Energy Policy 113 (2018) 76–86

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Politics in the U.S. energy transition: Case studies of solar, wind, biofuels and electric vehicles policy

Leah C. Stokes[a,*], Hanna L. Breetz[b]

[a] Department of Political Science and Bren School of Environmental Science & Management, University of California Santa Barbara, USA
[b] School of Sustainability, Arizona State University, USA

ARTICLE INFO

Keywords:
Energy transitions
Political economy
Decarbonization
Renewable energy
Energy history

ABSTRACT

We examine the politics of US state and federal policy supporting wind and solar in the electricity sector and biofuels and electric vehicles in the transportation sector. For each technology, we provide two policy case studies: the federal Production Tax Credit (PTC) and state Renewable Portfolio Standards (RPS) for wind; state Net Energy Metering (NEM) and the federal investment tax credit (ITC) for solar; federal excise tax incentives and the Renewable Fuel Standard (RFS) for biofuels; and California's Zero Emission Vehicle (ZEV) mandate and federal tax incentives for electric vehicles. Each case study traces the enactment and later revision of the policy, typically over a period of twenty-five years. We use these eight longitudinal case studies to identify common patterns in the politics of US renewable energy policy. Although electricity and transportation involve different actors and technologies, we find similar patterns across these sectors: immature technology is underestimated or misunderstood; large energy bills provide windows of opportunity for enactment; once enacted, policies are extended incrementally; there is increasing politicization as mature technology threatens incumbents.

1. Introduction

Over the past four decades, federal and state governments in the United States have passed numerous policies to promote clean energy. A large literature examines the technical, economic, and policy aspects of energy transitions (Smil, 2010). However, the political dynamics have received less attention (Meadowcroft, 2009; Hughes and Lipscy, 2013; Stokes, 2013). Since transformative energy policies threaten incumbent industries and impose substantial costs (Breetz et al., 2017), enacting and sustaining policies requires considerable political support. Yet despite widespread recognition that barriers to the energy transition are primarily political, rather than technological or economic (Delucchi and Jacobson, 2011), we lack a cohesive literature on the politics that drive, constrain, and shape renewable energy policy—particularly in the United States.

Understanding the political dynamics of energy transitions requires detailed case studies of state and federal policy (Jacobsson and Lauber, 2006). In this paper, we examine eight longitudinal case studies of how politics shaped policy decision-making over the past three decades. We examine four low-carbon technologies: wind, solar, biofuels, and electric vehicles (EVs). For each technology, we trace how political agendas, actors, and institutions affected the enactment and evolution of two major state and federal policies. For wind energy, we examine the federal Production Tax Credit (PTC) and state Renewable Portfolio Standards (RPS); for solar, state Net Energy Metering (NEM) and the federal investment tax credit (ITC); for biofuels, federal excise tax incentives and the Renewable Fuel Standard (RFS); for EVs, California's Zero Emission Vehicle (ZEV) mandate and federal tax incentives.

This paper provides both empirical and theoretical contributions to research on energy transitions. Since the political histories of several of these policies are poorly documented in energy policy literature–including the Investment Tax Credit (ITC), the Renewable Fuel Standard (RFS), and various EV tax credits–our original case studies offer a significant empirical contribution. These cases also provide a counterbalance to the European emphasis in energy transitions research (Markard et al., 2012).

Our analysis also contributes conceptual and theoretical development. Few articles conceptualize the changes across transportation and electricity as a single energy transition, but we find that they share similar politics, suggesting common challenges in the move away from fossil fuels. Examining these cases demonstrates that numerous policy factors have driven renewable energy policy adoption in the US: energy crises, financial recessions, national security, and environmental and public health concerns.

We identify four broad patterns in the politics of renewable energy policymaking. First, policymakers and incumbent industries often

* Corresponding author.
E-mail address: lstokes@ucsb.edu (L.C. Stokes).

http://dx.doi.org/10.1016/j.enpol.2017.10.057
Received 12 July 2017; Received in revised form 26 October 2017; Accepted 29 October 2017
Available online 21 November 2017
0301-4215/

underestimated new energy technologies. Second, omnibus legislation tended to provide key political opportunities for renewable policies. Third, once enacted, supportive policies were often sustained through incremental extensions, despite moments of retrenchment due to expiring provisions. Fourth, as low-carbon energy technologies matured and began threatening incumbent fossil fuel industries, they became more politically contentious. We conclude that sustained political support for these technologies through long-term advocacy coalitions will be necessary to complete the renewable energy transition.

2. Energy transition politics

Many studies examine the technical, economic, and policy drivers of energy transitions. The political dynamics, however, have received less attention. Although the *importance* of politics is acknowledged, the literature lacks a cohesive theory of how political institutions and actors affect energy policymaking. Here we review recent developments from three relevant fields: political science, policy studies, and energy transitions.

In political science, a recent review described the subfield of energy politics as "relatively underdeveloped" (Hughes and Lipscy, 2013). Most research dates to the 1970–1980s and focuses on international political economy and oil geopolitics. Recent work in this subfield continues to emphasize national security and the political economy of incumbent fuels—not renewable energy. This emphasis is beginning to shift with new studies relating renewable energy to public opinion (Ansolabehere and Konisky, 2014; Stokes, 2013; Stokes and Warshaw, 2017), electoral dynamics (Stokes, 2015a), coalitional politics (Meckling and Jenner, 2016), and green industrial constituencies (Aklin and Urpelainen, 2013). However, renewable energy remains an understudied topic in political science. Our paper highlights several important political dynamics that could be explored in future research, including layering of regulatory policies and tax incentives, and interactions between state and federal policy.

In the policy literature, scholars often analyze policymaking with theories such as the Multiple Streams model, Punctuated Equilibrium Theory, and the Advocacy Coalition Framework. Although these theories focus on slightly different actors, time scales, and causal mechanisms (Nowlin, 2011), all emphasize windows of opportunity for policy change, especially following acute "focusing events" such as oil and nuclear crises (Carlisle et al., 2016; Grossman, 2013; Nohrstedt and Weible, 2010; Nohrstedt, 2008; Smith, 2002). Our paper builds on this literature by demonstrating how oil crises drove omnibus energy legislation, opening policy windows for wind, solar, biofuels, and EVs. In addition to considering policy enactment–the main focus of policy process theories–we also examine how policies were extended, revised, or retrenched. This requires understanding the interaction between policymaking and technologies over time (Breetz et al., 2017).

Energy transitions scholars tended to emphasize the technical aspects of innovation, niches, and socio-technical systems (Markard et al., 2012)–indeed the term "transition" is apolitical. However, calls for deeper engagement with politics, policy, and governance (Meadowcroft, 2009, 2011; Scrase and Smith, 2009; Shove and Walker, 2007) catalyzed research in this field. This emerging literature often emphasizes the structure of policy actors, including alliances (Lawhon and Murphy, 2012), networks (Musiolik and Markard, 2011), and advocacy coalitions (Jacobsson and Lauber, 2006; Farla et al., 2012; Markard et al., 2016). Compared to energy studies in political science and public policy, the energy transitions literature has less emphasis on agenda-setting and crisis-driven policymaking, which may reflect its predominantly European epistemic community.

Several newer debates in this literature particularly resonate with our case studies. One area develops new theories about "regime resistance," including how incumbent fossil and automobile industries resist system transformation (Geels et al., 2014) and how countervailing industries and grassroots social movements can push back (Hess, 2014, 2016). Our cases contribute to this literature, showing how incumbent industries may not resist initial policies, as well as how resistance increases over time as deployment scales up.

Another branch of energy transitions research emphasizes institutional aspects, including institutional values and priorities (Laird, 2001; Kuzemko et al., 2016), institutional "layering" in which renewable energy programs are created without dismantling existing fossil fuel regimes (Laird, 2016), and cross-national discursive-institutionalist comparisons of how actors mobilize ideas (Kern, 2011). Our cases confirm that the US energy transition is being pursued through institutional layering rather than transformative reforms. We further contribute to this branch of research by showing that layering involves an interaction between regulatory polices and tax incentives, as well as between federal and state policies.

3. Research methods

3.1. Process tracing in case studies

Each case study traces the emergence, enactment, and evolution of one policy. The case studies are longitudinal— they trace the policy over an extended period, typically about twenty-five years. For each case, our goal is to explain how political dynamics shaped policy outcomes; evaluating policy impacts, estimating costs, or explaining adoption rates are beyond the scope of this study, except insofar as these factors influenced policy decision-making.

In each case study in Section 4, we rely on process tracing, a research method developed primarily in political science. Process tracing reconstructs a chain of events to identify causal mechanisms within a case study (Beach and Pedersen, 2013; Trampusch and Palier, 2016). Process tracing first reconstructs the historical record, establishing *what* and *when* decisions occurred, with a particular focus on identifying the sequence of events. The procedure then moves towards explanation, examining *why* and *how* political decisions were made.

In the discussion in Section 5, we comparatively analyze across case studies with the goal of identifying common patterns in the politics of policy-making. This is an inductive form of comparative case study analysis that aims to generate hypotheses that can be generalized beyond the specific cases (Levy, 2008). The relationships we uncover through this approach could be tested in future research through deductive case studies or quantitative analyses.

3.2. Case selection

In this paper, we selected the two fastest-growing alternative energy sources in the electricity and transportation sectors (Fig. 1). For each, we selected two key policies that drove investment and commercialization in recent decades. The timeline for key episodes of policy enactment are shown in Fig. 2. Although many complementary policies have affected the energy transition, we focus on the most prominent policies for each technology.[1] Ultimately, our goal is to explain how these policies were created, rather than accounting for all factors affecting technology deployment.

This selection criteria resulted in a range of policy types, include both regulations and subsidies. For wind, solar, and EVs, it is notable that the regulations we examine are typically state-level mandates (RPS, ZEV Mandate) while the subsidies are federal tax incentives (PTC, ITC, EV tax credits and rebates). For biofuels, both the blending mandate and tax incentives were enacted at the federal level. The case of solar NEM is primarily a regulatory policy, but is often seen of as involving some subsidization as well; in this way, it is a mixed case.

[1] We focus on supply-side efforts to deploy new fuels and vehicles, not policies to increase efficiency. While efficiency is important, it does not necessarily drive substitution between energy sources and affects only the pace of decarbonization (Trancik et al., 2014).