

## Energy Constraints

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**Abstract** Building on research in anthropology and philosophy, one can make a distinction between type I and type II energy ethics as a framework for advancing public debate about energy. Type I holds energy production and use as a fundamental good and is grounded in the assumption that increases in energy production and consumption result in increases in human wellbeing. Conversely, type II questions the linear relationship between energy production and progress by examining questions of equity and human happiness. The type I versus type II framework helps to advance public debates about energy that address broad questions of profitability, regulation, and the environment, and in the process poses fundamental questions about the reverence for energy growth in advanced technological societies.

**Keywords** Energy · Ethics · Anthropology of energy · Energy culture · Energy ethics

Public and scholarly discussions of energy are unreasonably narrow. Although virtually everyone today thinks energy production and use important, conceptualizations and responses differ wildly—and yet are remarkably constrained in what they take into account. Debates about increased production (whether in oil, natural gas or even renewable), profitability, environmental protection, and tax regimes have not fundamentally altered the foundations of American culture. Yet the issue of energy—precisely because it has become so intertwined with the ways of life and

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self-understandings in advanced technological countries—deserves much broader reflection. Consider just two approaches that could help increase public and academic intelligence about this issue: anthropology and philosophy.

### Anthropologies of Energy

It was actually anthropologist Leslie White in the 1950s who gave the first extended expression to what is arguably the most widely accepted view of the energy-society relationship, which sees the particular forms of society as dependent on energy inputs. According to White, “Everything in the universe may be described in terms of matter and energy, or, more precisely, in terms of energy” (1959, p. 33). What is true of physical systems is also true for biological and cultural systems. He quotes with approval and emphasis from Nobel chemist Frederick Soddy, who was among the first to imagine nuclear power and maintained that the laws of energy are not only important in physics, but are fundamental “in the whole record of human experience, and they control, in the last resort, the rise and fall of political systems, the freedom or bondage of nations, the movements of commerce and industry, the origin of wealth and poverty, and the general physical welfare of the race” (White 1959, p. 39, italics in original). Had he known of his work, White might also have referenced the argument of chemical engineer A. R. Ubbelohde (1955), who argued that the ideal political system, called “Tektopia,” would necessarily require the presence of large numbers of “inanimate energy slaves” to replace traditional human and animal slaves. A more well-developed, qualified, and policy sensitive contemporary engineering analysis can be found in the work of Vaclav Smil (2006).

White put his own historical anthropology in quasi-mathematical terms, with the formula  $E \times T = P$ , where E is energy, T is the technology of its production, and P is product (or goods and services). “A culture is high or low depending upon the amount of energy harnessed per capita per year” (White 1959, p. 42). He proposed five basic stages of cultural development insofar as energy is derived from humans themselves, from domesticated animals, from plants (in agriculture), from natural resources (coal, oil, gas), and from nuclear energy. He summarized his view with a “law of cultural development: *culture advances as the amount of energy harnessed per capita per year increases, or as the efficiency or economy of the means of controlling energy is increased, or both*” (White 1959, p. 56, italics in original). It is easy to see this view reflected in American ideological refusal to consider reductions in energy production or use as anything other than a threat to the American way of life.

White’s grand narrative was formulated in the teeth of an emerging, more dominant effort in anthropology to treat all cultures in their own terms and to abandon unilineal theories of development. In opposition to White, for instance, Margaret Mead (1953) argued that not only did less technological cultures have something to learn from more technological ones, but more technological cultures also often had things to learn from less technological ones. This observation was confirmed decades later with the finding that different countries produce and consume enormously different amounts of energy, with some lower consumption countries scoring higher on quality of life indicators than those with higher per

capita energy coefficients. Yet Mead and others paid little attention to energy per se—and White’s vision connected in a remarkably reinforcing, self-serving way with the dominant trend in American life, justifying and promoting a commitment to the ever-increasing production and consumption of energy.

If the anthropologists who followed White did not accept his thesis linking energy and progress, they and historians such as David Nye (1990, 1998) did uphold his more general observation that transformations in energy use engender transformations in society and culture. Adding a critical edge, social scientists and humanities scholars such as the contributors to *The Culture of Energy* (Rüdiger 2008), the Rice University “Cultures of Energy Initiative” (2011-present, see <http://www.culturesofenergy.com>), and a recent anthropological collaboration on *Cultures of Energy* (Strauss et al. 2013) argue the complexity of energy-culture relationships. The *Cultures of Energy* volume especially points out how the production and consumption of energy simultaneously distribute social and cultural power unevenly among the world’s populations. A strength and limitation of this research is that it tends to focus on particular sources or sectors rather than energy in general. Concerning nuclear, for example, anthropologists study scientists and engineers along with Native American uranium miners and communities living in national sacrifice zones such as open pit mines, garbage landfills, and chemical or nuclear waste deposal areas. Other anthropologies learn about oil from indigenous communities dependent on the land that is irrevocably changed by wells and waste sites, state officials grappling with aspirations of modernity, and corporate personnel attempting to position their operations as socially responsible. Still others trace the impact of US dependence on coal by examining the wellbeing of workers, activists and the environment. Anthropologists are also on the frontlines of the current natural gas boom and of efforts to expand renewable energy. In an exception to the pattern of sector-specific research, anthropologists investigate the impacts of climate change for the livelihoods and structures of meaning of the world’s most vulnerable people.

Starting from the insight that people’s use of energy shapes and is shaped by their understanding of it, anthropologists also explore different energy worldviews. Americans, for example, switch between religious, magical and technical registers when discussing and attempting to define energy (Rupp 2013). A similar sense of magic surrounds oil and its intoxicating promises of wealth (Weszkalnys 2013). Rural electrification projects in the developing world bring to light the articulation of energy with established religious beliefs and practices and social institutions of marriage and kinship. In rural Zanzibar, for example, people associated electricity with Islamic ideals of purity and safety, even as the ability to stay up watching television past sunset resulted in some people missing morning prayers. The safety of lights relaxed but did not erase restrictions against men and women sharing social space (Winther 2013).

## Philosophies of Energy

A different but complementary effort to appreciate relationships between energy and culture can be found in philosophy. Philosophers have paid little systematic

attention to the phenomenon of energy, but what they have paid is revealing. First, the concept of energy is not nearly as simple as we often assume. Although we can have direct experience of burning wood, coal, and oil, energy itself is more elusive. Engineers define energy as the capacity to do work and distinguish kinetic (motion) from potential (position) energy. For physicists, however, energy is a fundamental aspect of matter defined by the formula  $E = mc^2$ . Yet as Richard Feynman says, “It is important to realize that in physics today, we have no knowledge of what energy is” (Feynman and 1963, sec. 4-1). There may be “formulas for calculating some numerical quantity,” but this leaves energy itself as something of an ontological mystery. For physicist and historian Jennifer Coopersmith (2010), energy is a “subtle concept.” The subtlety is greater than even Coopersmith argues, since there are concepts of energy operative in biology, medicine, and psychology that deserve to be related to those found in the physical sciences and engineering. The term *qi* in Chinese acupuncture, which is commonly translated as “energy,” even though not as manipulable as its scientific homonym, is perhaps no more mysterious.

Indeed, the historico-philosophical analysis of the concept of energy in the West from Aristotle to Einstein further suggests the need for much more careful analysis than is usually found in talk about energy policy and politics. Aristotle’s *energia* or active reality is only remotely related to the energy of early modern natural philosophy and mechanics. At the same time, David Hume in the 1700s found the terms “power,” “force,” and “energy” quite “obscure and uncertain” (*Enquiry Concerning the Human Understanding*, §49). Philosophical discussions in the 1800s and early 1900s postulated a *vis viva* present in both non-living and living entities (see, for instance, Henri Bergson’s concept of *élan vital*).

Second, the philosophical analysis of various social commitments to energy production and use can identify a variety of arguments. White and others generally argue in a consequentialist or utilitarian manner that energy production increases human power and thereby raises the quality of life, sometimes understood in a circular manner as measurable in terms of energy consumption. There is also on occasion a suggestion that increasing energy use by humans is natural. Such a view is fundamentally teleological, arguing that inherent to human nature is a drive toward or attraction for energy, that energy production and use realizes or perfects human nature. From this perspective, efficient energy production takes on the character of a virtue. From a deontological perspective, it can also be argued that rationality commands that human beings have a categorical obligation to maximize energy production. Giving White’s argument a slightly different interpretation, it is possible to develop a philosophy of history that sees expanding energy productivity and use as the core of historical change. Last but not least, someone could propose an aesthetics of energy as beautiful. Certainly it is the case that large scale energy explosions and energy projects such as dams might be perceived as examples of the sublime.

Finally, third, there are any number of ethical and political philosophical questions that bear on energy production and use. Is the production of energy more properly managed by private corporations or public agencies? To what extent should states create institutions that foster cheap energy for their citizens and consumers? That promote energy conservation as well as utilization? How should the dangers of explosive energy releases (whether chemical or nuclear) be

managed? To what extent and how should human harms and risks of energy production and use best be addressed and regulated? How are trade-offs between the degradations of the natural environment by energy production (pollution) or use (waste and climate change) to be adjudicated? What is really meant by such apparently idealistic terms as “sustainable energy,” “green energy,” or “alternative energy”? Perhaps the most general ethical issue of energy production and use falls under the rubric of energy equity and justice. Certainly it is important from the perspective of justice to consider to what extent those who most benefit from an energy regime pay their fair share in terms of harms and risks and whether those who are most subject to harms and risks fairly benefit as well. There are issues of free and informed consent in regard to energy production and use just as in medical knowledge production and healthcare.

### **Type I Versus Type II Energy Ethics**

In the exploration of such a cluster of questions it is important not just to promote analytic precision with regard to specific cases but to reflect on alternative ways to frame issues. There are at least two quite different frameworks that bear directly on and can easily modify common productive, economic, environmental, and political attitudes toward energy. For want of better names, call these type I and type II frameworks. The belief that there is a linear relation between energy and culture constitutes type I. It necessarily assumes that energy production and use is a fundamental good. Skepticism with regard to such a linear relationship is the foundation of a type II framework.

During the energy crisis of the 1970s—and the term “energy crisis” itself deserves more careful criticism than is common—the radical social critic Ivan Illich challenged prevailing beliefs with a little book on *Energy and Equity* (1973). Although he admits the value of energy production and use up to a point, in counterfoil to White, Illich attacks the ideology of never ending growth and criticizes current energy policies in the advanced and much of the developing world. “For the primitive, the elimination of slavery and drudgery depends on the introduction of appropriate modern technology, and for the rich, the avoidance of an even more horrible degradation depends on the effective recognition of a threshold in energy consumption beyond which technical processes begin to dictate social relations” (Illich 1973, p. 8). Beyond a threshold abstractly defined as that between enough and too much, energy production and consumption begins to undermine the abilities of people to lead their own lives. Illich tries to get specific with regard to energy used in transport and argues that beyond about 15 miles/h persons increasingly become passive consumers of travel. The simple comparison of the authentic auto-mobility of walking with riding in an automobile or flying in an airplane calls attention to increasing degrees of passivity and dependence on technology and institutions.

For Illich the issue of equity is not the same as equality, fairness, or justice. Equity implies some level of ownership or engagement, as when one holds equities or stocks in a corporation. The problem with advanced forms of energy production

is that they progressively depend on expertise and the alienation of a majority of citizens—turning citizens into consumers. “What is generally overlooked is that equity and energy can grow concurrently only to a point. Below a threshold of per capita wattage, motors improve the conditions for social progress. Above this threshold, energy grows at the expense of equity. Further energy affluence then means decreased distribution of control over that energy” (Illich 1973, p. 5). High level energy production and consumption necessitates technocracy—a tendency most evident with nuclear energy but present as well in all high-tech energy production systems. Only the experts can know what is really going on. The energy system becomes as opaque as the inside of a computer.

Whereas type I energy ethics rests on acceptance of the validity of one or more arguments for the energy-civilization coefficient, type II energy ethics is grounded in one or more questions raised in this same regard. Energy is argued to be at most a qualified rather than an unqualified good; as perhaps necessary, but only up to a point, beyond which it can in multiple ways become counterproductive. In the form of a consequentialist or utilitarian argument, after crossing a certain threshold, increasing energy production and use reduces the quality of life. In teleological terms, stabilized or balanced energy use by humans is more natural than unrestricted increases. From a deontological perspective, humans are rationally obligated to limit not only their utilizations of energy but its production as well. Historically there are clearly questions to be raised about whether the grand narrative of human change can be characterized as simply one of progressive energy development. And surely there are instances in which energy is ugly—ugly even in its sublimity.

According to Illich, “The energy crisis cannot be overwhelmed by more energy inputs. It can only be dissolved, along with the illusion that well-being depends on the number of energy slaves a man has at his command” (Illich 1973, p. 10). Slave holding, of both inanimate as well as animate slaves, has an inescapable effect on the slave owner. Energy gluttony is just as vicious as, and not so different from, over eating and obesity. Today the radical question of how and to what extent energy production and consumption influences opportunities for leading the examined life, the only one that (according to Socrates) is truly human, has been largely suppressed in favor of the pursuits of efficiency or renewable energy.

To claim that the high technology way of life has become deeply intertwined with energy production and use is not the same as the energy determination thesis of White nor of popular self-understandings and assumptions. It is simply to admit that this is indeed the way many people today think. Some have consciously chosen to think of themselves as energy dependent beings—although at the same time they bemoan the extent to which energy production and consumption are themselves constrained by economic, ecological, or political factors. But could it not be that energy production and use, when examined from the limited perspectives of economics and politics, is itself a constraint on leading the good life? Do not both anthropology and philosophy suggest that life is more than energy production and use? Are there not other perspectives from history to art, poetry, psychology, and religion that could further de-constrain and enrich the way people think about energy?

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