt and equity in that plant, they will work hard to keep it open.

In the absence of federal action, US states' and cities' actions are not adding up to solving the crisis. What's more, a backlash against clean energy policy is growing across the country, led by interest groups with a vested stake in the fossil fuel status quo. Environmental advocates, including renewable energy companies, have attempted to counteract the backlash; and since the election of Trump in 2016, clean energy advocates have gained some momentum. But we must recognize that almost half the country's electricity system still lacks clean energy targets (Barbose 2018). The transition is not happening fast enough.

Plan of the Book

The following chapters explore organized combat in the American energy system. Chapter 2 provides the book's theory and core argument. I review models of policy change that emerged from debates over social policy in advanced democracies at the national level. Drawing on this research, I define the book's key concepts, including interest groups, policy expansion, and retrenchment. I then develop a new model of policy change focused on the fog of enactment and organized combat, outlining both direct and indirect pathways that advocate and opponent interest groups exploit to influence policy after implementation. Drawing on original survey data from US state legislators and their staff, I provide evidence for my theory, supplementing the historical institutionalist case studies in the rest of the book.

In Chapter 3, I examine the historical roots of the current conflict over the electricity system. Private electric utilities have long held a privileged position in energy policy, controlling state regulatory bodies for most of the twentieth century (Hirsh 1989; Hughes 1983). Early regulatory decisions surrounding electricity ownership and pricing structures paved the way for contemporary conflicts over renewable energy policies. Notably, utilities used their power to shape policy and technology to their advantage in three ways: they resisted innovation, they advocated for rate structures that exacerbated environmental harms, and they denied the climate crisis and other environmental problems. Taking a historical view, we can see that the electricity system developed the way it did—with large, fossil fuel plants and expensive, privately owned, and poorly maintained electric grids—because it served the interests of these powerful private utilities. Thus, like Naomi Oreskes and Erik M. Conway's book *Merchants of Doubt* (2010), this chapter shows how utilities' delay and denial have undermined progress on climate change. It was only with the energy crisis and the rise of the environmental movement in the 1970s that utilities' dominance began to be challenged.

Chapters 4 through 8 present the book's contemporary empirical cases. Across these chapters, I trace iterative cycles of policy enactment, implementation, and revision over several decades. In Chapters 4 and 5, I examine one of the earliest and most prominent renewable energy laws in the United States: Texas's RPS, enacted under then-governor George W. Bush in 1999. Chapter 4 provides the early history of clean energy leadership in Texas, when wind energy grew rapidly. Relying on original archival research and primary interviews with both advocates and opponents, I explain why Texas acted on clean energy before California and other more progressive states. I show how savvy advocates used public opinion to drive policy change during windows of opportunity. More broadly, this case reveals a classic positive feedback dynamic: a growing wind energy sector increased its influence over the legislature and successfully expanded clean energy policy. Here, advocates relied on the fog of enactment to get a clean energy target and an ambitious infrastructure spending bill passed in the legislature. They also worked through the public to convince legislators that clean energy leadership was important for Texans.

In Chapter 5, I conclude the Texas story on a sad note. Over time, fossil fuel companies and industrial energy consumers came to oppose Texas's renewable energy policies. Given their political influence over both politicians and regulators, these opponents were able to block reforms from passing in the legislature or being implemented through regulatory bodies. While a solar energy policy was passed in Texas in 2005, it was never implemented. Clean energy opponents succeeded in blocking the law's implementation because they were influential with the legislature and with regulators. One fossil fuel industry lobbyist reportedly worked from a desk in a key senator's office. In this chapter, we see how opponents can directly undermine policy, even if advocates have previously won policy conflicts and started positive feedback. We also see how opponents can use the fog of enactment strategically to resist policy during implementation.

In Chapter 6, I explore a case of retrenchment by a thousand cuts. Kansas first implemented a clean energy law in 2009, through a political bargain. In exchange for a renewable energy target, Democratic governor Mark Parkinson agreed to approve a coal plant. But the coal plant was never built, and the opposition to the RPS grew. The state seemed poised to withstand retrenchment attacks, due to strong growth in the wind energy industry. However, the opponents—including Koch Industries and their allied AFP—returned year after year and eventually wore down the advocates. Unable to directly overturn the law through the legislature, the opponents worked to weaken support for the policy. They backed politicians in primaries and secured appointments in vacant seats for anti-renewables candidates. They also funded astroturf campaigns. Advocates responded by organizing the public, but they were less politically influential— particularly after the Republican Party made supporting the clean energy rollback a litmus test for party financing. Despite the established wind energy industry backing pro-renewables Republicans in primaries, the fossil fuel opponents were eventually able to retrench the law. This case shows that when policy feedback begins to take hold, it can threaten policy opponents. When these incumbent opponents have sufficient political influence, they can undermine feedback even in cases where feedback has effectively created or supported advocates.

In Chapter 7, I examine a different renewable energy law: net metering. These laws have been crucial across the country for the development of the solar market. They set the rules for how to compensate individuals and organizations supplying energy to the grid. After passing a series of clean energy targets in the 1990s and early 2000s that the state never implemented, Arizona finally began to get serious about renewable energy in 2008, passing a net metering law that year. After this policy, solar energy grew rapidly as companies from earlier acting states crossed into Arizona, in a case of feedback spillovers. However, the state regulator made a series of decisions from 2013 to 2017 that weakened and ultimately retrenched the state's solar policies. Here, regulatory capture was key to electric utilities' success in controlling the policymaking process. One utility, Arizona Public Service, spent at least $55 million across several elections to block clean energy policies and elect anti-solar politicians. This chapter shows how opponent interest groups can directly drive retrenchment through regulatory capture.

In Chapter 8, the final empirical chapter, I examine how networked interest groups can learn about policies in other states and use this information to swiftly drive retrenchment. Ohio was one of the last states to enact a renewable energy target. For this reason, electric utilities understood more quickly that the policy would undermine the financial viability of their existing fossil fuel assets. When states are followers rather than leaders, the fog of enactment is less likely to occur. ALEC, which has electric utility and fossil fuel companies as members, played an important role in Ohio, putting retrenching clean energy "mandates" on the agenda. Opponents worked over several years to freeze the policy, creating an uncertain future for renewable energy companies in the state. They also changed the rules around wind energy siting, locking the entire industry out of the state. At the same time, these utilities pressured their regulators and the legislature to pass subsidies to keep their polluting coal power plants open longer. In 2019, the utilities finally succeeded in repealing the state's efficiency and renewables standards, replacing them with a bailout for coal plants. In this case, we see how policy feedback can fail when opponents networked across the states learn from earlier policies' implementation and weaken the policy before it is able to generate lock-in.

In Chapter 9, the book's conclusion, I chart a path forward, both theoretically and empirically. I show how using a more complex model of policy feedback enables a better understanding of the conditions under which retrenchment is likely. This chapter makes the case that understanding organized combat between policy advocates and opponents is crucial to explaining policy change. I also show how advocates and states can get climate policy back on track, reviewing more hopeful recent developments in state clean energy laws. For too long, a small set of interest groups has captured the regulatory process—the very mechanism that is supposed to serve and protect the public interest. They have used their power to imperil the health and well-being of all people on the planet. To address climate change, policy advocates need to win policy conflicts more often. Clean energy advocates must learn from their opponents' success in retrenching policy.

The final chapter provides lessons from the opponents' playbook over the past 100 years. Until our policies are able to effectively challenge fossil fuel corporations and electric utilities as vested interest groups, the lives of billions of people and even more animals, species, and ecosystems are in grave danger.

Climate change is the largest threat the United States and all societies currently face. We need to radically alter the energy sector's politics if we hope to begin to solve this problem. Advocates cannot just focus on building the future. They must also dismantle the past. To transform our energy system and address the climate crisis head on, we must undermine opponents' political power. The fossil fuel era must end.