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Introduction

Argument and Purpose

This is a book about the making of the global fossil economy. It takes as its vantage the colonial territories that became the modern nation-state of India between the nineteenth century and the late twentieth century. Starting with the formation of coal commodity frontiers in the remote Adivasi highlands of the Chotanagpur Plateau in eastern India in the 1810s and ending with India's fossil-fuel nationalizations during the global crises of money and energy in the 1970s, this book examines the layered transformations of mining environments underpinning India's late twentieth-century rise as a world-leading energy producer. It argues that India's fossil economy originated in the agrarian property relations that emerged under British colonialism and that these property relations defined both the trajectory of India's energy history in the twentieth century and the place of fossil fuels within India's postcolonial politics of development. In this way, the book tells the story of the global fossil economy through the changing forms and practices of owning the energy resources of the subterranean earth.

Why tell the history of fossil fuels from the perspective of property? In recent years, scholars have begun to sketch the history of the origins of the global fossil economy, seeking to understand the centrality of energy to the making of modern economic life and the material conditions of global interdependence. This scholarship has attempted to break with an earlier, largely Eurocentric account, which privileged European industrialization as the modular historical experience through which the global history of fossil fuels could be definitively measured. In place of models of economic history, new research has instead emphasized a political history of technology and infrastructure, focusing on the historically specific conditions of fossil-fuel production, consumption, and distribution for societies beyond industrial Europe and posing new methodological departures for explaining the ongoing use of fossil fuels on a planet facing global warming.¹

With few exceptions, however, this recent turn to histories of energy has largely moved away from centering questions of ownership—the juridical and social relations that have transformed the planet’s stocks of fossil fuels from objects of nature into abstract sources of property and capital.² This presents major difficulties for explaining the Indian case, though it is also a problem for understanding the origins, social structure, and durability of fossil-energy regimes more generally. India’s contemporary fossil economy remains deeply tied to long-term problems of land control, a system organized in the present through an expansive state apparatus for the ongoing acquisition of Adivasi agricultural and forest land for new coal projects. Controlling the ownership of India’s coal-bearing lands, the nation’s most abundant source of fossil energy, has been a central preoccupation of the postcolonial state since independence in 1947. This has led to long-running conflicts over property rights between the Indian state and the many Adivasi communities that live on ancestral lands across the major mining areas of the Chotanagpur Plateau and the Gondwana Basin, exploding in the 2000s in insurgent warfare between state paramilitaries, Adivasis, and Maoist guerrilla factions that lasted over two decades.³

As this book will substantiate, these more recent conflicts over land and minerals in Adivasi territories, along with the Indian state’s overarching assertion of a sovereign right to control fossil fuels, are rooted in a history of subterranean property making and agrarian transition going back to the colonial period. India’s fossil economy grew out of a very specific property system: the Permanent Settlement of Bengal of 1793, the major institutional reform that founded the East India Company’s fiscal state in South Asia. Although the Permanent Settlement has been a canonical theme in the historiography of the region, its analysis has been confined to the law’s governance of *agrarian* property and revenues. The foundational work of Ranajit Guha identified the ideological origins of this property system in eighteenth-century European discourses of agrarian improvement, feudal estate holding, and physiocratic notions of agriculture as the primary source of social wealth. The “common veneration of private property” institutionalized by the rentier system of the Permanent Settlement, Guha showed, was forcibly grafted onto an Indian society far more heterogeneous in its precolonial organization of agrarian property and custom.⁴ However, this emphasis on the agrarian dimensions of the law has missed one of its most peculiar, and perhaps most consequential, legacies: that it was this agrarian property system that provided the legal basis for private property rights to subsurface coal across colonial India’s major coal-fields, and it was this system of governing subsurface wealth that would persist until the nationalization of India’s energy sector in the 1970s.

In the late eighteenth century, the region that would become the center of India’s colonial and postcolonial fossil economy was a sprawling, multilingual,

multiethnic upland territory east of the Vindhya Mountains and extending south and north from the river valleys of the Damodar and the Mahanadi. The region was hemmed by multiple sovereign and quasi-sovereign entities, and its most notable topographical feature was its dense tropical forests, shaping the movement of armies, traders, and pilgrims through tortuous forest pathways that climbed the plateau escarpments.⁵ The formation of a colonial property regime in this region was difficult work, accompanied by outbreaks of frontier violence from communities that the colonial state would first label “*chuars*,” thieves or bandits, and who were later identified by colonial ethnologists as “tribes” before social movements calling for the use of “Adivasis” or “first inhabitants” emerged in the early twentieth century.⁶ This geographical, ecological, and seemingly racial specificity of the highland forests led to the creation of an architecture of territorial governance that Kalyanakrishnan Sivaramakrishnan has called a “zone of anomaly,” in which sustained exceptional lawmaking was used to pacify the region as a source of colonial revenues.⁷

By the mid-nineteenth century, however, this region at the juridical edges of colonial power was transformed into what the anthropologist Anna Tsing has elsewhere called a “capitalist frontier,” whereby the active ecologies and mobile peoples of the upland forests became subject to an expansionary process of coal mine enclosures.⁸ Discoveries of coal formations in the highlands dated back to the 1770s, but after 1800 new investments in mines by Indian and European merchants coincided with a changing forest agroecology. Colonial land settlement and revenue payments in fixed currency enabled an extension of the arable margin of wet rice agriculture from alluvial western Bengal into the upland forests, resulting in the conscription of Adivasi and Dalit communities of Santals, Bauris, Bhumij, Mundas, and Oraons into newly dependent relations with large landed estate holders known as *zamindars*, or owners of the land/earth.

Zamindari was the form of agrarian estates established by the Permanent Settlement, which assigned a heritable title of land revenue fixed in perpetuity and paid to the colonial state to encourage zamindars to improve the values of their properties through investments and agrarian subleasing.⁹ In the anomalous legal and topographical areas of the upland coalfields, this agrarian property system became the juridical framework for titular zamindari ownership claims over subterranean resources as well. Although the Permanent Settlement lacked any formal recognition of mineral or subsurface property in coal as an extension of zamindari right—a legal ambiguity that colonial courts would converge in recognizing by the end of the nineteenth century—it was the framework of zamindari estate holding that ultimately shaped every advance of the colonial mining frontier.

The use of agrarian estates to govern India’s fossil economy would become historically consequential, but initially this system followed similar global

patterns. The plausibility of zamindari as an overarching property framework reflected the predominance of agriculture in a preindustrial world economy, as well as the commonplace juridical invocation of “land” as an archetypal legal metaphor for denoting the nature and rights of physical property.¹⁰ Property laws throughout European and colonial societies in the nineteenth century inherited all sorts of ideas about subsoil concessionary arrangements from ancient and medieval traditions of mineral extraction, connecting ideas of agrarian land ownership to wider interpretive contestations over the spatial entailments of hereditary land rights; the definitional status of “land” as a volumetric concept; novel revisions to Roman civil law principles like *emphyteusis*; the assignation of mineral rights to the occupational customs of mining artisans, castes, or metallurgical guilds; legal carve-outs for “lateral” or apex rights of easement; religious exemptions; and the rights of sovereigns to join, separate, or tax land and mineral estates.¹¹ By the second half of the century, however, the use of agrarian property to contain such hybrid claims on the earth’s subsurface began to strain, with the meanings of topographical land remade by the intensification of mining investments connecting the industrial transformations of Euro-American economies to far-flung mineral frontiers.

These changes were caused in no small measure by the new global demand for fossil fuels. Beginning in the late nineteenth century, empires and nations alike began to recognize the centrality of fossil energy to modern forms of state power and economic development, shaping new global mining laws from Qing China to the Mexican Constitution of 1917.¹² During this period, debates about modernizing mining jurisprudence within the common-law tradition of Britain and its empire centered on sovereign ownership claims over fossil fuel-bearing land. Motivated by strategic questions over the use and conservation of finite mineral resources, as well as the detrimental role of private property in shaping patterns of investment and production, jurists and imperial administrators began to argue for the separation of subsurface rights from surface-level agrarian property, making the former a distinctive domain of sovereign ownership. These ideas were articulated as extensions of older claims of regnal or monarchical privileges reserved for the “royal” metals of gold and silver to the new coin of the realm, buried carbon, and were most apparent in the legislative codes in the white settler dominions of Australia, Canada, and South Africa.¹³ Even Britain with its long history of agrarian estate holding eventually followed the path of sovereign expropriation by vesting domestic coal and oil deposits in the Crown in the 1930s, setting the stage for the total nationalization of the British coal industry in 1946.¹⁴

Property forms in India’s fossil economy, by contrast, took a different path. Whereas large-scale coal production in countries like Britain, the United States, and Germany fueled the industrial transformation of these

societies, coal mining in colonial India instead reinforced the agrarian-rentier social relations of the zamindari system. While coordinated investment through either the cartelization of large mining industries or state-led mineral reforms occurred elsewhere, India's coal economy resembled more closely the agrarian logics of plantation and agricultural commodity frontiers that characterized colonial capitalism throughout Asia, Africa, and Latin America.¹⁵ Even as Indian coal production grew to record heights by the early twentieth century, the zamindari system was not supplanted by new mining laws, but actually the power of zamindars over the land was more deeply entrenched.

Imperial and merchant capital investment solidified a system of rentier property owners who wielded social power through the accumulation of mining rents and their control over dependent Adivasi and Dalit peasants who became seasonal wage workers for colonial mining companies. The undervaluation of coal properties and fierce competition for agrarian labor and land led to the parcelization of zamindari coal seams under increasingly fragmented mining claims. By the interwar period, this subleasing system produced a landscape destroyed by waves of short-term investments, as zamindars, European companies, and agrarian moneylenders chased after rising and falling coal prices. The morbid symptoms of colonial property appeared on the land in new geographies of mine fires, land subsidence, overcrowded mining camps, and populations of dispossessed peasants. When the colonial state finally attempted minor reforms to rationalize aspects of the coal system through state-enforced land acquisition and eminent domain, even these expressions of sovereignty were constructed in subordinate relation to the foundational prerogatives of zamindari property.

It was this deep agrarianism of India's fossil economy that the postcolonial state would inherit after independence, becoming the material basis for new projects of state-led energy development under India's first prime minister, Jawaharlal Nehru. Postcolonial politicians who came to power with Nehru and the Indian National Congress, the anti-colonial political party that led independent India for its first several decades, argued for a vision of energy sovereignty freed from the colonial system of extraction, insistent that zamindari forms of subterranean property were incompatible with the energy demands of a nationally planned economy.¹⁶ Yet the social rootedness of colonial property relations prevented the expropriation of either subsurface landowners or colonial-era mining companies, even amid rising landlord abolition movements in the 1940s and 1950s. India's politicians and economic planners would instead carve out more limited visions of subterranean sovereignty while directing public investment into parts of the Adivasi highlands less impacted by the legacies of the Permanent Settlement. Fossil fuels may have been imagined as the energy of national development, but their extraction entailed

a continuation of Adivasi expropriation and agroecological destruction, not an end to colonial property. The combination of state developmentalism and zamindari landlordism influenced various regional movements for an autonomous Adivasi state, as well as growing political violence and strike actions against landlords, mining companies, and police. As the Adivasi theologians Nirmal Minz and Joel Lakra would explain in a pamphlet from 1968, India's postcolonial state derived its power from upper-caste "colonisers and exploiters" dominating the Adivasi highlands in the name of a new destructive sovereign right.¹⁷

Taken together, these residual relations of colonial property provide a different methodological approach for the global history of energy. Rather than a history of successive energy transitions, or an emphasis on the primacy of industrialization for explaining fossil-fuel dependence, the Indian case instead returns attention to the problem of fossil fuels as property and the forms of social wealth and power that such property relations sustained. This vantage of property should not be read deterministically, as if the subsequent history of fossil fuels in South Asia could be fully attributed to an original moment of enclosure or an institutional form standing outside historical change. What the Indian case provides instead is a particularly acute example of the role of property in shaping the divergent trajectories of fossil-energy systems out of their conjunctural emergence in the nineteenth century. This book is not simply an account of a distinctive "Indian" pathway towards fossil-fuel dependence; its attention to the changing use and valuation of natural resources under property regimes invites us to see the uneven development of a *global* fossil economy emerging through connected histories of empire and capitalism.

This historiographic intervention becomes more significant by following colonial property relations into the period of decolonization. Whereas others have emphasized the specificity of the postwar period and the rise of state-led development in driving what J. R. McNeill and Peter Engelke have called the "Great Acceleration" of global fossil-fuel use, the Indian case again points to a longer history of colonialism.¹⁸ The visions of energy sovereignty articulated by India's postcolonial leaders were not simply expressions of an anthropocentric modernity or a derivative ideology of nature's conquest; rather, they were an effort to undermine a colonial fossil-energy system that remained largely beyond the control of the postcolonial state even decades after independence.¹⁹ At the national level, the difficulties of confronting colonial property appeared in the management of a class- and caste-stratified democratic polity, with a fiscally impoverished and ideologically divided postcolonial government that ultimately accommodated the extant social power of zamindars and mining companies. At the international level, the problem of property manifested in India's dependence on foreign aid, which tied the country's economic policies to an orthodoxy of Western countries, lending institutions, and corporations

insisting on the obligations of sovereign states to guarantee the rights of private capital and existing colonial assets.²⁰ In this way, the juridical freedom of decolonization was not a blank slate for enacting large-scale transformations of nature and society, but, rather, a reflection of what Adom Getachew has called the “sovereign inequality” of postimperial forms of global power.²¹

When the Indian state finally did nationalize its fossil-fuel sector after 1971, newly created state-owned mining companies destroyed many of the vestiges of colonial property by asserting an expansive sovereign right over India’s coal lands, leading to unprecedented rates of energy extraction that fueled economic growth into the new millennium. By the mid-2010s, India became the world’s second-largest producer of coal, overtaking the United States. But even after nationalization, the government’s ability to acquire new coal-bearing areas continued to depend on the repurposing of older laws of property, sovereign rights to the subsurface, and the management of Adivasi agrarian and forest landscapes honed in the era of zamindari. Attending to these contradictions, this book provides a way of understanding the emergence of fossil economies in the postcolonial world that moves beyond accounts foregrounding statist development and its ideologies of growth. It calls attention instead to the historical structures of accumulation that preceded decolonization and made fossil fuels a material condition of both development and economic sovereignty in the postwar age. This book opens a window onto the fate of mining environments within that history and the long reach of colonial property in shaping India’s place within the global history of fossil fuels.

Locating India in the Global History of Fossil Fuels

In 1974, the Government of India published a fuel policy report forecasting the country’s growth in energy demand for the next several decades. The report was released on the heels of the global surge in oil prices caused by the OPEC oil embargo a year earlier, which drastically threatened India’s fiscal stability and the country’s capacity to import petroleum, a rapidly growing fuel source for India’s energy mix. Even as oil preoccupied many of the policy prescriptions offered by the report, its authors nevertheless began by centering India’s energy problems in the following terms: “The most important fact about the energy situation in India is that nearly half of the total energy consumed in the country comes from non-commercial sources. The bulk of the non-commercial supplies is consumed in rural areas and is obtained from vegetable waste products, firewood, and cow dung.”²²

The persistence of these so-called noncommercial energy supplies within the Indian economy had long been used by government officials to represent the country’s slow progress towards rates of economic development comparable

with Western industrial states.²³ Serving as a proxy for India's sustained agrarian poverty, these sources of energy were measured against the uneven penetration of "commercial" sources of energy—fossil fuels and electricity—in providing the primary means of livelihood and household fuel consumption for India's population of 547.9 million people, then the second largest in the world.

Yet this way of framing India's energy problems also presented an explanatory puzzle. As the authors of the fuel policy report were acutely aware, India already possessed a relatively large fossil-energy-producing sector. The country's primary source of commercial energy was coal, representing 63 percent of total commercial energy use in 1970, which was overwhelmingly derived from domestic sources of production. Oil was the next largest fuel at 29 percent, provisioned primarily through foreign petroleum imports, though with increasing state-directed investment in prospecting and production in Assam, Gujarat, and the offshore oilfields of the Indian Ocean. These energy sources were complemented by significant growth in India's electricity-generating capacity after independence, which drew nearly 50 percent of its power from hydroelectric power stations by the early 1970s.²⁴ In global comparative terms, India had become by far the most important coal-producing economy in the developing world outside of China, representing 52 percent of total coal production of all "late-developing" countries lacking significant oil exports.²⁵

If the Indian fossil economy not only was relatively advanced but, in the case of coal, also boasted a history as old as many of the leading industrial states of the West, why was it that India's energy economy appeared structurally defined by a paucity of fossil energy? What might this characterization of India's fossil economy tell us about the place of India within the global history of fossil fuels more generally? Over the last several decades, fossil fuels have become widely debated subjects of global and comparative history. Historians such as E. A. Wrigley and Kenneth Pomeranz have drawn attention to the defining role that fossil fuels played in what Pomeranz famously called "the great divergence," or the conditions through which Europe rose to industrial prominence in the nineteenth century against a simultaneous stagnation and decline of Asian economies.²⁶ British coal reserves represented one of the primary sources for this epochal industrial transformation, which Wrigley explained as a passage from the constraints of agriculture-based "organic economies" towards the "mineral economies" underlying the mechanization of human and animal labor power that revolutionized production relations on a world scale.

Such accounts have shaped a sense of the specifically European, or perhaps North Atlantic, origins of global fossil-fuel dependence, with a correlated understanding that countries now part of the global South embraced energy-intensive development only at a much later period.²⁷ This framing has been

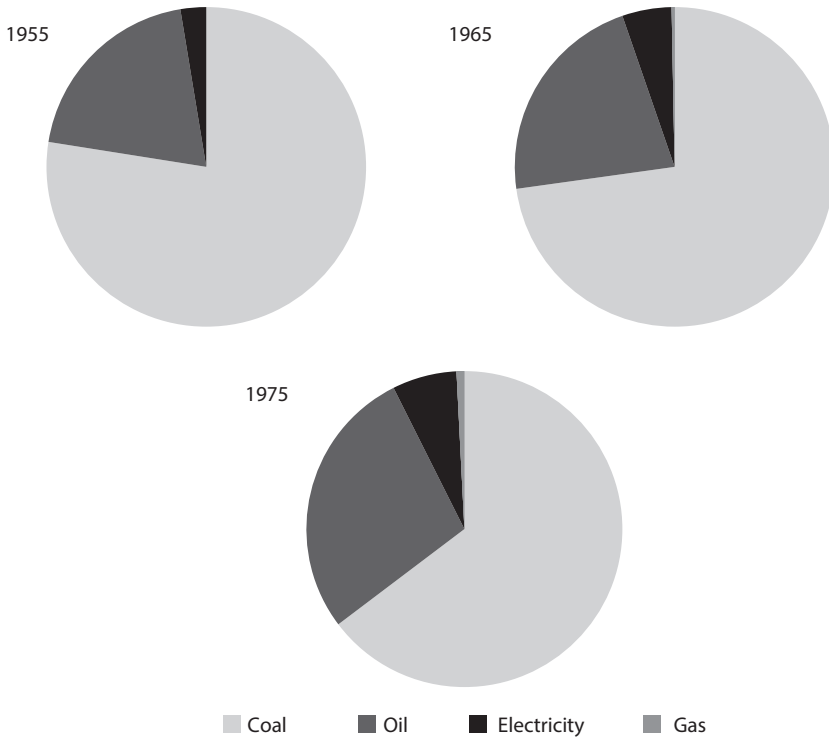


FIGURE 3. Final commercial energy consumption, 1955–1975. Data from Ashok V. Desai, “India’s Energy Consumption: Composition and Trends,” *Energy Policy* 6, no. 3 (1978): 224.

especially influential for environmental historians, whose engagement with the periodizing debates surrounding the concept of the Anthropocene, or the period when humans began to act as a collective geophysical force, reflects similar notions of European origins and subsequent global diffusion. The first articulation of this position was given by Eugene Stoermer and Paul Crutzen, who argued for a periodization of the Anthropocene beginning with the fossil-fuel-based industrialization that they associated with the advent of James Watt’s steam engine in Britain in 1784.²⁸ A related periodizing argument was then taken up by McNeill and Engelke, who oriented their analysis of the Anthropocene to the period after 1945, or what they called the “Great Acceleration.” This period, these authors showed, marked an unprecedented intensification of global fossil-energy use, witnessing the release of three-fourths of all anthropogenic carbon emissions ever produced and coinciding with the era of decolonization and postwar development. Humanity’s fundamental transformation

of the planet's biogeochemical systems, according to this approach, thus unfolded alongside the expansion of fossil fuel consumption beyond Europe and North America, suggesting that the energy history of places like India or China has been defined by a characteristic "lateness," or that their significance only lies in the mid-twentieth century quantitative rupture of global emissions.²⁹

One of the problems with these perspectives lies in their methodological assumptions about the appropriate geographical scale for studying both the beginnings of the fossil economy and the mechanisms of its transmission. As Wrigley himself noted, England's adoption of coal as the country's primary fuel source lay in a much longer history of substituting coal for timber as a source of heating. The movement from "heat energy" to "mechanical energy," as Wrigley explained, began to take place in earnest only in the final decades of the eighteenth century with the adoption of steam-engine technologies, the final move in overcoming the limits of so-called organic economies.³⁰ Yet, as the environmental historian Andreas Malm has shown, even with the advent of a wide range of new applications for coal, its use continued to be rivalled by the cheapness and relative efficiencies of waterpower in British mills, dating what he calls the "decisive shift to steam" in manufacturing only to the 1840s.³¹ This prolonged transition to fossil-energy-intensive manufacturing followed from more than a century of changes to British textile production spurred by interaction and competition with weavers in the Indian subcontinent, as Prasannan Parthasarathi has demonstrated. It also paralleled the wider remaking of British political economy through the emergence of the "second British Empire" centered on its colonial possessions in South Asia after 1783.³² If an energy transition thus occurred in Britain during this period, certainly domestic and regional factors may have been decisive in shaping its outcome. But the spatial dimensions of "Britain" invoked at this time were already presupposed by the imperial geographies and modes of resource extraction that gave British divergence its content and form. In other words, the spatial framework for the archetypal fossil-fuel transition in global history was not the nation, but an empire.³³

As this book will demonstrate, neither was colonial India a latecomer to the fossil economy of the nineteenth century, nor was its function within such a transition confined to its subjugated provisioning of the agricultural commodities, labor, and revenues that helped to fuel metropolitan Britain's industrial ascent. Coal arrived in India as a colonial commodity, reflected culturally in the adoption of Anglicized versions of *koyala* as the word for "coal" in many Indian vernaculars, or as foreign, or *bideshi*, coal to contrast the black sooty fuel appearing as makeweight ballast in English sailing ships with domestic Indian charcoals.³⁴ Already in 1774, East India Company merchants in Bengal laid the first claim to one of the region's main coalfields—a short-lived attempt to forge local munitions for the company's many war-making campaigns.

Following the abolition of the company's trading monopoly in 1813, independent merchant houses in Calcutta began surveying operations for potential coal investments in the Chotanagpur Plateau in western Bengal and Assam.

Greater investment in Indian coal awaited the adoption of steamships for coastal and inland river trading, as well as for war transports to move the company's *sepoy* armies across the Bay of Bengal into lower Burma, during the 1820s. By 1836, Indian and European merchants in Calcutta constituted a "Coal and Iron Committee" for searching out untapped coal lands. Mercantile and administrative interests in coal were not confined to British possessions in subcontinental India alone, especially with the advance of transoceanic steam routes connecting Britain to India via the overland isthmus of Suez in the 1830s.³⁵ Coal survey efforts by then encompassed the eastern African coast, the Gulf of Aden, the Straits Settlement, and the wider Pacific. Such work was overseen and institutionalized in India itself with the founding of the Museum of Economic Geology after 1840, which became a central clearinghouse for measuring, comparing, and validating discoveries of profitable fuels and minerals across the Indian Ocean.³⁶

These aspects of India's nascent coal age took a decidedly different form with the reconstitution of British imperial power after the 1857 rebellion and state investment in railway infrastructures for transporting imperial armies. It was the financial logic of railway bonds and the combined imperial ideologies of infrastructural "security" and "public works" that forged a railway network for integrating Indian agricultural commodities, laborers, local markets, and land values within the economy of the British Empire. Indian coal mines underwrote this expansion, with the growing demand for cheap fuel driving down the cost of Indian coals relative to British coal imports. The expansion of railways paralleled the expansive undertaking of coal surveys by the Geological Survey of India, an institution founded in 1851 as the successor to the Museum of Economic Geology and charged with mapping the mining geographies of a subcontinental fuel economy of coal.³⁷

The global Great Depression of 1873–1896 significantly accelerated these trends, leading to the mass export of British capital into colonial territories and the remolding of India's imperial government into a fiscal vehicle for managing Britain's trade and credit obligations on a world scale.³⁸ Indian railway investment for the movement of agricultural commodities into global markets was one of the most visible signs of these intensifying global entanglements, becoming by 1900 the fifth-largest rail system in the world.³⁹ This materialized what Charles Bright and Michael Geyer have called the new "condition of globality" after 1870, characterized by a global division of labor between industrializing Europe and its colonies, as well as sharpening spatial distinctions between cities and agrarian hinterlands.⁴⁰ In India's coalfields, this expansionary era of capital investment led to the growth of new joint-stock

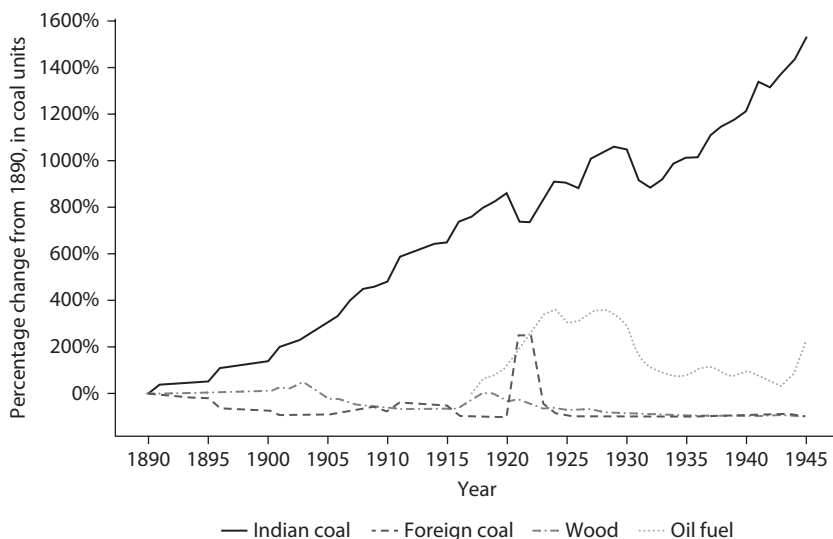


FIGURE 4. Fuel consumption on Indian railways, 1890–1945. Data from Government of India, Department of Statistics, *Report on the Production and Consumption of Coal in India* (Superintendent of Government Printing, various years). Coal equivalent units: Wood in terms of 1 ton of coal to 2 1/2 tons of wood; oil in terms of .55 ton of oil to 1 ton of coal. The base value of Indian coal in 1890 is 654,829 tons.

companies that shifted colonial investments towards unworked areas of the mining frontier. In the 1890s, following mining strikes in Britain and Wales that immobilized the imperial system of overseas coal exports, railway connections between the Jharia coalfields of the western Chotanagpur Plateau and the Port of Calcutta were finally completed, unleashing a period of sustained coal growth and rising coal profits that lasted over a decade. Speculation in new coal properties built out an energy geography in the western coal lands that would account for the vast majority of India's coal production for most of the twentieth century. The number of coal companies grew between 1890 and 1920 from 6 to 227, while that of coal mines exploded from 90 in 1885 to 682 by 1920.⁴¹ Overwhelmingly, it was European firms and shareholding capital that captured the windfalls of this expansion.⁴² After 1908, when coal prices dipped and growth stalled, Indian coal exports were circulating in coaling ports across the Indian Ocean and as far east as Yokohama, Japan.

There were many ways to measure India's extractive transformation during this period. By the end of the coal boom of the 1890s, for instance, Indian coal production represented the largest single share of fossil fuels produced in any of the colonial territories of the British Empire. Between 1905 and 1915, Indian annual coal production more than doubled to over seventeen million tons, which fueled new industrial investments in Indian textile, jute, iron, and steel manufacturing.⁴³

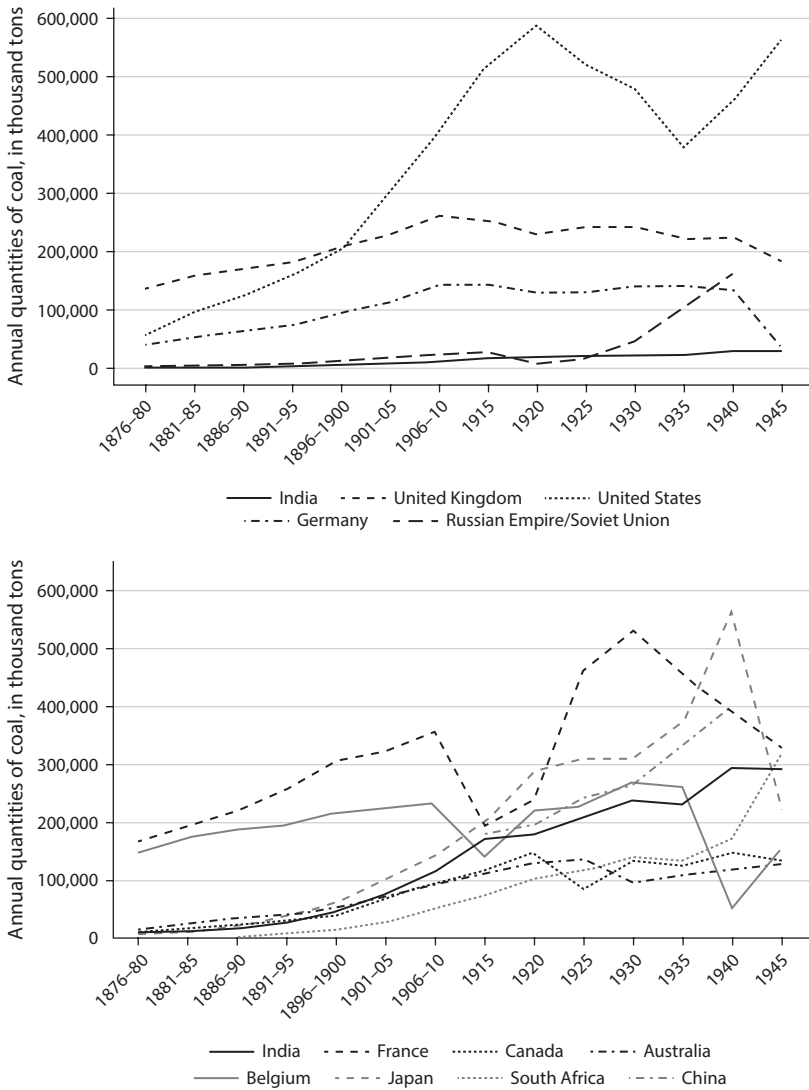


FIGURE 5. Coal produced in the British Empire and principal foreign countries, 1876–1945. Data from Government of India, Department of Statistics, *Report on the Production and Consumption of Coal in India* (Superintendent of Government Printing, various years).

Even with this growth, however, Indian coal represented only 1.8 percent of global production, making it the world’s eighth-largest coal producer, but obviously overshadowed by the leading coal-producing nations of the United States, the United Kingdom, and Germany, which collectively accounted for about

84 percent of global output in 1919.⁴⁴ India's marginal share of global coal production was more than appropriate, according to Britain's late imperial boosters, who described the Indian energy economy in the early 1940s as already "self-sufficient," having grown to produce twenty-eight million tons of coal annually by this time, maintaining its status as the world's eighth-largest producer.⁴⁵ These metrics were reflected not only in production levels, but in the labor intensity of coal employment. In 1946, one year before Indian independence, over three hundred thousand workers were employed in the Indian coal industry, a figure trailing only Britain, the United States, the Soviet Union, and Germany.⁴⁶

The peculiar intensity, and yet relative marginality, of colonial India's fossil economy is perhaps one reason why scholars of energy have not located it within a history of the origins of global fossil-fuel dependence. More likely, however, this absence is explained by an expectation that histories of fossil energy, especially of coal in the nineteenth century, are necessarily correlated with national industrialization. A failure to identify such a correlation thus locates India outside a Eurocentric model of industrial modernity framed by rising per-capita consumption of fossil fuels. Certainly, the large-scale production of fossil energy in colonial India was not connected to any identifiable pathway of sustained industrial growth. Colonial India, like other large agrarian societies under European empires, experienced limited labor-intensive industrial development, including within sectors of the economy that underwent partial mechanization, such as jute or cotton manufacturing.⁴⁷ The primary role of fossil fuels in the colonial economy was to serve the needs of railway transport, not industrial investment, resulting in the intensification of agrarian social relations and reflecting a deeper structural logic of empire as an extractive, rather than a productive, political economic form. Railways would continue to be the single largest consumer of Indian coal output for the entirety of the colonial period, oscillating between one-third and nearly two-fifths of total coal consumption between 1915 and 1945, until mining and industrial manufacturing would gradually overtake rail transport in the 1950s as the largest coal-consuming sectors.⁴⁸

These structural characteristics of India's fossil economy are not easily subsumed within an account of energy transition defined by a nationally enclosed space economy.⁴⁹ Nor do they represent a belated condition of large-scale fossil-energy production beginning only in the age of decolonization. The idea that India's postcolonial turn to more intensive fossil-fuel development can be understood by periodizing schema like the Great Acceleration naturalizes exactly what it needs to explain: why it was that postcolonial countries came to view fossil fuels as the necessary energy of a national developmental transition at all.⁵⁰

In moving beyond a framework of European origins and subsequent diffusion, it becomes possible to see the differentiated political and economic

conditions under which fossil fuels became part of global economic life, and how these essential commodities became anchored within societies like India's even absent their function as a source of industrialization or mass consumption.⁵¹ Rather than the anachronistic invocation of the nation, it is the spatial framework of empire that reveals the globally dispersed networks of capital investment and fossil-energy production that created a global fossil economy subsequently divided by national states. The attempt by India in the postcolonial era to achieve a modern fossil economy was precisely an effort to break with the structural features of the fossil-energy system inherited from empire, not to begin a process of industrial or technological change as if untouched by the transformations of the nineteenth century. What would become increasingly clear for the Indian politicians and bureaucrats engaged in this postcolonial project, however, was that to break with the fossil economy of empire meant to confront its legacies of property and social power on the land. The colonial fossil economy had not been some ephemeral creation of imperial neglect; rather, its roots extended deep into India's colonial society. Out of the fossil economy created by empire, it was the rise and consolidation of a rentier class of subterranean landowners in the mining hinterlands that would outlast the colonial regime itself.

Fossil Fuels and the Land Question

To understand the role of property within a history of energy spanning colonial and postcolonial periods, it is illustrative to work backward from more contemporary events. There are few better examples of this genealogy of property than the Indian national elections of 2014, when the erstwhile chief minister of the western Indian state of Gujarat, Narendra Modi, swept to power as the country's new prime minister in a historic campaign against the Indian National Congress. Modi's party, the Hindu nationalist Bharatiya Janata Party (BJP), rode a popular wave of anti-incumbency sentiment against the Congress and its prime minister, the Oxford-trained economist Manmohan Singh, following a series of corruption scandals and popular protests that smeared the final years of Singh's administration. After the Congress government had survived a WikiLeaks cable scandal, forgery allegations against Congress officials managing India's hosting of the Commonwealth Games, and the revelation of improper administration of contracts regulating cell-phone bandwidths, in 2012 the comptroller and auditor general released a report documenting decades-long impropriety in the state's allocation of coal-bearing lands to mining companies, a scandal that became known in the Indian press as "Coalgate," after the Watergate corruption investigation that brought down US President Richard Nixon in 1974. Then-candidate Modi used the scandal to campaign on a

message of waste and corruption presided over by the Congress. “*Desh ka koyla kha gya* [The country’s coal has been eaten],” Modi thundered in stump speeches across the country.⁵²

Singh was not simply the person in charge when the Coalgate scandal broke. In the 1990s, he had served as India’s finance minister championing the IMF-induced “liberalization” of the Indian economy, leading to the removal of many controls for foreign investment, state licensing, and the privatization of certain public-sector assets.⁵³ Deregulation ultimately targeted the Indian state’s monopoly over the coal sector and its state-owned mining companies by opening government-controlled “coal blocks” to investments from thermal power companies and industrial manufacturers seeking captive energy supplies. The 2012 report from the auditor general found that these allocations had been provided to companies often with favorable royalty exemptions as the basis for executing the mining leases. Lacking institutional transparency and the appropriate market-based mechanisms for valuing India’s coal lands, the report estimated that coal-block allocation potentially cost the public exchequer \$27 billion (Rs 1.86 trillion). In the Supreme Court ruling that followed, all of these coal leases granted between 1993 and 2009 were deemed “illegal and arbitrary” and subject to immediate cancellation.⁵⁴

The Coalgate scandal proved to be a critical juncture in India’s more recent political history, not least because it helped to consolidate Modi’s and the BJP’s control over the Indian political system. But the scandal also cast into relief the deeper historical entanglements between energy and Indian politics. India’s state-controlled institutions for valuing, acquiring, and extracting coal-bearing land appeared as one of the defining features of the country’s economic ascendancy in the late twentieth century, persisting in spite of market reforms across the entirety of the Indian power sector. The size and significance of these state-based rentier apparatuses only grew, reflecting the wider phenomenon of the Indian state’s function under neoliberalism as a “land broker” responsible for assembling economic territory, such as coal mines, real estate, port complexes, and manufacturing special economic zones for encouraging more generalized capital investment.⁵⁵ While the scandal came to be viewed as an improper deviation from the free-market shibboleths otherwise governing India’s economic liberalization, it also raised more fundamental questions about how and why the Indian state had ever come to own the nation’s subterranean stocks of fossil energy in the first instance.

This state rentier aspect of India’s fossil economy dated back only to the mid-1970s, when a different Indian prime minister, Indira Gandhi, began to nationalize the country’s coal mines in a series of phased state takeovers running from 1971 to 1975. This resulted in the creation of Coal India Ltd. (CIL), a state-owned mining company that is today the single largest coal-producing entity in the

world.⁵⁶ The expropriation of private mining firms appeared to represent the achievement of one of the earliest ambitions of Indian politicians charged with managing the country's postcolonial political economy. Many of the leaders of the postindependence Congress viewed the state as the only institution capable of safeguarding India's finite reserves of fossil fuels. This understanding had been shaped by the experiences of colonial mining practices, which Indian nationalists identified with the reckless destruction of the country's coal stocks, the creation of fire landscapes like those at the Jharia mines, and the use of coal properties as unproductive sources of financial speculation. It was only through the total expropriation of these colonial property claims, such advocates had hoped, that India could rebalance what one of the country's premier geologists, D. N. Wadia, identified in a speech to the United Nations in 1949 as "the disequilibrium in the world's mineral economies."⁵⁷

One of the core ambitions of this book is to rethink not only how colonial property shaped the structure of India's postcolonial fossil economy but also how these same dynamics created a particular postcolonial politics of energy. In so doing, this work joins a growing body of research into the relationship between fossil fuels and politics.⁵⁸ Few works have more forcefully posed this relationship than Timothy Mitchell's widely influential *Carbon Democracy*, which argued that the "materiality" of fossil fuels determines political phenomena. Mitchell's case study was coal mining in nineteenth-century Britain and the subsequent rise of petroleum concessions in the interwar Middle East. Adapting concepts from the science-studies scholar Bruno Latour, Mitchell attempted to show how the physical distribution of fossil fuels in the earth's crust shapes "socio-technical" networks of production and use, which then organize society, politics, and nature in particular ways. For Mitchell, this was epitomized in the distinctions between political forms he attributed separately to the material qualities of coal and petroleum. The spatial concentration of British coal mines and the labor intensity of underground mining created unique opportunities for labor strikes and sabotage, especially in the energy "bottlenecks" of railways and coaling ports. These features of the British fossil economy, Mitchell argued, demonstrated a material connection between coal and modern forms of democracy, while the distinctive material qualities of oil and the capital-intensive conditions of its production pointed towards an alternative political history of empire and authoritarianism for the petroleum-rich Middle East.⁵⁹

This emphasis on the materiality of carbon energy draws attention to important technical dimensions of the global fossil economy. But as a general theory of fossil-fuel politics, it has more limited validity. India's coal economy, as I have suggested, developed through conditions of empire, not democracy, which deepened ties between metropole and colony and created structures of violence and expropriation in the interior coal lands that

became subject to colonial capital investment. Relatedly, for twentieth-century China, as Victor Seow has demonstrated, large-scale coal production did not determine a democratic transition, but a project of bureaucratic state centralization.⁶⁰ What Mitchell understands as a politics inherent in the material qualities of coal is probably better explained as a partial account of the historical conditions of mine work as they developed in the particular British case.⁶¹ There is no necessary relationship between the socio-technical systems Mitchell describes and the material requirements of coal extraction. In India today, for instance, the majority of coal is extracted through open-cast or surface mining, a capital-intensive form of mechanized mine work that was rapidly deployed after 1975 and coincided with *both* intensifying state authoritarianism and widening democratic participation.⁶² Rather than politics growing out of any fixed materiality, the global history of fossil fuels suggests instead a wider set of factors structuring relations between fossil fuels and political forms.

While this book centrally takes up issues of materiality and the socio-technical nature of energy systems, it does so by refocusing attention on an aspect of the fossil economy that is reducible to neither the physical properties of carbon resources nor networks of energy distribution and consumption—that is, fossil fuels as forms of property. Fossil fuels became sources of global social wealth within the historical configurations of nineteenth-century capitalism, a social and ecological system of accumulation that preceded the rise of both fossil energy and industrial technology.⁶³ The technical relations of production that created modern energy economies were already presupposed by social practices that made it possible to understand fossil fuels as sources of economic value under juridical relations of property and ownership. Fossil fuels became valuable not only because of their mere discovery, nor by their subsequent use in factories or transportation, but because regimes of property rendered fossil-fuel-bearing lands into abstractions of price, profit, and capital, analytically prior societal transformations of nature that made fossil energy into an ownable and tradeable asset. Carbon resources like coal and petroleum did not arrive at mining surfaces, drill sites, factory smelters, coaling stations, pipelines, or refining complexes, only then to be worked up into relations of society and politics; they were, rather, already inscribed by the social relations of property that put nature “to work” as a commodity.⁶⁴

At stake in this distinction is not only a deeper understanding of property within the history of fossil fuels but a methodological approach that seeks to locate fossil energy within a history of capitalism exceeding concerns with industry and technology alone. The lens of property provides such a vantage, as it points to what the historian Jonathan Levy has called the “legal form” of capital, or the agents and institutions that produce social wealth by assigning pecuniary values to “legal property” in expectation of future income.⁶⁵ Such

legal property may become a physical factor or means of production—as in a factory, a coal mine, or an electricity grid—or it may serve the function of providing returns on nonproductive, idle, or financial investment, such as rent or other types of passive income derived through interest and speculation.

The diversified and, indeed, dematerialized functions of property within a capitalist economy are particularly important for examining the social logics underlying the development of fossil-fuel investments. These resources often entered into historical processes of capital accumulation as ownership claims through the category of mining rents, a juridical form defining a time-bound monopoly ownership claim, as well as a valuation of geological quantity, quality, and future profitability. Mining rents thus denote both an alienable ownership stake over a material asset and the financial valuations of price and profitability derived from energy markets that determine when and how these resources are used.⁶⁶ Such an ownership structure has served to underwrite all sorts of financial and monetary instruments that do not necessarily bear on the technical requirements of energy production and may actually incentivize the unproductive use of propertied assets through speculation, hoarding, or underinvestment in energy development.⁶⁷ The legal form of property thus helps to see a history of energy and capitalism through what the geographer David Harvey calls “value in motion,” or the changing historical conditions of capital accumulation that move beyond a unilinear focus on the realization of value through production alone.⁶⁸

These intersecting issues of property, rent, and production bear significantly on the Indian case. The colonial fossil economy was dominated by connections between rentier zamindars and a corporate form known as managing agents, a portfolio asset-managing institution that emerged in India in the 1830s for controlling joint-stock investments across landholding companies, tea plantations, coal mines, labor-, or “coolie-,” recruitment firms, insurance schemes, textile mills, and more.⁶⁹ While the managing-agency system would continue to function until its abolition in 1969—two years before the first nationalization of the Indian coal sector—many in the postcolonial state had long critiqued the system’s dysfunction. Managing agents pursued short-term profits by tracking investment to what the Indian Coalfields Committee of 1946 called the “violent fluctuations” of India’s rising and falling coal prices while allocating relatively little capital to the productive capacities of individual mines.⁷⁰ These firms were able to withstand pricing slumps and coal gluts by virtue of their near monopoly control over India’s largest coalfields, which they commanded through their extensive concentration of agrarian and coal-bearing land deeds that paid mining rents to zamindari estates. For planning economists in India’s postcolonial state, managing agencies represented a logic of capital investment defined by the short-term *financial* gains of

portfolio investment preferences and agrarian rentier interests, rather than vehicles for coal-productivity growth through the long-term planning of *industrial* investment in any single sector.⁷¹

But the specificity of fossil-fuel property in the Indian case also points to a particular colonial genealogy of power on the land. The colonial companies and land speculators that first entered India's coal lands in the nineteenth century staked their extractive claims in an agrarian and forest ecology in which there was little knowledge of the extent of subsurface coal seams. While there were extensive precedents for precolonial histories of mining and mineral jurisprudence throughout the Indian subcontinent, the zamindari property system that governed agrarian subleasing lacked a substantive legal mechanism for recognizing the ownership of subsurface coal rights. What this meant in practice was that many of the coal *pattas*, or land deeds, acquired by companies reflected a conception of "land" in which ownership over the agrarian topsoil was subsequently taken to imply rights to the minerals beneath it. Many early mining claims were created through the valuation and subleasing of ambiguous agrarian property deeds that would only later become recognized as ownership stakes for mineral wealth. More critically, it was the conjoined ownership of agrarian and subsurface land, as well as colonial discourses of zamindari "feudal" entitlements, that allowed both companies and zamindars to control the labor of Adivasi and Dalit peasants. Coal *pattas* transformed mining companies into agrarian landlords, in which their control over agrarian revenue collection created a captive labor force of tenants exchanging land rent for work in the mines. This would become one of the primary accumulation strategies for the largest of the managing-agency firms, producing a mining geography of "fuel estates" encompassing both working mines and cultivated farmland.⁷²

Scholars of imperial mining economies have often been attentive to the role of geological discoveries in shaping new conceptions of property, especially with the growing impact of state-led geological surveys from the mid-nineteenth century onward. Certainly, the state-led rationalization of "vertical" property under new modes of geological surveying is an important component of the Indian story as well.⁷³ But it was neither the exclusive impact of the lawmaking capacities of the colonial state nor the identification of coal distributions by geological surveyors that created coal property in the forest highlands. It was instead zamindars and companies that forged a system of subterranean property on the ground and in the absence of an established framework of subsurface rights. The disputed foundations of these subterranean property claims ultimately became inscribed in the legal meanings attributed to zamindari estates in colonial jurisprudence following the mining boom of the 1890s, reflecting a greater recognition by the colonial state of the permanence of the mining economy and what it was doing to the agrarian frontier. The physical demands of

coal extraction had split open the land, swallowing ever-greater tracts of forests, watercourses, and paddy and millet fields. The growing value of coal-bearing land coincided with intensifying cycles of agrarian drought and debt, forcing new populations of Adivasis to find wage work in the mines. If coal had first entered the forest highlands as an appendage of an agrarian property regime, by the late-colonial period zamindars and companies had remade the landscape in their image as owners of mining capital claiming the subterranean earth.

In recentering the problem of property, this book builds on both the extensive historiography of land in the history of South Asia and canonical works in environmental history concerned with property rights and agroecological change.⁷⁴ Raising the particular subsurface entailments of “land” expands the spatial focus of these earlier studies, calling attention to the role of legal abstractions in shaping how mining economies transform the earth into what Karl Marx elsewhere called *terre-capital*, or “land capital.”⁷⁵ Yet the idea that one could work the subsurface and leave intact the surface world was only ever a legal fiction. The enduring agrarian property forms of the Permanent Settlement of 1793 striated the social relations of the highland forests in multiple ways, pointing ahead to contestations over the ownership of subsurface resources that would become entangled in wider political movements of state secession, zamindari abolition, and linguistic and ethnic identity. Even the fledgling state-owned fossil-fuel companies created by the postcolonial state in the mid-1950s were intended to overcome these contested relations of subsurface ownership, shaping a short-lived project of fossil-fuel “socialism” for eradicating the remnants of colonial property. It was the issue of land and the inequitable legacies of its ownership that animated a new postcolonial politics of energy sovereignty. The nineteenth-century agrarian transitions of the forest highlands had unleashed an age of fossil capital, a history through which contrasting visions of the postcolonial future were now to be staked.

Structure of the Book

This book is organized into five chronological chapters that trace connections between India’s colonial and postcolonial pasts. In the book’s epigraph, Henri Lefebvre tells us nothing disappears completely, and with each chapter we see ecological and social transformations accumulating across an advancing timeline. The first chapter explores the advent of the global fossil economy in the nineteenth century through an imperial frame. Moving from accounts of nineteenth-century globalization that emphasize the role of communication technologies underlying new forms of imperial connectivity, this chapter instead foregrounds the historical processes driving the commodification of India’s fossil fuels. The chapter follows three interlinked periods of a colonial

energy transition that shaped the conditions for capital investment in India's coal lands: the rise of colonial merchant interests in coal properties and the subsequent emergence of imperial geological surveying, financial investment in railways and coaling infrastructure, and the expansion of the "company town" as a spatial and juridical framework for controlling nature and labor.

Chapter 2 shifts from global and imperial scales to regional histories of property and land. It explores how the making of India's coal economy displaced and transformed the forested agroecologies of India's eastern highlands through the emergence of subterranean property claims. These processes were centered on agrarian conflicts between the colonial state, Adivasi and Dalit cultivators, and the class of large landholders subsequently known as zamindars. As this chapter shows, the gradual appropriation of subterranean property by zamindars shaped a mining economy defined by unfree labor and a colonial discourse regarding the feudal entitlements of mining property. These changes were further shaped by the deteriorating conditions of agricultural production caused by drought and the expansionary land-acquisition projects of colonial firms.

If the first two chapters sketch the material coordinates of the colonial fossil economy in the long nineteenth century, chapter 3 shows how these changes influenced a rising nationalist consciousness of the fate of nature under modern industrial economies during the interwar period. Focusing on the Bengali sociologist Radhakamal Mukerjee, this chapter follows how issues of "energy" and "nature" entered into nationalist discourses of state-led development that would become adopted by the Indian National Congress in the 1930s. Mukerjee's trajectory as an anticolonial intellectual frames the emergence of ecological and agrarian thinking as alternatives to industrial modernity at a critical period of imperial crisis and nationalist politics. But his life and work also provide a window onto the limited purchase of such ideas in a world increasingly defined by the competitive dynamics of energy-intensive industrial development, foreshadowing postcolonial debates about capitalism, state development, and resource sovereignty in the final two chapters.

Chapter 4 opens at the moment of Indian independence in 1947. It documents how the postcolonial state sought to assert sovereign ownership over India's fossil economy in the aftermath of empire. The chapter shows how early efforts by the Indian state to reinscribe fossil fuels as the patrimony of the Indian people were challenged by existing owners of subterranean property—zamindari estate holders and private mining companies. Nationalist efforts to defeat private property claims coalesced in a series of zamindari abolition laws in the 1940s and 1950s, which were in turn shadowed by Adivasi and other regional movements for the political reorganization of the mining frontier. These varied attempts to expropriate the agrarian inheritances of the Permanent Settlement of 1793—what the historian C.L.R. James called, in a different context of

abolition, the combination of “violence and reason” accompanying revolutionary transformation—were gradually beaten back, shaping a new conciliatory politics of federalism with far more limited expropriatory aims.⁷⁶ The failure of abolition in India’s coalfields would in turn shape the productivist pivot of the Indian state’s turn towards “socialist” development during the mid-1950s.

The fifth chapter follows that socialist turn by focusing on the emergence of India’s state-owned petroleum sector after 1954. The postcolonial state’s pivot to oil reflected both the failures of state expropriation in the coal sector and a turn towards socialist ideas of energy development within the cabinet of Jawaharlal Nehru. It examines the formation of the state-owned institutions of the Oil and Natural Gas Commission (ONGC) under Nehru’s close adviser, Keshav Dev Malaviya, and the discovery of new domestic sources of petroleum that underwrote new ideas of India’s energy sovereignty premised on the expropriation of colonial mining interests. One of the ironies of the successes of the ONGC was that by helping to drive unprecedented growth in Indian oil consumption, it further deepened the country’s dependence on oil imports, which tied India’s energy economy even closer to a volatile global oil system organized by payments denominated in the foreign currencies of the US dollar and the British pound. The new scale of these oil dependencies set the stage for India’s exposure to the money and energy crises of the early 1970s, which in turn compelled the state’s transformation of the coal sector under an emergency regime of fossil-fuel nationalization.

The book concludes with an analysis of the energy crisis of 1973 and the nationalization of India’s energy economy under Prime Minister Indira Gandhi. This period marked India’s turn to the energy-intensive development that had largely eluded the early postcolonial state, as fossil-fuel production surged under new nationalized public-sector coal companies. This productive leap exacerbated the histories of colonial and postcolonial property conflicts, with large-scale Adivasi displacement, antistate violence, and the growth of state paramilitaries accompanying investments in new mining projects. Not only did nationalization entail the state’s takeover of existing coal properties, but it created the institutional conditions for a technological shift in the means of coal extraction. The period after 1975 witnessed the growth of surface or open-cast mining as the dominant mode of extracting coal, creating a new politics of land centered on the total destruction of agrarian and forest environments and the mechanization of various labor processes. There were few better spatial representations of the future of India’s fossil economy than these open-cast pits that began to appear across the forest landscape. Their staggered depths, toxic water discharges, and ash-drenched roadways overtook the land, with coal heaps packed down into waiting truck beds and railway cars, disappearing like rolling thunder beyond the forest fringe.

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