

1 Introduction

Some may think that decisions about energy can be made on a purely technical or technological basis, without the need to be “distracted” by abstract questions of justice. We disagree, not only because typical controlling statutes for electric utilities require pursuit of outcomes that are “just and reasonable,” but also since in *substance* energy problems raise moral issues decisively and differentially affected by the outcomes of policy decisions.¹ People are starting to recognize that the world of energy involves fundamental ethical questions. Thirty years ago, electrons, barrels of oil, and justice would have seemed like a jumble of topics, but now their combination makes sense.

Consider the following example.² It is a quiet summer afternoon in Ohio, in the middle of a moderate, but hardly unique, warm spell. Imagine that you are sitting in the control room of the Ohio electric grid, in your third year on the job, feeling competent enough to be comfortable covering the shift while those around you go to get a sandwich or to work on maintenance routines. You look up at the “big-board” showing how much power is being carried by each major transmission line, how that compares to its design-limits, and how Ohio’s grid ties into the systems feeding the rest of northeastern North America. You know that you are responsible for a small, but vital, part of “the Eastern Interconnect” which serves 200 million people spread over a million square miles of the US and Canada.

¹ By “decisively,” we mean that some decisions will foreclose options that cannot readily be revisited or reopened; by “differentially,” we mean that some decisions will lead to outcomes that are morally and materially different from other decisions that could have been made.

² Our discussion here is simplified for illustrative principles. However, it is inspired by an important actual event. For a readable, fascinating, and authoritative analysis of that real world example, see the US–Canada Power System Outage Task Force, *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* (Washington, DC: US Department of Energy, April 2004).

Things seem calm, until you notice that one important line, serving 2 million people in and around Cleveland, is rapidly overheating. You take a few minutes to try to lower the load upon that line by opening up alternative lines, but few are available and they do not adequately compensate. Now you face a major choice: should you deliberately disconnect the Cleveland region from the larger power grid? If you do, 2 million people will certainly lose all electric power immediately and without notice, and it may well take two to four days to reconnect them. But, if you do not disconnect the region around Cleveland, there is a small but real chance – your best guess is 5 percent – that the entire Eastern Interconnect will be affected and that 50 million people, or more, will lose power and need at least four days (since a larger area will take more time to fix) to be fully reconnected.

You would love to gather more information, to ask your boss to make a decision, or to convene a meeting of experts and the representatives of the millions of people who could be affected either way. But, alas, the reality is that, at the rate the key line is overheating, you have only a few minutes to decide “what’s the right thing to do?”³ Will you, *should you*, expose hundreds of millions of people to a real chance of losing all electric power for days, or will you disconnect the line to Cleveland, knowing that there is a certainty that 2 million real, identifiable people will lose electricity for at least two days in order to reduce the risk that the same thing might happen to 50 million others, or perhaps more?

What will you decide? And *how* will you decide?

As it happens, several philosophers of justice have thought about similar questions in the past. One of them, an Englishman named Jeremy Bentham, proposed a theory that is labeled as utilitarianism and which is sometimes summed up as seeking “the greatest good of the greatest number.” Using some basic arithmetic, a Benthamite could describe a choice of disconnecting 2 million people for at least two days as “four million person-days without power.” In contrast, a 5 percent chance of disconnecting 50 million people for four days could be

³ This phrase, “What’s the Right Thing to Do?,” is the title of Michael Sandel’s book, which, as the subtitle makes clear, focuses on justice theory as a guide to decisions and actions, not merely as a form of contemplation. See Michael J. Sandel, *Justice: What’s the Right Thing to Do?* (New York: Farrar, Straus, and Giroux, 2009).

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described as expecting “10 million person-days without power.” Thus, under Bentham’s approach, disconnecting Cleveland is the ethical choice. Why? Because it avoids the risk of an expected 10 million person-days without power as a result of inaction, compared to a mere 4 million person-days without power if Cleveland is disconnected.⁴ However, German philosopher Immanuel Kant would disagree. He would state the importance of individual freedom in contrast to cumulative social benefit. Kant’s ideas could lead one to conclude that if individuals should not be sacrificed for greater social goods, then a specific city full of specific people should not be harmed to protect the expected well-being of a greater number of others.

Bentham and Kant hardly exhaust the range of justice theory on this example. Aristotle’s concept of justice focuses on the idea of “virtue,” defined as being “fit” for the true purposes of a person, an object, or a society (such as a polis, or a municipality). Suppose you knew that the city at risk, Cleveland in this case, was unusually productive, or unusually unproductive, as measured by its contribution to America’s gross domestic product (GDP) – or its Human Development Index. Or what if it was about to host some important international event, such as the Olympics or the World Series (of American baseball)? Would that make it a more – or less – “virtuous” city? Would you think it right to take higher risks to keep Cleveland on the electric grid if you knew that it was “punching above its weight” in contributions to our economic prosperity? What if it housed a vital center for contributions to our military security? Is that the kind of “virtue” that you think should best be taken into account in deciding if it is “just and reasonable” to impose greater risks on others in order to keep Cleveland from a disconnection?

You are most likely *not* sitting in an electricity control room as you read this book. But real people must make similar decisions every minute. And despite the moral implications of those decisions, our species is drifting into a future threatened with climate change and

⁴ In a simple version of utilitarian theory, you, sitting in the control room of the Ohio grid, might do some very simple arithmetic and say that a 100 percent chance of an outage for at least two days for 2 million people around Cleveland equals an expectation of at least 4 million person-days without power. However, a 5 percent chance of an outage for at least 50 million people for at least four days equals an expectation of at least 10 million person-days without power – which means the decision to disconnect Cleveland is the proper one.

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rising sea levels, burgeoning amounts of energy-related pollution, aggravated scarcity and insecurity of energy fuels, the proliferation of nuclear weapons, and a host of other hazards. This creates pressing ethical conundrums with no easy resolution. It is becoming increasingly clear that routine energy analyses do not offer suitable answers to these sorts of issues. The enduring questions they provoke involve aspects of equity and morality that are seldom explicit in contemporary energy planning and analysis.

Essentially, this is because our current global energy system is prehistoric – both in terms of the fuels it utilizes, and also in the intellectual assumptions underpinning it. We rely on dwindling reserves of fossilized fuels that have existed for millions of years to provide a majority of our energy needs and services. These have paradoxically returned us to dependence on a sort of hunter-gatherer lifestyle, with global fossil-fuel hunting expeditions using more expensive and sophisticated technology to discover and develop untapped reserves.⁵ The belief in limitless opportunities for energy use to grow within a limited globe is also prehistoric in a sense, for it contravenes even rudimentary lessons from physics, thermodynamics, ecology, and biology.

However, our moral systems are also ill-equipped to handle the complexity and expansiveness of modern-day energy and climate problems. As one sign of this, a recent study from psychologists and environmental scientists at the University of Oregon concluded that human moral systems are not well attuned to address the crisis of climate change given its complexity, the difficulty of assigning blame, and our own complicity in causing it.⁶ They noted that cognitively, climate change is abstract, complex, and nonlinear, making it hard to predict the trajectory of future emissions pathways, and harder still to connect them with actual consequences on the ground. It becomes even more difficult when most of the impacts from climate change will occur in the future, making them temporally distant, and when those impacts are asymmetric, such as increased rainfall in some areas, and decreased rain in others. Climate change, moreover, is largely unintentional, making it

⁵ Kurt Yeager, *Electricity and the Human Prospect: Meeting the Challenges of the 21st Century* (Palo Alto: Electric Power Research Institute, 2004).

⁶ Ezra M. Markowitz and Azim F. Shariff, “Climate Change and Moral Judgment,” *Nature Climate Change* 2 (March 2012), pp. 243–247.

relatively “blameless” and lacking features of intentional moral transgressions such as murder or cheating. In the case of climate change, there was never any real intention to do harm – and in some cases, there was the opposite, such as building coal-fired power stations to provide jobs, improve economic security, or expand access to modern energy services. Lastly, climate change must overcome our guilty bias; that is, humans do not like to feel guilty, and will derogate evidence of their own role in causing a problem. The implication is that individuals will work to avoid feelings of responsibility for climate change; some will even have optimistic biases, downgrading any negative information they receive and counterbalancing it with almost irrational exuberance.

Clearly, we need new ways of thinking about, and approaching, the world’s energy problems – and the issues at hand make global energy security and access among the central justice issues of our time, with profound implications for happiness, welfare, freedom, equity, and due process. Any decent and stable society must grapple with the injustices surrounding energy and the environment.

“Energy justice” as a concept and a tool

The concept of “energy justice” gives us a way to better assess and resolve these dilemmas. We define an energy-just world as one that equitably shares both the benefits and burdens involved in the production and consumption of energy services, as well as one that is fair in how it treats people and communities in energy decision-making. In other words, we see importance to both substantive outcomes and decisional procedures. Energy justice, thus, involves the right of all to access energy services, regardless of whether they are citizens of more or less greatly developed economies. It encompasses how negative environmental and social impacts related to energy are distributed across space and time, including human rights abuses and the access that disenfranchised communities do or should have to remedies. Energy justice ensures that energy permitting and siting do not infringe on basic civil liberties and that communities are meaningfully informed and represented in energy decisions.

To better illuminate the moral aspects of our energy systems, this introductory chapter begins by defining the concepts of “energy,” “justice,” and of “energy justice.” It then previews the chapters to come

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and highlights four factors distinguishing this book from other types of energy analysis and scholarship.

Energy as a concept

The global energy system consists of infrastructures for the extractive industries, electricity, transport, and agriculture. However, it is far more than that alone. The poet and painter William Blake (1757–1827) once wrote that “energy is eternal delight.” It seems that the very word “energy” first appeared in English in the sixteenth century, and then it had no scientific meaning. It simply referred to forceful or vigorous language, and it was not until the 1800s that the concept of “energy” encompassed anything resembling its modern form, when natural philosophers began to use it to describe phenomena such as the motion of the planets, transfer of heat, and operation of machinery. The concept continued to evolve into today’s common scientific definition that energy is the capacity to do work, or the ability to move an object against a resisting force.

Even now, the notion of “energy” is a broad idea and envelops a number of disciplines. In a scientific sense, Newtonian physics functions within the fundamental empirical truth of the first law of thermodynamics, which states that energy is neither created nor destroyed, but rather changes form.⁷ For scientists and engineers, the term “primary energy” means the energy “embodied” in natural resources, such as coal, crude oil, natural gas, uranium, and even sunlight, wind, geothermal heat, or falling water, which may be mined, stored, harnessed, or collected but not yet converted into other forms of energy. Sometimes analysts use the term “end-use energy” to refer to the energy content of primary energy supplied to the consumer at the point of end-use, such as kerosene, gasoline, or electricity, delivered to homes and factories. The phrases “useful energy,” “useful energy demands,” and “energy services” refer to what “end-use energy” is transformed into: heat for a stove, mobility in an automobile, or mechanical energy for air circulation. “Energy services” are often measured in units of heat, or work, or temperature, but these are in essence surrogates for measures of satisfaction experienced when human beings

⁷ National Aeronautics and Space Administration (NASA), *Conservation of Energy*, found at: www.grc.nasa.gov/WWW/K-12/airplane/thermo1f.html, accessed July 5, 2010.

consume or experience them. Energy services can thus be regarded as the benefits that energy carriers produce for human well-being.⁸

Biology and life sciences recognize life as a continuous input of energy, (almost) all of which originates from the sun: light energy transforms into chemical energy to produce water and minerals, while any “lost” energy is merely converted into heat as the energy is passed along different trophic levels.⁹ Minerals, then, can be understood as units of energy – like food calories – and can be measured by the energy required to raise 1 kilogram of water 1 degree Celsius.¹⁰

Of course, in our daily lives, we use the word “energy” and its derivatives in many other ways. We use “energetic” as an adjective to describe people on a spectrum from “energetic at a high-octane level” to “not having enough energy to get out of bed.” When we speak as energy consumers, we refer to energy sources to fuel our cars, light our homes, and heat or cool our buildings. Politicians speak about “energy security” to describe the merits of purchasing – or conquering – petroleum from foreign countries. Engineers focus on the efficiency and reliability of energy systems looking for “line losses” or “redundancy” or “fuel efficiency.” Anthropologists note that we need energy for needs and aspirations, that we do not need “electrons” or “kilowatt-hours” but instead well-lit studying areas, warm rooms, and cold beers – we seek comfort, cleanliness, and convenience.¹¹

Drawing from both these scientific and social conceptions, by “energy” we therefore refer to the sociotechnical system in place to convert energy fuels and carriers into services – thus not just technology or hardware such as power plants and pipelines, but also other elements of the “fuel cycle” such as coalmines and oil wells in addition to the institutions and agencies, such as electric utilities or transnational

⁸ B.K. Sovacool, “Conceptualizing Urban Household Energy Use: Climbing the ‘Energy Services Ladder,’” *Energy Policy* 39(3) (March 2011), pp. 1659–1668.

⁹ Marietta College, *Environmental Biology – Ecosystems*, found at: www.marietta.edu/~biol/102/ecosystem.html#Energyflowthroughtheecosystem3, accessed July 5, 2010, and What Is Life: A Life Science Education Forum, *What is Life? Principles of Biology*, found at: www.whatislife.com/principles/principles05-energy.htm, accessed July 5, 2010.

¹⁰ Jim Painter, “How Do Food Manufacturers Calculate the Calorie Count of Packaged Foods?,” in *Scientific American*, July 31, 2006, found at www.scientificamerican.com/article/how-do-food-manufacturers/.

¹¹ Elizabeth Shove, *Comfort, Cleanliness, and Convenience: The Social Organization of Normality* (Oxford: Berg Press, 2003).

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corporations, that manage the system, as well as the households and enterprises that consume or put that energy to work.

As we shall see, decision-makers grapple with both (1) the benefits of energy technologies that are constantly completing much work for the human race, and (2) the costs required to maintain these benefits. Energy systems and technologies can be socially advantageous, providing underlying and basic work in order for human beings to pursue other aspects of life. Immense human achievements have been made possible through concentrated energy, including longer life expectancy through improved healthcare as well as the energy requirements for humanity to land on the moon and send probes to Mars. The past CEO of the Electric Power Research Institute has even gone so far as to declare that “energy is the elemental force upon which all civilizations are built, and technology provides the means to harness energy.”¹² Energy is, according to the late economist E.F. Schumacher, “not just another commodity, but the precondition of all commodities, a basic factor equal with air, water, and earth.”¹³

Nonetheless, little in life comes free of cost, and energy systems indeed require inputs (e.g. natural resources) and produce both desired and undesired outputs (e.g. pollution) that must be accounted for. It is the responsibility of those managing the system to weigh the benefits of energy services – like heat in our homes, light at night, hot showers, quick transportation – against the economic, social, and environmental costs it takes to produce and maintain these benefits. Developing, implementing and maintaining the energy systems that support these services require significant human involvement, essentially reminding us that “energy works for humanity but it must also be worked for.”¹⁴ Consequent costs on a macro scale create a tension between societal damages and the benefits that energy systems provide. A fair weighing of these benefits and costs is essential for determining the outcomes among which decision-makers must choose. Indeed, major statutes, such as the Federal Power Act in the United States, explicitly set the goal of “just and reasonable” outcomes for processes such as setting

¹² Yeager, *Electricity*, p. 3.

¹³ Geoffrey Kirk, *Schumacher on Energy: Speeches and Writings of E.F. Schumacher* (London: Jonathan Cape, 1977).

¹⁴ John G. Clark, *The Political Economy of World Energy: A Twentieth Century Perspective* (Chapel Hill: University of North Carolina Press, 1990), p. 1.

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prices for energy. But to define a “just” result, we need to consider an age-old question: what exactly is justice?

Justice as a concept

Justice as a fundamental concept has been debated for well over 2,000 years. As one recent philosophical textbook put it:

If the concept of human rights is of relatively recent origin, just the opposite could be said about the concept of justice: It is a moral concept with a rich and long history, stretching back before the time of Plato and Aristotle and running as a constant thread from ancient thought to the twenty-first century.¹⁵

Admittedly, justice is a difficult notion to tie down. As philosopher Scott Gordon puts it, “justice is the central concern of law and jurisprudence and a large part of the social sciences, and it is also a major one of philosophy, theology, and the arts.”¹⁶ For the Greeks, justice involved living a virtuous life, but did not ban slavery; for modern libertarians, it is about minimizing government intervention and control over individual choices; for social philosophers, it can be about equality and welfare. For Christians, justice refers to divine law commanding human behavior, with stipulations in the Bible such as the “Golden Rule” and the “Ten Commandments.”¹⁷ For European philosophers during the eighteenth and nineteenth centuries such as Thomas Hobbes and John Locke, justice was derived from “natural law” and, like physics or gravity, an absolute concept consisting of moral rules and principles.¹⁸ The criminal justice system in most countries sets laws specifying rules to be obeyed and penalties imposed when one breaks them. Some believe therefore that justice is inherently tied to the law, and to

¹⁵ Lawrence M. Hinman, *Ethics: A Pluralistic Approach to Moral Theory*, 4th edn. (Belmont, CA: Thomson and Wadsworth, 2008), p. 233.

¹⁶ Scott Gordon, *Welfare, Justice, and Freedom* (New York: Columbia University Press, 1980).

¹⁷ Jose Ambrozic, “Beyond Public Reason on Energy Justice: Solidarity and Catholic Social Teaching,” *Colorado Journal of International Environmental Law and Policy* 21(2) (Spring 2010), pp. 381–398.

¹⁸ See Thomas Hobbes, *Leviathan*, 11.1–2; Robert P. Kraynak, “The Behemoth: Doctrinal Politics and the English Civil War,” ch. 3 in *History and Modernity in the Thought of Thomas Hobbes* (Ithaca: Cornell University Press, 1990), pp. 32–68; Leo Strauss, *Natural Right and History* (University of Chicago Press, 1953), p. 181; and John Locke, *Second Treatise of Government*.

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retributive or preventive orders made by a judge or an official authority like Congress. Others believe justice concerns individual liberty, and the ability of each citizen to freely pursue – and hopefully realize – their own individual desires. Many modern notions of justice focus on the concept of “fairness” and attempt to create the conditions for fair social structures, which in turn produce a fair distribution of goods and services.

One recurring theme is that the concept of justice may be less important for what it *is* than for what it *does*. In this sense, the concept of justice is a tool with multiple functions:

- It links individual wishes to the values of a larger body and, thus, to the implicit or explicit coercive pressures of society as a whole;
- It serves to resolve disputes in ways that extend beyond mere individual preferences and, thus, reduces the demeaning impact otherwise felt by those whose wishes are rejected;
- It enables us to make better choices, even in the absence of disputes, by distinguishing between more and less “just” outcomes expected from our decisions;
- It promotes mental health and psychological well-being since being dealt with “justly” enables us to feel healthy, virtuous, sane, and “right.”

In this “functional” sense, we can discuss what justice is, not by reviewing multiple a priori definitions of the term, but by observing its effect on actual decisions.¹⁹

One image of justice that has persisted throughout Western culture since at least the time of Plato and Aristotle is the statue of Lady Justice. Today, she can be seen sitting pensive-like and blindfolded holding in one hand a sword, and in the other hand a scale.²⁰ Upon first reflection, one may observe that Lady Justice is female, and in fact, most icons of justice, across cultures, have been female. The blindfold seems to imply that justice should be impartial, and that decisions based upon either political or personal associations, or upon factors outside of the strict issue at stake, are unjust. The sword gives Lady Justice a certain authority in her decision, while the scale implies a combination of balancing a number of interests with an empirical objectivity to her conclusions.

¹⁹ This is analogous to estimating the mass of the moon, not by direct measurement, but by calculating its effects upon the oceanic tides and then calculating the mass necessary for a moon at a known distance to create that tidal change.

²⁰ Dennis E. Curtis and Judith Resnik, “Images of Justice,” *Yale Law Journal*, 96 (1986–1987), pp. 1727–1772, at p. 1729.