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Review Article

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Ethics of Energy Equity and Human Security

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Abstract
This paper on ethics background discusses on energy equity and human security. Human security is guaranteed only if constant energy supply is guaranteed. It discusses some important ethical questions which the author is able to answer as well as received from various reliable sources. The answers are not complete. It is the curiosity of the reader to add more and make the world a better place to live in with energy security and human security.

Introduction

In Physics energy is defined as the capacity to do work. Energy generation supports economic growth and hence a higher standard of living. At the same time it also has financial and environmental costs. Energy is a vast and expansive field that spans generation-whether from a wind farm or a nuclear power plant-to how people use energy to power things like home appliances and industrial manufacturing. And, every level of the energy industry could bring new opportunities for reliability, affordability, and accessibility for the most disinvested communities. Energy equity focuses on fair distribution, ensuring low-income communities are benefitted from modern, renewable energy without disproportionate costs and without harming the environment. This approach ensures individuals have access to energy for health, safe and sustainable livelihoods. Energy equity and human security are inextricably linked to the global shift toward sustainable, decentralized, and equitable energy systems that support, rather than exploit, local communities. In this paper let us discuss the various ethical questions that have to be tackled to achieve greater benefits to a large number of people who use energy for livelihoods and to run industries and hospitals without wastage of energy. While headway towards clean, sustainable energy has been achieved, there are emerging challenges with the equity of the transition, especially in developing nations.

Energy Equity

Ethics is the study of what is morally right and wrong, or a set of beliefs about what is morally right and wrong. The idea of energy equity is rooted in principles of social justice, and assumes that affordable and reliable energy should be a fundamental human right and a vital component of reducing poverty and improving quality of life of each and every human being. Energy disruptions compromise healthcare, water systems, communications, transportation, food security, education, public safety, and economic activity. Energy security and human security are mutually reinforcing and, in important respects, inseparable dimensions of sustainable development. Energy equity is measured and understood primarily through four key dimensions: recognition, procedural, distributive, and restorative equity.

There are Four Core Dimensions of Energy Equity

- Recognition Equity that Acknowledges historical and social contexts, including who lives in a community, their demographics, historic exposure to toxics or redlining, and distinct pollution or climate burdens.
- Procedural Equity which Ensures fair and meaningful public participation in decision-making, guaranteeing that low-income and frontline communities can easily access information, enroll in programs, and take part in energy planning.
- Distributive Equity that Focuses on the fair allocation of costs and benefits, ensuring that clean energy advantages, financial incentives, and environmental hazards are shared equitably without overburdening vulnerable populations.
- Restorative (or Structural) Equity that **Remedies** past harms and systemic disparities, actively repairing cumulative

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environmental and economic damages inflicted by legacy energy systems on marginalized groups.

However, recent progress is stalling and the World Economic Forum's latest Fostering Effective Energy Transition report shows countries are shifting their focus to energy security at the expense of equity, which could slow down the energy transition."While ensuring energy security and sustainability is critical, so is maintaining and building energy equity. This will require large-scale international financial support to low-income countries and such a ramp-up is crucial to ensure an inclusive transition that benefits all nations, regardless of their economic status," says Roberto Bocca, Head of Energy and Materials at the World Economic Forum.

Human Security

The international energy agency IEA defines energy security as "the uninterrupted availability of energy sources at an affordable price"

As stated by the Japanese government, the notion of human security: "comprehensively covers all the measures that threaten human survival, daily life, and dignity-for example, environmental degradation, violations of human rights, transnational organized crime, illicit drugs, refugees, poverty, anti-personnel landmines and. Infectious diseases such as AIDS-and strengthens efforts to confront these threats." 'Comprehensive security' was a notion developed in Japan between 1970s and 1980s that was concentrated still on the security of the country, as traditional thoughts of security, but in a wide sense surrounded both military and economic security. Japan's definition for human security seems to be all inclusive.

The US Government explicitly recognizes that energy is the backbone of daily life. When energy infrastructure fails, individual human security is instantly compromised. While the United Nations traditionally separates "human security" from state security, the U.S. approach-orchestrated primarily by the U.S. Department of Energy (DOE) and the U.S. Department of State-directly links individual safety, economic survival, and public health to a robust and uninterrupted energy flow [1-4].

Core Ethical Concepts

Justice: Encompasses distributive justice (fair allocation of resources, benefits, and burdens), procedural justice (fair decision-making processes), and recognition justice (respecting the rights and cultures of affected groups).

Responsibility: Assigning accountability for the impacts of technology, both positive and negative, and considering obligations to the environment and future generations.

Autonomy: Respecting the right of individuals and communities to make informed decisions about technologies that affect their lives and environments.

Beneficence and Non-Maleficence: The obligation to do good and avoid causing harm, applying to environmental and social outcomes.

These concepts provide a moral compass for evaluating the ethical landscape of sustainable technology.

Now let us switch over to some interesting questions and plausible answers:

How do we reconcile the disproportionate consumption of energy by developed countries with increasing demand for energy in developing countries? Pathways to Reconciliation

Concessional and Blended Finance: Wealthier nations and international bodies must provide low-interest loans and risk-mitigation funds to lower the cost of renewable projects in emerging markets, as outlined by the World Bank.

Technology Transfer: Advanced economies must share energy-efficient innovations alongside local training and governance support to help developing regions leapfrog traditional high-emission development stages.

Balanced Policy Frameworks: Emerging markets benefit from targeted local policy tools-such as tax incentives and streamlined regulations-tailored to scale up solar, wind, and grid efficiency.

Is it fair for rich countries to encourage developing countries to limit their energy consumption and shun luxury lifestyles?

To address this tension, international frameworks like the UN Paris Agreement rely on the principle of **"Common but Differentiated Responsibilities."** This approach suggests that while all countries must address climate change, wealthy nations must lead the effort by cutting their own emissions first and providing financial aid and technology transfers to help developing nations grow sustainably.

At the social level, should governments provide concessions to make energy more affordable and accessible for lower-income people as a fair justice?

Yes, governments should provide concessions and targeted support because lower-income households face an outsized energy burden, often spending a much higher percentage of their income on basic utility costs than wealthier groups.

Providing this help is a core part of **energy justice,** which aims to make resources fair and accessible for everyone regardless of income.

How to Do It Right

Targeted Subsidies: General price cuts for all people can waste public money and cause overconsumption. Governments should focus aid directly on low-income groups.

Long-Term Fixes: Giving cash for bills helps short-term needs, but fixing homes with better insulation and efficient devices provides permanent relief.

Clean Upgrades: Providing access to decentralized solar power in remote or poor areas helps families save money over time.

Why Concessions Matter

Lower Bills: Low-income families often have to choose between buying food and paying for power. Direct bill help prevents dangerous cut-offs.

Better Health: Unaffordable energy forces people to live in extreme cold or heat, which cause serious health problems.

Clean Energy Access: Poor communities are often left behind in clean energy transitions because they cannot afford high upfront costs for solar panels or efficient appliances. Studies on Energy efficiency and energy justice for U.S. low-income households show that lower-income groups need specialized help to benefit from new technology.

Will subsidies for energy run the risk of subsidizing inefficient use of energy?

Yes, energy consumption subsidies run a high risk of encouraging wasteful and inefficient use of energy by hiding the true market cost from consumers.

When governments artificially lower energy prices, people lose the financial incentive to conserve power or invest in modern, energy-saving upgrades. According to the MIT Climate Portal, subsidizing energy gives consumers the wrong price signal, which feeds inefficient behaviour and excessive consumption.

How Subsidies Cause Inefficiency

Distorted Pricing: Low prices remove the urge to turn off unused appliances, seal drafts, or lower heating and cooling use.

Delayed Upgrades: Consumers and businesses skip buying high-efficiency equipment because cheap energy makes waste affordable.

Strained Grids: Overconsumption overworks local power grids, leading to frequent blackouts and infrastructure decay.

Better Policy Options

Instead of subsidizing daily energy consumption, experts suggest shifting funds to:

Direct Efficiency Grants: Helping families and small businesses pay for insulation, LED lights, or heat pumps.

Targeted Support: Giving direct cash aid to poor households instead of cutting the price of every kilowatt-hour used.

Conclusion

Energy equity and human security are deeply interconnected, concluding that energy security is fundamentally human security. Energy systems cannot be measured solely by supply-side infrastructure or national stockpiles; their true security test is their direct contribution to individual and community well-being. Achieving true balance requires resolving the Energy Trilemma by simultaneously delivering energy security (resilience to shocks), energy equity (universal affordability and access), and environmental sustainability. Unfair energy access deepens vulnerability to climate change, whereas reliable, modern energy strengthens health, economic, and food security. Moving toward sustainable, renewable, and localized energy infrastructure reduces reliance on volatile fossil-fuel autocracies and fosters long-term global peace.

References

1. Rehan Hamid. Energy Security Is Human Security, and Human Security Is Energy Security, Northwest Territory Power Corporation; EUCLID (Euclid University); NAPEG. 2026. 1-12.
2. Bouzarovski S, Petrova S. A global perspective on domestic energy deprivation: Overcoming the energy poverty–fuel poverty binary. Energy Research & Social Science. 2015. 10: 31-40.
3. Bouzarovski S, Simcock N. Spatializing energy justice. Energy Policy. 2017. 107: 640-648.
4. Cherp A, Jewell J. The concept of energy security: Beyond the four As. Energy Policy. 2014. 75: 415-421.

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