

INTRODUCTION

On October 2, 1927, the *New York Times* featured a bold headline: “The Electric Age: A New Utopia.” Explaining history in terms of energy epochs, the author declared that the United States was facing the most remarkable transformation in its history: “It began with the steam engine and the first industrial revolution. It is now closed by the electric superpower system and the new industrial revolution.”¹ In closing the age of steam, the author reflects an ideology of energy exceptionalism that positioned electricity as an autonomous source of power that was modern, unlimited, and a clean replacement for the old-world technologies. Absent from the article was any mention of coal or steam, even though nearly all of the electricity generated in the country at the time was produced by burning coal.

Fifty years earlier, when the Centennial Exhibition in Philadelphia introduced the first practical applications of electricity to the country, they were mere curiosities. The 1876 world’s fair featured the majestic Corliss steam engine, which captivated many of those who attended, as well as a host of other new technologies, including the telephone, the improved telegraph, and several arc lighting systems. While the Corliss ran on steam transported to the engine via underground pipelines, the telephone, telegraph, and arc lights received power through unobtrusive strands of wire.

Electrical power was an entirely new energy paradigm, unlike anything that came before it. At the point of consumption,

electricity created light and heat, or provided a backbone of current on which communications could travel. It was at once miraculous and mysterious. Electricity was antithetical to open flames and hissing steam: it was intangible, it was silent, and it was invisible. Whereas the utilization of energy from fire or steam was only possible close to the point of combustion, electricity extended the range that useful power could travel. By inserting physical space between smoky fires, pressurized boilers, and usable power, the small dynamos present at the fair gave life to clean, silent electrons that became surreptitious energy agents for dirty, burning coal. Embraced by the American public as a modern and progressive power source, electricity began to replace the fires of gaslights and was poised to power a variety of contrivances in homes and businesses. In a technological sleight of hand, coal was converted to electricity in a process removed from the view of the rising American consumer class.

Writing in 1906, historian Henry Adams recognized that electricity was “but an ingenious channel for conveying somewhere the heat latent in a few tons of coal hidden in a dirty engine house kept carefully out of sight.”² Adams’s comment identifies a key feature of how energy would become conceptualized in the American mind—as burning coal and central power plants moved farther from sight, society would begin to embrace electricity as an environmentally inconsequential source of energy. With his contention, Adams recognized that electricity represented invisibility and a loss of direct contact with fire and fuel, a technology that transformed dirty, old-world energy into something modern and clean, and subsequently became portrayed as autonomous.

Although electrification did not eliminate all industrial fires nor solve all of the problems of industrial smoke, it did begin to eliminate the flames that society encountered on an up-close and regular basis. As it became widely adopted in the early 1900s, electricity eliminated the salience of energy use by removing the need to handle fuel, tend to flames, or experience the detritus of smoke or soot. Clean and smoke-free, electricity fit well with deeply engrained visions of a bucolic and pastoral America. At the same time, the always-on, unlimited na-

ture of electric power altered the awareness of consumption. Prior to electrification, coal bins, woodpiles, and lantern-cans provided a visual—and physical—indication of the amount of energy used. The electric switch did not. These two qualities of clean energy at the source and limitless on-demand power fit well with long-held American attitudes about consumption and consequences. The delivery of electric energy via wire, along with other forgotten infrastructures such as water distribution systems, constituted what historian Martin V. Melosi has described as “hidden functions.”³ While electrification did not eliminate industrial smoke in the Progressive Era, it transformed domestic energy use into a hidden function that became innocuous and unlimited in the American mind.

Unlimited and inconsequential energy fit well within an ideology of energy exceptionalism, a condition that had existed in American culture since the first European colonists arrived. In North America, where fuel sources seemed inexhaustible and the environment infallible, American attitudes toward energy use developed around ideas of inconsequential consumption. As industrialization and fire-based energy began to threaten exceptionalist visions of America’s pristine nature in the second half of the nineteenth century, a new urban middle class was ripe for progressive solutions. The subsequent development and adoption of electrification began to reframe American attitudes toward energy use. As an imagined alternative to fire, steam, and coal, electricity came to be seen by consumers as an energy panacea. From its early commercialization and moving forward, advancements in technology began to disassociate electricity from the coal and steam that produced it. Electricity became an abstract form of power as technological, cultural, and social factors combined to assign new social meanings to energy use. As technological advancements allowed for increased physical distance between power generation and power consumption, the commodity of electricity became an independent actor, consciously detached from the infrastructure of production. As the spatial dynamics of energy production and transmission changed, cultural factors led the public to view electricity as mysterious, utopian,

and an alternative to the proximal fire-based energy sources of the past. With the adoption of electricity occurring simultaneously with the trends of Progressivism and consumerism, power companies promoted the use of electricity while energy infrastructures became less visible. As electricity became dissociated from coal in the minds of Americans, an ideology of energy exceptionalism reformed around renewed beliefs of inconsequential consumption.

Electricity has been perceived by American society as a modern, unlimited, and clean form of energy since it came into practical use at the end of the nineteenth century. As power generation plants moved out of city centers and dark particulates were scrubbed from smokestacks, consumers had no reason to believe that electrical power was anything other than a clean and progressive energy source. Removed from their consciousness, the burning coal that ultimately powered their world on the other side of the outlet became forgotten by Americans. For nearly a century, the billions of tons of coal that powered the electroconsumer culture in the United States was, as Adams said in 1906, hidden in the “dirty little engine house” that was the electrical generation infrastructure.

Human beings tend to respond to threats that are easy to picture, and electrification allowed for the hiding of the deleterious consequences of its production. Even after the effects of nearly a century of coal-fired electricity generation began to surface in the press in the early 1970s with the discovery of acid rain in the northeast United States, the association of coal with electrification never fully materialized in the mind of the American consumer. Recent studies suggest that a majority of Americans are still not aware of the origins of their electricity and the role that coal plays in its generation.⁴ The invisible nature of the electrical production and distribution infrastructure has led to a “blue-sky” mentality—if the sky is blue and looks clear then everything must be okay. As this manuscript goes to press, technological and energy abstraction has continued to accelerate. While Americans’ energy consciousness and literacy may now be changing in light of overwhelming evidence of global climate change, the role that coal-fired electricity plays

in our lives is still largely an abstraction. Few of us think about the nineteenth-century technology of coal and steam that produces much of the electricity required for our ubiquitous Internet, smartphones, or wireless tablet computers. Electric automobiles with names such as Leaf, Volt, and Tesla are seen as technologies that are freeing us from the bonds of fossil fuels, yet in many locations they too largely depend upon coal- and steam-derived electricity for their locomotion. Few think past the marketing hyperbole or are cognizant of the seven hundred million tons of coal still burned per year to power our illusionary modernity. We are as a society better informed now than we were in the past, yet nonconscious consumption as it applies to energy usage remains problematic. While this work is limited to showing the historical roots of American energy exceptionalism as it relates to electrification, it also intends to shed light on our present condition. Today's remaining skepticism over climate change and insensibility to the consequences of energy use is directly informed by the past, and in this story we can value history as a mechanism that drives awareness of the consequences of our deep-seated and ongoing cultural behaviors of consumption.

If this work advances our understanding of how Americans perceive their technological world, it is by standing on the shoulders of giants that have come before. Past studies have traced how Americans reconciled the ascendancy of technology with the sublimity of nature. This work attempts to expand the lens of inquiry into less-visible technological systems in general and energy systems in particular. Works that have influenced this book include Leo Marx's *The Machine in the Garden*, from 1964, which was a breakthrough in merging intellectual history, the history of technology, and culture. Focusing on the nineteenth century, Marx examines how Americans came to resolve ideas about the environment and progressive views of technological and scientific advancement. Marx's work is notable in that it shows how American writers and artists began to merge technology into the environment, creating a "middle landscape" between an unspoiled primitivism and a technologically advanced progressivism.⁵ By illustrating how industrial-

ization became merged with pastoralism in cultural artifacts, Marx shows how technology became reconciled as part of nature. In his deconstruction of Henry David Thoreau's *Walden*, Marx reveals harmony between the organic and the inorganic, in which "the hills in the background and the trees of the middle distance gently envelop the industrial buildings and artifacts. No sharp lines set off the man-made from the natural terrain."⁶ Concluding that Americans have embraced an ideology that technology, "the machine," could coexist with a pure environment, "the garden," Marx follows the roots of a pastoral ideal back to the time of Jefferson. While the country grew as an industrial powerhouse, Marx argues, a "technological sublime" ideology was promulgated that positioned technology as a panacea, and this ideal is often reflected in the American historical discourse. Although Marx is making an argument that views industrialization as destructive and ultimately in conflict with nature, his epistemological basis that mechanization and technological advancement led to an American rhetoric of the technological sublime is a framework that can serve well as a starting point for examining cultural ideas related to energy usage. From atomic power to the internet, scholars have often speculated over the promise of new technologies as a positive force of change—with utopian dreams serving as blinders to potential social or environmental effects. The story of electrification runs along very similar lines.

A number of other notable authors have traced the effects of technology and industrialization on the environment. These works not only investigate environmental exploitation and pollution but also are useful in following the path of environmental reform and consciousness in the United States and relate well to society's incognizant use of energy. David Stradling's *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881–1951* examines how coal-related smoke abatement movements in the United States formed in response to the growing coal smoke problems that arose between 1881 and 1951. Stradling's book, which is as much a social and technology history as it is an environmental work, examines shifts that took place in the makeup of reform

leaders as well as in the ways reformers confronted the smoke problem. In addition to discussing the activities of reformers, Stradling's book offers insight into how a new rising class of engineers began to displace laypeople as the stewards of airborne emissions.⁷

While Stradling examines the nascent environmental issues that confronted bituminous cities such as Cincinnati, Chicago, Cleveland, and Pittsburgh, William Cronon's *Nature's Metropolis: Chicago and the Great West* explores the effect that urban growth had on the surrounding countryside.⁸ Cronon addresses how space between producer and consumer became irrelevant as Chicago's thirst for commodities expanded outward. In this work, he explores two highly relevant themes: spatial dynamics and commodification. Although Cronon's study addresses people's relationships with space in the context of the expansion of railroads, his broader point is that as the distance between production and consumption of goods grew, natural products lost their identity. Cronon uses goods such as meat to make his point, stating that the distance between "the meat market and the animal in whose flesh it dealt seemed civilizing."⁹ While he does not address energy in his work, Cronon's examples relate to the distance between the coal mine, the dynamo, and power consumption. Just as the railroad was the facilitator of space in Cronon's study, in an examination of energy usage the wire is the connection as coal is transitioned into its more "civilized" form of electricity.

As a collection of essays that touch upon the themes of both Stradling and Cronon, Martin Melosi's *Effluent America: Cities, Industry, Energy, and the Environment* also examines the history of urban pollution and urban environmental reform.¹⁰ *Effluent America* frames a range of issues in urban environmental history, including the relationship between industrialization and pollution as well as a study of the effects of urban growth. Melosi's section on coal and smoke in the late nineteenth century is particularly relevant because it reveals how smoke was associated with a "degraded" society. Quoting from Lewis Mumford's *The City in History*, Melosi relates to Mumford's "Paleotechnic Paradise: Coketown," which in turn borrows

from Charles Dickens's *Hard Times* the notion that "Coketown specializes in producing dull boys."¹¹ Only when the cleanliness associated with electrification is seen against this backdrop of evil smoke can one gain a clearer picture of the juxtaposition of electricity, which is a core theme of the present work.¹²

While environmental studies and intellectual histories examine the implications of anthropocentrism and how Americans attempted to reconcile and justify technology, histories of technology explore how infrastructures were built in response to social acceptance. The evolution of electrical networks that began in the latter half of the nineteenth century occurred with great public fanfare and occasional controversy, yet as the technology and transmission networks matured, social acceptance was rapid and widespread. The two most widely recognized works on the study of electrification are those of Thomas Parke Hughes and David E. Nye. Hughes's book, *Networks of Power: Electrification in Western Society, 1880–1930*, is an all-encompassing study of electrical systems in the United States, Great Britain, and Germany. Hughes is mainly concerned with examining electrification as a system, and as such, concentrates on the design and construction of electrical grids and interconnectivity.¹³ In documenting how long-distance power transfer developed in the western United States, Hughes shows how this development was a gateway for the spatial dynamic that allowed for increased distance between electrical generation and consumption.¹⁴ Hughes also dedicates an entire chapter to the development of electrification in Chicago, a topic of great importance in this study. In Chicago, under the direction of Samuel Insull and the Chicago Edison Company, the first urban system that merged smaller power networks into a regional grid formed. Thus, the generation of power became further removed from the central city much earlier compared to other urban areas.¹⁵

David Nye's *Electrifying America: Social Meanings of A New Technology, 1880–1940* is a technological and social history of electrification that traces not only the adoption of systems but also how Americans confronted the new energy source.¹⁶ Nye's work is broad-ranging, covering a variety of areas from the de-

velopment of the grid to the White City of the Chicago World's Fair in 1893. Of all the existing literature, *Electrifying America* most closely pursues the social meaning of electrification expressed in utopian ideas as well as the evocation of electric landscapes in art and literature.

Nye is particularly insightful in examining how the public confronted the new technology of electricity. In one key section, he identifies a "small technical elite that viewed [electrification] as an instrument for rationality and social reform."¹⁷ This group runs congruent to the rising class of professionals identified by Robert Wiebe who were confident that engineered solutions would trump old-world problems as represented by coal and smoke.¹⁸ Faith in engineers allayed concerns about the environment, and Nye's contention that the emergence of an engineering "elite" in the late 1800s signaled a cultural shift from confidence in traditional high culture to confidence in scientific knowledge is significant. This view runs parallel to David Noble's idea that "the electrical and chemical industries form the vanguard of modern technology in America."¹⁹ Nye's work identifies many of the key factors in electricity's social history; as such, his work serves as a launching point into deeper inquiries into how the technology shaped Americans' attitudes.

Whereas both Hughes and Nye treat of the social adoption of electrification on a macro level, Maury Klein's approach in *The Power Makers* considers the incremental development of energy technologies and the transition from steam to electricity. Klein's work is valuable in that it documents the long, slow process in the discovery of the "mysterious ether" that was electricity.²⁰ Here, the "terrifying force" was eventually harnessed, but not without a long pedigree of being associated with "lightning and divinity."²¹ While Klein's study concentrates more on technological inventions than perceptions, his history does illustrate how electricity was viewed as a more advanced energy source than coal. In addition to discussing technological development, Klein also provides a well-rounded overview of the key personnel in the development of electrical systems. While the stories of Edison, Tesla, and Westinghouse are well known, Klein's research on Insull begins to address an

important point in how society began to see electricity as environmentally inconsequential.

Insull was a pioneer in consolidating small power generation stations and creating a model for wide area transmission networks, a critical point in the separation of power generation from consumption. In his investigation of Insull's archives, Klein reveals evidence that reducing smoke pollution from the center of Chicago was on Insull's mind as he installed new turbine dynamos in the early 1900s.²² While Klein's work as well as that of Forrest McDonald documents Insull's impact on the development of the infrastructure of electrical transmission, the broader implications of Insull's model are not addressed.²³ By offering inexpensive power, Insull promoted an "always on" mentality that encouraged energy consumption. At the same time, the regional networks that Insull pioneered, which were powered by large-capacity steam turbines, locked in coal as the primary fuel for electrical generation in the United States.

A number of other works are significant in any study of perceptions of energy and energy transitions in the United States. *Routes of Power: Energy and Modern America* by Christopher F. Jones is masterful in tracing the roots of fossil fuel dependence in the United States.²⁴ Jones's work goes far to explain how society's desire for inexpensive energy led to our current predicament of nonrenewable energy dependence. Vaclav Smil's *Energy Transitions: History, Requirements, Prospects* is a valuable study that provides a scientific and technical analysis of energy usage while documenting critical turning points in the nation's energy history.²⁵ Last, but by no means least, is the work of Richard F. Hirsh and Benjamin K. Sovacool, specifically their paper titled "Wind Turbines and Invisible Technology: Unarticulated Reasons for Local Opposition to Wind Energy."²⁶ Hirsh and Sovacool's work should be required reading for anyone interested in how Americans view energy use. By bringing a perspective of the current state of nonsalience surrounding the nation's electrical infrastructure, Hirsh and Sovacool provide an up-to-date ending to the history contained in this work.

While many of these works investigate how technologies and energy sources have developed and been adopted over

time, the present study examines how American attitudes about energy evolved in the context of electrification. The first chapter explores the cultural roots of energy exceptionalism in the United States. Since the first Europeans arrived in North America, the attitudes they developed toward energy were shaped by the notion of abundance. Coming from an England that had been deforested due to the prolific burning of wood, the first settlers saw the New World in terms of an energy bounty with no shortage of consumable energy. Along with the importance early colonizers placed on ample fuel, narratives that they left behind reveal an appreciation for the clear air of a utopialike unspoiled continent. The contradiction within these two values—a desire to exploit resources of energy within the framework of a pristine environment—sets up the foundation of energy exceptionalism. As the nation evolved, these incompatible values remained in place; American society became a voracious consumer of energy yet continued to imagine the country in terms of pastoralism and environmental tolerance.

Chapter 2 shows how the contradiction between energy-intensive economic development and environmental inconsequentiality evolved. In the first two hundred years of European occupation, North America began a transition from a pristine natural landscape to an industrialized society similar to what was left behind in England. Although pristine pastoralism was a state that many in the early United States wished for, industrial capitalism became a growing force. Thomas Jefferson's vision for the country was a low-energy society of agriculture and yeoman farmers, where the bounty of the land could offset the need for industrialization and urbanization. Jefferson's ideal of the country as a rural space remained embodied within an ethos that scholar Richard Hofstadter identifies as the "agrarian myth," and Leo Marx refers to simply as "the garden."²⁷ Despite Jefferson's vision of what the country should be, the reality was something entirely different. In a quest for national wealth and power, men such as Alexander Hamilton, Tench Coxe, and even Jefferson eventually accelerated domestic manufacturing and urbanization.

The nation's first textile mills in New England fit within the ideological framework of a pure environment. Water-powered and smoke-free, the mills were seen by many observers as exceptional and superior to the Dickensian factories of the Old World. Despite the clean energy incorporated in these commercial utopias, they were short-lived. An unquenchable demand for profit and goods outpaced the capabilities of water power, and by the middle of the nineteenth century the coal-fired steam engine was becoming widely adopted in the United States. By the end of the Civil War, the nation had set a course to be a society dependent upon carboniferous fossil fuels.

While energy exceptionalism as an ideology began with the first European colonists and remained a part of the American ethos, the inherent conflict between pyrotechnologies and an unspoiled environment began to surface in the nineteenth century. Following chapter 2 tracing the ascendancy of coal and its inconvenient cognate of smoke, chapter 3 explores urban American society's response. Pressed between conflicting values of production, consumption, progress, and social health, urban reformers and industrial capitalists were at odds over the effects of high energy consumption. Industrial boosters and those who stood to profit took the position that smoke was beneficial, while middle-class urban reformers began to equate smoke with social degradation and ill health. The conundrum for a rapidly urbanizing population in the cities of the Midwest and East was that of a modern society dependent upon an ancient form of fire-based energy. As the imagined ideal of a pristine and forgiving environment became obscured, inventions and efforts to control or hide the smoke represented an impulse to restore a sense of pastoralism.

Chapter 4 demonstrates how technological solutions and the emergence of technical systems and networks began to instill confidence that reconciliation between the conflicting values of consumption and a pristine country was possible. Twenty percent of the nation's population attended the Philadelphia World's Fair in 1876 and witnessed the emerging technology of electricity. In a society that was illuminated, heated, and powered by proximal fire, the electrical technologies on dis-

play at the fair debuted a new paradigm of energy abstraction. Suddenly, electricity altered the spatial dynamics of energy production and consumption by transforming the heat energy bound up in coal into a new form of power and transmitting it through innocuous strands of wire. Whereas steam power and all other sources of energy necessary for the production of light, heat, and mechanical motion required proximal flame and visible networks of distribution, electricity possessed the ability to distance flame from consumable energy. In an exploration of the 1876 fair, chapter 4 uncovers not only technological shifts but also how influential social leaders began to define electricity as an energy panacea that could transform society. While the physical separation between fire, steam, and electricity represented an instance of the technological abstraction of energy, the rhetorical portrayal of electricity as an autonomous antithesis of coal marked the beginnings of a cultural abstraction.

Chapter 5 examines the roots of energy abstraction in the context of electrification in greater detail. Invisible and intangible, electricity was easily detached from nature and well aligned with the ideology of exceptionalism. The chapter traces the development of electricity from the early theoretical work of Benjamin Franklin to the laboratories of continental Europe and England. Conceptualizing electricity proved difficult, as even those well schooled in the sciences could not entirely grasp what it was. Franklin saw electricity within the metaphor of fluid, and scientists such as Alessandro Volta and Hans Christian Ørsted reconceptualized electricity's properties when the fluid metaphor proved inadequate. Although the advancements of theoreticians such as Michael Faraday and Joseph Henry led to the practical application of electrical power, the difficulty in understanding the nature of electricity remained. Electricity was unearthly and ethereal as it was rendered invisible and transmitted through wire. From the inventions of men such as Samuel Morse to the first lighting systems of Charles Brush, the public was captivated by the mysterious nature of electricity. As power generation moved farther away from power consumption with the deployment of the first centralized and regional

generation stations, the energy supply chain became less connected and more abstract.

Following the previous chapter's demonstration of how technological abstraction began to render electricity as an invisible energy source, chapter 6 explores the process of cultural abstraction. Electricity as a new energy source became not only physically detached from the coal and steam that ultimately created it but consciously detached as well. A core tenet of energy exceptionalism is the perceived inconsequentiality of energy production and consumption, which began to occur when both the physical and cultural manifestations of the electrical delivery chain became hidden. As the physical infrastructure was being obscured by distance, electricity became culturally constructed as a utopian power source. By 1882, the perception of electricity had changed from a technology that was a curiosity to one that was a utopian source of energy. Attitudinal shifts were due not only to technical advances such as a long-distance power transmission but also from cultural cues. At the Chicago Columbian Exposition in 1893, organizers of the world's fair created an idealized electric dreamscape known as the White City. To the twenty million people who attended the fair, electricity became synonymous with American progress: it was clean and capable of almost anything. At the same time, plans for harnessing the power of Niagara Falls were announced, leading to news accounts that unlimited and inexpensive energy was soon at hand. As the White City and the promise of Niagara gave hope that a smoke-free environment was possible, the period's literature promoted and reinforced visions of an electrical energy panacea. In the popular utopian novels of the late nineteenth century, electricity was the featured technology that rescued society from the smoky haze of oppression. The chapter ends by showing how the White City, Niagara, and period literature promoted a mind-set that disassociated electricity from environmental consequences.

Although by the early twentieth century many segments of American society believed that electricity was a utopian and inconsequential energy source, the reality was something else entirely. Chapter 7 examines the formation of the modern elec-

trical infrastructure and investigates how unlimited electricity consumption was encouraged by the rising trends of consumerism and inexpensive power. In addition, writings and media accounts of the time show how Americans had come to define electricity as a stand-alone energy source completely disassociated from coal. While the possibilities of maintaining a society of limitless power consumption within a pristine environment wavered in the fire-powered years of the Gilded Age, the exceptionalist legacy was restored to the American mind after the turn of the century. The chapter shows how the adoption of the steam turbine as the nation's primary source of power generation further obscured the nation's electrical infrastructure and inextricably tied the nation's electricity production to coal. First utilized on a large scale by Samuel Insull and the Chicago Edison company in 1903, steam turbine technology resulted in higher-capacity generation plants that led to fewer power stations farther removed from the populations they served. Consequently, the electrical infrastructure became less visible to the consuming public. In the process, the coal that fired the plants was obscured from the sight and consciousness of American consumers. As the nascent electrical grid became more concealed, electric companies promised a utopia of convenience. By encouraging the purchases of electrical contrivances power companies promoted electricity as an energy source that freed the housewife from toil and encouraged men and boys to build and experiment with electrical tools and toys.

As the adoption of electrical conveniences and the consumption of electricity per household expanded, the abstraction of energy grew as well. Electricity became defined as a clean energy source in the early twentieth century and it became clear that the link between electricity, coal, fire, and smoke had been broken in the mind of society. While the American public celebrated clean electricity, annual coal usage in the United States continued to grow. In 1927, when the *New York Times* proclaimed that the "electric age" had arrived and the age of steam had passed, the country was poised to consume more coal than ever before. At the same time, Americans became steeped in a culture that encouraged unlimited power consumption that

came with no environmental consequences. As the electrification of the country expanded, the coexisting notions of clean and unlimited energy intensified, mirroring the ideology of energy exceptionalism first espoused by European colonists upon landing in the New World.

For historians, research is always a double-edged sword. At once we are thrilled to uncover intriguing stories that were unexpected finds, but frustrated we cannot follow every thread we uncover. In this history of energy and electrification in the United States, many possibilities for alternatives to coal-based energy appeared along the way, and the parallels to the present go far to reveal the roots of our current embedded energy infrastructure. As early as 1833, German immigrant John Adolphus Etzler surmised that there were natural forces such as the sun and wind that could be harnessed to drive the future. Etzler appreciated the progress that steam-powered mechanization could bring to society, yet he felt that the coal interests would have too much power over the masses. Although Etzler did obtain patents for his early wind technologies, he found no support for his pursuits and was ultimately seen as an eccentric.

In 1853, John Ericsson, who would go on to invent the iconic Civil War ironclad the USS *Monitor*, built and sailed a two-thousand-ton “caloric” ship, the *Ericsson*, between New York and Washington solely on the power of the sun. Despite this accomplishment, the ship was deemed as too slow for commercial purposes.²⁸ A little more than two decades later, Ericsson was shut out of displaying his caloric engine at the Philadelphia Centennial Exhibition in 1876, which was largely sponsored by coal interests.

In 1888, Charles Brush, an early pioneer of alternating current electrical lighting systems, built a wind-powered dynamo to supply electrical power to his Cleveland home. Despite his success with the project, Brush’s technologies were not pursued, as coal-derived electrical generation was already becoming a well-entrenched technology. While Etzler, Ericsson, and Brush may be three of the more well-known alternate energy enthusiasts, archival research has exposed others who were pursuing a noncoal infrastructure for the generation of electricity.

In a delightfully accidental find deep in the archives at the University of Wyoming, correspondence between a Laramie rancher, Frank Bosler, and the General Electric Company, reveal another attempt in the pursuit of electrical generation without coal, utilizing wind power. The letters from 1913 between Bosler and General Electric—one of the major manufacturers of steam-turbine electrical generation components—demonstrate General Electric’s commitment to coal-turbine technology.²⁹ The company’s “wind will never work” philosophy both ensured that the United States would become a voracious consumer of coal and set back any viable pursuit of renewable energy at the same time. As a backstory in this work, the history of renewable energy in the United States is an area ripe for further inquiry. As alternate energy sources show up chronologically in this work, they are perhaps an indicator of how a noncoal society could have evolved, yet as history is not always a place for counterfactual analysis, the reader will have to decide what might have been.