

## Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality

Symons, Jonathan; Friederich, Simon

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

### Empfohlene Zitierung / Suggested Citation:

Symons, J., & Friederich, S. (2022). Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality. *Historical Social Research*, 47(4), 303-326. <https://doi.org/10.12759/hsr.47.2022.48>

### Nutzungsbedingungen:

Dieser Text wird unter einer CC BY Lizenz (Namensnennung) zur Verfügung gestellt. Nähere Auskünfte zu den CC-Lizenzen finden Sie hier:

<https://creativecommons.org/licenses/by/4.0/deed.de>

### Terms of use:

This document is made available under a CC BY Licence (Attribution). For more information see:

<https://creativecommons.org/licenses/by/4.0>

---

# Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality

Jonathan Symons & Simon Friederich \*

---

**Abstract:** »Spannungen innerhalb von Energiegerechtigkeit: Wenn globale Energiepolitik Ungleichheit verstärkt«. Global energy justice remains far out of reach. If the goal of energy justice is the universal, equitable, and democratic provision of safe, affordable, and sustainable energy services, the international community currently lacks the physical, ideational, or governance infrastructure necessary for its realization. Instead, access to energy remains radically unequal, continuing greenhouse gas emissions are creating intergenerational sabotage, and fossil fuel revenues routinely corrupt democratic politics. In addition to distributive injustice, global energy governance also creates dilemmas of procedure and recognition that are our focus. Here, we first identify inherent tensions between local democratic sovereignty and global energy justice and then argue that existing energy governance infrastructures often amplify powerful actors' leverage over the energy choices and strategies of less powerful communities. We conclude by discussing the design of a governance infrastructure that could promote climate mitigation and energy access goals without exploiting international inequalities in ways that risk undermining justice.

**Keywords:** Energy justice, equality, democratic sovereignty, *Energiewende*, nuclear.

---

## 1. Introduction

---

In this paper, we argue for two central claims and explore their implications for global energy governance. Our first claim is that *there are inherent tensions between local democratic sovereignty, energy democracy, and global energy justice*. When political communities freely deliberate and choose which energy strategy – out of a range of them – to pursue for themselves, they will often select one that is globally unjust. Here, we use the term “democratic sovereignty” to

---

\* Jonathan Symons, School of Social Sciences, Macquarie University, Sydney NSW 2109, Australia; [jonathan.symons@mq.edu.au](mailto:jonathan.symons@mq.edu.au).

Simon Friederich, University College Groningen, University of Groningen, Hoendiepskade 23/24, 9718BG Groningen, The Netherlands; [s.m.friederich@rug.nl](mailto:s.m.friederich@rug.nl).

Acknowledgements: We acknowledge the helpful comments on an earlier version of this paper by two anonymous referees.

refer to decisions reached through constitutional processes within democratic states. While it has long been recognized that global environmental problems often arise from free riding and collective action dynamics (Gardiner 2011), our argument points out that obstacles arise from legitimate attempts to exercise local autonomy, not just from pursuit of narrow economic self-interest.

Our second central claim relates to the institutions and infrastructures set up to pursue the global goals of energy security, energy access, and climate safety. We argue that existing *energy governance infrastructures often amplify powerful actors' leverage over the energy choices and strategies of less powerful communities*. They also do not provide any compensating mechanism through which less powerful actors can decisively influence, let alone coerce, powerful actors to make their energy strategies more consistent with energy justice. Consequently, the existing governance infrastructure inadvertently sharpens existing tensions between democratic sovereignty and global energy justice. Thus, the discourse that claims that fossil fuel use generates harm but has no real benefits may contribute to uneven and hypocritical patterns of global governance. Perversely, these patterns amplify the harms and limit the benefits experienced by poorer and less powerful communities.

We illustrate our analysis with two high-profile cases in which global interest and democratic preference appear to conflict: Germany's decision not to further expand its nuclear power fleet and, rather, to shut it down early and Nigeria's efforts to finance the development of its domestic fossil gas resources. These brief cases are selected primarily because Germany and Nigeria represent very different energy pathways, which nevertheless both illustrate our considerations: Germany, with its advocacy for an ostensibly renewable energy-based *Energiewende* (cf. Besio, Arnold, and Ametowobla 2022, in this volume), and Nigeria, with its fight for international financing of downstream fossil fuel extraction to advance human development. We use these cases to argue i) that well-intentioned people may have coherent and legitimate reasons to prefer energy pathways that are far more carbon-intensive than other available ones, ii) that there is currently no single practically viable and globally applicable path to energy justice, and iii) that the background conditions of colonial legacies and global inequality mean that governance infrastructures that seek to steer energy choices by restricting access to development finance will themselves be unjust. We conclude that progress toward energy justice would benefit from globally consistent mechanisms that prompt national policymaking to consider global impacts while giving equal protection to *all* communities' democratic control over energy choices.

Our claim that local democratic preferences and global interests can conflict should not be surprising. Similar phenomena are familiar within other areas of national policymaking – exclusionary refugee laws and national vaccine hoarding are prominent examples. Here, we show that this applies to

energy supply and distribution. We note that analogous tensions between the idea of “energy democracy” (Section 5) and global justice have been identified elsewhere (e.g., Szulecki 2018). Given the ubiquity of these tensions between democracy and global justice, the question of whether and how democratic sovereignty might be constrained to take account of the interests of people outside the national community has been a recurring concern of international political theory (Buchanan and Keohane 2006). By contrast, when civil society advocates seek policies that will restrict fossil fuel access in the Global South, they are sometimes less attentive to these tensions (e.g., Mainhardt 2019). We suggest some alternative approaches that might better align climate and energy justice goals.

The paper’s structure is as follows: Section 2 reviews in which respects global energy justice is currently out of reach: energy access is highly unequal; climate change amplifies these inequalities; and there is a tendency for fossil-fuel-rich states to act in democracy-undermining ways. Section 3 surveys different arenas of global energy governance and outlines how these infrastructures combine to restrict the choices of low-income communities. Section 4 takes a closer look at two international actors, Germany and Nigeria. Section 5 identifies the causal mechanisms that give rise to the tension between democracy and energy justice and suggests some governance infrastructures that might mitigate these tensions. Our argument focuses on the infrastructures of power in the energy sector, encompassing the dynamics of the global political economy and its governance institutions.

---

## 2. Failures in Global Energy Justice

---

Scholars of “energy justice” have proposed a variety of definitions for this term (see Fuller and McCauley 2016; Sovacool et al. 2017). Here, we focus on the characterization by Pellegrini-Masini, Pirni, and Maran (2020), who argue that research into energy justice can best be understood as being grounded in the concept of “equality.” In this reading, energy justice describes a situation of formal equality in the procedures through which decisions about energy are made (procedural energy justice) and of substantive equality in access to energy services and distribution of harms (distributive justice), as well as substantive equality in the extension of dignity to all (recognition justice) (Pellegrini-Masini, Pirni, and Maran 2020; see also McCauley et al. 2013). Understanding energy justice in terms of equality anchors energy justice in a widely understood philosophical principle and helps to make sense of the diverse energy justice literature (Pellegrini-Masini et al. 2020, 6). For example, Pellegrini-Masini, Pirni, and Maran (2020) argue that the concept of equality connects the ten constituent principles of energy justice that have been proposed by a leading group of scholars: availability, affordability, due process,

transparency and accountability, sustainability, intragenerational equality, intergenerational equity, responsibility, resistance, and intersectionality (Sovacool et al. 2017, 687).

Here, we summarize the scale of current energy injustice by briefly outlining some key inequalities associated with the existing global energy system. Our emphasis is on three factors: inequality in access to energy services, inequalities arising from energy's contribution to climate harm, and the connection between iniquitous political orders and fossil fuel revenues. We argue that each of these inequalities points to tensions between local and global interests in energy infrastructure, which partially explain why national political communities might value retaining local political control over energy choices.

*Unequal access:* The global energy system reflects the wealth and power inequalities of the wider international order. In fact, estimates of the energy embodied in goods and services suggest that inequality in individual access to energy services is slightly greater than wealth inequality, as measured through expenditure (Oswald, Owen, and Steinberger 2020). In energy, the poorest 50% of humanity accounts for less than 20% of final consumption (Oswald, Owen, and Steinberger 2020). A significant evidence base establishes that energy and human development are closely correlated at lower levels of human development and energy use (Azam et al. 2021; Iñaki et al. 2016; Martinez and Ebenhack 2008). Energy access is integral to a healthy living environment, education, health care, and employment. To take just one example, indoor air pollution associated with a lack of access to clean cooking remains the leading environmental threat to human health in the poorest parts of the world (Fuller et al. 2022).<sup>1</sup> Its health impacts are greatest on young children and, owing to the gendered division of cooking labor, women.

Reflecting the growing recognition that human development requires adequate access to energy services, the United Nations (UN) Sustainable Development Goals (SDGs) of 2015 included the goal of universalizing access to affordable, reliable, and sustainable energy (SDG 7). Progress toward SDG 7 is tracked through indicators that measure electricity access, access to clean cooking, and the share of energy supply from renewable generation. The 2022 Clean Energy Progress Report documents modest progress in all these indicators. However, the rate of change is insufficient to achieve the goal of universal – minimal (see below for details) – energy access by 2030 (International Energy Agency [IEA] et al. 2022). Around 9% of the global population now lacks any electricity access (700 million people), while around 31% (2.4 billion people) lack access to clean cooking. On both measures, rural

---

<sup>1</sup> Air pollution remains the leading environmental threat to human health globally (responsible for 9 million deaths annually), but advances in access to clean cooking mean that indoor air pollution's share of this health burden is declining (Fuller et al. 2022).

communities in the least developed countries are the most disadvantaged (IEA and OECD 2022).

SDG 7's goal of "access to electricity" is itself a somewhat misleading measure since the definition of "access" is not calibrated against the level of access that would be necessary to secure any specific level of human flourishing. The lowest tier of supply that satisfies the definition of "access to electricity" describes a household that receives four hours of electricity access a day (including at least one hour in the evening) at a level that might be sufficient to power a light bulb and run a radio (see Bazilian and Pielke 2013; Bhatia and Angelou 2015). A household might thus meet the minimal test of "energy access" while lacking sufficient energy to unlock the benefits of education, refrigeration, clean cooking, or protection from extreme temperature. SDG 7's focus on *household* energy access also fails to measure the degree to which modern energy is available for collective applications outside the home that are vital to human development – in industry, hospitals, public transport, schools, etc. (e.g., in the European Union [EU], less than 30% of energy use is domestic [Eurostat 2022]). The experience of the COVID-19 pandemic, in which vaccine distribution was sometimes dependent on cold storage, demonstrated only one impact of this inequality (Nadimuthu, Raj, and Victor 2022).

*Unequal impacts of climate change:* A second injustice emerges from energy's contribution to climate change. Global energy production, which primarily advances the material interests of high-income people, is the leading driver of climate change which primarily harms low-income communities. Given extreme inequality in energy access, the Intergovernmental Panel on Climate Change (IPCC) concludes that eliminating energy poverty and providing universal access to modern energy services would increase global greenhouse gas (GHG) emissions by "at most a few percent" (IPCC 2022b, 13). Around 65% of total global GHG emissions are derived from fossil fuel use that supports the energy sector (34% of GHG emissions) and industry, transport, buildings, etc. (IPCC 2022b, 12). There are a small number of near-zero-carbon national electricity grids, which tend to rely heavily on hydroelectricity and/or nuclear power, as well as several medium-carbon renewable-dominated grids. However, even in these cases, economic sectors other than electricity production continue to rely on fossil fuels.

Adverse impacts of climate change vary with geography – for example, low-lying nations and equatorial regions that are already close to the limits of thermal comfort are particularly vulnerable. However, the vulnerability of specific communities is tightly connected to their affluence and associated adaptive capacity. To give just one example, while extreme heat-related mortality is projected to increase with a changing climate, historical experience suggests that adaptation has the potential to mitigate most of this increase (Huber et al. 2022). However, some adaptation can only be enabled by higher

levels of energy access (e.g., the use of heat pumps) than are currently available for the majority of the population in the Global South. Similarly, methane-derived fertilizers are significant sources of GHGs, and the resulting warming is a threat to agricultural productivity; however, productivity gains from fertilizer use also benefit food security (IPCC 2022a, 16).

Energy use not only drives climate change – if it is based on fossil fuels – but it also enables adaptation. Unequal energy access therefore poses a severe threat to human welfare, especially as the scope of climate harm increases. That is to say, fostering equality in access to energy services is probably of greater importance for human welfare in the coming decades than is limiting warming to any specific level. A person with secure insulated housing, access to energy services, and health care is likely to fare better under 2°C or even 3°C of warming than an impoverished person in a world where warming has been limited to 1.5°C. As the IPCC (2022a, 14) explains, vulnerability to climate harm and the development patterns associated with low-energy use are tightly linked: “regions and people with considerable development constraints have high vulnerability to climatic hazards” since “vulnerability is higher in locations with poverty, governance challenges and limited access to basic services and resources, violent conflict and high levels of climate-sensitive livelihoods (e.g., smallholder farmers, pastoralists, fishing communities).” Moreover, the IPCC (2022a, 14) notes that development patterns associated with increased vulnerability are associated with colonial legacies.

*Rentier governance:* A third energy-linked inequality arises from energy’s impacts on governance and conflict. The term “rentier” refers to states (or corporations) that receive a substantial proportion of their income through “rentier” profits gained by controlling assets (in this case, wealth gained from fossil fuel extraction). Fossil fuel resources – and especially oil resources – are often associated with authoritarian governance, with civil conflict, and with international “petro-aggression,” of which the Russia–Ukraine conflict is an example. Proponents of the “rentier state” thesis tend to argue that while rentier profits are not determinative of political destiny, there is an inverse link between rentier income and democracy (Ross 2001, 332).

Some widely accepted explanations for the corrosive impact of rentier income on democracy suggest that rentier revenues bolster the state *vis-à-vis* civil society and finance patronage networks that pre-empt potential opposition. By reducing the state’s need to raise revenue through taxation, rentier revenues also minimize one of the key sources of demand for democratization (Kuru 2002). Other scholars point to fossil fuel companies’ complicity in human rights abuses in undermining democratic processes and maintaining colonial power structures and inequalities (e.g., Yusuf 2008).

Shell’s historical role in Nigeria is a notorious example of these dynamics. Shell and BP attained a virtual monopoly on oil exploration in Nigeria,

courtesy of preferential treatment by the British colonial government in the mid-20th century. Shell then gained such a dominant economic position that, after Nigeria won its independence in 1963, the company achieved political influence within a succession of both military and civilian governments. Shell's complicity with human rights abuses attracted global condemnation in 1995, when General Abacha's military regime executed Ken Saro-Wiwa and eight Ogoni activists who had been campaigning for Ogoni control of oil production and resources. The resulting international pressure played a role in the subsequent transition to elected civilian rule (Frynas, 2003; Holzer 2007; Yusuf 2008).

The rentier state thesis has a corollary in international politics. Lenin's (1916, 121) argument that rentier profits are central to *imperialist parasitism* is perhaps the most famous account of international rentier impacts. More recently, Jeff Colgan (2010) proposed the concept of "petro-aggression," which seeks to explain why oil-exporting states engage in more international aggression than non-oil-exporting states. Colgan's (2010) argument is simple: resource income allows "revolutionary governments" to finance conflict. In this account, domestic politics shape a state's appetite for military aggression, and material circumstances – such as financial resources – mediate whether it is acted on. Rentier income can thus enable military aggression, where resources were otherwise a constraining factor (Colgan 2010). Another strand of analysis – directly connected to Lenin's (1916) account of imperialism – focuses on the use of force by great powers (Price-Smith 2015). In this view, "asymmetric conflict" between greater powers and oil producers is often motivated by powerful states' desire to preserve hegemonic control over fossil fuels. Arguably, many of the United States' interventions in the Middle East since 1980 have been driven by a desire to "increase the availability" and "control the transit" of lucrative fossil fuels (Price-Smith 2015, xiv).

Of course, arguments about rentier governance are contested, and not even their strongest proponents argue that oil revenues *determine* state behavior. However, taken together, these lines of analysis support the general proposition that unequal access to the financial benefits of fossil fuel extraction tends to undermine both democracy and peace, which in turn has implications for the recognition and equal dignity of political communities.

---

### 3. The Infrastructure of Global Energy Governance

---

Global inequalities in energy access are primarily a consequence of patterns of uneven development established by the colonial world order. However, today, the infrastructure of global energy governance, which has evolved haphazardly in response to conflicting interests and contradictory global imperatives, has contributed to perpetuating energy sector inequalities (cf. Degens,



Hilbrich, and Lenz 2022, in this volume). Perhaps the key characteristic of global energy's physical and governance infrastructure is that it supplies the energy requirements of powerful states while imposing few restrictions on their freedom of action.

Powerful states typically regard energy security as part of their vital economic interests and even key to national security; thus, they are unwilling to surrender their control over energy decision-making to multilateral governance. Nevertheless, since states have a set of overlapping interests, they have joined together to create a wide range of agreements and organizations that govern energy, however weakly. Since energy is central to both economic development and military security, regulation of energy has been one factor driving the negotiation of the general institutions of global governance (e.g., the UN's early interest in nuclear energy and the European Coal and Steel Community's regulation of coal). However, the combination of powerful states seeking to safeguard their autonomy while also supporting weak multilateral efforts to secure global public goods has a predictable result: multilateral energy governance, on the one hand, *prompts* powerful states to consider global interests in their internal deliberations, and on the other hand, it *forcefully constrains* the energy choices of less powerful actors. That is to say, the conflicting imperatives motivating global energy governance often combine to amplify international power inequalities.

One helpful survey of energy governance identifies three major arenas of cooperation: energy supply (primarily guaranteeing supply for the Global North), energy access (for the Global South), and climate impacts (Cherp, Jewell, and Goldthau 2011). First, the institutions governing *energy supply* emerged following the 1970s oil shocks. Organizations representing producer states (Organization of the Petroleum Exporting Countries) and importers (International Energy Agency) both sought to maintain oil market stability through agreements governing output, reserves, and information sharing (Cherp, Jewell, and Goldthau 2011). These agreements are buttressed by security institutions, such as NATO, which formalized its role in protecting critical fossil fuel supply infrastructure since the addition of energy security to the NATO Strategic Concept in 2010 (Bocse 2020; Scheffer 2009).

A second arena of international cooperation is concerned with promoting *access to energy*. It mobilizes a different set of actors, which include "international development organisations, international and regional development banks, aid agencies of industrialised countries and large international NGOs" (Cherp, Jewell, and Goldthau 2011, 82). Critics point to the support these development agencies give to fossil fuel development through project finance, advisory services, and national budget support. For example, in 2019, the World Bank Group's active energy project portfolio included \$21 billion in fossil fuel financing and \$15 billion in renewables (including large-scale hydroelectricity) (Mainhardt 2021). The energy access agenda initially focused

on supporting the construction of national energy infrastructure, such as hydroelectric dams. However, since the 1980s, it has shifted toward promoting individual and household energy access. This shift converged with increasing attention to renewable energy and is epitomized by the UN SDG 7 (2015).

Finally, the negotiation of the UN Framework Convention on Climate Change (1992) marked the emergence of a climate regime whose central instrument, since the Paris Agreement (2015), has been the “Nationally Determined Contribution,” a nonbinding national plan to reduce GHG emissions and adapt to climate change.

The tensions between these three priorities – energy security, energy access, and climate change mitigation – are apparent in both domestic and international governance. The period following the inauguration of the climate-focused Biden administration and the onset of a global energy crisis in 2021 is illustrative of how governments struggle to juggle their commitments to climate action and the political pressures created by energy shortages. In April 2021, President Biden convened a Leaders Summit on Climate to motivate increased climate ambition and restrictions on fossil fuel financing.<sup>2</sup> However, just six months later at the October 2021 meeting of the G20, political leaders faced an emerging energy crisis. In response, the Biden administration and Western allies now demanded an *increase* in global oil production to protect an “energy system that ensures affordability, including for the most vulnerable households and businesses.”<sup>3</sup> One week later, at the Glasgow Conference of Parties to the United Nations Framework Convention on Climate Change, these same parties pledged to end the international financing of coal plants and gas exploration (the ban on gas exploration was adopted by a smaller group). By mid-2022, as the energy crisis was amplified by Russia’s war against Ukraine, many of 2021’s climate commitments were quietly shelved. For example, Germany announced the reopening of shuttered coal-fired power plants and demanded renewed international investments in gas exploration (Falconer 2022). At the time of writing in mid-2022, concerted American and European activity was seeking to shore up existing – and develop new – fossil fuel supplies (Ravikumar, Bazilian, and Webber 2022).

This series of events illustrates the way in which the interaction between the three arenas of energy governance systematically amplifies international inequalities by prioritizing rich world energy security above all other concerns. The first regime, which focuses on energy supply and effectively secures energy access for Organisation of Economic Co-operation and Development member states, has operated with remarkable consistency since the 1970s. Certainly, the intellectual and knowledge-sharing functions of the IEA have expanded to promote renewable energy, low-carbon innovation, and

---

<sup>2</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/23/fact-sheet-president-bidens-leaders-summit-on-climate/> (Accessed November 30, 2022).

<sup>3</sup> <http://www.g20.utoronto.ca/2021/211031-declaration.html> (Accessed November 30, 2022).

decarbonization; however, the IEA's emergency response mechanism and Western countries' energy security effectively remain a central focus.

In contrast, the energy access arena has seen dramatic changes. Three factors – the “greening” of development, a new focus on poverty alleviation, and the development of individual accountability mechanisms within the development finance regime complex – all combined to make international financing less amenable to *state priorities* in the Global South, even as development finance became more sensitive to both global priorities and to adverse impacts on local communities (Park 2022). The result has been a shift from financing centralized energy infrastructure to promoting decentralized energy access.

A second change has been directly motivated by climate concerns: international development agencies have announced an almost complete stop to financing fossil fuel developments, even as profit-oriented exploitation of fossil fuels has continued apace. The World Bank has long excluded nuclear energy projects from its financing rules (Pehuet Lucet 2019). In 2019, it also halted financing of upstream oil and gas and later went on to commit to financing almost only renewable energy (IEA and OECD 2022, 55). In 2021, the G7 reached an agreement to end fossil fuel financing. China's announcement in September 2021 that it would stop financing new offshore coal plants completed the shift. All major development agencies, which include both national agencies, such as the U.S. International Development Finance Corporation, and international ones, such as the Asian Development Bank, have now ended most financing for fossil fuel developments (there are some limited exceptions for fossil gas development) (IEA and OECD 2022, 55). Many private sector actors, including banks and sovereign wealth funds, have also pledged to end the financing of new fossil fuel development.

The IEA and OECD (2022, 55) describe the result as a “gradual tightening of the availability of finance for fossil fuel projects, including natural gas, in all parts of the world.” Since policy shifts by development agencies are comprehensive, they will constrain those countries that are dependent on development agencies for finance in ways that do not apply to those with alternative sources of finance. In other words, it is the formerly colonized states of the Global South whose policy autonomy is most constrained by global climate concerns. Fossil fuel developments servicing Western markets will also face higher financing costs but still have the potential to proceed, as they do not require development finance.

In energy governance, mechanisms that apply to all actors often take the form of nonbinding pledges that can be fairly readily reversed; for example, the Paris Agreement's system of “Nationally Determined Contributions” and the G20 pledge to end fossil fuel subsidies have not stopped Germany from expanding and supporting coal use during the 2022 energy crisis. Mechanisms expanding energy access in the Global South typically follow a similar

pattern. For example, SGDs are primarily implemented via “nationally owned and country-led” strategies.<sup>4</sup> In contrast, decisions made by development agencies to end financing for certain types of investment limit sovereign autonomy comprehensively. We conclude that multilateral energy governance *gently prompts* powerful states to consider global interests but forcefully *constrains* less powerful actors in their energy choices. This outcome is not necessarily the deliberate intent of policymakers. It is a consequence of conflicting global priorities intersecting in the context of profound global inequality.

---

#### 4. Global Interests in National Democratic Decision-Making

---

In almost every national context, national political preferences are occasionally in tension with measures that would provide the most rapid progress toward net zero emissions. In this section, we summarize two difficult and highly contentious decision arcs. Our goal is to show that in both cases, in addition to the strong normative case to prioritize the mitigation of GHG emissions, there are also influential considerations – whether they appear legitimate to outsiders or not – that favor policies that prioritize other national goals ahead of mitigation. However, whereas Germany has the capacity to select a higher-emissions pathway, Nigeria is struggling to implement an energy path that aligns with its citizens’ interests and preferences.

##### Germany

When, in the late 1970s, Social Democrat German Chancellor Helmut Schmidt was briefed on climate change, its future risks, and fossil fuel burning as its chief cause, his reaction was to push for an accelerated expansion of nuclear energy (Der Spiegel 1979). His vision was for German electricity to be largely nuclear energy-based and emission-free by 2010. Schmidt reportedly argued, when speaking to the board of the Social Democrats: “In 2010 we will not have any oil anymore. All cars will run on batteries. For that, we will need nuclear plants, so that batteries can be charged from power sockets” (Der Spiegel 1979, our translation).

In terms of engineering and economics, the German nuclear industry was in a good position to accomplish Schmidt’s vision. Cost increases in nuclear power plant construction had been moderate compared with the experience in the United States (Lovering, Yip, and Nordhaus 2016, Fig. 7) and build times for the large light water reactors completed in the 1980s were between six and

---

<sup>4</sup> <https://www.un.org/sustainabledevelopment/development-agenda/> (Accessed October 21, 2022).

ten years (IAEA 2021, Table 5). For Schmidt and contemporary advocates of nuclear energy, to the extent that they subscribed to the notion of energy justice, it included a clear mandate to expand German nuclear energy production much further. Continuing to rely on fossil fuels was irresponsible, according to Schmidt. He reportedly told colleagues on the Social Democratic Party board: “The combustion of any type of hydrocarbon leads to dangerous heating of Earth. ... the consequences will be starvation catastrophes that overshadow anything we have seen so far in Sahel” (Der Spiegel 1979, our translation). Schmidt saw nuclear energy as the only scalable climate-neutral energy source capable of powering an industrial society.

However, public support for the further expansion of nuclear energy had already begun to crumble when Schmidt announced his ambitious plans, even within his own party. Schmidt was replaced as chancellor by Helmut Kohl in 1982, when Social Democrats lost office to Christian Democrats. From that moment on, no further reactor projects were initiated, and it seems likely that nuclear power already lacked popular support (Radkau and Hahn 2013, Chapter V). Environmental groups attacked nuclear energy, not fossil fuels, presumably because the risks of nuclear accidents and the challenges of nuclear waste disposal loomed larger for them than the threat of climate change (though further cultural factors may also have played an important role) (Radkau and Hahn 2013, Chapter IV). Later, in 1998, a coalition of Social Democrats and Greens, elected with an overwhelming parliamentary majority, began to implement an election promise to achieve a complete phaseout of nuclear energy by the 2020s (nuclear energy supplied about one-third of German electricity throughout the 1990s). This decision was briefly postponed by the Merkel administration in 2010 and then again accelerated after the Fukushima accident in 2011.

As Russia expanded its war against Ukraine in February 2022, Germany revisited this dilemma in a time of crisis: Would it proceed with closing its final nuclear plants, even though the result would be increased fossil fuel purchases from Vladimir Putin’s murderous regime, increased local coal consumption, and higher GHG emissions? Or would state leaders extend the life of nuclear plants, even though doing so would overturn a deep, longstanding democratic consensus and create tensions within the governing political parties? Critical voices arguing that this – democratically based – decision prioritized public anxieties ahead of an evidence-based assessment of safety (Jarvis et al. 2019) have recently become more influential. They are stimulated by concern over the decision by German authorities to reactivate previously shuttered coal plants in July 2022 (Falconer 2022). At the time of writing in mid-2022, these questions have not yet been resolved.

A more complete assessment of Germany’s energy strategy and its evolution over time would consider other aspects unrelated to nuclear energy. For example, one may argue that Germany’s generous consumer subsidies for

solar power in the last two decades have been in the service of energy justice because, as chronicled by Nemet (2019), they have contributed to reducing the costs of solar technology globally, thereby incrementally reducing energy poverty. Assessing to what extent they did so, whether the same benefits for solar could have been achieved while prioritizing a transition away from coal rather than nuclear, and at the expense of which other options, is beyond the scope of this paper.

## Nigeria

Although Nigeria is a major oil exporter, its fossil fuel resources have scarcely been utilized domestically (per capita CO<sub>2</sub> emissions were 0.61 tonnes<sup>5</sup>). Under the Buhari administration (since 2015), Nigerian political leaders have become vocal opponents of international moves to end development finance for downstream gas infrastructure. Completion of Africa's largest fertilizer production facility in March 2022 – the Dangote Fertilizer plant – was a significant step toward the administration's development goal. The plant promises not only to make Nigeria self-sufficient in fertilizer but also to supply its neighbors. Here, the Nigerian government ignored those sections of the international community that advise African countries to “leapfrog” fossil fuels and rely exclusively on renewable energy for their development.

Nigeria also faces an ongoing dilemma concerning fuel subsidies. Efforts by previous Nigerian administrations to eliminate fuel subsidies triggered mass protests in the country, and polling evidence suggests that the subsidy regime continues to enjoy strong public support (McCulloch, Moerenhout, and Yang 2021). Nevertheless, international economic agencies advise that ending domestic fuel subsidies would increase Nigeria's economic efficiency and human welfare while reducing carbon emissions. Later, we discuss the political feasibility consideration that appears to underpin Nigerian public support for this seemingly irrational policy.

Writing in *Foreign Affairs* in 2021, Yemi Osinbajo, Nigeria's vice president, sets out a detailed argument for gas development in sub-Saharan Africa, emphasizing human rights, equity, and rejection of Western hypocrisy. Osinbajo argues that the internationally recognized rights to sustainable development and poverty eradication should not be sacrificed for climate goals. Gas's contribution to industry, fertilizer production, and cooking – in addition to power generation – means that it makes a vital contribution to development and human dignity. Since newly built gas infrastructure has an expected lifespan of only 20-25 years, Osinbajo argues that utilizing gas as a transition fuel is now consistent with Nigeria meeting a net zero target by 2050. Given that Nigeria's

---

<sup>5</sup> <https://www.icos-cp.eu/science-and-impact/global-carbon-budget/2021> (Accessed October 21, 2022); <https://ourworldindata.org/grapher/co-emissions-per-capita> (Accessed October 21, 2022).

current per capita GHG emissions are less than 10% of that of the EU (its share of historical emissions is even lower) and given that most Western powers include gas in their long-term planning (Japan, UK, Belgium, Germany, and the United States), Osinbajo points to a basic injustice in moves by international development financing institutions (such as the U.S. International Development Finance Corporation and the World Bank's International Finance Corporation) to limit financing for gas development in Africa (2021). In the context of continuing Western support for projects that develop African fossil fuel resources for export, Osinbajo implies that opposition to development assistance for African gas development is hypocritical. Significantly, the IEA and OECD (2022) support both Osinbajo's arguments concerning gas's essential role in development and the need for continuing development finance.

Opponents of development assistance for fossil fuels typically deny that fossil gas can enable human development in Africa, deny that fossil fuel development enjoys popular support, and deny that development and poverty reduction are the real goals of Nigerian elites. Instead, they suggest that existing "investment patterns show this rush for gas and oil has nothing to do with increasing energy access for Africa. It has everything to do with propping up fossil fuel dependent economies of the North" (Oil Change International 2022). Critics are correct when they claim that the majority of African fossil fuel development is intended for export markets. However, this is not inconsistent with Osinbajo's argument: the case for development assistance responds to the difficulty of financing precisely those projects that will benefit poor local communities. It is also possible that Osinbajo's campaign is disingenuous – and that the real purpose of the Nigerian government's campaign is to preserve elite access to fossil fuel rents. However, if we take both sides' rhetoric at face value, then their disagreement is factual rather than normative. It concerns whether development finance can be targeted in ways that will benefit low-income communities.

Although neither the German nor Nigerian situation has reached a final resolution, at the time of writing, Germany has reopened shuttered coal-fired power stations, while Nigeria is continuing its campaign to source development finance for downstream gas projects.

---

## 5. Toward a Governance Infrastructure that Responds to Local–Global Tensions

---

In this section, we first outline some causes of the tension between democratic autonomy and global energy justice. Next, we offer a preliminary analysis of the kind of global decision-making infrastructure that might respond to these tensions in ways that promote justice.

In light of our previous discussion, most current energy-linked inequalities are seen to be products of the background inequalities of the contemporary global order, rather than injustices that are *sui generis* within energy governance. Consequently, we cannot expect energy governance to be the single site that provides restitution for colonial harm and unjust economic structures. However, neither should the infrastructure of energy governance utilize background inequalities, such as the Global South's dependence on international finance, to impose additional restrictions on national autonomy. We suggest that mechanisms will be more consistent with equity and energy justice if they prompt all national communities to deliberate on global priorities as they develop their energy policies, generate additional support for low-carbon development without prohibiting alternatives, and/or regulate international trade in fossil fuels multilaterally.

Why do we suggest that the tension between democratic and global priorities is inherent and inevitable? As a first cut at an explanation, we might point to a classic collective action problem: where the benefits of a specific energy choice accrue locally (e.g., more abundant energy or elimination of local environmental harms) and costs are negative externalities (e.g., future climatic change), democratic local decision-making can be anticipated to give sub-optimal weight to global challenges (Gardiner 2011; Olson 2009). This is one of the primary factors that explains the explorative, facilitative, inclusive, and noncoercive character of climate governance as it applies to affluent states (Cherp, Jewell, and Goldthau 2011, 82-5). Periodic conferences, reviews, and pledges are intended to raise the profile of global priorities within national policymaking and to create a sense of shared global progress. The logic of collective action suggests that if national communities are asked to make near-term sacrifices for climate goals, they are more likely to do so if they are assured that others elsewhere are making similar efforts.

An analysis of the material interests and instrumental logics underpinning a collective action problem explains only one part of the conflict between democracy and energy justice. The debate over "energy democracy" and justice points to wider elements of these tensions. *Energy democracy* is a relatively new term in the academic literature that describes both an ideal and a process of "strengthening and realisation of the right of participation of the individual and of the collective in decision-making on energy policies, in pursuit of more equitable and sustainable energy outcomes, including enhanced ownership of energy systems" (Droubi, Heffron, and McCauley 2022, 4). Its advocates also commonly claim that decentralized renewable energy is more conducive to democratic politics than centralized thermal generation (Burke and Stephens 2018); these are claims that, in our view, are hard to reconcile with the higher levels of unionization at thermal generation facilities than in the renewable sector and with the prevalence of nuclear power in European social democracies. Energy democracy's inherent connection to a specific ideal



energy system marks an important difference from the idea of “democratic autonomy,” which is our concern. However, energy democracy refers to a specific ideal of democratic autonomy. The emerging critical literature concerning the tensions between energy democracy and energy justice points to ways in which “energy democracy” in one community can displace injustices to other places. For example, Lennon (2021) examines how a community-owned solar power generator whose decisions seek to advance the interests of the local community will typically contribute to forced labor and environmental harm in the supply chain of solar panels (see also Sweeney 2021).

This critical energy democracy literature increasingly recognizes tendencies for local participatory initiatives to fail to attend to the global systems that shape their choices (injustices embodied in production, trade, finance, etc.), to inadvertently exclude communities who have less capacity to be recognized on their own terms in the democratic process, and to displace environmental problems to other locations (Droubi, Heffron, and McCauley 2022; Lennon 2021). Critical scholars have also noted that the concept of energy democracy has arisen within affluent European and North American contexts in which political enfranchisement and energy access are relatively assured. It cannot be assumed that the Western “energy democracy” ideal of local ownership and participation in the governance of distributed grids is the path through which energy-impooverished communities will seek to achieve universal electricity access, nor can we assume that distributed, community-owned, or renewable energy will even be viewed as an ideal by people the world over. Historically, universal energy access has usually been first achieved by centralized, state-owned utilities.

Research into Nigerian attitudes toward fuel reform points to another wrinkle in the relationship between local concerns and global priorities: democratic choices typically reflect beliefs concerning feasibility that are grounded in local experience (McCulloch et al. 2021; see also Jewell and Cherp 2020). To outsiders, public support for fuel subsidies in Nigeria might appear paradoxical in that subsidies tend to be economically regressive, inefficient, and environmentally harmful. Why would the public not embrace reform? A mass opinion survey conducted in Nigeria in 2018 found that the people who are most strongly opposed to reform are those who believe “the government is corrupt” or that the government “lacks the capacity to implement compensation programs” (McCulloch et al. 2021). It seems that knowledge that the redirection of fuel subsidies into other, more effective forms of compensation could *theoretically* benefit most people does not make them support reform. Presumably, this is because people’s image and experience of government makes them doubt that this outcome is *feasible* in practice. A similar analysis might explain the German public’s unwillingness to accept empirical analysis that finds vast economic, climate, and health benefits from prioritizing the closure of coal-fired power stations rather than

nuclear closures (Jarvis, Deschenes, and Jha 2022). Distrust of government, and of nuclear power, is often highest among marginal communities (and women) who have good historical reasons to suspect that the state might not safeguard their well-being (Abdulla, Vaishnav, and Victor 2019).

The complexity of global energy governance and public attitudes toward energy, together with the enormous political challenges of mobilizing support for an energy transition that will optimize energy security, energy access, and climate outcomes, suggest that there is no single ideal solution for energy transitions or their governance. As Cherp, Jewell, and Goldthau (2011, 75) write, “governing complex systems and governing transitions requires striking a tenuous balance between exploitation, determination and efficiency on the one hand and exploration, flexibility and diversity on the other.” If political support for a just low-carbon transition is to be sustained, respect for local decision-making autonomy may not simply be a requirement of recognitional justice; it may also be a strategic necessity. By making this claim, we are not denying that it might be possible to achieve a global low-carbon transition in which countries of the Global South are denied certain energy choices. However, the likelihood is that such a model would amount to a form of energy apartheid in which today’s patterns of radically unequal energy access persist far into the future. Indeed, most mitigation pathways utilized by the IPCC anticipate that less developed countries should carry the burden of mitigation, while developed countries continue to increase their energy consumption (Kanitkar, Mythri and Jayaraman 2022).

One counterargument suggests that ending development financing for gas developments is not coercive; in this view, Nigeria still has democratic autonomy to build gas infrastructure if it wishes but has no automatic right to draw on international financing, let alone development assistance, to support a globally harmful development. The problem with this argument is that it tacitly accepts the existing international economic order, with its radically unequal distribution of human development and political autonomy, as a viable baseline. Governance approaches that restrict the already constrained democratic autonomy of the Global South are inconsistent with the principles of recognitional and procedural justice. A second likely objection holds that the continued financing of fossil fuel development in the Global South might enrich elites at the expense of ordinary people. This objection is reasonable and deserves scrutiny on a case-by-case basis. However, we have many examples that suggest that welfare benefits to ordinary people from downstream gas development can be significant (Roy et al. [2020] and Roy [2021] outline this argument as applied to Bangladesh). Consequently, restrictions on development financing motivated by these objections should be conditions requiring pro-poor development projects rather than restrictions based on specific types of development.

How can the infrastructure of global governance respond to the tensions between democratic autonomy and global energy justice in ways that are consistent with procedure/recognition justice? A first suggestion is the further development of infrastructure that prompts all national communities to deliberate on global priorities as they develop their energy policies. Such mechanisms may not achieve rapid change, but they do have the advantage that they do not compromise the political autonomy of low-income communities disproportionately. Models of international human rights reviews or of climate governance – such as nationally determined contributions – that have been accepted by powerful Western states as appropriate ways to align their own domestic policy-making with global priorities provide one useful model. Such approaches do not directly restrict national autonomy. Instead, they provide rhetorical resources for domestic advocates of global goals (climate mitigation, adaptation, and energy access) and create moments where decision-makers must justify their choices with respect to global priorities.

A second type of approach is to mobilize additional international resources to finance mitigation and adaptation (e.g., the Green Climate Fund [GCF]). Since such initiatives have a greater influence on the capital-constrained communities of the Global South, they also have the potential to exploit international power inequalities. Indeed, the GCF has been criticized for entrenching neoliberal governance (Bracking 2015). However, to the extent that climate-focused measures are *additional to existing sources of finance*, they expand rather than restrict democratic autonomy. Moreover, if such funds are multilaterally governed – as was a central demand of the G77 in the negotiation of the Green Climate Fund – their potential to function as mechanisms of Western influence is diluted.

A third approach might seek to govern trade in fossil fuels on a multilateral basis to minimize adverse impacts on governance and climate. This is a path that the international community has not taken to date, precisely because it would begin to limit the supply of fossil fuels to powerful states. Nevertheless, a wide range of proposals – ranging from denying market access or shipping to fossil fuels sourced in oppressive states through a global carbon price and coal-exporter taxes, to an international treaty imposing a progressive moratorium on fossil fuels – have been put forward (Le Billon and Kristoffersen 2020; Wenar and Kouris 2018). Any such supply-side climate policy would constrain the choices of all communities to some degree and might potentially have marginal adverse impacts on energy access that should be compensated for. However, if a treaty regulating fossil fuel trade were applied universally, its impacts would be proportional to fossil fuel use and so would primarily impact those affluent communities whose fossil fuel usage is highest.

---

## 6. Conclusion

---

It is widely appreciated that climate change reflects a collective action problem (Gardiner 2011). Using fossil fuels for energy generation and other purposes has historically benefited local actors, whether individuals or communities, because fossil fuels have been relatively cheap and useful for a large variety of purposes. The dramatic costs of fossil fuels in terms of health and well-being, in contrast, are in large part borne by people, today and in the future, who hardly benefit from fossil fuel burning (IPCC 2022a). To the extent that these costs arise from anthropogenic climate change, they are “socialized” on a global scale. This creates incentives for free riding and makes it very hard to eliminate emissions from fossil fuel burning anywhere, as long as fossil fuels are the cheapest energy sources for a variety of applications.

This analysis, sketchy as it is, suggests that local *self-interests*, legitimate and understandable as they may be, are one significant cause of climate-linked injustice – to the extent that fossil fuel burning for energy generation constitutes an injustice as it fuels climate change. Our analysis, as presented in the previous sections, does not dispute this analysis, but it sharpens it further, particularly as we point to i) considerations of political feasibility that ground community energy choices and ii) how the emergence of a discourse that recognizes the costs of fossil fuels, but not their benefits, has facilitated unequal and hypocritical decision-making in global energy governance.

Our analysis sought to draw an analogy between German and Nigerian dilemmas that reflect tensions between *democratic autonomy* and *global energy justice*. However, we argue that although similar tensions between democracy and energy justice are ubiquitous, differently situated political communities have unequal capacities to respond autonomously to these dilemmas. The background inequalities of international politics ensure that rich Western states (e.g., Germany, Japan, or the United States) and the most powerful developing states (e.g., China) have much greater autonomy than capital-constrained countries in the Global South (e.g., Nigeria). The result is an international energy injustice that is often overlooked, even by civil society advocates of energy justice: inequality in political autonomy with respect to energy choices. Since unjust colonial legacies are most commonly corrected through state political agency – rather than simply the identification of injustice – the question of political autonomy is impactful (Roy and Foreman 2021; Sullivan and Hickel 2023).

We believe that, fortunately, this element of energy injustice can potentially be mitigated. Governance infrastructure that prompts national communities to deliberate on global interests, that mobilize additional resources for climate mitigation, or that regulate trade in fossil fuels multilaterally all have the potential to advance distributional justice without exploiting or

accentuating other inequalities. However, as the last four decades of climate governance have shown, measures that constrain powerful states' democratic autonomy face overwhelming political opposition. In contrast, measures that constrain the South's developmental choices face less resistance. As they seek to advance climate mitigation internationally, proponents of energy justice should be mindful that tensions between democracy and justice are inherent and universal.

---

## References

---

- Abdulla, Ahmed, Parth Vaishnav, Brian Sergi, and David Victor. 2019. Limits to deployment of nuclear power for decarbonization: Insights from public opinion. *Energy policy* 129: 1339-1346.
- Azam, Anam, Muhammad Rafiq, Muhammad Shafique, Haonan Zhang, Muhammad Ateeq, and Jiahai Yuan. 2021. Analyzing the relationship between economic growth and electricity consumption from renewable and non-renewable sources: Fresh evidence from newly industrialized countries. *Sustainable Energy Technologies and Assessments* 44 (2021): 100991.
- Bazilian, Morgan, and Roger Pielke. 2013. Making energy access meaningful. *Issues in science and technology* 29 (4): 74-78.
- Besio, Cristina, Nadine Arnold, and Dzifa Ametowobla. 2022. Participatory Organizations as Infrastructures of Sustainability? The Case of Energy Cooperatives and Their Ways for Increasing Influence. *Historical Social Research* 47 (4): 91-113. doi: [10.12759/hsr.47.2022.40](https://doi.org/10.12759/hsr.47.2022.40).
- Bhatia, Mikul, and Niki Angelou. 2015. Beyond Connections: Energy Access Redefined. ESMAP Technical Report; 008/15. World Bank, Washington, DC. <https://openknowledge.worldbank.org/handle/10986/24368> (Accessed July 23, 2022).
- Bocse, Alexandra-Maria. 2020. NATO, energy security and institutional change. *European security* 29 (4): 436-455.
- Bracking, Sarah. 2015. The anti-politics of climate finance: the creation and performativity of the green climate fund. *Antipode* 47 (2): 281-302.
- Buchanan, Allen, and Robert O. Keohane. 2006. The legitimacy of global governance institutions. *Ethics & international affairs* 20 (4): 405-437.
- Burke, Matthew J., and Jennie C. Stephens. 2018. Political power and renewable energy futures: A critical review. *Energy Research & Social Science* 35: 78-93.
- Cherp, Aleh, Jessica Jewell, and Andreas Goldthau. 2011. Governing global energy: systems, transitions, complexity. *Global Policy* 2 (1): 75-88.
- Colgan, Jeff D. 2010. Oil and revolutionary governments: Fuel for international conflict. *International Organization* 64 (4): 661-694.
- Degens, Philipp, Iris Hilbrich, and Sarah Lenz. 2022. Analyzing Infrastructures in the Anthropocene. *Historical Social Research* 47 (4): 7-28. doi: [10.12759/hsr.47.2022.36](https://doi.org/10.12759/hsr.47.2022.36)
- Der Spiegel. 1979. Kernenergie: Der Kanzler geht aufs Ganze. 1979. *Der Spiegel* (17 June). <https://www.spiegel.de/politik/kernenergie-der-kanzler-geht-aufs-ganze-a-e8ebb4ad-0002-0001-0000-000040349636> (Accessed July 21, 2022).

- Droubi, Sufyan, Raphael J. Heffron, and Darren McCauley. 2022. A critical review of energy democracy: A failure to deliver justice? *Energy Research & Social Science* 86: 102444.
- Eurostat. 2022. *Energy Consumption in households*, updated 2022, available at: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy\\_consumption\\_in\\_households](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households) (Accessed July 21, 2022).
- Falconer, Rebecca. 2022. Germany to fire up coal plants as Russia cuts gas supply. *Axios* (June 20). <https://www.axios.com/2022/06/20/germany-coal-plant-increase-russia-cuts-gas-supply> (Accessed July 23, 2022).
- Frynas, Jędrzej George. 2003. The oil industry in Nigeria: conflict between oil companies and local people. In *Transnational Corporations and Human Rights*, ed. Jędrzej George Frynas and Scott Pegg, 99-114. London: Palgrave Macmillan.
- Fuller, Richard, Philip J. Landrigan, Kalpana Balakrishnan, Glynda Bathan, Stephan Bose-O'Reilly, Michael Brauer, Jack Caravanos, et al. 2022. Pollution and health: a progress update. *The Lancet Planetary Health* 6.
- Fuller, Sara, and Darren McCauley. 2016. Framing energy justice: perspectives from activism and advocacy. *Energy Research & Social Science* 11: 1-8.
- Gardiner, Stephen M. 2011. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*. Oxford: Oxford University Press.
- Holzer, Boris. 2007. Framing the corporation: Royal Dutch/Shell and human rights woes in Nigeria. *Journal of Consumer Policy* 30 (3): 281-301.
- Huber, Veronika, Cristina Peña Ortiz, David Gallego Puyol, Stefan Lange, and Francesco Sera. 2022. Evidence of rapid adaptation integrated into projections of temperature-related excess mortality. *Environmental Research Letters* 17 (4): 044075.
- IAEA. 2021. Country Nuclear Power Profiles: Germany, updated 2021. <https://cnpp.iaea.org/countryprofiles/Germany/Germany.htm> (Accessed July 21, 2022).
- IEA, IRENA, UNSD, World Bank, and WHO. 2022. Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC. License: Creative Commons Attribution – NonCommercial 3.0 IGO (CC BY-NC 3.0 IGO).
- IEA, and OECD. 2022. Africa Energy Outlook. 2022. *World Energy Outlook Special Report. Fance: International Energy Agency*. <https://iea.blob.core.windows.net/assets/6fa5a6c0-ca73-4a7f-a243-fb5e83ecfb94/AfricaEnergyOutlook2022.pdf> (Accessed July 23, 2022).
- Iñaki, Arto, Iñigo Capellán-Pérez, Rosa Lago, Gorka Bueno, Roberto Bermejo. 2016. The energy requirements of a developed world. *Energy for Sustainable Development* 33: 113.
- IPCC. 2022a. Summary for Policymakers. In *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Hans-O. Pörtner, Debra C. Roberts, Melinda M. B. Tignor, Elvira S. Poloczanska, Katja Mintenbeck, Andrés Alegria, Marlies Craig, et al. Cambridge: Cambridge University Press.
- IPCC. 2022b. Summary for Policymakers. In *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Jim Skea, Priyadarshi R. Shukla, Andy Reisinger, Raphael Slade, Minal Pathak, Alaa Al Khourdajie, Renée van Diemen, et al. Cambridge: Cambridge University Press, Cambridge.

- [https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC\\_AR6\\_WGIII\\_SP\\_M.pdf](https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SP_M.pdf) (Accessed November 30, 2022).
- Jarvis, Stephen, Olivier Deschenes, and Akshaya Jha. 2022. The private and external costs of Germany's nuclear phase-out. *Journal of the European Economic Association* 20 (3): 1311-1346.
- Jewell, Jessica, and Aleh Cherp. 2020. On the political feasibility of climate change mitigation pathways: is it too late to keep warming below 1.5° C? *Wiley Interdisciplinary Reviews: Climate Change* 11 (1): 621.
- Kanitkar, Tejal, Akhil Mythri, and T. Jayaraman. 2022. "Equity Assessment of Global Mitigation Pathways in the IPCC Sixth Assessment Report." OSF Preprints. November 3. doi: [10.31219/osf.io/p46ty](https://doi.org/10.31219/osf.io/p46ty).
- Kuru, Ahmet. 2002. The Rentier State Model and Central Asian Studies: The Turkmen Case. *Alternatives: Turkish Journal of International Relations* 1 (1).
- Le Billon, Philippe, and Berit Kristoffersen. 2020. Just cuts for fossil fuels? Supply-side carbon constraints and energy transition. *Environment and Planning A: Economy and Space* 52 (6): 1072-1092.
- Lenin, Vladimir. 1916. *Imperialism, the Highest Stage of Capitalism*. Peking: Foreign Languages Press.
- Lennon, Myles. 2021. Energy transitions in a time of intersecting precarities: From reductive environmentalism to antiracist praxis. *Energy Research & Social Science* 73: 101930.
- Lovering, Jessica R., Arthur Yip, and Ted Nordhaus. 2016. Historical construction costs of global nuclear power reactors. *Energy policy* 91: 371-382.
- Mainhardt, Heike. 2019. World Bank Group Financial Flows undermine the Paris Climate Agreement: The WBG contributes to higher profit margins for oil, gas, and coal. *Urgewald eV*. <https://www.urgewald.org/shop/world-bank-group-financial-flows-undermine-paris-climate-agreement> (Accessed October 21, 2022).
- Martinez, Daniel M., and Ben W. Ebenhack. 2008. Understanding the role of energy consumption in human development through the use of saturation phenomena. *Energy Policy* 36 (4): 1430-1435.
- McCauley, Darren A., Raphael J. Heffron, Hannes Stephan, and Kirsten Jenkins. 2013. Advancing energy justice: the triumvirate of tenets. *International Energy Law Review* 32 (3): 107-110.
- McCulloch, Neil, Tom Moerenhout, and Joonseok Yang. 2021. Fuel subsidy reform and the social contract in Nigeria: A micro-economic analysis. *Energy policy* 156: 112336. [https://www.re-course.org/wp-content/uploads/2021/12/World-Bank%E2%80%99s-Development-Policy-Finance-2015-to-2021-Stuck-in-a-carbon-intensive-rut\\_final.pdf](https://www.re-course.org/wp-content/uploads/2021/12/World-Bank%E2%80%99s-Development-Policy-Finance-2015-to-2021-Stuck-in-a-carbon-intensive-rut_final.pdf) (Accessed October 21, 2022).
- Nadimuthu, Lalith, Pankaj Raj, and Kirubakaran Victor. 2022. Environmental friendly micro cold storage for last-mile Covid-19 vaccine logistics. *Environmental Science and Pollution Research* 29 (16): 23767-23778.
- Nemet, Gregory F. 2019. *How Solar Energy Became Cheap: A Model for Low-Carbon Innovation*. London: Routledge.
- Oil Change International. 2022. *Response: International Energy Agency understates gas expansion risks for African communities, jobs, and climate* (June 20). <https://priceofoil.org/2022/06/20/response-international-energy-agency-understates-gas-expansion-risks-for-african-communities-jobs-and-climate/> (Accessed October 21, 2022).

- Olson, Mancur. 2009. *The logic of collective action*. Cambridge: Harvard University Press.
- Osinbajo, Yemi. 2021. The Divestment Delusion: Why Banning Fossil Fuel Investments Would Crush Africa. *Foreign Affairs* (Augst, 31). <https://www.foreignaffairs.com/articles/africa/2021-08-31/divestment-delusion> (Accessed October 21, 2022).
- Oswald, Yannick, Anne Owen, and Julia K. Steinberger. 2020. Large inequality in international and intranational energy footprints between income groups and across consumption categories. *Nature Energy* 5 (3): 231-239.
- Park, Susan. 2022. *The Good Hegemon: US Power, Accountability as Justice, and the Multilateral Development Banks*. Oxford: University Press.
- Pehuet Lucet, Fabienne. 2019. Conditions and possibilities for financing new nuclear power plants. *The Journal of World Energy Law & Business* 12 (1): 21-35. doi: 10.1093/jwelb/jwy032.
- Pellegrini-Masini, Giuseppe, Alberto Pirni, and Stefano Maran. 2020. Energy justice revisited: A critical review on the philosophical and political origins of equality. *Energy Research & Social Science* 59: 101310.
- Price-Smith, Andrew T. 2015. *Oil, illiberalism, and war: An analysis of energy and US foreign policy*. Cambridge, Massachusetts: MIT Press.
- Radkau, Joachim and Hahn Lothar. 2013. *Aufstieg und Fall der deutschen Atomwirtschaft*. München: oekom.
- Ravikumar, Arvind P., Morgan Bazilian, and Michael E. Webber. 2022. The US role in securing the European Union's near-term natural gas supply. *Nature Energy* 7: 465-467.
- Ross, Michael L. 2001. Does Oil Hinder Democracy? *World Politics* 53 (3).
- Roy, Joyashree. 2021. Basket Case to Beacon: How Bangladesh Transformed Itself into a Modern and Resilient Society *Breakthrough Journal* (August 16). <https://thebreakthrough.org/journal/no-14-summer-2021/bangladesh-energy-beacon> (Accessed October 21, 2022).
- Roy, Joyashree, and Chris Foreman. 2021. Ecomodern Justice. *Breakthrough Journal* (August 16). <https://thebreakthrough.org/journal/no-14-summer-2021/ecomodern-justice-summer-issue-intro> (Accessed October 21, 2022).
- Roy, Joyashree, Hasan Mahmud, Mohsen Assadi, Niyaz Iman, and Homam Nikpey. 2020. Moving beyond Gas: Can Bangladesh Leapfrog and Make the Energy Transition Just by Exploring the Role of Geothermal Energy and Gas Infrastructure? *International Energy Journal* 20 (3A).
- Scheffer, Jaap De Hoop. 2009. Speech by NATO Secretary General Jaap de Hoop Scheffer on Security Prospects in the High North. *Brussels: NATO*. [https://www.nato.int/cps/en/natohq/opinions\\_50077.htm](https://www.nato.int/cps/en/natohq/opinions_50077.htm) (Accessed October 21, 2022).
- Sovacool, Benjamin K., Matthew Burke, Lucy Baker, Chaitanya Kumar Kotikalapudi, and Holle Wlokas. 2017. New frontiers and conceptual frameworks for energy justice. *Energy Policy* 105: 677-691.
- Sullivan, Dylan, and Jason Hickel. 2023. Capitalism and extreme poverty: A global analysis of real wages, human height, and mortality since the long 16th century. *World Development* 161 (2023): 106026.
- Sweeney, Sean. 2021. Sustaining the Unsustainable: Why Renewable Energy Companies Are Not Climate Warriors. *New Labor Forum* 30 (3): 104-110.
- Szulecki, Kacper. 2018. Conceptualizing energy democracy. *Environmental Politics* 27 (1): 21-41.



- Wenar, Leif, and Ioannis Kouris. 2018. Shipping policy to fight the resource curse. *Global Policy* 9 (2): 184-192.
- Yusuf, Hakeem. 2008. Oil on troubled waters: Multinational corporations and realising human rights in the developing world, with specific reference to Nigeria. *African human rights law journal* 8 (1): 79-107.

All articles published in HSR Special Issue 47 (2022) 4:  
Infrastructures & Ecology

Introduction

Philipp Degens, Iris Hilbrich & Sarah Lenz

Analyzing Infrastructures in the Anthropocene.

doi: [10.12759/hsr.47.2022.36](https://doi.org/10.12759/hsr.47.2022.36)

Contributions

Sheila Jasanoff

Spaceship or Stewardship: Imaginaries of Sustainability in the Information Age.

doi: [10.12759/hsr.47.2022.37](https://doi.org/10.12759/hsr.47.2022.37)

Dominic Boyer

Infrastructural Futures in the Ecological Emergency: Gray, Green, and Revolutionary.

doi: [10.12759/hsr.47.2022.38](https://doi.org/10.12759/hsr.47.2022.38)

Simone Schiller-Merkens

Social Transformation through Prefiguration? A Multi-Political Approach of Prefiguring Alternative Infrastructures.

doi: [10.12759/hsr.47.2022.39](https://doi.org/10.12759/hsr.47.2022.39)

Cristina Besio, Nadine Arnold & Dzifa Ametowobla

Participatory Organizations as Infrastructures of Sustainability? The Case of Energy Cooperatives and Their Ways for Increasing Influence.

doi: [10.12759/hsr.47.2022.40](https://doi.org/10.12759/hsr.47.2022.40)

Giacomo Bazzani

Money Infrastructure for Solidarity and Sustainability.

doi: [10.12759/hsr.47.2022.41](https://doi.org/10.12759/hsr.47.2022.41)

Jonas van der Straeten

Sustainability's "Other": Coming to Terms with the Electric Rickshaw in Bangladesh.

doi: [10.12759/hsr.47.2022.42](https://doi.org/10.12759/hsr.47.2022.42)

Mathilda Rosengren

When Infrastructures and Ecological Actors Meet: Resituating "Green" Infrastructures through the History of the Willow Tree.

doi: [10.12759/hsr.47.2022.43](https://doi.org/10.12759/hsr.47.2022.43)

Bronislaw Szerszynski

Infrastructuring as a Planetary Phenomenon: Timescale Separation and Causal Closure in More-Than-Human Systems.

doi: [10.12759/hsr.47.2022.44](https://doi.org/10.12759/hsr.47.2022.44)

Stephen C. Slota & Elliott Hauser

Inverting Ecological Infrastructures: How Temporality Structures the Work of Sustainability.

doi: [10.12759/hsr.47.2022.45](https://doi.org/10.12759/hsr.47.2022.45)

All articles published in HSR Special Issue 47 (2022) 4:  
Infrastructures & Ecology

Lisa Suckert & Timur Ergen

Contested Futures: Reimagining Energy Infrastructures in the First Oil Crisis.

doi: [10.12759/hsr.47.2022.46](https://doi.org/10.12759/hsr.47.2022.46)

Vincent Gengnagel & Katharina Zimmermann

The European Green Deal as a Moonshot – Caring for a Climate-Neutral Yet Prospering Continent?

doi: [10.12759/hsr.47.2022.47](https://doi.org/10.12759/hsr.47.2022.47)

Jonathan Symons & Simon Friederich

Tensions Within Energy Justice: When Global Energy Governance Amplifies Inequality.

doi: [10.12759/hsr.47.2022.48](https://doi.org/10.12759/hsr.47.2022.48)

Epilogue

Peter Wagner

Frontiers of Modernity: Infrastructures and Socio-Ecological Transformations.

doi: [10.12759/hsr.47.2022.49](https://doi.org/10.12759/hsr.47.2022.49)