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The Geopolitics of Global Energy: The New Cost of Plenty

edited by
Timothy C. Lehmann

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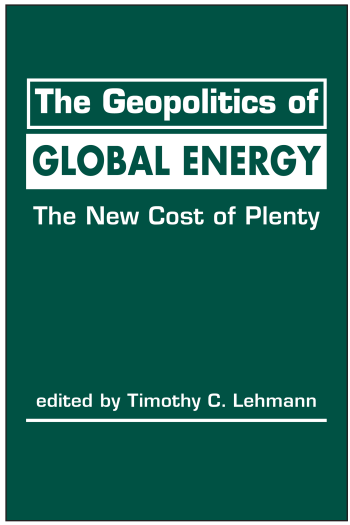

LYNNE RIENNER PUBLISHERS

1800 30th Street, Suite 314
Boulder, CO 80301 USA
telephone 303.444.6684
fax 303.444.0824

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The Geopolitics of Global Energy

Timothy C. Lehmann

This volume explores the contemporary economics and power politics of global energy. Among the many topics related to this central aspect of economic and military power, resource scarcity, depletion, and rivalry have been long-standing concerns for scholars of energy, political economy, and strategic studies. For example, Thomas Malthus worried that population growth would outstrip agricultural production, causing calamitous human behaviors, and William Jevons found that increased coal consumption and resource depletion resulted from Great Britain's improved efficiency in coal use. Greater efficiency in production and applied end uses did not reduce total consumption in the case of coal—quite the contrary—yet it did stave off Malthus's most dire predictions in agriculture. The questions that drove these concerns frame much of this volume's apolitical inquiry: exactly what are the conventional and unconventional energy resources available for stable economic development?

Key Questions Animating the Volume

To evaluate this seemingly innocuous question of mere scientific measurement, the authors in this volume are of necessity addressing themselves in whole or in part to four interlocking questions.

- What are the world's known energy reserves, and how do domestic and international politics affect these assessments?
- How do contests over energy resources and the wealth they generate shape political relations and economic structures within and among states?
- What have been the social, environmental, and political consequences of the conventional energy system?

- Is there an energy transition afoot in the world, and if so, what are its key characteristics and likely consequences?

Attempting to answer these questions with any degree of accuracy invokes the many state and corporate actors whose strategic assessments and investments determine the world's collective energy fate. The more directly political aspects of this volume center precisely upon the agendas and decisions of the world's leading commercial and military-related actors. Regardless of whether one investigates commercial market power or sovereign military power, energy is the necessary and irreplaceable common element. Energy is fundamental to every aspect of social, economic, and military life, and its use characteristics separate humans at both the individual level and in the many stratifications and contests within the international arena. What is also true about energy's ubiquitous role in social and hierarchical relationships is that nearly any energy resource can be developed. Given sufficient capital investment, end use infrastructure development, and governmental commitment, most energy resources are convertible into usable products. Because this domain is so important, it has always been the special provenance of the most important commercial and state actors, and they are all highly attentive to the competitive maneuvers of their peers. Yet their choices and the resulting energy outcomes are variable, even within their own times.

For example, in the 1920s and 1930s, despite the cartelized and highly functional global oil market and the obvious operational performance and strategic benefits attending the use of refined fuels from crude petroleum resource inputs, Germany converted its readily available coal resources into refined fuels such as gasoline. Using very capital-intensive and chemically sophisticated processes, Germany did this for strategic, autonomy-enhancing reasons, and these stimuli accelerated from 1933 forward under Adolf Hitler's chancellorship (Hayes 1987; Birkenfeld 1964). During the same period, the major Western international oil companies included IG Farben (the leading German actor in the synthetic oil from coal effort) and a few other key actors in a global petrochemical cartel. In this volume, the oil majors refer primarily to: Standard Oil of New Jersey (Exxon), Standard Oil of New York (Mobil), Standard Oil of California (Chevron), The Texas Company (Texaco), Royal Dutch Shell, and British Petroleum (BP) (hereafter the oil majors). The broader cartel among energy and chemicals concerns effectively locked down the patented technology to develop liquid fuels from coal outside of Germany, setting up the world's first transnational petrochemical cartel with clear vested interests. Beyond forming an industrial and political truce among key US, Dutch, and British actors, the cartel's most direct objects were to control the world's non-Soviet oil resource territories and the myriad refined products markets. These now

encompassed all manner of petrochemical by-products, such as Rayon, the first patented commercial product of the cartel (Blair 1976; Sampson 1975; US Federal Trade Commission 1952). The oil majors, the leading chemicals concerns, and their Anglo-American-Dutch home governments shaped much of the development of the oil age as it grew from its inception in the early pre–World War I era, to its full flowering in the years leading into World War II.

The Oil Age

The oil age was led by the United States and its oil majors. Despite oil production not outpacing coal as the top energy resource across all energy types until 1975 (see Table 1.1), oil was the dominant energy type after World War I (Darmstadter 1971: 224, 652). It remains so today. Aside from Sasol in South Africa, coal as a liquid fuels source is not something the world dwells on much anymore. This remains true despite the fact that nonliquid unconventional energy resources such as oil sands and natural gas plant liquids are becoming increasingly important to the "oil" game. Since January 2010, oil sands and even coal have received US regulatory support to qualify as proven oil reserves on the books of energy companies (US Securities and Exchange Commission 2009: 2163). With regulatory innovation such as this, one can look backward into the present and see how striking it remains that on the basis of a suboptimal energy resource for transportation fuel end uses (i.e., coal), Germany was able to go so far in its military and industrial challenge against the three leading oil powers—the United States, Britain, and the Soviet Union. Germany built impressive military capabilities and led in rocket fuels development because of this devel-

Table 1.1 World Total Primary Energy Consumption by Energy Type, 1925–2015

Energy Type and Share of World Energy Supply	1925	1945	1955	1965	1975	1985	1995	2005	2015
Coal	82.9	66	54.1	41.8	29	30	27.1	27.8	29.4
Oil	13.3	23	32.5	39.4	46.3	37	39.7	36.3	33
Natural gas	3.2	10	11.6	16.7	18	20	23.2	23.6	23.8
Other	0.6	1	2.8	2.1	6.7	13	10	12.3	13.8

Sources: British Petroleum, *Statistical Review of World Energy* (various years); Clark (1991); Darmstadter (1971).

Notes: "Other" includes hydroelectric, nuclear, and all renewable energy sources. Renewables were omitted in British Petroleum data until 1995 (renewables were only 2.78 percent of the total in 2015, up from 1.4 percent in 2010, but nuclear and hydroelectric together were still over four times greater than renewables in 2015).

opment track, and this fact is testament to just how malleable hydrocarbon formations are as energy resources (Stokes 1985).

Given sufficient capital, technology, and political will, nearly any hydrocarbon can be converted into usable fuels for vital end uses, including the two most important: electrical generation and transportation. While the interwar German example demonstrates that energy resources can be adapted to most end uses, the fact that the three leading oil powers defeated the "have-not" powers of Japan and Germany illustrates a deeper truth about energy geopolitics (Chapman 1984). Those that have the most energy resources under their sovereign authority are usually capable of developing them more fully and securing their lines of communication with military force. Thus, they are more likely to win the systemic wars that affect global energy and related alliance patterns for decades to come. Political order itself is determined by and visible in these energy and alliance patterns, revealing global politics, in effect, as a mutually constitutive system conditioned primarily by energy and war. Thus, the geopolitics of energy are inseparable from state grand strategy and war, and it becomes clearer that any change in an existing political order would have to have a corollary change in the energy system.

In the oil era this is obvious. Oil is the indispensable fuel for conquering distance through power projection and mobility, while oil remains essential to military firepower as well, providing the toluene in TNT, for example, among other vital explosive components. The struggle for autonomy and influence always attends the geopolitics of energy, and war and the threat of war are ever-present aspects of ordering relations among key political actors, whether these are states or firms. After World War II, the United States helped pull the world forward into the modern oil-based industrial era, raising oil's share in total world energy use from 23 percent in 1945 to 46.3 percent by 1975. In 1945, on US territory alone, US firms produced 66 percent of the world's crude oil while helping make oil 30.5 percent of total US energy use. The United States used its dominant position over world energy and trade to convert postwar allies to oil-fired economies (Hein 1990; Stokes 1994). The Soviet Union simply followed suit on the basis of its own unconquered oil resources in the Caucasus and elsewhere. The early decades after World War II were an era of cheap and abundant oil and other energy resources for global economic development and war, whether in Korea, Vietnam, or the more indirect proxy wars from the Horn of Africa to Central America. After depleting much of its easily accessible reserves in winning the war and securing a postwar sphere of influence, the United States adjusted its policies, which had been based on North American energy supremacy, to ones based on dominance over oil supplies from the Middle East (Painter 2012; Citino 2010). The Soviet Union, the second

most powerful oil actor in the world, built a similar system with its allies and satrapies based in the oils under their control from the Eastern bloc (Painter 2014). The world became a more interconnected and petroleum-based place as world trade and travel grew exponentially through the first oil shocks of the 1970s. Then, as now, US dominance of the Middle East remains essential to US hegemony. Contrary to leading academics' many decades old admonitions for the United States to leave the Middle East because it is not strategically vital, the United States remains diplomatically and militarily anchored in the Middle East (Mearsheimer and Walt 2016: 82–83; Glaser and Kelanic 2016: 233–235; Posen 2013: 112; Layne 2006: 188–189). US policymakers, such as Zbigniew Brzezinski, have not blanched at this reality, which will continue until the world's energy system changes (Mann 2013: 162–168; Brzezinski 2003/2004).

Different Era, Same Actors, Same Game

Today the world's leading business concerns are the oil firms, and their long-term investments and patterns of cartelized cooperation still determine much of the world's energy development and end use patterns. Whether one considers various fleeting moments in resource development since the 1970s oil shocks, including the late 1970s move back to synthetic oil from coal or the modern euphoria over a "golden age of gas," the major petrochemical firms and their home governments are the ones that created these energy infrastructures (IEA [International Energy Agency] 2012b). This is unsurprising when reflecting on the fact that Standard Oil of New Jersey was once a major coal firm, too, and the key labor strife in Colorado in 1913–1914 concentrated on Standard's coal and steel combine, the Colorado Fuel and Iron Company. Coal is not a primary focus of this volume, nor is it for the majors at present, except as an object for their plans to displace coal with natural gas in electrical generation. But, coal's fate moving from transport fuel of choice after the era of wind and sail to its current role of nearly exclusive use in electrical generation is instructive nonetheless (King 1953). In fact, the geopolitics of energy as a field of study really begins with the analysis of the role of coal in relative national power and imperial rivalry. As Peter Shulman has ably demonstrated, coal was once king for a reason. Rising US power in what is commonly thought of as Britain's dominance of the coal era complicated relations between the two English-speaking titans, just as the world was to transition to oil (Shulman 2015). The share of coal in global energy consumption has not fallen in forty years, and in the past twenty years it has edged up to 29.4 percent because of coal-based electrical generation in key countries.

The current emphasis on natural gas is directed in the main by the planning and operations of three oil majors—ExxonMobil, Royal Dutch Shell, and ChevronTexaco. ExxonMobil is the largest natural gas producer in the largest gas-producing country, the United States, while it also wields influence over the liquefied natural gas (LNG) exports it developed in Qatar, the largest LNG exporter in the world with roughly one-third of the world's total LNG trade (Kamrava 2013: 44; Allsopp and Stern 2012: 24–25). If one adds Chevron's operations in Australia and elsewhere to the direct partnership between ExxonMobil and Royal Dutch Shell in the oil and natural gas of the British North Sea, the Groningen field in the Netherlands and myriad other locations (including in Iraq), the global trend toward natural gas becomes less conspicuously about competitive markets evolving toward cleaner alternatives to oil than another planned energy market expansion by the oil majors.

The same holds for what Harold Hamm of Continental Resources calls a "renaissance" in hydrofracked shale rock formations (Carroll and Olson 2014). After Continental, ExxonMobil is the number two acreage leaseholder in the Bakken formation in North Dakota, which is still producing close to 1 million barrels of oil a day (mbd), while ExxonMobil and the other oil majors also produce a great deal of the heavy oil product coming out of the Albertan oil sands development (*Oilsands Review* 2014; Philips 2014). The relative power that ExxonMobil and Houston firms more broadly hold over global energy is as difficult to overstate as it is to fully assess. One recent indicator of the relative advantage held by these firms is the readmission of ExxonMobil and the other majors back into Mexican oil, which was nationalized in March 1938 and operated since then by one of the leading national oil companies (NOCs) (Williams and Carroll 2014). As of this writing, ExxonMobil and other Houston energy services firms are desired partners for the Mexican government and state-owned oil company Pemex. They alone can bundle exploration and production expertise with refining and distribution systems, helping Mexico enhance its oil recovery from declining fields and tap the ultra-deep offshore reserves in the Gulf of Mexico and its own shale formations. Simply put, these Houston-based oil majors hold the cards in the energy world. They have learned how to play their hand to perfection, waiting out recalcitrant NOCs and states, while dangling their technological edge in energy resource development to improve individual fields, whole reservoirs, and other performance characteristics, affecting economic growth and well-being.

These petrochemical majors are indeed "energy" firms, as they are wont to state in public, particularly when contrasting themselves with coal, but they are less than forthcoming about the extent and purpose of their strategies. They are even more taciturn when it comes to clarifying their estima-

tions of possible, probable, and proved energy resources and reserves. These financial and legal concepts have seen some Sartorian stretching over time and outright fraud in the case of Royal Dutch Shell in 2003 (Critchlow 2004; Gerth and Labaton 2004). While Royal Dutch Shell's 23 percent overstatement of proven oil reserves under corporate management was motivated by financial politics on its own behalf as well as Organization of the Petroleum Exporting Countries (OPEC) member states (including Oman and Nigeria), Libya's understatement at the same time was also seemingly political but of a decidedly state strategic variety. Libya's "proved" oil reserves jumped up 22 percent in late 2003, taking it from having Africa's third-largest oil reserves to the single largest cache of proved African oil reserves (*Oil and Gas Journal* 2003: 46–47). Was it newly discovered geological properties or technological advances that led to this large upward revision at precisely the same time Colonel Qaddafi reached out yet again to the Anglo-American powers (Pargeter 2012: 189; St John 2004)? Did British prime minister Tony Blair visit Qaddafi in March 2004 with Royal Dutch Shell in tow to bury the hatchet out of altruism, or was it to help Royal Dutch Shell consummate deals that would assist with its reserves accounting dilemmas, or was it rather, as ever, a mixture of both?

The Extent of Conventional and Unconventional Energy Resources

Reserves estimates are as fickle as the value of foreign exchange, and they are assuredly political. It is a function of politics as much as it is technology and investment when a possible, recoverable hydrocarbon resource becomes accepted as a proved reserve, despite the desire of many in industry and government to focus only on the latter factors. There really are no cardinal values in energy reserves assessments. They remain estimates bounded by the politics and strategies of the actors who map, extract, and govern them. More pointedly, as the Royal Dutch Shell case from 2003 highlighted, there are mixed motives and incentives at play when estimates are generated, field by field, hydrocarbon reservoir by hydrocarbon reservoir. Furthermore, the reliance of seemingly authoritative bodies such as the International Energy Agency on petrochemical-related actors such as IHS for the original data used in analytical reports brings into question the ability of any non–industry related source to generate objective analyses of reserves, production, and depletion rates (Sorrell et al. 2012; Macalister 2009; *Financial Times* 2009). All of these are further complicated by changes in technology and the degree of investment commitment. For example, enhanced oil recovery technologies can help raise recovery rates in reservoirs above the historical norm of

30–40 percent and therefore allow for an increase in proved reserves from old reservoirs. Similarly, improved drilling technologies that unlock previously unreachable resource reservoirs, such as shale rock formations, change the proved reserves profiles of firms and states and the production possibility frontiers of whole energy enterprises, whether state-owned or private. This is evidenced by a recent oil reserves ranking from Rystad Energy in Norway, which puts the United States in first place ahead of Russia and Saudi Arabia (Rystad Energy 2016).

Adam Sieminski, late of Deutsche Bank and the US Department of Energy's Energy Information Agency, captured prevailing industry and government sentiment regarding the extent of oil resources and their possible exhaustion. In 2014, he said: "Peak oil supply was based on three critical assumptions. The first one is that you know what the resource base is, and then the second and third are that prices don't matter and technology doesn't matter. I was a firm believer that prices do matter, technology does matter, and that the resource base is dependent on prices and technology" (Moore 2014). This is a neat formulation and, of course, not inaccurate. Oil sands and coal have been reclassified and are indeed now "oil" reserves. The technology and investment have been applied in sufficiently large amounts to liquefact the sandy hydrocarbons, and some of the fruits of this endeavor rolled down North American train tracks at nearly 800,000 barrels a day in 2014, vastly more than the mere trickle of seven years ago (Natter 2014; Penty and Catts 2014). Because of the extra developmental expense compared with the "easy oil" of the classical petroleum era, government intervention has usually been the key dimension in altering relative prices and developing unconventional resources as well as their obvious reclassification as proved reserves. This has certainly been the case for the unconventional energy resources in Canada and elsewhere. The rule change allowing proven reserves to cover oil sands, shale rock, and coal was a landmark support for the oil majors who are heavily invested in the Canadian oil sands project.

Investments and rule changes such as these support the heady optimism of industry leaders and their chief trumpeters such as Daniel Yergin (Yergin 2015; IHS 2012). For example, in 2014, Chevron's chairman and chief executive John Watson confidently noted: "we're going to be in the fossil fuels business for a long time," while his lieutenant Robert Ryan once remarked that "we should celebrate the fact that we have enough oil and gas to carry us forward until a new energy technology can take their place" (Carroll 2014; Krauss 2010). These modern Standard Oil of California officers are in good company with long-standing partner Saudi Arabia, whose former oil minister, Sheik Ali Al-Naimi, said in December 2014: "Fossil fuel will remain the main source of energy for decades to come" (Carey and Syeed 2014). There

is no doubt that large increases in unconventional energy resource investments have produced more fossil fuel–based energy, but the opportunity cost of that investment and the externalities of these new resources have yet to be measured fully. Leaving aside for a moment the social, environmental, and political considerations of the unconventional "renaissance," the basic infrastructure to harness these resources and distribute them to refiners and end users is already under great strain in North America, the leader in this incipient unconventional era. Reliance on rail transport for the Bakken crudes alone has periodically jammed up a great deal of the US rail system, stranding much of the Western states' coal for electrical power generation elsewhere in the country. The domestic coal constraint due to the spike in Rockefeller-era oil-by-train shipments caused US imports of coal to surge by 37 percent in 2014, as coastal electrical utilities used imported coal over harder to rely on Mountain West coal (Parker 2014). This trade-off is an indelible example of the "new" energy era and hardly a sign of an energy renaissance.

The same holds when one looks at natural gas in southern Iraq or North Dakota. The nearly one-third of the associated natural gas of North Dakota's shale boom and over one-half of southern Iraq's natural gas that is simply flared off, instead of captured for its energy utility, is nothing but an abominable misuse of energy resources (Sontag 2014; Lando and van Heuvelen 2011). These micro examples of resource squandering and the elemental trade-offs among coal, oil, and natural gas inherent in the interdependent energy system highlight just how difficult it really is to either favor or disconnect from any one existing energy resource let alone integrate an entirely new one. Entrenched energy interests and infrastructure abound across the global energy system, and they do so because of their key positions within leading countries.

Differential Dependencies in Energy End Use

The lay public is led to believe that energy resources are fungible across applied end uses, having heard repeatedly, for example, that drilling for natural gas in North America will lead to energy independence and free the United States from dependence on the Middle East. Somewhere lost in the coverage is the fact that natural gas is not a substitute for oil in transportation end uses, at least not yet, nor without massive investments in infrastructure. Raw energy resources are inextricably linked through their refined energy products to whatever applied system uses their combustible power. This link is often tightly coupled, even inseparable, and thus the locus of political contests over autonomy and dependence. For example,

today no crude oil goes directly into a transportation craft's fuel tank, but in the past, some crudes were so light and nonsulfuric that they could be used directly in naval ship boilers. Tarakan crude in Dutch-controlled Borneo was such a crude, and its seductive quality proved too enticing to Japanese naval planners in the 1920s and 1930s. They devised war plans around seizure of this and other valuable Dutch East Indies crude oil resources, instead of a more valuable technological partnership with Germany in synthetic fuels from coal or even more extensive oil prospecting on their own in Manchuria, which could have led to the Daqing fields. Oil does not have many substitutes in transportation fuels because the engines that power vehicles and other crafts have been built to use refined crude oil products as both fuel and lubrication.

Although it remains basically valid that any energy resource type can be configured to any end use, the practical fact is that coal for liquid transportation fuels, for example, is not making a comeback, despite adherents in some quarters (Bartis, Camm, and Ortiz 2008). This is not atypical of the confidence game that plays out in most countries' domestic political systems, particularly in the United States. Although few people are pushing "clean coal" and fewer still the possibilities of coal to liquids for transport end uses, the current euphoria over natural gas for liquid fuels and possible transportation end uses captures an outsized share of public attention (Cardwell and Krauss 2013). More broadly, natural gas is extolled as the bridge fuel to the future, but its widespread applicability to transportation is only vaguely described, while natural gas–powered buses in some cities are touted as harbingers of a not so distant future.

The truth is natural gas is not a fungible substitute for oil in the critical end use of transportation. From fuels refining for transportation to engine and vehicle configuration and production, the requisite natural gas infrastructure either does not yet exist or is simply too narrow to make a dent in oil's globally vital role any time soon. As a share of global energy supply across all end uses, natural gas has increased only marginally in the past several decades, from 20 percent in 1985, to 23.8 percent in 2015. In transportation, natural gas still powers at the most only 1 percent of road transportation vehicles, and no more than 1.4 percent of natural gas consumed globally is for the transportation fuel end use (IEA 2013a: 13, 2010: 7). Natural gas plays almost no role in other modes of transportation, such as ships, planes, and trains, and one is left to marvel at the public and elite perception that natural gas might easily substitute for oil in transport (Arnsdorf 2014). Oil majors such as Royal Dutch Shell have recognized the oversupply problem in natural gas and shelved projects such as the planned $20 billion gas-to-liquids plant in Louisiana and some operations in Australia (Reed 2014; Elvidge et al. 2009: 619; World Bank 2004: 14). Simply put,

natural gas may have an increasing role in displacing coal in electrical generation, but it is many decades away from a vital role in transportation.

As the world's largest industrial economy and energy consumer, China's energy resource use epitomizes the quandary of energy resource–end use path dependence. China's electrical grid is powered predominantly by coal, while its car and light truck market has been the world's largest on an annual basis since 2009. China's road transportation is fired almost entirely on oil, and its electricity consumption is fueled nearly exclusively by coal. Of the roughly 37 million cars and light trucks sold in China in 2011 and 2012, only 20,000 were all electric or hybrid electric vehicles (Green Car Congress 2013), and in March 2013, China reported only 39,800 electric vehicles on its roads. In 2014, 72 percent of China's electricity consumption was fed by coal (IEA 2016h). If natural gas is to displace coal for electricity in China, it has a long way to go, and while non-petroleum-based vehicle sales in this the world's largest market are growing, they still hover around 1 percent of annual sales. China is not yet consuming gasoline at the prodigious US rate, but its growth is remarkable, from approximately 250,000 barrels a day in 2003, to nearly 2.25 million barrels a day in 2013 (Collins and Erickson 2014; Zaretskaya 2014). Paradoxically, the contemporary hope that rare earth element–based electric vehicles will alter the interlocking reality of oil for transport hinges on China too, as it is the largest producer of these elements mined from inner Mongolian pits. Although it seems that some of the world's leading transportation manufacturers are moving toward electromobility, the pace is still glacial just when the world's actual glaciers are melting faster than ever before.

Even if transport moved toward electrification, the electrical grid's ungainly reliance on coal dooms the conversion's utility for environment and climate change mitigation purposes. In 2014, coal was 41 percent of the global electrical grid's primary energy supply, slightly above its 38.3 percent share in 1973. The primary shift over this period has been away from oil and toward nuclear, natural gas, and some renewables for electrical generation, none of which have displaced coal's central role in electrical generation (IEA 2016i: 24). The power and prerogatives of incumbency in global energy are stark, whether one focuses on coal for electricity or oil for transport. The fossil fuel sector has reaped unseemly subsidies—$325 billion in 2015—and they command attentive and responsive government that is simply lacking for newer, renewable energy sources (IEA 2016e: 97). Relative to renewables, the energy incumbents capture the largest share of both governmental largesse and investment capital (Morales 2014a). Renewables face a long uphill climb. At only about 3 percent of total energy supply across all end uses globally, they are not likely to significantly alter the pat-

terns of energy consumption nor the power of the actors who have delivered these patterns onto humanity (IEA 2014a: 6).

Political Autonomy, National Variation, and Resource Geopolitics

While global energy resource development and end use patterns are fossilized, there is variation at the national level. This is where the crucible of politically motivated innovation clashes with the power of the oil majors' transnational complexes of vested interests. The structure of global energy is largely one of "alliance capitalism," wherein the transitory moments of price competition and rivalry usually give way to managed outcomes among the largest actors, whether state or private, usually both simultaneously (Dunning 1997; US Federal Trade Commission 1952: 21–36). Alliance capitalism has been the norm at least since Britain's pre–World War I effort to ensnare German elite factions in Iraqi oil through an ownership stake to Deutsche Bank. Today nearly every important development in global energy involves Houston-based firms. Proponents of the Western oil majors usually excuse the oligopolistic and cartelized nature of energy markets as necessary because of the scale of investment capital required or the sophistication of the technology involved, which combine to make virtue out of the necessity of collaborative market practices, not competitive ones (Yergin 2011b: 87–105). This is a nice theoretical argument, but the reality is that since late 1927, the petrochemical sector has seen mostly cartelized cooperation punctuated only by fits of competitive truculence, such as when OPEC first successfully exercised its power over "access" to exports from its oil-producing territories in the 1970s, or when the Saudis unleashed their effort at global market share retention in late 1985, amid North Sea competition from the oil majors. When the European Union fined the narrow oil products cartel in waxes in 2008, one could still see one of the more outlandish extant vestiges of the petrochemical cartel that has dominated global energy since the 1920s (Carvajal and Castle 2008).

The Western oil majors are not in rivalry with OPEC so much as they are in a complex form of partnership based in a decades-old cartelized commercial truce. On occasion these relations may tear over high political matters, but only rarely do they rupture permanently. Mexico's return to the fold eight decades after nationalization is testament to the fact that the long-term leaders of the energy system generally prevail. Despite a general pattern of stability in energy relations, there is an elemental evolution under way in global energy geopolitics. While the United States shifted away from oil for electricity generation with the oil shocks of the 1970s, initially

replacing it with natural gas and coal, the Japanese are just beginning this process in earnest. In 2012, Japan relied on very expensive imported oil supplies to power 19.6 percent of its electrical grid, and renewables still had only a de minimis share. By way of comparison, in the United States, coal was 50 percent of electrical generation in 2002 and natural gas only 18 percent. But, by 2015, coal and natural gas each supplied 33 percent of US generation (US Department of Energy 2016a). In the well-known German case, determined government policy made renewables 29 percent of electrical generation in 2015. Nonetheless, Germany maintained its reliance on coal, keeping coal's share of electrical generation at 42.3 percent in 2015. Germany leads in renewable energy but lags in electromobility, while Japan leads in this area with world-beating electric and hybrid vehicles despite its electrical grid being more fossil fuel–fired than most.

These seemingly inconsistent trends are a product of the tense interplay of the national quest for autonomy amid ongoing geopolitical rivalry and dependence. In Germany, the desire to supplant imported Russian natural gas is as much an impetus as the interest in greening and denuclearizing the grid. For its part, Japan's near obeisance to US oil majors in the postwar era is finally giving way to a vigorous debate about the best path toward Japanese energy autonomy, both for the electrical grid and in electrified transport. Here again, choices about energy use and infrastructure are not merely about one sector of the economy, they underpin all the others, from industrial output to most military spending. For example, China and Russia's record $400 billion, thirty-year deal in natural gas can be seen as autonomy-enhancing for each. Russia needs Eastern outlets for its energy amid its geopolitical rivalry with the West, while China seeks natural gas supplies over land that limit Western influence over imported LNG (Paik 2015). Sino-Russian energy deals thus serve many geopolitical objects and illustrate the limits of the oil majors and their home governments with respect to the great powers still unbowed before the United States. Russia's ability to use its "blue gold" to cement the Sino-Russian partnership exemplifies the truism in Vladimir Putin's 2003 Energy Strategy. It stated: "The role of the country in the global energy markets largely determines its geopolitical influence" (Poussenkova 2010).

The objects of state autonomy and geopolitical influence have led many other states to choose shorter-term energy solutions that are worsening the well-known social and environmental consequences of fossil fuel reliance. Whether US efforts at unconventional energy from oil sands or fracked shale rock, or German and Japanese reliance on coal and oil as bridge fuels to a more autonomous and green future, many leading states are now choosing paths that have palpably negative consequences. Coal, oil, and natural gas use and greenhouse gas emissions are the primary drivers of climate

change, and the sociopolitical corollaries of these resources are clearly negative (Le Billon 2013; Ross 2012). Nonetheless, collectively, the world returns to these resources again and again, as well as to the unconventional ones developed by the same actors. This raises a simple question: can the world afford more of the same from the leading energy actors as they structure state transitions to ever-more costly hydrocarbon resources?

Geopolitics and the Resource Debate in International Relations

The geopolitics of energy is a seemingly well-established subject area, stretching back many decades. But with few exceptions, it remains a rather poorly detailed area of inquiry by both the scholarly and policy communities (Dyer and Trombetta 2013; Kalicki and Goldwyn 2013; Moran and Russell 2009). Obfuscation regarding power, interests, and intentions among key political actors remains the norm, while studied evasion of evaluating (let alone assigning purpose to) the actors within politically dominated energy markets remains a leading narrative motif (Keohane 1984: 204). For example, far too many scholars who accept a role for oil in war find the Iraq wars to have had oil as a mere "necessary precondition" to a contest about free-flowing access to world oil markets, as opposed to an obvious object of the war (Lehmann 2017; Black 2015: 227–228; Colgan 2013: 149; Duffield 2011: 162; Gholz and Press 2010). These scholars therefore forgo proper analysis of the "control" of Iraq's oil and natural gas fields, while the explanation of political actions in the language of the market is pat. Actors such as ExxonMobil chairman Rex Tillerson do this too. Tillerson labeled the 2014 Saudi production-maximization decision against higher-cost, unconventional oils from outside OPEC a mere "price discovery exercise," even though the obvious political objects in Saudi Arabia's decision included: piquing the United States for its behavioral transgressions in the Middle East; destroying rival supplies from unconventional US shale resources; and limiting demand for more efficient oil-consuming vehicles around the world. Presumably these all would have served Saudi Arabia's intent to remain the oil world's central banker as well as the core US ally in the region.

One can always reduce politically motivated power maneuvers to dissembling statements about prices or market conditions invoked by states who cloak their interests and actions against others. For example, in early 1941, the United States, Great Britain, and the Netherlands told the Japanese that market conditions had caused the drying up of their prior oil trade with the Dutch East Indies due to oil company tanker removal to the Atlantic theater (Anderson 1975: 159–167). In fact, these governments recalled the

tankers for political reasons to undercut Japan's contractual rights to a great deal of East Indies oil, and they made the oil majors play a dissembling intermediary role in so doing. In effect, they made the reality of a contractual right to "access" oil supplies a paper fiction, while they bought more time to eat into Japan's oil stockpiles for the coming war. These examples underscore that geopolitical analysis of energy requires assessing the inherent rivalry among states and firms over the wealth and power that flow from controlling the motive energy for economic activity and military power projection (Stopford and Strange 1991; Gilpin 1975: 241–244). An energy geopolitics lens looks first, therefore, at the positional rivalry over natural resource geographies that provide the fuel for motive energy (Gilpin 1981). This approach necessarily accepts that technology, industry, and trade condition this rivalry and can alter the seemingly straitened geographic realities of actors, as illustrated by the German synthetic oil from coal example. The energy resource potential of a particular geography is always vital, but political actors will not necessarily contest each other for it using violent means. The Arctic and South China Sea resource geographies are good instances where one can observe the variability and limits of assuming geopolitics ends in conflict. Many great scholars have disputed this "pseudo-scientific" notion of geopolitics since it first appeared at the turn of the last century (Morgenthau 1963: 158–159; Weigert and Stefansson 1944: xx–xxi).

In this volume, geopolitics means only that there exists positional rivalry among powerful state and private actors over the energy determinants of national economic and military power. The most powerful of these actors contest each other for autonomy and influence, and it does not strain credulity to ponder whether ExxonMobil operates its own autonomous policy relative to the most powerful states, even the United States and Russia. International relations theory in this area of inquiry is simple and underdeveloped, and it revolves around two questions. First, how effectively do the powerful transnational oil majors work their will upon national polities? Second, must resource-based geopolitical rivalry end in zero-sum nationalist political conflict, instead of cartelized cooperation bridging political rivalry?

For international relations realists, structural Marxists, neo-Malthusians, and many environmental scientists, conventional hydrocarbon energy resources are finite, growing scarcer and provoking international competition and conflict. Energy has always been synonymous with relative power and wealth, and thus there is much less likelihood of resource politics taking on a globally cooperative hue in the long run. Whether state or private interests are more served in resource conflicts separates realists from Marxists, but both see conflict as likely. In contrast to these resource pessimists, others contend that cooperation among states and firms and shared technological innovations render energy resource use more efficient, leading to the discovery of

new resource frontiers and cooperative political relations. Many scholars argue that conventional energy resource depletion does not imply an actual exhaustion of global resources and a pending spike in conflict. Instead, they see developments in technology and firm strategies bringing newer and often more expensive resources into development, prolonging our existing resource-consuming infrastructures, while providing more opportunities for political collaboration in developing these more expensive resources. For example, with increased capital investment, we might extend natural resources such as oil for decades into the future. Daniel Yergin has always spoken for this school, arguing that "the resource endowment of the planet is sufficient to keep up with demand for decades to come" (Yergin 2009: 95). Yergin and other resource optimists presume that firms and governments will develop key resource geographies and technologies for their many end uses with little concern for relative power, while the "resource endowment of the planet" allows one to see oil sands as mere substitutes for oil without adverse social and environmental consequences.

In this volume, analyses of both broad interdisciplinary schools are challenged. The more complex trade-offs among resource availability, technological constraints, and geopolitical rivalry are examined in several areas. In the early twenty-first century, the central focus of resource political economy lies on the future of the carbon-based political and economic order. Collectively, coal, oil, and natural gas still make up just over 80 percent of all energy consumption, much as they did in 1985. Alternative energy types such as nuclear, wind, solar, and geothermal supply small amounts of energy for power generation, but not for transport. Although vast electric rail transport exists in Asia and Europe, it was killed off in the main long ago in the United States by the National City Lines cabal (Snell 1995). Chevron, a key conspirator in that episode of entrenching the oil majors' preferred transportation system, also played a large role in ensuring Japan's dependence on US-controlled Middle East oil supplies. After China was reintegrated into the Western system and Daqing oil became a real alternative for those few Japanese refineries not run by the majors, the oil majors intervened to manage the flow of Chinese oil to Japan (Lehmann 2013: 137–138; Lee 1984; Harrison 1977). The oil majors have been successful in eliminating whole alternative infrastructures (as with electric light rail in the United States) and in limiting elementary supply diversification efforts by key allies such as Japan in the 1970s. In so doing, they have always ensured ready end use markets for their energy wares with few meaningful alternatives.

Today may be little different. Tremendous investment in the Canadian oil sands of Alberta and ultra-deep oceanic regions are all led by the oil majors. For example, total investment in the Canadian oil sands dwarfs

investment in electric batteries for transportation, which have seen approximately $5 billion in total investment in the United States and the bankruptcy of many once-heralded firms such as A123 Systems, A Better Place, and Fisker Automotive. The resurgence of oil and natural gas production in North America via hydraulic fracturing in "tight" shale reservoirs has driven down the price of natural gas and increased the attractiveness of Houston exploration and production (E&P) firms. Firms and states in Latin America, Europe, and other parts of the world are busily exploring this method of extracting oil and gas deposits with Houston partners. All of these developments reflect little more than path-dependent fealty to the existing petrochemical-based system and its leaders.

Is confidence in continuously expanded development and demand for more expensive and less accessible oil and gas warranted? Which leading economies are using resources differently and challenging the fossilized future envisioned by the oil majors? While Japan and the United States appear wedded to fossil fuels, Germany leads in renewable energy for electricity while also committing itself to denuclearization. China, as in all spheres, is the 800-pound gorilla of global energy and resource politics. Will China stay with an oil-based future given its current dominance in rare earth elements production, the building blocks of any green power generation and electric mobility transportation future? Might Germany or Japan collaborate with China on transitioning away from coal and oil for electricity and transportation, and thereby nullify US dominance of the Middle East and rise of the unconventional North American petroleum-based order? Or, is China's resource nationalism—vigorously on display with its rare earth export embargo on Japan in 2010 and recent military challenges in the East and South China Seas—foreshadowing more rivalry and conflict ahead?

The academy is divided over these questions. Some, such as Amory Lovins (2011), argue that we are on the cusp of a total transformation away from fossil fuels, while others argue that alternative fuels and technologies are infeasible in the near term (Smil 2014). Maintaining the carbon-based economy requires development of previously inaccessible resources or the return to costly production of synthetic fuels from coal, oil sands, or oil shale feedstocks. Again, these were first perfected in interwar Germany when energy autarchy for war drove the country's synthetic fuels program. This motivation for improved relative autonomy may apply to US and Canadian state and business decisions to promote Albertan oil sands, but the requirement to demonstrate this remains. For example, are these more costly oils desired for bargaining leverage vis-à-vis OPEC, or simply to help render North America fully autonomous (Jaffe and Morse 2013)? These motives are difficult to disentangle as all state and private actors

have a stake in obfuscating how the world economy is driven by the development of energy resources. Coal, oil, and natural gas still determine the overall resource landscape, but their environmental consequences are all too apparent. Renewables might dethrone them if they can substitute in power generation and transportation. For example, a fully electric car could displace some oil, but it requires coal for electricity in many places and uses large amounts of rare earth elements mined in unsustainable ways, primarily in China. With any alternative resource, holistic assessment of "well to wheels" resource usage, carbon footprints, and environmental externalities is needed. This remains an elusive comparative analytic. What is certain is that the demand for energy and other resources did not abate with the global recession, and China's growth ensures a constantly increasing need for resources of all types. Efficiencies and renewables might change conventional resource use, but this will only come to pass if the political power of the oil majors and their home governments are neutralized or converted to the cause. For example, existing hybrid cars only alter resource demand slightly and challenge Houston on the margins, as the United States and China have not embraced electromobility fully yet (a little less oil, much more rare earth elements for permanent magnet motors). Given Jevons' paradox, transport electrification might not reduce overall resource consumption. China's unrelenting growth in oil consumption since becoming the largest car and light truck market in 2009 is testament to this paradox.[1]

All electric vehicles would substitute rare earth–laden motors and lithium inputs for the oil-fired internal combustion engine. This would further oil-based mining operations and the depletion of many vital resources, while causing increased US and Chinese fossil-fueled electrical grid usage. Resource trade-offs such as these may appear optimal from some political or business vantage point, but the climate consequences and geostrategic ramifications of large-scale transition remain underexplored. Simply put, which resources and infrastructures will exist in the future are not products of an apolitical contest based on technical merit. Although it is true that oil defeated coal in transport due to its technical efficiency and military utility, it was even more important that the United States and Great Britain dominated oil's early geography and the industrial base that produced the machines consuming the new fuels. Any serious transition to energy resources not under the control of the existing oil majors will be fraught with conflict, and frankly, must court it to have any chance of success. Whether the resource optimists or the pessimists will be proven more accurate is difficult to discern at the moment. It is not difficult, however, to see how energy politics will determine relative economic growth, geopolitical alignment, and the fate of the planet's climate in the years to come.

Outline of the Book

In the chapters that follow, the authors address conventional energy resources and related politics in a critical light, drawing on the vast store of scholarship on the processes of energy resource and industrial transitions. Which capital-intensive infrastructures are built determines which resources will be used in particular patterned ways for decades. In Chapters 2, 3, and 4, Michael Klare, Philippe Le Billon and Gavin Bridge, and Naná de Graaff introduce the broad themes of the volume and explore central questions appraising the state of political organization and rivalry in global energy resources. In these chapters the collective enterprise of the volume is summarized and long-standing global energy patterns and current trends are examined.

In Chapter 2, Michael Klare offers a skeptical view on the carrying capacity of the planet and offers insights into the political consequences of fundamental resource scarcity, use, and depletion. Klare assesses whether geopolitical rivalry over energy is receding and finds little cause for hope that cooperation might replace rivalry in the energy world. In Chapter 3, Philippe Le Billon and Gavin Bridge address the enormous contribution of oil in global political economy, highlighting its essential role in all forms of commercial and military transportation. Le Billon and Bridge draw on their excellent book *Oil* (Bridge and Le Billon 2012) to explore the social and political dominance of oil and the difficulty in holding oil actors to account for the many social maladies that attend their enterprises. They illustrate how a new era of better oil might come to pass such that this energy order's negative influences might be mitigated, eventually setting the stage for an energy transition to take root. In Chapter 4, Naná de Graaff employs her intriguing methodology for assessing transnational oil elites' interlocking networks to probe the question of how international and national oil companies interact and whether there are new forms of corporate alliances afoot in the energy world.

In Chapters 5 and 6, Dag Harald Claes and Timothy Lehmann evaluate the full range of issues surrounding what the continued dominance of "oil" means for resource politics, albeit for particular regions with broad, global implications. Respectively, they examine how the seemingly ceaseless push for oil and gas in the Arctic and the accelerating development of Albertan oil sands and fracked hydrocarbons in North America affect energy relations among the leading actors. These projects beguile many technological determinists who see the longevity of the conventional resource system proved in every barrel extracted from previously ignored undersea geographies and "heavy oils" in sand and "tight oil" shale deposits. Whether these unconventional resources presage enduring abundance is

less clear, and the pitfalls of these projects are explored in light of the many past experiences of irrational exuberance in unconventional energy sources (e.g., the US Synthetic Fuels Corporation). Claes offers a reflective rejoinder to the resource pessimists of the world. He highlights the promise that the Arctic region may become one of cooperation among the leading energy actors of the world, instead of a zone of rivalry and conflict. In contrast, Lehmann spells out the interrelationship of North America and Middle Eastern oil resources in the global energy system and the ongoing saga of US hegemony. He finds little cause for optimism for a greener and more peaceful energy geopolitics.

In Chapter 7, Andrew Erickson and Austin Strange explore the foregoing trends within a rising China keen on flexing its muscle in resource-rich near abroad regions. Erickson and Strange examine the all too broad subject of China, the largest natural resource–consuming and greenhouse gas–emitting nation on Earth, by detailing China's push to control the offshore energy resources in the South China Sea. They examine the strategic consequences of China's efforts to control the South China Sea militarily and assess whether the region's oil and natural gas play a driving or ancillary role in the nation's naval buildup in the region and more aggressive policy. China is planning to increase its use of natural gas, and its endeavors in the South China Sea affect the Asia Pacific region's stability as much as its economy, which highlights whether the growth of natural gas becomes a force for integration and cooperation or its opposite.

In Chapters 8 and 9, Volkmar Lauber and Andrew DeWit offer compelling studies of the world-leading developments in Germany and Japan. These nations highlight the difficulties of affecting the desired trend toward less conventional energy resources and more renewables. Each resource-poor state grapples with external and internal pressures to use domestic energy transition to maintain relative economic position in regions where potentially rivalrous powers infringe upon them—Russia in the case of both Germany and Japan, and China in Japan's case. Adding to the stresses in each country is the difficult political drama of denuclearization, particularly for Japan. Lauber explains how Germany's impressive renewables development for electrical generation might not have come to pass had it not been for the benign neglect of leading German energy actors while citizens led a successful public power and renewables deployment campaign for nearly two decades. In contrast to Germany's bottom-up approach, DeWit details how the Japanese state has had to cope with many shocks to its domestic energy system while trying to navigate its historically debilitating external energy dependency to even greater industrial and trade heights. In Chapter 10, Timothy Lehmann assesses the likely costs of the oil majors' focus on spreading natural gas as a bridge fuel to some future with much less coal,

but with only managed growth for renewables. The possibility of a renewables energy concert is evaluated against the entrenched power of the oil majors' petrochemical concert.

Notes

1. Jevons' paradox concerned coal use in mid-1800s Britain and found that more efficient energy use only led to more energy use. Jevons noted: "It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth." See also Galvin (2016: 1–3, 11–13).