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Andrew Needham, *Power Lines: Phoenix and the Making of the Modern Southwest* (Princeton, NJ: Princeton University Press, 2014). ISBN: 9780691139067

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Introduction by Christopher F. Jones, Arizona State University

On March 21, 2019, the Navajo Nation decided by a slim margin to abandon efforts to purchase the Navajo Generating Station (NGS). The 2,250 MW coal-fired power plant near the border between Arizona and Utah had been constructed in the 1970s by a conglomerate of utilities and government agencies. For more than four decades, the plant ran at near full capacity, becoming one of the worst contributors to climate change in the nation. In 2017, the coalition decided that it was no longer profitable to keep NGS running due to low natural gas prices, and declared that it would end its lease in 2019. With the Navajo Nation unable and unwilling to find a new buyer, it is expected the plant will close soon.

For environmentalists, this is a decision to be cheered. Removing one of the nation's largest coal-fired power plants from operation is a necessary step for addressing climate change. But at the same time, the closure of NGS highlights one of the profound justice questions we face as a society: how do we provide a sustainable transition for communities built around fossil fuels? For decades, jobs at NGS and the nearby Kayenta Mine represented some of the best paying opportunities in a region characterized by chronic poverty. Revenues from the NGS lease comprised about a quarter of the operating budget for the Navajo Nation, and the royalties from the Kayenta Mine (whose only customer is NGS) have provided as much as three-quarters of the Hopi Tribe's annual funds. The looming closure of the plant and its mine are likely to have devastating consequences on the local economy.

How did we get here and what can we do? A good start for anyone interested in such issues is to begin by reading **Andrew Needham's *Power Lines***, a book that uncovers the deeply entangled history of the rise of Phoenix and its exploited hinterlands. As Needham documents, the spectacular rise of the modern southwest was not simply the result of anti-New Deal business relocation or the development of air conditioning; it was a transformation predicated on keeping blue skies in Phoenix while extracting energy and water from elsewhere. And that elsewhere turned out to be the Navajo reservation in the northern part of Arizona, a region much richer in natural resources than political or economic power. In this book, then, Needham deftly tells a tale of the growth of Phoenix that extends deep into its hinterlands, revealing the damaging and socially unjust ways in which coal was mined and burned for the benefit of others. It is a story we must grapple with today as we deliberate how to transition away from fossil fuels while providing justice to the communities who will be most harmed.

Power Lines has been recognized with several major book awards, including the 2016 George Perkins Marsh Prize from the American Society for Environmental History and three separate book awards from the Western History Association in 2015: the Caughey Western History Prize, Hal K. Rothman Prize, and David J. Weber-Clements Prize. It was also named winner of a 2015 Southwest Book Award from the Border Regional Library Association.

This roundtable's reviewers deserve immense credit for not only the quality of their responses, but their longstanding patience in waiting for this roundtable to see the light of day. The earliest reviews were submitted nearly three years ago, so if any footnotes seem out of date, that should not be held against the reviewers. **Matthew Klingle** opens the roundtable, illustrating the contributions the book makes to urban political-environmental histories, while raising topics of intra-urban inequality, comparative case studies, and regions as units of analysis. **James Allison** praises Needham for integrating environmental analyses into broader stories while asking questions about the distinctions between energy and power and encouraging further attention to the complexities of Navajo nationalism that shaped tribal action. **Julie Cohn** places *Power Lines* in a longer history of electrification and its politics, focusing on public versus private ownership and the topic of resource curses. **Robert Lifset** concludes the roundtable, situating Needham's work in the context of recent publications in the history of energy and exploring reasons for the revival of coal in the 1960s and 1970s. Unfortunately, Andrew Needham was unable to complete a response to accompany this roundtable, so this is the first in the series to appear without comments from the author.

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. In addition, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

Comments by Matthew Klingle, Bowdoin College

In my campus office sits a wooden desk nameplate. It says "Lloyd E. Bowman" in white sans serif letters, yellowed with age, flanked by peeling logos of the Department of Interior and the Bureau of Reclamation. Behind the name plate is a black and white photo of a concrete dam, lit by floodlights, jutting into an inky night. Lloyd Bowman was my grandfather. He took the photo of Seminoe Dam on the North Platte River in 1938 as part of the construction crew. His leather-encased surveyor's tape measure sits to the side of the framed picture, near the nameplate.

For Lloyd, building dams and stringing wire was noble and necessary work. Raised in a sod house carved out of the Wyoming prairie, he knew life without electrical lights and running water. He gave 38 years to BuRec as an engineer and supervisor before retiring to chase par in suburban San Diego. Lloyd cherished the places that provided his livelihood, taking his daughter and two grandsons on camping trips across the intermountain West. To him, concrete dams and high-tension power lines were as much part of the region as rapid-choked rivers and snow-clad peaks. I keep my grandfather's keepsakes close for more than sentimentality. They are also talismans to inspire work. Lloyd grasped in his sunbaked forearms and callused hands what I know in my head: we live in a world of entanglements, and none of us are pure.[1]

This insight lies at the heart Andrew Needham's *Power Lines*. As with many good books, the title conveys the argument. The power lines tying coal beds in the Navajo Nation to suburban homes of greater Phoenix are more than conduits for electricity. They are also the embodiment of the "unequal and frequently unperceived systems of commodity production, distribution, and consumption that underlie and abet daily life in metropolitan America."[2]

The modifier "metropolitan" is the crux of Needham's argument because William Cronon's *Nature's Metropolis* is both inspiration and foil to *Power Lines*. As in Cronon's path-breaking book, Needham is often less concerned about a particular place than the connections between places. Substitute the flows of Dakota wheat or Wisconsin wood into the trading pits and lumberyards of Chicago for the flows of Kayenta Mine coal or Boulder Dam hydropower into the electrical grid of Phoenix and you have a similar story. Urban history is metropolitan history is regional history.[3]

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[1] My thinking here is also influenced by Richard White, "The Problem with Purity," Tanner Lecture on Human Values, delivered at the University of California at Davis, May 10, 1999, available at http://tannerlectures.utah.edu/_documents/a-to-z/w/white00.pdf (accessed July 26, 2017).

[2] Andrew Needham, *Power Lines: Phoenix and the Making of the Modern Southwest* (Princeton, NJ: Princeton University Press, 2014), 17.

[3] Needham made this argument earlier in Andrew Needham and Allen Dieterich-Ward, "Beyond the Metropolis: Metropolitan Growth and Regional Transformation in Postwar America," *Journal of Urban History* vol. 37, no. 7 (November 2009): 943-69.

The Phoenician boosters who made the modern Valley of the Sun also saw "the engine of Western development in the symbiotic relationship between cities and their surrounding environment."[4] But whereas Cronon's book was almost entirely about such relationships, Needham's book is also an urban history about a specific city. It reverses the analytic of Cronon's study to reveal the often-hidden metropolitan nature of Phoenix's built environment. In Needham's hands, that nature is most visible and most powerful when it is defined as a political subject.

Power Lines is thus most successful as an urban political environmental history. The distinction is important because Needham's choice to write about a city is not novel in itself. The city as subject in environmental history has gained much ground in the past three decades, thanks in large measure to Cronon's example. As with so much of the historical field, however, many of these works are mostly social or cultural in focus, looking for the manifestations and meanings of urban nature in struggles to provide clean water and remove waste, create parks, control feral animals, reshape waterways and topography, or exclude those human residents on the margins of power from the environmental amenities of urban life.[5] All address politics in some way, some more directly than others, but few are as suffused with political history and political economy as *Power Lines*.

What makes *Power Lines* original is Needham's critique of postwar liberal political economy (or "growth liberalism" as labeled by some scholars) as shaping and being shaped by spatial and environmental factors over time. While this may seem intuitive to environmental historians, Needham takes this story to historians who may never read environmental history, showing why prevailing ideas about production and consumption, political economy and state action, and urban and regional planning fall short because they limit their analysis to discourse and policy alone. Nature matters in this book, materially and discursively, just as it matters in almost all history.

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[4] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Co., 1991), 34.

[5] For representative examples, see Andrew Hurley, *Environmental Inequalities: Class, Race, and Industrial Pollution in Gary, Indiana, 1945-1980* (Chapel Hill: University of North Carolina Press, 1995); Martin V. Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore: The John Hopkins University Press, 1999); Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (New York: Cambridge University Press, 2001); Kathleen A. Brosnan, *Uniting Mountain and Plain: Cities, Law, and Environmental Change along the Front Range* (Albuquerque: University of New Mexico Press, 2002); Ari Kelman, *A River and its City: The Nature of Landscape in New Orleans* (Berkeley: University of California Press, 2003); Matthew Klingle, *Emerald City: An Environmental History of Seattle* (New Haven: Yale University Press, 2007); Michael Rawson, *Eden on the Charles: The Making of Boston* (Cambridge, MA: Harvard University Press, 2010); Catherine McNeur, *Taming Manhattan: Environmental Battles in the Antebellum City* (Cambridge, MA: Harvard University Press, 2014); and Colin Fisher, *Urban Green: Nature, Recreation, and the Working Class in Industrial Chicago* (Chapel Hill: University of North Carolina Press, 2015).

Needham argues that what Lizabeth Cohen called "the consumer's republic" needs to account for the environmental conditions that made postwar growth politics possible.[6] As a result, *Power Lines* is often more in conversation with signature works in twentieth-century urban history than it is with environmental history.[7] Longstanding themes at the heart of modern U.S. urban and political history—postwar reconversion, urban and regional redevelopment, housing policy, the rise of the conservative right—are folded into environmental history while topics often seen as environmental history—wilderness protection, pollution abatement, growth management—are folded into urban and political history. Needham demonstrates that any analysis of Phoenix's growth coalition would be insufficient without addressing the climatic challenges of building a major city in the arid Southwest, the seeming surfeit of natural resources such as coal for industrial and residential electrical power, or the perceived need to protect clean air and wild places to attract migrants at the expense of strip mines and smoke plumes on the Navajo Reservation.

As Needham concludes, Phoenix's spectacular growth was not simply the artifact of successful city boosters, savvy Congressmen or Senators, sympathetic federal agencies, or a muscular postwar liberal consensus. It was also possible because of the city's relative proximity to coal fields on the marginalized Navajo Reservation. Coal became the latest tool for incorporating Native peoples into the American body politic. Bureau of Indian Affairs officials colluded with Phoenix elites and even some tribal leaders to replace agriculture with industry to "modernize the Navajo" through developing the reservation's coal deposits.[8] It was a chimerical dream. Coal mines and power plants shipped energy south to Phoenix, leaving pollution and privation in their wake. Urban development was thus predicated not just upon hinterland resource extraction but also hinterland colonialism.

The twinned stories of suburban development and urban underdevelopment have many antecedents in urban political history, but not many parallels in environmental history. Another of Needham's achievements is to bring these two narratives together. As I have described to several colleagues, *Power Lines* is a mashup of *Nature's Metropolis* and Robert Self's *American Babylon*, a history of white suburban domination and black urban resistance in postwar Oakland,

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[6] Lizabeth Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America* (New York: Alfred A. Knopf, 2003).

[7] For representative works, see Thomas J. Sugrue, *The Origins of the Urban Crisis: Race and Inequality in Postwar Detroit* (Princeton, NJ: Princeton University Press, 1996); Lisa McGirr, *Suburban Warriors: The Origins of the New American Right* (Princeton, NJ: Princeton University Press, 2001); Becky M. Nicolaides, *My Blue Heaven: Live and Politics in the Working-Class Suburbs of Los Angeles, 1920-1965* (Chicago: University of Chicago Press, 2002); Robert O. Self, *American Babylon: Race and the Struggle for Postwar Oakland* (Princeton, NJ: Princeton University Press, 2003); Alison Isenberg, *Downtown America: A History of the Place and the People Who Made It* (Chicago: University of Chicago Press, 2004); Kevin M. Kruse, *White Flight: Atlanta and the Making of Modern Conservatism* (Princeton, NJ: Princeton University Press, 2005); Matthew D. Lassiter, *The Silent Majority: Suburban Politics in the Sunbelt South* (Princeton, NJ: Princeton University Press, 2006); and Kevin M. Kruse and Thomas J. Sugrue, eds., *The New Suburban History* (Chicago: University of Chicago Press, 2006).

[8] Needham, *Power Lines*, 123-156.

California. The coevolved histories of black political liberation and white tax revolt, Self argues, cannot be understood separately. In the end, Self concludes, the story of Oakland explains how "capitalism values different spaces differently," and when those "values are in place, embedded in property," the resultant consequences can dictate "all kinds of aspects of social life" from gutted public schools to abandoned downtown retailers.[9] Needham takes such insights and applies them to explain the impoverishment of Phoenix's rural and indigenous environs.

For all of Needham's ambitions, however, he leaves much terrain unexplored or unexplained. Such omissions are expected, even in a book of such sweep and command. The book is at its best in explaining how the political economy of energy production and consumption is integral to urban morphology and politics on a regional scale. He rightly challenges urban and environmental historians alike to look beyond the city lights. Yet by enlarging the aperture of his lens to capture a wider field of vision, Needham also loses focus on how and where the regional geographies of energy have perhaps shaped urban geographies of inequality within the city. To what degree did inexpensive electrical power affect public housing, highway and infrastructure planning, school districting, or other political institutions that continue to divide Phoenix and other cities by socio-economic status? How and why have some neighborhoods flourished while others declined during Phoenix's rapid ascent? As Andrew Ross notes in *Bird on Fire*, a jeremiad against Phoenix's rampant growth, recent concerns over sustainability and environmental justice have evolved within the urban crucible of reactionary nativist politics and sanctioned discrimination against Latino residents and immigrants. By focusing on making Phoenix more sustainable, he concludes, many green-minded Phoenicians are making "technical adjustments to business as usual" rather than facing the deep inequities that have long defined their city and its region.[10]

Conversely, how did the arrival of electrical power and industrial mining further exacerbate social tensions and environmental inequalities on the Navajo Reservation (or the many other sovereign reservations that encircle metropolitan Phoenix, from Gila River Indian Community to the south to the Salt River Pima-Maricopa Indian Community to the north)? Needham examines often bitter disputes between Navajo tribal factions over energy colonialism in detail, avoiding the obvious trap of depicting all Natives as ecological Indians. Still more could be done to investigate the paradoxes of having access to electrical power in rural North America while enjoying little of the promised economic uplift. The forested hollows of the Tennessee River Valley, the sagebrush-flecked plateaus of the Columbia River, the boreal taiga of indigenous Quebec—these and other places have been sacrificed for distant urban energy consumption. Such communities invite further investigation into the social and environmental consequences of urban appetites for ever more energy extracted from places far flung and unseen.

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[9] Self, *American Babylon*, 18.

[10] Andrew Ross, *Bird on Fire: Lessons from the World's Least Sustainable City* (New York: Oxford University Press, 2011), 313-14.

In a similar vein, Needham might also have done more to identify the strengths and limitations of regionalism as an analytical device. He frames the Southwest in the early twentieth century as a "region of fragments," of isolated cities scattered across the desert scrambling for political and economic ascendancy.[11] But he misses an opportunity to probe how his idea of metropolitanism (which relies heavily upon the unacknowledged and uncited insights of Canadian scholar Harold Adams Innis) might complicate earlier definitions of Western North America as urban region.[12] And what about the comparative insights of *Power Lines*? To what extent do Phoenix's energy geographies mirror similar geographies in other North American cities or regions? What does a focus on Phoenix and its hinterlands reveal that parallels or diverges from a focus on Vancouver, Houston, or Charlotte?

Finally, Needham's book, perhaps unwittingly, joins a small but growing and important chorus of histories that challenge, even subvert, expected histories of conservation and environmentalism.[13] If not for the crusades of the Sierra Club and other environmental organizations to stop the continued impoundment of the Colorado River, or the support of powerful allies, such as Stewart and Mo Udall, who stood up to Floyd Dominy and the Bureau of Reclamation, or the demands of businessmen for clean skies to attract aerospace workers and suburban homeowners, the Valley of the Sun today might be cooled and illumined by the lower-carbon electricity of concrete hydro dams.

Needham is too smart to assign blame for the unequal geographies of power that divide the Southwest to environmentalists alone. Yet in his conclusion, where he quotes from a 1971 article by Jack Neary, who lamented the smoke-smudged skies of the once pristine Colorado Plateau, he misses an opportunity to underscore further an inconvenient truth: our affections for nature are often commensurate

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[11] Needham, *Power Lines*, 23-54.

[12] Innis first developed his "metropolitan-hinterland thesis" in Harold Adam Innis, *The Fur Trade in Canada: An Introduction to Canadian Economic History* (Toronto: University of Toronto Press, 1930, 1956). Cronon acknowledges Innis in *Nature's Metropolis* as shaping his argument. See Cronon, *Nature's Metropolis*, 53-54, 401. The most prominent contemporary advocate for defining the North American West as an urban region is Carl Abbott. See *The Metropolitan Frontier: Cities in the Modern American West* (Tucson: University of Arizona Press, 1993) and *How Cities Won the West: Four Centuries of Urban Change in Western North America* (Albuquerque: University of New Mexico Press, 2008).

[13] For recent examples, see Christopher C. Sellers, *Crabgrass Crucible: Suburban Nature and the Rise of Environmentalism* (Chapel Hill: University of North Carolina Press, 2012); Ellen Griffith Spears, *Baptized in PCBs: Race, Pollution, and Justice in an All-American Town* (Chapel Hill: University of North Carolina Press, 2014); Carolyn Finney, *Black Faces, White Spaces: Reimagining the Relationship of African Americans to the Great Outdoors* (Chapel Hill: University of North Carolina Press, 2014); Carl A. Zimring, *Clean and White: A History of Environmental Racism in the United States* (New York: New York University Press, 2016); and Miles A. Powell, *Vanishing America: Species Extinction, Racial Peril, and the Origins of Conservation* (Cambridge, MA: Harvard University Press, 2016).

with our desires to consume it without heed to the wider costs of our appetites.[14] Indeed, environmentalism's continuing blind spot of consumption perhaps mirrors postwar liberalism's continuing blind spot of social inequity. The promise of liberalism was race blindness and equality of opportunity; the reality was that the promise only applied if white privilege was not threatened. As other historians have shown, some cited by Needham himself, self-avowed white liberals were often the first to decry school desegregation or affirmative action when it affected their personal prospects or political supremacy.[15] To be sure, progressive Phoenicians were not at fault for the environmental injustices unleashed upon the Navajo by coal mining and electrical generation. But they were not fully innocent, either.

The mark of any great book is the range of questions it opens rather than the answers it gives. By this measure, *Power Lines* opens important and unsettling questions for environmental historians to explore. It provides a map for other historians to follow when applying environmental history to enduring topics of significance in the American past. And it is also a sobering reminder that we have an obligation to ourselves and our publics to tell stories that may subvert or upend cherished beliefs. We all live in a world of entanglements, and none of us are pure.

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[14] Matthew Klingle, "The Nature of Desire: Consumption in Environmental History," in *The Oxford Handbook of Environmental History*, Andrew C. Isenberg, ed. (New York: Oxford University Press, 2014), 467-512.

[15] For example, see Lily Geismer, *Don't Blame Use: Suburban Liberals and the Transformation of the Democratic Party* (Princeton, NJ: Princeton University Press, 2014), a study of changes in liberalism within in Boston's Route 128 suburban corridor. Needham cites Geismer's 2010 University of Michigan dissertation, the basis of her book.

Comments by James Allison, Christopher Newport University

"Environmental Sensibilities"

As a graduate student, I recall endless conversations among my cohort about the state of environmental history, where it was headed, and what role we would play in its future. These were passionate exchanges full of naïve proclamations and ambitious plans, and they often contained more than a hint of contempt for our fellow graduate students working in more traditional fields of study. We sometimes snickered at the stilted discussions held by the serious political and diplomatic historians around us. We dismissed the overly abstract, and admittedly intimidating, debates among scholars of race, class, and gender about constructed categories and discourses of power. And we were openly hostile to intellectual historians who failed to ground their sophistries about the power of ideas in the material world. You see, my group knew a secret the others did not. It was *our* category of analysis – nature – that was destined to change the practice of history. How could they not see it? If there was one thing all humans shared in common, it was that they existed in a reciprocal relation with the nonhuman world. Surely, this had to be accounted for in our histories of the human past, and we were just as sure that our colleagues would eventually see the light. As one of my fellow believers never tired of asserting, environmental history would one day cease to exist as a field simply because all historians would reflexively incorporate nature into their work as a matter of professional custom. In a similar vein, I recall brashly informing colleagues in a first-year modern American history seminar that they were all, in fact, environmental historians, they just did not know it yet. We were insufferable.

But I know we were not alone. By now, multiple generations of environmental historians have had the opportunity to ponder the potential of a fully incorporated environmental perspective on the past and fantasize that utopian future where nature is held on par with class, race, gender, and even power as a category of analysis. Dewy-eyed graduate students, like my group, have these breathless conversations anew every year, but we have also had them as sober professionals in more formal settings. Beginning most clearly with a pair of seminal essays from Richard White and Donald Worster in the mid-1980s and continuing on to Paul Sutter's recent publication in the *Journal of American History*, environmental historians never tire of ruminating on the state of our field, prophesizing its future, and sermonizing on why others should take heed.[16] In fact, despite my friend's assertion that environmental history will one day recede into the shadows as we convert the masses, the institutionalization of the field into vibrant professional

[16] Richard White, "Environmental History: The Development of a New Historical Field," *Pacific Historical Review* 54, no. 3 (1985): 297-335; Donald Worster, "Appendix: Doing Environmental History," in *The Ends of the Earth: Perspectives on Modern Environmental History* (New York: Cambridge University Press, 1988), 289-308; and Paul S. Sutter, "The World with Us: The State of American Environmental History," *Journal of American History* 100, no. 1 (2013), 94-119.

organizations, journals, conferences, and online forums such as this one to host state-of-the-field discussions makes that day less and less probable.

Yet in some significant way, Andrew Needham's work examining the urban, political, economic, environmental, and indigenous forces that forged the modern American Southwest feels as if we, the environmental historians, are close to the Promised Land. Years of encouraging colleagues to incorporate nature into their studies has produced in *Power Lines* an elegant template for just how to do so. To be sure, this work is not an environmental history in which nature is a problematic concept to be unpacked or simply a despoiled subject matter to be explained. But it is a history that takes seriously the agency of nonhuman forces in all things, including topics so seemingly far afield as federal housing codes, mortgage lending practices, and city charter debates. The result is a comprehensive study of the well-known phenomenon of postwar metropolitan growth that gracefully incorporates an environmental perspective to reveal what we have missed previously. As someone somewhere once said, our goal is not to be environmental historians, but historians with environmental sensibilities. Clearly, Needham has those sensibilities.

At its core, *Power Lines* is an urban and political history. Its subject matter is the development of the modern metropolitan Southwest, with Phoenix as its focus. As such, the book relays a fairly familiar tale of New Deal and postwar federal policies encouraging suburban growth under the belief that any associated economic benefits would be shared widely. Federally-backed housing codes and lending practices supported the construction of mass-produced neighborhoods that were wired for the mass consumption of energy. Federal laws also broke up utility holding companies and encouraged the growth of regional utilities that pursued an unabashed "grow-and-build" strategy to supply these homes with abundant electricity (73). And federal dollars underwrote the expansion of defense industries that created jobs to lure people to the Southwest and into the new homes. At the same time, local elites seized control over the allocation of this federal support to further their own economic interests. In Phoenix and elsewhere, they converted agricultural land into planned developments that ensured the liberal dreams of broad prosperity disintegrated into the segregated reality of the urban/suburban divide. As the countryside was made ready for the hordes of incoming white workers, minorities were relegated to the political periphery even as they lived amongst the crumbling infrastructure of the urban core.

These points regarding the growth of the American Southwest, as Needham freely admits, are standard contributions to "a compelling synthesis of postwar American history [that] has focused attention on metropolitan space as the central battleground of American politics" (6). The author, like other urban and political historians before him, explains in excellent detail the federal policies and local actions that produced the social, economic, and political configurations within the Southwest and he shows how these structural relations then shaped what was possible for individual actors. This is fine and important work.

But the genius of *Power Lines* lies in Needham's ability to demonstrate how a broader environmental perspective can expand and alter a story we thought we knew well. Refusing to remain confined by metropolitan borders, the author seizes upon the most ubiquitous yet mysterious of natural forces – energy – to conduct an analysis that reaches far beyond. If one of the hallmarks of the modern Southwest was the pervasive availability and use of electricity to make suburban life livable, Needham reminds us that the materiality of that energy mattered. Where it came from, how it was generated and transmitted, and what social and environmental costs were incurred along the way are necessary elements of the metropolitan growth story. Needham thus invites the reader to gaze above the legions of air-conditioned homes filled with electronic appliances and follow the power lines out of town. In the hinterlands of the Colorado Plateau, in a space few urban scholars have dared to venture, we meet the people and resources that made metropolitan growth happen.

The Navajo Nation and its prodigious coal supplies lie at the center of the new geography Needham reveals to explain the modern Southwest. Hidden from previous accounts of regional growth, the Navajo's obscurity was partly the result of scholarly perspective and largely the intent of historical actors. "Downtown businessmen" who directed Phoenix's postwar growth aligned the city's vision of itself as a sunny and healthy environ with federal policies aimed at winning the Cold War. This meant attracting the "clean" industries of the military-industrial complex with a stable and friendly government, low taxes and labor costs, and environmental amenities. By necessity, then, any "dirty work" associated with making this growth model work – such as producing cheap electricity – had to be located in distant places out of sight and mind. Enter the Navajo. Their remote reservation contained millions of tons of low-sulfur bituminous coal – not to mention ample oil, gas, and uranium deposits – and crucial water rights. If those resources could be tapped, electricity could be produced for export to booming southwestern cities and the unwanted byproducts left behind.

But other forces had to align to make an "ecotechnological system" based upon Navajo resources viable (9). Needham thus tackles the decades-long evolution of electricity provision in the region to show how a system that began with New Deal dams and social planners morphed into the postwar proliferation of parallel and wasteful public and private systems, and then settled into an interconnected and efficient public-private grid. Here, the author is at his best explaining the evolving mission of the Bureau of Reclamation; the tangled relationships between mining companies, utilities, municipalities, and public agencies; and the complicated financial and technological innovations required to build a strong and stable grid. Peering through this thicket, Needham seizes on the fungibility of electricity as the key factor that made the integration of distant geographies through a power grid possible. Once private utilities convinced public agencies that electricity produced anywhere could service needs everywhere – and the technology existed to transmit it long distances with little entropy – the Bureau of Reclamation could tap excess coal-sourced electricity to meet the rising demands of its agricultural consumers

while private generators could access hydroelectricity for peak urban demand. Utilities also could worry less about the carrying costs of idle plants and could start maximizing economies of scale by constructing truly massive facilities wherever it was cheapest to generate electricity. Increasingly, that place was the Navajo Reservation.

The building of this interconnected electricity grid is a crucial missing component of the metropolitan growth story and revealing its history is a major contribution. But this new finding alone is not sufficient to explain how Navajo resources fueled southwestern growth. The Navajo people, their tribal government, and the legal structures that governed both played prominent roles as well, and Needham understands this. In two chapters dedicated to the Navajo, the author shows how tribal leaders initially embraced energy development and its potential revenue as a vehicle to improve social services and establish infrastructure to lure jobs. Mimicking their metro counterparts, these leaders passed ordinances to make it easier to do business on the reservation and made promises about the modernizing benefits electricity could bring tribal members. But the fact that the Navajo Reservation failed to experience the same type of growth as the surrounding region demonstrates the real limits placed on tribal possibilities. Federal Indian policies aimed at terminating tribal status and assimilating Native Americans set the context for tribal negotiations with energy firms, while intense reservation poverty – a legacy of earlier, even more insidious federal policies – made such bargaining far from arms-length. The results were one-sided deals that simply extracted Navajo energy for use elsewhere.

The asymmetrical benefits of reservation energy development triggered a new nationalist response among young Navajo influenced by the anti-colonial rhetoric of groups like the National Indian Youth Council. Needham, in fact, sees various shades of nationalism on the reservation – more on this in a moment – and argues that these objections shaped future development, even preventing some exploitative projects. But he astutely concludes that indigenous resistance had its limits. For those projects already in place, with capital fixed in an infrastructure that privileged metropolitan desires over Navajo rights, the die was cast. The tribal government could regulate existing energy development through taxes or environmental ordinances, but not prevent or fully control it. In short, the author's handling of the Navajo's experience with energy development demonstrates Indian agency, but also deftly situates Indian actions within fluctuating federal policies and economic structures that both constrained and were themselves affected by those actions.

Truly, *Power Lines* is an impressive mapping of the constellation of forces that created the modern Southwest. It contributes on so many fronts, not the least of which is providing a model of how to incorporate non-human actors to reveal powerful forces previously missed, including other humans. But no work is without its issues and this one is no exception. As a scholar of tribal energy development, my gripes, unsurprisingly, revolve around the author's handling of energy and Indians.

To begin, I would encourage Needham – and all scholars – to think more carefully about the concepts of "energy" and "power." As some historians have argued, these terms are not interchangeable and the clumsy rendering of them into synonyms can corrupt an analysis of energy systems.[17] Energy is the *capacity* to do work, while power is the rate at which that energy is directed towards accomplishing some task (i.e. *doing* work). Energy is potential, power is practice. Physicists keep these concepts separate and clear, but we in the humanities and social sciences tend to lose that discipline when explaining why some actor or actors has more or less power. We would do well to remember that the "social" power we seek to explain is based upon those material energy inputs available to historical actors. Again, energy provides the capacity to exercise power, but it is the ability to put that energy to a purpose that determines powerfulness.

Unfortunately, Needham often falls prey to the common tendency to elide these differences, but the differences matter. In the clearest example of this from *Power Lines,* the author masterfully details the forces that re-oriented the Southwest's electricity system towards the Navajo and their coal, but then claims that this new geography "reversed traditional center-periphery geographies; while power flowed out of this center, political decision-making power was not retained there" (174). This is no small contention. If I am reading him correctly, Needham is arguing that the well-established (though problematic) core-periphery analysis that scholars use to explain the flow of commodities out of the periphery and into the core where powerful decision makers reside was inverted in this case. But this is simply not true. For one, power did not leave the Navajo Reservation – the "core" of Needham's new geography – energy did. The power to direct that energy had, for the most part, always resided outside the reservation. This did not change simply because the material commodities of coal and electricity were now being exported. It is true that the reservation became the "center" of energy production, but calling it the "core" of a new system in which power was located in the "periphery" confuses what scholars mean by these terms. Under Needham's approach, one could take any extractive industry, locate the heart of its production, and label that area a "core" out of which commodities full of energy flowed, directed by powerful people elsewhere (the "periphery" in Needham's view). This type of spatial analysis might help reveal where commodities originate, but does little to explain how they get incorporated into broader markets. The confusion of these terms and the erroneous conclusion it supports could have been avoided with a more careful handling of the term "power."

I also have qualms about Needham's treatment of Navajo nationalism. To explain its emergence, the author relies heavily on broader patterns of Indian activism during the 1960s. Most specifically, he targets the work of the National Indian Youth

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[17] Edmund Russell et al., "The Nature of Power: Synthesizing the History of Technology and Environmental History," *Technology and Culture* 52, No. 2 (April 2011): 246-59; see also Elliot West, *The Contested Plains: Indians, Goldseekers, and the Rush to Colorado* (Lawrence: University Press of Kansas, 1998), esp. xxi-xxiv; Richard White, *Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995), esp. 6, 13-14.

Council (NIYC) that offered the intellectual framework of colonialism to help young American Indians understand their subordinate position within American society. This context is well done and helpful, and it is clear that many Navajo gravitated towards this message. But the connection between these broader currents and *the* Navajo nationalist movement is undeveloped. Needham provides lots of testimonials, lifted from Navajo newspapers, of "young radicals" critiquing reservation energy development in anti-colonial terms. He also gives anecdotal evidence of certain tribal members attending NIYC training courses or being politicized on college campuses. And numerous tribal organizations are described that self-consciously framed their efforts as an exercise of Navajo nationalism. But as opposed to the author's detailed handling of Phoenix elites who orchestrated metropolitan growth by *building* networks of like-minded businessmen and politicians, there is little sense of how this indigenous movement began or evolved. Who were the organizers, what triggered their actions, and how did they enroll others to the cause? How did kin and clan relationships shape the groups that formed? And how did existing tribal political structures, including a pervasive patronage system, negotiate this new ideology? We are told that Tribal Chairman Peter MacDonald embraced the rhetoric of nationalism, but why? Was this an opportunistic move to coopt a movement or was he a product of the movement itself? The answers are not provided. Instead, we see the outcomes in the form of letters to the editor, protest pamphlets, political speeches, and direct action protests, but we do not know how the Navajo people got there.

Certainly, "getting inside" the Navajo community to understand the building of a movement that may not have been well-documented is a difficult task. It is also asking a lot of a project designed primarily to explain metropolitan growth happening elsewhere. But the lack of a ground-level tribal analysis does matter, as it clouds Needham's reading of Navajo nationalism. The author, in fact, sees multiple strands of "nationalism" here. One is represented by Peter MacDonald's desire to nationalize energy projects and have his government run them as a means to strengthen tribal sovereignty. The other is the brand preferred by young radicals who supposedly rejected all development as a colonial threat to Navajo culture. But I suspect that these versions are more similar than Needham lets on, and that the tribal conflict is less about shades of ideology and more about who benefits and loses from energy development. If we knew more about the networks of people that made up the two camps, we would know for sure. The evidence that is provided shows that both sides opposed energy development controlled by outsiders *and* that both sides would support energy projects controlled by a Navajo government that, in MacDonald's words, would "do it right" (232). Of course, what doing it right meant and for whom was the crux of the issue, and this is why we need to know more about the people involved. But when the head of local NIYC chapter, John Redhouse, says, "We should seek to develop our resources ourselves and receive a greater portion of their true value," he is advocating the same style of nationalism as Peter MacDonald (240).

Needham's concluding section entitled "Local Power" shows that the real divide was not between competing visions of nationalism, but between MacDonald's supporters – whoever they were – and those tribal members living closest to the mines and power plants that would forever disrupt existing lifeways. This latter group had the most to lose from energy development, and while they sometimes framed their protection of place in terms of preserving Navajo traditions and identity, it is not at all clear that those so personally affected would make the same arguments if the projects were planned elsewhere. In other words, what Needham sees as disputes over different forms of nationalism, I would suggest are better framed as the outward manifestations of different positions within the social and natural geography of the Navajo Nation. Where one lived, who their people were, and what their own personal life experiences entailed would have affected an individual Navajo's stance on energy development. No doubt the author would agree with this. But his approach to understanding tribal divisions by examining the resulting rhetoric rather than tracking the social and material conditions that first formed opposing camps leaves the impression that tribal members simply flocked to a particular ideology. I do not think that was the case. Instead, tribal factions most likely formed along other lines that are undeveloped here, and then those groups adopted a particular nationalist rhetoric that most forcefully advocated their position. Parsing through this rhetoric, however, reveals that the underlying nationalist desire was the same: Navajo control of Navajo energy development.

But no book can be all things to all people. These minor criticisms aside, *Power Lines* is an impressive piece of scholarship that connects a wide array of historiographies. Urban, political, indigenous, energy, and environmental historians must all take notice, and according to the diverse set of awards *Power Lines* has already garnered, they are doing so. These accolades are well-deserved and I would add my voice to the chorus of applause for Andrew Needham's fine book. Well done, Andrew, and thank you for vindicating an obnoxious gang of environmental historians.

Comments by Julie Cohn, University of Houston

Andrew Needham's prize-winning *Power Lines* offers a complex and detailed story about the electrification of greater Phoenix and the environmental consequences of this project. More to the point, *Power Lines* is about the people who invest in and benefit from electrification, and the people who carry the environmental burden. The book begins in Phoenix and ends on the Colorado Plateau, as Needham follows the electricity backward, from its many points of use in the sprawling city, to the dams, coal mines, and power plants at which it is produced. In this narrative, Needham finds the money, and the privation, by following the power.

In Needham's retelling, the benefits and burdens of electrification are unequally distributed between the urban center and the hinterlands, while the physical infrastructure stretches across both. Needham provides a riveting social and political history of the area, revealing longstanding inequities between white Phoenicians and other residents of color; a shifting balance of influence among business leaders, politicians, federal agency officials, and activists; and interurban and interstate negotiation for access to the bounty of the West. For historians interested in energy in general, and electric power in particular, Needham brings human consequences into an envirotechnical story. This opens the opportunity to explore several interesting questions in the history of electrification, all of which implicate inequities in resource development, transformation, and use. Needham's narrative engages the first two questions together: Is electricity a commodity or a service? And, depending upon the answer, should it therefore be produced and delivered by public or private power entities? Less directly, but quite provocatively, Needham raises the specter of the "resource curse." If electrification brings both benefits and burdens, and the distribution of each is inequitable, does this reveal some sort of inherent curse hiding within the energy abundance of the United States?

Commodity or Service? Public or Private?

When Thomas Edison first sold electric lighting systems to wealthy homeowners, commercial businesses, cities, and towns in the late 1800s, he competed with gas-lighting companies and other electric lighting systems. He was selling a commodity affordable to a few and unattainable for most. After only a few short years, however, owners of power companies envisioned making electricity so affordable and valuable to customers that it would be "possible to make electrical supply a necessity and not, as it now is in many instances, rather a luxury."[18] By the early 1900s, states began to regulate investor-owned power companies. State commissions conferred monopoly service areas to individual utilities in return for controlled rates and this further underscored the notion of electricity as a public

[18] "Station Efficiencies," *Electrical World* 52, no. 22 (1908).

service. Over time, in the United States, the quantity of electricity generated by investor-owned companies far outpaced that produced by government-owned power companies. But the total number of municipal companies exceeded the number of private companies, and climbed through the first decades of the twentieth century. For more than one hundred years, politicians, utility owners, civic groups, government administrators, and others debated whether electric power service should be a public or a private enterprise.[19] Throughout, investor-owned utilities strove to make a profit on the commodity they sold, while customers grew accustomed to electrical service at the flip of a switch.

In practical terms, the debates may not matter to customers as long as the lights go on and the rates are reasonable. The state of Texas offers a clear example. Most of Texas has had a deregulated wholesale power market since the early 2000s. Individual customers have the opportunity to select a generator based on any number of factors, including price, length of contract, and quantity of renewables in the mix. Yet, Texans are notoriously poor at researching options and selecting providers. It has taken fifteen years for two-thirds of power customers to switch from a legacy provider.[20] This despite the fact that prices vary by as much as 6 cents per kilowatt-hour, a difference of $833 per year for the average household.[21] In Texas, the problem may rest with the challenge of deciphering the choices, but it also reflects a degree of complacency among customers.

On another level, the politics of public vs. private power revolve around differing conceptions of governments and economies. Some in the United States have argued that a government-owned power supply represents creeping socialism. Electrification was originally a capitalist enterprise and should stay that way. These might be the proponents of electricity as a commodity. Others argued that as a vital and essential public service, electricity is rightly under total government control. In the gray area between commodity and service, still others have advocated for close government oversight of investor-owned power companies. The US power industry, however, has stubbornly remained a hybrid of public and private systems, regulation at various levels of government, and, today, competitive markets alongside monopoly networks.

In *Power Lines,* Needham makes the point that "electricity comes with no label saying 'Made in China.'" (18) On an interconnected system, the physical

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[19] For example, see Philip J. Funigiello, *Toward a National Power Policy: the New Deal and the Electric Utility Industry, 1933-1941* (Pittsburgh: University of Pittsburgh Press, 1973); Richard Rudolph and Scott Ridley, *Power Struggle: The Hundred-Year War over Electricity*, 1st ed. (New York: Harper & Row, 1986); Richard F. Hirsh, *Power Loss: The Origins of Deregulation and Restructuring in the American Electric Utility System* (Cambridge, MA: MIT Press, 1999).

[20]James Osborne, "In Texas Power Market, Flighty Customers Pose Challenge," *Biz Beat Blog, Dallas Morning News Website,* December 23, 2015, http://bizbeatblog.dallasnews.com/2015/12/texas-power-companies-contend-with-flighty-customers.html/.

[21] "2014 Average Monthly Bill – Residential," *Energy Information Agency Website,* http://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf.

characteristics of electricity – and in particular the fact that it literally follows a path of least resistance and least impedance – complicate identification of its generating origin. Even if electricity is a commodity, the average customer would find it impossible to distinguish between the electron from the commercial power plant and the electron from the federal dam. This implies that it really doesn't matter who generated the power. Needham notes that Phoenicians might have been able to locate the source of their electricity before 1965. (165) One might dispute the plausibility of this by also noting that the Phoenix area power companies already exchanged power on an interconnected system, albeit a smaller one. But more importantly, Needham suggests that Phoenicians might have cared. After 1965, power came from "a nebulous pool that combined public and private coal, natural gas, and hydropower, into a totally fungible commodity whose origin could not be located." (165) Needham here explicitly refers to electricity as a commodity, not a service. *Power Lines* opens an opportunity to reconsider the longstanding debates about the nature of electricity and who best should generate and deliver it.

Consider three different points Needham makes. First, in each decade, small groups of individuals (dare I say "power brokers"?) from both the public and private sectors make the choices about electrification for Phoenix. The Phoenix story is unusual because investor-owned utilities and a quasi-governmental regional authority, the Salt River Project (SRP), competed directly for access to markets at certain points, even when they shared power. In *Power Lines*, the Phoenix deal-makers seemed less concerned with which entity supplied the power than with the direction and extent of the region's growth, for which abundant electricity was essential. As Needham says, "In these politics, the public-private coalitions that governed Sunbelt cities competed against one another and their Northeastern and Midwestern counterparts to attract capital." (105) The alliances among boosters, elected officials, and agency heads to expand Phoenix seemed to render the public vs. private power debate moot, because in the end all that really mattered was expedience. This then opens the question of who benefited from the project of electrification (primarily Anglo Phoenicians) and would that have differed based on who was producing the power and transmitting it over the power lines?

Second, Needham describes alliances between the SRP and the Phoenix investor-owned utilities, despite periodic competition. The first major project of the federal Bureau of Reclamation, Roosevelt Dam, produced electricity controlled by SRP. Notably, Phoenix's investor-owned utilities also obtained power from the dam beginning in 1913. (pp. 36-38). In 1928, SRP and Central Arizona Light and Power Company (CALAPCO) formally delineated their respective service areas. In the 1930s, regarding a scheme to bring power from Boulder Dam into Arizona, "… SRP joined CALAPCO in fighting the proposal. In part, this rejection reflected the general absence in Phoenix, before the 1950s, of the battles between public and private power that characterized much of the nation's electrical politics." (41) In the 1950s, SRP and Arizona Public Service (APS), the successor to CALAPCO, disputed the boundaries of each entity's service area, but ultimately resolved this by integrating transmission networks and planning the sequencing of new power plants. (76) In

Needham's analysis, SRP and CALAPCO/APS were more alike than different, both seeking to protect their financial operations, their defined customer base, and their regional autonomy. Both entities shared the vision of making Phoenix "the center of a Southwestern empire." (42) In this regard, the distinctions between public and private power, and the interests of the different entities appear blurred from the get-go.

Third, Needham illustrates that there are clear winners and losers as electrification takes place. The urban "blob" of Phoenix wins with sufficient electricity from both coal-fired and hydroelectric plants to support country-club living, "clean" industry, and expansive suburban development. The distant Colorado Plateau and its residents lose, with environmental damage, depressed economic activity, internal political discord, and inadequate electricity. While Needham illustrates that private investors certainly dominated the project of electrification, and especially coal-mining and power generation on the Colorado Plateau, his study also suggests that the federal government was complicit in the unequal development and distribution of electric power. He notes, for example, by the 1960s "federal policy focused increasingly on unlocking resources on Navajo land rather than ensuring employment accompanied development." (124) The process of electrification, as Needham shows, is much more complex – with each new development contingent on past choices – than simply a question of public vs. private power. But it would be interesting to consider what a public policy might have looked like that ensured equitable access to electricity, and equitable sharing of the necessary burdens. By extension, how might this contemplation contribute to contemporary debates about how to access adequate and equitably distributed electricity for the future without further compromising the earth's climate?

Is the Colorado Plateau "Blessed" with a "Resource Curse"?

The unequal distribution of benefits and burdens following electrification of Phoenix sounds similar to tales of resource extraction and blight in other parts of the world. British economist Richard Auty coined the term "resource curse" in 1993 to describe an inverse relationship between a country's exportable resource wealth and its domestic economy.[22] Most resource curse studies look at countries in Africa, South America, and Asia.[23] In economics, political science, international studies, and related fields, scholars have tested the notion of the resource curse and debated its merits as an explanatory tool. Some have offered alternative analyses to the apparent disconnect between resource wealth and domestic economic growth,

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[22] Richard M. Auty, *Sustaining Development in Mineral Economies: The Resource Curse Thesis* (London and New York: Routledge, 1993).

[23] Anthony J. Venables, "Using Natural Resources for Development: Why Has It Proven So Difficult?" *The Journal of Economic Perspectives* 30, no. 1 (2016): 162. For resource curse analyses in the United States see Grant D. Jacobsen and Dominic Parker, "The Economic Aftermath of Resource Booms: Evidence from Boomtowns in the American West," *The Economic Journal* 126, no. 593 (2014): 1092-1128; Stratford Douglas and Anne Walker, "Coal Mining and the Resource Curse in the Eastern United States," No. 14-01, Working Papers, West Virginia University (2015): 1-28.

suggesting, for example, that "resource dependence appears as a symptom, rather than a cause of underdevelopment."[24] To an environmental historian, the notion of a resource curse sounds dangerously similar to environmental determinism. The continuing debates over the resource curse concept, however, suggest that it is a very compelling tool for understanding why resource extraction has beneficial results in some places and burdensome results in others.

Needham's book illustrates the specificity of history as a way of understanding resource extraction, resource use, and economic benefit in a particular region of the United States. Needham offers neither economic regression charts nor pan-regional comparisons. Instead, he takes the reader on an in-depth exploration of the relationships between a growing southwestern city and its hinterlands. The upshot of Needham's story is a disturbing perspective on the inequities between the booming expansion of Phoenix and the dire conditions of the Navajo Nation on the Colorado Plateau. It sounds very much like a resource curse story:

- In the early twentieth-century, Arizona and its neighboring states represent a region with lagging economic development.
- Falling water and coal comprise two examples of the untapped resource wealth of the area.
- When investors and government agencies develop those resources, the benefits accrued to some and not others, most notably not the residents closest to the coal and the falling water.

Needham's study is markedly different from most resource curse analyses. Using the historian's toolbox, Needham weaves together the particulars of decisions, investments, exclusions, and so forth that resulted in electrification of Phoenix. Further, Needham's story takes place in the United States, a country not typically identified with the resource curse. This study focuses on electrification, usually treated as a highly technical project of economic advancement. Unlike oil and diamonds – resources that are typically mined and then transported across the globe for myriad uses – the coal and falling water in *Power Lines* are harnessed to produce power in situ, which is then used relatively close by. But the area immediately adjacent to the power plants does not enjoy access to abundant and affordable electricity.

The electrification of Phoenix and its hinterlands is different from the standard resource curse narrative in other ways. The historical and evolving relationship between Indian tribes and the federal government, for example, complicates

[24] C.N. Brunnschweiler and E.H. Bulte, "Linking Natural Resources to Slow Growth and More Conflict," *Science* May 2, 2008: 616-617; Stephen Haber and Menaldo Victor. "Do Natural Resources Fuel Authoritarianism? A Reappraisal of the Resource Curse." *The American Political Science Review* 105, no. 1 (2011): 1-26. Jørgen J. Andersen and Michael L. Ross, "The Big Oil Change: A Closer Look at the Haber–Menaldo Analysis," *Comparative Political Studies* 47, no. 7 (2013): 993.

questions of ownership and contracting authority. The Navajo Nation exists as a sovereign entity within the United States, but the US Congress has plenary power over the nation. Throughout the history of resource development on the Colorado Plateau, as Needham illustrates, federal agencies stepped in to finalize the terms under which outside entities accessed coal and produced power. Needham traces the efforts of Navajo leaders across many decades to harness the reservation's energy resources on behalf of its inhabitants, but the oversight role of the federal government was one factor that minimized the success of these initiatives. (124).

Needham brings the environmental consequences of coal mining and river damming to the fore, perhaps introducing a different notion of what a resource curse might be. The growth of Phoenix represents one type of environmental travesty: conversion of a dry desert landscape into a network of roads, power lines, sprinkler systems, buildings, grassy lawns, and other manmade artifacts - sustained only by excessive reliance of imported energy and water. The strip-mining and power production on the Colorado Plateau represents a second, as depicted in the image described as "The Rape of Black Mesa for $$$" with "… a giant death's head rising from the combined emissions of Four Corners, Navajo, and Mojave Generating Stations." (219) The network of extra-high-voltage transmission lines forming a web across the southwest represents a third visual environmental consequence of electrification. Arguably, the development of Phoenix benefited millions of individual residents who found work and well-being there. The Navajo did participate in the economic activity of energy development on their reservation. The power lines do represent healthy economic links between different locales in the Southwest. But the overall environmental transformation of the region can be troubling, especially as one attempts to determine if resource wealth is a curse or a blessing.

So, is the Colorado Plateau cursed by its mineral wealth? Needham's book suggests that minerals alone are neither the curse nor the blessing, rather the social decisions made about those resources are telling. Is there value, then, in acknowledging that the United States is not immune to the resource curse, particularly when examining the process of resource development, transformation, and use in given regions? Further, if one understands certain regions of the United States as suffering from a resource curse, can this concept be better explored by introducing attendant environmental burdens and benefits alongside the economic and socio-cultural ones?

In *Power Lines*, Andrew Needham has provided ample material to provoke new inquiries into some of the persistent concerns of energy development and human experience. He pushes the reader to abandon the binaries of commodity and service, public and private, in favor of asking broader questions about the benefits and costs of electrification. Perhaps it is time to reframe both the historical inquiry about electrification and more contemporary arguments about who controls power in terms of what customers care about most and how to achieve that with expedience. But then the question remains, which customers count? By looking at both economic

and environmental aspects of electrification in Arizona, Needham has invited the concept of the resource curse into this historical narrative, and has further offered new ways to think about what the resource curse might be. Can the environmental concerns be integrated with economic and political consequences to better understand how energy development has taken place in the United States, who wins and loses, and why? Needham successfully introduced a story about Phoenix, urban expansion, technical integration, and environmental change; and then left the reader standing beside the Navajo, pondering how to rectify the inequities of a century-long project to turn on the lights.

Comments by Robert Lifset, University of Oklahoma

Reading the first half of Andrew Needham's book on the growth and expansion of Phoenix and the Navaho nation to the north reminded me of William Cronon's *Nature's Metropolis*. Only *Power Lines* begins to approach Cronon's achievement without doing the full Cronon; instead of tracing *every* commodity flow into and out of Phoenix, Needham focuses on one: energy.

Energy forms the foundation and grounding of the entire book. Beginning with the building of Boulder Dam, Needham traces in the first chapter how energy tied together a fragmented region. The second section, "Demand" describes the expansion of metropolitan Phoenix; part III, "Supply" explores how the energy that powered Phoenix's expansion and the greater southwest came from the Navaho reservation; and part IV "Protest" examines the opposition this arrangement produced among environmentalists and a new generation of Native American activists.

Large parts of this story are not new. One can find in the energy historiography the struggle between public and private power, the rise in the demand for energy, and the environmental impacts of energy production, including the implications of the increasing physical separation of energy production and consumption. What is new is how Needham deftly brings these together in a history of the southwest.

Prior to the 1960s, the southwest was powered by federally built hydro in the inter-mountain west and natural gas from west Texas. The future capacity of hydro power was limited (it also carried the additional drawback of a reliance on the federal government) and by the 1950s it began to appear that there would not be enough west Texas natural gas to continue to meet the rising energy demand of the region. Atomic power was dismissed as too expensive (I suspect the large amount of water nuclear power requires also played a role). Local utility companies faced hard limits on their ability to pursue a grow and build strategy without control of a new source of energy.

The solution was to tap the large reserves of coal sitting beneath the Navajo nation to the north. But in part because Phoenix developed an identity as a growing city without the air pollution problems that plagued others, the coal would be mined and used to power electricity generating stations sited on the reservation. Within a dozen years the Navajo reservation would be ringed by four large coal powered plants, one of which, Four Corners, created so large a plume of smoke that the Mercury astronauts reported it was one of the two man-made objects they could identify from space (the other being the Great Wall of China). By 1975, the Navajo and Hopi reservations generated 8,000 MW of electricity, representing almost 65% of all the electricity consumed in Arizona, New Mexico and southern California.

Needham pays careful attention to a series of developments and choices that led to a greater reliance on coal powered electricity produced on the Navajo reservation. To cite one example, the Bureau of Reclamation's efforts to build the long distance transmission lines that would bring power from the dams envisioned in the Colorado River Storage Plan (CRSP) and stitch together the west were met with an effort by ten investor owned utilities to create their own grid connecting the southwest. This effort by private power would link utilities allowing them to collectively build larger power plants (taking advantage of economies of scale) using the cheapest fuel: coal. As a result, the Navajo reservation would be used to power not just the expansion of metropolitan Phoenix but also Albuquerque, Salt Lake City and greater Los Angeles.

The second half of this book traces the impact of these developments on the environment and politics of the Navajo nation essentially arguing that the reservation became a sacrifice zone for the economic development of the wealthier and whiter cities to the south and the west. By highlighting a great environmental and political injustice, Needham carefully traces the social and environmental consequences of how Phoenix benefitted from cheap energy while shifting the burden associated with this energy production onto others.

Needham then attempts to suggest that the rise of coal in the southwest foreshadowed the larger national revival of coal, which has resulted in increasing carbon emissions. Here the book is on weaker ground. While the turn to coal in the southwest in the 1960s predates its national revival, coal consumption increases in the 1970s because the energy crisis makes oil and natural gas more expensive and difficult to obtain while nuclear power failed to fulfill its promise. The environmental justice dynamic of siting large amounts of generating capacity in a landscape populated by the region's poorest most disempowered residents is not unique to the southwest. But how necessary was this dynamic, when the federal government through a series of policies culminating in the Power Plant and Industrial Fuel Use Act of 1978, ordered electric utility plants to switch from burning oil and natural gas to coal? The historical forces that account for the turn to coal in the southwest in the 1960s do not explain its national revival in the 1970s.

This book is part of an emerging scholarship in the history of energy. In the past two years this scholarship has expanded our understanding of energy transitions (Christopher Jones, *Routes of Power*), traced the diplomatic and cultural impacts of a particular form of energy (Peter Shulman, *Coal & Empire* and Bob Johnson, *Carbon Nation*) and examined the impact of energy production on environmentalism (Lifset, *Power on the Hudson*). As an effort to use energy to find new insights into the development of a region Needham's book is best read alongside Paul Hirt's, *The Wired Northwest* and Christopher Manganiello's *Southern Water, Southern Power*. It would be interesting to read how the author sees *Power Lines* contributing to this historiography.

Following energy allowed Needham to trace the political and social inequalities of the southwest, the impact they drew on the physical landscape and the ideas that powered a large and diverse group of characters. It's a remarkable demonstration of the power of energy as an analytical tool and the insights it can bring to historical inquiry.

About the Contributors

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