FUELING OIL SCARCITY: PRODUCED SCARCITY AND THE SOCIOPOLITICAL FATE OF RENEWABLE ENERGY

by Lea Winter

Oil anxieties usually stem from fears about running out of oil, but the true oil scourge of the past is overabundance. Oilmen conceal their oil in order to maintain profits and manipulate their monopoly on oil so that they may wield political power. To keep the price of oil high enough to sustain the industry, oil authorities have developed methods of producing scarcity. The results of making oil scarce have been harmful to society economically, politically, and socioculturally. Since current forms of alternative energy are naturally scarce, this article evaluates whether the effects of the oil curse arise from scarcity itself or from the production of scarcity. The destructive experiences with produced oil scarcity inform prospects for a future with alternative energy, including how these energy forms can be developed in ways that avoid the associated effects of the "oil curse."

Produced Scarcity

The oil industry's primary challenge for the majority of the twentieth century was the "organization of scarcity and the prevention of abundance."[1] Experiences of perceived scarcity – especially in the 1970s – and the current looming threat of peak oil derive not from geological limits but rather from strategic methods of producing scarcity. The factors dictating oil scarcity lie "above-ground" – resource availability is often determined by the ways in which societies and economies are internally organized.[2] In the case of oil, scarcity arises from within the organization of the industry itself.[3] Academic analysis of the petroleum industry has revealed that geologically limited peak oil is not a real imminent threat, evident from the lack of consensus among oil corporations about whether peak oil is a

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threat at all. Some corporations add the peak oil theory to their repertoire of "strategic imaginaries" used for producing scarcity and controlling prices.[4]

Mechanisms of Scarcity Production

The methods by which scarcity is produced may shed light on whether the resulting problems derive from the methods themselves rather than being inherent to oil. The peak oil claim can be used to "naturalize a situation whose origins are political and economic," transmitting the source of the perceived scarcity into the natural realm and thereby obscuring Big Oil's position of culpability.[5] Theories of resource scarcity include unequal resource distribution as one of three factors in producing environmental scarcity, where natural scarcity and population growth constitute the other two components.[6]

The material properties of oil enhance the ability to control its accessibility. Crude oil extracted upstream must undergo various transformations that "involve establishing connections and building alliances," translating forms of political power along the pipeline as the hydrocarbons are transformed.[7] Political agency arises through opportunities to slow, disrupt, or cut off the supply of oil at various nodes of oil transformation and transportation. Oil companies may introduce small delays, interruptions, and controls in order to enhance their power by limiting the "flow of energy;" they can raise prices by "restricting output" to engineer a shortage.[8] This "capitalism of inefficiency" has been exploited as oil companies insert controls over the conduits of oil production – "bottlenecks" through which oil must flow.

When oil sources are controlled by the state, the government imposes political limits in order to control production. The story of wildcatter Columbus "Dad" Joiner provides a telling example: When Joiner discovered the single largest oil field in the history of the United States, the government eventually declared martial law in the East Texas oil fields and 4,000 troops were deployed to enforce the field's "allowable" production levels.[9] During the 1930s, when price instability was fueling an oil crisis, President Franklin D. Roosevelt assigned Secretary of the Interior Harold Ickes to handle the crisis. Ickes set a precedent for a prominent federal role in stabilizing the oil industry. He implemented a "scalar fix," an institutional mixture involving national, state, and local control. State entities as well as corporate oilmen can thus exercise control at critical points along the production line – running the gamut from influencing perceptions about geology to levying tax – in order to produce the appearance of scarcity.

Economic Effects of Scarcity

The methods used to produce scarcity tend to undermine the normal balance of supply and demand, merging economics with the political and corporate aspects of oil. Scarcity is rarely felt as a physical limit, but rather is experienced via price; scarcity is often constructed through prices in order to advance commercial and geostrategic interests.[10] Economics provides a means by which to regulate the availability of oil. Economics is also transformed by value distortion in the context of the landed nature of oil, and the logic of classical economics becomes corrupted through the power possessed by oil companies and cartels.

Oil companies promote narratives that frame oil extraction as onerous and costly, legitimizing the high prices experienced by consumers despite the natural abundance of oil. The companies also capitalize on peak oil claims to legitimize exploitation of non-conventional sources so that they can tap into an increasing proportion of available fossil fuels. These sources, such as tar sands and natural gas, enhance the investment portfolios of international energy companies, transferring control over energy sources to profit-driven oil companies.[11]

Political control over supply and demand via oil power can transform oil into an economic weapon. When capitalist production is analyzed as a "social process that engages people and nature in mutual transformation," the price of production and market prices merge.[12] Classically, prices of production represent the actual costs of production and can be explained by theories of value; they are separate from market prices, which reflect the actual exchange price of commodities in response to fluctuation in supply and demand. Neoclassical thought does not distinguish between these two origins of prices, though; it recognizes only a market price produced by the "subjective preferences of economic agents" through the market.[13] In this context – the "blinding light" of the market – value is rendered "invisible."[14]

Oil cartels may take advantage of this concept of obscured value. For example, it had been commonly accepted that profits would be divided equally between states and oil companies, but the Organization of Petroleum Exporting Countries (OPEC) redefined these royalties as compensation for the intrinsic value of oil as a nonrenewable resource.[15] The landed nature of oil – that oil wealth is intrinsically and inextricably linked to the land where it happens to be found – presents a "barrier to capital," where sociopolitical forces determine the actual price of oil.[16] The oil royalties may be construed by the landowner to appear to represent payment for use of the owner's natural capital, but the payment actually reflects the power of landlords to claim an absolute rent, regardless of the productivity of their oil fields. Further, through alliances within cartels, the landowners can achieve greater control than individual landlords

can. As sovereign states, they can share information with one another while preserving the secrecy of oil flows and the true value. The impact that these practices have on the capitalist world is enormous since the members of cartels wield the power to affect the level of world oil production.[17] Oil price formation can thus be linked to complex interactions between state politics, oil companies, landed property, and capital as they "struggle for the production and appropriation of value," moving the determinants of value far from the physical production cost.[18]

The landedness of oil contorts the relationship between physical abundance and access. Petroleum economics becomes delimited by the "capitalist system of private property rights" rather than by geology.[19] In the U.S., artificial controls over market prices were imposed to regulate the price of oil. The 1930s saw plummeting oil prices and overabundant production, leaving Americans with the impression of a "national market glutted seemingly with no mechanism to stop the production of oil."[20] The price of oil flowed into the price of all commodities, since much of the commodities industry was based on oil. The U.S. thus developed an "institutional fix" for its oil market – taxes as a free market policy tool – constraining production to match consumer demand.[21]

Sociocultural Effects of Scarcity

The economic effects associated with oil permeate into the social spheres of capitalist life, where any perceived shortages are felt as an "oil shock."[22] Modern capitalist society has been built on and shaped by oil, creating what Matthew T. Huber, associate professor of geology at Syracuse University, terms the "real subsumption of life under capital."[23] The dense, transportable energy supplied by oil has caused a merging of work (production) and life (reproduction), leading oil to underlie the basic functions of life.

Petroleum provided the "lifeblood" for this new American way of life, so when it was restricted, people experienced impingement upon their personal freedom and patterns of living.[24] "Pain at the pump" became a motif throughout society, where high gas prices came to symbolize oppression under neoliberalism.[25] Political events in the Middle East during the 1970s were felt as price increases and apparent oil scarcity, manifested as social experiences such as the "quadrupling of oil prices, gasoline lines, and geopolitical turmoil."[26] Americans felt the effects of global oil politics, via prices, in changes imposed upon their everyday lives. A Bell telephone ad from 1974 illustrates this infiltration: the ad depicts a phone and the quotation, "Fill'er up this weekend," suggesting that instead of taking a long, leisurely drive to visit friends or relatives on the weekend (as had become common practice in suburban life) homeowners could

interact "long distance" by talking on the phone.[27] People became frustrated by changes in the availability of oil because their lives had been built upon its abundance and its permeation into every level of life. Oil prices began to represent a "social barometer," where rising prices produced distress and falling prices relief.[28] The anxiety surrounding uncertainty about the availability of cheap oil – and thus the ability to continue life unobstructed – was pervasive. The political vise clamped around oil's natural abundance resulted in the linkage of oil scarcity to interruption of everyday life.

Political Effects of Scarcity

Oil influences political relations and is often manipulated – via production of scarcity – as an instrument of political power. Politics constitute the main determinant of the volume of oil produced and how it is allocated.[29] Even the oil company Exxon has asserted that "peak oil" will actually result from sociopolitical relations rather than from geological limits, including "government politics, lack of access to existing resources, [and] competition from alternative energy sources."[30] Although this analysis may represent a method employed by the gas company to manipulate perceptions and thus encourage consumers and investors to support companies' access to oil sources, it highlights the heavy influence of politics on the availability of oil. British Petroleum (BP) has expressed its beliefs that the peak oil dialogue derives from social and political limitations. In 2007, the company's global vice president for exploration stated at a conference that peak oil is a "metaphor for a deeper anxiety about energy security in the western world, rooted in politics and concern about climate change," rather than based on geological limits.[31] As expressed by these oil companies, political powers can manipulate the social experiences of scarcity to create fear about the imminent social realties of imagined peak oil, thus motivating legislation to further limit production. This view is implicit in the anti-peak maxim that the "Stone Age didn't end because of a lack of stone."[32]

The political power conferred by oil is uneven, reflecting the uneven distribution of oil resources.[33] The resources are literally "embedded" in the "territorial framework of states" and are often considered the property of the states in which they are found.[34] Oil power is manipulated not only by corporate powers and private greed, but it is also regulated through public patrimony, state institutions, and the agency of state actors – often in secrecy.

Oil wealth facilitates secrecy among political powers, leading authoritarian governments to depend upon oil revenue to placate the public as a means of preventing democratizing revolts. Oil states are 50 percent more likely to be autocratic and more than twice as likely to have civil wars as non-oil states.[35] These

political and military effects are correlated to statistics that these states are more secretive, more financially volatile, and bar women from economic and political opportunities. As oil companies came to be owned by states, the scale of production, control over the source of production, checks on stability, and secrecy throughout the process became warped. Control over oil resources by authoritarian governments provides autocrats with a mechanism for silencing dissent. If a government is primarily financed by taxes, it is inherently constrained by the wills of its citizens. When it is funded by oil, though, it possesses independent revenue and becomes less susceptible to public pressure. The secrecy that cloaks oil revenue enables dictators to remain in power by concealing evidence of their greed and incompetence, and to deliver more benefits to citizens than the amount they collect in taxes would otherwise allow them. Whereas non-oil autocracies generally become democratic over time through popular dissent, oil-fueled dictatorships can persist, reinforced by secrecy.[36] Their control over oil and management of scarcity leads to the perpetuation of social and political inequality. The regimes thus persist as dictatorships, and violent civil unrest becomes rampant. Insurgents are often reluctant to agree to lay down their arms due to distrust of their government based on experience with its secrecy and dishonesty surrounding inequitable distribution of oil revenues.[37]

The appearance of scarcity is key to harnessing the political power of oil. This power capitalizes upon fears surrounding limitations on access to oil, igniting political tensions and "resource wars."[38] Ordinary consumers have felt the effects of political control over oil, especially, for example, during the oil embargo of 1973. National security became equated with "energy security," and more specifically, oil security. The "oil weapon" seemed powerful enough to overwhelm "centuries of Euro-American global domination." Tensions over the oil squeeze partially motivated the U.S. invasion of Iraq in 2003. Americans began to protest this political and military move, supporting a new theme emerging in world oil politics: "No Blood for Oil." A new type of imperialism arose based on conquest for oil and the pursuit of control over the flows of oil, where local stability and lives would be sacrificed in order to secure control over oil. Oil has become both a cause for and a tool of political action, motivating attempts to control access to it and promoting threats of economic and social strangulation through produced scarcity.

Outlook for Naturally Scarce Alternative Energy

In contrast to oil, most currently available forms of alternative energy are naturally scarce. A key property of oil that results in its abundance for society is its "propensity to flow," the dominant factor determining the "myriad actions of

this technology," as petroleum economist J.E. Hartshorn explains.[39] Most alternative energy forms – solar, wind, hydropower, and geothermal – are limited to use at the point of collection, as there is no energy carrier inherent in the technologies to transport the energy harvested from these alternative sources.[40] These energy sources are also unevenly distributed, so they can only provide energy for limited geographies.[41] The dominant forms of alternative energy – solar and wind – are also temporally scarce due to their intermittency. Solar energy is maximally available only half the time, during the day (and not at all on cloudy days), and wind turbines typically stand idle 65 to 80 percent of the time.[42] A third of the estimated social cost of solar energy is due to intermittency.[43] Whereas oil is densely packed with energy, renewables are bulky and their energy content is diffuse, with solar and wind farms requiring vast amounts of land.[44] Although solar energy technically provides enough power to meet future energy demands, its limitations create natural scarcity that increases costs.

The "missing link" for large-scale adoption of oil alternatives is a method for storing and transporting renewable energy.[45] Pumped hydroelectric power and compressed air energy are limited to providing power at the site of collection, and battery storage would require an infrastructure entirely different from the current one, which is based on liquid rather than solid fuel.[46] The most promising energy system is one that relies on storage of energy in chemical bonds.[47] The most fundamental of such renewable technologies is hydrogen gas, which offers the most "versatile energy storage system" and the "best energy carrier."[48] Wind and solar energy can be converted to chemical energy using electrolyzers, which split water into hydrogen and oxygen gas. The energy from the renewable source becomes stored in the high-energy chemical bonds of hydrogen and can be released when the gas is burned. However, there is currently no infrastructure to support a hydrogen-fueled society; hydrogen exists as an extremely low-volumetric density gas at room temperature rather than as a liquid.[49] When not thoroughly contained, it escapes to the atmosphere, tremendously complicating conveyance infrastructure. The gas must be condensed in order to provide enough energy to be useful, but large amounts of energy and financial resources are required to liquefy it.[50] In addition, hydrogen gas is highly explosive (it was the fuel that ignited the Hindenburg), raising significant safety concerns surrounding civilian use of the substance.[51]

The renewable energy technologies described above will likely remain energy sources to be used on-site at the point of capture, continuing to be naturally scarce and geographically limited; their projected sociopolitical impact as compared to experiences of oil scarcity is discussed below.

Making Scarce Alternative Sources Abundant

Promising new technologies may provide a form of renewable energy much more similar to oil in terms of physical properties relevant to the current energy infrastructure. One strategy involves transformation of hydrogen energy into a safer, more convenient form, such as nitrogen-based fuel. An example of nitrogen-based fuel consists of aqueous urea and ammonium nitrate, compounds that are both common fertilizers. Hydrogen – produced by splitting water using solar energy – theoretically can be reacted with air-abundant nitrogen and carbon dioxide to produce this fuel, storing the energy provided by the sun in chemical bonds in the fuel. This fuel solution achieves an energy density appropriate for stationary power generation and it is a safe, clear liquid at room temperature.[52] Another promising option for chemical hydrogen storage involves conversion of carbon dioxide to carbon-based fuels using hydrogen.[53] This strategy produces a fuel similar to gasoline, facilitating the potential infrastructural transition to its large-scale use.

According to Dr. Gideon Grader, director of the Grand Technion Energy Program, a key enabling technology for most synthetic nitrogen- or carbon-based fuels is the synthesis of hydrogen from water in an economical, competitive way.[54] Normally, the water-splitting reaction would require large amounts of energy, but employing a catalyst in the reaction can greatly lower the energy needed to split water. Conventionally, expensive and rare platinum-group metals have been used as catalysts, so research must be conducted to develop non-precious, efficient catalysts. A correlation was recently identified for predicting the activity of metal catalysts in producing hydrogen gas by splitting water, using a fundamental thermodynamic property (hydrogen binding energy).[55] This study provides significant advancement in developing non-precious, efficient catalysts for producing hydrogen gas from solar energy.

Once these technologies advance, society may be presented with a new type of fuel that is competitive with oil and that would not contribute to global climate change. If the process remains dependent upon precious metals, similar issues associated with collection of landed resources in unstable regions would be encountered (although it is unlikely that these technologies would advance regardless given the high economic cost of precious metals). The key question for the future involves the way in which the properties of oil have enabled production of scarcity: if infrastructurally compatible, clean, and renewable fuel becomes available, will it be manipulated to be made artificially scarce, dooming us to repeat our experiences of the oil curse?

Alternative Energy: Doomed to Oil's Murky Fate?

It was shown earlier that increasing geological scarcity cannot explain or justify high economic returns.[56] This finding provides direct evidence that dependence upon natural scarcity of energy resources (such as direct solar energy for point-of-collection use) would not supply sufficient cause for disproportionate profit and power among those in the industry. There is little empirical evidence indicating that environmental scarcity on its own causes simple scarcity conflicts between states; further, scarcity of renewable sources does not often cause resource wars between states.[57] Of the twelve conflicts in the twentieth century involving resources listed by the forest ecologist Arthur Westing, access to oil or minerals was involved in ten. Only five of these conflicts involved renewable resources, and a mere two of them involved resources other than oil and minerals. Mineral resources including petroleum can be "more directly converted into state power" than renewable resources such as land and solar rays.[58] Simple, natural scarcity of geographically limited renewable energy should not produce the symptoms of the oil curse. To share the same fate as oil, a resource must be subject to control by a corporate or state entity, where the methods of producing scarcity lead to manipulation and corruption of power. The mere appearance of scarcity is insufficient to initiate the effects of produced resource scarcity that have flowed from oil.

As noted previously, many of the maladies associated with oil derive from the landed nature of the resource, which creates opportunities for "oil power to be held in the hands of a powerful few."[59] The source of the renewable fuels discussed above is the sun. While sunlight is more prevalent in some areas than others, sunlight is much more scarce temporally than spatially. Before society began using oil – and even before it began using coal – the dominant fuel was wood, whose energy originates in sunlight. Back when society's fuel derived from living, biologically captured sunlight, all people had similar access to fuel, and its availability could not be manipulated by any governing entities attempting to regulate access.[60] The type of renewable fuel discussed here does not suffer from landedness, so its abundance cannot be kept secret and its production cannot be monopolized by a lucky few with access to it. Sunshine spreads over the entire earth rather than being buried in random reserves in select locations.[61]

Another significant property of oil is its propensity to flow. Oil companies have been able to perpetuate a "capitalism of inefficiency" by placing themselves "in control of the conduits" of oil, interrupting production at key processing points through which oil had to flow.[62] While renewable liquid also flows and can easily be adapted to conveyance via the existing infrastructure used for

oil, the concept of the pipeline would be redefined. Currently, the oil pipeline must extend over long distances in order to connect the crude oil source to the processing plant, to distribution sites, and to end use. The key difference for renewable fuel is the location of the source: Collection of solar energy can be accomplished on-site wherever a processing plant is desired. The propensity of alternative fuel to flow is thus necessary for adoption into everyday life, but its ubiquitous source locations on earth render obsolete the long pipelines that have offered ample opportunities for secrecy and interception.

The many ills that society has suffered through the mechanisms of producing oil scarcity relate largely to the source itself: crude oil is restricted to highly specific, fatedly random sites across the earth, creating vulnerabilities that allow landowners to control distribution. Oil barons have manipulated their control over oil in secrecy, causing reverberations through economic media that have transformed and interrupted everyday life, from restricted leisure to imperialism and civil wars. Naturally scarce renewable energy should not be expected to cause the ills of oil, as these ills are fueled by the production of scarcity rather than by the experience of scarcity itself. Prospects for alternative fuels are bright, as their renewable sources are temporally scarce but distributed equally to all on earth.

Notes

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