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Who pays the pathway on low-carbon societies? Political ecology reflections on the real victims of energy transitions

Keynote Address to the First International Conference on Climate Actions and Just Transition, April 4, 2025

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The urgency, emergency, and necessity of triple energy transitions across the world

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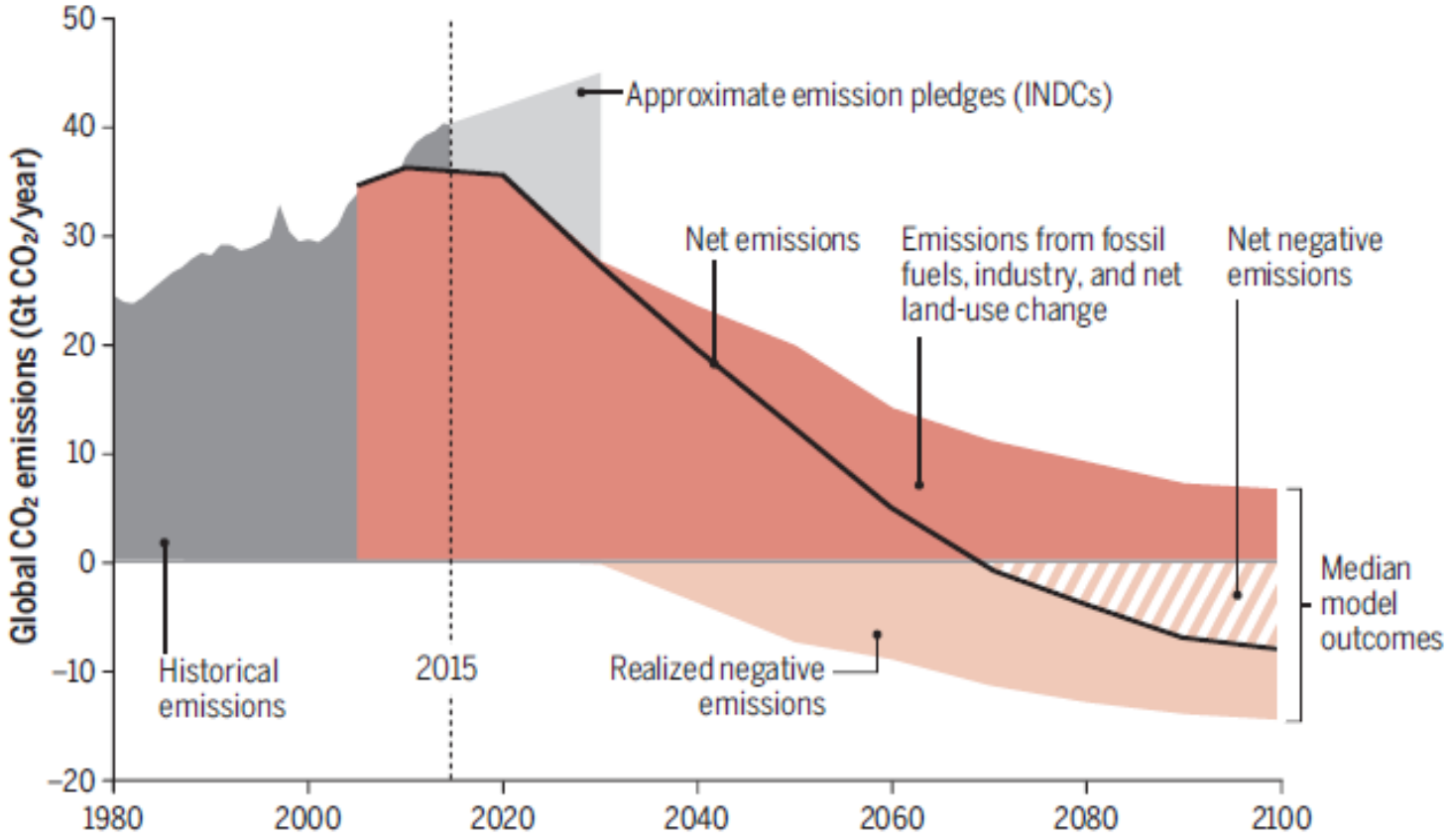

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A matrix of inequities and vulnerabilities with low-carbon and sustainable technologies and behaviours

Demographic inequity (between groups)
· Adoption is strongly mandated by gender roles (EVs, improved cookstoves, food-sharing) · Diffusion patterns substantially shaped by class, caste, income or wealth (improved cookstoves, EVs, solar panels, food-sharing) · Exclusion of non-homeowners or those without access to roofs (solar panels) · Adoption patterns favouring wealthier households and communities of mainly white people, and disfavouring those struggling with illness or financial difficulty (solar panels) · Subsidies favouring wealthier households (EVs, solar panels) · Adoption patterns favouring higher-income homes, larger homes and homes with children (food-sharing) · May entrench inequality and a gap in digital skills and awareness (food-sharing) · Can put those with food allergies or special needs at risk of contamination or illness (food-sharing) · Depends on a relatively advanced skillset of food preparation, handling, storage and refrigeration as well as disposal and waste (food-sharing)

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Source: Sovacool, B.K., Newell, P., Carley, S. et al. Equity, technological innovation and sustainable behaviour in a low-carbon future. *Nat Hum Behav* (2022). https://doi.org/10.1038/s41562-021-01257-8

A matrix of inequities and vulnerabilities with low-carbon and sustainable technologies and behaviours

Demographic inequity (between groups)	Spatial inequity (across geographical scales)
· Adoption is strongly mandated by gender roles (EVs, improved cookstoves, food-sharing) · Diffusion patterns substantially shaped by class, caste, income or wealth (improved cookstoves, EVs, solar panels, food-sharing) · Exclusion of non-homeowners or those without access to roofs (solar panels) · Adoption patterns favouring wealthier households and communities of mainly white people, and disfavouring those struggling with illness or financial difficulty (solar panels) · Subsidies favouring wealthier households (EVs, solar panels) · Adoption patterns favouring higher-income homes, larger homes and homes with children (food-sharing) · May entrench inequality and a gap in digital skills and awareness (food-sharing) · Can put those with food allergies or special needs at risk of contamination or illness (food-sharing) · Depends on a relatively advanced skillset of food preparation, handling, storage and refrigeration as well as disposal and waste (food-sharing)	· Erodes some spiritual and cultural practices in rural communities (for improved cookstoves) · Threatens rural food preservation based on smoke where alternatives are unavailable (for improved cookstoves) · Contributions to traffic congestion and automobile accidents in cities (EVs) · Lack of charging infrastructure in rural areas (EVs) · Perpetuation of a 'decarbonization divide' between Global North and Global South (EVs, solar panels) · Shifting of conventional cars to peripheral (non-low-carbon) areas (EVs) · Cross-subsidization of energy costs that burden the poor (solar panels) · Unfair and at times exploitative labour practices (solar panels) · Bias towards urban areas and cities, less rural states, and especially wealthier cities and cities in the Global North (food-sharing, solar panels)

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Interspecies inequity (between humans and non-humans)	
· Rebounds in increased driving or kilometres travelled impinging on forests or nature reserves (EVs) · Roadbuilding and impingement of green spaces or trees in urban areas (EVs) · Pushing of conventional cars to peripheral regions increasing air and water pollution (EVs) · Increased air pollution or carbon emissions from fossil-fuelled electricity (EVs) · Electronic waste streams releasing toxics into habitats (solar panels and EVs) · Environmental destruction and deforestation with mineral and material extraction (EVs and solar panels) · Fossil-fuel use, occupational hazards and pollution from local manufacturing (solar panels) · Potential rebounds in increased waste (and toxins) due to mistakes and improper sorting or handling (food-sharing)	

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Interspecies inequity (between humans and non-humans)	**Temporal inequity (across future generations)**
· Rebounds in increased driving or kilometres travelled impinging on forests or nature reserves (EVs) · Roadbuilding and impingement of green spaces or trees in urban areas (EVs) · Pushing of conventional cars to peripheral regions increasing air and water pollution (EVs) · Increased air pollution or carbon emissions from fossil-fuelled electricity (EVs) · Electronic waste streams releasing toxics into habitats (solar panels and EVs) · Environmental destruction and deforestation with mineral and material extraction (EVs and solar panels) · Fossil-fuel use, occupational hazards and pollution from local manufacturing (solar panels) · Potential rebounds in increased waste (and toxins) due to mistakes and improper sorting or handling (food-sharing)	· Embedding private motorized automobility for future generations (EVs) · Failing to address the underlying causes of food waste and unsustainable agriculture (food-sharing) · Cementing future burden of cooking and domestic activities onto women (for improved cookstoves) · Generation of toxic waste streams and disposal concerns for future generations (EVs, solar panels) · For-profit motivations can lead to conflict and community tension over future food pathways and limit sustainable change (food-sharing) · Can legitimize overproduction and food surplus and fail to address the root causes of food insecurity (food-sharing)

Source: Sovacool, B.K., Newell, P., Carley, S. et al. Equity, technological innovation and sustainable behaviour in a low-carbon future. *Nat Hum Behav* (2022). https://doi.org/10.1038/s41562-021-01257-8

"Energy justice" involves:

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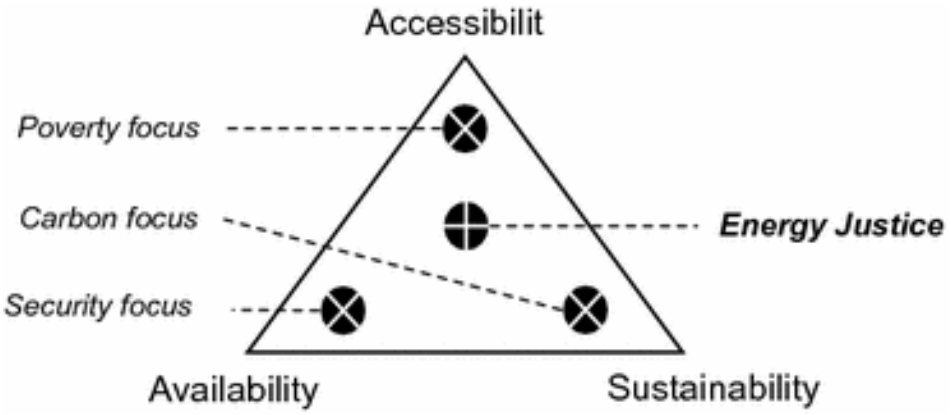
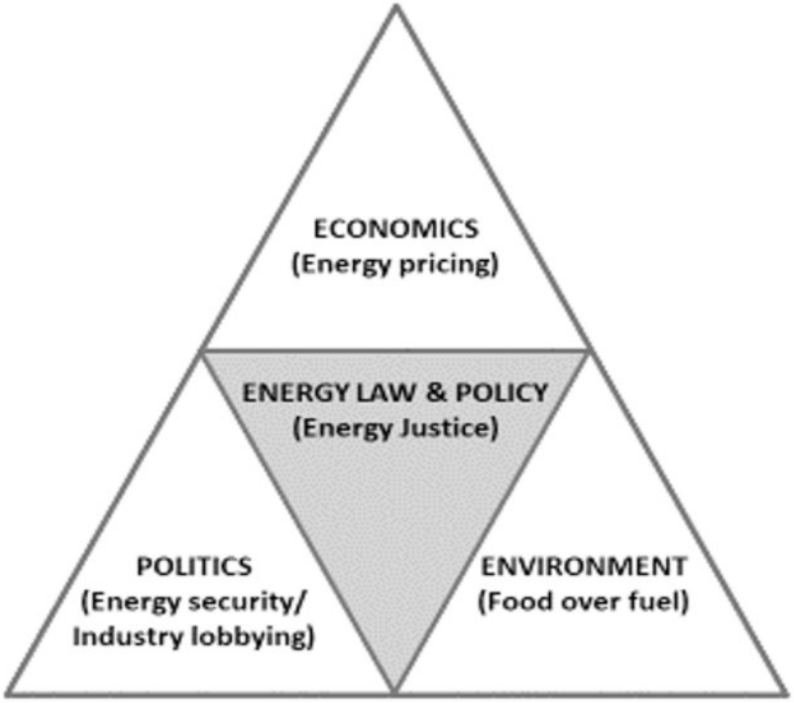
- *Costs*, or how the hazards and externalities of the energy system are disseminated throughout society;
- *Benefits*, or how the ownership of and access to modern energy systems and services are distributed throughout society;
- *Procedures*, or ensuring that energy decision-making respects due process and representation;
- *Recognition*, or assessing the impact of energy systems on the poor, vulnerable, or marginalized.

Source: Sovacool, BK, RJ Heffron, D McCauley, and A Goldthau. "Energy decisions reframed as justice and ethical concerns," *Nature Energy* 16024 (May, 2016), pp. 1-6.

“Energy justice” involves:





Source: Darren McCauley, *Global Energy Justice: Tackling Systems of Inequality in Energy Production and Consumption*, Springer, 2017

Healy et al. and "sacrifice zones" – but what about pro-climate interventions?

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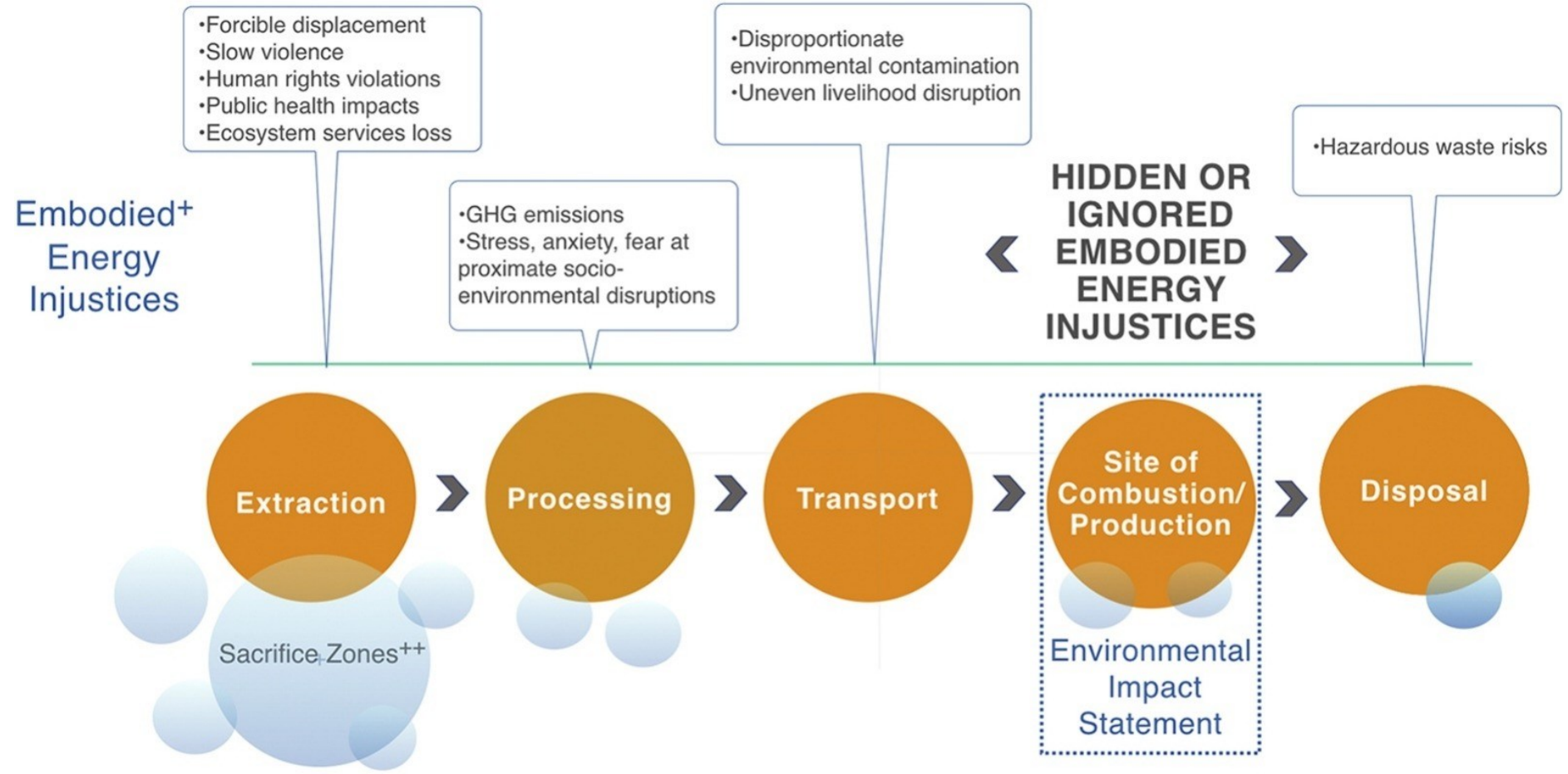

\+ The injustices listed can occur anywhere along the supply-chain but typically are most prevalent around sites of extraction.
++ Sacrifice zones are areas poisoned or destroyed for the supposed greater good of economic progress.

Source: Healy, N., Stephens, J. C., & Malin, S. A. (2019). Embodied energy injustices: Unveiling and politicizing the transboundary harms of fossil fuel extractivism and fossil fuel supply chains. *Energy Research & Social Science*, 48(June 2018), 219–234.

Case study selection: France (1970/80s), Germany (1990s), Norway (2000s), UK (2010s)

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Research design (mixed methods)

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Sixty-four semi-structured expert research interviews

Country	Date	Illustrative Institutions
France	July 2018	CEA (Atomic Energy Commission of France), Electricité de France, ESSEC Business School, Greenpeace, International Energy Agency, Organization of Economic, Cooperation and Development, WISE-PARIS
Germany	July 2018	BMWi (Federal Ministry for Economic Affairs and Energy), Ecologic Institute, Fraunhofer Institute for Solar Energy Systems ISE, German Solar Association (BSW-Solar), the German Energy Agency, the German Solar Energy Society (DGS), Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW)
Norway	June - September 2018	Energi Norge, Ministry of Transport and Communications, Norwegian Public Roads Administration, NTNU (Norwegian University of Science and Technology), Statnett, the Norwegian Electric Vehicle Association (NEVA), TOI (The Institute of Transport Economics)
Great Britain	August 2018	Department for Business Energy & Industrial Strategy, Citizens Advice, Energy Saving Trust, Good Energy, Oxford University, Smart Energy GB, University College London

Research design (mixed methods)

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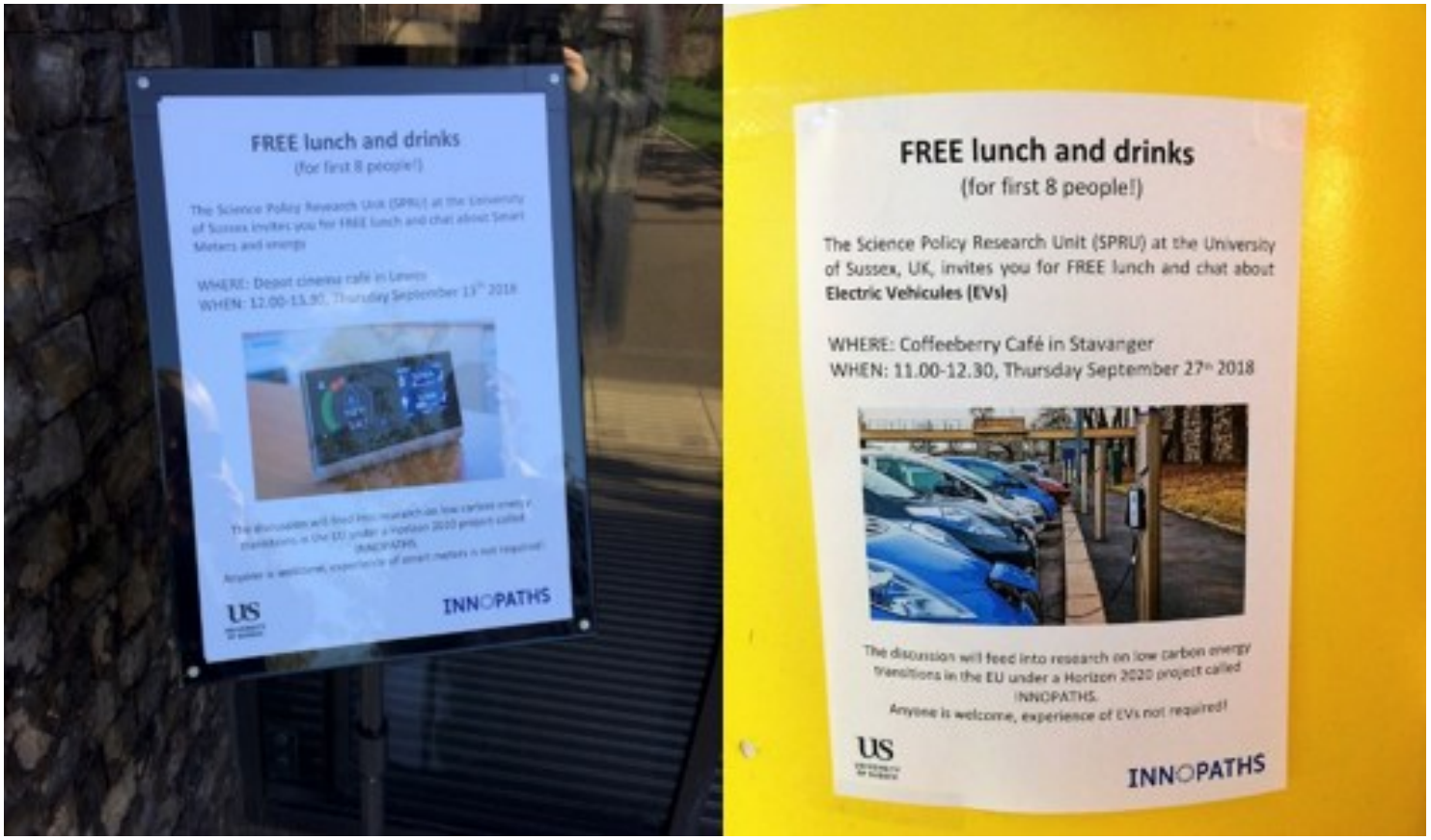
Five focus groups: Lewes (Great Britain), Colmar (France), Freiburg (Germany, two of them), and Stavanger (Norway)



Research design (mixed methods)

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Twelve internet forums (three per country, more than 2m total members) with 58 further responses

Country	Forum	Description	Members	Responses
Norway	Elbilforum.no	Norwegian EV forum	20,487	7
Norway	Tesla motors club Norway	Online forum for Tesla owners in Norway	N/A	4
Norway	SpeakEV	Online electric car forum for all EV owners and enthusiasts	16,152	0
Germany	Photovoltaik forum.com	A solar forum in German	100,823	2
Germany	Solarstrom-forum.de	Photovoltaic forum in German	2,329	0
Germany	Building Technology Forum - Solar Energy	Online forum for all building technologies including solar	N/A	0
GB	Money Saving Expert	Consumer forum	1,778,314	1
GB	Navitron	Private company forum on a range of energy issues	7139	0
GB	OVO Energy	Private company forum on a range of energy issues		0
GB	The IET	The Institution of Engineering and Technology	N/A	38
France	Que Choisir	Consumer forum	130536	1
France	Forum photovoltaique	Energy forum	42596	5
France	Droit Finances	Consumer finances forum	N/A	0

How many injustices?

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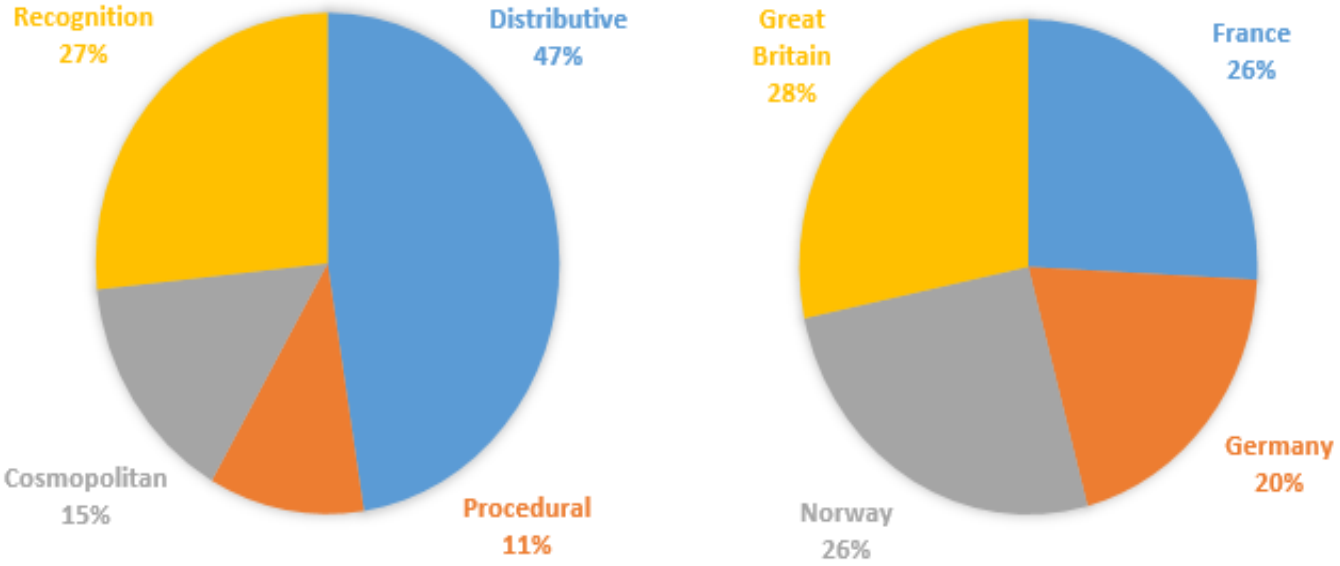
	No.	Injustice	Description	Supported by[a]	Frequency[b]
France	1	High long-term costs to tax payers	Future tax payers bearing burden of decommissioning and waste management	RI, FG, IF	11
	2	Risk of accidents	Economic and environmental impacts of a serious incident or accident	RI, FG, IF	10
	3	Crowds out other renewable investment, forestalling energy transitions (in France and beyond)	Future citizens will be locked into nuclear investments and denied benefits of clean energy	RI, FG	8
	4	Nuclear waste burdens	Future generations will face statistically higher risk of pollution due to growing amount of waste	RI, FG, IF	8
	5	Rising electricity costs due to rising nuclear costs	Future energy consumers will have to pay higher costs due to rising costs of nuclear (plus the costs of subsidizing renewables, which lag behind because of nuclear lock-in), complacency around electricity consumption	RI	6

Findings: summary of injustices (exhaustive "simple" list)

- Our evidence accumulates into 120 (inductively or analytically) distinct energy injustices
- Distributive injustices dominated (57), followed by recognition (32), cosmopolitan (18) and procedural (13)
- Injustices were more evenly distributed with smart meters (34 injustices) entailing the most, followed by nuclear power (31 injustices), electric vehicles (31), and solar PV (24 Injustices).



Sovacool, BK, A Hook, M Martiskainen, and LH Baker, "Decarbonisation and its discontents: A critical energy justice perspective on four low-carbon transitions," *Climatic Change* 155(4) (August, 2019), pp. 581–619.

E.g. of whole systems approaches

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Spatial

	Production/ distribution stage	Consumption stage	Disposal/ recycling stage
Macro scale (global)	• Mineral extraction processes • Transportation of materials • Labor conditions • Global supply chains	• Rising energy demand • Impact on other countries' policies	• Rising global waste • Geopolitical issues
Meso scale (national)	• Increase in subsidies leading to raised taxes • Carbon footprint of installations • Diversion of funds from other sectors	• Inequality of benefits • Increased vulnerability and inequality	• Waste • Costs of disposal • Recycling of old materials
Micro scale (local)	• Disruption of ecosystems • Diversion of funds from other sectors • Loss of local jobs in old systems • Health risks to workers in factories	• Local pollution • Exposure to local risks • Urban-rural divide	• Legacy of local pollution

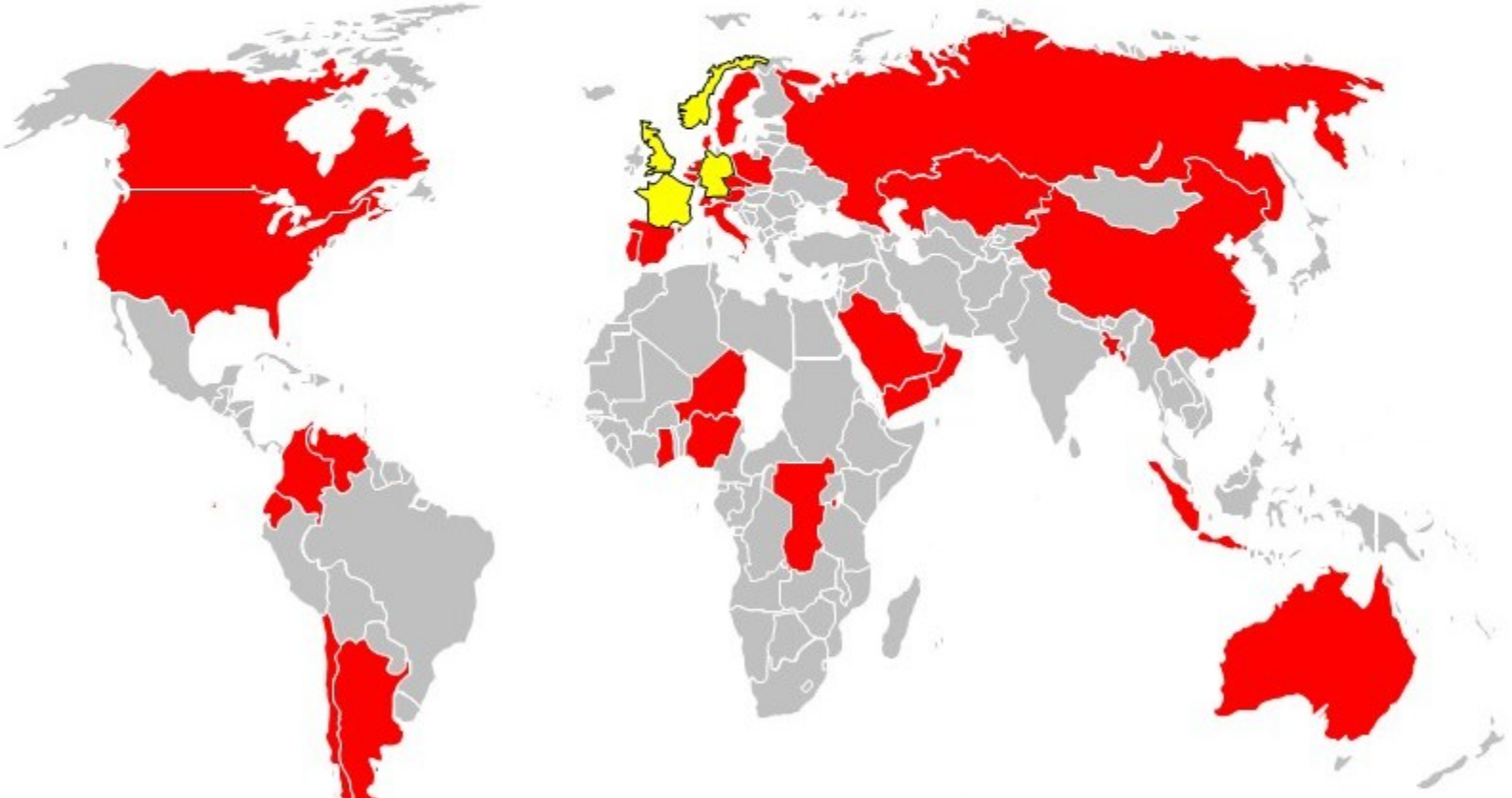
Temporal

Source: Sovacool, BK, A Hook, M Martiskainen, and LH Baker. "The whole systems energy injustice of four European low-carbon transitions," *Global Environmental Change* 58 (September, 2019), 101958, pp. 1-15.

Micro injustices
Local pollution and waste
Community health
Property prices
Unequal household benefits
Traffic congestion
Parking
Closure of local coal mines

Meso injustices
Nuclear accidents
Disruption of other national transitions
Higher national energy prices
Loss of national employment
Expansion of roads
Undermining utility business models
Bankruptcy of national firms

Macro injustices
Uranium mining and waste
Unsafe nuclear exports
Metal and mineral inputs
Flows of electronic waste
Exporting of dirty cars
Poor overseas labour conditions
Disruption of fossil fuel industry
Disruption of other transitions



Source: Sovacool, BK, A Hook, M Martiskainen, and LH Baker. “The whole systems energy injustice of four European low-carbon transitions,” *Global Environmental Change* 58 (September, 2019), 101958, pp. 1-15.

Energy impacts often befall the *most* vulnerable groups

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Review

Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation

Benjamin K. Sovacool [a, b, *]

Abstract

This study critically examines 20 years of geography and political ecology literature on the energy justice implications of climate change mitigation. Grounded in an expert guided literature review of 198 studies and their corresponding 332 case studies, it assesses the linkages between low carbon transitions—including renewable electricity, biofuel, nuclear power, smart grids, electric vehicles, and land use management—with degradation, dispossession and destruction. It draws on a framework that envisions the political ecology of low-carbon transitions as consisting of four distinct processes: enclosure (capture of land or resources), exclusion (unfair planning), encroachment (destruction of the environment), or entrenchment (worsening of inequality or vulnerability). The study vigorously interrogates how these elements play out by country and across countries, by type of mitigation option, by type of victim or affected group, by process, and by severity, e.g. from modern slavery to organized crime, from violence, murder and torture to the exacerbation of child prostitution or the destruction of pristine ecosystems. It also closely examines the locations, disciplinary affiliations, methods and spatial units of analysis employed by this corpus of research, with clear and compelling insights for future work in the space of geography, climate change, and energy transitions. It suggest five critical avenues for future research: greater inclusivity and diversity, rigor and comparative analysis, focus on mundane technologies and non-Western case studies, multi-scalar analysis, and focus on policy and recommendations. At times, low-carbon transitions and climate action can promote squalor over sustainability and leave angry communities, disgruntled workers, scorned business partners, and degraded landscapes in their wake. Nevertheless, ample opportunities exist to make a future low-carbon world more pluralistic, democratic, and just.

Table 3
Vulnerable groups mentioned in academic research on political ecology and climate mitigation (n = 198 studies).

Vulnerable group	No. of articles	% of articles
Non-human species	153	77.3%
Local communities, host communities, adopters or households	152	76.8%
Farmers, agriculturalists, or pastoralists	74	37.4%
Rural poor	73	36.9%
Occupational workers, wage laborers, or their unions	72	36.4%
Indigenous/aboriginal groups, ethnic/racial minorities, or members of a lower caste	71	35.9%
Future generations (e.g., nuclear waste)	71	35.9%
Fishers and water resource users	51	25.8%
Environmental groups, civil society, wildlife reservists, land managers or nature conservationists	38	19.2%
Urban poor	36	18.2%
Women (including gender roles)	27	13.6%
Recreationists, campers, hikers, forest users	27	13.6%
Banks, financiers, investors (including fossil fuel incumbents)	27	13.6%
Elderly	13	6.6%
Students	13	6.6%
Disabled individuals	12	6.1%
Forced labor or modern slaves	10	5.1%
Coastal homeowners (e.g. offshore wind energy)	10	5.1%
Prostitutes	10	5.1%
Children or youth (including health impacts)	5	2.5%
Local businesses (including tourism)	5	2.5%
Refugees (including displaced persons and forced migrants)	3	1.5%
Alcoholics	3	1.5%
Affluent suburban homeowners	1	0.5%

Source: Author.

Table 4
Indigenous peoples and ethnic communities marginalized or displaced by climate mitigation efforts.

Reference(s)	Technology/ies	Particular group(s) negatively effected
Avila [98], Lawrence [124]	Wind energy	Sami herding community in Sweden
Avila [98]	Wind energy	Zapoteco and Huave coastal and agricultural communities in Mexico
Avila [98]	Wind energy	Traditional fisheries and pastoralists in India
Avila [98]	Wind energy	Adivasis forestland users in India
Avila [98], Rignall [125]	Wind energy, solar energy	Saharaui contested territories and other indigenous groups in Morocco
Avila [98]	Wind energy	Lenca communities in Honduras
Avila [98], Calzadilla and Mauger [92]	Wind energy	Turkana, Randile and Borana communities in Kenya, especially ranchers and cattle stewards
Avila [98]	Wind energy	Traditional fisheries in Brazil
Avila [98]	Wind energy	Quilombola communities in Brazil
Avila [98],Carruthers and Rodriguez [86], Gerber [88], Kelly [126], Sánchez De Jaegher [127]	Wind energy, hydropower, forestry, tree plantations	Mapuche communities and Mapuche-Williche indigenous leaders in Chile
Avila [98]	Wind energy	Wayuu communities in Colombia
Avila [98]	Wind energy	Koyna Sanctuary traditional pastoralists in India
Avila-Calero [128], Calzadilla and Mauger [92],Dunlap [129], Dunlap [130], Dunlap [131], Howe and Boyer [132], Siamanta and Dunlap [133], Sovacool et al. [17], Zárate-Toledo et al. [134]	Wind energy	Indigenous peoples of the Isthmus of Tehuantepec in Mexico
Barandiarán [135], Revette [136]	Electric vehicles, smart grids, renewable energy storage (lithium for batteries)	Indigenous communities living near lithium mines and salt flats in Bolivia's Uyuni
Barandiarán [135]	Electric vehicles, smart grids, renewable energy storage (lithium for batteries)	Indigenous communities living near lithium mines and salt flats in Chile's Atacama
Bednar et al. [137], Reames [138], Reames et al. [139]	Energy efficiency, heating, lighting	African Americans in urban Michigan
Bednar et al. [137], Reames [138]	Energy efficiency, heating	Hisdpanics in urban Michigan
Bonds and Downey [105], Sovacool and Bulan [84]	Biofuel (palm oil), hydropower	Erosion of land tenure of the Penan, Kayan, Kenyah, Kajang, and Ukit groups in Malaysia
Bonds and Downey [105],	Biofuel (palm oil)	5 million indigenous people displaced by palm oil development in Indonesia
Borras and Franco [83]	Climate smart agriculture	Indigenous peoples and ethnic minorities in Myanmar
Borras and Franco [83], Poffenberger [140]	Climate smart agriculture, forestry, land use	Indigenous peoples and forest dependent minorities in Cambodia
Borras et al. [141], Fortin and Richardson [142], Leach et al. [143], Lohmann [91]	Biofuel (ethanol), land use (biochar)	Dispossessed indigenous peoples in the Amazon
Brady and Monani [121], Mulvaney [144], Powell [145]	Wind energy, solar energy	American Indian tribal lands and Native American tribes
Brannstrom et al. [146]	Wind energy	Territories of indigenous peoples and traditional communities in Brazil
Cram [147],Cram [148]	Nuclear power (waste)	Yakama Nation, the Nez Perce Tribe, and the Confederated Tribes of the Umatilla Indian Reservation in the United States

Table 4 (*continued*)

Reference(s)	Technology/ies	Particular group(s) negatively effected
Curley [149]	Wind energy, solar energy	Navajo Nation in the United States
Desbiens [150]	Hydropower	Crees Nation in Canada
Dolter and Boucher [151]	Solar energy	First Nations and Indigenous Peoples in Saskatchewan Canada
Dunlap [85], Dunlap [107], Dunlap [152], Pasqualetti [153], Sovacool et al. [30], Sovacool et al. [17]	Wind energy	Indigenous peoples of Juchitán de Zaragoza in Oaxaca Mexico
Dunlap [154], Dunlap [155]	Wind energy	Zapotec Indigenous community in Mexico
Fairhead et al. [80], German et al. [78], Leach et al. [143], Lohmann [91],Mirumachi et al. [26], Newell and Bumpus [156], Sikor and Lund [157], Stock and Birkenholtz [158]	Biofuel, climate smart agriculture, forestry, land use (biochar), carbon funds, solar energy (solar parks)	Global indigenous communities and ethnic groups affected by land grabbing or appropriation of resources
Finley-Brook and Thomas [159]	Hydropower	Naso and Ngobe indigenous territories in western Panama
Furnaro [160]	Renewable energy (broadly)	Indigenous communities in Chile
Gerber [88]	Bioenergy (tree plantations)	Dayak communities in Borneo
Gerber [88]	Bioenergy (tree plantations)	Tupinikim, Guarani and Pataxó communities in Brazil
Gerber [88]	Bioenergy (tree plantations)	Maisin communities in Papua New Guinea
Graetz [161], Marsh and Green [162]	Nuclear power (uranium mining, nuclear waste)	Aboriginal Australians and Torres Strait Islander "First Peoples" in Australia
Hommes et al. [163]	Hydropower	Ethnic minorities and indigenous peoples in Turkey
Islar et al. [164]	Solar energy, wind energy, hydropower	Dalits (often viewed as the lowest social caste) and indigenous people in Nepal
Martínez and Castillo [165]	Hydropower	Peasant, indigenous, and Afro-Colombian rural communities
Newell and Mulvaney [166]	Solar energy, wind energy, smart grids, electric vehicles	Trade unions and indigenous peoples movements
Richards and Lyons [167]	Bioenergy, land use, forestry (plantation forests)	Indigenous and subsistence farmers in Uganda
Scott and Smith [168]	Wind energy, solar energy	Six Nations communities in Canada
Siciliano et al. [108], Sovacool and Bulan [84]	Hydropower	Orang Ulu peoples and indigenous peoples from the upper Balui River, including some semi-nomads in Sarawak, Malaysia
Sovacool et al. [30]	Biofuel	Indigenous communities such as the Dene, Cree, and Metis in Canada

Table 4 (*continued*)

Reference(s)	Technology/ies	Particular group(s) negatively effected
Sovacool et al. [31]	Smart meters	Exclusion of rural and Scottish communities
Sovacool et al. [94]	Electric vehicles, solar energy, wind energy (waste streams)	Discrimination against ethnic groups and minorities in Ghana
Sovacool et al. [94]	Electric vehicles, smart grids, renewable energy storage (cobalt for batteries)	Discrimination against ethnic minorities in Democratic Republic of the Congo
Stock and Birkenholtz [158], Yenneti and Day [169], Yenneti and Day [170], Yenneti et al. [171]	Solar energy (solar parks)	Indigenous minorities or those of a lower caste in Gujarat India
Sunter et al. [172]	Solar energy (rooftop PV)	African Americans neighborhoods in the United States
Sunter et al. [172]	Solar energy (rooftop PV)	Hispanic neighborhoods in the United States
Temper [173]	Tree plantations (pine and eucalyptus), biofuel (sugarcane plantations)	Farmers and indigenous groups in Uganda
Temper [173]	Biofuel (Jatropha)	Indigenous groups and pastoralists in Ghana
Temper [173]	Biofuel (ethanol)	Indigenous groups and traditional communities in Senegal
Temper [173]	Biofuel, forestry, land use	Mukaya Diaspora in Juba in South Sudan
Temper [173]	Biofuel (ethanol)	Indigenous groups, traditional communities, and landless peasants in Mozambique
Temper [173]	Biofuel (palm oil)	Indigenous groups in southwest Cameroon
Temper [173]	Forestry, land use	Indigenous groups in Rio Negro Argentina
Temper [173]	Forestry, land use	Indigenous groups and communities in San Martin Peru
Velasco [174]	Hydropower	Emberá Katıo indigenous community
Walker et al. [175]	Hydropower	Munduruku people in the Tapajo's River Valley

What does a "political ecology" approach offer?

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	Political economy	Political Ecology	Social Justice	Critical Development Studies
Primary focus	States and markets, conflict over natural resources, winners and losers	Power regimes, processes, or ideologies that enclosure upon resources or exclude agents from access	Fairness and equity in decision-making practices	Patterns of inequality in global economic development and growth
Related academic disciplines	Resource economics, geopolitics, political geography, political science, economic geography	Human geography, ecology, political geography, sociology, peasant studies	Environmental sociology, law, jurisprudence, philosophy, ethics, energy policy	Development studies, development economics, political geography, political science, International political economy
Key concepts or terms	Resource curse, intrastate conflict, interstate war	Human rights, externalities, accumulation by dispossession, new imperialism, peripheralization, resistance	Procedural justice, distributive justice, cosmopolitan justice, justice as recognition	Core and periphery, development discourse, appropriate technology
Selected authors	Michael Watts, Richard Auty, Terry Lynn Karl, Vaclav Smil, Michael L. Ross	David Harvey, Paul Robbins, Bill Cooke, Uma Kothari, Andy Blowers, Pieter Leroy, Noel Castree, James McCarthy	Karen Bickerstaff, Gordon Walker, Harriet Bulkeley, Benjamin Sovacool, Raphael Heffron, Darren McCauley, Kirsten Jenkins	Jeffrey Sachs, U. Kothari, Arturo Escobar, James Ferguson, James C. Scott, EF Schumacher

Sovacool, BK, M Tan-Mullins, and W Abrahamse. "Bloated bodies and broken bricks: Power, ecology, and inequality in the political economy of natural disaster recovery," *World Development* 110 (October, 2018), pp. 243-255.

How can “political ecology” be operationalized?

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Dimension	Process	Description	Sub-processes	Disciplines
Economic	Enclosure	Capturing resources or authority	Territorial accumulation, privatization, market stretching, parallel bureaucratization, land grabbing	Political geography, environmental geography, public policy, public administration, neo-Marxism

Sovacool, BK, M Tan-Mullins, and W Abrahamse. “Bloated bodies and broken bricks: Power, ecology, and inequality in the political economy of natural disaster recovery,” *World Development* 110 (October, 2018), pp. 243-255.

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Social	Entrenchment	Worsening social inequality	Comparative advantage, elite capture	Welfare economics, environmental justice, gender studies, political economy

Sovacool, BK, M Tan-Mullins, and W Abrahamse. "Bloated bodies and broken bricks: Power, ecology, and inequality in the political economy of natural disaster recovery," *World Development* 110 (October, 2018), pp. 243-255.

What does it reveal? When applied to climate policy / adaptation:

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Table 1 | The political economy of climate adaptation in practice

Process	Dimension	Description	Examples
Enclosure	Economic	Acquiring resources or authority: transferring public assets into private hands, or expanding the role of private agents in the public sector	Wonthaggi desalination plant in Australia, disaster recovery in Honduras
Exclusion	Political	Marginalizing stakeholders: limiting access to decision-making processes and forums	Coastal protection in Norway, sea barriers in Alaska
Encroachment	Ecological	Damaging the environment: intruding on biodiversity-rich areas or regions with predisposed land uses, interfering with ecosystem services , or contributing to greenhouse-gas emissions	Marine protected areas in Tanzania, climate-proofing infrastructure in the Maldives
Entrenchment	Social	Worsening inequality: aggravating the disempowerment of women or minorities and/or concentrating distributions of wealth	Livelihood diversification in Burkina Faso, disaster relief in Kenya

Source: Sovacool, BK, BO Linnér, and ME Goodsite. "The Political Economy of Climate Adaptation," Nature Climate Change 5 (7) (July, 2015), pp. 616-618.

Or disaster relief and recovery

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Summary of political economy of disaster recovery case studies.

Process	Case study	Explanation
Enclosure	Hurricane Katrina	Public recovery resources primarily benefitted large corporations (casinos, cruise line ships, port operators) and homeowners; private actors use recovery to facilitate their own housing development plans or the capture of public school buildings
	Boxing Day Tsunami	Government-linked private companies used no-build zone policies to seize prized beach front land for their own developments
	Typhoon Yolanda	Privatization of aid distribution reduced the effectiveness of aid, resettlement patterns threatened by land grabs
	Canterbury Earthquakes	Canterbury Earthquake Response and Recovery Act conferred unilateral power to the national government so that it could suspend laws, acquire, hold and dispose of property
Exclusion	Hurricane Katrina	Businesses employed low-wage undocumented workers in reconstruction work, excluding others; minority evacuees faced rent hikes or eviction; women and disaster front-line volunteers were excluded from planning discussions
	Boxing Day Tsunami	Marginalizing policies with tedious procedures for claims excluded certain groups from receiving aid and compensation
	Typhoon Yolanda	A 40 m 'no-build zone' excluded landless occupants from the rehousing process
	Canterbury Earthquakes	A centralized government approach interfered with decision-making processes of local officials and weakened the rights of homeowners in securing insurance claims
Encroachment	Hurricane Katrina	Reconstruction involved infrastructure repair and dredging done in conditions of relaxed environmental standards
	Boxing Day Tsunami	Lack of coordination between agencies resulted in more fishing boats given to communities and intensified fishing activities with depleted fishery resources
	Typhoon Yolanda	Embankments altered the ecology and ecosystem services provision of coastal areas
	Canterbury Earthquakes	Infrastructural repairs resulted in significant diesel emissions; rezoning of urban areas as a result of liquefaction resulted in longer commuting distances
Entrenchment	Hurricane Katrina	Poor, minority, female evacuees were less likely to have access to transport, more likely to face forcible resettlement or remain in temporary shelters; private developers used the disaster as an opportunity to promote their own agendas
	Boxing Day Tsunami	Non-Buddhist communities received less aid due to smaller networks; some donations were politicized and used convert followers
	Typhoon Yolanda	DR and rebuilding strategies focused on men; women were further marginalized with microfinance schemes; poverty and land tenure insecurity were worsened via recovery efforts
	Canterbury Earthquakes	Market led recovery approach increased the vulnerability of renters/tenants and the poor

Sovacool, BK, M Tan-Mullins, and W Abrahamse. "Bloated bodies and broken bricks: Power, ecology, and inequality in the political economy of natural disaster recovery," *World Development* 110 (October, 2018), pp. 243-255.

Or climate change mitigation broadly

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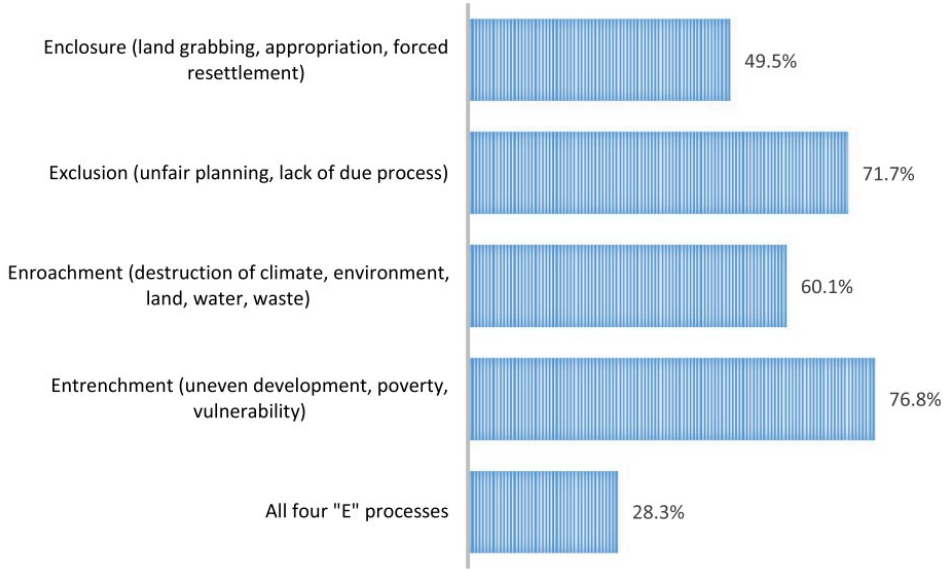
Meta-analysis of 198 article and 332 distinct case studies

Case study technology for academic research on political ecology and climate mitigation (n = 198 studies).

Technology	No. of articles	% articles	% cases
Wind (including onshore, offshore)	97	49.0%	28.9%
Solar (including solar PV, CSP, solar thermal)	75	37.9%	22.3%
Hydro (including big dams, small and micro hydropower)	40	20.2%	11.9%
Bioenergy & waste (including refuse, biomass, residues, wood, crops)	20	10.1%	6.0%
Nuclear (including uranium mining and processing)	19	9.6%	5.7%
Biofuel (including ethanol, biodiesel, Jatropha, palm oil)	17	8.6%	5.1%
Land (including biochar, forest management, soil, smart agriculture, mining)	17	8.6%	5.1%
Housing (including energy efficiency, heating, retrofits)	15	7.6%	4.5%
Electric mobility (including EVs and PHEVs)	12	6.1%	3.6%
Smart grids (including smart meters and homes)	8	4.0%	2.4%
Geothermal (including conventional and advanced)	6	3.0%	1.8%
Mundane (e.g., bikes, cookstoves, light bulbs)	4	2.0%	1.2%
Hydrogen (including fuel cells)	2	1.0%	0.6%
Energy transport nodes (including T&D for electricity, biofuel pipelines)	2	1.0%	0.6%
Clean coal (including CCS and CCUS)	1	0.5%	0.3%
Mobility (including congestion charging, ridesharing, MaaS)	1	0.5%	0.3%



Sovacool, BK. “Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation,” *Energy Research & Social Science* 73 (March, 2021), 101916, pp. 1-16.

Further/most recent conceptual elaboration:

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Like reconceptualization of “the city” or “the state, we focused on three elite processes:

- **Experimentation**: using peripheral spaces (geographically, socio-economically, or politically) as a laboratory to test climate change solutions or low-carbon technologies, transferring risks there but not always the benefits;

- **Financialization**: the expansion and proliferation of financial instruments, innovations, logics, and markets within the global economy and many national economies. Commonly described as “the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies”;

- **Dispossession**: often an outcome of experimentation and financialisation, this sees climate change measures as dispossessing others of their land, wealth, political and economic participation or other assets, exacerbating inequalities in the process

Sovacool, BK, L Baker, M Martiskainen, and A Hook. “Processes of elite power and low-carbon pathways: Experimentation, financialisation, and dispossession,” *Global Environmental Change* 59 (November, 2019), 101985, pp. 1-14.

Further/most recent elaboration:

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Case(s)	Technical elites	Financial elites	Regulatory elites	Physical elites
Bangladesh (coastal protection)	Experiment with community afforestation pilots and dyke design (e.g., World Bank and USAID)	Invest in infrastructure and valuable land (e.g. microfinance institutions, global banks)	Erect planning processes and policies to exclude others	Use physical force to evict the landless from *char* and *khas* land
Netherlands (coastal protection)	Experiment with dredging, materials, vessels, and storm surge barrier design (e.g. Delft Laboratory and a consortium of Dutch engineering conglomerates)	Configure the Delta Works as a profit making entity via consulting contracts overseas, (e.g. Royal Boskalis Westminster N.V, Royal Van Oord, Royal VolkerWessels Stevin N.V)	Rijkswaterstaat ignore local and environmental concerns	Physically evict fishers and recreational users from estuaries and coastal areas
Malawi (climate insurance)	Experiment with algorithims and risk estimation (ARV; World Bank; DfID; InsuResilience, IPCC)	Pool risk across the insurance mechanisms (investors; fund-managers; ARC Limited; Applied Insurance Research; Eqecat)		
South Africa (renewable energy financing)	Experiment with auction mechanisms and models (domestic renewable energy firms and manufacturers; local branches or subsidiaries of international technology and engineering firms)	Back and promote least-cost auctions (banks; equity investors; project developers)	Managers of the national renewable energy procurement programme enforce and legitimize the auctions	
Mexico (renewable energy financing)	Experiment with auction mechanisms and models (international engineering and technology firms including Enel, Engie and EDF)	Back and promote least-cost auctions (banks; equity investors; project developers)	Renewable energy auction regulatory frameworks enforce auctions, with support by the state government (i.e., governor of Oaxaca)	Local, state and regional authorities threatening violence and disrupting social protests

Sovacool, BK, L Baker, M Martiskainen, and A Hook. “Processes of elite power and low-carbon pathways: Experimentation, financialisation, and dispossession,” *Global Environmental Change* 59 (November, 2019), 101985, pp. 1-14.

Concluding thoughts and insights

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- Cosmopolitan concerns remind us that justice impacts are *multi-scalar* and do not occur only in Europe
  - Nuclear reactor designs being exported, cheap electricity trade, uranium mining, and nuclear waste
  - Low-wage manufacturing in China, factory waste streams for solar
  - Copper and cobalt (DRC), e-waste (Ghana) for smart meters
  - Extractive industries (cobalt, lithium) for EVs, e-waste, cheaper/dirtier cars flooding other markets
- Clean energy may be a human right, but securing it currently forces tradeoffs with other human rights, leading to *green on green* and *poor on poor conflict*
- We must avoid conceptual approaches or research designs that obscure or mask this emerging *decarbonisation divide*

Source: Sovacool, BK, A Hook, M Martiskainen, A Brock, and B Turnheim, "The decarbonisation divide: Contextualizing landscapes of low-carbon exploitation and toxicity in Africa," *Global Environmental Change* 60 (January, 2020), 102028, pp. 1-19.

The political ecology of climate action is multi-scalar

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Table 4
The multi-scalar nature of the political ecology of adaptation in Bangladesh

Scale	Political ecology predominately affects	Explanation
Macro: National export zones, industrial clusters, and protected areas	*Khas* land, farms, coastal villages, forests	People become displaced or lose livelihood opportunities in the face of climate-infrastructure, forest conservation areas, waterways, and aquaculture sites
Meso: Cities and regions	Public commons, char areas, hilly agro-ecological regions	Powerful landlords (*jotdars*) utilize a neo-feudal system of dependent peasants (*lathiyals*) to consolidate power and concentrate wealth
Micro: Neighborhoods and households	Family assets, *banadasyu* patronage networks	Moneylenders and community leaders take advantage of disaster victims by forcing them to sell assets at low prices or recruiting them into a patronage system managed by the *matabbar* and *talukdar*

Source: Author.

Sovacool, BK. "Bamboo beating bandits: Conflict, inequality, and vulnerability in the political ecology of climate change adaptation in Bangladesh," World Development 102 (February, 2018), pp. 183-194.

Concluding thoughts and insights

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- Sometimes the evilest villains are local or community actors, this challenges the norm that greater stakeholder/community involvement is always an optimal strategy

- The four Es can interconnect and support each other, enclosure leading to exclusion or encroachment leading to entrenchment

- We must first at least recognize the political ecology operating “behind” or “above” climate action so it can be planned for and possibly managed and minimized

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