Research Articles

California's Cap-and-Trade System: Diffusion and Lessons

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Abstract

This article investigates the roles of policy diffusion and policy learning in shaping the design of California's cap-and-trade system. On the surface, it is very similar to other cap-and-trade programs, but in practice many detailed differences reflect active efforts by California policy-makers to avoid flaws that they saw in other systems, such as the EU ETS and the US East Coast's Regional Greenhouse Gas Initiative. We assess how California's cap-and-trade system emerged, the significance of policy diffusion, and the lessons for other trading systems by applying two broad sets of theoretical frames—the role of policy diffusion and the role of organized local political concerns. We find that despite the signature status of the trading system, California mostly relies on much less transparent and more costly direct regulation. We also find that California's cap-and-trade system has developed mostly in its own, special political context, which hampers the feasibility of cross-border trading.

California adopted and designed its cap-and-trade system at a time when many countries and regions, notably the European Union, were experimenting with emissions trading. By 2006, the US federal government under the leadership of George W. Bush had failed to adopt a nationwide strategy to cut emissions, and California moved ahead on its own. Those efforts took many forms, but the centerpiece was California Assembly Bill 32 (AB 32)—the Global Warming Solutions Act—which the California State Legislature adopted in 2006. AB 32 set in motion a process that led to a statewide cap-and-trade system that came

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into effect in 2012. This article investigates the roles of policy diffusion and policy learning in shaping the design of that system. On the surface, the AB 32 system is very similar to other cap-and-trade systems, but in practice many detailed differences reflect active efforts by California policy-makers to avoid flaws they saw in other systems. The California system was designed to create the impression that efficient markets were being used to control emissions in the state, when, in fact, most of the real effort in cutting emissions came from more expensive regulatory and procurement mandates. California policy-makers also understood that the state produces only a fraction of global emissions, and thus they designed their cap-and-trade system with the potential for other states and countries to link to California's carbon market. As the implementation of AB 32 proceeded, California took on the role of a leader trying to encourage other states and the federal government to follow.

We examine the origins and operation of California's cap-and-trade system from two broad sets of theoretical frames. First, we concentrate on the role of policy diffusion. Building on previous research, we examine the broad process of diffusion and active learning as policy agents and organized interest groups sought to identify and apply lessons from other trading systems when designing and adjusting the California emissions trading program. Previous literature has shown that the implementation process, through which the design of a cap-and-trade system becomes reality, is crucial for a system's continued growth and support of climate policy (Houle et al. 2015; Klinsky 2013; Paterson et al. 2014). Such processes are intrinsically complex and responsive to many different actors, interests, administrative arrangements, institutions, and ideas. For such reasons, we find that there is no simple story of international policy diffusion—the idea of cap and trade has diffused globally, but its implementation depends on many diverging local political interests.

Second, we examine how these organized political concerns within the state have affected the design of the system. There is a huge literature on "clean" or "optimal" cap-and-trade systems but relatively little literature on *how* political economy affects the design and operation of cap-and-trade schemes (but see Houle et al. 2015 and Klinsky 2013 for comparisons of emissions trading systems across several US and Canadian subfederal jurisdictions). Local concerns have affected the coverage of the cap-and-trade system—for example, overcoming opposition from the state's politically well-organized oil industry was crucial to the expansion of coverage to include the transport sector in the second compliance period (2015–2017). Strategies to overcome and redirect organized environmental and community interests were crucial to creating a cap-and-trade system in the first place. Some of these groups—such as those anchored in the environmental justice movement—were concerned that trading would lead to loopholes, local pollution "hotspots," and other poor outcomes. In 2016, those concerns were instrumental in pushing forward the bill AB 197 to adoption by the state legislature; this bill specifically instructs the government to prioritize direct regulation of large emission sources, and hence will make California's

cap-and-trade system even less of a "pure" form of trading after 2020. Finally, how revenues from cap-and-trade auctions would be spent was also crucial to building political support. The cap-and-trade auctions have generated about four billion dollars to date, which is deposited in the Greenhouse Gas Reduction Fund, where it is subject to appropriation by the state legislature. The auction proceeds are channeled to infrastructure investments, projects for disadvantaged communities, and other activities that are the darlings of well-organized interest groups.

Theoretical Framework

Although the history of California's climate change policy is rich, the central purpose of this study is to make theoretical sense of why California adopted cap and trade and how California policy-makers designed and adjusted that system over time. We limit our case study to the pre-2020 period, during which AB 32 gave specific authority to introduce a cap-and-trade system. In August 2016, the state senate adopted SB 32, which extends California's climate policy to 2030 and requires a 40 percent cut in GHG emissions below 1990 levels. It is beyond the scope of this article to explore the consequences of SB 32 and AB 197, but these new laws will keep the debate about the design and implementation of the cap-and-trade system alive for years to come.

To assist in the analytic effort, we draw from two main clusters of theory—policy diffusion and local political economy. Policy diffusion can be defined broadly as "a process in which policies spread across time and space" (Börzel and Risse 2012). Diffusion can happen via learning—in which case agents actively identify lessons from other jurisdictions and apply them—and it can happen as foreign ideas are adapted by local political forces (Elkins and Simmons 2005, 39). The former approach emphasizes adjustment as a cognitive and organizational process; the latter emphasizes political economy and the relative influences of organized interest groups.

With regard to learning, we are interested in how policy-makers can learn about policies, administrative arrangements, institutions, and ideas from other trading systems; thus, we draw upon the significant literature on policy learning as a key diffusion mechanism (e.g., Elkins and Simmons 2005; Shipan and Volden 2012). Learning may involve correcting design "errors" in response to the perceived failure of another system, or simple emulation or copying of policies or practices pursued by others (Underdal et al. 2015). A key mechanism is "transnational communication and lesson drawing," in which a government that is considering introducing emissions trading draws rational lessons about program design from external actors (Holzinger and Knill 2005). In examining policy learning, we have two interests. One is to understand the actual causal mechanisms that help explain the design of policy instruments. The other is to explain the convergence and divergence of policy instruments globally over time, which has important theoretical and policy implications. For theory, an

explanation of convergence or divergence would contribute to the recent literature showing that despite the globalization of ideas about policy instruments, a wide array of other factors—other ideas, institutions, practices, and such—affect the process of diffusion (Gulbrandsen and Wettestad 2016). Full convergence is not a necessary or even a likely outcome of diffusion within such political settings (Klingler-Vidra and Schleifer 2014, 264). For policy-makers, understanding the degrees of convergence and divergence is important because essentially all the applied policy literature about carbon markets has assumed that the internal designs of markets are similar, and thus that linkages between markets over time will be relatively straightforward. If that assumption does not hold, then the emerging interest in linking carbon markets needs to pay much closer attention to how markets with highly heterogeneous design will become linked or integrated (Victor et al. 2005). A research program on carbon market linking is emerging (e.g., Ranson and Stavins 2016), and this article contributes in that realm.

With regard to political economy, we examine how *local political factors* are crucial for explaining the adoption and design of emissions trading systems (ETSs). Such local influences act as mediating factors through which external practices and impulses pass (Falkner and Gupta 2009; Inderberg and Bailey 2016).

We start by looking at the mobilization and relative power of interest groups. We are interested in interdependence relationships between policy-makers and the electorate (e.g., Bueno de Mesquita et al. 2005)—reflected, in particular, in how policy-makers interact with organized interest groups that aggregate electoral interests into powerful voices (e.g., Skodvin et al. 2010). We also assess the role of institutions in shaping which politically organized actors get a voice in the design of policy (Baumgartner and Jones 2009; Kingdon 2003). We look at the processes through which legislation is open to external influence—in particular, the AB 32 legislation—because electoral support is crucial for legislative success (Arnold 1990). Particularly notable is that California's climate change and energy policies delegate authority to several administrative bodies that solicit and respond to organized interest groups in different ways. AB 32 explicitly and solely delegates administrative authority to the California Air Resources Board (CARB), but other statutes independently authorize other agencies to pursue policies (such as the state's renewable portfolio standard) that reduce CO_2 emissions, and thus affect CARB's overall goal of returning to 1990 emission levels by 2020 and the functioning of the CARB-managed cap-and-trade system. We expect affected actors to exploit varying opportunities to block, change, or refine specific design elements—and those efforts will be reflected in the design of California's cap-and-trade system as well as in how it interacts with other policy instruments.

Third, we analyze whether path dependencies and lock-in effects related to previous policy programs and experience influenced the scope and design of the cap-and-trade system. Previous research has demonstrated that path dependencies can create "lock-in" effects that constrain and influence policy choices

(Pierson 2000). The timing and sequence of choices in developing a policy can shape the array of interest groups and institutions that seek to influence it, which in turn can affect future policy choices and their effects.

We employ data from position papers and reports produced by major actor groups, more formal stakeholder processes, impact assessments, and policy reviews. We complement these official sources of information with thirteen semistructured interviews with key stakeholders (see the Appendix), which have allowed us to identify the causal chains of influence and path dependencies that resulted in the design of the California cap-and-trade system. The interviews revolved around six open-ended questions related to the role of the organization/expert in shaping the design of the cap-and-trade program, lasted between 45 and 90 minutes each, and included state politicians or their expert staff, environmental nongovernment organizations (ENGOs), relevant state agencies, and academics.

Background: California's Cap-and-Trade Program

The California cap-and-trade experiment originated at a time when political attention to climate change was increasing rapidly but federal climate policy responses seemed unlikely. In the early 2000s, the Republican-led US Congress essentially had no majority in favor of a federal climate policy act, nor was the executive branch, led by President George W. Bush, pushing for much federal policy. Bipartisan efforts in the US Senate in 2003 and 2005 to pass cap-and-trade legislation—in parallel with the EU's introduction of an ETS—quickly stalled. In California, however, the Democratic Party had greater political strength and proved capable of working with a large group of moderate Republicans, including Governor Arnold Schwarzenegger, who sought market-friendly environmental policies. This political alliance put climate policy on the agenda in the early 2000s, and they looked to the EU and the Kyoto Protocol experience for partial inspiration when they proposed the Global Warming Solutions Act (AB 32).[1] The law required California to reduce its GHG emissions to 1990 levels by 2020, about 15 percent below the emissions expected under a "business-as-usual" scenario. It also created an administrative apparatus along with supportive political coalitions that have worked in tandem to deepen and expand the impact of that original framework.

AB 32 authorized CARB to develop regulations to achieve "the maximum technologically feasible and cost-effective GHG emission reductions," and stated that CARB "may" use emissions trading as an option for how to implement the objectives in the legislation.[2] This ambiguity reflected a political debate still alive in California, with political forces concerned about minimizing economic impacts arrayed against environmental justice groups that were suspicious of unfettered

1. Interview 1.
2. See California Health & Safety Code § 38562(c) (emphasis added): www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc.

markets and concerned that trading would create pollution hotspots within disadvantaged communities (EDF/IETA 2015).

CARB developed an initial scoping plan in 2008, which outlined California's emission reduction target and included a wide range of recommended strategies, direct regulations, market-based approaches, voluntary measures, and other programs—most of which CARB itself did not directly control. The most important policy programs were the state's renewable portfolio standard (RPS), the low-carbon fuel standard (LCFS), and energy efficiency measures. The cap-and-trade system, according to CARB's logic, was to offer a "backstop" and an insurance policy.[3] The backstop would help ensure that total emissions would not rise above the prescribed levels. The insurance function, in tandem, would create a mechanism that could make up emission reduction efforts that were lost if any of the major complementary policies were to fail. This logic was extremely important to CARB's design, because the agency knew that the full package of climate policy measures, such as the state's low-carbon fuel standard, would face severe and possibly successful legal challenges (Wara 2014).

CARB turned the "may" in the authorizing statute into an actual emissions trading program by engaging an expert group consisting of California's top economists to evaluate policy options—that group, almost by design, strongly recommended cap-and-trade as the most cost-efficient policy instrument (Economic and Allocation Advisory Committee 2010). CARB leaned heavily on the expert group's advice in choosing cap and trade as a central element in the state's climate policy package. Over the next three years, CARB's own experts developed the detailed rules of the cap-and-trade program and engaged a range of external experts and stakeholders in the process. In 2011 CARB submitted final rules for the state's cap-and-trade program, which was implemented in January 2012 (CARB 2016). An update of the scoping plan was approved by CARB in 2014 and includes new strategies and recommendations.

California's cap-and-trade system covers about 85 percent of the state's total emissions and targets emitters of more than 25,000 tons of CO_2 equivalents annually. It covers all major sectors, including electricity producers and first-deliverers, process industry and manufacturing, oil and gas producers, and transport fuels. In total, about 450 entities are required to participate in the carbon market. The market was designed to develop in three compliance periods, from 2013 to 2020, when new policy action would have to extend or replace the current scheme. The allocation of permits was based on 90 percent free allocation and 10 percent auction in the first phase (2013–2014), which covered only electricity and industrial sources. Transportation fuels became subject to the cap-and-trade program in the second phase (2015–2017), with a requirement for this sector to buy allowances at auction (or to buy offsets from third parties). The total percentage of free permits is to be reduced to 75 percent by 2020 for some covered sectors in

3. A special thanks to two reviewers who helped us understand the interplay of the backstop and insurance functions.

the third phase (2018–2020).[4] Banking and borrowing of permits is allowed. The rules for offset purchasing are firm, allowing for a maximum of 8 percent offset permits for each covered entity and quite rigid assessments of eligible projects (EDF/IETA 2015). For the purposes of reliable monitoring, reporting, and verification of both activities in the market and cuts in emissions, CARB requires all covered entities to report on a yearly basis. The program contains a flexible price-containment mechanism through which the Allowance Price Containment Reserve (APCR) builds up a pool of additional allowances that can be introduced into the market if permit prices exceed specified levels. In effect, this creates a limited cost-control mechanism (Borenstein et al. 2016). The program has a price floor that started at $10 per ton for 2012–2013 and then increases at a rate of 5 percent per year until 2020. The rate is 5 percent in real (not nominal) terms, defined as 5 percent plus the consumer price index. Finally, the revenue from auctions goes into the Greenhouse Gas Reduction Fund, whose proceeds are earmarked for low-carbon development projects in California (EDF/IETA 2015; Gulbrandsen and Wettestad 2016; Rabe 2015).

The California program emerged amidst a vacuum of serious federal policy. Californian politicians and regulators described their efforts in terms of leadership, but they also knew that California's strategy must be designed to expand and influence a larger fraction of the nation's (and the world's) emissions. To that end, California helped initiate the Western Climate Initiative (WCI) from 2007. WCI was formed as a collaborative initiative to develop a regional cap-and-trade program, with seven US states (California, Washington, Oregon, New Mexico, Arizona, Utah, and Montana) and four Canadian provinces (Quebec, Ontario, Manitoba, and British Columbia) as members. WCI emerged at the same time that a regional GHG reduction program was established on the East Coast—the Regional Greenhouse Gas Initiative (RGGI). Over a period of four years, several partner workshops planned WCI's design elements, making it close to implementation-ready by 2011.

Those efforts may have been eclipsed by the arrival in 2009 of a new president in Washington—Barack Obama, whose Democratic Party at the time also controlled both houses of Congress. During a brief window of opportunity that year, several major legislative efforts were pushed forward—notably on health care and climate change. When momentum was building for the Waxman-Markey bill in the 111th Congress, copies of the California climate regulator's implementation plan, the 2008 scoping plan, were distributed widely in Washington DC to show

4. The details are more complex. In particular, it is crucial to note that allowances enter the market broadly in two ways. One is through free allocation (mainly to utility and industrial sectors that are large existing emitters). The other is through sale, which occurs under three distinct sets of auction rules: (a) auction of CARB-owned allowances, which generates revenue for the state's Greenhouse Gas Reduction Fund, (b) sale of so-called consignment allowances, which utilities "consign" to CARB to sell with the revenues recycled back to utility ratepayers, and (c) Québécois allowances, which are jointly auctioned with the California allowances and are treated as equivalent for compliance purposes. Only the sale of CARB-owned allowances generates discretionary revenue for the California government.

that climate mitigation policy was feasible. Eventually, the Waxman-Markey bill passed the US House of Representatives but failed to attract sufficient support in the US Senate, where the bill died without a formal vote as the Obama administration focused on other legislative priorities (Lizza 2010).

During midterm elections in 2010, a wave of new governors took office, and the Democrats lost unified control of the federal legislative branch. That political pivot killed hopes for further climate legislation in Washington and helped undermine the WCI. Almost all collaborating states bowed out of WCI by the end of 2011 (Rabe 2015). Only California and Quebec implemented cap and trade, and in 2014 the two programs formally linked, now constituting one carbon market.

Analysis

Origins of the Cap-and-Trade Program: A Case of Policy Diffusion?

Previous research has pointed to a number of potential sources of learning as California designed its cap-and-trade program. Emissions trading as a climate policy instrument originated in discussions related to the Kyoto Protocol in the late 1990s, inspired by successful US experiences with the SO_2-trading market established under the Clean Air Act (Schmalensee and Stavins 2013). Responding to similar external influences, the European Union embraced the idea of a carbon market and started planning and implementing its pioneering ETS from 2001 onward (Skjærseth and Wettestad 2008). The US Congress debated several proposals for adopting a federal cap-and-trade program, but bills failed in the Senate in 2003, 2005, and 2008 (Bang 2010). Moreover, nine states on the East Coast formed RGGI in 2005 with the aim to set up a regional cap-and-trade system to cut GHG emissions from the electricity sector. The WCI was initiated on the heels of RGGI and included both a broader scope (all sectors of the economy) and membership (eleven states and provinces; Rabe 2015).

Politicians and regulators in California were interested in drawing lessons from experiences with the nascent EU ETS. On the basis of experiences with overallocation and windfall profits in the EU ETS, CARB put a lot of weight on ensuring that the data and rules were right before implementation of the carbon market began.[5] European politicians visited California and helped convince Governor Schwarzenegger that emissions trading would be a cost-effective and useful policy approach for California.[6] Bureaucrats and technical experts from the EU visited California several times to share their knowledge and experience.[7] Representatives from CARB also visited Brussels to learn about emissions trading.[8] Our interviewees emphasized that the main purpose of learning from

5. Interviews 6 and 11.
6. Interview 13.
7. Interview 2.
8. Interview 6.

the EU was to avoid some of the key mistakes, especially regarding overallocation of permits, generous rules for offsets, and windfall profits for emitters. Such design elements helped drive EU carbon prices down—an outcome that Californian politicians and regulators wanted to avoid.

Over time, domestic emissions trading programs gained an increasingly important role in the design phase of California's cap-and-trade system. Specifically, collaboration within the WCI allowed California, parallel to CARB's work with the scoping plan, to learn from how other jurisdictions were grappling with similar decisions. This was an interactive process, in which common WCI design elements were developed for offsets and compliance, with the specific aim of future linkage between systems, and all participating states went through lawmaking preparations.[9] More critical voices describe the WCI process as being dominated by Californian ideas and expert knowledge, a hegemony that was strengthened when most member states, except California, Quebec, Ontario, and British Columbia, withdrew from WCI by 2011 (Interview 11; Rabe 2015). The design of Quebec's cap-and-trade system was clearly influenced by WCI collaboration, which simplified the process of later linkage to California's system.[10] For California, linkage to other markets required that those markets have designs substantially equivalent to its own—that both California and Quebec used the standard WCI market design made the linkage much easier (Benoit and Côté 2015; Cullenward 2015).

Some of the flexibility provisions in the California cap-and-trade program appear to be designed in part on the basis of lessons from the EU ETS and RGGI (Rabe 2015). Specifically, the numbers of covered entities and auctioned allowances would expand over time, and hence increase the size of the market. After activating the California cap-and-trade system's first phase from January 2013, regulators increasingly were talking about linkage with RGGI and Quebec. These discussions made California policy-makers less inclined to focus only on their own design, but to keep an eye on how the California market could remain compatible with (and shape) other markets.

Learning also happened through expert academic advice. Notably, the independent Economic and Allocation Advisory Committee, consisting of economists from California's top universities, gave important input to CARB. The committee's advice was quite influential for CARB's argumentation to establish a cap-and-trade system in California as a central part of the climate policy package, along with other policy measures (Borenstein et al. 2016). During preparation of the first scoping plan, the committee gave important advice on specific design elements, including the price control mechanism.[11] California established a minimum price floor in the auction of allowances (though prices briefly fell below this level during a crisis in mid-2016). California does not have a

9. Interview 5.
10. Interview 5.
11. Interviews 9, 10, and 11.

price ceiling, but a quantity-limited pool of allowances are held in the APCR, which are available in three tiers, at $40, $45, and $50 per ton of CO_2 equivalent. Those tranches (which have never been tested) create an elastic price ceiling—although if the APCR becomes depleted, there is no strict upper limit on prices. Concern that market prices could blow through the APCR is a critical issue in ongoing market design questions, and the Emissions Market Assessment Committee (EMAC)—CARB's top academic advisors, established to be a watchdog over the implementation of the market—voiced concern over this issue in 2013.[12]

To summarize, the California cap-and-trade program design was developed with an eye toward the experiences from other ETSs, in particular the EU ETS, RGGI, and the regional WCI collaboration. The main focus was to avoid making the same mistakes that others had experienced, especially related to the allocation of permits, compliance rules, offset practices, and price setting. Diffusion happened by learning from errors rather than by copying (Underdal 2013). Domestic internal learning and diffusion were more important than the EU's example throughout the design process; learning from the EU by avoidance was most important initially and did not make much of a difference when the system was up and running.

Local Political Concerns: Path Dependency and Political Economy

In developing its climate policy program, California's Democratic political majority and the regulatory authorities did not only draw lessons from other ETSs. Designing a system that took local concerns into account was crucial for garnering and sustaining political support. Hence, local political concerns mediated how lessons were learned. Stakeholder involvement was important in this process of learning about how cap-and-trade might operate and how it affected the interests of politically important groups. CARB organized twenty-four workshops with a broad range of stakeholders and designated more than twenty people within CARB to develop the scoping plan. All new proposed design elements were subject to public hearing processes with long commenting periods, and thousands of comments were submitted and answered.[13]

Path Dependency: California has a long history of serious air pollution problems, and the state is vulnerable to serious impacts of climate change, including droughts, wildfires, and water shortages. Californians express high concern for environmental degradation and climate change, as well as relatively strong support for climate policy compared to those in other states (Howe et al. 2015; Leiserowitz et al. 2013).

When the Federal Clean Air Act was passed in 1970, California already had a long history of efforts to address local air pollution. CARB, for example, was

12. See EMAC's letter to CARB on this matter in November 2013: https://www.arb.ca.gov/cc/capandtrade/emissionsmarketassessment/priceceiling.pdf.
13. Interview 5.

established in 1967 and was already deeply engaged with understanding and responding to the state's unique geography (high-density urban centers located in arid basins where pollution concentrates—notably in Los Angeles). As a result, an exceptional number of people with high competence within the field work in key agencies such as CARB, the California Energy Commission, and the California Public Utility Commission. Both the previous literature and our interviewees underlined this highly developed competence as being crucial for California's ability to design the current climate policy program (Houle et al. 2015).[14]

For California, the so-called "complementary policies"—the RPS, LCFS, and energy efficiency measures—in fact represent the most important components in the climate policy package in terms of emission reductions. These complementary policies were designed to take the bulk of emission cuts (as much as 80 percent in 2015), and the cap-and-trade system was designed to sweep up remaining cuts (not more than 20 percent in 2015) not handled through the RPS, energy efficiency measures, or LCFS.[15]

The policy mix was purposely designed this way to avoid soaring permit prices and political controversy, according to the regulators and legislators we interviewed.[16] If allowance prices had been too high—making the real costs of abatement transparent—protests could have mounted against the cap-and-trade system and potentially jeopardized its continuance. The climate policy package is built to gradually increase allowance prices and gradually increase the acceptance of cap and trade among stakeholder groups.[17] A strong coalition of actors were heavily involved in designing the climate policy package in this particular way, with an intended interaction between direct regulation and cap and trade that leaned most heavily on the effect of direct regulation. The coalition consists of legislators, the governor's office, and emissions trading experts in key state agencies and ENGOs.

First, Democratic legislators formed a strong majority in the state legislature that actively pushed through legislation that could support a strong climate policy, including cap and trade. Part of their mission was to organize regular hearings and debates in the state legislature that would educate state politicians on the climate change issue, with the intention to build a stable majority coalition that would support climate policy initiatives in both the assembly and the senate.[18] However, the election in 2014 brought in a more diverse group of Democrats—including those that represented low-income voters and districts with industries exposed to the cost of climate policy—who sought to amend the climate policy package to make it more reflective of consumer and business concerns. The adoption of AB 197, which authorized an extension of CARB's

14. Almost all interviewees mentioned this.
15. Interviews 5, 6, 2, 3, and 1.
16. Interviews 5, 6, 2, 3, and 1.
17. Interviews 5, 6, 2, 3, and 1.
18. Interview 1.

regulatory responsibility for cutting GHGs, but with new expectations toward the cap-and-trade system, shows the effect of these new legislators entering the state legislature.

Second, the governor's office has persistently supported cap and trade as a central piece of California's climate policy. Governors Schwarzenegger, Davis, and Brown were instrumental in initiating and supporting ambitious climate policy initiatives (Houle et al. 2015). In close alliance with the Democratic majority in the state legislature, they issued executive orders at crucial moments to initiate and implement climate policy instruments such as cap and trade that initially did not get direct support in the legislature. CARB has benefited from the ability to shop around for support. When the legislature has been less supportive, the governor has often intervened to support CARB's mission of deepening climate policy and expanding the scope of the cap-and-trade system. This element of California policy appears to be durable, since it is unlikely that a governor who is unsupportive of a strong climate policy would be elected in California.[19]

Third, the coalition includes experts from the CARB, Energy Commission, and ENGOs that were instrumental in designing the climate policy package—a network of experts that has emerged from long experience working on environmental regulation and markets since the 1970s. This same constellation of experts were instrumental in designing a climate policy package for California in which direct regulation—including the RPS, LCFS, and energy efficiency regulations—forms the basic building blocks.

Stakeholder Influences on Specific Design Elements: ENGOs, in particular the Natural Resources Defense Council (NRDC) and Environmental Defense Fund (EDF), worked in close partnership with regulators in developing the design of the cap-and-trade system and had a powerful position in designing key elements, such as the offset rules.[20] Indeed, interviewees point out that NRDC was one of the key architects of the system. For example, Mary Nichols, the current CARB chair, first worked as staff at NRDC and later came to the CARB as a key person during the scoping plan years. She has been the powerful board chair during the implementation of state climate policy under AB 32. Critics have criticized ENGOs for having too close relations to regulators and for their lack of critical input to the policy-making process.[21]

Other major stakeholders were closely involved in shaping the climate policy package. California's investor-owned utilities (IOUs)—Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric—played an important role in the scoping plan process and actively took part in hearings and workshops organized by CARB. As key stakeholders, the IOUs weighed in with their market expertise to shape the design. The allocation mechanism and auctioning rules were

19. Interviews 1, 2, 3, and 4.
20. Interviews 12, 13, 9, 10, and 11.
21. Interviews 9 and 10.

of particular interest to utilities. In the cap-and-trade program, most of the permits are distributed for free—including to utilities. The utility permits are consigned back to CARB for auction, which generates revenues that are then recycled to ratepayers—creating the impression that the net cost of the emission control efforts is low. Moreover, the IOUs were highly attentive to the fact that some of them had a historical legacy of importing large amounts of power through contracts with out-of-state coal-fired power plants. Emissions from those plants were high, creating the risk (or opportunity) for "resource shuffling," as higher-emitting power was redirected to states not covered by a cap (Cullenward 2014; EDF/IETA 2015), a phenomenon that could affect the carbon price and also undermine the efficacy of the cap-and-trade program and California's ability to meet its emission reduction targets (Cullenward 2014).[22] This risk has diminished as nearly all of those coal-fired contracts have been unwound and as the Californian IOUs fully embraced emission reduction as a central goal. Californian IOUs are generally considered the most progressive IOUs in the country on climate change issues, and with the current design for allocation, auctions, reporting, and compliance, they are not opposed to regulation. All three of the California IOUs, indeed, have long been shifting from companies that generate power to "wires" companies that specialize in transmission and distribution—areas where there are high capital investments and supervised, assured rates of return.

Fuel suppliers and the oil industry have been more strongly opposed to the climate policy package than the utility industry. The oil industry prefers a cap-and-trade system over direct regulation, and it has signaled strong disagreement with the LCFS, in particular, on grounds that the program will be infeasible for producing enough low-carbon fuels to meet demand and is complex and cumbersome to implement (Western States Petroleum Association 2015). Indeed, since California's cap-and-trade program now includes transportation fuels under the program, oil industry representatives perceive the LCFS not as a complementary but as a contradictory policy (Western States Petroleum Association 2015). In 2014, an oil industry campaign was criticized for employing a strategy to thwart AB 32 by creating a misguided image of consumer protest against new climate policy initiatives, notably by placing ads that looked and sounded like grassroots citizen-activists' views, while in reality promoting oil industry priorities and working against the implementation of AB 32 (Bloomberg News 2014). In 2015 the industry launched a massive campaign to prevent new legislation that would have mandated a statewide reduction in oil consumption of 50 percent by 2050. The lobby campaign appears to have had effect, since the bill (SB 350) did not receive sufficient support in the state legislature in a decisive vote in October 2015.[23] Several of our interviewees described it as a very successful

22. The cap-and-trade regulation specifically lists thirteen "safe harbors" that are not considered resource shuffling. First-deliverers must report electricity deliveries to CARB with emissions calculated according to the specific compliance obligations (EDF/IETA 2015).
23. Interview 2.

campaign.[24] Still, it is important to note that this only applied to one element of the bill—the requirement to reduce the consumption of petroleum fuels in the transportation sector. Two of the other primary measures—on renewable energy and energy efficiency—were retained, and the bill was signed into law in 2015.

Several analysts and independent academics are quite critical of the design of the current policy mix, pointing out that the de facto central role of the RPS and LCFS is an indication that the cap-and-trade system is not working optimally.[25] Too many compromises have been made with stakeholders, which have opened the policy up for leakage problems. In particular, resource shuffling involving creative ways of using coal-fired power from neighboring states constitutes a leakage problem caused by compromises between CARB and the utility sector.[26] Moreover, critics claim that there is little reason for California to celebrate the cap-and-trade system as a cornerstone policy instrument as long as the bulk of its emissions cuts are addressed through traditional command-and-control regulations. In essence, these critics say, the climate policy package is carefully constructed to hide the marginal costs of climate action.[27] With a relatively low and stable carbon price in the cap-and-trade system attracting the most attention, the much higher costs incurred by the less talked about RPS and LCSF are not so visible to the public.

Since the implementation of the cap-and-trade system, and increasingly in its second development phase (2015–2017), substantial revenues have been generated from cap-and-trade auctioning. The funds are earmarked to reduce GHG emissions, but AB 32 points to other important policy priorities that must be considered when using the revenue. Ensuring benefits to disadvantaged communities, cutting emissions cost-effectively, and maximizing societal benefits to the environment, economy, and public health are among the most important priorities (EDF/IETA 2015). The Greenhouse Gas Reduction Fund allows policymakers to invest auction proceeds in programs that cut GHG emissions and accelerate pollution reductions, while also delivering on some other key policy objectives. Hence, the fund has allowed the state government to support infrastructure investments, projects for disadvantaged communities, and other low-carbon policies with fresh funding—activities that would normally face stiff competition in the broader public budget (CARB 2016). Our interviewees pointed out that politicians in Sacramento seem to find it especially pertinent to use the proceeds to support low-income constituents in electoral districts where the assemblyman or senator is in a swing-vote position. In other words, the intention is to use the proceeds strategically to build future support for even more ambitious climate policies.[28]

24. Interview 2, 12, and 13.
25. Interviews 9, 10, and 11.
26. Interview 9.
27. Interviews 9, 10, and 11.
28. Interviews 2, 3, 6, 1, and 4.

Critical voices have questioned the ways that proceeds have been used so far and whether the supported projects really are green, or whether funds are used to pay off potential critics of the cap-and-trade program, indicating that the process is shady.[29] Moreover, the auctioning element face challenges. The question of whether the cap-and-trade program's auction of government-owned allowances constitutes an impermissible tax is currently before state courts; California law requires a two-thirds legislative majority for the passage of new taxes, but "regulatory fees" require only a simple majority (Cullenward and Coghlan 2016). This potential judicial roadblock to the program may prove moot, because the California legislature is even more heavily skewed to the Democratic Party after the 2016 election, which gave the party a two-thirds majority.

Conclusions

As California adopted AB 32 and started to develop its cap-and-trade program, regulators and politicians looked to other jurisdictions to learn from their experiences. California "learned" a few lessons from early actors—mainly about dangers to avoid, such as overallocation of permits and the risk of generous offset rules—but then proceeded largely into uncharted territory, because it designed and implemented rapidly a system that was much more complex and bespoke to California conditions than other relevant ETSs, which thus offered only partial learning models.

Local political concerns were important mediating factors in the diffusion process that helped shape the design of the cap-and-trade program, and California's established regulatory competence and experience in air pollution policies played an important role. Democratic legislators, the governor's office and regulators from CARB, and the Energy Commission and CPUC had developed crucial competencies for designing a climate policy package that gave traditional command-and-control measures like the RPS and LCFS the main task of cutting emissions, while the cap-and-trade program was designed to sweep up remaining emissions. Such key stakeholders as IOUs and the oil industry influenced the design of elements in the cap-and-trade program and the larger climate policy package, including the allocation mechanism, auctioning rules, and how to include and regulate refined oil products through the cap-and-trade and LCFS. But the most important stakeholders in the design were probably the ENGOs. Key elements in this respect are rules to channel auction proceeds into the Greenhouse Gas Reduction Fund and to earmark funds for investments in green infrastructure and projects that support disadvantaged communities—which was crucial to ensure that interest groups that favored that outcome would remain supportive.

29. Interview 10.

Our findings indicate that the climate policy package was purposely designed to rely heavily on direct regulation so as to avoid high permit prices in the cap-and-trade program, which would have caused political controversy that could have jeopardized continuance of the whole package of climate policy measures.

California policy-makers see their cap-and-trade system as "leading" other jurisdictions to adopt more stringent climate policies. The effort to create a leading program has to some extent affected the design of the scheme—notably, designs related to how the California market might link to others. The linking of the California and Quebec cap-and-trade programs has expanded the scope of the two systems. The goal for California's legislators and regulators is to expand the system further, and so to include more states and provinces that are considering cap and trade, such as Ontario. That said, so far linkage has not been widespread; it might still emerge, however, through the parallel trading system in Quebec or through common recognition of international offsets.

Because California is a unique case in several respects, it is unlikely that other states in the US will be able to adopt similar systems. First, the Democratic majority in the state legislature is very strong and stable, and it has a long history of championing environmental policy. This political landscape is not very common in other states, or indeed at the federal level. Second, California has very little coal left in its energy mix, after policy reforms related to air pollution control caused a switch from coal to natural gas (and increasingly, renewables) as the major source of electricity generation. Most other US states rely on coal for a much larger share of their power production. Third, public support for ambitious climate and environmental policy is very strong and stable, which is also not the case in many other states.

Fourth, and perhaps most significant, California has very strong competencies in its regulatory agencies that is readily tapped to develop and implement complex and comprehensive environmental policies. No other state has such a deep administrative base, which means that no other state is likely to easily copy California's approach of blending a complex cap-and-trade system with an even more complex suite of administrative policies. The development of just California's cap-and-trade system has required extraordinary technical and legal expertise. This does not mean that other states will not be able to adopt such policies, but it does suggest that they will need to build administrative capacity, tolerate erratic implementation, or outsource the needed administrative functions to other bodies. Washington State, for example, recently adopted a market-based approach to emission reduction that relies extensively on private standards bodies to develop implementing rules. One implication is that the implementing rules for future cap-and-trade systems could vary substantially (and perhaps unpredictably) on a state-by-state basis, suggesting that it could be very difficult to attain deep linkages between various cap-and-trade systems—a situation that might lead to a more balkanized global trading system that could erase many of the economic and environmental advantages of flexible

market-based approaches to pollution control. Furthermore, as some of our interviewees claimed, the existing linkages to Quebec were created in large part to show off politically, and their environmental effect is very modest.[30]

To close, we note that whereas this article has focused on learning and diffusion—emphasizing how the California design has diverged from that in other markets—it is important to recognize that from a political perspective the forces that have arrayed in favor of California's cap-and-trade system see themselves not just through the lens of learning, but in a more evangelical mode. They are seeking to control emissions in California and to get others to follow suit, since climate change is a global problem, and California's emissions are themselves less than 1 percent of the global total. As such, this study suggests that the policy learning and diffusion literature has perhaps focused too much on the learning process from the perspective of receptors, and not enough from the perspective of diffusers. For policy entrepreneurs who aim not just to change policies at home, but also to generate followership in other jurisdictions, what can they do to be most effective? Our study suggests that California has, perhaps, not paid enough attention to that question, because it has designed a system that relies almost uniquely on the capabilities of California and will not easily be replicated elsewhere.

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30. Interviews 9, 10, and 11.

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Appendix: Interviews Performed in Sacramento and San Francisco, October 2015

1: Democratic state senator, October 13

2: Legislative assistant for the State Senate Energy, Utilities, and Communications Committee, October 13

3: Legislative assistant for Democratic state senator, October 13

4: Legislative assistant for Democratic state senator, October 13

5: California Air Resources Board, October 12

6: California Energy Commission, October 12

7: California independent system operator, October 12

8: Statkraft San Francisco office representative, October 14

9: Legal scholar, Stanford University, October 14

10: Researchers, Hoover Institute, October 14

11: Legal scholar, University of Berkeley, October 11

12: NextGen, October 15

13: NRDC, October 15