Complex Contestation: The Emerging Politics of Energy Transitions

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Where we started: politics of support and opposition

The political economy of clean energy, including both the real world politics and the field of research that studies it, is experiencing its own transition as the technology scales up. When I began working in this field fifteen years ago, renewables and electric vehicles were expensive technologies in early stages of market adoption. With the technology in its commercial infancy, political action focused on getting initial policies adopted, building coalitions for policy expansion, and neutralizing opposition from fossil fuel interests.

These themes of adoption, expansion, and overcoming opposition could be seen in several branches of political economic literature. This includes *policy process* studies that used concepts such as agenda-setting, policy windows, and policy entrepreneurship to explain episodes of policy adoption (Stokes and Breetz 2018, Aklin and Urpelainen 2018), *policy feedback* studies that explored patterns of reinforcement or retrenchment over time (Stokes 2013, Moe 2016, Breetz et al. 2018, Meckling 2019), interdisciplinary *socio-technical transitions* approaches focusing on niche formation, regime disruption, and regime resistance (Geels 2014), and *applied political economy* that developed roadmaps for emerging energy technologies with attention to niches, new entrants, and the neutralization of incumbent interests (Victor et al. 2003, Meckling & Biber 2021). In different ways, these literatures explored how seeds could be planted, protected, and nurtured into growth.

Much of this research framed the politics as a distributive conflict between supporters and opponents. Often this framing was explicit. For example, Breetz et al. (2018), Aklin and Urpelainen (2018), Meckling (2019), and Stokes (2020) all conceptualize transition politics as a competition between clean energy constituencies and incumbent industry interests. Other times this division into supporters and opponents was more assumed or implicit. For example, this framing comes through in some of the suggested themes for this workshop, specifically "political foundations of support for the clean energy transition" and "how to overcome/neutralize incumbent industry opposition." I don't want to overstate the dominance of this framing—in particular, studies of more contested technologies such as biofuels (Breetz 2020) or hydrogen (Machado et al. 2022) tended to grapple with more nuanced political fault lines—but it was prominent in many research articles and continues to influence academic discourse on the political economy of energy.

The dichotomous supporter/opponent framing of energy transition politics is also apparent in public discourse. I was struck by this recently while reading Bill McKibben's (2022) article on the Investment Reduction Act in *The New Yorker*, which

told a story of heroes and villains in the US energy transition. The good guys included the renewable energy industry (cleantech engineers, entrepreneurs, and financiers), environmentalists (scholars and activists), and left-leaning policymakers (Biden administration, various Democratic governors). The bad guys included not only the 'usual suspects' of fossil fuel lobbyists, electric utilities, and right-leaning policy groups, but also local environmental groups that oppose transmission projects. In describing local groups in Maine that blocked a proposed transmission line, it offered a disparaging quote from a Department of Energy (DOE) official: "Those advocates are not really serious about giving people access to modern energy." I'll come back to this shortly as an example of what's wrong with the pro/con framing of these politics.

Where it's going: complex contestation

What I argue in this memo is that we may be outgrowing the simple narrative of supporters and opponents. In an era when the challenge was getting the energy transition up to speed, yes, it was useful to understand who was pushing on the accelerator versus the brakes. But many emerging decisions that confront the energy transition can no longer be summarized in terms of 'forward to clean energy' versus 'backward to fossil fuels.' Stakeholders are confronting an array of more complex sustainability trade-offs that are becoming apparent as clean energy scales up. If we simplistically label a group as 'opposition' when they raise concerns about clean energy projects, we may well miss what they're actually fighting about.

Take those local environmental groups in Maine that McKibben lumps in with the opposition. Their position on the Central Maine Power (CMP) transmission corridor is not as simple as he portrays. The CMP corridor was designed to connect existing hydropower from Quebec to consumers in Massachusetts, cutting through 53 miles of undeveloped forest in Maine as the shortest route. Local environmental groups opposed the project principally to protect conservation, recreation, and tourism. They also raised distributive justice concerns that Maine would bear environmental costs while receiving few jobs or ratepayer benefits. Moreover, they cited concerns that large imports of Canadian hydropower could crowd out new projects for solar and offshore wind in Maine. In explaining its opposition to the CMP corridor, Natural Resources Council of Maine summarizes, "Maine must move aggressively to reduce carbon pollution by embracing local clean energy projects like solar and offshore wind that will create new good-paying jobs, strengthen our economy, and protect our health and environment." (NRCM 2021). There's a lot going on here—including land conservation, economic development, clean energy jobs, resource additionality, and distribution of costs and benefits across states—that we miss if we characterize this as parochial groups that "aren't serious" about renewables. It is also worth noting that two unions and 25 towns along the route also opposed the project, and 60% of Maine voters voted against the transmission project in a referendum. It is a complex and interesting case about social license to operate.

This fight about transmission in Maine is just one of many cases where stakeholders have raised concerns about the impacts of clean energy projects. These concerns include land use, jobs, equity in costs and benefits, political voice and procedural justice, environmental and human rights impacts of mining, geopolitics of

supply chains, community development, technical reliability, and consumer safety. Many stakeholders, including communities, environmental groups, and tribes, are broadly supportive of clean energy but nevertheless concerned about the local impacts of specific projects or policies. That's the interesting point where we find ourselves in the energy transition. It's what makes it hard to label groups as simply 'supporters' versus 'opponents.'

This complex contestation can influence the trajectory of energy transitions at the project level by affecting which projects are developed, where it occurs, who can participate, or how projects are designed to mitigate negative impacts. It may also influence decision-making about policy instruments or goals. More broadly, debates about impacts may shape decisions about technological pathways for the transition, including how much countries will decarbonize through renewables and batteries and how much they will embrace other technologies such as nuclear energy, carbon capture and sequestration (CCS), hydrogen, and synthetic fuels.

In other words, we're no longer just talking about the accelerator and brakes. We're also talking about steering wheels (direction of transitions) and shocks (mitigation of impacts). Or to put it into more academic terms, many emerging debates in the energy transition are starting to look more like dialectical processes—where stakeholders are negotiating the contradiction between support for clean energy and concerns about its impacts—rather than dichotomous fights between supporters and opponents. How stakeholders negotiate and resolve these tensions will determine many decisions going forward. If we continue to discuss energy politics in dichotomous terms, we'll either have to ignore these complex contestations or shoehorn them into categories that don't fit.

Emerging examples of contestation

To further elaborate this argument, here I briefly discuss three fronts of contestation: land use, mineral supply chains, and equity for low-income communities. This is not meant to be exhaustive, just some briefly sketched examples for discussion. What these show is that while some conflicts do continue to look like supporters/opponents, other conflicts can lead to engagement, participation, reflection, and compromise in ways that shape the direction of the transition.

Land Use

Renewables and transmission infrastructure will require vast acreage of land in the coming decades. Solar alone could require up to 10 million acres of land by 2050, or 0.5% of the total surface area of the 48 contiguous states (DOE 2021). This large-scale industrial development will largely occur in rural landscapes, creating what has been described as "energy sprawl" by The Nature Conservancy (McDonald 2009). Although these projects generate income for individual landowners, other local stakeholders may be concerned about land preservation, biodiversity, habitat fragmentation, recreation, tourism, property values, and cultural values of landscapes. These are a prime source of "green on green conflicts" between renewable energy and

other environmental issues (Burch et al. 2020). It's already a major challenge for solar and wind development in many states, and it's likely to ramp up in the future.

Conflicts over land use are being resolved in a variety of ways (Gross 2020). One policy response is restriction: 31 states have placed some restrictions on renewables development (Goyal et al. 2021), including 11 counties and three municipalities that have banned solar plants on farmland (Daniels and Wagner 2022). In other cases, stakeholders are finding constructive ways to improve siting and reduce conflict. For example, many government agencies and environmental groups have pursued strategies to incentivize development on low-impact sites, such as disturbed lands or rooftops, as well as to minimize transmission additions by using storage or siting renewables to utilize transmission capacity from closed coal plants. Dual-use projects, such as agrivoltaics that elevate solar panels to allow animal or crop agriculture underneath, are also being explored. To mitigate wildlife impacts, some projects are exploring approaches for technology design or wildlife relocation.

This is an enormous topic that I can only touch on here. The key point is that while conflict over land use will block many projects, it can also drive improvements in project selection and design. Positive engagement may help to mitigate "energy sprawl" by encouraging land-sparing, dual use, and appropriately designed projects.

Mineral supply chains

Minerals for clean energy include lithium, cobalt, nickel, copper, graphite, and rare earths. The International Energy Agency (IEA) estimates that global mineral resources for energy must be quadrupled by 2040 to meet the goals of the Paris Agreement (IEA 2021). Far from being clean, this mining and processing raises numerous environmental and social concerns. In addition to land use, environmental impacts can include water usage, wastewater discharge, acid drainage from mines and tailings, and hazardous waste. Workers may face unsafe working conditions or human rights violations; for example, human rights organizations and academic researchers have documented exploitation, abuse, and child labor in artisanal cobalt mining in the Democratic Republic of Congo (Sovacool 2021). Minerals development in weak states also raises the risk of community displacement and violence, leading some to call this a problem of "green conflict minerals" (Church and Crawford 2018).

Although the IRA created strong incentives for domestic minerals production and battery manufacturing, environmental and tribal groups have raised concerns about local sustainability impacts. Sometimes this is playing out in the courts. For example, after the Bureau of Land Management approved a new lithium mine in Nevada, environmental and tribal groups brought lawsuits to block it. In other cases the federal government is acting pre-emptively to avoid conflict. For example, the Department of Interior restricted copper and nickel mining on 225,000 acres of national forest in Minnesota, citing ecological and cultural reasons (described as a "green energy mineral lockup" by the *Wall Street Journal* (The Editorial Board, 2023)). Domestic mining is a front of contestation that will likely increase under the IRA.

In addition to managing conflict about upstream resources, the government needs to address midstream strategies for battery designs that require less of the most sensitive minerals, as well as downstream end-of-life strategies for battery reuse

and recycling. Currently, we have no plan for how to safely dispose of millions of lithium-ion batteries, which are a risk both for environmental toxicity as well as fire hazards in recycling facilities and landfills.

Globally, there is also an urgent need to translate awareness of these impacts into strategies for supply chain governance (Sovacool et al. 2020). Pressure is likely to increase on corporate actors for supply chain transparency and accounting and traceability mechanisms. It remains to be seen whether these mechanisms will be voluntarily developed by private firms, individually or collectively, or whether they will be helmed by governments. These issues about minerals production and supply chain impacts have been ignored for a long time, but it's now a rapidly moving space.

Equity and low-income access

As energy technologies have moved from niches towards mass adoption, critiques have grown about the inequitable access for low-income households. Two areas where this has heated up are rooftop solar and electric vehicles. Since federal subsidies for these products come through tax credits, many low-income households are ineligible, since they don't pay enough income tax to use these subsidies. Differences in homeownership and home type, and the high upfront costs of these technologies, also contribute to technology adoption and subsidies being skewed towards wealthier households (Borenstein & Davis 2016).

As consumer and justice advocates have raised equity issues in state and federal policy debates, policymakers have sought to improve accessibility. What is interesting to me, however, is that they have largely done so by trying to replicate or simulate ownership for lower income households. For solar, the emerging trend is "community solar" programs where ratepayers access virtual net metering through subscription models, thus simulating net metering from rooftop solar. For electric vehicles, this has resulted in some states offering higher rebates for low-income households, as well as the introduction of income caps, vehicle price caps, and provisions for used vehicles for the federal EV tax credit. While these will certainly benefit some moderate-income households, many low-income households are still barred by the administrative hurdles and other barriers (e.g., long contracts or credit rating requirements for community solar, vehicle ownership for EVs).

This is now leading to more radical critiques. For example, a recent report from the Climate + Community project argued that instead of transitioning all vehicles into EVs, policy could be used to prioritize active and public transit and decrease the size of electric cars (Riofrancos et al. 2023). The authors argued that this would decarbonize transportation with less mining and "ensure transit equity, protect ecosystems, respect Indigenous rights, and meet the demands of global justice." I mention this as an example of stakeholder advocacy that is critiquing the dominant paradigm of transportation decarbonization but should not be dismissed as 'not serious about EVs.' They are raising deeper critiques based on sustainability and social justice impacts. It exemplifies how contestation may actually be seeking to move a discussion forward, providing pressure to make energy transitions more equitable and with lower environmental impacts.

Conclusion

This memo argued that many emerging conflicts in clean energy are better characterized as dialectical tensions than dichotomous opposition. These is complex contestation where stakeholders are grappling with trade-offs for land use, mining, equity, and other important issues. So, what does this imply for the acceleration of clean energy? It's hard to summarize given the diversity of issues, actors, problem scales, and policy venues, but here are a few thoughts.

In some cases, governmental or non-governmental organizations can pre-empt or proactively minimize conflicts that threaten to delay decarbonization, leading to improved siting decisions with fewer delays. The Department of Interior and US Geological Survey have developed various planning tools to help developers and land managers target renewable projects with the lowest impacts. The Nature Conservancy has its Site Wind Right tool. In nuclear energy, new approaches for consent-based siting offer an anticipatory strategy for engaging stakeholders up front to avoid intractable long-term conflicts (Richter et al. 2022). To some extent, attempts to streamline siting and permitting can also be seen as a way to reduce conflict (Sud et al. 2023), though figuring out how to reform permitting can itself be quite conflictual.

In many cases, however, conflict over the direction of the energy transition is unavoidable. Instead of delegitimizing it as NIMBYism, the real question is how to steer conflicts in a productive direction (Eichenhauer & Gailing 2022). Large-scale renewables, transmission, storage, and associated supply chains will not come without sustainability impacts. They will take millions of acres of land that currently provides agricultural, conservation, and cultural purposes. Decarbonization will also require a massive global expansion of mining, including in weak states with potential for human rights violations and environmental degradation. There are also thorny questions about equity and justice, not only for low-income households, but also issues of procedural justice, recognition justice, and distributive justice across space, income, race, and time. Conflict about these and other issues does risk derailing many clean energy projects. But it also has the potential to help us steer the energy transition in even more sustainable and equitable directions if we are open to constructive contestation from people who support renewables but have concerns about the impacts. I don't know how to harness conflict for productive evolution, but I am proposing that we pursue this as an important agenda.

Lastly, a final point for researchers is that we should be more precise about what we mean by 'opposition.' Yes, there are still straightforward opponents out there. But we should probably be clear about whether we're discussing general opposition to renewables versus specific opposition to local projects. We should also probably stop using the term "incumbent industries" as shorthand for opposing groups. At this stage of the energy transition, numerous incumbent actors are seeing the economic opportunities and stepping up to advance clean technologies. This includes traditional automakers that are investing in electric vehicles and utilities that are implementing ambitious plans for 100% renewable, clean, or net zero energy. Their knowledge and capacity are incredibly useful in achieving clean energy goals. Instead of assuming that all incumbents are laggards and opponents, it is important to understand their heterogeneous strategies and processes of engagement.

Bibliography

Aklin, M., & Urpelainen, J. (2018). *Renewables: The politics of a global energy transition*. MIT Press.

Borenstein, S., & Davis, L. W. (2016). The distributional effects of US clean energy tax credits. *Tax Policy and the Economy*, *30*(1), 191-234.

Breetz, H. L. (2020). Do big goals lead to bad policy? How policy feedback explains the failure and success of cellulosic biofuel in the United States. *Energy Research & Social Science*, *69*, 101755.

Breetz, H., Mildenberger, M., & Stokes, L. (2018). The political logics of clean energy transitions. *Business and Politics*, *20*(4), 492-522.

Burch, C., Loraamm, R., & Gliedt, T. (2020). The "Green on Green" Conflict in Wind Energy Development: A Case Study of Environmentally Conscious Individuals in Oklahoma, USA. *Sustainability*, *12*(19), 8184.

Church, C. & Crawford, A. (2018). Green Conflict Minerals: The Fuels of Conflict in the Transition to a Low-Carbon Economy. International Institute for Sustainable Development. https://www.iisd.org/system/files/publications/green-conflict-minerals.pdf

Daniels, T., & Wanger, H. (2022, August 11). Regulating utility-scale solar projects on agricultural land. Kleinman Center for Energy Policy, University of Pennsylvania. https://kleinmanenergy.upenn.edu/research/publications/regulating-utility-scale-solar-projects-on-agricultural-land/

Department of Energy (DOE) (2021). Solar Futures Study. https://www.energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf

Eichenauer, E., & Gailing, L. (2022). What Triggers Protest?—Understanding Local Conflict Dynamics in Renewable Energy Development. *Land*, *11*(10), 1700.

Geels, F. W. (2014). Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. *Theory, culture & society*, *31*(5), 21-40.

Goyal, R., Marsh, K., McKee, N., & Welch, M. (2021). Opposition to renewable energy facilities in the United States. Sabin Center for Climate Change Law, Columbia Law School. https://climate.law.columbia.edu/sites/default/files/content/RELDI%20report%20updated%209.10.21.pdf

Gross, S. (2020). Renewables, Land Use, and Local Opposition in the United States. The Brookings Institution. https://www.brookings.edu/wp-content/uploads/2020/01/FP_20200113_renewables_land_use_local_opposition_gross.pdf

International Energy Agency (IEA) (2021). The role of critical minerals in clean energy transitions. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

Machado, J. T., Flynn, B., & Williamson, I. (2022). The national shaping of Europe's emerging hydrogen strategies: Cooperative or competitive hydrogen Politics?. *Competition and Regulation in Network Industries*, *23*(1), 77-96.

McDonald, R. I., Fargione, J., Kiesecker, J., Miller, W. M., & Powell, J. (2009). Energy sprawl or energy efficiency: climate policy impacts on natural habitat for the United States of America. *PloS one*, *4*(8), e6802.

McKibben, B., (2022, Dec 27). From climate exhortation to climate execution. *The New Yorker.* https://www.newyorker.com/news/daily-comment/from-climate-exhortation-to-climate-execution

Meckling, J. (2019). Governing renewables: Policy feedback in a global energy transition. *Environment and Planning C: Politics and Space*, *37*(2), 317-338.

Meckling, J., & Biber, E. (2021). A policy roadmap for negative emissions using direct air capture. *Nature communications*, *12*(1), 2051.

Moe, E. (2016). *Renewable energy transformation or fossil fuel backlash: Vested interests in the political economy*. Springer.

Natural Resources Council of Maine (NRCM) (2021). CMP corridor: A bad deal for Maine. https://www.nrcm.org/wp-content/uploads/2021/09/cmp-corridor-facts.pdf

Richter, J., Bernstein, M. J., & Farooque, M. (2022). The process to find a process for governance: Nuclear waste management and consent-based siting in the United States. *Energy Research & Social Science*, *87*, 102473.

Riofrancos, T., Kendall, A., Dayemo, K.K., Haugen, M., McDonald, K., Hassan, B., & Slattery, M. (2023). Achieving Zero Emissions with more mobility and less mining. Climate + Community Project in partnership with University of California, Davis. https://www.climateandcommunity.org/more-mobility-less-mining

Sovacool, B. K. (2021). When subterranean slavery supports sustainability transitions? Power, patriarchy, and child labor in artisanal Congolese cobalt mining. *The Extractive Industries and Society*, *8*(1), 271-293.

Sovacool, B. K., Ali, S. H., Bazilian, M., Radley, B., Nemery, B., Okatz, J., & Mulvaney, D. (2020). Sustainable minerals and metals for a low-carbon future. *Science*, *367*(6473), 30-33.

Stokes, L. C. (2013). The politics of renewable energy policies: The case of feed-in tariffs in Ontario, Canada. *Energy Policy*, *56*, 490-500.

Stokes, L. C., & Breetz, H. L. (2018). Politics in the US energy transition: Case studies of solar, wind, biofuels and electric vehicles policy. *Energy Policy*, *113*, 76-86.

Sud, R., Sanjay, P., & Glicksman, R. (2023). How to reform federal permitting to accelerate clean energy infrastructure: A nonpartisan way forward. The Brookings Institution. https://www.brookings.edu/wp-content/uploads/2023/02/20230213_CRM_Patnaik_Permitting_FINAL.pdf

The Editorial Board (2023, Jan 29). Biden's green-energy mineral lockup [Editorial]. *The Wall Street Journal.* https://www.wsj.com/articles/biden-administration-mining-duluth-complex-minnesota-superior-national-forest-deb-haaland-electric-vehicles-11674860178

Victor, D. G., Heller, T. C., & Victor, N. M. (2003). Political Economy and the Hydrogen Revolution (Working Paper No. 17). Stanford University, Program on Energy and Sustainable Development.