POWER GRIDS AND POWER GRIDLOCK:

GREEN ENERGY POLICY EXPERIMENTS IN THE UNITED STATES

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LIST OF ABBREVIATIONS

COP21 – 2015 United Nations Framework Convention on Climate Change in Paris, France

EHA – Event History Analysis, also called duration or hazard modeling

GHG – Greenhouse gas emissions, also referred to as carbon or CO2 emissions

INDC – Intended Nationally Determined Contributions submitted by nations to COP21

NRPS – Nonrenewable Portfolio Standard (voluntary compliance), also called Renewable Portfolio Goal

OPEC – Organization of Petroleum Exporting Countries

PG&E – Pacific Gas & Electric

PURPA – 1978 Public Utility Regulatory Policies Act

RE – Renewable energy sources, typically referring to wind, solar, landfill gas, small hydropower, municipal solid waste/anaerobic digestion, and geothermal

RPS – Renewable Portfolio Standard (mandatory compliance), also called Renewable Electricity Standard

SES – Social-ecological systems

UNFCCC – The United Nations Framework Convention on Climate Change

INTRODUCTION

SCALING ENERGY RESOURCE MANAGEMENT FOR RESILIENT ENVIRONMENTAL GOVERNANCE

Any movement to regulate contemporary environmental issues, regardless of whether it is undertaken by an individual, organization, social movement, must find an appropriate legislative body to try to influence. Actors must determine the scale of environmental governance they hope to affect in order to define and institute lasting changes. This practical necessity conflicts with the nebulous "cross-scale dynamics" of common-pool resource issues like regional air quality, overfishing, deforestation, or human-induced climate change (Buizer et al 2011). Public administrators (our governors, presidents, judges, legislators) rarely have the capacity to address every enmeshed scale involved in an issue. They tend to live and work as realists, viewing scales not as human constructions, but objective entities.

Adaptive ecosystem management is one tact that has been suggested by scholars in order to transform policy on multi-scalar, ever-changing resource management issues in frustrating, rigid government agencies. Environmental governance theorists like Elinor Ostrom increasingly emphasize how the management of complex social-ecological systems (SES) is a process with unforeseeable outcomes (Ostrom 2008). These scholars encourage integration of solutions across scales with constant feedback and adaptation in order to avoid a one-dimensional, one-size-fits-all approach to policymaking. Through this process, institutional arrangements can encourage ecosystems to be resilient to climate change and other human-caused stresses. We can broadly frame this pursuit by asking how environmental policy can be compared across scales to make SES governing institutions more resilient.

The adaptive management approach begins when scientists and scholars undertake a temporary period of strategic analysis and modeling to gradually accumulate environmental knowledge. In "Panarchy", Gunderson and Holling (2002) explain that the following phase, innovative implementation, is typically where attempts at adaptive policy get frustrated by "the reality of politics and power in societies where entrenched interests manipulate information for narrow purpose" (91). Entrenched interests use their position of power to influence legislation to keep their dominant economic position. Change from this position in the panarchic model can only occur "when a triggering event unlocks the social and political gridlock of larger levels in the panarchy" (91). These unambiguous failures occur stochastically and cause sudden lurches of policy transformation.

A *panarchy* is a representation of human systems that accounts for more directions of influence than a top-down hierarchy. In a healthy society, as defined by Stewart Brand (1994), each scale influences those above and below it, but is allowed to experiment and operate at its own pace. Larger scales tend to move at a more conservative pace, acting as stabilizers and accumulating "memory of past, successful, surviving experiments" (Gunderson & Holling 2002: 76). Meanwhile, smaller scales spur faster cycles of innovation. This paper attempts to examine the panarchy of actors and motivating social factors behind specific models of environmental resource management. Examining the human characteristics, interests (public and private), and ideologies that determine the specific content and context of a policy can help reveal whether or not it is scalable.

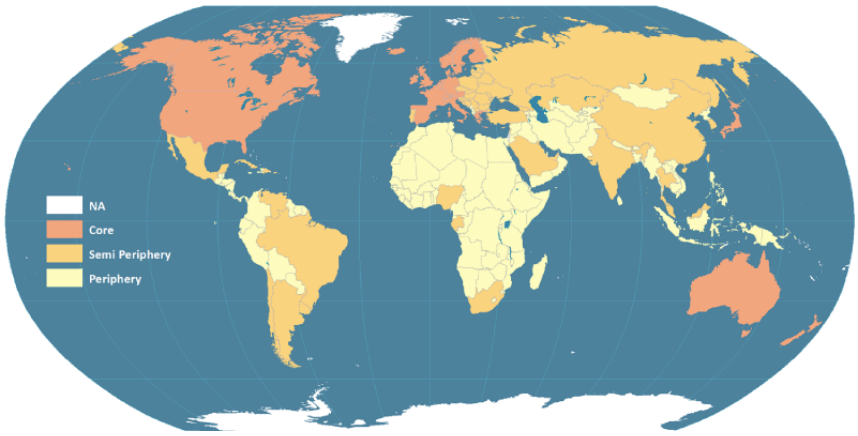

FIGURE 1: CORE-PERIPHERY COUNTRIES *(DUNN, KUWANO AND BREWER 2000)*

CORE COUNTRIES AND THE GLOBAL WARMING IMPERATIVE

Over the last three decades, climate change has gradually joined the perennial political priorities of economic stability and national security in nations around the world. Adequately scaling efforts to address global carbon reduction for mitigation is one of the primary hurdles faced by policymakers. A stable global climate is the fundamental common-pool resources shared by socio-ecological systems. Because the costs of global warming from anthropogenic greenhouse gas emissions will be unevenly distributed over different ecosystems, and will occur over a long time scale, it is an enormous technical challenge to adaptively manage this commons (Brewster 2009). Climate-resilient policymaking requires the maintenance of networks of feedback over a vast geographic scale. The long-run stability of the atmosphere surrounding the Earth has motivated comprehensive international reform before, but it remains to be seen whether systematic change will occur in carbon-producing economies. The ubiquity and multitude of carbon producing sectors (agriculture, transportation, electricity generation, etc.) adds another dimension to this challenge.

The section charts recent patterns of carbon reduction regulation in developed core countries with democratic systems of governance. The nation-state is perhaps the most common unit of analysis in the field of comparative environmental governance. Incremental increases in global knowledge about the socio-environmental implications of climate change has spurred nations to bolster their renewable energy portfolios, amongst other measures (Hays 1996: 109). The global climate change framework provided by the United Nations has effectively incorporated the concerns of developing countries over climate transition inequity, demonstrating that it is an adaptive, cooperative model.

INTERNATIONAL CARBON REDUCTION EFFORTS

At the broadest scale, the United Nations Framework Convention on Climate Change (UNFCCC) provides a regulatory structure that almost every nation agreed to uphold during the 2015 Paris Convention. This was the most comprehensive display to date of international resolve to confront greenhouse gas emissions (GHG) and limit global warming to under two degrees Celsius. 195 nations worked out the Paris Agreement, a commitment to nationally determined carbon reduction contributions that may be signed in 2016. Diplomatic negotiations managed to get to agree all countries on board with carbon reduction goals, in part by requiring core countries to fund climate change transitions in peripheral countries whose economies have not been accelerated by a century of fossil-fueled growth. If signed by countries representing over 55% of the world's GHG emissions next year, it will legally bind participating countries to attempt to reach zero net GHG emissions between 2030 and 2050. However, any parties that sign will also have to adopt and ratify the emissions goals through their own legal systems.

This analysis focuses on the carbon reduction obligations of these core nations because of their historic advantages from fossil fuel exploitation and consumption, a product of energy imperialism (Pomeranz 2000). Australia, Canada, Japan, the United States, and most of Western Europe have been considered core countries in global markets since midway through the 20th century, though several other G20 countries in southeast Asian and South American nations, South Africa, and Saudi Arabia have been included on this list. Core countries are the industrial or post-industrial countries with the greatest wealth and dominant positions in world markets. Under World Systems Theory, core countries use their power to exploit the natural resources of peripheral countries (including fossil fuels), resulting in accelerated industrialization, modernization, and the unequal concentration of wealth in these nations (Wallerstein). Governments in these countries maintain powerful militaries and have strong regulatory abilities, due in part to their large budgets. Per capita income, energy consumption, and education are higher in these countries' populations than in the rest of the world. Employment in the core tends to be high-skill, high-wage jobs in the service sector, high value-added goods manufacturing, or constructing capital-intensive investments. Peripheral countries' economies typically center around low-skill, low-wage jobs, low value-added products, labor-intensive investment and resource exportation.

Although some critics express doubt about COP21 functioning as substantive reform, due to the difficulty of enforcing national commitments, the UNFCCC has successfully united countries under a more equitable, climate-resilient resolution. Although it is yet to be seen whether its ambitious carbon reduction level is met, this global collaborative effort at environmental governance represents a sudden lurch in adaptive global warming policymaking to a broader scale. Countries have taken collective responsibility in international climate change treaties by contributing the carbon policy actions of regional governments assembled under centralized Climate Action Plans, which establish formal emission reduction targets for their electricity sector and fund adaptation and mitigation in other sectors as well. The UNFCCC summits have effectively created a new policy norm and ethical expectation at the global scale: core countries are expected to financially support

periphery countries with billions of dollars as part of their INDC. Thereby, historic beneficiaries of carbon-intensive energy imperialism assume more responsibility in broader carbon reduction efforts.

When discussing the Renewable Energy Targets in their Climate Action Plans, world leaders extol the rapid pace of development of exportable wind and solar technologies, the energy independence and security these technologies allow, and the high-skill jobs and tax dollars generated by new RE projects (Dincer et al. 2014, 326). Renewable energy policy is thereby used as a climate change wonder-balm, converting a gloom-and-doom issue into a politically-enticing prospect for maintaining domestic growth, environmental quality, and energy security simultaneously.

All core countries displayed in Fig. 1 democratically elect their policymakers. As such, environmental governance in these countries reflects their voting constituencies' ideals, though many additional factors that have been shown to influence policymaking agendas than bottom-up public opinion. Democracy has been empirically linked to decreased national pollutant emission rates (though this effect is affected by average income, education, and urbanization). This may be because democratic processes play a key role in the environmental governance panarchies of core countries because they select and empower the policymaker, as a figurehead for popular movements. Under democratic governments, agents can "exercise their preferences for environmental quality more effectively" (Farzin & Bond 2006). In the United States, popular democratic processes like direct ballot initiatives and referendums interact with traditional representative democratic processes. This has helped shape the U.S. unique energy economy and environmental governance decisions, particularly in the western half of the country.

The funding and political support for the four INDC priorities articulated by Canada's Climate Action Plan, which are mirrored in the Climate Action Plans of Japan, Australia, and nations in the European Union, have systematically failed to materialize in the United States at the federal level. The next section moves in a scale degree to examine the shaky support for the United States Intended Nationally Determined Contribution to the UNFCCC Climate Goals, and the state-level experimentation churning underneath this national political gridlock.

WHAT ABOUT THE U.S.? RED HOUSE, BLUE HOUSE, GREENHOUSE

U.S. CLIMATE CHANGE POLICY GRIDLOCK

Many countries have pre-emptively constructed and committed to their national contributions from the Copenhagen Accord, though it remains to be seen if the U.S "Individually Determined National Contribution" (INDC) to COP21 will stand. The only mechanism of enforcement upon the U.S. from the 2015 Paris Agreement is public shaming by other countries. Furthermore, the monetary contributions negotiators agreed to contribute to developing countries' carbon transitions were non-legally binding due to limitations back home. Explicitly put, the Republican majority in Congress threatened to rescind any financial commitments using the power of the purse. Thereby, US national scaling of carbon reduction policy may not occur, leaving it unable to meet its international commitments to the UNFCCC. This would fall in line with historic patterns of climate action non-participation by the US.

The United States is both the world's foremost contributor of greenhouse gases[1] and the only major world power that continues to give serious weight to climate change skepticism in both media and government (Paarlberg 2015, 178-179). As such, it is a necessary participant in, and liability to, any comprehensive global attempt to reduce carbon emissions. The debate over appropriate global warming policy action in Congress has stalled since the late 1980s. Although subsidies for renewable energy have been passed semi-annually in the form of the Solar and Wind Production Tax Credits, no substantive carbon emission reduction policy has made its way through both chambers. This section delves into political barriers that frustrate national-scale carbon reduction policymaking in the United States, and the policy responses that have arisen at the state level. The decentralized nature of renewable energy regulation in the U.S. makes it difficult to compare to other nations with centralized carbon reduction policies.

This may be because of the partisan polarization around the issue of climate change. On one side of the aisle sit those confident that failure to address climate change with regulation will result in environmental apocalypse: *Grapes of Wrath*-scale agricultural Dust Bowls[2], the Jenga block collapse of fragile ecosystems, and the submersion of any and all cities close to a coastline due to rising sea levels. On the other side sit those confident that the cost of any climate change policies will destitute our government and make our economy less globally-competitive: we may as well write China a blank check, fire every American worker, and rent the White House out as a timeshare for petty cash. The liberal alarmist and conservative denialist: each scornfully asks how the other can be so irresponsible.

Though these characterizations may be overly simplistic, they are not a grand departure from the rhetoric presently deployed in federal chambers. In January 2015, Republican

[1] In carbon dioxide emissions per capita

[2] see Oppenheimer & Boyle's *Dead Heat: The Race Against the Greenhouse Effect* (1991)

Senator James Inhofe (the chair of the Environment and Public Works Committee) brought a snowball into the Senate Chambers, as evidence against the ostensible existence of global warming. He punctuated his closing remark ("Here Mr. President, catch this!") by tossing it onto the floor, although lobbing it at the closest Democratic Senator would have had the same symbolic significance. Extreme partisan polarization precludes actual discussion on global warming in favor of schoolyard bickering and posturing.

A sizeable proportion of Congress does not readily accept the internationally accepted scientific consensus over anthropogenic global warming. This is well documented in Congressional testimonies. Even less members agree that this is an issue that requires immediate policy action. Researchers have found that one of the most consistent predictors of environmental concern in the set of an individual's attributes is political ideology and party identification: "Democrats and more politically liberal individuals tend to express stronger environmental attitudes than do Republicans and ideological conservatives" (Konisky et al 2008: 1068). Speakers for both parties have stuck to the party line the debate over climate change action, with Republicans generally expressing the view that regulating carbon dioxide emissions would be harmful to the national economy (Park et al 2010). Due in part to this fundamental disagreement, the US has reneged on every United Nations climate treaty besides the current Paris Agreement. However, this lack of consensus must be considered in the context of a broader movement in the last decade towards unified polarization and political gridlock in the United States.

Though political ideologues with vehement views have become more conspicuous than ever, due to the rise of online media, the American voting base remains fairly moderate (Nivola & Brady 2006, 8). However, both parties have become more unified in their stances on issues (10). This has led Republicans and Democrats to a deepening of disagreements in terms of "the *distance* between their respective sets of convictions [sic]", especially over certain hot-button issues (11). Climate change and energy policy have thereby become one more politicized issue that the gridlocked House and Senate have difficulty collaborating over (Fisher et al. 2013, Chasek and Wagner 2012, Dunlap & McCright 2008).

National Climate Change Policy Efforts

Despite powerful environmental organizations like the Sierra Club putting climate change mitigation at the top of their agendas, the US environmental movement has not been able to motivate federal legislatures to act to regulate carbon emission reductions. Though some scholars claim improving legislators' scientific knowledge of climate change could stimulate regulatory action, many studies show that the amount of environmental knowledge people have is less influential on their opinion of appropriate climate change action than their political ideologies. Fisher et al. found that in the 109th-110th Congresses, though the science of climate change has become less politically polarized, House and Senate Republicans and associated business representatives deeply disagreed about whether regulating carbon dioxide was appropriate, what policy tools should be used, and what effect they might have on the economy (Fisher et al. 2013, 83).

Presidential attempts to mirror other nations' climate action have repeatedly been frustrated in US legislative bodies since the early UNFCCC conventions in 1990 due to this partisan division. Renewable energy sector-specific legislation has had marginally more success, although the federal solar and wind production tax credits have frequently been turned off by Congress, then renewed. This has been shown to wreak havoc on the rates at which new renewable energy projects are developed.

The most notable recent attempt to pass a unifying federal renewable energy target through the legislature came in 2009. Recently-elected President Barack Obama sought to fulfill his campaign promise of comprehensive climate change action. He managed to pass large renewable energy development subsidies in an economic stimulus package, but his touchstone carbon cap-and-trade policy and federal renewable energy target was shot down in the Senate. This bill, the Waxman-Markey American Clean Energy and Security Act, narrowly made it through the House, but the "most significant environmental law of its generation" had its passage blocked because support was fractured amongst Senate Democrats. Republicans aggressively and effectively used the filibuster, though they were offered a large number of "riders" as concessions on the bill (Klyza and Sousa 2013, 291-292).

Thus, when the time came to garner support for the Clean Power Plan, the current INDP of the US, the Obama Administration attempted to circumvent the Republican-majority Congress entirely. The Clean Power Plan intends to cut US carbon dioxide emissions by 32% from 2005 levels by 2030. It weighs its cost (which largely entail the forced closure of coal plants that are scheduled to go offline) against the public health benefits from reduced coal particulate matter, energy efficiency savings, and renewable energy jobs. Although the renewable energy component of the CPP claims that the plan will lead to "30% more renewable energy generation by 2030"[3], it is left up to states to determine how they will choose to respond to the emission reduction goals that the EPA has set for them. The emission goals are modest given that the natural gas revolution and 2008 Economic Recession have considerably decreased US emissions below 2005 levels without states lifting a finger.

President Obama instructed the EPA to create a rule to reduce carbon emissions from new and existing power plants using executive authority, which allowed states to determine how they would meet these goals. The EPA utilized a surprising 2007 Supreme Court Ruling that reinterpreted the Clean Air Act and defined greenhouse gases as a pollutant[4]. Thus, the executive branch attempted to utilize the judicial branch and government agencies to sidestep gridlock in the legislative branch over climate change action. These are two of five "alternative pathways" that Klyza & Sousa argue evolved for environmental policy to circumvent federal gridlock in the 21st century (2013).

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[3] https://www.whitehouse.gov/climate-change

[4] (http://www.nytimes.com/2007/04/03/world/americas/03iht-scotus.1.5124385.html?_r=0)

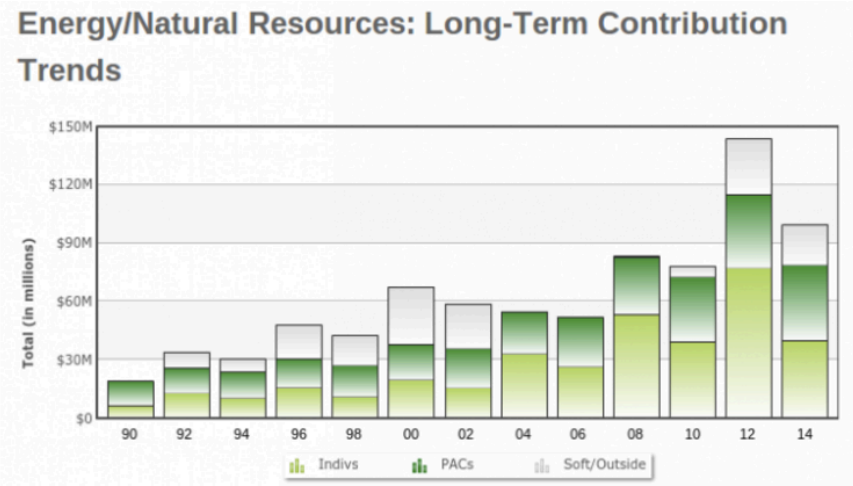
The Clean Power Plan was quickly challenged by multiple lawsuits from red states on the grounds that it is a dictatorial abuse of executive authority. This case has made its way to the Supreme Court. Protesting members of Congress argued that the Clean Power Plan (CPP) is unauthorized by US voters and prior legislation. Although the outcome of this court case remains to be seen, this action halted implementation of the EPA ruling for the near future. Thereby, this attempt to stalled attempt to utilize centralized authority demonstrates that historic models of American environmental legislation are restrained by political gridlock around the issue of climate change.

The backlash against the Clean Power Plan ruling on the grounds that it is undesirable to the public and oversteps presidential authority seems to be unsupported: it was authorized by both the Supreme Court's reinterpretation of the definition of carbon emissions as a pollutant under the Clean Air Act, and vast public support. During the rule's notice-and-comment period, citizens across the country coordinated by grassroots environmental groups submitted an unprecedented eight million comments in support of EPA's plans to limit carbon pollution from new and existing power plants. Although a supportive comment does not directly influence policy as a vote affirms a ballot initiative, it is a direct indication of public sentiment over an issue. Large public demonstrations also suggest that environmental voters vehemently support policy action: the People's Climate March on November 29, 2014, flooded the streets of New York City with over 300,000 protesters attempting to mobilize stringent policy action from the world leaders at a U.N. Climate Summit taking place in the city.

Additionally, renewable energy support has polled favorably with Americans from both parties. Over 70% of all respondents favored more solar and wind power in the U.S. over any other source. 68% of Republicans supported more solar power development. Incidentally, this is higher than the portion of Republicans who think climate change action is merited. This suggests that renewable energy production is not purely associated with carbon reduction attributes, but that the other perceived benefits of development (like national security and job creation) are enticing to voters.

This begs the question: if clean power is politically popular with voters, why are legislators not supporting the Clean Power Plan? The dis-alignment between federal stances and popular opinion suggests that other political or social factors may be contributing to climate and renewable energy policy inaction. Besides partisan gridlock and extreme rhetoric over the climate change issue, McCright and Dunlap suggest that entrenched utility and fossil fuel industries use lobbying, election donations, and climate change skepticism research institutions in order to create "anti-environmental counter-movements". In 2014, the oil, gas, and coal lobby and electric utility lobby were the 5th and 6th largest lobbying interests in the capitol, respectively. Analysis by the Center for American Progress, a progressive public policy think-tank, found that fossil fuel and private utility industries spent $721 million on direct contributions, television ads, and lobbying for anti-environmental candidates in the 2014 election cycle, while environmental groups spent a paltry $50 million in comparison (Moser & Lee-Ashley 2014). Thus counter-movements reinforced by entrenched industries

that benefit from current market structures and policy (like tax breaks and excluded market competition) restrict environmental movements. Adaptive feedback and environmental policy lurches to a broader scale are thus held at bay, despite the accumulation of global knowledge of the implications of climate change.



CREDIT: CENTER FOR RESPONSIVE POLITICS

FIGURE 2: COAL, OIL, AND NATURAL GAS LOBBY CONTRIBUTIONS

NEW FEDERALISM: STATES AS "LABORATORIES OF (ENVIRONMENTAL) DEMOCRACY"

Environmental policy in the United States has historically been an exercise in federalism, in which central agencies authorized by congressional legislation are responsible for setting environmental standards. In the 1970s, the burgeoning environmental movement induced the passage of several central federal statutes regulating pollutants, beginning with the 1970 Clean Air Act. Subsequent amendments passed by Congress, and rules enacted by the US Environmental Protection Agency, regulated specific air pollutants like sulfur dioxide. These environmental measures compelled states and their agencies to comply with emission baselines, but allowed them to tack on more stringent regulations. Thereby, foundational environmental regulations and pollution control measures established a centralized, top-down hierarchy. Federal agencies pass regulations, and state agencies enforce them.

However, climate change policy inaction must also be considered in the general declining trend of legislative productivity in Congress, which has dropped to historic lows in the past several sessions. As the Wall Street Journal recently reported, even lobbyists are moving "in droves" from Washington D.S. to state capitols like Lansing, Michigan because they are frustrated with the level of policy inaction (Chinni 2016). Figure 3 shows the declining rate of public bill passage over the last several decades.

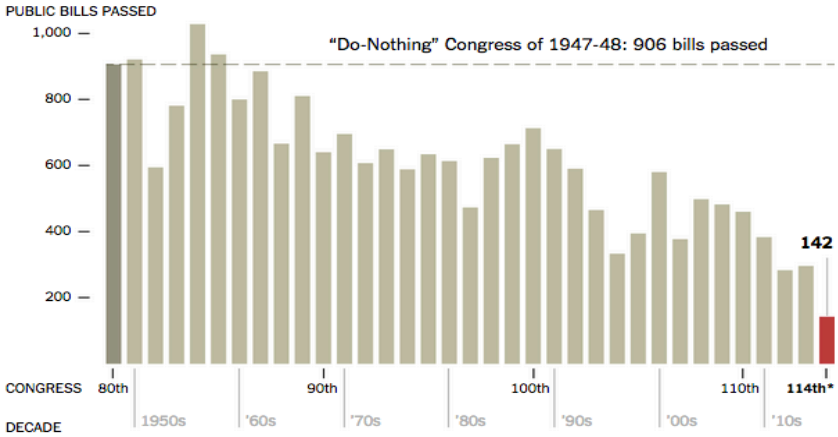


FIGURE 3: CONGRESSIONAL BILL PASSAGE, 1947-2014 ***(NEW YORK TIMES, 2015)***

No comprehensive federal carbon emission regulation of the electricity sector has managed to sail between the liberal Scylla and conservative Charybdis intact. However, one need only turn towards the home states of federal politicians to find a proliferation of substantive renewable energy regulations, which have been created, debated, and incrementally passed over the last two decades. Pragmatic legislators, interest groups, and social movements have found that federal gridlock, entrenched technologies, and the dire, politicized national rhetoric around climate change could be stealthily circumvented by pursuing decentralized action at the state level (Klyza & Sousa 2013, 315).

Increased pressure on state legislatures to pass policies reducing carbon emissions from energy generation led to the "ad hoc"[5] adoption of state RPS as a policy innovation (Powers 2015, 26). I argue that this policy model was adopted to appease increasing bottom-up pressure from coalitions of public environmental movements to address climate change. However, industrial sectors in a state are a powerful determinant of whether or not an RPS is adopted because of their influence on state policymakers. In particular, utilities with low-carbon portfolios are more likely to support the adoption of RPS legislation because it gives them a competitive leg-up, and reinforces their monopolistic control over electricity markets. The political entrenchment and influence of low-carbon utilities in the Western United States has led to a convergence in state governments on RPS over other types of carbon reduction policies.

[5] i.e. "for the particular end or case at hand without consideration of wider application"

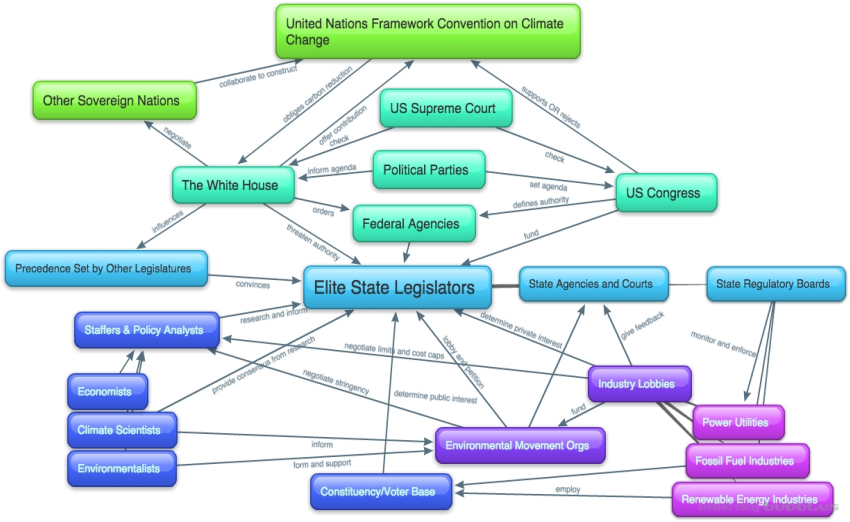


FIGURE 4: STATE SCALE PANARCHY OF US CLIMATE CHANGE GOVERNANCE

Elite state legislators are the arbiters of environmental governance at this scale. Though highly divergent in form, level of ambition, and bipartisan participation, the state Renewable Portfolio Standards these legislators pass address public concern over carbon emissions by encouraging utilities to deploy large renewable energy projects. The environmental and market implications of these capital-intensive projects are rarely contextualized in the history of a state's energy economy and social movements. Just as international climate agreements are designed to address historic inequities between countries, climate-resilient utility regulation at the state level should be continually monitored for its inequitable effects on socio-environmental systems.

STATE EXPERIMENTATION WITH RENEWABLE PORTFOLIO STANDARDS

Renewable Portfolio Standards (RPS) are the most frequently utilized regulatory tool in the United States for developing renewable energy sectors; they have been passed in 36 states as of March 2016[6]. Targets resembling RPS have also been set in many core/semi-periphery countries around the world, including Australia, China, Japan, Korea, Chile and the European Union[7]. Most countries, and states, list renewable targets as one component of their broader

[6] 34 states retain their original RPS, or a more stringent version. The state legislature in Ohio suspended their standard in 2014 for evaluation, while the West Virginia state legislature entirely rescinded their statute in 2015 the.

[7] Britain and Germany have set more stringent renewable energy targets in their national legislatures than the broad EU goal of 20% by 2020. The European Commission reported that member nations

Climate Action Plans. Renewable Portfolio Standards are a market mandate that sets a goal and fines utilities if they fail to produce a certain proportion of their electricity from renewable sources by set dates. The earliest form of this policy innovation at the state level in the U.S. was passed in Iowa in 1983, but RPS did not begin spatially diffusing between states until 1991 (Matisoff 2008). After the initial policy innovation, RPS began to spread regionally in a decentralized, "contagious" manner (Dincer et al. 2014: 325).

State RPS proliferation is unusual in the historical context of the American environmental movement because it arose with little centralized persuasion or coordination. Increasing pressure from scientists, environmentalists and social movements to spur climate change policy has run headfirst into the barrier of entrenched technologies and political gridlock at the national level. This spawned uncertainty amongst investors, and had a destabilizing effect on renewable energy project development. Powers (2015) notes that inconsistent federal tax policy "has subjected the wind energy industry to a boom-and-bust development cycle that constrains the investment, growth, and stability necessary to support reliable and low-cost wind energy development" (25). Solar energy developers face similar trials due to federal tax credit expiration.

The contagious trend for U.S. state legislatures to adopt and strengthen Renewable Portfolio Standards (RPS) since 1991 has been the subject of several studies. Studies previously conducted by economists and sociologists have fallen into two broad categories: attempts to model and evaluate 1) the underlying conditions that lead a state to adopt an RPS and 2) the achievements of these programs after they are implemented. Since U.S. states began crafting and passing Renewable Portfolio Standards in 1991, thirty states have made compliance with these policies mandatory for utilities operating in their geographic boundaries. Eight other states have passed RPS policies for which compliance is only voluntary. To date, thirteen states have no RPS policy in place, though legislators and advocacy groups in these

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are on track to meet this goal (https://ec.europa.eu/energy/en/topics/renewable-energy) in June 2015. See conclusion section for explicit comparison between EU and US systems.

states may have unsuccessfully proposed RPS-type legislation (DSIRE 2015).

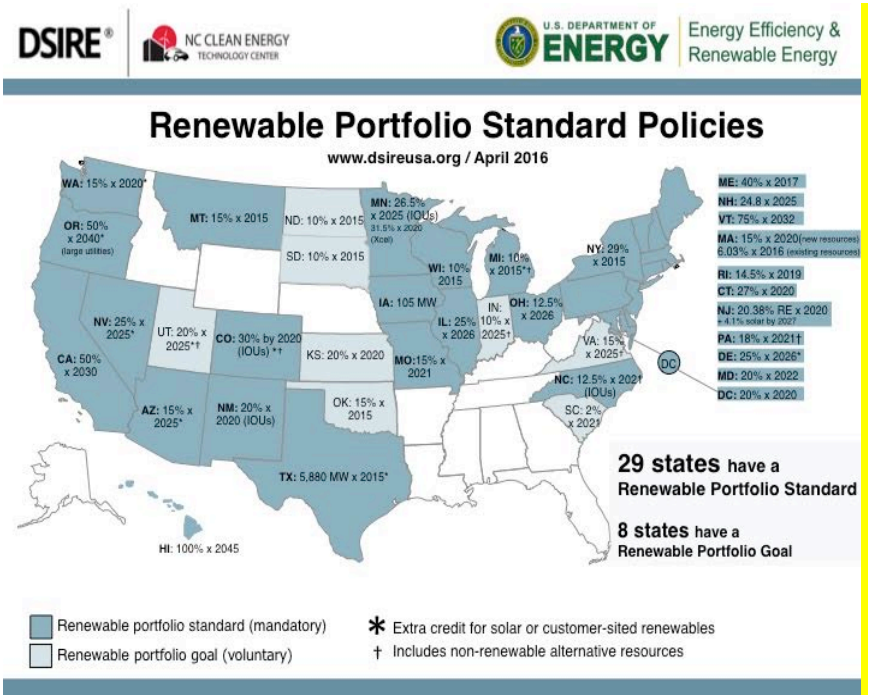

FIGURE 5: STATE RENEWABLE PORTFOLIO STANDARDS *(DSIRE 2016)*

However, no two state renewable standards are exactly the same. Even at the most fundamental level of target and year, state targets differ in stringency. For instance, Arizona's is 15% by 2025, while neighboring California's is 50% by 2030 (DSIRE 2015). RPS are highly divergent in content (e.g. mandatory versus voluntary compliance status), level of ambition (e.g. what % by what year), credit allowance, and even in what qualifies as a renewable energy source. Target and year are but the tip of the iceberg; policymakers modify "resource eligibility, in-state requirements, new build requirements, technology favoritism, lobbying by industry associations and non-profits, groups cost caps, program coverage (IOUs vs. Cooperatives and Municipal utilities), cost recovery by utilities, penalties for non-compliance, rules regarding REC creation and trading, and additional non-binding goals" in order to flexibly determine the effect an RPS might have on their state[8]. No standardization or regulation of these policies currently exists to coordinate these policies at the federal level.

[8] http://www.sourcewatch.org/index.php/Renewable_portfolio_standard

This program divergence is often determined by state-specific constraints and objectives. My literature survey found that the RPS adoption in a state is linked to specific economic and political factors that policymakers weigh most heavily (Vasseur 2014, Matisoff 2008, Yin and Powers, Lyon and Yin 2010, Dincer et al. 2014). The following table shows the output for two ordinary least squares (OLS) regression of internal determinants of renewable energy and energy efficiency policy adoption in the 48 contiguous states, and two boot-strapped

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_7 X_7 + \varepsilon$$

Table 2. Two Models Regressing State Characteristics on Total Number of Energy Policies. Parameter Estimates Are Shown, with Standard Errors in Parentheses (48 Observations).

Model	OLS	OLS	Neg-bin Bootstrap (500 reps)	Neg-bin Bootstrap (500 reps)
F-statistic	7.15***	8.42***		
Wald chi squared			37.48***	43.46***
R^2	0.56	0.55		
GSPPC	0.2e–04 (0.2e–04)	0.2e–03 (0.2e–03)	0.3e–04 (0.3e–04)	0.2e–04 (0.2e–04)
CO_2 intensity	–2.25 (1.90)	–4.60 (2.57)*	–0.204 (.359)	–0.412 (0.316)
Coal & gas PC	1.06e07 (9.51e–07)	2.8e–07 (8.93e–07)	–3.38e–08 (3.97e–07)	–2.13e–08 (3.31e–07)
Criteria air pollutants PC	5.54 (3.10)*	4.34 (2.25)*	0.576 (0.456)	0.508 (0.336)
Citizen ideology	0.357 (0.075)***	0.370 (0.07)***	0.031 (0.007)***	0.031 (0.007)***
Solar density	1.82 (1.87)		0.166 (0.192)	
Wind potential	–0.089 (0.155)		–0.0058 (0.025)	
Renewables index		1.88 (1.85)		0.173 (0.196)
Constant	–25.25 (12.92)*	–22.67 (12.00)*	–1.09 (1.62)	–957 (1.34)

*represents significance at the α = 0.1 level; **represents significance at the α = 0.05 level; ***represents significance at the α = 0.01 level.

maximum likelihood regressions (*excluding Alaska and Hawaii*; Matisoff 2008: 538). Several of the dependent variables are causally linked, and could be dropped to reduce collinearity. However, they provide useful examples of the types of variables that have been qualitatively linked to RPS adoption.

This regression analysis by Matisoff (2008) found that more liberal citizenry in a state dramatically increases the likelihood of environmental policy adoption in the energy sector (*"Citizen ideology"*). This conclusion has been found by several other econometric analyses, and holds with other findings on US environmental partisanship. Further implications are that citizen opinion affects state policy decisions. There is also a correlation between state wealth per capita and environmental policy adoption. This suggests either that environmental quality is a "normal good" that is more demanded as personal income increases, or that wealthy states are more likely to adopt costly programs that require regulatory oversight *("Gross State Product Per Capita").* Both conclusions reflect broader, observable trends in environmental policy adoption by wealthy, progressive governments.

The following table is an OLS regression I conducted with 48 state observations on another suite of internal characteristics. My dependent variable is a dummy variable representation of whether or not a state has adopted an RPS. My independent variables and controls are as follows: the proportion of state residents living in urban areas (a proxy for the power of urban voters drawn from the US Census), whether or not the state allows direct ballot initiatives (a proxy for direct democracy drawn from), education level, the carbon intensity

	(1)
	RPS Adoption
% of Population Living in Urban Areas	-0.154
	(-0.27)
Direct Ballot Initiatives	-0.0515
	(-0.31)
% of Population Over 25 with Bachelor's Degree	3.691*
	(2.37)
Carbon Intensity of State Economy	-0.000221
	(-1.11)
Carbon Intensity of State Energy Supply	0.00924
	(1.24)
Estimated Solar Potential	2.25e-09
	(0.14)
Estimated Onshore Wind Potential	2.45e-08
	(0.28)
Estimated Geothermal Potential	5.51e-08
	(0.16)
Constant	-0.605
	(-0.99)
Observations	48
r2	0.255
F	1.672

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

FIGURE 6: INTERNAL DETERMINANTS OF STATE RPS ADOPTION

of state economies[9], the carbon intensity of the state energy supply, and various estimates of the geographic potential for renewable energy development.

As is immediately apparent, my regression output has much less explanatory power or statistical significance than Matisoff's findings. This is due to my specific suite of independent variables and the number of variables each in each state level observation. Other studies suggest that event history analysis methodologies can create better fit models of RPS adoption over panel data by creating a larger pool of observations; thereby, I do not discard the influence of my independent variables and controls with no measured significance. My conclusions are that education (and wealth) increase likelihood of RPS adoption in a state.

The following section synthesizes characteristics of states with RPS experiments with historic American movements. Furthermore, the outcomes of these experiments can be formed into broad lessons about scaling RPS.

[9] Energy Information Administration data from the year 2000 in kilograms of energy-related carbon dioxide emissions per million btu. This is my proxy for entrenchment of fossil fuel industries in a state's political economy, due to a lack of lobbying data at the state level.

RPS AND PUBLIC POWER IN WEST COAST STATES:

This section moves even further down in geographic scale to attempt to contextualize RPS experimentation at a regional and local level. From this zoomed-in view, specific cities, projects, and people come into focus as the objects of societal attention, making entrenched industry interests in RPS design more apparent. I discuss two large non-fossil fuel energy projects that exemplify specific eras in California's energy history: the urban progressive movements of the early 1900s, and modern green capitalists. These movements have defined core liberal values on the West Coast, but each clashes with traditional conservation-based environmentalism in and around these projects. Democratic politicians align their policy objectives with these movements in order to engage their voting bases. The ecological consequences on-site at giant renewable energy projects are, to some extent, a consequence of utility rate-making structures. Utilities' interests in preserving their competitive advantage from current market structures have contributed to the contagious popularity of the RPS carbon reduction policy model.

CALIFORNIA

The state of California is an illuminating case study due to its history of contentious energy policy and development decisions, conflict sparked around utility governance, non-fossil fuel sources, rising electricity costs, and environmental quality. California is the most populous state in the Western United States by far, with more than 50% of the population of every state west of the Mississippi combined. It is also the state with the greatest portion of residents living in urban areas. As a result, California's cities are enormous, the engines for its economy. If it was ranked with national economies of the world by GDP, California would be the 8th largest. All of this demand places a huge load on regional electricity grids, and compounds the implications and costs of major energy policy decisions.

The state's governing body has historically been an innovative early adopter in energy transitions and regional leader in energy policy models. In part, these policy adoptions sate the state's ever-growing energy appetite. Due to the size of its economy, greenhouse gas emissions from California are greater than many of the nations who are signatories to the Kyoto Protocol and other global climate change mitigation efforts. Actors in environmental governance must keep this fact foremost in their mind when asking whether or not California's carbon reduction policy efforts should be scaled up to the entire United States. Constructing energy policy to suit a state the size of a nation is already a complex task, which risks applying the same blanket treatment to regions with vastly different geographic features and social needs. Assembling this state and 49 others under one unified policy effort, without sacrificing the flexible feedback and adaptation necessary for resilient environmental governance, is a monumental task to say the least.

In California, there is a long-standing conflict between large, "utility-scale" renewable energy development and traditional environmental interests like conservation and biodiversity. As Renewable Portfolio Standards incentivize utilities to engage in this type of capital-intensive energy development, we must question the assumption that Renewable

Portfolio Standards benefit every condition of regional environmental quality. Policymakers should consider how this model of legislation meets the desired environmental outcomes, like carbon reduction, by reinforcing the current profit structure of utilities. In California's case, utility focus on capital-intensive renewable energy investments has repercussions for ecological health at the production site. This section explores this conflict in two massive fossil-fuel-free energy projects: the O'Shaughnessy Dam, a hydroelectric installation in Northern California and the Ivanpah Solar Electric Generating System, a concentrated solar plant in Southern California.

- RPS ADOPTION REFLECTS CLASSIC ENVIRONMENTAL INEQUITIES.

Though 90 years separates the construction of these two major projects, both were highly contested by environmentalists in California as they were being installed. Their continued operation still attracts concern for its effect on local ecosystem function and charismatic species loss. However, their existence is a continued asset in the beleaguered state energy system for the public resources they provide to California's major metropolitan areas.

The O'Shaughnessy Dam, which bars the Tuolumne River as it empties out of the Hetch Hetchy Valley in Yosemite National Park, is integrally linked to the dramatic expansion of San Francisco in the early 1900s. At the turn of the century, the population of the city was exploding due to waves of immigration. New residents needed fresh water for household use, and regional farmers needed fresh water for crop irrigation, so mayor James D. Phelan proposed damming the Tuolomne River and building an aqueduct that stretched to the Bay Area.

The notorious San Francisco earthquake of 1906 (magnitude 8.3, the largest seismic event to occur in the contiguous United States in the 20th century) highlighted the need for more developed public infrastructure and secure water supply. The many fissure from this quake damaged buildings, but also severed water pipelines and gas mains, causing a water shortage that allowed raging fires to burn for four days and nights. About 25,000 buildings burned, and 3,000 people died in what remains one of the deadliest natural disasters in U.S. history. As 90% of the total destruction was attributed to the fires, this tragedy triggered city planners efforts to secure the water supply.

FIGURE 7: FIRES AFTER THE 1906 GREAT EARTHQUAKE OF SAN FRANCISCO *(LIBRARY OF CONGRESS)*

Urban planners for the city linked the cities However, when San Francisco was granted the rights to build the hydroelectric dam and create Hetch Hetchy Reservoir, they sparked the first major environmental controversy in U.S. history. John Muir, the godfather of the

American conservation movement, vehemently protested the struggle around the original dam proposal with Sierra Club and John M. Muir: "*Dam Hetch Hetchy! As well dam for water-tanks the people's cathedrals and churches, for no holier temple has ever been consecrated by the heart of man."*

However, before the arrival of Europeans in the 1850s, the Hetch Hetchy Valley was inhabited by Native American hunter-gatherers (the Miwak and Paiute, amongst others) for over 6,000 years. In the spring, snow melt would bottleneck at the narrow outlet to the valley, making it seasonably unavailable to the tribes. They carefully cultivated the valley meadows and its valuable flora by setting bushfires to keep back tree cover; Hetch Hetchy Valley is a bastardized name for these natural resource management practices (*hatchhatchie* means "edible grasses" in Miwok). The usage of local ecosystems and biota, therefore, was occurring long before John Muir laid claim to them for preservation.

Poor minority demographics are perceived as being unengaged in environmentalism, and as having less agency to engage in environmental management in their locales. The challenge of addressing environmental justice is a consideration for state and federal policy in the US, as it has been in global environmental treaties. One of the greatest barrier to getting all 195 signatories on the United Nations Paris Agreement was the issue of climate inequity between developed and developing countries. In order for developing countries like India and China to be able to participate in carbon reduction in a manner that did not disadvantage their economic growth, developed countries agreed to contribute to large climate mitigation funds.

Renewable Portfolio Standard adoption studies rarely engage in interpretation and broader contextualization of their findings. For instance, one of the primary correlations observed is that wealthier states[10] are more likely to pass Renewable Portfolio Standards. As a form of environmental regulation, RPS reflect disparities in the kinds of citizens and states that have engaged in environmentalism since its inception.

- UTILITIES SEEK TO PRESERVE CONTROL OVER THEIR MARKETS.

The city of San Francisco and its urban planners authority California's costly experience with utility deregulation, though the result of many coalescing factors, set an uninviting precedent for states looking for a way to increase competition in their electricity sectors, spark innovation, and drive down prices. Utility deregulation is something of a misnomer, given that it typically involves more active regulation than traditional US utility regulation. In the electricity sector it implies that However, future energy policy decisions for environmental governance should be made with the knowledge that the failure of utility deregulation in California was, in part, the product of longstanding political economies and narratives around public power.

[10] Based on per capita income of residents

RPS passage tends to follow utility deregulation (the introduction of market competition in the electricity sector) and RPS is one of opposition in the Western United States. There is a strong correlation between deregulated utilities and RPS adoption. I theorize that utilities are less likely to oppose RPS if they have access to lots of low carbon resources like existing hydro, geothermal, and nuclear plants.

The first component of this conflict: against traditional conservation. The second component: fixed costs from installation are good for local economies, and good for urban consumers (especially low-income) who have faced wildly fluctuating fossil fuel prices in the past. The so-what: traditional conservationists challenging these developments must consider the implications of their argument for societal equity. It is important that the policy decision-making process incorporate both of these perspectives, conservationists and consumers. Resilient policy institutions account for not just ecological concerns, but social ones.

- RPS Can Detrimentally Affect Ecosystems Around Production

While some policymakers categorize them as environmental legislation, RPS do not necessarily

The Ivanpah Solar Electric Generating system sits outside of a tiny town in the California Mojave Desert. It is an enormous circular array of mirrors directed at a molten salt reactor in the top of tower taller than any building in the nearby town. The mirrors heat up the reactor until the salt is over 1000 degrees, so that water can be evaporated off of it to power steam turbines. The solar plant technology overcomes a critical deficiency in solar photovoltaic technology: production variability. Thermal heat in the reactor can be stored for 8 hours, generating power long after the sun has gone down. Solar plants, thereby, are a technological development that overcomes a key criticism of renewable energy.

Their continued usage to meet Renewable Portfolio Standards is desirable to utilities because their consistent production and large initial capital investment cost. Thus

However, the geographic area necessary to cover with mirrors in order to heat the central tower to the proper temperature is vast. SIZE OF AREA. Environmental conservation watch groups vehemently protested the impact of the Ivanpah plant on the fragile ecosystems of the Mojave Desert. Their fears were validated by bird death when the plant first began producing.

However, the generation by this plant in Southern California also alleviates some of Los Angeles' long-time dependency on fossil fuels.

American Progressive politics, wealth, urbanization, and renewable energy. Environmental values and industrial appeal. Education.

Green capitalism, but not necessarily environmentalism

Based on correlations observed in quantitative studies, wealthy states where liberals control state offices and legislatures, and environmental organizations are represented are more likely to adopt Renewable Portfolio Standards. Washington neatly fit that profile in 2006 when it passed its 15% by 2020 RPS via ballot initiative (DSIRE). Washington has many small, decentralized, public power utilities than the average state, and a state energy portfolio dominated by hydroelectric generation (White 1996, 49).

Renewable Portfolio Standards affirm the environmental credentials of elite political officials and planners in historically liberal states. Vasseur (2014) is primarily concerned with the effect produced in his econometric model of RPS adoption when both internal characteristics of a state and external influences from the surrounding political context of the region are included. He takes issue with the technical approach of previous studies for neglecting the influence of regional policy diffusion. Vasseur's internal model of state characteristics examines a variable for 'EMO density', which attempts to capture the number of environmental movement organizations active within a given state-year (1648). He finds this variable has positive statistical significance on RPS adoption ($p < 0.5$). [11] However, previous research on the wind energy industry has found that environmental movements organizations are only a powerful influence on state production in conjunction with either sympathetic political elites or abundant wind energy potential (1641). Vasseur's results also support previous studies suggesting a positive correlation between RPS adoption and state income per capita (1648). He also supports positive correlations between RPS adoption and control of state legislatures/governor's offices (1648).

RPS are politically expedient for elite policymakers to support because they generate political popularity from a wide voter base. The employment implications Before successfully running for Governor of Washington, Jay Inslee co-wrote and published a high-profile book, *Apollo's Fire,* on confronting global warming with federal renewable energy policy and subsidization of technological R&D. In the book, he describes the need for energy "revolution" to create "millions of new green-collar jobs" (Inslee & Hendricks 2006, 20). In Inslee's view, federal investment in renewable energy can not only address the three-headed hydra of skilled domestic job creation, climate change and national security, but can further focus new investment in "local and metropolitan economies, increasing social justice and reducing economic disparity" (17). Inslee describes how Americans should rightfully be dominating solar photovoltaic production, a technology of our own invention; instead, Japan and other manufacturing nations have capitalized on US ingenuity. Inslee attempts to

[11] This data was filtered using environmental conservation and renewable energy keywords from the Policy Agendas Project Encyclopedia of Associations database, a census of national social-movement organizations. The address given by the organization was counted as state location. The author attempted to control for the influence of proximity to Washington D.C., but found no bias in the data (Vasseur 2014, 1646).

generate support for renewable energy policy from his public audience by appealing to our nationalist sentiments.

Governor Inslee includes an excerpt from Sarah Patton in his book, the executive director of the Northwest Energy Coalition who was one of the major environmentalists involved in passing the stringent Washington RPS (50% by 2030). Her narrative on the 2006 Washington RPS adoption by direct ballot initiative demonstrates how environmental organizations coalesce networks for specific policy actions in broader social movements, and utilize direct democracy to overcome political-industrial barriers in government institutions. Patton describes the "broad coalition" built of "environmental and consumer organizations, businesses, labor unions, the American Lung Organization, political leaders from both parties, farmers, a former electric utility executive, the Washington Association of Churches, and even U.S. Senator Hillary Clinton" (320-321). Her organization gathered thousands of ballots from environmentally concerned voters. This suggests that the Washington RPS (with one of the most ambitious targets in the nation) was passed due to the alliance between bottom-up voter will and elite state representatives, coordinated by environmental organizations. Furthermore, the inclusion of diverse actors in the state not only contributed to the adoption of her policy and the resilience of environmental governance in the state. She emphasizes how this direct democracy effort not only battled skeptical inaction in state legislatures, but overcame entrenched industry lobbies nationally (the coal industry's influence "in the White House") (321).

In March of 2016, the Oregon House of Representative doubled the Oregon RPS to 50% by 2030. Local news sources reported that utility representatives had agreed to the measure because regional environmental organizations threatened to coordinate an effort to pass an even more stringent ballot initiative[12]. Although elected officials "frame[d] any effort to reduce greenhouse gases as an economic threat", voters utilized direct democracy to bypass their representatives (47). The ability to put carbon reduction on the ballot for popular vote - without persuading skeptical state legislators - has thereby been a powerful tool for environmental organizations.

Lesson 2: RPS Do Not Always Have Desirable Environmental Outcomes

We can draw a distinction between state RPS experimentation in

Many states with RPS have attempted to change who controls their energy markets. There is a correlation between destructuring ***How does market structure affect the models of utility regulation we choose, and the scales at which we choose to apply them?*** How does market structure affect the incorporation of environmental values? Is government regulation necessary to introduce these values? In what form? How do historical policy norms and narratives affect modern decision-making?

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[12] http://www.utilitydive.com/news/oregon-utilities-endorse-bill-to-end-coal-use-by-2030-boost-rps-to-50-by/411637/

A perennial concern of scholars attempting to make predictions about the future of environmental regulation is whether or not

- Environmental values
- Natural monopolies
- Public vs. Private: Encouraging competition to drive down prices or government price-settin

LESSON 3: UTILITIES SEEK TO PRESERVE CONTROL OVER MARKETS.

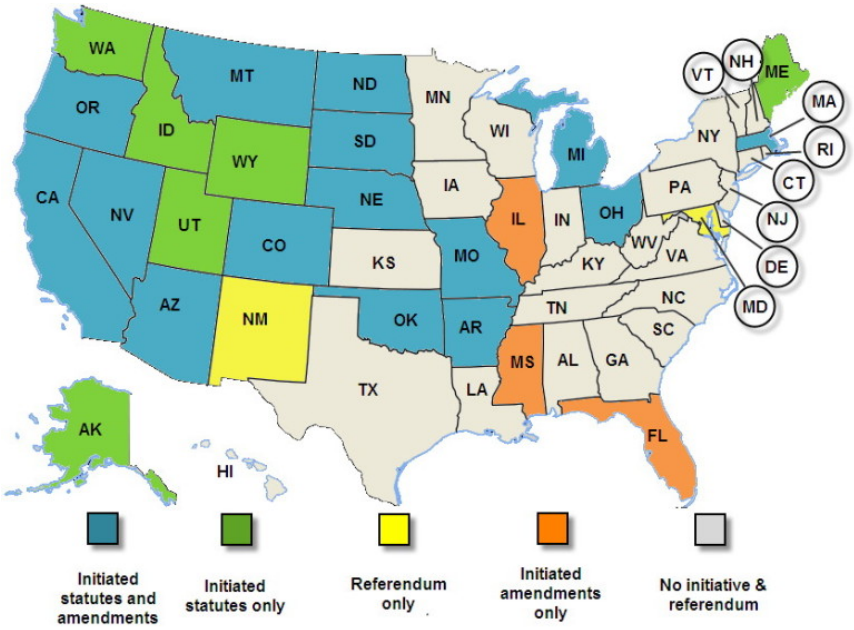

FIGURE 8: STATES WITH BALLOT INITIATIVES

The broader implications of the effect of concentrated urban voter influence on Renewable Portfolio Standards via direct ballot initiative is that these populations are typically distanced from the impacts of large, utility scale renewable energy developments. This is largely due to land scarcity in urban areas. Project development is good for local employment in rural areas. For example, the average wind project generates 22 years of high-wage employment. Furthermore, tax revenues from renewable energy projects in rural counties can increase local governmental budgets and the number of public amenities (like school buses). When wind projects lease land from farmers, traditional rural landowners, it gives them economic security by supplementing their annual incomes.

This relocation of economic benefit out of the urban energy core may be a countering trend that helps decrease social stratification within core nations. Joseph Stiglitz predicts that a "poor people in rich countries" trend of socioeconomic inequality in core countries will deepen for the foreseeable future.

Qualitative examination of specific West Coast states in the style of Barry Rabe, with historical context and quotes from key political elites is a necessary component of my methodology. Story-style analysis of Progressive movement and Environmentalism

Barry G. Rabe provides several illustrative case studies of the RPS programs in individual states, including Texas, Massachusetts, Nevada, Pennsylvania and Colorado (Rabe 2007, 11). His qualitative discussion and brief historical overviews effectively contextualize the adoption and effect of these states' RPS policies. However, he fails to provide any states as controls for his discussion. For instance, he provides no baseline example of renewable energy development in a state without an RPS or a state with an NRPS. As a result, it is difficult to objectively compare the effects of RPS passage. Vasseur (2014) also highlights the need for situated research into why specific states passed NRPS policies, which are effectively symbolic policies, devoid of substantive content.

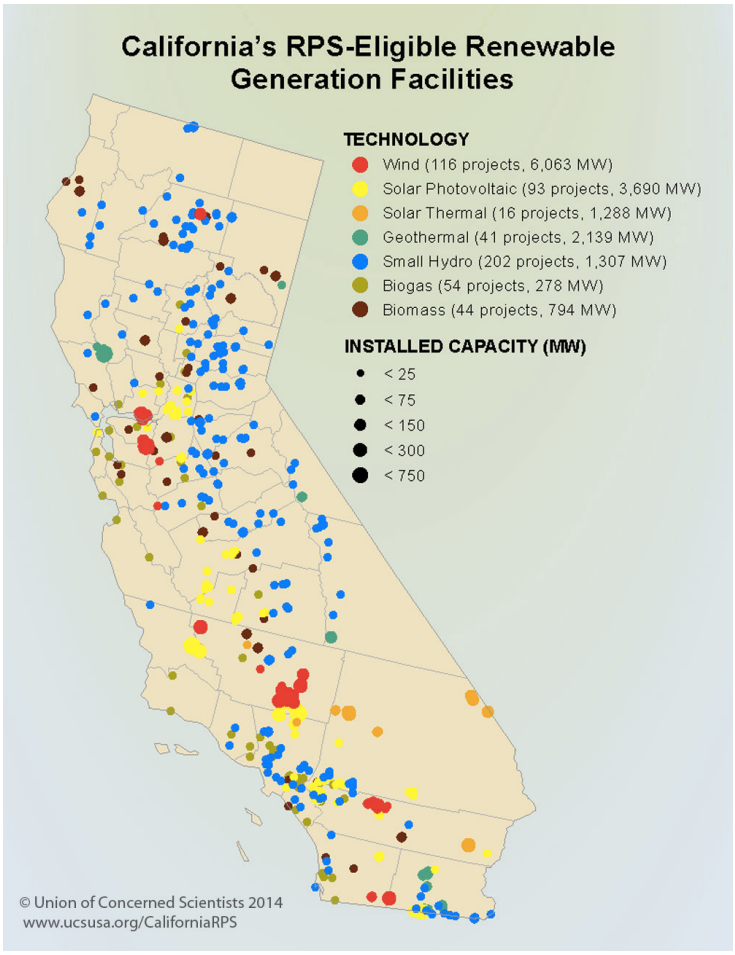

FIGURE 9: RPS-ELIGIBLE RENEWABLE GENERATION FACILITIES ***(SOURCE: UNION OF CONCERNED SCIENTISTS)***

FIGURE 10: CALIFORNIA ELECTRIC UTILITY SERVICE AREA *(SOURCE: CALIFORNIA ENERGY COMMISSION)*

Monopolization of energy markets

Ballot initiatives

Environmentalism (conservation)- John Muir, Yosemite Valley

Utilities come in conflict with environmentalism: Hetch Hetchy Dam, PG & E, urban demand

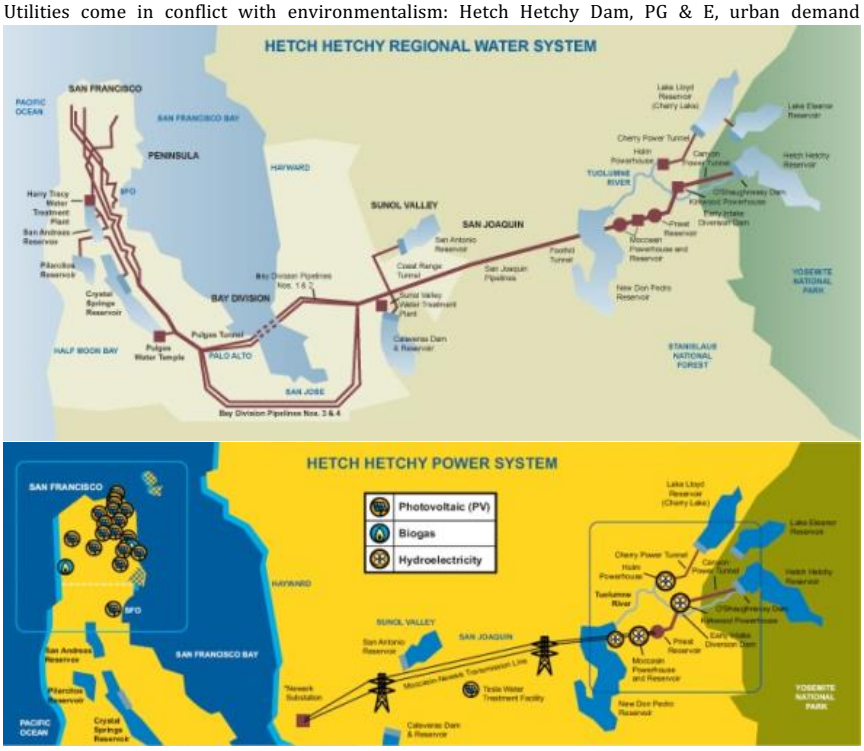

FIGURE 11: HETCH HETCHY WATER & POWER TRANSMISSION *(SOURCE: SFWATER.ORG)*

Restructuring Utilities

2002 Energy Crisis

- CA became the first state to deregulate its $23 billion electric utility industry in 1996 (SF Gate). Until that point in time, Pacific Gas & Electric, Southern California Edison, and San Diego Electric had monopolistic control over all production, transmission, and distribution in the state. The law promised cheaper electricity rates to utility customers (both residential and industrial, like cement and steel plants) by increasing competition between energy producers.
- How did it go wrong?
- How did this challenge or not challenge existing market structures (who has control)?

Palo Alto (wealthy: percent with income of 100k or more, municipal ownership of single utility, lots of pre-existing hydro, tech progressives), (Pasadena and

Anaheim). https://vimeo.com/61055308, http://www.slate.com/articles/business/the_juice/2014/09/palo_alto_power_supply_how_the_home_of_stanford_became_carbon_neutral.html

Technology, Silicon Valley, education at places like Stanford.

The negative effects of renewable energy developments on environmental conservation should be weighed and discussed with awareness of historic inequities around these discussions. Early environmentalism in California is typified by John Muir, the patron saint of the American conservation movement – an older, wealthy, white, male progressive. Critical environmental historians argue that "Muir's vision of wilderness is rooted in economic privilege and the abundant leisure time of the upper class" (LA Times 2014). They point out the "correlation between the emotional, biblical language of Muir's writings and the demographic makeup of national park visitors and the ranks of the largest environmental organizations — mainly aging, white Americans" ((LA Times 2014).

Urban residents in cities like San Francisco tend to be wealthier, more educated, and more progressive. When found to be common across a state, these traits have each been shown to have positively correlate to the chance that the state adopts a Renewable Portfolio Standard.

Costs and benefits. Dead birds do not necessarily validate blanket opposition to large renewable energy projects by environmentalists – given the historic social equity, and affordable electricity prices for low-income households.

OREGON AND WASHINGTON

Planners and politicians in the Pacific Northwest have advocated for non-fossil fuel technologies since the early 1900s, though their underlying motivations and the suite of energy sources considered progressive has changed over time. Lewis Mumford was an influential writer on the early philosophy of technology and sustainable city development throughout the first half of the twentieth century. As a sociologist, historian, philosopher of technology, and literary critic obsessed with urban architecture and planning, he proposed that human "technics" (a more inclusive term for human technological advancements that encapsulates their social components as well as economic) could advance the universal standard of life, if kept under control properly (Mumford 1959, 528-529). His early works emphasized the importance of spreading electricity and mass communication as common human goods necessary to equality. Later in his career, as the American environmental movement entered the national consciousness, he became critical of the cost technics could bear if left unconstrained.

In his environmental history of energy in, on, and through the Columbia River, *The Organic Machine,* Richard White claims that the seeds of green energy capitalism and progressivism where sown by the theories of Ralph Waldo Emerson (White 1995, 34-35). In the 1930s, influential intellectuals like Mumford incorporated Emersonian ideals on value of natural beauty in their writing. Nature, in their view, could be carefully transformed and incorporated to improve human society (68). Mumford collaborated with elite policymakers to plot dam development in the

Columbia River Gorge. His optimistic plans for the "Neotechnic" age had no room for "Paleotechnic" coal and gas, which were perceived as heavy and dirty. In the view of these regional planners, early industrial technics polluted cities and were inconvenient to haul to power plants. It was much more elegant to set up unified public networks of transmission lines from large hydroelectric dams. When distributed in this manner, Mumford had great faith that electricity could be a social good: by liberating humans from labor, planners thought they could improve welfare and transform society (48). This sentiment, a common energy utopianism that "made Giant Power into social theory", is perhaps best exemplified in policy by Franklin D. Roosevelt's rural electrification schemes (55).

The Organic Machine critiques the continual re-perpetuation of green capitalist fantasies. Lewis Mumford's view of technology back in 1930 was that the time had come to "complicate the mechanical… to make it more organic [and]… more harmonious with our living environment" (White 1995, 68). Though rosy views of large hydroelectric installations have been darkened over time by knowledge of the disruption they create in river ecosystems, White argues that Americans have simply "transferred our dreams to other sources" like nuclear, wind, and solar (48; 35). He thus critiques utopian views of green energy by pointing out the historical trend: new innovations in technics, when developed by economies of scale, tend to create environmental externalities that are unknown at the time.

Furthermore, when policy and planning push for energy transitions to establish social goods, those goods can be co-opted by capitalist systems for private gain. In 1968, Garrett Hardin labeled the impulse for every actor to claim public goods for private gain the "Tragedy of the Commons" (White 1995, 39). This is how White describes the consolidation of electric grids ownership into private utility monopolies after World War I. However, he does not fully subscribe to Hardin's theory, noting that commons have historically been governed by cautious users who "set up rules" and limit access (39). He thereby calls attention to the vested power in rules we set for ourselves.

The first attempt by policymakers to incentivize energy development officially designated as "renewable" was the 1978 Public Utility Regulatory Policies Act, or PURPA. PURPA forced utility companies to allow Independent Power Producers, renewable energy developers, to connect to their grid transmission. This Act, passed by the 95th Congress as part of President Jimmy Carter's broader National Energy Act, came in an era in which sharply rising gas prices made national energy security a top priority. Although Carter is perhaps best known as a sweater-wearing advocate for energy conservation and efficiency measures, renewables played an important role in his attempt to reduce America's dependence on the global oil cartel (i.e. the Organization of Petroleum Exporting Countries). To overcome strong opposition from Senate Republicans, southern Democrats, and the coal and natural gas lobby, President Carter appealed to the public's sense of patriotism in a massive advertising campaign backed by the Democratic National Committee[13]. Elite Democrats at the state level, like Governor Jay Inslee, have since mimicked Carter's tactics by nationalistically appealing to voters to create social-environmental movements.

When selecting renewable energy policies, state politicians are in an uncertain political environment, with limited legislative precedence to draw on to inform their decisions. Unlike societal issues like crime and property ownership that have been addressed with policy since the Sumerian kings inscribed tablets of law in 2100 BCE, the relative novelty of renewable technologies means that

[13] http://www.presidentprofiles.com/Kennedy-Bush/Jimmy-Carter-Energy-policy.html

most policymakers have less than half a century of previous experience to draw on. RPS adoption literature suggests that elite policymakers, and their planning teams, tend to look for precedence in their region. Although these planners and their teams frequently examine what policies governments with similar jurisdictions are utilizing (or what coordinating agencies like the United Nations recommend) the final content of those policies is often determined by the internal political, economic, social and natural resource capacities of the state.

DISCUSSION

SCALING UP TO A FEDERAL RENEWABLE PORTFOLIO STANDARD?

This section centers around the question of broader RPS applicability in the United States. Specifically, I draw specific conclusions about whether the US should combine state-level Renewable Portfolio Standards regulations under one federal standard in order to mitigate carbon emissions at a broader scale. In summary, state-level RPS experimentation will not necessarily result in a "sudden lurch" of national policy transformation, like the adoption of a federal RPS by Congress. It may take "unambiguous" stimulus in the form of a natural disaster or drastic price signals to sound the alarm. Due to entrenched industry interest in preserving current utility market structures, unless the polar icecaps thaw, social and political gridlock around climate change in the United States may not follow suit. Thereby, political capital at the federal level to meet the global warming imperative might be better spent re-evaluating existing legislation to make it more equitable, cutting fossil fuel subsidies, and challenging utility ratemaking structures.

INTERNATIONAL COMPARISONS

Some advocates argue that it would build a more resilient policy framework for carbon-free development that better fits the global scale of the climate change challenge. It would bolster the nation's environmental credentials and shore up weaknesses in the patchwork of state RPS policies. This would increase the economic efficiency of state efforts. However, it may be unlikely to hope for carbon reduction regulation given current federal gridlock. This political capital could be better spent strengthening existing federal tax credits and market-based alternatives that introduce competition to electric utility markets, and offering renewable energy incentives to underserved demographics. In the United States, building renewable energy equity and resilience will require careful

Unlike the United States, the experiences of administrative states at the lower scale of governance has resulted in broad political consensus in the European Union over appropriate carbon reduction regulatory action. In 2001, the European Union passed the Directive on Electricity Production from Renewable Energy Sources and set more ambitious targets in 2007 (Lyon 2016, 2). The EU has made frequent use of this instrument, and has integrated each member nations' renewable standard into one broad target *(see the final discussion section of this paper for more explicit comparison with the EU and other core countries)*.

Other core regions have adopted approaches to implementing the requirements, some of which resemble RPS policies (Menanteau et al., 2003). Another core nation that has adopted a national Renewable Energy Target is Canada. However, the national government has undertaken very little systematic change besides this goal-setting to make their electricity sector more equitable.

Canada is a core nation with a secure electricity system and a carbon reduction goal of 30% by 2030 from 2005 levels (*climatechange.gc.ca*). Although several of Canada's provincial governments have instituted innovative carbon reduction regulations, the central government has failed to undertake systematic feedback into its national energy framework (Climate Action Plan).

This complacency on the part of the national government may be because the Canadian energy grid gets 79% of its national power mix from non-emitting sources, largely hydroelectricity and nuclear power. In fact, electricity in some regions is synonymous with the word *hydro.* These generators, while not explicitly renewable, produces cheap energy that gets fed into large, government owned, public utilities for each province. Ontario and Alberta are regional leaders, and have created several policies since the 1990s to induce utility-independent renewable energy investment, carbon reduction, and utility competition (liberalization into a wholesale electricity market). For example, in response to Ontario's 2009 adoption of the Green Energy Act that legislated, utilities have authorized and funded the building of new transmission infrastructure across the country in order to connect planned renewable production. British Columbia has instituted a carbon tax with reported success reducing carbon emissions without significantly impacting regional economic growth.

Thereby, comparison with Canadian policy suggests that a U.S. federal renewable energy target could amount to little more than green-washing to cover a lack of centralized government effort to systematically become more climate-resilient.

I find that federal RPS adoption is politically impractical given current conditions of gridlock. Republican majorities currently oppose all attempts at climate change regulation in both houses of Congress. However, a more enduring criticism of RPS effect is that they tend to have relatively little effect on new renewable generation compared to federal and state production tax credits. This damning conclusion has been empirically validated in studies like Haar & Theyel (2006: 79). Perhaps the political capital necessary to spend to push through a federal RPS could be better spent supporting more consistent Production Tax Credit extensions after the current round expires in 2018.

As such, Renewable Portfolio Standards may be more politically 'contagious' than other forms of state-level carbon reduction policy simply because of their legislative precedence, and because they placate voters seeking climate action as well as low-carbon utilities seeking a competitive edge. Politicians have heard about them from the next state over for 25 years. For example, regardless of their actual outcome, a carbon tax *sounds* like it could

be more radical, expensive, and unpopular with voters. After all, 'taxation' has been America's least favorite word since the Revolutionary War.

Although some scholars suggest that a symbolic Renewable Portfolio Target might be more politically feasible for uniting state RPS at the federal scale, voluntary compliance RPS at the state level have not been linked to any observable change in renewable energy development rates. Vasseur even refers to these voluntary policies as "Nonrenewable Portfolio Standards", or NRPS. His view is that these symbolic policies are a ploy that only have political utility, and carry no real effect. Bache et al. (2015) generalizes this sentiment to symbolic environmental meta-policies, which is commonly observed in environmental policy fields: Cosmetic declaratory commitments have a "high politico-strategic effectiveness, but… are not aimed at solving societal problems and thus have a low impact effectiveness" (Bache et al. 2015, 847).

Comment [JDP1]: You have a common writing style throughout much of this thesis that turns it into a term paper: "X said Y." Look above and you'll see this a lot. It's good that you are reading and summarizing scholars! But without weaving each into your own argument, you've lost the original scholarly contribution expected of a thesis. Here in particular, at the very end, you should be tying together and expanding your own argument: if someone was important to cite/summarize, you should generally have done this way up at the top.

The current US political climate makes implementing any comprehensive federal carbon reduction regulation seem an unlikely reality. Unless the distance between party stances on climate change begins to close, one party gains a significant majority in both the House and Senate, or legislators start breaking from the party stance with greater frequency, future federal regulation attempting to change underlying market conditions will have a difficult path to overcome extremist climate rhetoric, partisan gridlock, and entrenched industry lobbies.

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