

## Review

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# Energy and Ethics: A Race We should Win

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**Abstract:** The global paradigm shift towards sustainable energy solutions has led to an unprecedented emphasis on renewable energy sources. This paper delves into the transformative potential of renewable energy as not just a technological advancement but a beacon for ethical progress. We explore the multifaceted dimensions of renewable energy, from its ability to mitigate climate crisis and its role in promoting energy equity and security to its potential to reshape geopolitical landscapes. The ethical considerations underpinning these shifts are paramount; transitioning to renewables questions our responsibility to future generations, challenges current power structures, and demands reconsidering resource distribution. In a world grappling with environmental degradation and socio-economic disparities, renewable energy emerges not merely as an alternative power source but as a game changer that intertwines technological potential with ethical imperatives. This paper highlights the urgency of embracing renewable energy for its environmental merits and the profound ethical transformation it promises for the future.

**Keywords:** Renewable energy; Global warming; Ethical implications

## 1. Introduction

Fossil fuels, the predominant energy sources of the past century, have witnessed incredible advancements in industrialization and modernization. But they have also been accomplices to some of our time's most significant environmental and socio-economic challenges. Climate crisis, driven primarily by the greenhouse gas emissions from burning these fuels, has emerged as a formidable adversary, altering weather patterns, causing sea levels to rise, and threatening biodiversity. Beyond the

environmental consequences, the geopolitics of energy has been a recurring flashpoint, with nations jostling for control over finite fossil fuel resources, leading to conflicts, economic disparities, and a constant undertone of global tension<sup>[1]</sup>.

Global energy orders have been gradually reshaped to reduce carbon emissions during the last two decades. Another top concern for policymakers is energy security, because of the war in Ukraine. Climate change and energy security are now dual priorities that reshape national energy planning, energy trade flows and the



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broader global economy<sup>[2]</sup>. Thus, regional cooperation and domestic energy production are added as priorities to net-zero carbon emissions transition. Both geopolitics and geo-economics are pivots for climate change policies as climate related crisis: i) enhance conflicts; ii) causes migration; iii) results negative economic impacts; and iv) deteriorates the security of supply for food and commodities. According to a World Bank report, water-induced migration is fueled by global warming, while the ten percent of the rise in global migration is directly linked to droughts and lack of water<sup>[3]</sup>.

Moreover, the accessibility and affordability of energy remain pivotal concerns. Energy poverty, wherein vast swaths of the global population lack access to reliable and modern forms of energy, affects nearly a billion people. Such disparities highlight the ethical dilemmas inherent in our current energy paradigms<sup>[4]</sup>. Globally the need to pursue a new vision of energy security –one based on availability, reliability, affordability and sustainability– poses enormous challenges. A system that reflects the concept of distributed generation; in which consumers produce, use and sell their electricity; is leading towards a rapidly increasing share of renewables in electricity generation and its decreasing cost, new storage technologies and the introduction of electric vehicles in the market<sup>[5]</sup>.

As we navigate this modern landscape, the call for a transition to cleaner, more equitable energy sources is not just a matter of ecological preservation but an ethical imperative. The modern world's narrative will be significantly influenced by how we address these energy challenges and realign our priorities to foster a world that is powered efficiently and ethically<sup>[6]</sup>. In a contested reality nowadays, we have not realized the seriousness of the ecological risk. The fundamental causes of the climate crisis are individualism and prosperity in combination with the satisfaction of human greed, and nature's violation to overproduction creates an immense disruption. As a result, human beings are no longer in harmony with the natural environment<sup>[7]</sup>. Radical changes in environmental policies are not so easy to implement as they require technology issues to be resolved; infrastructure shortage to be overcome and new business models created to capture value. In a creative co-existence

and symbiosis of man and nature; compromises can exist but there cannot be any compromises on the core values of humanity<sup>[8]</sup>.

This paper seeks to dissect the intricate relationship between energy production and consumption patterns and the moral imperatives that guide them, emphasizing that the race towards a sustainable and equitable energy future is not only one we should win but one we must win for the sake of humanity and our planet. The structure of the paper is as follows. Chapter 2 presents how global trends in energy and especially renewable energy are affecting tomorrow, while Chapter 3 discusses in more detail the connection between disruptive innovation and traditional morality. In Chapter 4, the many challenges in environment and spirituality as confronting energy transition are further deployed.

## **2. How Sweeping Global Trends in Energy are Affecting Tomorrow**

Innovation and deployment of new clean technologies are essential for a successful transition to low carbon energy system. Ambitious climate action plans can play a major role in putting the world on track to reach full climate neutrality in the second half of the century. An integrated approach should be taken into consideration encompassing technological, environmental and social aspects<sup>[9]</sup>. Achieving low energy demand is not only driven by technological innovation but it also requires changing behaviors, social norms, governance, and a range of crucial non-cost aspects of technology diffusion<sup>[10]</sup>.

### *A. Renewable Energy: a game changer for the future*

The journey towards a renewable energy future encompasses various technologies such as solar, wind, hydro, and geothermal power, each offering a unique set of ethical considerations. The transition to renewables carries the potential to mitigate greenhouse gas emissions, reduce air and water pollution, and foster energy access in underserved communities. These outcomes align with ethical principles prioritizing environmental stewardship, social equity, and intergenerational justice<sup>[11]</sup>. However, balancing economic interests, energy security, and environmental protection requires careful consideration of distributive justice and ethical responsibilities toward both current and future generations.

The interconnectedness of ethics and renewable energy shapes global energy systems' trajectory. A critical examination of ethical implications informs policy formulation, innovation, and public discourse. However, inclusivity, engagement, and global cooperation are imperative to ensure that the energy transition is guided by ethical principles that respect human rights, cultural diversity, and ecological integrity<sup>[12]</sup>. The modern world needs a deeper exploration of the ethical considerations that will determine the success and sustainability of renewable energy as a game changer for the future<sup>[13]</sup>.

#### *B. Investing in clean energy transition*

As the world grapples with the twin challenges of meeting escalating energy demands and mitigating the impacts of climate crisis, the transition to clean energy emerges as a solution with profound implications. Investing in this transition is a prudent economic decision and a testament to a collective commitment to a sustainable future<sup>[14]</sup>.

Financially, the clean energy sector has demonstrated remarkable resilience and potential for robust returns on investment. In recent years, the costs associated with renewable energy technologies have seen a precipitous decline, making them increasingly competitive with, or even cheaper than, conventional fossil fuels in many regions. This cost competitiveness, rising awareness, and supportive policy frameworks have spurred private sector participation, leading to rapid innovations and scalability in the renewable sector. Moreover, investments in clean energy often translate into job creation, local community empowerment, and developing a skilled workforce for a future-oriented industry, ensuring socio-economic benefits beyond mere returns on capital<sup>[15]</sup>. The world is shifting towards a more electrified, renewable-rich energy system. For every \$1 invested in fossil fuels five years ago, \$1 went to clean energy. While today, for every \$1 invested in fossil fuels, \$1.8 goes to clean energy<sup>[16]</sup>.

Beyond the tangible economic advantages, investing in the clean energy transition embodies a broader vision of stewardship. It reflects a conscious choice to prioritize long-term environmental health over short-term gains, to champion inter-generational equity, and to promote a balanced coexistence with the planet's natural systems<sup>[17]</sup>. In a world marked by increasing

environmental vulnerabilities, such investments echo a collective responsibility to future generations, ensuring they inherit a world where energy remains a catalyst for progress but not at the expense of the planet's well-being<sup>[18]</sup>. Addressing the monumental challenge of climate crisis requires a multi-faceted approach, combining technological, economic, societal, and policy-driven strategies<sup>[19]</sup>. Tackling climate change is about preserving the environment and ensuring a habitable, prosperous planet for future generations.

#### *C. The energy security quest. Can war compromise environmental targets?*

Climate change multiplies and amplifies existing risks to peace and development as it potentially obstructs access to health, water, food, and housing. Especially people who are already in vulnerable situations may experience impacts more acutely because they have less capacity for coping and fewer resources. Climate change can drive displacement and undermine human rights, while leaving women especially vulnerable<sup>[20]</sup>. In 2020, more than 30 million people were newly displaced because of weather-related disaster<sup>[21]</sup>. Climate change adds pressure on state and community structures. In various national security plans, climate change remains a threat as much as a call for increased military spending to deal with this, rather than a challenge to reduce or rethink their operations. Military spending and arms sales have a deep and lasting impact on the capacity to address the climate crisis, as the steady increase in weapons worldwide is also fueling the climate fire, stoking violence and conflict, and compounding the suffering for those communities most vulnerable to climate breakdown. Every dollar spent on the military not only increases greenhouse gas emissions, but also diverts financial resources, skills and attention away from tackling one of the greatest existential threats humanities has ever experienced<sup>[22]</sup>. Although direct emissions during conflicts are obvious, we often need to dig deeper to untangle the indirect influence that conflicts have on emissions. The societal and developmental changes in many post-conflict areas directly affect urban recovery, and land use changes that lead to rapid emissions' growth, due to an institutionally weak environment and ill-maintained infrastructure<sup>[23]</sup>. The potential for conflict rises when resources become scarcer and populations more food insecure. Conflicts

displace people, increase pressure on scarce natural resources and disrupt food production<sup>[24]</sup>.

*D. Green energy provides a new social contract.*

The relationship between the energy sector and society should respond to multiple problems such as environmental impacts, climate change, economic and governance issues; that remain in controversy. The transition to a low-carbon economy requires a new social contract that implements energy justice and achieves transformative societal change, protecting rights and ensuring well-being for all<sup>[25]</sup>. Because energy markets are sensitive to instability and crisis contexts, Jiglau et al. argue that it is time to move altogether beyond the market-centered consumer paradigm, towards a paradigm focused on humans, households, dignity, justice and human rights<sup>[26]</sup>.

The idea of a new social contract must face climate justice and the just transition, that means aiding the displaced investments to ensure that clean energy is accessible and affordable for all, and urgent action to improve public and environmental health affected by dirty energy<sup>[27]</sup>. A new social contract refers to the necessity of humankind taking collective responsibility for the avoidance of dangerous climate change or other dangers to the planet. Apart from decarbonization, overcoming global energy poverty is the second major goal of remodeling energy systems. The transformation must be achieved within a very tight timeframe, which poses a significant challenge in the context of international negotiation systems. In parallel, our societies must be willing to act in an anticipatory manner, based on long-term orientation for politics, economy and society<sup>[28]</sup>.

### **3. Disruptive Innovation and Traditional Morality**

To address the wicked problems of climate change and environmental degradation radical and disruptive changes are needed in the current set-up of sociotechnical systems and across energy, food, water and mobility systems. Kivimaa et al propose that disruption should be unlocking the stability and operation of incumbent technology and infrastructure, markets and business models, regulations and policy, networks and ownership structures, behavior and cultural models. Addressing all potential consequences of disruption is also important, such as direct and

cascading impacts on various and intertwined aspects of social justice, security and safety<sup>[29]</sup>.

Technological disruption provokes many reactions as, in some cases, technological innovations undermine established moral norms without clearly leading to a new set of norms. There is an important interrelationship between the ethics of new and emerging technologies and the ethics of moral disruption<sup>[30]</sup>.

Any transition beyond fossil fuels calls for an urgent and committed re-evaluation of dominant strategies for various spheres of life: social, economic, technological, institutional, and political. If there is any hope for rapid decarbonization today, it lies in movements, innovations, or technologies that will fundamentally redirect the world's trajectory toward a low-carbon, post-growth future<sup>[31]</sup>.

*A. Symbiosis: a creative co-existence.*

Industrial symbiosis is a key strategy to support the transition toward the circular economy, as approached from the technical, economic, regulatory, and institutional perspective<sup>[32]</sup>. Industry worldwide is currently in search of ideas for preserving their economic growth and competitiveness while enabling efficient use of resources and reducing the levels of CO<sub>2</sub> emissions. Both companies and policymakers are incorporating strategies that principally focus on developing circular economy and industrial symbiosis, handling the efficient use of energy and other resources. The synergy between the industrial companies and the environment is critical for the influence on every element of sustainable development<sup>[33]</sup>. Energy clustering can provide relevant benefits hardly achievable without cooperation, mutually improving the energy efficiency of industries and of other activities in the neighborhoods. Collaboration and synergistic possibilities offered by geographic proximity led to great competitive advantages involving waste and resources flows<sup>[34]</sup>.

*B. Drivers and enablers of innovation that accelerate energy transition.*

Innovation plays a key role in the development of sustainable clean energy technologies. Nowadays, many clean energy technologies are not mature nor sufficiently cost-competitive enough to be deployed on a commercial scale. A broad range of different sustainable energy technologies can be developed

based on the geographical, political and social disparities and availability of resources around the globe. It is recognized that the key systemic hurdles for the fast-track development of new innovations remains the high technological risk, the financial cost and the strong commercial competition from established, low-cost but high-emitting products. The reality is that innovators of early-stage sustainable energy solutions find that there is usually a significant financing gap, while public and private funding are typically not well aligned to meet this need <sup>[35]</sup>. The current trend is that breakthrough energy technologies with broad applicability and affordability are needed to substitute incumbent solutions and lifestyles.

We have recently entered the dawn of the fourth industrial revolution, in which it differs in speed, scale, complexity, and transformative power compared to previous revolutions. Technology and advancements in science drive transformation around the world in ways in which we live, work, and interact with one another. The benefits of the fourth industrial revolution have obstacles that must be harnessed, directed and overcome, such as income inequality, cybersecurity, and ethical dilemmas. The main effects of this revolution on the business environment are the impact it will have on consumer expectations, product quality, the move toward collaborative innovation, and innovations in organizational forms <sup>[36]</sup>. Transition pathways for net zero encompass innovation challenges for the scaling of less mature technological solutions such as hydrogen, materials substitution, and electrification as well as societal challenges to increase the market acceptability of these solutions. Enablers for firms to address net-zero constraints can be tackled through four firm-level innovation levers: combinative, collaborative, integrative, and socio-cognitive capabilities <sup>[37]</sup>.

*C. Are we paying attention to the changes that really matter?*

We need to provide more energy especially for the poorest, but that energy must be produced without releasing more greenhouse gases. Today most of the available zero-carbon applications cost more than their fossil-fuel counterparts <sup>[38]</sup>. Mainly we need: a) new tools and technology breakthroughs for fighting climate change, b) long-term energy investments to tolerate multiple risks, and c) advocating for policies that encourage innovation.

The transition to low carbon energy systems cannot solely rely on technological innovation, but it also requires social innovation. It concerns innovation which contributes to low carbon energy transition, civic empowerment, and social goals pertaining to the general wellbeing of communities. Key topics relevant to social innovation emerge, pertaining to attain particular social goals, like community empowerment, alleviating energy poverty, energy justice, social equality, and increasing the wellbeing of local communities <sup>[39]</sup>. In a study exploring the use of community values in governance approaches for the diffusion of sustainable energy, three primary fields are suggested: developing policies, aligning citizens' expectations, and involving citizens in the community development <sup>[40]</sup>.

The review of the literature has shown that several barriers for carbon-neutral technologies exist, which currently impede the sustainable transition. An enabling framework to overcome existing barriers should support decision makers to consider all underlying criteria of this urgently needed energy transition. The criteria of such an enabling framework can be environmental and ecological protection; society, culture, and behavior; equity and justice; knowledge; energy policy; finance; and infrastructure. Even though some criteria differ from country to country, strong governmental support for the transition is always required to be successful. In this way, decisions fostering changes in behavior are much easier to realize for the entire society <sup>[41]</sup>.

#### **4. At the Intersection of Environment and Spirituality**

The energy sector is at a pivotal juncture, influenced by the intertwining forces of tradition and innovation. As the world seeks answers to questions about sustainability, energy security, and environmental stewardship, the balance between innovation and traditional values, especially those rooted in the ascetic traditions of the Judeo-Christian culture, becomes increasingly significant. Those traditions and customs with emphasis on stewardship, reverence for creation, and the sanctity of life, provide a unique lens through which to evaluate and navigate the energy sector's challenges.

*A. The climate crisis is not only an ecological issue.*

Climate crisis causes a radically change in the way

we perceive the world, the Creation itself. A successful confrontation of the ecological problem is mainly a matter of ethos rather than an issue of moral rules. Neither it is the application of the law but an attitude towards the God and the world. Today the ecological crisis is fed by the eudemonism of contemporary humanity. But the human being is mainly ontologically related to nature and not only functionally related, serving in a passive (as a conservationist) or managerial (economic) way. The ecological crisis is a spiritual problem that goes hand in hand with social injustice and a wrong hierarchy of values <sup>[42]</sup>.

Religion can handle the conception of a better world by managing our existential anxiety and by enhancing social cohesion <sup>[43]</sup>. Our society must form a personal and spiritual ethos before any social or ecological ethic. The commitment in ecological issues is not a matter of social acceptance but of theological conviction. As a result, world's religions can use their faith and wisdom to raise awareness to the wonder of creation <sup>[44]</sup>.

#### *B. We live to promote harmony and balance in the world*

Our approach towards Creation should be truly human and living according to our God-given nature. Neither worship nor contempt is required but a reconciliation between mankind and nature <sup>[45]</sup>. Concerns for the environment can only be appreciated via a direct connection to human problems like poverty, hunger and thirst. As humans become greedy abusers of the Creation instead of being grateful users then ecological issues raised as issues of social justice. Both words “ecology” and “economy” share the prefix “eco” as the same etymological root. A prefix that derives from the Greek word “oikos” that means “home”. The collapse of our planet – our home – because of any environmental reason will simply cause the collapse of any economic system. As the natural environment also belongs to future generations, our generation must change the way it perceives the world to effectively deal with the problem <sup>[46]</sup>.

#### *C. Striking a Balance with Cultural and Spiritual Insight*

Reconciling the innovations in the energy sector with traditional values, especially through the prism of those ideas, is a profound journey. The balance entails cherishing the time- tested reliability of historical energy sources while embracing innovative solutions'

transformative potential. The traditional values in energy include:

i. Reliability: Historically, energy systems, especially those based on fossil fuels, prioritized reliability, ensuring consistent and uninterrupted power. Just as Judeo-Christian traditions emphasize the steadfastness of God's love, energy has been a dependable cornerstone of societal development.

ii. Economic Growth: Fossil fuels have long fueled economic progress, mirroring the growth and spread of western civilization. Energy accessibility and affordability were vital for societal well-being, as spiritual accessibility is crucial in the Judeo-Christian and ascetic traditions.

iii. Localization: Energy strategies, grounded in the geopolitics and resources of individual nations, sought to harness local resources. This mirrors the ethical value of local traditions and respect for regional liturgical practices.

While the innovation-driven shifts through an ascetic lens will include:

i. Sustainability: As the impacts of climate change become clearer, the shift toward sustainable energy echoes the emphasis on stewardship. Humans are potential caretakers of Creation. Innovations in renewable energy sources, such as solar and wind power, resonate with this call to protect and preserve the environment.

ii. Decentralization: Modern technology enables a move from centralized power plants to community-driven, de-centralized energy solutions. This shift mirrors that emphasis on community and local parish life, where spiritual energy is distributed and shared among believers.

iii. Digitalization: The rise of smart grids, IoT devices, and artificial intelligence in optimizing energy use parallels the ascetic tradition's embrace of ancient wisdom and contemporary practices to enhance spiritual well-being.

Emphasis on respect for creation, the interconnectedness of life, and the duty of stewardship provides a holistic framework for understanding and navigating the evolution of the energy sector.

## **5. Concluding Remarks: Making Change Happen**

Our world faces significant challenges transitioning

towards a more sustainable, low-carbon energy future. To successfully transition towards a cleaner energy system, policy interventions, regulatory frameworks, and investment incentives are essential to promote decarbonization and increase the share of renewables. Renewable energy emerges not only as an alternative power source but as a game changer that intertwines technological potential with ethical imperatives. Balancing economic interests, energy security, and environmental protection requires careful consideration of distributive justice and ethical responsibilities toward current and future generations. This paper discusses the relationship between energy production and consumption patterns and the moral imperatives that guide them, emphasizing the race toward a sustainable and equitable energy future. In a creative symbiosis of man and nature, compromises can exist, but there cannot be any compromises on the core values of humanity. Investing in clean energy transition reflects a conscious choice to prioritize long-term environmental health over short-term gains, to champion intergenerational equity, and to promote a balanced coexistence with the planet's natural systems. Inclusivity, engagement, and global cooperation are imperative to ensure that the energy transition is guided by ethical principles that respect human rights, cultural diversity, and ecological integrity. A new social contract that implements energy justice protects rights and ensures humanity's well-being is a prerequisite for a successful transition to a low-carbon economy. Innovation plays a vital role in the development of sustainable clean energy technologies. The balance between innovation and traditional values becomes increasingly significant as the world seeks answers to questions about sustainability, energy security, and environmental stewardship. Traditions rooted in ascetic ethos with emphasis on stewardship, reverence for creation, and the sanctity of life, provide a unique lens through which to evaluate and navigate the energy sector's challenges. A successful confrontation of the ecological problem is mainly a matter of ethos rather than an issue of moral rules. The environmental crisis is a spiritual problem that goes hand in hand with social injustice and a wrong hierarchy of values. Environmental concerns can only be appreciated via a direct connection to human problems. The shift toward sustainable energy echoes similar emphasis on

stewardship, the interconnectedness of life, and respect for the creation. Innovations in renewable energy sources resonate with this call to protect and preserve the environment.

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