H-Environment Roundtable Reviews

Volume 14, No. 1 (2024)
https://networks.h-net.org/h-environment

Publication date: January 24, 2024
Roundtable Review Editor: Stephen Milder

Germán Vergara, *Fueling Mexico: Energy and Environment, 1850-1950*. Cambridge: Cambridge University Press, 2021. ISBN: 9781108831277.

Contents

Introduction by Stephen Milder, Rijksuniversiteit Groningen

Germán Vergara's *Fueling Mexico: Energy and Environment, 1850-1950* explores the "fossil fuel revolution that turned the former agrarian country into a rapidly industrializing nation" (1). One of the first national histories of the transition to fossil fuels in a country beyond Western Europe or the United States, **Claudia Leal** writes in her contribution to this roundtable that *Fueling Mexico* "opens a path that many will follow." This roundtable reflects on the significance of Vergara's pioneering book, particularly from the perspectives of energy history and of Latin American history. At the same time, the roundtable also takes up two other exciting conversations sparked by Vergara's book. First, it considers the relationship between environmental history and other fields or approaches, from cultural history to economic and political history. Second, it addresses questions about the universality of the transition to fossil fuels and the role played by governments in realizing and shaping that transition.

Edward Beatty's contribution, centered around the provocative question "what would this book have looked like if the author approached the topic through another lens," opens this roundtable. Beatty prompts Vergara to consider how his book might have been different if it were a work of economic history, global history, political history, or cultural history. In proposing this thought experiment, Beatty also brings the field of energy history into the conversation, drawing our attention to the fact that "the field of energy history draws a large part of its dynamism from its roots in different and more longstanding fields of history."

Rocío Gomez prompts us to think further about the interlinkages between energy history and other fields, pointing out that "this work is not merely an energy history but rather one that weighs how the materials that fed energy production shaped social history, political agendas, cultural traditions, and environmental changes." Gomez also pushes the discussion towards the present, with an opening vignette about pipeline thieves and closing comments about "how far Mexico has to go to ready itself for climate disaster." In so doing, she prompts Vergara to tell us more about what the history he relates in *Fueling Mexico* can shed light on how a new energy transition—towards renewable energy—might unfold.

Claudia Leal emphasizes another aspect of the relationship between fields of historical research, specifically the relationship between environmental history and energy history. Her discussion of this point also brings the conversation to the importance of Vergara's work for the field of Latin American history, since Leal notes that energy has been notably absent from Latin American environmental history. By noting Vergara's book's importance for the field of Latin American history, Leal's comments raise interesting questions about how we think about energy and why the subject remained understudied in this region's history despite the fact that "energy has shaped everything."

Victor Seow's comments place *Fueling Mexico* in a global context. He emphasizes the way in which Vergara addresses the Mexican energy transition and its difference "from what is usually taken to be the typical Euro-American trajectory." He is particularly interested in the way that coal served as a short-lived "energy bridge" to the oil age rather than a lengthy phase in Mexico's energy history. At the same time, he also thinks about the links between the history of energy transitions and social, political, and environmental history. Noting the social and environmental consequences of Mexico's transition to oil, he wonders whether "ideas of or efforts at social and political reform in Mexico's revolutionary past…might be recovered for the purposes of imagining…environmental and energy interventions."

Germán Vergara's thoughtful response addresses each of these lines of questioning. He describes his work as taking a "panoramic approach" to energy history that is intended to note links with other fields of historical inquiry and thus open conversations, rather than seeking to have the last word. In discussing both the way in which Mexico's energy transition fits the global story of transition to fossil fuels even as it offers some meaningful and noteworthy particularities, Vergara also finds a fitting answer to the contributors' questions about *Fueling Mexico*'s meaning for current debates about energy transitions in the climate age. He notes the way in which Mexican politicians and elites were able to determine much about how Mexico entered the fossil fuel age, even if it was beyond their power to wholly reject a transition to fossil fuels. Accordingly, he notes, "Since the state was instrumental in the large-scale adoption of fossil energy, this means that the state has the historical responsibility to lead the transition to renewables."

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 Edward Beatty, University of Notre Dame

Over the last decade or so, Energy History has emerged as a vital field of study in its own right, with a rapidly growing body of books and articles, a journal (or two), and one of the more active working groups in the Consortium for History of Science, Technology, and Medicine. Dynamic, active, and hyper-relevant to arguably the central challenge facing humankind today, the field of Energy History draws a large part of its dynamism from its roots in different and more longstanding fields of history. Though Energy scholars seem most often to emerge from the history of science and technology, some draw on environmental history, economic or business history, global history, and broader approaches in political, social, and cultural histories. Some lean more social science, others more humanities. Indeed, the cross-field and often interdisciplinary approaches within Energy History reflect what is crystal clear in the present moment: the challenge of achieving a *sustainable* energy regime for the planet will yield to no one type of policy intervention or market incentive; this wicked problem is not simply reducible to technical solutions, and will be contested, negotiated, and subject to divergent meanings, interests, and influences at every turn.

Most recent works in energy history have focused on the dramatic and historically recent transition from a solar energy regime to a fossil fuel energy regime, from the world of muscle and plant and water and wind to the world of coal and oil and natural gas. Germán Vergara's 2021 book *Fueling Mexico: Energy and Environment, 1850-1950* is a superb addition to this already strong field. I initially reviewed the book for the *Hispanic American Historical Review* (HAHR, 102:3) and won't repeat my overview and evaluation here, other than to sing again the book's praises. Of all the books I have read over the last five years or so, this has been one of the most satisfying. In fact, it is the book I most wish I had written myself! Grounded in meticulous research, clearly organized around a central narrative and a set of embedded arguments, conveyed in direct and engaging prose, and erudite without being pedantic, Germán Vergara's book is just superb.

In brief, Vergara narrates Mexico's transition to a fossil fuel economy between 1850 – when steam engines were scarce and nearly all aspects of production, transportation, light and heating relied on solar energy sources – and 1950, when the country had largely transitioned to a fossil fuel-dependent and predominantly urban and industrial economy. Since then, over ninety percent of Mexico's energy needs are met by oil and natural gas. Chapters 1 and 5 bookend the chronological story by sketching the energy regime of the country at either end of this century-long narrative, and the implications of the solar and later the fossil fuel regime for Mexico's economic and social life. The intervening chapters focus on three roughly chronological stories in between.

Industrialization offered the most compelling path to wealth generation – and thus to national sovereignty and survival – in the highly competitive international context of

the latter nineteenth century. Mexican investors and governing officials pursued "material progress" in the form of new technologies and industrial production, the subject of chapter 2, which traces the adoption of steam power in manufacturing and railroads with particular attention to growing levels and awareness of deforestation. Chapter 3 centers on coal. Like so many places around the world, Mexican politicians and industrialists saw coal as the ticket to national progress and an imagined industrial future in the nineteenth century. Yet low demand and scarce domestic resources meant that widespread adoption of coal-based steam power only came late in nineteenth century Mexico, serving as a short-lived transition from the solar regime to an electricity- and petroleum-based regime in the twentieth century.

Chapter 4 takes up the history of petroleum, emblem of economic independence and guarantor of economic and political sovereignty. Oil quickly came to dominate Mexico's energy economy as well as the country's political economy through the twentieth century. It never completely supplanted the use of animate power, wood, and coal before the 1950s, though it marginalized those activities to zones of economic and social exclusion, sometimes just "next door" to communities with more privileged access to petroleum or electricity-based energy. Access to fossil fuel energy was both cause and consequence of deepening social inequality. Differential access shaped inequalities between nations in the twentieth century, as well as between communities within nations. To paraphrase Timothy Mitchel, Mexico's "carbon autocracy" pursued a state project largely hostile to both political opposition and social inclusion, and largely oblivious to environmental depredation. Through each of the chapters, Vergara frames the energy story with close attention to the environment—environmental constraints and their management, environmental depredation and its consequences—as well as to the extensive variations in energy practices and energy access across local and regional spaces within the country.

It is never entirely fair to ask an author to write (or to have written) a book that she or he had no intention of writing in the first place. Nevertheless, the thought-experiment "what would this book have looked like if the author approached the topic through another lens" can be useful, or at least usefully provocative. Let me take a moment to ponder the questions and issues this book might raise if the topic were approached from the vantage point of economic history, global history, political history, and cultural history. One of the many great strengths of this book is that it should engage and appeal to scholars from each of these fields. Although Vergara's passion is closest to the surface on the environmental questions related to the exploitation of forests or coal or petroleum, he offers here a generous and multifaceted account that cuts across methods and approaches.

What if this were an economic history? Economic historians might inevitably gravitate to the relationship of energy and economic growth. This might imply an exploration of supply and demand conditions for the adoption of a new energy regime, or an exploration of the relationship between natural resource endowment and technological innovation. Specifically, an economic historian might ask, what role did resource scarcity (and thus relative prices) play in shaping Mexico's fossil fuel

transition? Did the relative scarcity of wood, water, and coal constrain Mexico's transition to a fossil fuel regime until the large-scale exploitation of petroleum in the first decades of the twentieth century? Vergara pays close attention to the vast deforestation that swept Mexico in the nineteenth century (as in so many places around the world, including the United States). But Mexico's largely semi-arid environment made forests particularly fragile and slow to recover. Sites amenable to water power were also relatively scarce, and local competition for mill locations often proved intense, dating back to the Colonial era. Furthermore, the quantity and quality of the nation's coal reserves were never sufficient to meet domestic demand. In short, resource scarcity might plausibly have constrained the adoption and diffusion of mechanized power: water mills, steam engines, and of mechanization in the economy generally. Did resource scarcity constrain technological innovation in the pre-electricity world, with consequences for economic development? This is an open question rather than an argument, and Vergara's book is suggestive but not definitive. Other countries satisfied energy needs through coal or oil imports. One can imagine, in other words, a history of energy and the environment in Mexico ca. 1850-1950 centered around economic historians' typical focus on the determinants of economic growth, technological change, and industrialization.

What if this were a global history (or at least a Mexican story set explicitly and unavoidably in a global context)? On one hand, histories of energy transitions are nearly always told within histories of nation states, and for good reason. Nation-states have long been the conventional unit-of-analysis for histories of the fossil fuel transition. Either the classic British case stands in for an asserted universal experience, or we get histories of energy in the US, France, Egypt, China, and elsewhere. Policies to support the development of coal (for instance) typically originate in national governments (e.g. exploration and surveying, mining rights and concessions, railroad development, and incentivizing consumer demand for a new fuel source). Resource development is pursued within national borders, or sought by extending those boundaries to imperial dominions (or, third-best, acquired through inter-national trade). On the other hand, from the British case on, there have been no strictly "national" histories of energy. Virtually every place on earth, at some point in the nineteenth or twentieth century, has experienced a roughly analogous transition from a wholly solar energy regime to a largely carbon-based fossil fuel regime. The knowledge, ideologies, norms, and aspirations that helped drive the fossil fuel transition were themselves global – or at least transnational – in nature, highly mobile across national boundaries. In one sense this became a story of technology transfer, diffusion, and, in some ways, of technological determinism. Once the new technologies of steam power, electricity, and internal combustion were developed and innovated in the economies around the North Atlantic, private and public sector actors in other parts of the world sought to adopt them, as quickly as possible and at any cost. Political decisions, social interests, and cultural norms—all particular to a place and a nation—were marginal rather than central in any explanatory account. There was nothing contingent or unique about the big picture, although historians will resist this conclusion until the end. One can imagine, in other words, a history of energy and the environment in Mexico ca. 1850-1950 in which every development is

entangled with global interactions and influences, the narrative presented as one variation of a global experience.

What if this were a political history? Energy historians often play with the double meaning of "power." The revolutionary nature of the fossil fuel transition inaugurated new forms of power, in both senses of the word. Most directly, humans figured out how to convert fossil fuels into motive force using new machines via steam, electricity, and internal combustion.

Nowhere was this dramatic transition solely market-driven. Governments of all persuasions enhanced their power—their administrative and military capacity—in order to facilitate the extraction and exploitation of fossil fuels and their conversion into energy using new technologies. In turn, the fossil fuel-powered economy created new opportunities for states to extract revenue, deepen and extend their administrative capacities, and exert authority in the name of energy security and the imperative of economic growth. The Mexican state is an exemplar in this respect. The Liberal and then Porfirian governments of the latter nineteenth century subsidized a national rail grid and rewrote commercial and property law in order to create the conditions for a national market and the ensuing export boom and incipient industrialization. All this was dependent on fossil fuel adoption (and both exports and domestic industry yielded social dislocation along with economic growth and modernization). In the twentieth century, Mexico's oil reserves (and the state's control of them) underwrote the ability of a single political party to consolidate power in the two decades following the revolution of 1910-1920 and to maintain a near monopoly on national politics for seven decades (ca. 1929-2000). The state's control of oil constituted something of a blank check, enabling successive governments to subsidize industrial investment, coopt political opponents, incentivize political allegiance, and strategically allocate social benefits in narrow and politically useful ways. Political decisions and policies were instrumental in this history, but also in a sense irrelevant. What alternative path was possible? One can imagine, in other words, a history of energy and environment in Mexico ca. 1850-1950 centered around the expanding power and administrative reach of the state.

What if this were a cultural history? How should we understand the cultural construction of a new energy regime in Mexico, or the way a new energy regime challenged and re-shaped cultural norms? What are the implications of Vergara's narrative for a more user-centered history, focused on energy's consumers and the ways that dramatic, revolutionary changes in the nature and cost of light, heat, and motive power altered social relations and cultural constructs in Mexico? In Mexico and around the world, electricity became by the turn-of-the-century the preeminent marker of modernity for both policy makers and consumers, especially in industrial and urban settings. But for residents, workers, and investors, electricity was also a contested commodity, understood and imagined through distinct, culturally embedded lenses, sought or resisted, and always negotiated: household to household, block to block, office to office throughout the city. Those who lived and worked in the city, travelled through it, or saw it from the countryside created their own imagined

vision of electrical light and power. Often these visions, aspirations, and anxieties varied across boundaries of ethnicity, race, and gender. Certainly access to power did. Fortunately, Diana Montaño's excellent book, *Electrifying Mexico*, conveys a user-centered and cultural story of the "electriscape" during this era, taking pressure off Vergara. To be fair, Vergara's attentiveness to culture is never far from the surface, and sometimes front and center, as in his discussions on "dreaming of industry" and "eating oil" in chapter 5. Nevertheless, the question continues to nag at the end of Vergara's account: how did particular norms, habits, and values in Mexican society shape the trajectory of the energy transition 1850-1950, and how did the profound implications of that transition re-shape cultural norms and practices? One can imagine, in other words, a history of energy and environment in Mexico ca. 1850-1950 that highlights not only how energy transitions both create opportunities and dislocated lives, but also how they reshaped the identities and imagined possibilities for nearly everyone touched by the new power regime.

Germán Vergara's *Fueling Mexico* is not an economic, global, political, or cultural history. At least not fully or solely so. It speaks to each of these approaches in ways that are satisfying rather than frustrating, and it works to pull readers who are deeply immersed in any of these approaches out onto a broader, more integrated landscape. But it also leaves the central questions raised by these various lenses unanswered, or perhaps just implicitly addressed. This book is the better for having avoided a more narrowly defined methodological or field-based approach. Nevertheless, the concluding chapter of the book (or a response in this forum!) might have been – might be – a place to muse more explicitly about these kinds of questions.

Finally, I want to return to two questions I raised in my initial HAHR review of this fine book and that reprise a few points from above. Vergara leaves us with a fine-grained and highly sensitive portrait of Mexico's transition to a fossil fuel economy. The depth of Vergara's archival research and the thick description of each chapter convey the particularities of the Mexican experience: of its natural and human landscapes, the dramatic economic transformations of the era and the way those varied within and across regions, and the political economy of natural resource use for rural communities, modernizing investors, and state-builders holding public office. All this constitutes a particularly Mexican story, and a somewhat revisionist account of Mexican history. But, of course, societies around the world underwent essentially the same transformation of energy regime, at more or less the same time, from England, Continental Europe, and the United States to countries, colonies, and new nations in Latin America and parts of Asia and the Middle East. Transition from solar to fossil fuel regimes are nearly universal and differ far less in their broad patterns and outcomes than in their particulars. Everywhere, fossil fuels seemed to promise dramatically expanded access to power, wealth, and well-being; no place did societies and social actors turn away from this promise, except at the margins. How should we balance the particular and the universal in the Mexican case?

Second, and more succinctly, what does this historical transition suggest about the transitional challenges that lie ahead of us: from fossil fuel dependence to

decarbonization and a (presumably) sustainable energy regime? It seems to me that Vergara's account of Mexico's previous transition highlights three factors that facilitated change rather than constrained it. Technological innovations made possible the profitable use of new energy sources; government policies incentivized investment in new technologies, and social groups proved relatively malleable to the adaptations required by a new energy regime (though many had little voice in the process). Fossil-fuel dependence has given us—most of us but not all—vastly improved metrics of welfare than our nineteenth century predecessors, even as it has proven unsustainable and likely catastrophic to our future.

Almost thirty years ago my PhD advisor suggested we keep always a short shelf of history books on our desk, arranged in two groups: a few that we know we would have done better, and a few that we might only dream of emulating. Models, in other words, of what we aspire to accomplish. Germán Vergara's *Fueling Mexico* sits on my desk, firmly in the latter category. It is a masterful contribution to a strong and critical body of literature on energy regimes and energy transitions. It presents a new narrative of Modern Mexican history, and exhibits the depth of research, richness of narrative, attention to thickly described detail, and ambition to speak to big questions to which all monographs should aspire.

Comments by Rocío Gomez, Virginia Commonwealth University

In January 2019, a viral cell phone video caught pipeline thieves, or *huachicoleros*, in Tlahuelilpan, Hidalgo attempting to steal petrol under the cover of darkness. Even as a security officer in a bulletproof vest and weapon watches from a distance, many pass the cameraman with plastic containers of gasoline. With a bright flash of light, screams replaced conversations as the pipeline erupts in a giant orange fireball. A man near the camera yells to burning victims, telling them to throw themselves on the ground. "Roll around!" he urgently yells at one. In a final, haunting image, the camera zooms in on several individuals running through the field in darkness, their torsos and legs visibly on fire, with screams punctuating the crackling of flames.

While horrifying, the above episode illustrates how ingrained Mexico's energy regime is. Energy inequities, infrastructure expansion, fossil fuel regimes–all of these are central themes of Germán Vergara's *Fueling Mexico.* Vergara emphasizes from the start that this book is not going to be your typical energy history of Mexico, but rather one that bypasses the traditional narratives of oil in Mexico and focuses on previously undiscussed actors. The book traces the energy history of the country from its reliance on wood fuel in an agricultural society, to its brief dependence on coal, to its mid-twentieth century petroleum regime. Importantly, this work is not merely an energy history but rather one that weighs how the materials that fed energy production shaped social history, political agendas, cultural traditions, and environmental changes. It offers a layered perspective that includes different parts of the country rather than simply focusing on Mexico City. Consequently, Dr. Vergara offers us an energy humanities perspective that traverses class, regions, and fuel sectors; indeed, a more holistic approach to tackling energy questions. He emphasizes that this book offers a study of energy regimes, or how a society extracts, consumes, and transports energy. Over the course of the one-hundred-year period discussed in the book (1850-1950), Vergara guides readers through the regime changes in energy by taking into account local demands and access to resources as well as regional effects on energy policy.

The first chapter situates 1850 Mexico in a pre-fossil fuel regime. Largely agricultural, the country relied on solar energy to feed its crops and its forests. Farmers depended on the sun to grow crops that sustained smaller communities. Forests then fed local demand for fuelwood in domestic use, foundries, and later steam engines. Regional differences highlighted how forests were razed for slash-and-burn agriculture in Yucatán while many mining areas were fuel starved because of the colonial legacies of mining that had stripped the forests down. Juxtaposed with the central state of Querétaro, this chapter excels in its detailed discussion of energy in these two very different regions. Meanwhile, this solar regime limited the growth of urban areas and how large their populations could grow when fuelwood was finite. Similarly, poor infrastructure contained the sales of wood and kept them local.

Chapter 2 introduces the fuel hungry technology that serves a catalyst to the fossil fuel regime. Steam power initially relied on wood, but with the forests dwindling after centuries of mining, coal became a suitable alternative. Mined in the northern states of the country, coal had become far more common by the 1880s. Steam power technology quickly became a critical part in textile production, water management, and mining technology. Likewise, the railroad network grew during the late nineteenth and early twentieth centuries, which led to additional demands on forests. With railroad stations, towns became hubs for commerce and exchange, growing into cities. As the chapter closes, it presents the country on the cusp of transition as fuelwood dwindles to the point of attracting international attention. An 1882 article in *Harper's Magazine* by the US politician John Bigelow, for example, referred to Mexico as suffering from "fuel famine" (82-83), which prompted a response from politician and diplomat Matías Romero.

Regardless of the elite squabbles, this social circle's arguments regarding coal did indeed trickle down to geologists and engineers, as illustrated by Chapter 3. Vergara demonstrates how British arguments characterizing coal as central to modernity and civilization influenced the Secretaría de Fomento to send the Ramírez expedition to central Mexican states in search of coal. Coahuila coal miners subsequently carried the burden, as their state was the sole solid producer of coal. Prices and availability varied as the coal market fluctuated, which inevitably affected the most vulnerable. This chapter prompted a question from this reader on how energy humanities and studies of the Anthropocene intersect in their discussions of energy accessibility and equity. Suddenly, markets and the economics of energy came into play as to how a business or factory was run. Vergara also explores the case of Monterrey, the industrial metropolis of the north. The city was blessed with its proximity to coal mines in Coahuila, which spurred its industrialization in the 1890s. Overall, coal served as a bridge with oil looming on the horizon.

Chapter 4 begins by glossing over the oil expropriation of 1938, when President Lázaro Cárdenas nationalized the oil industry. The short discussion of this monumental event is strategic. Vergara notes in his introduction that this moment only solidified the importance of oil as Mexico's energy regime. Instead, the book plays the long game and examines the role of oil in indigenous history, cultural history, and environmental history. U.S. businessman Edward Doheny and British businessman Weetman Pearson dominated the petroleum industry in Mexico with their companies. After oil stumbled in the early 1920s, it formed a central part of propaganda and fueled (pun intended) the expansion of highways. Even so, the rapid industrialization and consolidation of oil as the country's energy regime contributed to social inequities. Far-flung farming communities, indigenous peoples, and impoverished individuals were all left behind, which further exacerbated inequalities during this period. What stands out about this chapter is the petroleum propaganda that pervades Mexican culture and history. Not only is the expropriation a major holiday but it is also a cultural moment of national unity as depicted in films and photographs of the era.

The final chapter stirred unease in this reader, namely because it depicts an acceleration to our present day. By the 1950s, Latin America offered tremendous promise even as it struggled with social and economic disparities. As the book notes, Mexican politicians saw private capital as an opportunity to take the lead in industrialization, while the national government would fund specific sectors. Similarly, the author underscores the close ties between the oil-dependent industries and food. The Green Revolution, of course, industrialized agriculture while also introducing petro-chemical fertilizers and pesticides; yet, it also introduced new foods that were culturally associated with developed countries (think: bacon). Whereas the solar regime of 1850s Mexico saw farmers spend caloric and physical energy on the cyclical planting of seasons, here in the 1950s, oil changed diets and the energy regime of food production. Part of this reader's unease in reading this chapter stemmed from the question of how environmental monitoring (if it even took place at all) fell on private companies or individuals. This concern is not solely linked with oil and oil spills but also with the amount of exposure to chemicals and pesticides workers suffered while on the job or the amount of pesticides sprayed. Indeed, a prevailing theme that seems to emerge time and again is the body. (This prompted a reflection on the rhetoric of the question: "How can we rid ourselves of fossil fuels?" That's not the question; instead, consider "How can we extricate ourselves from our petroleum biome?")

In examining the energy regimes of the country over the course of a hundred-year period, *Fueling Mexico* demonstrates how changes in energy regimes, such as wood to coal to oil, shaped the development and state of urban spaces, infrastructure, water accessibility, food production, and forest cover. Read against the backdrop of climate change, this book illustrates how far Mexico has to go to ready itself for climate disaster, an event the country is not ready for as the author warns in the introduction and the conclusion. Energy inequities persist and private companies have little accountability. Moreover, natural events fed by climate change, such as hurricanes on the Pacific coast and droughts in the north central region, are compounded by massive deforestation in the Yucatán, even as new refineries are built. While the author gives us some hope that the country is turning towards renewable energy, this reader wonders if further disparities in clean energy access will persist, especially with a Pemex on every corner declaring oil king.

Comments by Claudia Leal, Universidad de los Andes

Fueling Mexico is a very timely book that opens a path that many will follow. About a decade ago, Germán Vergara, a Mexican who travelled to the US to do his PhD in History at the University of California at Berkeley, made the wise decision of writing his dissertation about energy. This crucial topic had escaped historians working on Latin America. As Vergara tells us in his book, in the case of Mexico, historians had certainly looked at coal extraction but they had focused on labor conflicts, sidestepping coal itself. Given the historical importance of oil for the Mexican economy, it is no surprise that this sector had been at the center of research efforts of various kinds. However, the role of oil in "fueling Mexico" had not caught the attention of historians devoted to social and economic history –and not even of those who over the last two decades have built the basis of the environmental history of the region. Myrna Santiago did write an innovative book –*The Ecology of Oil*– that considers the environmental effects of oil drilling up to 1938, and which is also a labor history.[1] But the fact that oil sustained Mexico's modernization —with all that this entails— had escaped everyone. Such an oversight was not exclusive to Mexico's historiography.

A Living Past, an edited volume that provides a general overview of the environmental history of Latin America in the nineteenth and twentieth centuries, does not have a chapter on energy.[2] In 2012, when John Soluri, José Augusto Pádua and I thought about possible topics and contributors for this book, we did not give much thought to energy. John McNeill, who kindly wrote the epilogue, noticed that something was missing and remarked: "Unlike most regions, Latin America relied on biomass until it relied on oil and hydropower […] Due mainly to quirks in geology, there was no coal age, no 'king coal' in Latin American history" (269). In this manner, he pointed out that there was a key topic that needed attention. By this time, that is, 2018, Germán Vergara had already finished his dissertation and was working on the book.

Fueling Mexico explains the transition from a solar or organic regime, based on fuelwood and muscle, to a fossil fuel regime that after flirting with coal settled primarily on oil. This change allowed Mexicans to increase their energy consumption exponentially, way beyond population growth. The rise in energy use began in the late nineteenth century with steam engines (powered mainly with fuelwood) and larger and more sophisticated water wheels. This development was coupled with a frantic search for coal, since Mexicans knew all too well how England and Europe had industrialized. However, the path to a fossil fuel society depended ultimately on Mexico's geology and on the country's capacity to use, rather than export, its abundant oil resources. The country had a huge but short-lived boom of oil extraction

[1] Myrna Santiago, *The Ecology of Oil: Environment, Labor, and the Mexican Revolution, 1900-1938*. Cambridge University Press, 2006. See also Myrna's testimony in https://solcha.org/myrna-santiago-1

[2] John Soluri, Claudia Leal and José Augusto Pádua. *A Living Past: Environmental Histories of Modern Latin America*. Berghahn Books, 2018.

that peaked in 1921 and led mainly to an increase in exports. But by 1938, when the industry was nationalized, the country consumed most of the oil it produced. By 1955, oil and natural gas represented 75% of all energy consumption. By clearly drawing the broad national trends of the transition, while also showing regional differences and uncovering revealing stories and details, Vergara makes historians of Mexico and Latin America aware of the material basis of the social life that we study. Histories in this vein had already been written for other parts of the world, such as E. A. Wrigley's *Energy and the English Industrial Revolution*.[3] However, Vergara tells us that his is the "first energy history of a country other than USA and those of Western Europe" (11) –a needed pioneer in the Global South.

The contents of the book, plus its timing and style, should make it widely read among Latin Americanists –more so if it gets translated into Spanish. Awareness of our current environmental crisis has recently increased in our region; everybody knows about climate change and the idea that we are in a new geological era, the Anthropocene, in which our species has become the main agent of change, is slowly becoming known. Given that the crisis derives from our ability to extract and use fossil fuels, which gave us access to millions of years of photosynthesis, it should not surprise us that many want to know how exactly this came to be. The growth and acceptance of environmental history within Latin American studies, and the parallel 'material turn' in the social sciences, have paved the way for scholars from different walks of life to be interested in the kind of research *Fueling Mexico* presents. That the book is clearly organized, easy to follow, and has great photographs, makes it all the more enticing to read. I would hope that no survey class on Modern Latin America or the region's Twentieth Century will fail to incorporate the findings of this book. Courses on geography or environmental studies of the region will also find it useful. And wouldn't it be great if *chilangos* could visit El Parnaso library in Mexico City, find a cheap but well-designed edition, and go home to learn how our current lifestyle came to be?

There is much we learn by reading *Fueling Mexico* from beginning to end. Vergara explains nicely the limits imposed by the organic energy regime: food and wood allowed only for the existence of smallish cities and made transportation costly: "Costs became prohibitive for many enterprises after a relatively short distance, especially bulky, low-cost goods like grain and wood. […] transportation costs for daily necessities like firewood […] exceeded the item's price after 10–15 kilometers. Similarly, it only took a few dozen kilometers before items like grain and wood required more energy to haul than they contained" (56). It also makes clear how Mexico simply did not have enough coal deposits, in the right places, and of enough quality to effectively replace the sources that had been used for centuries and even millennia. And it makes us aware that oil undergirded agricultural modernization, changes in food consumption, fundamental cultural products such as radio and TV, and even deforestation. Ultimately, any historian can come to reflect how his or her specific topic was affected by the availability and use of different forms of energy. Will

[3] E. A. Wrigley, *Energy and the English Industrial Revolution*. Cambridge University Press, 2010.

histories of social movements, for example, reflect on how population distribution and transportation, which are affected by energy, helped shape aspirations and repertories of protest and negotiation?

Besides having a great potential to impact other types of histories, as the first of its kind, this book suggests avenues that others can pursue to enlarge our understanding of its specific subject. An obvious one is to research the particularities of the energy transition of other Latin American countries (and regions within them), and make comparisons. Big and rich Brazil has everything nature can offer—or almost, since it surprisingly lacks abundant oil deposits. How do Mexico and Brazil's differences in energy endowments affect their historical trajectories? Other scholars have already begun to give clues to answer these kinds of questions by treading the path opened by Vergara. Articles on related topics for Brazil and Chile have appeared recently, and will probably keep appearing, and there is even a new dissertation that zooms into Mexico City's energy transition.[4] Given that Latin America produces around 48% of its electricity with hydraulic sources, as opposed to 15% at the global level, this is certainly a promising area of research, in which some advances are already being made.[5] As in other topics of environmental history, this one should encourage dialogue with other disciplines, such as geology and engineering, and lead to take seriously the role of physical geography in history. In this sense it can be part of recent efforts to build more-than-human histories.

Energy has shaped everything. *Fueling Mexico* ultimately contributes to the greatest challenge of environmental history: to help us –humans– to understand and rethink our place in the world, taking into consideration the many social divisions among us.

[4] Antoine Acker, "A different story in the Anthropocene: Brazil's post-colonial quest for oil (1930-1975)", *Past & Present* n.249 (2020): 167-211; Mauricio Folchi, Gustavo Blanco and Stefan Meier, "Definiciones tecno-políticas en la configuración de la matriz energética chilena durante el siglo XX", *Historia* (PUC), No 52, vol. II (2019): 373-408; Reynaldo de los Reyes, "*Energy transitions, Infrastructures, and Environment in Mexico City, 1910-1970*", PhD Dissertation, El Colegio de México, 2022.

[5] For a recent example see Diana J. Montaño, *Electrifying Mexico: Technology and the Transformation of a Modern* City. Austin: University of Texas Press, 2021.

Comments by Victor Seow, Harvard University

How might placing energy at the center of historical analyses reshape our understandings of the past? In *Fueling Mexico*, Germán Vergara sets out to retell Mexico's history from the mid-nineteenth to mid-twentieth century through a focus on transformations in energy use. The result is a rich and engaging account of how Mexico came to embrace fossil fuels over the course of a century of reform and revolution and how the country was, as a result, remade.

Before I proceed further, I want to express thanks to Stephen Milder for inviting me to participate in this roundtable and to Germán for making my job easier by writing such a terrific book. *Fueling Mexico* was an absolute pleasure to read, and I learned a ton in the process. For historians of energy, it holds, as one writer Germán cites, commenting on the Mexican oil industry in 1919, had put it, "mines of liquid gold."

Fueling Mexico invites us to think more deeply about energy transitions in terms of both universal trends and particular aspects. At the outset, Germán states that the narrative he offers "highlights how a country could fully shift to fossil energy while following a distinct industrial path, challenging the notion of a single pattern of energy transition and industrialization based on Europe or the USA."

As he proceeds to show, Mexico's route toward fossil fuels was indeed different from what is usually taken to be the typical Euro-American trajectory. Although it began, as in the standard narrative, with steam engines, which "allowed Mexico's inhabitants for the first time ever to convert heat into work without a human or animal body," it was notable that the steam engines here mostly burned wood (in the form of firewood and charcoal) and not coal. First introduced to a handful of textile factories and silver mines in the mid-nineteenth century, these steam engines came into popular use across Mexico over the decades that followed, powering a considerable industrial expansion that relied minimally on fossil fuels.

By the 1880s, the continuously escalating fuel demands of steam power would, however, spark a deforestation crisis. It was in this context that Mexico's industrial elite saw in coal a promising substitute. Mexico's coal consumption grew for a few decades thereafter, fed by a combination of rising domestic production in the north and increased imports from the USA, Britain, Germany, and Australia. As compared with many other parts of the world where coal became (and, in a good number of instances, still reigns today as) king, though, Mexico would dethrone this black rock in a relatively short span of time.

On account of the country's massive but geographically concentrated petroleum deposits, which Anglo-American extractive interests began tapping upon the blessing of the Porfirio Díaz government, Mexico underwent an oil boom in the first two decades of the twentieth century. By 1921, it was the world's second-largest petroleum producer. Redirecting exports of this sizeable output to domestic

consumption, Mexico switched from coal to oil as its main energy source for powering industry, driving transportation, and generating electricity, and oil proceeded to flow faster and in greater volumes across Mexican society.

By the mid-twentieth century, Mexico was indisputably fossil fueled. Among the examples Germán gives to illustrate this, one that stuck in my mind was how the widespread electrification that oil enabled allowed for the mechanized and industrialized production of both tortillas—"what was historically Mexico's most important dietary item"—and the maize flour from which it is made. The results, he thoughtfully notes, were checkered. On the one hand, this saved much labor for many poor women, who previously worked on their knees for hours each day grinding maize and cooking tortillas. On the other hand, this came at the expense of much local autonomy in food production, as most Mexicans started relying heavily on big agricultural corporations and increasingly homogenized corn from far away.

In tracking Mexico's energy transitions over the course of a century, Germán succeeds in showing the distinctiveness this process, most notably coal's short stint as an industrial fuel here. At the same time, his account challenges interpretations that completely write off coal as unimportant to the country's energy history. As he points out, Mexican elites, who looked to European and American models of industrialization and were influenced by ideas akin to those of William Stanley Jevons, took coal to be essential for industrial progress. This was particularly so as the fueling demands of mines and factories depleted domestic forests by the late nineteenth century. Coal served, then, as what Germán usefully terms an "energy bridge" between an industrial expansion fueled by wood and water and one powered by oil. At a broader level, this narrative is helpful in encouraging an appreciation for the hold that universalistic notions (such as that which tethered industrialization to coal) can have on local developments even as they are shaped and constrained by them.

Another of the many lessons *Fueling Mexico* has to offer energy historians is the importance of thinking between region and nation. As Germán contends, energy transitions almost always start regionally before spreading nationally. In the case of Mexico, the turn to fossil fuels began first in and around Mexico City and Monterrey. Later, with the switch to oil, it swept across other urban and industrial areas and, following the advent of the Green Revolution, to rural ones, too. Where such changes took off and where they extended to (if at all) were, as he shows, products of regional disparities in environmental conditions, resource endowments, and political significance.

The resultant differences in energy systems have yielded socioeconomic chasms. Much of Mexico's wealth is concentrated in Mexico City and in the north, particularly Monterrey, which is situated near both the coal mines of Coahuila and the oil fields of Veracruz. In terms of per capita income, these areas outpace by a large margin the poorest states, which are mostly located in the south. Where there had been historically more socioeconomic diversity, now there are, as Germán puts it, "two Mexicos." A focus on regional patterns thus reveals foundational features of a

country's energy economy that national aggregates all too easily mask. More generally, this account also underscores just how central fossil fuels have been to concurrent processes of flattening and bifurcating through which the uneven geographies of the modern world are produced and reproduced.

It is admittedly unfair to demand more from a book that already does so much. The rich details and careful arguments within the text rest upon an extensive reading across a range of sources, evidenced by the substantial footnotes, many of which contain useful supplements and fascinating asides. I would, nevertheless, be interested in Germán's further reflections here on at least one set of issues. Throughout the book, he highlights both the fossil transition's mixed socioeconomic results, in which there have been clear winners and losers, as well as its unquestionably negative environmental impacts, which have overwhelmingly affected the disadvantaged. "Genuinely solving environmental and energy problems thus requires addressing social and political issues," he writes toward the end. I am curious as to whether there are ideas of or efforts at social and political reform in Mexico's revolutionary past (even if ultimately unrealized) that he thinks might be recovered for the purposes of imagining the environmental and energy interventions he seeks?

"During the 1850s," Germán writes, "Mexico existed on the boundary between two ages." With great erudition, exhaustive research, and clarity of thought and prose, *Fueling Mexico* demonstrates how that boundary was crossed and the manifold costs and persistent contradictions of the fossil-fueled age.

Response by Germán Vergara, Georgia Institute of Technology

I'd like to preface this response by offering my heartfelt thanks to the reviewers, who so generously took time from their busy academic schedules to engage with my book and think about some of its implications. Their comments and analyses of *Fueling Mexico* are thoughtful and have motivated me to consider new and important questions. While writing is often a solitary endeavor, a published book, as Jorge Luis Borges once said, "is not an isolated being, it is a relationship." I want to thank Stephen Milder for organizing the roundtable and connecting my book with a community of scholars. I'm very grateful for his and their interest in my work.

Ted Beatty's marvelous thought experiment reminded me of the initial stages of writing this book, when it was possible to take it in several different directions. I was interested in a variety of problems, including the relationship between modern economic growth and fossil energy, how the transition to fossil fuels shaped urbanization, and cultural attitudes towards fossil energy and industrialization, among others. While I think of myself primarily as an environmental historian, I also wondered which other historical approaches (cultural, economic, regional) I should incorporate. I chose eclecticism and decided that I wanted to tackle all or most of the problems that interested me through a combination of various approaches. This is not necessarily a claim to originality. The best environmental histories (John McNeill's *Mosquito Empires* or Corey Ross's *Ecology and Power in the Age of Empire*, for example) are characterized precisely by their capacity to blend a variety of themes, fields, scopes, and methods. This is what I was trying to emulate: a history that bridged the gap between material and cultural spheres, economy and politics, and regional, national, and global scales.

I knew that by trying to say something about so many things through a variety of perspectives, I risked a certain level of superficiality. But I accepted the gamble, given that I viewed the book as a kind of first panoramic account of the energy transition. My intention was to write something that could encourage further research and lead other historians to develop more focused treatments, either to confirm, complicate, or even refute my book's findings. In other words, my wish was to begin a conversation, not to have the final word (if that's ever possible in history).

But, to continue with Beatty's thought experiment, what if I had chosen a more focused approach? If I had, say, decided to write an economic history? As Beatty points out, an economic historian might primarily be interested in the question of resource scarcity in the transition to fossil fuels and technological change. While in the book I tried to show the role that wood and water scarcity played in both, my real concern was much closer to that of ecological economics than mainstream economic history, heavily influenced by neoclassical economics. For me, the key issue was to historically examine the environmental limits to "embedded" industrialization (or dependent on local ecosystems) and modern economic growth and to illustrate how only fossil energy was capable of overcoming such "limits to growth" by providing

access to millions of years' worth of photosynthesis. (How much longer modern industrial economies can ignore environmental limits is, of course, a critical question that anthropogenic global warming has put into sharp relief, but that's a different discussion.) Within such a framework, I can also imagine the book contributing (perhaps in the conclusion) to what seems to me is the central question of the twenty-first century: is a "green" industrial society, with its need for endless growth, truly feasible? Or will the transition to renewables require not only phasing out fossil energy but also what "degrowth" literature calls the "growth dogma" in order to become truly sustainable in the long run? My point here is that even as a kind of economic history, *Fueling Mexico* would have likely pursued questions that are not necessarily at the center of the field and much closer to ecological economics, which remains marginal and has not influenced economic history at all, as far as I know.

A global history of Mexico's transition is an exciting idea that I hope someone takes on in the near future. Interestingly, one of the main appeals to writing about the energy transition to fossil fuels was that I soon realized it allowed me to tell a story that took place in Mexico but that had simultaneously been a global process. In this sense, as Beatty notes, every modern energy history inevitably transcends the boundaries of the nation-state. However, a truly global narrative would have required research in several different countries, something out of reach for me as an assistant professor on a tenure clock. What I was able to do was to engage in constant comparisons with other countries and decenter the national story by zooming in on regions and showing how these and not the nation were the original loci of the energy shift. Regions that, it is worth mentioning, had often direct connections with global firms, capital, and markets. In any case, in my view, a global history of Mexico's energy shift would have to go beyond a story "in which every development is entangled with global interactions and influences, the narrative presented as one variation of a global experience," which is something that I think *Fueling Mexico* deliberately tries to do (even if it doesn't fully succeed). A global history would have to, for example, simultaneously tell the story of the adoption of the steam engine in Mexico from the vantage point of textile factories and silver mines in Mexico and the Welsh firms that built the engines. Or tell the story of coal in Mexico not only through sources from Monterrey and Coahuila, as I did, but using the records of the New York investment firms that played a key role in the industry or those of the German, British, and US coal companies that exported coal to Mexico at a critical moment of its Porfirian industrialization.

I would like to address the idea of *Fueling Mexico* as a strictly political and cultural history as well as the thought-provoking questions about how to balance the universal and particular and the insights that Mexico's past transition might hold for the present. Beatty notes that "political decisions and policies were instrumental in this history, but also in a sense irrelevant." I partially agree. Given that the transition happened pretty much everywhere, this conclusion is logical. I've also never found any evidence of a viable alternative path. As we all know, socialist and communist states embraced fossil-fuel industrialization with even more fervor and determination than capitalist ones. And even utopian visions from the late nineteenth

century such as the garden city movement were simply trying to make fossil-powered industrial life more livable, not to replace it. At the same time, I'm convinced that political decisions and policies were instrumental in the *timing* and *pace* of the transition. That is, to the chagrin of historians enamored with contingency, it is very likely the adoption of fossil energy on a vast scale would have happened (the advantages being too many, the enormous downsides largely unknown at the time), but without the full-blown support of the Porfirian state or the post-revolutionary governments, it would probably have taken place later and more slowly. And the timing and pace mattered, just as industrializing "slowly" in the nineteenth century carried all sorts of different implications than doing it at lightning speed in the twentieth.

I thoroughly concur that Diana Montaño's *Electrifying Mexico* is an excellent contribution. I like to think that both books complement each other nicely. It is also hard to disagree that we need more cultural histories of energy. That said, my version of a strictly cultural history of the fossil-fuel transition would have looked very different from Montaño's. While I think there is great value in focusing on energy users and underlining the contested nature of Mexico's electrification because we want to know how people responded to this monumental transformation, my overall impression remains that the capacity of small consumers and common people to shape the long-term process was limited. Regardless of how differently residents and workers imagined and understood electricity or fossil energy, Mexico electrified and adopted fossil fuels in ways similar to other places. Perhaps, and this is a problem that future cultural historians might want to ponder, the capacity of the "norms, habits, and values" of common people to effectively and noticeably shape vast, enormously expensive and technologically complex systems such as modern energy systems is something that needs to be empirically proven in a variety of contexts, rather than assumed from the start. My own hunch is that cultural norms and preferences influenced such shifts more at an early stage and that their effect diminished quickly as the new energy system became more established. For these reasons, my own cultural history would have focused more on how the transition reshaped cultural norms and practices. I hinted at some of these changes, but a more thorough treatment would have examined in detail, among other topics, the cultural implications of how modern energy systems have made energy "invisible" for most people for the first time in history. For one, this reality has severed the connection between people's lifestyles and the effect they have on distant locations and ecosystems. It has also normalized a view, common in modern, industrial societies such as Mexico, that resources and "nature" are something that exist "out there," separate from their lives. I would have also analyzed much more in depth how the fossil-fuel energy regime has entrenched cultural assumptions about modern lifestyles and economies, such as taking for granted perpetual economic growth and viewing it as the historical norm (instead of exceptional) and as desirable and possible in the long run. Another line of inquiry that I find fascinating and would have pursued is what energy humanities scholars call "petro-cultures." They ponder, for example, how modern, fossil-based energy regimes shape gender norms and expectations. Here I think Montaño's book clearly shines substantial light.

Both Beatty and Seow raise similar points about how to balance universal and particular trends in energy transitions and whether insights from Mexico's past can be gleaned to inform today's urgent need for decarbonization. (Leal also wonders about particularities but her focus is Latin America and her framing slightly different so I will discuss her comment below.) I'll address these questions together. Regarding the issue of universality vs. particularity in the modern transition to fossil-fuel industrialization, I think historians should follow the example of archaeologists who study the adoption of farming during the first millennia of the Holocene. They have been able to find the particular in a story that unfolded in broadly similar ways around the world (despite the absence of direct contact among some of these regions, which makes it even more striking than the modern energy and industrial transition, with its global economy and, in the second half of the nineteenth century, emerging worldwide telecommunications infrastructure). The transition to farming as a model to think about modern energy transitions is reasonable if one remembers that for many scholars the adoption of farming and fossil-fueled industrialization are the two most important transformations in human history. Both led to a profound alteration in how humans related to and used the natural environment and to new societies whose basic traits were all similar. However, just as we have become accustomed to seeing the peculiarities of, say, Mesoamerican farming within the common matrix of agricultural societies, we should be able to do the same with, say, Mexico City or Monterrey. Despite both being modern, fossil-fueled industrial cities, anyone can see how different they are from New York or London or Shanghai, or even from each other. Fossil-fuel industrialization may have been a broadly similar global process but the outcomes worldwide have varied substantially. Just like with farming millennia ago. I would also like to note that one of the impulses behind writing *Fueling Mexico* was to universalize Mexico's fossil-fueled industrialization and to show that it was as much part of global industrialization as the Midlands of the Ruhr, rather than some defective version of them, as some scholars had previously suggested.

Does Mexico's past hold any lessons for today's incipient energy transition away from fossil fuels? I agree with the ones mentioned by Beatty, but here I would like to underline what seems to me the most important one: the state mattered. In Mexico (just as in many other cases), the state imposed the transition to fossil energy in the name of "progress," industrial growth, national interest, and other state-centered rationales. Nowhere, as Beatty points out, was the shift to fossil energy solely a market-driven process. Even more, the markets that developed to extract and distribute fossil energy were embedded in the conditions created by states and thus followed the logic of politics. As Karl Polanyi demonstrated decades ago, the "economy" and the state are two sides of the same coin. Since the state was instrumental in the large-scale adoption of fossil energy, this means that the state has the historical responsibility to lead the transition to renewables. In the case of Mexico, with its long history of state-owned energy sources, one can imagine a publicly owned renewable energy sector. Considering the decentralized potential of renewables, such an approach does not necessarily translate into a "green" version of Pemex. It could be a process driven by the federal state but largely controlled by, for example,

municipal governments. Perhaps this would help avoid repeating or at least mitigate the injustices and inequities that characterized the first transition, which (eventually) raised the standard of living of many Mexicans but also created huge disparities among regions that persist to this day.

The entrenched social inequalities of the fossil-fuel regime is something that Gomez and Seow discuss in their review. One of the key interests of the book was to examine who were the main beneficiaries and losers of the transition to fossil fuels. As noted previously, the shift was a process fostered and shaped by the state to favor industrial interests. A somewhat unintended effect of the transition was the creation of a modern and sizeable middle class in Mexico. Fossil energy also exacerbated regional disparities within Mexico and solidified a stark divide between industrial, fairly affluent areas (the Valley of Mexico, Monterrey, parts of the North and the West) and poor, heavily indigenous ones concentrated in some areas in Central Mexico and especially in the South. As Seow writes, one of the lessons of Mexico's transition "is the importance of thinking between region and nation."

These disparities continue today. Not only in regional and economic terms, but also in the differential impact that fossil fuel extraction, processing, and use have on, to employ Gomez's term, people's bodies and wellbeing. For example, the inhabitants of the city of Tula, 100 km north of Mexico City, are exposed to one of the most toxic environments not only in Mexico but, according to a 2006 UN report, the world. The extraordinary levels of air, water, and soil pollution result from the fact that Tula is the location of a huge oil-fired thermoelectric power plant, one of the biggest refineries in Mexico, and (energy intensive) cement-producing industries. One state governor described the area as an "ecological hell." In other words, Tula finds itself at the center of Mexico's fossil-based regime. But its largely low-income, poorly-educated population reaps few of the benefits of fossil wealth and most of its burden. In addition to having become a "cancer alley," Tula's inhabitants suffer from a variety of respiratory, skin, and neurological ailments. It is, to use historian's Christopher Jones's term, a "sacrifice zone." There are many Tulas in Mexico, where toxicity, poor health, and poverty are all connected to fossil fuels.

The continuing dominance of fossil energy in present-day Mexico is somewhat puzzling, as Gomez mentions, given the risk that climate change represents for Mexico and the considerable political changes of the past few years. To me, nothing illustrates the cultural and economic power of fossil fuels in Mexico more than the fact that it spans the right-left divide in the political spectrum. *Fueling Mexico* sought to show how this "consensus" on the need for fossil fuels and its rhetorical connection with prosperity, national sovereignty, and Mexican identity goes back to the early decades of the twentieth century. Which may explain why, rather than challenge it, the arrival of the first center-left government in decades has revitalized the "consensus," supporting fossil energy so forcefully and reviling renewables so routinely and effectively that one imagines Republican officials on this side of the border looking on with admiration. Mexico's current climate and energy policies are so regressive that the research and monitoring group Climate Action Tracker (CAT) rated the country's

2022 updated emissions targets for 2030 as "critically insufficient," the worst possible rating. The new targets breach both the Paris Agreement, signed by Mexico, and the country's own laws. This also happens in other parts of Latin America, a phenomenon I have described elsewhere as the "fossil left." My impression is that this attitude is rooted in a conspiratorial belief (which dates back to the 1970s) that environmentalism is a sort of Trojan horse from rich nations to stall Latin America's "development." In any case, this love affair between left-wing politics and fossil energy in Latin America is a phenomenon that warrants more research given that it goes against the strong connection in other regions of the world between right-wing ideologies and fossil fuels. (The fact that the current and incipient efforts by the leftist governments of Colombia and Chile to break the spell and move away from fossil fuels are seen as a new form of left-wing politics just confirms how ingrained such attitudes remain on that side of the political spectrum.)

Which brings me back to the question of particularities. In her comments, Leal remembers how John McNeill, in the epilogue he wrote for a collection of essays edited by herself and others on the environmental history of Latin America, brought attention to the absence of a chapter on energy and remarked: "Unlike most regions, Latin America relied on biomass until it relied on oil and hydropower […] Due mainly to quirks in geology, there was no coal age, no 'king coal' in Latin American history." "In this manner," Leal explains, McNeill "pointed out that there was a key topic that needed attention." It's significant that Leal mentions McNeill because few environmental historians have shaped my own work as much as he has. Two books stand out: *Something New Under the Sun: An Environmental History of the Twentieth-Century World* (2000) and *The Great Acceleration: An Environmental History of the Anthropocene Since 1945* (2015). These works (along with several of his articles) convinced me of the centrality of energy and fossil fuels in the emergence of the modern world. A less obvious but equally important lesson that I learned from McNeill and took to heart was the virtue (or maybe obligation?) as historians of writing with clarity and without unnecessary jargon. Finally, as one of the editors of the environmental history series at Cambridge University Press, McNeill played a direct role in the publication of *Fueling Mexico*.

Leal suggests that an obvious line of research for future energy historians of Latin America is to study "the particularities of the energy transition of other Latin American countries (and regions within them), and make comparisons. Big and rich Brazil has everything nature can offer—or almost, since it surprisingly lacks abundant oil deposits." This might be obvious but I concur with Leal that it is absolutely necessary. I tried to offer some initial comparisons between Mexico and the rest of Latin America, but far more needs to be done if we want to have a comprehensive understanding of the role that energy has played in Latin American history, one that matches the academic literature on Europe and the US. This type of research can move in two main directions. We need histories of transitions focused on individual countries, but the region's historiography would also greatly benefit from a Latin American history of energy. My understanding is that there is one in the works (by Antoine Acker and his collaborators in Geneva), although the focus might

be solely on oil. If so, hopefully some adventurous and ambitious scholar will in the future tackle a joint history of all fossil fuels across the region. Not to mention the need for histories that trace the story of fuelwood and other "traditional" energy sources from the colonial (and perhaps even pre-colonial) period until the present day. As is well known, with its still vast forests, many millions of Latin Americans continue to rely on fuelwood for a variety of domestic uses, another peculiarity of the region's energy history.

Leal also writes that "[g]iven that Latin America produces around 48% of its electricity with hydraulic sources, as opposed to 15 percent at the global level, this is certainly a promising area of research, in which some advances are already being made." While this figure mostly reflects Brazil and, to a lesser degree, countries such as Colombia (Mexico generates a mere 11 per cent of its electricity with water), Leal's point is well taken and should bring the attention of scholars to another distinctiveness of Latin America. In addition to the fairly unique story of coal in the region; the widespread persistence of fuelwood and other "traditional" energy sources among large segments of its population; and the prominence of hydropower; some countries of Latin America (Costa Rica and Uruguay, for example) have been at the forefront globally in the transition to renewable energy. Historians should have something to say about why this has been the case.

Once again, I would like to warmly thank all the reviewers and Stephen Milder for contributing and organizing this roundtable. It is opportunities like this that makes writing a history book worthwhile. Thank you.

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