



Energy justice: Conceptual insights and practical applications



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HIGHLIGHTS

- Concepts from justice, philosophy, and ethics can significantly inform energy consumers and producers.
- “Energy justice” can serve as a novel conceptual, analytical, and decision-making tool.
- A synthetic energy justice framework can enhance future energy analysis and research.

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ABSTRACT

Though it is far from obvious, concepts from justice, philosophy, and ethics can significantly inform energy consumers and producers. This study details how energy justice can serve as a novel *conceptual* tool for philosophers and ethicists that better integrates usually distinct distributive and procedural justice concerns. Energy justice serves as an important *analytical* tool for energy researchers striving to understand how values get built into energy systems or to resolve common energy problems. Energy justice presents a useful *decision-making* tool that can assist energy planners and consumers in making more informed energy choices. Our energy justice framework has elements of Kantian ethics, which takes each person as an end. It has libertarian elements of freedom and choice, suggesting that good societies present people with a set of opportunities or substantial freedoms, so they can choose to exercise these or not. It is pluralist about value, holding that capabilities for people are different and also that their own interests vary. It is concerned with justice as recognition, noting that failures of procedural justice can result in discrimination and marginalization. It, also, has elements focused on utilitarianism and welfare, attempting to improve the quality of life for all people, as defined by their capabilities.

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1. Introduction

Late last year, one of us had a conversation with a woman who was putting \$70 of gasoline into the tank of her large Sports Utility Vehicle. She explained that she needed the large car because her children would squabble if they had to sit near each other. Moments later she added that it was a pity that her brother had been wounded in Iraq, fighting to get cheaper oil to America. She, like many other consumers and even commentators and analysts in the energy studies field, did not see the ethical connection between her personal demand for oil, and military casualties related to securing that oil in the Middle East. She, in short, did not appreciate the energy justice dimensions to her behavior.

To many, seeing the word “energy” next to “justice” may seem like a confusion of disciplines. What does ethics, morality, and philosophy have to do with tons of coal, barrels of oil, or electrons flowing through a high voltage transmission line? However, if one takes a closer look, the moral implications of our collective energy decisions may become more apparent. Our species is drifting into a future threatened with climate change and rising sea levels [1], burgeoning levels of energy-related pollution which threaten our health [2], aggravated scarcity and insecurity of energy fuels [3], the proliferation of nuclear weapons [4], and a host of other hazards [5]. 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.

However, our moral systems are also ill-equipped to handle the complexity and expansiveness of modern day energy problems,

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especially climate change, which World Bank chief economist Nicholas Stern called the greatest energy-related externality of all time [6]. 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 [7]. They noted that cognitively, climate change is abstract, complex, and non-linear, 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 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 [8].

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. As one Brookings Institution study recently noted:

Decisions or indecisions today can impose heavy costs on our descendants or, at a minimum, limit the choices they will have. That is why there is an unprecedented need to merge the reality of an international community with the established principle of intergenerational responsibility [9].

Yet a series of recent content analyses of the top energy technology and policy journals confirms the perceived unimportance of justice as both a methodological and topical issue [10,11]. These analyses demonstrated that out of 5318 authors publishing in these journals over a period of ten years, only 6 had training in philosophy and/or ethics and only one used the word “justice” in its title and/or abstract [12,13].

This article aims to give students, consumers, planners, and policymakers both purpose and direction concerning their choices about energy production and use. It details how energy justice can serve as a novel *conceptual* tool for philosophers and ethicists that better integrates usually distinct distributive and procedural justice concerns. It suggests that energy justice serves as an important *analytical* tool for researchers striving to understand how values get built into energy systems or to resolve common energy problems. And it supposes that energy justice presents a useful *decision-making* tool that can assist energy planners and consumers in making more informed energy choices. It presents availability, affordability, due process, good governance, prudence, intergenerational equity, intragenerational equity, and responsibility as central energy justice principles.

Indeed, the topic of energy justice matters well beyond purely philosophical reasons. Firstly, energy justice can directly impact community livelihoods and the bottom line of energy corporations [14]. As just two examples, in Australia dozens of protesters scaled

50 m walls and chained themselves to the Hay Point Export Terminal near Mackay because they feared the ethical implications of exporting coal, causing \$14 million in lost revenues [15]. In Nepal, Maoist rebels repeatedly bombed and attacked various hydroelectric power stations owned by those they saw as corrupt or unfair [16]. Single conflicts such as these—over issues of distributive or procedural justice—can cost companies millions of dollars in delays, lawsuits, missed opportunities, social dislocation, and the damage of corporate reputations [17].

Secondly, psychological research has suggested that one of the most powerful predictors of the intention to take energy problems seriously, or to change energy related lifecycles or decisions, is who the respondent blames for energy problems [18]. If people believe their own consumption is wasteful and accept personal responsibility, they are likely to change their attitudes and actions. But if they are able to blame companies, politicians, foreign countries, and other consumers, they will do nothing. Who people see as responsible for energy problems, and what they perceive as just or unjust, can shape investment decisions, personal behavior, and even trust (or lack of trust) in both information about energy and the institutions regulating or supply it [19]. The topic of justice therefore permeates many aspects of energy conversion, distribution, marketing, and use. Moreover, reframing energy problems as ethical or moral conundrums can help energy producers and consumers see them in ways that make them more aware, accountable, or responsible for their decisions [20].

2. Energy justice as a conceptual tool

To begin, we define the concept of “energy justice” as a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making. To reach this definition, it is useful to first start by defining “justice.” Justice as a fundamental concept has been debated for well over two thousand 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 [21].

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” [22]. For European philosophers during the eighteenth and nineteenth century 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 [23,24]. 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 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 “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.

Justice primarily involves the distribution of what the father of social justice theory John Rawls calls the “primary goods” of rights and liberties, powers and opportunities, and income and wealth. These, according to Rawls, should be distributed in a manner a hypothetical person would choose if, at that time, they were ignorant of their own status in society. Or, as justice theorist Michael J. Sandel has eloquently written, “to ask whether a society is just is to ask how it distributes the things we prize. . . . A just society distributes these goods in the right way; it gives each person his or her due” [25]. Decision-makers, public and private, thus should strive to act as impartial persons implementing equitable actions in the world. In order to achieve their goal of justice, decision-makers must be blind to partiality and political bargaining, and must weigh benefits and costs empirically and objectively – making justice in this sense a matter of maintaining or restoring balance and proportion.

At the same time, equity and distributive justice deal with the distribution of material outcomes, or public goods such as resources or wealth and public bads such as pollution or poverty. Procedural justice is concerned with how decisions are made in the pursuit of social goals, or who is involved and has influence in decision-making. It thus has four important elements: (1) access to information; (2) access to and meaningful participation in decision-making; (3) lack of bias on the part of decision-makers; and (4) access to legal processes for achieving redress [26]. Modern justice consequently has societal as well as individual dimensions: it refers to the healthy functioning of society in addition to the fair treatment of the individual in day-to-day interactions. It boils down to who gets what, and the processes and procedures that govern how we decide the principles of that distribution.

These modern conceptualizations of justice mirror scholarship emerging from the recent field of environmental justice. Environmental justice is commonly defined as the distribution of environmental hazards and access to all natural resources; it includes equal protection from burdens, meaningful involvement in decisions, and fair treatment in access to the benefits [27]. Justice theorist Gordon Walker defines environmental justice’s two central issues as (1) how some consume key environmental resources at the expense of others and (2) how the power to affect change and influence decision-making is unequally influenced [28]. Ecological justice or “inter-species equity” [29] concerns itself with more equitable relations between humans and the natural world, or how humanity interacts with non-human beings [30,31].

Drawing from these strands of thought, we argue that energy justice involves the following key elements:

- Costs, or how the hazards and externalities of the energy system are imposed on communities unequally, often the poor and marginalized.
- Benefits, or how access to modern energy systems and services are highly uneven.

- Procedures, or how many energy projects proceed with exclusionary forms of decision-making that lack due process and representation.

Following from these three elements, an energy-just world would be one that promotes happiness, welfare, freedom, equity, and due process for both producers and consumers. It would distribute the environmental and social hazards associated with energy production and use without discrimination. It would ensure that access to energy systems and services is equitable. It would guarantee that energy procedures are fair and that stakeholders have access to information and participation in energy decision-making [32].

3. Energy justice as an analytical tool

Conceiving of energy justice as a mesh of procedural, distributive, recognition, and cosmopolitan aspects does more than create an integrated, synthetic concept; it also is a useful analytical tool for altering how energy problems exist or are framed. Energy justice forcefully reminds us that the selection between energy technologies is about more than merely hardware. As we exhaust energy resources and have to find substitutes to them, change our way of life, or transition to renewable energy, the biggest challenge will be determining how we make this transition, and more specifically *who* gets to make it, and *who* has to pay for it. This is not a question that can ever be answered by economics or engineering alone. Such disciplines can tell us how large energy reserves may be or how much energy fuels may cost today, but they treat supply as a function of geologic availability or of price and demand, not of morality [33]. Economics offers an excellent set of tools for estimating costs and benefits, but tells us little about who benefits and who suffers [34]. Imagine trying to explain to a farmer in Bangladesh who had lost three children in a “post-climate-change cyclone” in cost-benefit language that your extra pleasure in driving a bigger car outweighs his loss. Economics is concerned with accounting for efficiency, justice with accountability.

Essentially, our concept of energy justice connects energy policy and technology with the eight philosophical concepts, influences, applications, injustices, and solutions summarized in Table 1 reframing eight distinct energy problems as justice themes. The first four of these justice concepts—virtue, utility, human rights, and procedural justice—come primarily from classical theorists, the next four—welfare, freedom, posterity, and responsibility—come from modern thinkers.

According to this analytical view, the problem of efficiency becomes reframed not as an economic or technical issue, but one of virtue. Externalities are wrong on utilitarian grounds. Human rights abuses and poor social and environmental impact assessments can become rejected on Kantian or deontological reasons. Free, prior, informed consent becomes an essential part of due process and the siting of energy infrastructure. Energy poverty becomes immoral because it interferes with human beings’ ability to achieve functions and capabilities. Subsidies, intriguingly, can be viewed as an affront to individual liberty and personal property. The depletion of resources can be reframed as an issue about present versus future generations and climate change becomes a moral issue concerning responsibility, fairness, and the duty to respond to it.

In laying out this analytical roadmap, we do not mean to imply that these philosophers always agree on justice concepts or say the same thing. Not all of the principles are equal or consistent. Aristotle’s notions of justice are primarily based on virtue, things a good society should affirm, with an objective sense for what “good” is. Under this interpretation, justice is giving people what they deserve, and one cannot figure out “justice” without reflecting

Table 1
Energy justice analytical applications to energy problems.

Topic	Concept(s)	Major philosophical influence(s)	Applications to energy	Injustices	Solutions
Energy efficiency	Virtue	Plato and Aristotle	Energy efficiency: high penetration of efficient service	Inefficiencies involved in energy supply, conversion, distribution, and end-use	Fuel economy standards, energy efficiency labeling, industrial retrofits, utility-scale demand-side management, ascending block rate pricing, advanced metering and smart grids, training and capacity building, consumer education and awareness
Energy externalities	Utility	Jeremy Bentham, John Stuart Mill, Henry Sidgwick	Wellbeing: less suffering, pain, externalities, and disasters associated with energy production and use	The imposition of negative social and environmental costs on society such as traffic congestion, the extractive industries affiliated with energy production, the resource curse, nuclear waste, air pollution, greenhouse gas emissions, and water consumption	Passage of a carbon tax, accurate price signals and tax shifting, and environmental bonds
Human rights and social conflict	Human rights	Immanuel Kant	Universal human rights: an obligation to protect human rights in the production and use of energy	The violation of civil liberties—in some extreme cases death and civil war—undertaken in pursuit of energy fuels and technology, as well as the contribution of energy production to military conflict	Extractive industries transparency initiatives, energy truth commissions and inspection panels, improved social/environmental impact assessments for energy projects, availability of legal aid to vulnerable groups
Energy and due process	Procedural justice	Edward Coke, Thomas Jefferson, Jürgen Habermas	Due process: free prior informed consent for the siting of energy projects; fair representation in energy decision-making	Approaches to energy siting that ignore or contravene free, fair, and informed consent, and/or do not conduct adequate social and environmental impact assessments	Better information disclosure, broader community involvement and participation
Energy poverty	Welfare and happiness	John Rawls, Amartya Sen, Martha Nussbaum	Accessibility and subsistence: an energy system that gives people an equal shot of getting the energy they need, energy systems that generate income and enrich lives	Lack of access to electricity and technology, dependence on traditional solid fuels for cooking, and time-intensive fuelwood and water collection and processing of food in emerging economies, borne mostly by women and children	Social pricing and assistance programs as well as pro-poor public private partnerships for microhydro units, solar home systems, improved cookstoves, biogas digesters, and small-scale wind turbines, mechanical energy for pumping, irrigation, and agricultural processing
Energy subsidies	Freedom	Robert Nozick, Milton Friedman	Libertarianism: energy decisions not unduly restricted by government intervention	Gross subsidies that involve an involuntary wealth transfer to recipients, essentially raiding the pocket books of the unwilling	Elimination of inappropriate subsidies, subsidy impact assessments, sunset clauses, and adjustment packages for those dependent on subsidies
Energy resources	Posterity	Ronald Dworkin, Brian Barry, Edith Brown Weiss	Resource egalitarianism: an obligation to minimize resource consumption and ensure adequate reserves for future generations	Exhaustion of depletable energy reserves and fuels	Improved energy efficiency, establishment of national resource funds, commercial-scale deployment of renewable electricity and biofuels
Climate change	Fairness, responsibility, and capacity	Peter Singer, Henry Shue, Paul Baer, Stephen M. Gardiner, Dale Jamieson, Simon Caney	Intergenerational equity: an obligation to protect future generations from energy-related harms	A daunting suite of negative impacts from climate change including ocean acidification, food insecurity, climate refugees, and the increased frequency and severity of natural and humanitarian disasters	Greenhouse Development Rights, community-based adaptation, mitigation through stabilization wedges

Source: modified from [53].

on the most desirable way of life, taken as an absolute. Philosophers such as Immanuel Kant and John Rawls, by contrast, do not rest their principles on personal virtue. Instead, their concepts represent each person's ability to choose their own conception of a good life (although Kant's concept of rational choice seems to incorporate a definition of rationality that implies what many might call "virtue"). As Michael Sandel sums it up, "ancient theories of justice start with virtue, while modern theories start with freedom" [35]. As we will see in the next section, however, there is a way out of this morass—by creating a synthetic

decision-making justice tool that integrates the important, common elements of these disparate thoughts.

4. Energy justice as a decision-making tool

An important dimension to justice goes beyond concepts and analysis to decisions and thus decision-makers, including policy-makers and regulators as well as ordinary students, jurists, homeowners, businesspersons, investors, and consumers. Some decisions are readily identified as critical or regulatory, either

because they are presented in an adversarial format or as a “yes” or “no” request for approvals. Examples include requests for permits to build or buy power plants, or to drill within recognized boundaries. Policymakers, administrative officials, and bureaucrats routinely make these sorts of decisions, often with written narratives explaining the bases for a decision and sometimes subject to external reviews. A relatively small number of them therefore act as critical “gatekeepers,” given that in the next 20 years (from 2010 to 2030), fewer than 700 state regulators in the United States will serve in office and each one will approve about \$6.5 billion in utility capital investment during their term [36].

Many decisions, however, do not follow that pattern and are not so readily labeled. Often, this is because no specific decision-maker has clearly identified authority over the practice. Furthermore, many internal company decisions are never exposed to such transparency or “sunshine.” Many times, those who are unaware of the significance of their own acts make the most important decisions. For instance, each of a hundred million individuals may “decide” to turn a light switch on, yet none of them may be aware that the cumulative effect of such decisions will require the production of more energy, raise economic costs for all (by requiring new capital investments), raise reliability risks for all (by straining existing transmission systems), and raise environmental costs for all (through a “demand” to flood a valley for a dam, to drill deeper and further for gas or petroleum, or to burn enough coal to kill thousands through accelerated lung diseases caused by breathing particulate emissions).

Therefore, because vital outcomes can be driven by labeled and unlabeled, public and internal, and conscious and unconscious decisions, we present an energy justice decision-making framework summarized in Table 2. It argues that we need to start making energy decisions that promote:

- (1) availability,
- (2) affordability,
- (3) due process,
- (4) good governance,
- (5) sustainability,
- (6) intergenerational equity,
- (7) intragenerational equity, and
- (8) responsibility.

While all eight aspects are important, the idea was to start with the simplest and most accepted ones, such as availability and affordability, before moving towards the more controversial or complex ones such as intragenerational equity and responsibility.

4.1. Availability

Availability is the most basic element, for it involves the ability of an economy, market, or system to guarantee sufficient energy resources when needed. It therefore transcends concerns related to security of supply, sufficiency, and reliability, and it encompasses a range of different dimensions. It includes the physical resource endowment of a particular country or region, as well as the technological solutions that region utilizes to produce, transport, conserve, store, or distribute energy. It includes the amount of investment needed to keep the system functioning, essentially having a robust and diversified energy value chain, as well as promoting infrastructure that can withstand accidental and intentional disruption [37].

4.2. Affordability

A second core element is the basic affordability of energy services, a term that means not just lower prices so that people can

afford warm homes and well-lit dwelling spaces, but also energy bills that do not overly burden consumers. Affordability thus encompasses stable prices (minimal volatility) as well as equitable prices that do not require lower-income households to expend disproportionately larger shares of their income on essential services. Implicit with this criterion is the idea that highly available energy fuels and services is meaningless unless households and other consumers can afford to access and utilize them.

4.3. Due process

Due process seeks to ensure that the potential for stakeholder participation in the energy policymaking process at least roughly matches the importance (in aggregate and to each person affected) of the matter at stake and the irrevocability of any decisions that may be reached. It also necessitates effective recourse through judicial and administrative remedies and forms of redress. More specifically, the decision-making principle suggests that communities must be involved in deciding about projects that will affect them; they must be given fair and informed consent; environmental and social impact assessments must involve genuine community consultation; and neutral arbitration should be available to handle grievances.

4.4. Good governance

This principle suggests that, to minimize corruption and improve accountability, all people should have access to high-quality information about energy and the environment. Information, accountability, and transparency have become a central element of promoting “good governance” throughout a variety of sectors, a term that centers on democratic and transparent decision-making processes and financial accounting, as well as effective measures to reduce corruption and publish information about energy revenues and policies [38]. Access to information and transparent frameworks for preserving that access have been known under certain conditions also to encourage democracy, increase business confidence, and enhance social stability.

4.5. Sustainability

Sustainability refers to what the Brundtland Commission termed “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [39]. In an energy context it refers to the duty of states to ensure the sustainable use of natural resources. It means that countries have sovereign rights over their natural resources, that they have a duty not to deplete them too rapidly, and that they do not cause undue damage to their environment or that of other states beyond their jurisdiction. Ecologist Paul Hawken eloquently summed up sustainability when he wrote that it involves achieving a state where “the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations. It can also be expressed in the simple terms of an economic golden rule for the restorative economy: leave the world better than you found it, take no more than you need, try not to harm life or the environment, make amends if you do” [40].

4.6. Intragenerational equity

Intragenerational equity—that present people have a right to access energy services fairly—finds its roots in modern theories of distributive justice. Philosophers call it “distributive” justice because it deals intently with three aspects of distribution:

Table 2
Energy justice decision-making tool.

Principle	Explanation
Availability	People deserve sufficient energy resources of high quality
Affordability	All people, including the poor, should pay no more than 10 percent of their income for energy services
Due process	Countries should respect due process and human rights in their production and use of energy
Good governance	All people should have access to high quality information about energy and the environment and fair, transparent, and accountable forms of energy decision-making
Sustainability	Energy resources should not be depleted too quickly
Intragenerational equity	All people have a right to fairly access energy services
Intergenerational equity	Future generations have a right to enjoy a good life undisturbed by the damage our energy systems inflict on the world today
Responsibility	All nations have a responsibility to protect the natural environment and minimize energy-related environmental threats

1. What goods, such as wealth, power, respect, food, or clothing, are to be distributed?
2. Between what entities are they to be distributed?
3. What is the proper mode of distribution—based on need, based on merit, based on property rights, or something else?

Distributive justice argues that, if physical security is a basic right, then so are the conditions that create it, such as employment, food, shelter, and also unpolluted air, water, and other environmental goods. People are, therefore, entitled to a certain set of minimal energy services which enable them to enjoy a basic minimum of wellbeing.

4.7. Intergenerational equity

Instead of emphasizing distributive justice between different communities in the present, intergenerational equity is about distributive justice between present and future generations. It holds that future people have a right to enjoy a good life just like us contemporaries, yet one undisturbed by the temporal damage our energy systems will inflict over time. Consequently, each of us has a moral responsibility to ensure that today's children and future generations inherit a global environment at least no worse than the one we received from our predecessors—and that responsibility extends to preventing climate change and making strategic investments in something known as “adaptation” to increase the needed resilience of communities.

4.8. Responsibility

The final principle – responsibility – holds that nations have a responsibility to protect the natural environment and minimize the production of negative externalities, or energy-related social and environmental costs. This element of energy justice is perhaps the most controversial and complex, as it blends together four somewhat different notions of “responsibility”: a responsibility of governments to minimize environmental degradation, a responsibility of industrialized countries responsible for climate change to pay to fix the problem (the so-called “polluter pays principle”), a responsibility of current generations to protect future ones, and a responsibility of humans to recognize the intrinsic value of non-human species, adhering to a sort of “environmental ethic.”

5. Synthesis and suggestions for future research

As is perhaps obvious by now, the energy justice concepts, analytical applications, and eight decision-making principles introduced above are synthetic. They intertwine many notions of justice. Our energy justice framework includes distributive justice, which is about how energy harms and energy services are distributed, whether the energy system is equitable or not and whether it

is fair to future generations or not. It includes procedural justice, which is about free prior informed consent for energy projects, representation in energy decision-making, and access to high quality information about energy. Cosmopolitan justice applies these two concepts (distributive and procedural) globally, arguing that each individual person has inviolate worth that must be respected and protected. Enfolded in our framework are other elements of justice. We include the idea that guilty people should be held accountable for wrongful acts or “crimes”, something known as “justice as an outcome;” that individuals will be protected to prevent innocent people from being wronged, or “justice as due process;” and that all people should be treated equally under the law, or “justice as fairness” [41].

Such a synthetic or multifaceted notion of justice is necessary because “redistribution without empowerment can be short-lived, and empowerment without redistribution can be an insult” [42]. That is, proper distribution of outcomes—distributive justice—and impartiality in decision-making—procedural justice—are interconnected. One philosopher admits that “my utility may not only depend on what I get but on the manner in which I get it. That is my utility may not only depend on the consequences of policy but on the policy itself” [43].

A synthetic notion of justice is also needed because energy injustices are interrelated: the degradation of the environment can be wrong for reasons of posterity (hurting future generations), human rights (violating a “right” to a clean environment), and utility (externalities which produce human suffering and misery). Similarly, the exclusion of vast populations of people from accessing modern forms of energy can be wrong for reasons of virtue (failing to meet the essential purpose of what energy systems are for), welfare (denying them the ability to realize their functionalities and capabilities), and equity (failing to promote resource egalitarianism).

Lastly, a synthetic framework is needed to incorporate the sheer diversity of concepts and justice principles. In a commonality that spans millennia and continents, there is a common belief that “right” and “wrong” do exist objectively, even if they are hard to distinguish [44]. For example, as already mentioned, utilitarian theorists such as Bentham hold that the rightness of an act depends upon its cumulative beneficial impact; rights-based theorists such as Kant hold that individual rights cannot be overridden even if the consequences would be cumulatively beneficial. The two ideas seem insurmountably inconsistent—yet both in the end consider freedom from bodily harm a fundamental right [45]. They arrive at the same destination despite taking different routes. Thus, we hold that the view that ethics and moral principles are always relative to a specific society is dangerous and implausible; such relativism permits no basis for denouncing cultures that condone slavery or genocide, for instance.

This synthetic approach to energy justice reveals numerous areas of future, fruitful research. One is perfecting the energy justice checklist presented in [Appendix A](#). From what we have already

written, it should be clear that energy justice touches upon temporal, economic, sociopolitical, geographic, and technological aspects of the global energy system. Furthermore, in some sense we are all energy decision-makers. Even readers who are not energy planners, corporate executives, government regulators, or politicians do have something to say as voters and members of civil society, as students, as jurists, and as researchers and analysts. Their individual voices collectively can make a difference. Thus, the energy justice checklist in [Appendix A](#) represents a preliminary attempt to create a list of questions that can be applied to a wide range of items ranging from individual projects to government policies. It most certainly needs updated, extended, and revised.

Another promising avenue of future research is to design metrics or indicators which can better measure energy justice and also incorporate, in whole or in part, its salience into energy modeling or quantitative research efforts, since these still hold such allure (despite their flaws) for the energy studies community [46, 47–49]. Though we hold that not everything can or should be quantified [50], individual energy justice country metrics could tell us which institutions or nations are able to create more energy just environments or regimes than others. Energy justice metrics could also be designed or differentiated around particular technologies, i.e., coal can be compared for its energy justice strengths and weaknesses to natural gas, nuclear power, or wind energy. This can enhance both the analytical rigor and persuasive appeal of energy justice as a framework.

6. Conclusion

The concept of “energy justice” gives us a way to better assess and resolve energy related 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.

In sum, it is a mistake to talk about building infrastructure, improving energy security, developing energy resources, forecasting future energy demand, or conducting research on new technologies without first assessing energy justice: asking what this energy is for, what values and moral frameworks ought to guide us, and who benefits. Too often, national and international energy policies have focused on protecting adequate supplies of conventional fuels with little to no regard for the long-term consequences to the people and cultures the policies are intended to benefit. For, as eminent historian David F. Noble writes, without morality or justice, “The technological pursuit of salvation can become a threat to our survival” [51].

Acknowledgment

This study draws significantly from a book entitled *Global Energy Justice: Problems, Principles, and Practices*, published by Cambridge University Press in 2014.

Appendix A. A preliminary energy justice checklist

	Question	Example of injustice to be avoided
Temporal	Does a decision to build energy infrastructure account for the physical risks posed by climate change?	A state utility chooses to build a coal-fired power plant near the sea coast. Not only do the emissions from the plant provide a small but real contribution to climate change, but a hurricane and related storm surge destroy the plant. The ratepayers are left without electricity and with the costs of a no longer “used and useful plant”
	Does an energy-related decision account for regulatory risks associated with climate change?	A national oil company invests in the development of an offshore oil field with the expectation of price of oil above \$100 per barrel. Subsequently, nations reach a climate agreement with universal controls. The market reacts accordingly, sending the oil price below \$100. The NOC’s oil lacks a market and the taxpayers are left to absorb the cost of investment
	Does a country’s energy policy interfere with its responsibility to aid victims of climate change?	To accommodate a growing industrial sector a country invests heavily in coal-fired power plants. The emissions from these plants provide a substantial contribution to climate change. At the same time, highly populated coastal areas suffer from flooding due to sea level rise. The country spends significant budget funds assisting people who have lost their homes
	Will construction of an energy facility exacerbate environmental damage?	A newly constructed hydroelectric facility generates renewable power. However, it also alters river flow so that a region experiencing water shortages suffers more aggravated water scarcity
	Does a plan to build a nuclear waste storage facility provide for long-term risk mitigation measures?	Twenty years after its construction, the facility suffers structural damage. Because the facility is not insurable, taxpayers are left to pay for repairs and cleanup costs

(continued on next page)

Appendix A. (continued)

	Question	Example of injustice to be avoided
Economic	Does a decision to subsidize a certain energy industry add to the cost of externalities?	The tax code allows for deduction of intangible expenses incurred during exploratory oil drilling. The deduction further distorts the price of gasoline
	Does the cost of owning and operating a motor vehicle fully reflect the external cost caused by air pollution?	A driver commuting to work and driving a car with the same gas mileage as a carpooling driver is responsible roughly for the same amount of pollution. Yet the latter does not get rewarded for “preventing” her passengers from driving and, thus, causing more emissions
	How does energy affect the distribution of wealth in a country?	A significant portion of the country’s population lives below the poverty line while a few citizens connected to the energy industry are among the world’s richest people
	Does the mix of electric generation facilities match the actual demand?	Ratepayers in a non-restructured electricity market are usually left paying for reserve capacity
	Does switching to a more sustainable energy mix disproportionately affect poor members of the society?	On one hand, fuel assistance programs help poor communities to stay warm during cold months. On the other hand, these programs perpetuate the elasticity of demand for fossil fuels by discouraging the switch to cleaner heating units. Additionally, environmental externalities associated with combustion of fossil fuels disproportionately affect poor communities
	To what extent does the construction of an electrical generation facility and/or automobile fleet expansion account for volatility of oil and gas prices?	A utility switches its generation base to new natural gas-fired facilities. Natural gas prices, as they periodically do, rise significantly. Rate payers’ electricity bills skyrocket
Sociopolitical		A town police department updates its fleet with large SUVs citing their operational superiority and relying on, at the time, low gasoline prices. Gasoline prices go up and the town budget is diverted from the retrofit of the elementary school to keeping police vehicles patrolling the streets
	To what extent does the construction of an electrical generation facility account for a long-term increase in electricity prices?	A utility invests in the construction of a natural gas-powered plant. The investment takes 20 years to repay. Due to the overall increase in fuel prices, the electricity produced at the plant is significantly more expensive than that of a large wind farm. Ratepayers are stuck with high electricity bills
	What is the full price of military presence in oil producing regions?	The oil industry is subsidized through the defense budget and with the lives and health of national troops
	How transparent is the allocation of energy revenues?	A country has the following budgetary funds that receive revenue from oil exports: the strategic fund, the stabilization fund, the development fund, the education fund, and the general fund. However, the information about the amount in each fund is not publically available. The country’s security service just updated its vehicle fleet. School teachers have not been paid for six months
Geographic	To what extent does an energy company rely on the support of the central government known for its questionable governance methods?	The central government uses pipeline construction as an excuse to displace and thus weaken an ethnic community that opposes government’s policies
	Does the legal and regulatory regime of a country whose economy is dependent on export of oil and gas provide for meaningful participation of its citizens in the decision-making process related to energy matters?	Members of an indigenous community wake up to the sound of bulldozers clearing land for drilling pad
	Does an electrification plan include support for distributed generation and development of micro-grids?	Despite concerted effort to bring electric power to outlying areas, a remote village is not able to open a modern healthcare facility because it is located at the periphery of the national grid
	Does a proposal to mine coal include a plan to repair necessary infrastructure, decommission unneeded infrastructure, remediate the affected environment, and ensure sustainable economic growth after extraction activities have ended?	A community is left with pothole-laden roads, closed fast food restaurants, and post-apocalyptic landscape, and without a motivated young workforce

Appendix A. (continued)

Question	Example of injustice to be avoided
What is the percentage of generated revenue that stays in the area where fossil fuels are extracted?	Local people lose their agricultural lands, fishing and hunting grounds with little public budget to create new economic opportunities
Do the activities in connection with an energy facility negatively impact other economic activities that were prevalent in the area before the facility was built?	A thermal power plant depletes an underground aquifer, rendering agricultural activities impossible
Does the emitter (polluter) really pay?	A large energy producer continues to benefit from operating a fleet of coal-fired power plants. Yet a coastal community that received little to no benefit of fossil-fuel based economy is forced to relocate due to the sea level rise
Technological What is the horizontal distribution of energy efficiency capacity?	More than half a region's population does not have access to electric power. As a result, an energy efficiency program increases the socioeconomic gap between those who have electric power and those who do not
What is the vertical distribution of energy efficiency capacity?	An energy efficiency program targeting generation facilities achieves marginal gains because most plants have been put into service in the last 10 years and thus are relatively efficient. Yet the majority of households spend a significant portion of their income on heating cost because most of the housing stock is more than 50 years old
Does a technological solution intended to improve reliability reach the end user regardless of her income level?	A low-income village receives a grant to purchase a back-up diesel generator but is unable to run it on a regular basis due to high fuel costs
Have appropriate consultations taken place on the national and, if appropriate, international levels to ensure societal acceptance of accident risk?	An oil spill caused by a pipeline rupture leaves a large city located in a foreign state downstream the shared river without potable water supply. The city and the foreign state are unprepared to deal with the consequences and have to bear the cost of response and remediation
Do potential accident zones disproportionately affect low-income communities?	The smoke, toxins and ash from a refinery fire cover predominately a poor community occupying the area adjacent to the facility. Many inhabitants who are already affected by unfavorable living conditions suffer from short- and long-term health consequences. Missed paychecks and mounting hospital bills push the community further down the socioeconomic ladder
Does a proposed technology lock out low-carbon solutions?	An independent power producer builds a coal-fired base load power plant instead of a few natural gas load following units capable of compensating for intermittency of non-dispatchable renewable facilities
Does a fossil fuel-centric project require a multibillion dollar investment that would take decades to repay?	An oil company chooses to invest in exploration and development of new, remote, large, and marginally profitable oil fields. The alternative would have been to further diversify the company's portfolio from hydrocarbon production and invest in enhanced recovery from its mature assets

Source: modified from [52].

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