

Review Essay: For an 'energetic' sociology, or, why Coal, Gas, and Electricity Should
Matter for Sociological Theory

Andrew M. McKinnon, Assistant Professor in the Department of Social Sciences,
University of Toronto, Scarborough

This review essay was published in *Critical Sociology* (2007) vol 33, no. 1-2, pp. 345-356.

For the final, authoritative and formatted version, please see:

DOI [10.1163/156916307X168683](https://doi.org/10.1163/156916307X168683)

Oil: A Concise Guide to the Most Important Product on Earth by Mathew
Yeomans. New York: The New Press, 2005. 288 pp. \$22.95 (cloth). ISBN: 1-
56584-885-3. \$16.95 (paper) ISBN: 978-1-59558-028.

Global Energy Shifts: Fostering Sustainability in a Turbulent Age by Bruce
Podobnik. Philadelphia: Temple University Press, 2006. 248 pp. \$69.95 (cloth).
ISBN: 1-59213-293-6. \$22.95 (paper) ISBN: 1-59213-294-4

Children of the Sun: A History of Humanity's Unappeasable Appetite for Energy
by Alfred W. Crosby. New York: W.W. Norton, 2006. 208 pp. \$ 23.95 (cloth).
ISBN 0-393-05935-028-3.

Smil, Vaclav. 2006. *Energy: A Beginner's Guide* Oxford: One World
181 pp. \$14.95 (paper). ISBN: 1-85168-452-2

After the massive power-outages that left much of North America in the dark during
August 2003, the rising cost of gasoline at the pump that began in 2004, the ongoing oil
wars of "The Oil President", and the threats of global warming, some people are
beginning to ask questions about our present and future energy consumption.

Unfortunately, sociology has very little to offer in response to these questions, and few theoretical tools with which to analyse our present situation. In this review essay, I will discuss four recent books that—although only one of them is written by a sociologist—provide a very good starting point for thinking sociologically about energy. These books provide an excellent entrée into energy studies, and would provide a good core of readings for an advanced undergraduate or graduate course on the sociology of energy. Collectively, however, they offer a powerful indictment of our discipline—because it has had so little to say about energy acquisition or use. By showing how central energy processes are, not just in our present, high energy-dependent society, but for the whole history of human society, one wonders how sociology could have been so long silent about them.

Mathew Yeomans is a journalist who specialises in reporting about oil and he has written a zippy little book that provides a fast-moving introduction to the politics, economics and culture of oil for the general reader. Yeomans is a good writer and provides a carefully-researched story. If the story is sometimes short on sociological sophistication, this is not really a fair criticism, given the purpose and intended audience for the book. Even though intended for a general audience, it would be a useful book for introducing sometimes easily-bored undergraduate students to the topic by means they will find engaging.

Yeomans begins with a short history of oil, beginning with the discovery of ‘rock-oil’ in Pennsylvania in the 1850s, and the small group of entrepreneurs and snake-oil salesmen who sought to turn the brown gunk that oozed to the surface there into a viable commodity. Oil’s first use was as a lubricant; then when someone discovered how to

process it into kerosene, oil became the most important new source of light in Europe and North America—the world, after all, was quickly running out of the whales whose blubber had previously kept the lamps of the North lit. While the beginnings of the industry were humble (carting the stinky liquid from the wells in 42 litre whiskey barrels (still the international standard), there were—in retrospect—huge fortunes to be made for those who established themselves early (like John D. Rockefeller), and ruthlessly squeezed out competitors (also like Rockefeller).

Almost since Henry Ford's invention, America has been a car culture. The vast suburbs surrounding most US cities are scarcely even imaginable without gasoline, the internal combustion engine and a network of highways. In fact, the automobile and its popularity in America (thanks in large part to sophisticated successful advertising campaigns) were a saving grace to the oil industry. Edison's invention (viable electric light) had made a serious dint in the market for kerosene, and the oil industry magnates were desperate to find alternate uses for its product. (Incidentally gasoline was initially just an unwanted by-product in the production of kerosene).

One of the strengths of Yeomans' book is that he always keeps one eye on the politics of oil, both in the USA and abroad. Ever since World War I, oil has played an ever greater role in the political fortunes of nations. Germany, it could be argued, lost both the first and second world wars because it did not have its own oil reserves, and could not keep open its supply lines to its outside sources (the same explanation could also apply for Japan in the second world war). Since America is currently the global top-dog, Yeomans provides a brief, but relatively comprehensive picture of American energy security, and the lengths to which US foreign policy has been shaped by the need to

provide cheap oil for the American economy and its heavily oil dependent transportation needs.

Until World War II, the USA was a major oil producer, and could provide for its own needs (and crucially, for those of its allies during the war). With the decline of domestic oil production capacity, increased need and a global oil price system, the USA was drawn more into a situation where it had to control the access to supplies by diplomatic, military and economic means. The OPEC crisis made American vulnerability in this respect abundantly clear. The Iraq war, Yeomans argues, was less about access to Iraqi oil for American use, but rather to produce a 'non-aligned' competitor to OPEC, which would have the virtue of keeping the price down. Given that the Middle East has the largest proven oil reserves in the World, so long as America remains "addicted" to oil, the USA will simply not be able to stop meddling in Middle East affairs. While the amount of oil that is under the ground is a hotly contested issue, everyone agrees that as the supply gets tighter, everyone will have to make deals with the region's oil powers, in particular with Saudi Arabia.

Yeomans is perhaps at his best when he discusses the disastrous 'gift' that substantial oil reserves are to the people of underdeveloped countries. He offers an absolutely gruesome firsthand account of the lives of peasants in the Amazonian basin, and the way that their immediate environment has been turned into a giant toxic waste dump by years of oil extraction processes using standards that simply would not be acceptable (or legal) in North America or Europe. Precious little benefit comes to the Indians, or to anyone but a few élites in any otherwise poor oil-producing country. While the lack of economic spin-offs and general economic development may be common to

what Harold Innis referred to as types of “staples economies” (1995), the amount of money that can flow to a few bank accounts if the staple happens to be as valuable as oil, can generate rather substantial political instability, corruption, and –since oil powers are not fond of critics—human rights abuses and the crushing of dissent. Several case studies make this point poignantly.

Yeomans’ book is an undemanding read, arguably making it particularly suitable as a first introduction to thinking about oil for undergraduate students. Its primary agenda, as a book designed for market to the “chattering classes”, seems to be to put oil on the political agenda, and to raise awareness about key environmental, political and social issues. This it does admirably. On the other hand, it is a book with few surprises for those who read the newspapers and who already have sufficient interest in the topic to read the articles on oil. (As is standard for journalists, his primary sources are more often than not other journalists).

Bruce Podobnik’s *Global Energy Shifts* (2006), is not likely a book that will have the wide appeal of Yeoman’s introduction, though it will (hopefully!) find a much more substantial readership within the academy. It is a book that deserves a careful hearing. Podobnik comes at the topic as a World Systems theorist, and this proves to be a very fruitful approach for understanding the energy regimes. The topic of energy, in Podobnik’s argument, also suggests important theoretical revisions to World Systems approaches. Given the widespread recognition that we will have to wean ourselves off of fossil fuel, due to both environmental issues (global warming), and a dwindling supply (Hubbert’s peak), Podobnik looks to shifts between previous forms of energy to see how they happened. In particular, he is interested in the rise of coal, and then the shift from

coal to oil, natural gas and nuclear. Understanding these global energy shifts, Podobnik argues, can help us make the transition to a non-carbon (renewable, low pollution) energy system.

Podobnik wants to show that energy systems are social systems: the transition from one energy system to the other has not been the result of scarcity, nor is it the result of the inherent superiority of the new energy source, as some scholars in the past have been inclined to assume. The transition between energy systems has been much more a product of organised capital, state policy, labour instability and geopolitical rivalry. He makes his case admirably—and convincingly—in both of his major case-studies.

The rise of coal as a global energy regime is a fascinating one, and Podobnik tells it concisely, but with erudition. In 1800, coal made up only about 10% of world energy use, virtually insignificant compared with wood, which had been dominant for millennia. The rise of a capitalist class, with an influx of profit arriving from the colonies and driving interest-rates lower facilitated the development of mines in Britain, just as there was new pressure for Iron in the ongoing wars with France in the 1790s and early 1800s. The British quickly discovered that coal-steamships were a military advantage; they are more manoeuvrable than sailing ships and they can carry heavier armour. Rails had initially been developed for moving coal efficiently, but the British Army quickly discovered that rails provided the means for very efficient movement of troops and supplies over large distances on land, and thus provided another competitive advantage in the race to colonize the world. Control over patents and the export of efficient British steam engines greatly reduced the usefulness of coal elsewhere. By the time Britain lost control of the steam engine, British coal hegemony was solid. While coal was largely a

European energy in 1850, just 50 years later, it would be the hegemonic energy system throughout the globe.

The decline of coal and rise of oil was not a result of coal scarcities, in fact the world continues to mine coal on an enormous scale. Nonetheless, the increasing depth of mines required a more skilled labour force and made mining more susceptible to labour disruption; unionization drove costs up, and profit margins were slim. These were the conditions that gave oil a chance. The big boost came from low-cost gasoline automobiles (relative to more expensive coal and steam vehicles). America took the lead, not only in gasoline engines for cars, but also in the production of airplanes. Both kinds of gasoline-powered vehicles, played an important role (and the industries expanded exponentially) during WWI. Oil provided a military advantage in these vehicles, and even more in the Dreadnought, the British battleship whose enormous size *and* manoeuvrability immediately made coal battleships a liability.

The US initially had an oil advantage simply by virtue of extensive domestic reserves, which it used for its rapidly expanding automobile system, as well as for export. U.S. oil reserves proved crucial, if not decisive, during the WWII, as neither Germany nor Japan had substantial supplies, nor easy access to them. The end of WWII saw the US holding access to substantial foreign reserves, including 40% of the Middle-East's supply, in addition to still-strong domestic reserves. The OPEC oil crisis both showed cracks in the US hegemony over the global oil system, but also was a harbinger of future crises (such as Iran in 1980). Oil production will almost certainly peak sometime in the next 40 years—if it hasn't already—adding to the problems of an already unstable oil market, which will drive prices up, and provide a further push towards developing

renewable energy. While this is not automatic, Podobnik argues that the previous energy shifts (wood-coal and coal-oil) provide an historical precedent to a future shift to renewable energy.

It is here, I wonder, if Podobnik is not being a bit optimistic, though I certainly hope he is not. The sources of concern, in this respect, are as follows: 1) Renewable energy sources amount to less than .5% of global energy, meaning it has a very long way to go. 2) The coal infrastructure is much more solid, and states are already taking more interest in new possibilities for coal, not to mention harder to refine sources of oil, like the tar sands. 3) The two global energy shifts that Podobnik has discussed have by his own admission, both been *relative* shifts, meaning that the new forms of energy have added onto the total amount of energy being used. This begs the question of whether an *absolute* shift might take a different route, or even if it is possible. Podobnik does not think a shift to renewable energies is inevitable, and he provides helpful suggestions for institutional and policy frameworks required for such a shift. This discussion should be essential reading for all policy-makers, as well as for sociologists who are concerned with the future viability of civilization.

My other complaint about Podobnik's book is one of scope—though this is a complaint with a compliment. Podobnik provides a convincing analysis not only of the global energy shifts, but of the way that they are related to global military-economic hegemony. Looking at the cases of the coal regime and the oil regime in his analysis suggests a major revision of world-systems thinking may be in order. One of the key elements of hegemony is the capacity to make the most effective use of the hegemonic energy regime. If we contemplate an earlier hegemon, what is one of the most decisive

factors about Dutch economic/military supremacy? In addition to the advantages that the lowlands derived from climatic change, they were also the most effective users of wind power: wind for sailing ships, but also for creating draining land (the main purpose of all those windmills) thus providing more farmland. If this, along with the story Podobnik tells of the oil and coal regimes is taken seriously, then we will have to rethink the logic and dynamics of World Systems analysis itself.

Some of the larger historical scope I would like to see from Podobnik can be found in Alfred Crosby's *Children of the Sun* (2006). Crosby, an historian of large-scale processes, has written this very *big* little book which shows how important human energy use has been—not just in the relatively recent past of fossil fuels, but for all of human history. Our distinctiveness from our primate cousins stems in part from our capacity to communicate with each other symbolically; Crosby makes a compelling case that our effective use of energy may be of even greater importance in setting ourselves apart. With the exception of nuclear, geothermal and tidal energy (all recent additions to the repertoire of human energy use), all sources of energy originally derive from the sun. Thus, we are children of the sun.

For most of human and pre-human history, we have had only one “prime mover”, or means of taking sunlight and turning it into a means for doing anything: muscle power. Muscles use the energy that has been harnessed from the sun in plants (by photosynthesis) or in animals that have eaten and absorbed the energy from plant life. The ability to use fire was the first expansion of human capacity to harness the sun's energy. It provided some light at night and warmth in chillier climates, but fire's most important contribution, according to Crosby, was cooking. Because our ancestors have

been cooking for so many generations (and every known culture uses fire for this purpose), it is difficult to realise the importance of this for human societies, and even possibly, Crosby argues, for human evolution. Cooking opens up many more sources for nutrition, including some foods that would otherwise be dangerous, indigestible, or even poisonous; thus, humans were able to gather and use much more of the sun's energy than we were before. Fire, he suggests was an important contributor to our current physiology, including our digestive system, jaws, and our extraordinarily expensive—in terms of the amount of energy they use—brains—our brains use a much larger percentage of our total energy needs than do the brains of any other species on the planet.

According to Crosby, the intertwined development of agriculture and animal husbandry are also fundamentally means of tapping the sun's energy on a larger scale, permitting human population growth on the same amount of land. But the prime-mover remains the same—muscle, ours or those of our animals. New prime-movers arose in the form of wind- and water-mills, which provided new means of doing work with less dependence on muscle-power. Crosby skims over this technology and its historical role in a few pages far too briefly; especially given the considerable length of time that these were the only alternatives to muscles as prime-movers. Here they seem like little but a precursor to the steam engine, which was the next major innovation to follow; they appear, in fact, in the beginning of the chapter on coal and steam.

Admittedly, the power of a wind- or water- mill was feeble, even in comparison to the first steam engines. These, in conjunction with fossilized sunshine, provided the first means for humans to harness an enormously concentrated solar power. Steam engines provided the means for efficiently pumping out mines, so that miners could pursue coal

for heating further under the ground. They were used extensively for this purpose, long before the development of trains (based on the same mechanical principal) for moving coal to the cities and to other places where there was a use for these powerful engines. More and more ships began to use coal, rather than wind, to move across the oceans and rivers, though sailing ships were still used extensively in 1900, though they were clearly on the wane.

Crosby recognises that the looming oil crisis poses a challenge for humanity's ever-growing needs for more and more energy. Surveying the list of possible sources of energy, he suggests that nuclear energy—either fission, or even better, fusion if it can be accomplished in a viable way—is likely the only means for meeting this increasing demand. Here he differs considerably from Podobnik, who has his eye on renewable energy. Crosby is not exactly a cheerleader for nuclear energy, however, and he provides a reasonable and balanced assessment of nuclear energy's prospects.

Crosby's book is really a magisterial treatment of human history, and it makes a powerful case that energy use is absolutely central to human society. If there is a point at which I find Crosby's account unsatisfactory, however, it is in the inclusion of "unappeasable appetite" both in the title of the book, and in its theoretical argument. The ever-increasing demand for energy begins to seem less a mere historical trend (which it undoubtedly, especially when we consider the *longue durée*), but rather something essential about human nature. At one point, he suggests, that practicing energy conservation "...smacks of celibacy and dieting, neither of them human fortés" (140). While Crosby acknowledges that his own society (the USA) is "the diva of an energy extravagant civilization" (126), he does seem to project his own predilections as a

member of this diva society onto the whole world. Anyone who has spent an extended period of time in Europe, for example, will have noted that people are much better at conserving than the typical American¹—and European per capita energy use is about half that of North America's. Part of the reason for this seems to be cultural, part social-structural, and partly reflects higher energy costs. But even in the USA, energy gluttony is by no means universal. As the Princeton University Twin Rivers project demonstrated quite clearly thirty years ago, there is wide variation among domestic energy use in households (even 2-1), within identical townhouses with the same number of occupants (Socolow 1977). Furthermore, as Russell Nye's history of *Consuming Power* (1998) in the USA shows, there was nothing *natural* about those ever-increasing demands for power in the last 150 years: new forms of energy had to be aggressively marketed to sometimes wary consumers.

If anyone deserves the honorific “Dean of Energy Studies”, it is undoubtedly Vaclav Smil, professor of Environmental Studies at the University of Manitoba. Smil has written many books about energy for a specialised audience over the course of a long and distinguished career. This book is evidently his attempt to reach a wider audience, and to educate a broader public about the various scientific, historical, economic and social dimensions of energy. *Energy: A Beginner's Guide* (2006) is strongest on the technical issues of energy; it introduces these topics in a way that makes them genuinely accessible to those who lack the requisite background knowledge to read more specialised texts. Whether he is explaining the way plants convert solar energy into phytomass, improvements in the efficiency of jet engines, or why pre-industrial societies could not

¹ Thanks to Helena Knorková for making this point so clearly.

have developed mega-cities because of local energy limitations, Smil's explanations are clear, to the point, and even elegant.

Smil begins with an explanation of energy in natural systems, including a basic overview of energy science (chapters 1 and 2). He explains the forms of energy and the means of conversion between them, the process by which plants use solar energy (photosynthesis), and how animals (including humans) convert food to energy for our bodies' needs (metabolism). While social scientists may be tempted to think (somewhat parochially) that this is not where the real action is, and be inclined to skip over these discussions, we are well advised to pay close heed to Smil's introduction to the science of energy; the basic processes he explains here continue to play a crucial role even when we are talking about the social relations of energy production and use—without understanding the science of energy, we may misunderstand the social relations of energy. This becomes clear in the following chapters (3 and 4), when Smil discusses the way humans have appropriated and used energy through history. For those who have already read Crosby's account, the narrative will be familiar: the story is not as well told, but the technical details are better illuminated. Likewise, readers who have read Podobnik's account of coal and oil-based energy systems will perhaps also favour his account to that provided by Smil, who tends to emphasise the technological aspects of the story—sometimes at the expense of the social.

In chapter 5, Smil provides a clear account of how much energy penetrates and structures our everyday lives, from the way we build and heat our buildings, move from one place to another, communicate with one another, eat, shop, and just about everything else. Perhaps most useful for reflecting on the extent to which modern society is

permeated by high-intensity energy use, Smil provides an extensive range of facts, figures and comparisons between the energy consumed by different uses and purposes, along with very helpful indications of the relevant trends.

Smil's final chapter is an attempt to give us some help thinking about the future of our high-intensity energy-using civilization in light of the limited future for dependable fossil fuels. Rather than trying to make predictions—which he recognises is a precarious business—Smil gives us an overview of some of the possibilities, based on current trends, technological, social and ecological trends, all the while aware of the realities of non-linear developments in all of these spheres. He provides a good overview of all of the different possible energy sources, including nuclear, biomass, wind, photo-voltaic solar, and hydro-electric, discussing where the state of current technology and pointing to the current and likely ultimate limits and limitations of each. Overall, Smil seems relatively optimistic about the future, though he is by no means blinded by rose-coloured glasses. This is a brief summary of research Smil has published elsewhere (see Smil 2003), and his emphasis here is to provide a brief, accessible, and balanced assessment; as such, it lives up to its intentions.

While Smil does not provide the as sociological an analysis of energy shifts compared to Podobnik, his account is more sensitive to the technological dimensions of energy systems. Likewise, Crosby provides a better “big picture” historical account of humans and their energy use. Smil's small introductory book nonetheless provides something absolutely essential for anyone who is interested in thinking more about energy and society. It is not only an important introduction to the more scientific aspects of the topic, it is also an indispensable *reference*, reflecting Smil's many years of research

in this field. Several things would help maximise the book's usefulness for this purpose, should the book undergo a subsequent edition. (Since the topic is undoubtedly going to be one that will acquire increasing salience in the near future, and since this is perhaps the best general introduction of its kind, this seems highly likely). First, while the book is chock-full of useful facts and figures, there is not a reference to be found. Smil is himself an established authority on energy, and does not need an elaborate apparatus to provide credibility for his account, but this does seriously limit the book's usefulness as an *introduction* to the topic, as there is no way of following the discussion in the book *into* a broader literature. The second item on my wish-list would be a comprehensive glossary of terms and abbreviations, with an index to where to find discussions of each in the body of the text. Given the enormously technical dimensions of much of the literature about energy, this would be helpful both for students and other newcomers to the field.

The books reviewed here pose a challenge to sociology and social theory. Each of the books makes a convincing claim that energy has played, and continues to play a central role in the organisation of social relations. If their collective claim is convincing—and I for one believe that it is—why is there so little sociology of energy? Perhaps this is to put the question in too specialized and narrow terms, terms that indict only specialists in sociology of the environment. If energy acquisition and use has been a central factor, not just in modern high-intensity fossil-fuel civilization, but in the history of human kind, why do our theories of society have so little to say about energy? Why do they provide us so little help in thinking about energy shifts, crises, and developments? While a few of the “classical” authors (in particular Herbert Spencer and later Lewis Mumford) have tried to integrate energy acquisition and use into their general theoretical

orientations, this has been picked-up by very few contemporary sociologists. While the OPEC oil crisis and the rise of oil costs following the Iranian revolution did begin to generate a body of empirical research by sociologists on energy use, mostly with an applied orientation (for a review, see Rosa, Machlis and Keating 1988), the theoretical work was largely left to anthropologists (see Adams 1978); there it the topic faded, too, after the price of gas declined again. Perhaps recent events will lead to renewed interest in the topic, and perhaps we can start re-thinking about our theories of society in light of these reflections.

References:

Adams, Richard N. 1978. "Man, Energy and Anthropology: I Can Feel the Heat, but Where's the Light?" *American Anthropologist* (June)

Innis, Harold A. [1956] 1995. "The Importance of Staple Products in Canadian Development" in Daniel Drache (ed.) *Staples, Markets, and Cultural Change* Montreal and Kingston: McGill-Queen's University Press

Nye, Russell. 1998. *Consuming Power: A Social History of American Energies* Cambridge MA: MIT Press

Rosa, Eugene, Gary E. Machlis and Kenneth Keating. 1988. "Energy and Society" *Annual Review of Sociology* no. 14

Smil, Vaclav. 2003. *Energy at the Crossroads* Cambridge MA: MIT Press

Socolow, R. H. 1978 *Saving Energy in the Home: Princeton's Experiments at Twin Rivers* Cambridge MA: Ballinger