

UCLA

Recent Work

Title

The Search For Sustainable Energy and Indigineity

Permalink

<https://escholarship.org/uc/item/3ks0d3cb>

Author

Liudi, Champ

Publication Date

2026-03-16

The search for sustainable energy and it's potential to displace traditional/Indigenous methods of energy use

Champ Liudi¹

¹Chemical & Biomolecular Engineering Department, University of California, Los Angeles

*champliudi@g.ucla.edu

Abstract: This paper examines the tension between sustainable energy initiatives and Indigenous ecological practices, analyzing community perceptions through standpoint theory, theory of change, and Native feminism to argue that Western renewable frameworks must center Indigenous sovereignty.

INTRODUCTION

In recent years, climate change has emerged as one of the most urgent challenges facing humanity. Our demand for resources and comfort has caused irreversible damage to Earth's natural systems, pushing the planet toward a point where it can no longer sustainably support human life. While most people acknowledge that unchecked resource extraction threatens our collective future, changing deeply embedded lifestyles and energy habits remains enormously difficult. Sustainable energy has been widely proposed as the primary answer to this tension, offering a path forward that meets human needs without perpetuating environmental destruction.

Sustainable, or renewable, energy can be defined as energy produced from naturally replenished sources that are environmentally clean and do not deplete natural resources. Renewables such as wind, solar, and hydroelectric power aim for long-term viability, minimal environmental impact, and reduced greenhouse gas emissions. In principle, they represent a meaningful departure from the fossil fuel economy. In practice, however, their implementation is far more complicated particularly for Indigenous communities whose relationships to land, energy, and resource governance predate and often conflict with Western policy frameworks.

Climate change has not affected all communities equally. For the Diné (Navajo) people, for instance, climate change-induced drought has diminished local sources of firewood, while energy policies aimed at reducing greenhouse gas emissions simultaneously restrict coal use creating compounding pressures on already vulnerable households [5]. In Newfoundland and Labrador, Indigenous communities serve as a national case study in diesel dependence, even as large-scale hydroelectricity accounts for 95 percent of the province's electricity generation a figure expected to rise to 98 percent with the completion of the 824-megawatt Muskrat Falls Hydroelectric Project [4]. These examples illustrate that the transition to sustainable energy, while ecologically necessary, does not automatically translate into justice or benefit for Indigenous peoples.

A significant body of research encourages the development of renewable energy in Indigenous off-grid communities, yet limited work has examined how those communities perceive or support such systems. This gap exists in part because the narrative of energy transition has largely been shaped by Western researchers, whose frameworks may not reflect Indigenous values or priorities [4].

This work is in partial fulfillment of the ENGR184 course using the blueprint curriculum in Ref [1,2] and captured in a collection [3].

METHODS

The study shown in the paper is corroborated by various queer theories, rather than being quantitative research. The topic of this paper starts with the focus on energy consumption and its effects towards the climate, following with the people's approach towards finding alternate/renewable ways to use energy. However, there is an additional maxim to add where such changes don't always lead to better outcomes. To analyze the effects of change, an Indigenous perspective should be added wherein their history of maintaining a symbiotic/reciprocal relationship with the land might serve well on the topic of sustainability.

Research process starts with gathering and reviewing related literature on the impact of climate change on natives, native traditions/culture towards nature, and Indigenous energy access. Following from the literature, further exploration is done towards renewable energy and how it affects natives in comparison to more conventional energy use such as diesel.

STANDPOINT THEORY

As a student writing a paper for a class, my perception may be limited due to a lack of ties towards Indigenous communities. I approach this subject as an outsider to the communities whose experiences are central to this analysis. This distance carries real limitations.

I cannot claim firsthand knowledge of the relationships to land, energy, or governance that I describe, and my interpretation of Indigenous perspectives is necessarily mediated through the secondary sources available to me. At the same time, I am committed to resisting the tendency, common in Western academic writing, to treat Indigenous communities as objects of study rather than as knowledge-producing subjects.

This paper attempts to center Indigenous voices and frameworks where possible, while acknowledging that centering is not the same as belonging. I welcome critique and correction from those with closer proximity to these communities and experiences.

However, the focus on energy use and sustainability comes from my background as a chemical engineering student. Working under a project with a focus on creating an electrified ammonia plant and working as a section lead focusing on renewable energy, there are a lot of obstacles to overcome towards transitioning to cleaner fuels to use to create products. In the end, what matters as a chemical engineer interested in industry is optimization or cutting costs while maintaining efficient production and maximizing profits.

THEORY OF CHANGE

The Theory of Change focuses on everything being causal in terms of pathways. Applied within the paper, the theory of change becomes a tool for identifying gaps within the environmental premise of renewable energy in Indigenous communities. A hydroelectric project might successfully reduce emissions while bypassing Indigenous consent and processes, disrupt subsistence, and concentrate economic benefits elsewhere. The framework can ask not only the function of sustainable energy in an environmental sense, but for whom it works and, on whose terms or conditions.

NATIVE FEMINISM

Native feminism understands a detachment from western feminism by understanding how Indigenous women relate to the land, body, and sovereignty. Native feminism itself insists on mutual relations between human and ecological wellbeing that would later be marginalized through settler colonialism. In the paper, it draws attention towards how renewable energy being environmentally progressive can replicate the frameworks of settler colonialism by sidelining Indigenous woman's ecological knowledge and governance authority. Another factor is of how it draws attention to the gendered dimensions of energy insecurity by giving the brunt of energy poverty to the Indigenous woman.

RESULTS AND INTERPRETATION

Taking through all the frameworks used to analyze Indigenous relations with energy use, nuances start to appear. While the narrative of using renewables for a more sustainable future can be true and remain acknowledged, there are also cases where it becomes a means for the patriarchy to exploit a vulnerable underclass deemed as akin to property.

As time moves forward, cleaner production has become an important strategy for energy-intensive manufacturing industries to maintain competitiveness under sustainable development goals, and that Industry 4.0 technologies can effectively promote cleaner production in manufacturing [7].

Starting with conventional energy, the Inuit in NunatuKavut hold diverse views on diesel systems valuing them for employment, reliability, and community familiarity, while expressing deep concern about environmental impacts

and fuel spill risks. Key energy concerns centered on participatory injustice, exogenous development, and heat insecurity. The research also demonstrated that energy system risks fall disproportionately on women, seniors, and low-income families. Five themes include community familiarity, association with previous projects, cultural and subsistence relationships, endogeneity of resources, and energy security that emerged as the primary qualifiers of support or opposition to sustainable energy [4]

For Diné people as an example, firewood is central to cultural and physical survival and offers a reliable fuel embedded in local ecological systems. However, two acute problems emerge: climate change-induced drought will diminish local firewood sources, and policies aimed at reducing greenhouse gas emissions may restrict coal use, driving firewood demand to unsustainable levels. The researchers found that long-term sustainability of Indigenous firewood harvesting is maximized under scenarios where Indigenous ecological knowledge (IEK) is most adhered to. The core argument is that energy sovereignty communities' self-determination over their energy sources must be centered in any policy response [5].

For Indigenous communities in Western Canada, legal codices affect Indigenous communities in proportion to non-Indigenous perspectives on energy sustainability through the lens of pipeline leaks affecting communities in the Treaty 6 region of western Canada. While pipelines brought income to some, their environmental and social impact on Indigenous groups was severe. The researchers found that Indigenous communities are particularly vulnerable to pipeline leaks yet have limited capacity to mitigate them. [6]

CONCLUSIONS

Ergo, the cases shown in relation with the Indigenous and the modern collectively reveal a pattern that resists simple resolution. Sustainable energy, as an environmental project, carries genuine merit. The need to reduce greenhouse gas emissions and move away from fossil fuel dependence is not in question. What is in question is whether the current frameworks driving that transition are equipped to serve Indigenous communities, or whether they risk reproducing the same extractive and exclusionary logics that have historically harmed them.

Through standpoint theory, this paper has demonstrated that the perspective from which energy policy is designed matters enormously. Western-centered research and governance frameworks have consistently overlooked Indigenous ecological knowledge, producing interventions that are technically functional but culturally and politically misaligned. Through the theory of change, it becomes clear that environmental outcomes and social justice outcomes are not automatically linked; a hydroelectric project can reduce emissions while simultaneously bypassing Indigenous consent, disrupting subsistence practices, and concentrating economic benefits outside the affected community. Through Native feminism, the gendered and embodied dimensions of energy insecurity come into focus, revealing that the burdens of both energy poverty and poorly designed transitions fall disproportionately on Indigenous women.

Sustainable energy transitions cannot be considered truly sustainable unless they center Indigenous sovereignty at every stage of design, governance, and implementation. At best, sustainability without wisdom becomes nothing more than what came before with conventional energy but at worst, it becomes a new tool for the patriarchy and companies to displace marginalized groups. Energy sovereignty communities' self-determination over their own energy systems is not a peripheral concern but a prerequisite for just and durable outcomes. Future work in this area should prioritize co-produced research with Indigenous communities, the integration of Indigenous ecological knowledge into energy policy, and legal and institutional reforms that expand rather than constrain Indigenous governance authority over land and resources.

Hoicka [8] creates a distinction with conformative and transformative approaches to energy. It offers a useful diagnostic for evaluating whether any given transition project genuinely advances Indigenous sovereignty. Conformative approaches allow Indigenous communities to participate in existing energy markets without restructuring the institutions that govern them, a form of inclusion that leaves underlying power asymmetries intact.

By contrast, transformative approaches embed Indigenous governance authority at every level of design, ownership, and decision-making.

The difference is not merely procedural. As the British Columbia case illustrates, even where legal frameworks such as the Declaration on the Rights of Indigenous Peoples Act nominally protect Indigenous self-determination, institutional inertia can prevent those protections from translating into meaningful energy governance. Structural barriers including the fact that First Nations in BC are legally prohibited from owning and operating electricity utilities in ways that municipalities are not reveal that the gap between policy language and institutional reality remains wide [8].

What is a good example of renewable? The Kayenta Solar Farm on the Navajo Nation stands as a concrete example of what a transformative outcome can look like. When the coal-fired Navajo Generating Station and the Kayenta Mine closed in 2019 following decades of extraction that had generated wealth largely outside the Nation, the Navajo Tribal Utility Authority had already anticipated the transition. Rather than waiting for outside developers, the NTUA broke ground on two tribally owned solar projects before the closures took effect, completing a 55-megawatt facility that maintains some of the lowest consumer electric rates in the region and is projected to generate \$17.8 million in revenue returned directly to the Nation over its lifetime.

The human outcomes were equally significant. During construction, 85 percent of the workforce was Navajo, the Navajo workforce was paid \$5.2 million and received over 4,700 hours of specialized training in solar utility construction, and the project generated over \$3 million in taxes paid directly to the Nation. Beyond economics, the social impact was immediate: families who had relocated off the reservation to cities because those cities had electricity began moving back once their communities were finally connected. Critically, this outcome was possible because the NTUA retained ownership and governance authority over the project from the outset the energy served Navajo people first, on Navajo terms [8].

The outcome provided from a transformative approach can transform a dying and once considered outdated community into one still capable of sustaining itself but also maintaining the ways of the old. By seizing the hands of production needed with wisdom, can there be light with little to no darkness.

REFERENCES

1. Lee, Ethan, et al. "Education for a Future in Crisis: Developing a Humanities-Informed STEM Curriculum." arXiv preprint arXiv:2311.06674 (2023).
2. Sergio Carbajo, Nurturing Deeper Ways of Knowing in Science, *Issues in Science & Technology*, 2025, v. 41, n. 2, p. 71, doi. 10.58875/jkrw4525
3. Carbajo, S. (2026). Queered Science & Technology Center: Volume 4. Queered Science & Technology Center, 4. Retrieved from <https://escholarship.org/uc/item/0zb930m0>
4. Mercer, N., Hudson, A., Martin, D., & Parker, P. (2020). "That's our traditional way as Indigenous peoples": Towards a conceptual framework for understanding community support of sustainable energies in NunatuKavut, Labrador. *Sustainability*, 12(15), 6050. <https://doi.org/10.3390/su12156050>
5. Magargal, K., Wilson, K., Chee, S., Campbell, M. J., Bailey, V., Dennison, P. E., Anderegg, W. R. L., Cachelin, A., Brewer, S., & Coddling, B.F. (2023). *The impacts of climate change, energy policy and traditional ecological practices on future firewood availability for Diné (Navajo) People*. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 378(1889), 20220394. <https://doi.org/10.1098/rstb.2022.0394>
6. Datta, R., Hurlbert, M. A., & Marion, W. (2022). *Indigenous community perspectives on energy governance*. *Environmental Science & Policy*, 136, 555–563. <https://doi.org/10.1016/j.envsci.2022.07.010>
7. Ma, S., Ding, W., Liu, Y., Zhang, Y., Ren, S., Kong, X., & Leng, J. (2024). *Industry 4.0 and cleaner production: A comprehensive review of sustainable and intelligent manufacturing for energy-intensive manufacturing industries*. *Journal of Cleaner Production*, 467, 142879. <https://doi.org/10.1016/j.jclepro.2024.142879>
8. Hoicka, C. E., et al. (2025). "Stretch and transform" for energy justice: Indigenous advocacy for institutional transformative change of electricity in British Columbia, Canada. *ScienceDirect / Energy Policy*. <https://doi.org/10.1016/j.enpol.2025.114523>
9. Pasqualetti, M. J., & Necefer, L. (2018). Navajo residential solar energy access as a global model. *The Electricity Journal*, 31(7), 1–6. <https://doi.org/10.1016/j.tej.2018.08.003>

Commented [1]: It's required to cite relevant literature using correct styles. For more:

<https://libguides.com.edu/c.php?g=649172&p=4554037>