H-Diplo ROUNDTABLE XXVI-31

Victor Seow, *Carbon Technocracy: Energy Regimes of Modern East Asia*. Chicago: University of Chicago Press, 2021. ISBN: 9780226826554.

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Introduction by Dagmar Schäfer, Max Planck Institute for the History of Science, Berlin

In *Carbon Technocracy*, Victor Seow takes readers on a journey through the vast open-pit mine of Fushun to illustrate how four different governments—Meiji Japan, the Stalinist Soviet Union, the Chinese Nationalists, and finally the Chinese Communists—each pursued their vision of a modern coal-powered state. From the aftermath of the Russo-Japanese War (1904–1905) to the 1960s, these states mined the earth beneath Fushun to fuel their steel and iron industries, laying the groundwork for a vision of modernity that was driven by a continuous flow of energy for transportation and manufacturing. Steamships, railroads, highways, and the vehicles that traversed them, all needed coal. But behind this industrial endeavor local archives reveal countless individual stories which were masked by the impersonal machinery of the state. In ten of the twenty-five photographs included in the book, we catch glimpses of those who shaped this history: Japanese engineers, Soviet managers, and Chairman Mao Zedong, as well as the local mine workers, whose faces reflect a mixture of hope and hardship.

Seow's *Carbon Technocracy* presents a compelling argument: regardless of their differing ideological visions—colonial, socialist, republican, or Communist—the states that governed Fushun displayed strikingly similar behaviors at the local level, particularly when viewed through the lens of the mines. Seow uses the term "technocratic" to describe this continuity, as leaders across regimes believed that extracting sufficient coal would secure national power and societal prosperity, even though this vision rarely translated into benefits for the local population (8). Fushun's landscapes were devastated, its laborers exploited, and its future mortgaged, all in service of these states' aspirations for modernity. For those states, coal was always more than an energy source; it became a foundation for economic strength and a prerequisite for securing influence and participation in the local and global power struggles of the era.

Four insightful reviews—two by American historians and two which add a global and Asian perspective—highlight the richness of Seow's analysis of energy, environment, and coal in Manchuria. Each review brings a unique angle, and I recommend reading them in the following order for the most informed assessment of *Carbon Technocracy*. Miriam Kingsberg Kadia's review provides the clearest summary of the book's content, followed by Christopher Jones's assessment, which emphasizes its novelty within the growing literature on energy and environmental history. Megan Black's analysis adds depth with a comparison with U.S. politics, while Fa-ti Fan's comment envisions Seow's contribution as paving the way for a future historical narrative where lithium and battery production might replace the current focus on carbon-based fuels.

The reviewers respond to different aspects of the book. Black notes the "astonishing continuities" that highlight how different actors across borders sought to "metabolize" coal. She praises Seow's "prismatic, multihued, and multilingual" narrative that interweaves capitalism, energy, labor, and environmental history. Jones appreciates the vivid language and images, which include striking portraits of immense coal mines, grimy workers, and stern technocrats, that bring the narrative to life. Fan situates Seow's work within a long-term historical context, seeing it as an exemplary piece of trans/international history, while Kingsberg notes that Seow "wisely chooses not to focus heavily on the typical angle of transnationalism, instead grounding the book within a broader global context of political and technological development."

This range of interpretations reflects the multifaceted appeal of Seow's study. Depending on the reader's perspective, *Carbon Technocracy* can be read as either more or less centered on regional history.

The state and labor in the mines are central themes in Seow's long-term historical narrative. Kingsberg notes the diversity of state actors—from Qing officials and the South Manchurian Railway Company (a proxy for Japanese imperialism) to Soviet occupiers and China's Nationalist and Communist Party leaders, all of whom governed Fushun from a distance. Black points to the "various officials" as well and the unseen "structures driving coal extraction." Jones views the state through its policies, which were executed by engineers who transformed imperial dreams into mining projects. For Fan, the state's role in making Manchuria a laboratory of energy modernity was less about nation-building than an inspiration for thinking about shifting developmental agendas within international capitalism.

Alongside these varying depictions of the state, the second key theme is the experience of labor in the mines; how local people endured relentless physical and psychological exploitation. As Black notes, workers faced multiple layers of violence: grueling physical toil in the mines and oppressive ideological regimes. Men, women, and even children wielded picks, operated enormous pumps, and loaded coal carts. In his response to the reviews Seow emphasizes that safety concerns were paramount in local archival accounts, reminding us that, for many, the work in Fushun also offered a glimmer of hope as people sought refuge from war, famine, disease, or simply the harsh cold. The Fushun Museum commemorates these memories of hardship and perseverance, celebrating a place where people once found sanctuary and searched for a better future.

All the reviewers acknowledge Seow's engagement with the work of Timothy Mitchell.[1] However, Seow takes an almost opposite approach in his exploration of the relationship between energy and the state. For Mitchell, the sociopolitical form, i.e., liberal democracy in the US, is shaped by the exploitation of external energy resources locally and globally. Seow, in contrast, takes the mines as his starting point and expands on Mitchell's treatment of fossil fuels as if they were natural givens. Furthermore, Seow's analysis highlights forcefully that while states may select their materials (and source of energy), these materials, in turn, condition the local nature of the state. His notion of state technocracy is particularly rooted in the local dynamics of Fushun, making it more comparable to other coal extraction hubs such as Germany's Ruhr region before and between the World Wars or modern-day New South Wales in Australia, rather than to other contemporary regions under Japanese, Soviet, the Chinese Republican or Communist party rule. In other parts of East Asia, such states during the same period acted and looked very differently as they engaged with different materials, such as cotton or silk, as the main generators of wealth and focused on issues such as social justice or literacy reforms. *Carbon Technocracy* is a powerful reminder of the multifaceted nature of states. They are neither uniform entities nor all-encompassing structures. Instead, Seow compels us to see the state as a dynamic conglomeration of local characteristics, interests, and goals. Technocracy, in Seow's framing, is thus less about a politically dominant elite imposing technological principles on society and more about the act of defining energy, environment, material, labor, and expertise.

[1] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (Verso, 2011)

For a historian of technology like myself, Seow's key contribution lies in moving discussions of energy beyond infrastructure networks for energy (à la Thomas Hughes) while showing that all materials are indeed technologies.[2] That is to say, coal, to serve as a resource, requires significant processing. Coal is usable because people build large infrastructures around it. In this regard Seow is best appreciated and read together, not On Barak's, *Powering Empire* but also Arunab Gosh's research on Small Hydropower and Dana Simmons's analysis of technologies of measuring labor and calorimeters,[3] all of which tackling how people locally and globally integrated natural resources, economics, labor, and governance.

Seow concludes his account in the early 1960s, when millions of Chinese were digging for ore and coal, producing iron in backyard furnaces during the Great Leap Forward (1958–1962). 1960 is a crucial date, because this marks the moment when the ideological weight coal once carried began to dwindle even though it remained a key resource for decades. By the time that Mao Zedong met with Secretary of State Henry Kissinger in 1973, coal had lost its weight. No longer striving for a Western-style modernity, Mao had confidently redefined Asia's position as part, if not leader, of what was then known as the Third World. New, intangible visions of global order were taking shape.

Contributors:

Victor Seow is a historian of technology, science, and industry, focusing on China and Japan in their global contexts. He works at Harvard University, where he is the John L. Loeb Associate Professor of the Social Sciences in the Department of the History of Science. His book, *Carbon Technocracy* (University of Chicago Press, 2022), which is the subject of this roundtable review, has received several prizes in different fields, including the Association for Asian Studies' John Whitney Hall Book Prize, the Chinese Historians in the United States' Academic Excellence Award, and the Society for Historians of American Foreign Relations' Michael H. Hunt Prize for International History. Victor is currently writing a book that explores the relationship between science and work through a transnational history of industrial psychology in China.

Dagmar Schäfer is the Managing Director of the Max Planck Institute for the History of Science, Berlin. She is the author of *The Crafting of the 10,000 Things: Knowledge and Technology in Seventeenth-Century China* (University of Chicago Press, 2011), which received the Pfizer Award and Joseph Levenson Book Prize. Her recent publications include a workshop volume entitled *Ownership of Knowledge: Beyond Intellectual Property* (MIT Press, 2023). Schäfer is currently co-editing the three volumes of *The Cambridge History of*

[2] Thomas P. Hughes *Networks of Power: Electrification in Western Society, 1880–1930* (John Hopkins University Press, 1993)
[3] On Barak *Powering Empire: How Coal Made the Middle East and Sparked Global Carbonization* (University of California Press, 2020); Arunab Gosh, "The Significance of Small Things: Small Hydropower in the People's Republic of China, 1949–1983," *Comparative Studies in Society and History*. Published online 07 November 2024:1-28. DOI: 10.1017/S001041752400029X; Dana Simmons, *Vital Minimum: Need, Science, and Politics in Modern France* (University of Chicago Press, 2015).

Technology. In recognition for her contributions to new approaches to cultural studies and global history, she was awarded the Gottfried Wilhelm Leibniz Prize by the DFG (German Research Foundation) in 2020.

Megan Black is an Associate Professor of History at the Massachusetts Institute of Technology. Her research focuses on US environmental management and foreign relations in the late nineteenth and twentieth centuries She is the author of *The Global Interior: Mineral Frontiers and American Power* (Harvard University Press, 2018), which garnered four prizes in different subfields, including the George Perkins Marsh Prize from the American Society of Environmental History, Stuart L. Bernath Prize from the Society for Historians of American Foreign Relations, W. Turrentine-Jackson Prize from the Western History Association, and the British Association of American Studies Prize.

Fa-ti Fan is a Professor of History at SUNY Binghamton. He has published widely on science and modern China and on the global history of science. He is currently the President of the History of Science Society.

Christopher F. Jones is an Associate Professor of History at Arizona State University. He is author of *Routes of Power: Energy and Modern America* (Harvard University Press, 2014) and is completing a book manuscript on the invention of the idea of infinite economic growth.

Miriam Kingsberg Kadia is a professor of modern Japanese history at the University of Colorado Boulder. Her first book, *Moral Nation: Modern Japan and Narcotics in Global History* (University of California Press, 2014), won the Eugene V. Kayden Book Award. Her second book, *Into the Field: Human Scientists of Transwar Japan*, was published by Stanford University Press in 2020. Her new book project explores time accounting and time use in the twentieth century.

Review by Megan Black, MIT

Victor Seow's thrilling new book, *Carbon Technocracy: Energy Regimes and Modern East Asia*, offers a multiplicity of routes between fields that often move along in parallel rather than in a connected way. In my accounting, those fields include the history of science and technology, East Asian history, the history of capitalism, labor history, energy history, global history, and environmental history. There is so much to celebrate in a work that is as prismatic, multihued, and multilingual as *Carbon Technocracy*—thankfully the other discussants in this forum can help cover this ground. In my review, I will focus attention on the last two fields, which reflect my own grounding in US environmental history with an interest in the global context. Environmental and global scholarship has taken up different questions about the processes that converged forcefully in Fushun's coal mines, including how official planning for natural-resource developments impacted local and global environments; how different actors legitimized seizing and remaking material landscapes over time and space; and the interaction between top-down and bottom-up processes mediating between ideas, bodies, and nonhuman assemblages at widening scales.[1] Seow picks up these threads and offers fresh insight—all with an eye to lessons for our urgent present.

First, Seow reveals astonishing continuities, as different actors across borders sought to "metabolize" coal (in the Marxian sense, at the interface of human and nonhuman nature) in Fushun in Manchuria. Nations and empires laid siege to the operations there across decades from the late-nineteenth to the mid-twentieth centuries. At critical junctures, newly arrived authorities decided to continue building on the foundations of earlier projects, leading Seow to argue for the consideration of "what kinds of edifices" were built, and may continue to be built, on the foundation of coal (25). The constancy of this purpose is all the more astonishing for the messy geopolitical contestation over Fushun. Numerous elite planners sought to harness natural resources for different ends. The Manchu Qing prohibiting the mining of "dragon veins" (36) between ancestors' graves was the exception, for those veins were tapped: by the Chinese and Russian business interests that initiated turn-of-the-twentieth-century mining operations (chapter 1); in the Japanese seizure of that railway/coal corridor in 1905 (chapters 1 and 2) and subsequent wholesale invasion after 1931 (chapters 3 and 4); in the short-lived Chinese Nationalist reconstruction period (chapter 5); and through the Chinese Communist takeover (chapter 6) that made coal power the foundation of the socialist project. Throughout incremental shifts and large-scale regime changes, the technocrats' dream of rearranging the material world to their liking carried forward. Officials galvanized a near-constant scaling up & out of production. Unearthing coal at this pace had an incredible human toll, a point that is evident in

[1] As just a sampling, see James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (Yale University Press, 1999); Jessica Teitsch, B. *Engineering Nature: Water, Development, and the Global Spread of American Environmental Expertise*; Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (Verso, 2017); Julia Irwin, *Catastrophic Diplomacy: US Foreign Disaster Assistance in the American Century* (UNC Press, 2022); Thomas Robertson, *The Malthusian Moment: Global Population Growth and the Birth of American Environmentalism* (Rutgers University Press, 2012; University of North Carolina Press, 2011); Megan Black, *The Global Interior: Mineral Frontiers and American Power* (Harvard University Press, 2018); Timothy Mitchell, *Rule of Experts: Egypt, Technopolitics, and Modernity* (University of California Press, 2002); John R. McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914* (Cambridge University Press, 2010).

the underground mining explosion that killed nearly 1000; the murders of workers and technicians who were deemed threats and potential subversives; and a stream of casualties, illness, and injury wrought by waning safety standards and the slower violence of environmental catastrophe.

Throughout, Seow asks about the shifting nature of violence in this body-grinding work. One question posed involves legitimation. How was it that officials of different stripes justified the earth-moving transformations and bodily tolls? There is no doubt that the technological change that exacted more and more efficiency from the comparatively small, portable input of crystallized carbon recommended itself at a time of increasing industrialization: mobility, illumination, warmth, and an alleviation of drudgery. Seow skillfully analyzes this technoscientific specificity. But Seow also illuminates the cultural work that was necessary to legitimate carbon technocracy, to make coal expansionism seem so natural. Thanks to Seow's vivid prose, the reader encounters the many devastating byproducts—the smoke and grit, the illness, injury, and death—as regular inputs and outputs of the mining process. Such perils might have stayed the pick or excavator, but they rarely did. And we see numerous ways that historical actors in China, in parallel with those in US and other nations, justified their errand with discourses around what technocrats presented as obvious good. We see an array of ideas that rode along with chemical and technical understandings of coal—its grade, concentration of carbon along a scale from lowly lignite to multipurpose bitumen to rarified anthracite.

These ideas crystalized around the central refrain of thought: coal was fundamentally inexhaustible and urgently necessary. Notions of its "inexhaustibility" naturalized not only the extraction of coal, but the *immense and growing scale* of extraction. Over time, this faith in inexhaustibility endured, even as the different regimes tailored different metaphors to distinct state projects. We see this in occupying Japanese leader Kubo Tōru's likening of coal to the locally significant Dao, the "hub" around which other life-giving industries could abound, in a bid for legitimacy, as well as in Chinese Nationalist leaders' offering of a more firmly biological comparison of coal to "sinews" holding together the true body politic (168, 220). These tantalizing examples make me wonder about cultural products more broadly, or the imaginative worlds outside of Fushun that understandably do not appear across the pages in great depth. To what extent were other dreams available and in popular circulation, whether in China, Japan, or Russia?

A second question Seow asks of the human and environmental violence emanating from extraction concerns the structures that drove it. Many historians of environment and empire have assumed that such devastation in the capitalist political economy was promoted by Western political institutions. Excellent works, such as Thomas Andrews' *Killing for Coal*, underlined this foundational violence underpinning capitalist industrialization and alongside it, modernity itself.[2] Building from Christopher F. Jones' invaluable framework for understanding the physical costs of infrastructure projects associated with nation-building as "landscapes of intensification," Seow offers "warscapes of intensification" (11, 186).[3] Here, he distinctly flags the ramp-up in militarism in Manchuria with the launch of the Second World War that culled materials from hinterlands to service far-flung operations. Looking to the global context, one sees

[2] Thomas G. Andrews, *Killing for Coal: America's Deadliest Labor War* (Harvard University Press, 201).
[3] Christopher F. Jones, *Routes of Power: Energy and Modern America* (Harvard University Press, 2014).

how Seow's attention to such earthshattering earth-moving operations at Fushun reminds scholars of extraction that it was not confined to capitalism. Instead, the violence issued forth from distinct political and economic modalities, one layered atop the other, over and over again.

The starkest comparison is possible across the capitalist/communist divide. Like the work of globally minded environmental scholarship, including Kate Brown's *Plutopia*, Bathsheba Demuth's *Floating Coast*, geographer Julie Klinger's *Rare Earth Frontiers*, and scholars of international development schemes, Seow shows far more of continuity across the seeming opposites than difference.[4] The continuity also spans democratic and anti-democratic political institutions, a point that is evident as Seow nods heavily to Timothy Mitchell's pathbreaking frame of "Carbon Democracy" in outlining this new modality.[5] Leaders across these apparent divides similarly insisted upon the necessity of coal. Coal, they argued, was necessary to underwriting the abundance desired for different distributive ends—private accumulation on the one hand, and the socialist project on the other, but also to wildly different geopolitical ends, whether in service of Japanese militarism or Chinese nationalist reconstruction.

Thus, Seow shows with his layered, multinational history of one mining region that the common denominator was a dogged commitment to fossil-fuel expansionism. This shared substance across political-economic structures, in turn, suggests the immense size of the challenge in lessening fossil fuel dependence the world over. Among officials with loyalties to different political-economic projects, the unquestioned variable was growth itself. Production must increase because consumption could and must increase, the circular but steadfast logic went. Seow helps bring to the forefront this unchecked assumption of carbon technocracy. With this deep sedimentation, with the vertical reach of carbon technocracy, to what extent did actors on the ground come close to rearranging the terrain? What lessons from the people on the ground are most salient for thinking with the challenges of the ever-renewing present? Like the pressure, heat, and time that metamorphosed organic life into coal, what are the elements of more-than-human history that, if aligned, may have presented the optimal conditions to disrupt carbon technocracy's harmful continuity? With this question about layered histories, I wonder about examples from the book, from the uprisings, contestations, and debates to the near misses and alternate visions: what was the most promising path not taken envisaged outside of the growth mindset that drove it?

Seow succeeds in his ambitious errand to show the world in the mine. This world is not only evident in the geopolitical scrum over Fushun, but in the people on the ground, bathed in smoke—the workers moving through dark tunnels or across the pits, artists encountering the space with terror and curiosity, households risking life and limb for a bed warmed by coal, and—in a powerful motif throughout the book—the people taking solace from the drag of a cigarette, in some cases, the last one. Some who lived with this smoke had easy transit out of it, for example, the Japanese engineers whose superior electric lamps could guide them to

[4] Some examples include Kate Brown, *Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters* (Oxford University Press, 2015); Bathsheba Demuth, *Floating Coast: An Environmental History of the Bering Strait* (W.W. Norton, 2019); and Julie Michelle Klinger, *Rare Earth Frontier: From Terrestrial Subsoils to Lunar Landscapes* (Cornell University Press, 2017); David Engerman, *The Price of Aid: The Economic Cold War in India* (Harvard University Press, 2018).

[5] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (Verso, 2012).

safety through the darkness and smoke (113). Though Seow helps us see such engineers in their privileged paths in and out of the mine, he also challenges us to stay with those who did not live in such comparative luxury. He goes to considerable lengths to insist that the structure of carbon technocracy, which is undoubtedly a top-down configuration, is inextricable from the people shaped by and shaping the earthly crucible at Fushun. The lessons for environmental justice are clear: the human and environmental tolls were far too great, but were also unwaveringly justified.

One of the lasting lessons I will take from a book that is inundated with them is that repairing a world torn asunder by fossil fuels will take more than making room for "bottom-up" perspectives. As Seow suggests in the final pages, leaders must invite input on-the-ground in "formulating and framing what exactly the problems are to begin with" (323). The called-for transition to renewable energy opens up new questions about how people whose bodies are on the front lines of extraction will interact with other commodities. Seow's work is understandably focused on coal, and indeed, an assessment of the interconnection of coal and other commodity chains, including iron, copper, molybdenum, zinc, lithium, and rare earths mined—commodities of longstanding importance to the sinews of modernity but with growing importance to clean infrastructures that can harness wind and solar power, is well beyond the scope of the project. Nonetheless, Seow's applying his considerable insights on extraction to bear on the question of other commodities that are vital to lessening global dependence on coal would be welcome. What rules of carbon technocracy may still apply to emerging sectors that are premised on phasing out carbon? How might the different conditions of materiality, labor, and environment in other kinds of mining shape different futures? Such extrapolations may indeed be crucial if governments and societies are to escape the "deep seam of unfreedom" at the heart of carbon technocracy (323). Seow has done a tremendous service in getting to the foundations of that formidable but crumbling edifice.

Review by Fa-ti Fan, SUNY Binghamton

Ambitious and wide-ranging, *Carbon Technocracy* is an impressive historical study that addresses important contemporary issues. The core of the book is a close examination of the Fushun colliery in Manchuria, which was once the largest open-pit coalmine in the world, from the 1900s to the 1950s; that is, from the late Qing period, through the Japanese empire, to the Communist takeover.

This is a rich topic. Manchuria was both a borderland and a laboratory of modernity. A parade of states and other powers claimed political and economic authority over various parts of the area. The politics of natural resources, economics, labor, and technology constitutes the central concerns of Seow's investigation, with an emphasis on the crucial role of technocracy and developmentalist states in the formation and management of modern energy regimes. He argues that the two—technocracy and carbon energy regimes—reinforced each other and formed a feedback loop or even a spiral that led to an ever-increasing demand for natural resources and a deepening dependency on technocracy. The technocratic logic of productivity, efficiency, control, and extraction worked with various states which were active in the region despite their declared political and ideological differences (for example, scientific imperialism, military colonialism, state nationalism, and Communism). The case of Fushun therefore serves as a palimpsest of human and geological history, an embodiment of global currents, and an allegory of carbon modernity.

In some ways, the book intersects with several recent studies on science and technology in modern Asia, particularly Grace Shen's *Unearthing the Nation*, Shellen Wu's *Empires of Coal*, and Ying Jia Tan's *Recharging China in War and Revolution*.[1] Seow's study benefits from these and other earlier books on related topics (notably Timothy Mitchell's work), but it impresses by its breath and depth.[2] The book condenses a remarkable amount of information and integrates a variety of approaches. It contains a large cast of historical actors, including politicians, administrators, engineers, and miners. The narrative weaves together the history of technology, political history, environmental history, and socio-economic history. I have never visited Fushun, but after reading the book, I feel that I spent years there, witnessing miners wielding hoes, gigantic machines pumping water, and carts of coal rumbling by.

It should be noted that the geographical range of the book extends beyond Manchuria, to China and Japan, and, following transnational or comparative themes, to Britain, Germany, and the United States. Thus, the book is a fine example of trans/international history as well as of what has been called glocal history. *Carbon Technocracy* also contributes to diplomatic history. I highlight three relevant themes below.

First, the book is about the technopolitics of energy resources and the political might that was needed to possess them and that came with them. Since this issue is at least as relevant today as it was in the 1930s, what the book has to say about the Japanese empire and the Chinese states also speaks to many urgent

[1] Grace Yen Shen, *Unearthing the Nation: Modern Geology and Nationalism in Republican China* (University of Chicago Press, 2014); Shellen Xiao Wu, *Empires of Coal Fueling China's Entry into the Modern World Order, 1860-1920* (Stanford University Press, 2015); Ying Jia Tan's *Recharging China in War and Revolution, 1882–1955* (Cornell University Press, 2021).
[2] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (Verso, 2012).

matters today. The intense competition for the control of modern energy resources involving coal, oil, nuclear fuels, and now battery metals such as lithium and cobalt has been a salient part of international geopolitics since the late nineteenth century. As Seow argues, Japan (and China) regarded coal not simply as a key ingredient of industrialization, but also a strategic resource for national survival. Similarly, the intense language about "the scramble for battery metals" today highlights the entanglement of power politics, international order, global capitalism, and the environment. In this respect, the difference between the resources for producing energy and for storing energy is small.[3] The location and deposits of resources are a matter of geological luck (or curse, as they can as easily bring misfortunes as wealth to the area), but this is precisely where diplomacy and international politics, including such notions as sovereignty, territory, and extraction rights, come in.

Second, the concept of carbon technocracy is mainly about the management of resource extraction and distribution, which requires certain expertise and institutions aimed to impose a structure and flow on a socio-natural environment, often on a massive scale. Expanding that concept to what may be characterized as "energy technocracy" gives us a way to talk about the circulation and implementation of knowledge in managing energy regimes, from fossil fuels to renewable sources.[4] Since such expertise and institutions are both national and inter/transnational, there is always a diplomatic dimension to them. There is indeed much to learn from the example of coalmining in Manchuria, not least because most scholarship on energy resources has focused exclusively on the actions of the Western powers.

And third, the expertise, knowledge, and socio-material organization of energy exploration, extraction, and distribution builds on the foundation of scientific knowledge and technology. Therefore, science and technology have to be a significant part of any geopolitical history of industrialization as they have helped shape modern energy regimes. Indeed, science and technology have to be an integral part of many aspects of diplomatic history, more so now than ever. The voracious thirst and competition for new strategic minerals proves this point. Lithium, cobalt, and rare-earths mining in Latin America, Africa, and Asia are growing rapidly, and the power politics and diplomacy involved in the control,[5] production, and

[3] Steve LeVine. "The Great Battery Race." *Foreign Policy* 182 (2010): 88-95. Clare Church and Alec Crawford. "Minerals and the Metals for the Energy Transition: Exploring the Conflict Implications for Mineral-Rich, Fragile States," *The Geopolitics of the Global Energy Transition* (2020): 279-304. Marina Yue Zhang, "The Highly Charged Geopolitics of Lithium," *East Asia Forum*, 1 March 2023; https://www.eastasiaforum.org/2023/03/01/the-highly-charged-geopolitics-of-lithium/; Crawford, Nicholas, and David F. Gordon. "The Geopolitics of Greenflation." *Survival: Global Politics and Strategy*, *64* (2022): 91-112; Chris Arsenault and Philippe Le Billon, "Internal DND Study Calls Green Technology minerals 21st-Century 'Oil Weapon'," *CBCNews*, 20 June 2022, https://www.cbc.ca/news/business/green-transition-minerals-oil-weapon-1.6489196.

[4] Daniel Macmillen Voskoboynik and Diego Andreucci, "Greening Extractivism: Environmental Discourses and Resource Governance in the 'Lithium Triangle'," *Environment and Planning E: Nature and Space* 5, no. 2 (2022): 787-809; African Natural Resources Management and Investment Centre, "Approach Paper towards Preparation of an African Green Minerals Strategy;" https://www.afdb.org/en/documents/approach-paper-towards-preparation-african-green-minerals-strategy.

[5] Sam Howell, "Latin and South America Are a Key to the United States' Critical Minerals Puzzle," *The Diplomat*, 5 May 2023. https://thediplomat.com/2023/05/latin-and-south-america-are-a-key-to-the-united-states-critical-

distribution of these materials, made necessary by new technologies, rivals the intrigues of the brutal Korean TV drama Squid Game. In light of this, the recent scholarly interest in science and technology diplomacy is a welcome development.

Carbon Technocracy ends with a look at the present state of the Fushun colliery. It is not pretty: the scarred earth, the gaping holes, the dark gurgling streams, the half-exhausted mines, the abandoned structures, the depressed economy. It is a metonym of carbon technocracy and of its consequences. It is also a reminder to be cautious about the current headlong rush to mine new critical minerals. Admittedly, there is a pressing need for materials that are vital to the green technologies that available to us. Yet, precisely for this reason, it is necessary to break away from the faulty logic of "energy technocracy."

minerals-puzzle/; Anon, "Latin America Could Become This Century's Commodity Superpower," *The Economist*, 8 August 2023; Cullen S. Hendrix. *Shift to Renewable Energy Could be a Mixed Blessing for Mineral Exporters*. Peterson Institute for International Economics, No. PB22-1. 2022; See also the Wilson Center's Lithium Triangle Initiative. https://www.wilsoncenter.org/collection/lithium-triangle-initiative.

Review by Christopher Jones, Arizona State University

I'd like to open my comments by thanking the H-Diplo network for its work in promoting the roundtable review format. It has been such a good model that Jacob Hamblin borrowed it for H-Environment over a decade ago. I valued reading those roundtables so much that I agreed to take over as editor from 2014 to 2019. I loved the fact that reviewers did not have to follow the conventional book review format and could branch out to explore topics in greater depth and engage the author in a meaningful intellectual discussion. It also offers the chance to write in a different style. Be bold, I advised my reviewers during my time as editor. Embrace the freedom to create your own structure, I told them. Have fun, I wrote.

Advice, we all know, is cheap. Now that I am on the other side of the table, of course, being clever, creative, and fun seems a much taller task. Fortunately, it is made much easier by having a great book to review. Since my connection to this book is largely as a historian of energy, my comments and questions will focus on what I think the book contributes to that field of inquiry. I'll do so by starting by highlighting what I found most interesting, discussing its contributions to energy history, and concluding with some questions that I hope Dr. Seow addresses.

At the outset, some words of praise are certainly in order. *Carbon Technocracy* is a delightful work of history. It takes a topic of profound importance—the linking of the nation state to the ever-increasing consumption of fossil fuels, for better and often for worse—and explores it in a place of vital importance for both the past and the present—East Asia. It does so with writing that is clear and engaging throughout and punctuated with powerful sentences that drive home the argument. A special note should be made of the wonderful images that enliven the narrative—stunning portraits of giant coal mines, sooty workers, and stern-faced technocrats. The depth of research is a testament to Seow's impressive skills and hard work, spanning archives in multiple countries and sources written in multiple languages. The book succeeds at what I see as its central ambition: to show that we can gain deep understanding of the modern world through examining what happened when dreams of state power tapped into Fushan's cornucopia of coal. It is a first-rate piece of scholarship and a major accomplishment.

Carbon Technocracy contributes to at least three trends in the field of energy history, an area of inquiry that has made remarkable strides over the last couple of decades. After a surge of interest in the topic during the 1970s, scholarly work on energy flagged during the 1980s and 1990s, only emerging more widely in the 2000s and particularly in the last ten years.[1] This resurgence has done much to expand our knowledge of how energy has shaped social patterns and vice versa. But like all fields, energy history still has its blind spots. *Carbon Technocracy* takes key steps toward addressing three of these in particular.

[1] Works by authors including David Nye, Martin Melosi, and Richard White were notable exceptions: David E. Nye, *Electrifying America: Social Meanings of a New Technology, 1880–1940* (MIT Press, 1990); David E. Nye, *Consuming Power: A Social History of American Energies* (MIT Press, 1998); Martin V. Melosi, *Coping with Abundance: Energy and Environment in Industrial America* (Knopf, 1985); Richard White, *The Organic Machine* (Hill and Wang, 1995).

The first is geographic. The field of energy history has been heavily weighted toward works on America and northern Europe. While the energy practices of the Global North have had enormous consequences that have justified close scholarly attention, there is a great deal we still need to learn about other places and time. Seow makes it abundantly clear that East Asia, and China in particular, must be one of those places. Based on its dominant position in solar panel production, rare earth mining, and its extensive geopolitical efforts to secure access to fossil fuels, China may be the most important energy nation in the twenty-first century. Grappling with the energy history of this region is essential for understanding both the past and the present. Seow is not, of course, the first to look at energy history in East Asia, and his footnotes provide a good guide to other scholarship. But he is correct to argue that the field would benefit from more attention to East Asia, and this work provides an important step in that direction, particularly when it is combined with scholarship from historians including On Barak, Elizabeth Chatterjee, Bathsheba Demuth, Jennifer Eaglin, and Diana Montaño, to name just a few.[2]

A second virtue of Seow's topic is his energy of choice: coal. Humanistic studies of energy have had a particular fondness for oil, which has often been seen as the most glamorous and important of the fossil fuels (rivaled only in small part by an obsessive interest among some in nuclear power). Yet this focus on oil too often ignores the full array of the ways human societies have gotten and used energy, ranging from the muscles of humans and animals to firewood to renewable energy systems, a problem I have elsewhere labeled "petromyopia."[3] Nothing embodies this better than a sense that coal is a relic of the past and of declining importance in the twentieth century. Even in the United States, where coal is associated with the nineteenth century, production more than quadrupled between 1900 and 2000.[4] Coal, as Seow shows, played an absolutely central role in East Asian history, and it is an important reminder for the field of energy history as to just how important coal really is. I am especially pleased that his work brings the study of coal into the twentieth century, when it is so often relegated to the nineteenth century.

The third contribution Seow seeks to make is to bring the state back into energy history. This is an interesting claim, and makes me wonder if it now makes sense to talk about an emerging third wave of energy history. In such a typology, the first wave could be dated from the 1950s through the 1980s. In this period, I think the state features quite prominently. I have a hunch that in many ways, the heavy focus on government policies in this first wave helped generate a second wave of energy history, from the early 2000s

[2] On Barak, *Powering Empire: How Coal Made the Middle East and Sparked Global Carbonization* (University of California Press, 2020); Elizabeth Chatterjee, "The Asian Anthropocene: Electricity and Fossil Developmentalism," *The Journal of Asian Studies* 79, no. 1 (February 2020): 3-24, https://doi.org/10.1017/S0021911819000573; Bathsheba Demuth, *Floating Coast: An Environmental History of the Bering Strait* (W.W. Norton & Company, 2019); Jennifer Eaglin, *Sweet Fuel: A Political and Environmental History of Brazilian Ethanol* (Oxford University Press, 2022); Diana Montaño, *Electrifying Mexico: Technology and the Transformation of a Modern City* (University of Texas Press, 2021).

[3] Christopher F. Jones, "Petromyopia: Oil and the Energy Humanities" *Humanities* 5 (2), June, 2016.

[4] Coal production was around 269 million tons in 1900 and more than a billion tons in 2000. Data from EH.net and Congressional Report. See: https://eh.net/encyclopedia/the-us-coal-industry-in-the-nineteenth-century-2/ and https://crsreports.congress.gov/product/pdf/R/R44922.

to the late 2010s, in which other questions rose more to the fore.[5] As someone whose work could be placed in this second wave, I recall feeling at the time that state-centered analyses seemed overdone, and that more novelty could be gained by foregrounding other factors. The collective result was that the pendulum swung too far the other way. I'd be curious to know if Seow agrees with this typology and sees his work as part of an emergence of a third wave of energy history that aims to integrate the state in new ways.

I have two additional topics I will raise, both of which are linked to the concept of carbon technocracy. The first is a question about actors and agency. At several points in the text, carbon technocracy is described as an actor in a way that is similar to how we might describe humans. It "urges" things to be done, has a "vision," is "arrogant," has "strictures," issues "demands," and possesses "ideals" (70, 71, 82, 96, 247, and 250). I would be interested in Seow's comments on the analytical and political stakes of making carbon technocracy an actor in this sense. Analytically, what is gained and lost when we move from human actors as agents to inscribing values, desires, and goals to a conceptual framework such as carbon technocracy? If impersonal forces are actors, what are the conduits through which they act on the world, and what does this imply for human agency? And politically, if a goal of this project (as stated in the epilogue) is to help us rethink unsustainable patterns of fossil fuel consumption, does ascribing agency to a conceptual framework versus identifying the actions of particular individuals alter the strategies that those seeking to craft a sustainable future should take?

The second question is this: how broadly applicable is carbon technocracy as a framework of analysis, both geographically and temporally? What other societies might be prime candidates to be studied as carbon technocracies? Does it make sense to think of the United States in the twentieth century as a carbon technocracy? Nineteenth-century Germany or Britain? The twenty-first century Saudi Arabia, Brazil, India, or Russia? Is China in the present day properly understood as a carbon technocracy? And temporally, I'm curious how far back we could expect to see meaningful instances of carbon technocracy. Is the onset of the Scientific Revolution enough to suggest the presence of a belief in expertise that could be harnessed to the state, or can it be traced earlier? Is this a concept that can only be applied beginning with the late nineteenth and early twentieth centuries when new ideas of the state, engineering, and expertise had arisen? Conversely, what are the limits to the spread of this concept? How, for example, could an analyst who was interested in adopting this idea know that it is not a fit for a particular time and place? What would he or she look for to determine that it does not make sense to use this concept?

For more than a century, Fushun's coal has been transformative for technocratic dreams of power, empire, and development. Its most accessible seams have now been depleted, and the Chinese government has erected a museum celebrating its past. But it would be a mistake to see this site as a relic of history. For one thing, its carbon reserves are not gone—they have been transformed into carbon dioxide that will continue to warm the earth for centuries. At the same time, Seow's *Carbon Technocracy* shows how vibrant and

[5] See: Astrid Kander, Paolo Malanima, and Paul Warde, *Power to the People: Energy in Europe over the Last Five Centuries* (Princeton University Press, 2013); Bob Johnson, *Carbon Nation: Fossil Fuels in the Making of American Culture*, (University Press of Kansas, 2014); Christopher F. Jones, *Routes of Power: Energy and Modern America* (Harvard University Press, 2014).

generative this place remains. In his skillful analysis, mining its history reveals a rich trove of meaning about how the world became addicted to fossil fuels and the ideologies that must be abandoned if a more sustainable world is to be built.

Review by Miriam Kingsberg Kadia, University of Colorado Boulder

Fushun, today a city of about 2.2 million people, derived its raison d'être from the enormous coal deposit upon which it rests. Estimated at approximately 1.5 billion tons, its reserves appeared nearly inexhaustible to those who first plumbed their dimensions in the early twentieth century, and who devised extraction mechanisms of similarly mythical proportions. For decades, Fushun boasted the largest coal mine in Asia. At the height of its productivity, tens of thousands of workers, assisted by soaring cranes and ingenious underground engineering, extracted over eighteen million tons of coal annually. This man-made wonder attracted numerous renowned cultural and political figures, including Japan's most famous early twentieth-century female poet, Yosano Akiko (1878-1942); the Chinese writer Xiao Jun (1907-1988); and, in 1958, no less a personage than Chairman Mao Zedong.

Victor Seow, author of *Carbon Technocracy: Energy Regimes in Modern East Asia* emphasizes both the scale and the reputation of Fushun to justify the weighty intellectual enterprise that is supported by his study of its history: the delineation and workings of what he terms "carbon technocracy." In his description, carbon technocracy

> involved marshalling science and technology toward the exploitation of fossil fuels for statist ends. It was further characterized by an embrace of coal-fired development, a focus on heavy industrial expansion, a fixation on national autarky, an interest in labor-saving mechanization, a privileging of cheap energy, and a pegging of economic growth to increases in coal production and consumption(4).

Carbon technocracy enmeshed the state and its energy in a symbiotic and co-constitutive relationship, resting on faith in science and engineering to deliver the fossil fuels behind the powers and promises of modern statehood. Seow is keen to emphasize the human and ecological costs of this vision. Fushun, he argues, is a microcosm of planetary problems in the age of the Anthropocene (26).

The six chapters of the book explore the development of carbon technocracy under the successive authorities that controlled Fushun: first Japan, for which coal fueled the conquest and administration of the surrounding region of Manchuria and its empire beyond; then the Nationalists, whose two and a half year-long tenure, though brief, provides eventful material for analysis; and finally the Chinese Communist Party. Ideological and national differences notwithstanding, each of these regimes demonstrated a similar fervor for science and technology, an extractive energy policy, and an almost inhuman disregard for workers and the environment. Known to local inhabitants since at least the Han period (206 BCE-220 CE), the Fushun mine was initially explored at the beginning of the twentieth century by China's Qing rulers in cooperation with Russian investors. Following its victory in the Russo-Japanese War of 1904-1905, Japan laid claim to this underground treasure. By the early 1930s, under the direction of the South Manchurian Railway Company, which was Japan's imperialist proxy, Fushun was producing almost eighty percent of the coal mined in the region, and over one-sixth of the coal output of the empire. That fuel, Seow argues, made possible Japan's invasion of Manchuria and its reorganization as the puppet state of Manchukuo. In the early 1940s, it also gave rise to a "warscape of intensification," a "synergistic feedback loop" to

"stimulate and sustain the ever-increasing consumption" of coal and other fossil fuels (187). Although scholarship on Japan's wartime energy policy by diplomatic historians such as Michael Barnhart has emphasized the quest for oil, Seow notes that in fact coal was responsible for about two-thirds of the military machine.[1]

In late 1945, the Soviet Union took control of Fushun. Whereas Japan had viewed the mine as a source of energy for an everlasting empire, and had accordingly taken steps to preserve its sustainability and function, the USSR more or less pillaged the site, particularly its generators. When China's Nationalists recovered the mine in 1946, they drew on a robust geological knowledge cultivated over the course of the early twentieth century. In their eagerness to restore operations, Seow argues, they actually came closer to the political vision of a "government of engineers" than their Japanese predecessors (254). However, in late 1948 the Communists seized Manchuria and the colliery, inaugurating a new era of socialist development. Seow shows that, despite its rhetorical pretensions to superiority over past regimes, the CCP maintained much of the bedrock of carbon technocracy. One noteworthy difference—with arguably unfavorable outcomes for ordinary citizens—was the Party's sole focus on output. Unlike the Japanese and Nationalist governments, which had prioritized both production and consumption, the CCP was almost exclusively concerned with the former. In the decade after the establishment of the People's Republic of China in 1949, the country skyrocketed from the world's ninth- to third-largest coal producing state, at almost unfathomable human and environmental cost.

One of the major, tragic ironies of Fushun is that carbon technocracy's emphasis on mechanization did not, as engineers (and this reader) expected, succeed in replacing human labor. On the contrary, the adoption and adaptation of technology in the coal mine appeared to demand mounting numbers of workers, and to impose escalating burdens on those workers. Seow charts the increasing exploitation of "coolies" by Japan and Manchukuo and the wartime deployment of forced laborers (euphemistically described as "special workers," 197). The safety record of the mine also functions as an index of the technocratic state's prioritization of productivity over welfare. Fushun suffered twenty-nine major underground accidents in 1944, as Japan, ever more desperate for resources to sustain its war, ramped up production well beyond the point of sustainability. The following year, which witnessed Japan's defeat and the handover of the colliery to the rapacious stewardship of the Soviet Union, saw no less than fifty accidents. However, the return of the mine to Chinese control failed to improve its safety record: in the first five months alone of Nationalist sovereignty, Fushun experienced thirty accidents (249). After 1949, the CCP sought to distinguish itself from prior regimes through lip service to worker protections, but the unrelenting acceleration of production was accompanied by a similarly rising number of accidents. As late as 2005, close to six thousand miners died in work-related incidents in the People's Republic of China (PRC). (As Fushun and other mines have subsequently shuttered or scaled back, that number reached a low of 333 in 2018, 317).

Seow's account of the successive regimes of carbon technocracy in Manchuria makes the welcome choice not to emphasize the angle of transnationalism that is often applied today to the study of the region, but is

[1] Michael A. Barnhart, *Japan Prepares for Total War: The Search for Economic Security, 1919-1941* (Cornell University Press, 2013).

nonetheless well situated within an inseparable global context of political and technological development, foregrounding intellectual circuits and figures connecting China and Japan to the United States and the great powers of Europe.[2] Even during the early, autarkic years of the PRC, Japanese engineers who had been unable to repatriate after the end of World War Two served as essential, unexpectedly conscientious partners in restoring Fushun to working order—human exemplars of the resilience of carbon technocracy amid political change (266).

Seow's research is exhaustive, drawing on sources from China, Japan, Taiwan, and the United States. These include company records, technical reports, trade journals, literary works, travelogues, diaries, oral histories, and personal archives. Descriptions of the author's own trips to Fushun—in the introduction, he chronicles his first visit in 2011; by way of conclusion, he analyzes the Fushun Coal Mine Museum (Fushun meikuang bowuguan, which was established in 2011)—occasionally lend the text an anthropological flavor. The tone is distinctive and authoritative. I particularly appreciated Seow's forthrightness in ruling on some of the complicated moral questions raised by the book. Of the Japanese imperial legacy, which left northeast China as the most industrialized part of the reunited country in 1945, he writes, "we can…acknowledge Japan's 'positive' economic impact on Manchuria without celebrating it" (294). Seow declines to blame early twentieth-century stewards of the mine for carbon technocracy's planetary consequences, of which they had little awareness, but at the same time holds them accountable for their general indifference to human life and well-being.

"I came in search of the origins of China's modern industrialization. I found, instead, the beginnings of its end," the author states on the first page of the book (1). In light of this claim, the choice to terminate the analysis in 1960 took me by surprise. This year—the peak of annual coal extraction in Fushun and the halfway mark of the catastrophic Five-Year Plan of 1958–1962—seems to be more midpoint than end (or even the beginnings of the end). Given the importance of the consequences of carbon technocracy to the book's argument, I anticipated additional speculation into late twentieth-century topics such as planetary destruction, the rise of environmental consciousness, sustainable energy, and deindustrialization and precarity in the so-called rustbelt of northeast China. Moreover, in the context of recent growth in the field of PRC history, Fushun would appear to provide an illuminating lens through which to view the Cultural Revolution, Gang of Four intrigue, and the post-socialist transition. Indeed, these topics feel too important to address, as *Carbon Technocracy* does, in a brief epilogue. However, at over three hundred pages, the book is already a magisterial project of ambitious scope. One may hope that future scholars will take up the questions raised by this must-read contribution to the histories of science and technology, the environment, imperialism, Manchuria, and East Asia.

[2] Very recent examples of transnational scholarship in the Manchuria field include Hirata Koji, "Made in Manchuria: The Transnational Origins of Socialist Industrialization in Maoist China," *The American Historical Review* 126, no. 3 (2021): 1072-1101; Hye Ok Park, *Koreans in Transnational Diasporas of the Russian Far East and Manchuria, 1895–1920: Arirang People* (Routledge, 2022); Miya Qiong Xie, *Territorializing Manchuria: The Transnational Frontier and Literatures of East Asia* (Harvard University Asia Center, 2023).

Response by Victor Seow, Harvard University

My heartfelt thanks to Taomo Zhou for commissioning and coordinating this H-Diplo roundtable review and to Dagmar Schäfer for kindly writing the introduction. I am also tremendously grateful to the reviewers for their close engagement with and generous assessment of my book. Between them, they hold expertise across the range of historical fields that inspired and shaped *Carbon Technocracy*: technology, science, industry, energy, environment, China, Japan, empire, labor, and political economy.[1] Each offers insights that illuminate key features of the work or cast these in a fresh light.

Megan Black excavates the world in the mine, the global currents reflected in the operations of the book's central site. This she does with brilliance and the enthusiasm of a kindred spirit similarly drawn to the layered histories of subsurface spaces. In a complementary fashion, Fa-ti Fan looks in the other direction (up rather than down) and points to the mine in the world. He underscores the geopolitical dimensions of mining resources to power industrial societies, past and present, and the ways that such extractive endeavors intersect with science and technology. Miriam Kingsberg Kadia traces the account's main contours with erudition and care, highlighting how the work grapples with ethical questions about empire in its aftermath. And, in his analysis of *Carbon Technocracy*'s significance for the field of energy history, Christopher Jones well succeeds in the "tall task" he had set for himself to be "creative, clever, and fun." I am so thankful for the time and energy they have invested into my work.

The reviewers also raise a number of thoughtful questions, and I have grouped them into three areas. The first is scope, in terms of both the perimeters of the study and the reach of its conclusions. The second is alternatives. By this, I am referring to paths not taken by those who drove the history I tell as well as examples that did not make it into the book. And the third is legacies, or the extent to which the idea of carbon technocracy remains relevant to understanding energy regimes in the present. In what follows, I proceed through each in turn.

At its core, *Carbon Technocracy* explores how the fossil fuel economy and the modern technocratic state emerged in tandem in the industrial age. It does this through a history of the Fushun colliery in Manchuria, once the largest coal mine in East Asia. Across the first half of the twentieth century, Fushun switched hands between several Chinese and Japanese states, and the book uncovers how these markedly different political regimes, from Imperial Japan to Communist China, came to embrace strikingly similar technology-driven, coal-fired industrialism in the midst of an international order that was being reshaped in the carbon energy transition.

Central to this narrative is the titular concept of carbon technocracy. I use this term to describe a modern regime of energy extraction defined primarily by statist commitments to industrial development based on

[1] Megan Black, *The Global Interior: Mineral Frontiers and American Power* (Harvard University Press, 2018); Fa-ti Fan, *British Imperialists in Qing China: Science, Empire, and Cultural Encounter* (Harvard University Press, 2004); Christopher F. Jones, *Routes of Power: Energy in Modern America* (Harvard University Press, 2014); and Miriam Kingsberg Kadia, *Into the Field: Human Scientists of Transwar Japan* (Stanford University Press, 2019).

access to cheap and abundant sources of carbon energy and a desire to marshal science and technology toward this end. It represents both an ideal and the sociotechnical system that is brought into being in attempts to reach that ideal. I should note, as I do in the book, though, that the system does not neatly correspond to the ideal that inspired it. It is from that gap between the two that devasting human and environment costs arise.

One of the moves I seek to make in *Carbon Technocracy* is to bring the state back into analyses of the fossil fuel turn. In his review, Jones proposes a tripartite typology of energy history: a first wave that focused on government policies; a second wave (in which he situates his own excellent *Routes of Power*) that widened the lens to encompass other lines of inquiry such as that of infrastructure and consumption; and an emergent third wave (into which he places my book) that aims to reintroduce the state in new ways.[2] His framing generally resonates with me.

Although it is not necessarily novel in this regard, my take on the state is admittedly more capacious than most other accounts would have it (at least in energy history). Here, my inspiration is Timothy Mitchell. While the title of my book is clearly a reference to his *Carbon Democracy* and the approach within informed in more ways than one by that instant classic, it is actually Mitchell's earlier idea of the "state effect" that has most influenced my thinking.[3] Following Mitchell, I understand the state as not merely the bureaucratic bodies with which it is typically equated but "an effect of mundane processes of spatial organization, temporal arrangement, functional specification, supervision and surveillance, and representation that create the appearance of a world fundamentally divided into state and society or state and economy."[4] This allows me to fold into the narrative a wide array of actors beyond easily recognizable state agents like South Manchuria Railway Company managers or National Resources Commission engineers to include countless others who acted on or appealed to the interests and authority of the Chinese or Japanese state, from business leaders agitating for regulations against foreign coal imports to ordinary women and men who restricted their coal consumption to meet national needs.

Yet if *Carbon Technocracy* represents a third wave in energy history, it nevertheless still reflects a defining feature of the second wave that has contributed much to the latter's widened lens and additional lines of inquiry—its focus on materiality. By attending to the form that energy takes, historians like Jones have shown how the physical properties of different energy sources have bearing on how they are produced, transported, and consumed as well as the broader social and environmental implications of these processes.[5] Materiality similarly holds much explanatory heft in my book. To cite but one example, it was precisely the

[2] Representative works in this second wave include Christopher F. Jones, *Routes of Power: Energy in Modern America* (Harvard University Press, 2014), Bob Johnson, *Carbon Nation: Fossil Fuels in the Making of American Culture* (University Press of Kansas), and Thomas G. Andrews, *Killing for Coal: America's Deadliest Labor War* (Harvard University Press, 2008).

[3] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (Verso, 2011).

[4] Mitchell, "Society, Economy, and the State Effect," in George Steinmetz, ed., *State/Culture: State-Formation after the Cultural Turn* (Cornell University Press, 1999), 95.

[5] On how a focus on materiality might enrich energy history, see Christopher F. Jones, "The Materiality of Energy," *Canadian Journal of History* 53.1 (2018): 378-394.

difference in coal type that Japan, which possessed large deposits of coal, though not of the coking variety necessary for making steel, sought to gain access to metallurgical coal resources on the continent.

Temporally, the body of the book spans the first six decades of the twentieth century. This corresponds to the period from the start of modern coal mining in Fushun to the end of the first decade of the People's Republic of China. It is between these two points that the Fushun colliery came under the control of different regimes at different times, making possible an inquiry that is both connective and comparative. Kingsberg Kadia expresses some surprise at my choice to wrap up the main account in 1960, given my professed interest in the origins of China's modern industrialization and the related developments that take place in the decades after, as summed up in the book's epilogue.

One reason why I stop where I do is that the book is already quite lengthy, as Kingsberg Kadia also recognizes. Another is that the contradictions of carbon technocracy that were evident under prior regimes, particularly the willingness to sacrifice workers in pursuit of relentless extractivism, can already be seen by the conclusion of the new socialist state's first ten years. These would continue in the decades that followed, into and through China's reform era. As such, at least in terms of showing continuities I have found across the regimes I study and their relationship to coal, 1960 serves as a solid endpoint. But I do agree with Kingsberg Kadia, though, that a more extended treatment of the twentieth century's latter half will be instructive, and I look forward to work that others might do on that front.

Geographically, *Carbon Technocracy* may be centered on Fushun, but, as Fan points out, the narrative stretches beyond Manchuria to China and Japan and, on occasion, to Britain, Germany, and the United States. This comes partly from following the coal out of the ground to sites of combustion near and far and partly from tracking the transnational circulation of labor, technology, and expertise that undergirded the whole extractive enterprise.

Related to this issue of geography is Jones's question about the reach of carbon technocracy as a framework of analysis. He asks, as an example, whether the United States in the twentieth century might be thought of as a carbon technocracy. I will venture to say that the concept travels well outside the East Asian context of the book. However, I do hesitate in using it as a designation for individual polities—i.e., classifying a country as a carbon technocracy or not. At that level, most if not all modern industrial societies could be labeled carbon technocracies. This is perhaps sobering but not analytically satisfying. Rather, I think that carbon technocracy is most useful when we regard it, as I define it, as both an ideal or a vision and the system that emerges out of efforts to attain it, with the caveat that, as mentioned above, the two seldom if ever perfectly dovetail. For me, the driving question, then, is less whether a society is a carbon technocracy and more how and to what effect individuals taken by this ideal have tried to realize it within various societies. This is the approach I attempt in the book.

On this point of carbon technocracy, I should also address the question Jones poses about agency. He notes that there are a few places in the text where carbon technocracy seems to be presented as an actor in the way that a human being might and queries the implications of such a framing for analytical insight and political action. Looking at the passages that Jones points to, I apologize if there is any ambiguity in my phrasing.

Carbon technocracy remains to me in those instances an ideal held by individuals, who then act in ways that are informed by the tenets of that vision. As I see it, then, it does not have agency, but it does have power in the way that ideas have power.

The second theme of alternatives, to which we will now turn, is another important one to consider. The hold and prevalence of carbon technocracy as an ideal or a vision in the industrial age invites reflection on the existence of possibilities beyond it. In her review, Black observes the uprisings, contestations, and debates the book details and asks about the most promising path not taken that had been envisioned outside of carbon technocracy's growth mindset. From Fushun's history, the most compelling way of countering the productivism of carbon technocracy that we can recover may be the observation of safety. Across the various regimes, there were moments when those who managed the mines acknowledged that the push to produce, by encouraging the cutting of corners and the disregarding of precautions, compromised safety and exacted a human cost, as leaders in the socialist era did when they discovered, to some alarm, that miners were expressing sentiments such as "the coal is paid for in human lives."[6] That many of them continued or soon resumed their calls for escalating extraction is an indictment of their commitments. Still, if we take the preservation of human life and well-being to be of utmost priority, then this attention to safety and, ultimately, to the human toll of intensive mining may be a firm starting point from which we can push back against the impulses of unchecked developmentalism.

Also on the theme of alternatives is Black's question about imaginaries sparked by coal apart from those that appear in the book. A number of examples come to mind, and I will present two here. The first comes from Lu Xun 魯迅 (1881–1936), modern China's most celebrated writer. In a 1903 essay titled "A Brief Discussion of Geology in China" (中國地質略論), Lu Xun, who had studied at a mining school for several years, discusses the importance of coal for national survival in a world of steam power. Referencing Pandora's box, he likens coal to the hope that remains at the vessel's bottom and contends that "if it were gained, we will daily advance toward a bright and blazing future, and if it were lost, we can only anguish over our coming death."[7] Although his larger point about coal's significance may have been typical for his time, I bring up this example because the metaphor of Pandora's box seems relevant in current considerations of coal, though not for the hope that was left behind, as Lu Xun suggests, but the evils unwittingly unleashed when the receptacle was opened.

The second example comes from *The Crab Cannery Ship* (蟹工船), a short proletarian novel written by Japanese author Kobayashi Takiji 小林多喜二 (1903–1933) and published in 1929. In it, one encounters a description of the coal mine, like the cannery ship, as a worksite marked by the violence of capitalist excess, of tunnel walls "reinforced with multiple layers of miners' raw flesh" and mine cars bearing coal "with severed thumbs and little fingers adhering to them." Here, coal is portrayed as fuel for "a gigantic engine churning out capitalists' profits," even as the workers who mined it were all-too-often consumed in the

[6] "Fushun meikuang shigu ji wei yanzhong" [Situation with accidents at the Fushun colliery extremely serious], *Neibu cankao* (April 26, 1954), 259.
[7] Lu Xun, "Zhongguo dizhi lüelun" [A brief discussion of geology in China] (1903), in *Lu Xun quanji* [Collected works of Lu Xun], vol. 8 (Beijing: Renmin wenxue chubanshe, 1981), 8.

process—a recognition of a central, if frequently overlooked, tension underlying this resource in societies that so deeply depend upon it.[8]

Finally, there is the theme of legacies. What lessons might *Carbon Technocracy* hold for our present? Black ponders which rules of carbon technocracy might still apply to emerging sectors that are based on phasing out carbon. While pointing to the possibility of a more sustainable future, much of the discourse surrounding "green" energy cleaves closely to carbon technocracy's questionable logics, from dreams of inexhaustible resources tapped through technoscientific means to fantasies of unfettered growth that limitlessness would enable. The accompanying violence of extraction under the coal energy regime can already be seen in the mining of rare earth elements and critical minerals necessary for generating and storing energy from carbon substitutes.[9] This is also visible in the coloniality of decarbonizing technologies, such as the mass production of solar panels by forced labor in Xinjiang or the Norwegian wind energy projects that disrupt the land and lives of the Indigenous Sámi.[10]

Commenting on its relevance to resource management, Fan proposes that the concept of carbon technocracy be expanded and renamed "energy technocracy." Doing so, he argues, would allow it to encompass not only fossil fuels but also their "renewable" alternatives. In light of the continuities that I mention right above, I believe there is validity to Fan's suggestion. I do think, though, that sticking to the name carbon technocracy signals the sheer extent to which the relationship between energy and society in contemporary industrial economies has been conditioned by the extravagant expectations toward energy and the corresponding extractivist impulses that first arose in the carbon age.

What then is to be done? I do not presume to be able to offer a ready solution. One thing is for sure: moderating consumption, particularly among those of us who reside in places accustomed to plenty and profligacy, has to be part of it. Beyond that, my hope is that in reckoning with the considerable costs of carbon technocracy across a spectrum of polities, we may be inspired to seek possibilities for more justice and greater habitability as we continue to power our societies and remake this world we share.

[8] Kobayashi Takiji, *The Crab Cannery Ship and Other Novels of Struggle*, trans. by Željko Cipriš (University of Hawai'i Press, 2013), 55.

[9] Diego Andreucci et al., "The Coloniality of Green Extractivism: Unearthing Decarbonization by Dispossession through the Case of Nickle," *Political Geography* 107 (2023): article 102997.

[10] Ann Swanson and Chris Buckley, "Chinese Solar Companies Tied to Use of Forced Labor," *New York Times* (January 8, 2021); Eva Maria Fjellheim, "'You Can Kill Us with Dialogue:' Critical Perspectives on Wind Energy Development in a Nordic-Saami Green Colonial Context," *Human Rights Review* 24.1 (2023): 25-51. I thank Yangyang Cheng for reminding me of this point.