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History's contributions to energy research and policy

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ABSTRACT

Historical research can assist those analyzing contemporary energy systems or designing energy policies. While history does not directly repeat itself or offer powers of prediction, studies of the past can draw attention to frequently overlooked features of energy systems. Through a series of case studies, this article highlights historians' efforts to identify the essential role of social and cultural considerations in shaping the successes and failures of energy regimes. In particular, energy researchers and policy makers can learn much from historians about the links between energy, culture, and society; the role of often-invisible infrastructures in limiting useful discussions about energy systems; and the need to reevaluate the traditional notion of energy transitions.

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1. Introduction

Historians can be important allies for energy researchers and energy policy makers. This claim does not rest simply on the notion that history repeats itself or that academic scholars of the past have prescient abilities to predict the future. Though George Santayana's famous claim about the perils of ignoring the past has won wide circulation,¹ we argue for a more nuanced reading of the connections between the past, present, and future. We suggest that the value of history for energy research—especially to policy makers and policy analysts—comes from providing insight by identifying often-overlooked considerations among practitioners who propose and implement energy policies. Those considerations include social and political impediments that designers of new technologies frequently cannot imagine or long-standing, but difficult-to-articulate, angst among certain stakeholders who oppose implementation of energy plans. Experts at comprehending the establishment of trends and changes in them, historians who study energy can offer a special understanding of the nontechnical frameworks in which new technologies emerge and why they sometimes fail, even when they appear to have appealing technical attributes. In particular, historians pay significant attention (though not uniquely, as other essays in this volume indicate) to

the social context in which people create, deploy, and use technologies, leading to sometimes novel perspectives about energy systems.²

Both of this article's authors have written on the historical developments of energy systems and the challenges of contemporary energy transitions [2–7]. Drawing on our research as well as works by our colleagues, we present a series of examples highlighting the benefits of historical analysis for understanding today's challenges. Organized into four sections, this essay begins with a brief discussion of historical methods and policy connections. Next, it examines the essential role of cultural and social considerations in shaping if, how, and when various energy systems win acceptance. Though many analysts focus predominantly on the technologies and costs of energy systems, we suggest that they pay greater attention to nontechnical factors as they craft new policies. In the third section, we demonstrate that the long-term consequences of energy infrastructures highlight the importance of critical reflection on their construction and operation. Finally, we contend that history can help energy scholars broaden their understanding of energy transitions in ways that reveal new topics and ideas for debate.

In short, this article maintains that energy researchers and policy makers can acquire practical value from results of historical inquiry. While those hoping for prepackaged policy proposals may

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¹ The actual quotation reads "Those who cannot remember the past are condemned to repeat it." [1: p. 284].

² As will be noted later, historians often and explicitly depend on scholarship performed in other academic fields. For example, the authors have benefited from insights drawn from cultural anthropology, geography, consumer psychology, economics, landscape architecture, and engineering.

be disappointed, others who recognize that good policy requires deliberation of the social dimensions of energy systems may find useful insights.

2. Historical methods and policy connections

History, broadly, is the study of change over time.³ Within this activity, scholars use a wide range of historiographical methods to understand the past, and the profession contains numerous subfields (e.g., twentieth-century Europe, women's history, social history, environmental history, colonial America, history of technology). Despite this diversity, historians agree upon empirical research as a common feature. Claims must be grounded in documents such as government reports, trade journals, newsletters, and books; often these resources are found in traditional archives containing items such as personal letters, diaries, and meeting notes. However, historians have also proven remarkably adept at finding data through oral histories and even archeological evidence, such as artifacts found in museum collections, long-abandoned factories, and old power plants. Over the last few decades, the definition of an "archive" has expanded considerably, offering historians novel resources from which to write empirically based case studies and to make inductive conclusions.

As historians seek to understand past events, they necessarily draw from a host of disciplines. To comprehend the actions of individuals and groups, they often incorporate explanations that focus on political, economic, sociological, anthropological, geographical, economic, and technical considerations. Put another way, historical research inherently crosses traditional academic boundaries, adding value to energy research by providing many perspectives and in a manner advocated by Daniel Spreng in this volume [49]. Explicitly acknowledging the interdisciplinary nature of energy scholarship, historian Thomas P. Hughes elucidated an often-used "systems approach" that emphasizes the role of nontechnical concerns in the development of technological enterprises [29]. In particular, Hughes posits that systems consist of factors sometimes categorized as technical, administrative, economic, educational, legal, regulatory, and financial. Hughes himself used the history of electric utilities as a means for demonstrating the value of his methodology: successful system builders, such as Samuel Insull, arrayed what may have appeared to others as chaotic and incompatible elements to enable his Chicago utility company to thrive in the 1890s and later. He did this by aligning the interests of stakeholders in government, investment firms, educational institutions, and the public with those of his Commonwealth Edison power company. As a way to gain support for a regional monopoly, he even advocated for state regulation, which provided a host of self-serving benefits while also assuring legislators and consumers that his firm would not extort high prices for electricity.⁴

The literate public may view the creation of analogies as historians' most significant contributions to policy discussions. Through their case-study approach, scholars examine earlier events and sometimes compare them to contemporary challenges and future plans. In the process, they highlight similarities (or differences) in

causative factors, unanticipated consequences, and other important considerations that may not have been obvious to policy makers and analysts. Due to their training and sensitivities, historians can assist in energy research by evaluating and correcting analogies used by stakeholders, who often employ history to buttress previously enunciated positions or biases [12].

As an example, consider how leaders of industrial ventures sometimes create arguments based on the faulty analogy between past eras of economic growth and increased energy consumption. Reiterating the conventional wisdom, the Edison Electric Institute, a trade group of electric utility companies, observed in a 2007 publication, *Key Facts About the Electric Power Industry*, that "electricity is the lifeblood of the U.S. economy" and that "growth in electricity use has coincided with growth in the GDP since the end of World War II" [15].⁵ In a similar way, Dominion Virginia Power's website noted for many years that "economic growth is good news for Virginia, but it presents special challenges" due to the projected increase in electricity demand of almost 4000 MW in the near future.⁶ "A strong economy requires more energy to support its continued growth," the site declares [18]. Such claims appear compelling when drawing on experiences from several decades ago; more recent scrutiny, however, reveals the argument lacks credibility. Because of improvements in efficiency, the economy today demands about half as much energy to produce a constant dollar of gross domestic product than it did in 1973. And while electricity consumption paralleled economic growth for many years, the two became decoupled in the late 1990s, such that the economy grew 38 percent from 1996 to 2009 while electricity consumption increased only 15 percent [[19]: xii and [2]: 10].⁷ In other words, analogies that draw on formerly tight (and linear) relationships between economic growth and electricity demand no longer appear valid.

The use of analogies offers another practical benefit by making clear a set of overlooked factors that may have value. While urging people to exercise caution when using them, historian Otis Graham nevertheless observed that historical analogies can profitably aid policy makers in avoiding mistakes "from some impinging factor or factors whose bearing upon one's own narrower plans, indeed whose very existence, was often screened out of the analysis" [10–12]. In other words, the employment of analogies may help identify previously neglected factors and highlight the existence and significance of forgotten considerations, stakeholders, and institutions.

3. Culture, society, and energy

The cultural dimension of energy systems' creation and use constitutes one set of these frequently unexpressed considerations. Policy makers and analysts do not often acknowledge (and act upon) the difficult-to-articulate preferences and biases of those who nevertheless carry influence in policy debates. For example, an appreciation of the cultural values of nuclear engineers goes far to explain why some corporations promoted construction of atomic power plants to solve the energy supply problem after the onset of the 1973 energy crisis. Trained in universities to seek hardware solutions to ostensibly technical problems, many engineers sought

³ The field of historical inquiry is vast, and we stress that this essay is not intended to be a comprehensive review of the relationships between academic history and policy research. For scholars interested in learning more about history and policy, we recommend the following works: [8–13].

⁴ Hughes rejected the idea of technological determinism and autonomy—the idea that technologies develop lives of their own such that the advent or use of one technology dictates later use and creation of others. Instead, he established the notion that technological systems sometimes develop the social analog to momentum, which he described as a "mass of technological, organizational and attitudinal components [that tend] to maintain their steady growth and direction." [14: p. 460].

⁵ Similar claims abound. The American Electric Power Company claims on its website that "if the GDP goes up, it means people are doing better, generally, in their lives. The U.S. electricity line [in the accompanying graph]... goes up with the GDP line... because electricity is used to make lots of products and provide services" [16].

⁶ At the end of 2012, the utility had a summer capability of about 18,000 MW [17].

⁷ Electricity data from [20: Tables 1.5, 8.1]. These data were analyzed by historian Richard F. Hirsh and Stanford University research fellow Jonathan G. Koomey.

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