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Editorial

Politics and (Self)-Organisation of Electricity System Transitions in a Global North–South Perspective

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Abstract
Dominant electricity systems are inevitably transitioning into new forms in terms of power generation mix, mode of energy system governance and vested interests, the extent of state and consumer/citizen participation in the energy system, and energy justice expectations in different geographies in the Global North and Global South. In this editorial to the thematic issue entitled *Politics and (Self-)Organisation of Electricity System Transitions in a Global North–South Perspective*, we discuss politics and (self)-organisation of (just) energy transitions to expose how messy, convoluted, and fluid future electricity system transitions can be in both the Global North and Global South.

Keywords
decarbonisation; energy transition; global north; global south; Paris climate agreement; solar photovoltaic systems

Issue
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1. Global Decarbonisation and the Role of the Electricity Sector

The destructive consequence of fossil fuel consumption is now self-evident. Causal mechanisms and scientific remedial measures are well known and yet the proposed decarbonisation initiatives seem either far-fetched or run the risk of adventuring into an arena of obscurities, uncertainties, and ambivalences. In cases where decarbonisation initiatives are fairly straightforward and perhaps seamless, debates about the choice of pathways that would produce just outcomes raise more questions than answers. Carbon lock-ins are indisputable in critical sectors such as the electricity and transport sector, heavy industries, as well as the aviation and shipping industries. The consensus to keep the global average annual temperature rise to well below 2°C and even aspire to reduce it further down to 1.5°C—as stipulated in the Paris Climate Agreement reached in 2015—may have provided a timely inspiration and execution plan for future decarbonisation. Yet there clearly exist inconsistencies between the carbon emission trajectories, planned emission reductions, and required emission reduction targets of all countries, not excluding the so-called "climate progressive" nations (see Anderson, Broderick, & Stoddard, 2020). The energy industry alone contributes over 40% of global carbon emissions (International Energy Agency, 2020), and so the claim that the Paris-compliant global carbon budget requires complete decarbonisation by 2030–2045 (Anderson et al., 2020) suggests a radical transformation of the society, the economy and governance of energy systems across the world in less than three decades. The backtracking of wealthy nations from the Paris Climate Agreement (e.g., USA under President D. Trump), display of carbon lock-in syndromes, and/or structural contradictions in decarbonisation declarations among champions of sustainable energy transitions (Germany, UK, Sweden, and Norway) and obvi-

ous reluctance of coal-dependent European countries (Germany, Czech Republic, and Poland) to honour coal phase-out pledges (Europe Beyond Coal, 2019; Osička et al., 2020) speak louder than the popular adage. In other words, it is easier said than done. These wealthy western countries may have failed to exhibit exemplary behaviours in the transition to decarbonised energy systems due to structural and circumstantial constraints over which they have limited or no control. What appears intriguing, however, is the continuous promotion of low-carbon energy solutions in Global South countries where the technology is neither cost-effective nor easily compatible with their politics, energy system, socio-economic conditions, and the energy visions of different social groups (Boamah, 2020b). This double-standard or perverse approach to sustainable energy transition has been described as "energy bullying" (Monyei, Jenkins, Serestina, & Adewumi, 2018; see also Boamah, 2020b). The greater contribution of 'climate progressive countries' to global carbon emissions—compared to developing countries—places non-negotiable moral and political responsibilities on them in global decarbonisation initiatives. In fact, many developing countries do not feel morally obliged to implement renewable energy technologies unless they are cost-effective and fit seamlessly into their overarching socio-economic development master plans (Boamah, 2020b). The term 'energy bullying' could perhaps be an apt description to foreground justice considerations in the transition to low-carbon energy technologies. However, although least-developed countries are the primary victims of climate change impacts, a number of them (e.g., Indonesia, Philippines) are equally guilty of heavy carbon emissions, and thus, cannot shun their contribution to global climate change mitigation efforts solely on claims of 'energy bullying' by the Global North.

The pathways to decarbonisation remain convoluted and debatable in both the Global North and Global South. Climate scientists may have their say while politics and modes of energy governance drive decarbonisation initiatives in opposite directions, especially in the shipping, aviation, and heavy industry sectors where further decarbonisation options are either limited or too expensive. Of course, there is no single 'silver bullet' solution to this quandary of the Anthropocene and so the debate should rather be focused on identifying the most promising entry point for the discussion of trade-offs in decarbonisation pathways—of the menu of available options. Electricity reaches approximately 4.3 billion people, and the sector constitutes the single largest source of aggregate greenhouse gas emissions in most countries, predictably the fastest growing energy sector of the future. Moreover, the emergence of electric cars makes the sector a promising decarbonisation pathway (Sovacool & Walter, 2019). The electricity sector certainly has important roles to play in decarbonisation initiatives, especially given recent advancements in low-carbon energy technologies and their capacity to complement fossil fuel-dependent, centralised electricity systems which are currently losing their appeal in favour of decentralised electricity options in both the Global North and Global South (Boamah, 2020b; Bouffard & Kirschen, 2008; Taylor, Turner, Willette, & Uawithya, 2015). Two issues are noteworthy in the discussion of the choice of electricity transition pathways from among the countless available options. The first crucial issue is the direction and nature of the transition process, which would be more appealing in both the short- and the long-term. Put differently, this is whether to maintain the status quo or switch between decentralised, fully, or partly centralised systems, on the one hand; and the political and socio-economic impacts of the transition pathway chosen, on the other hand. The next and related crucial issue is whether the decarbonisation process should be self-driven, state-driven, and/or context-driven. The ambivalence over the potential of (un)just energy transition cuts across both of these issues. In other words, which electricity system transition should be chosen, with regards to where, when, for whom, with what consequences for the economy and fossil fuel consumption, and in order to escape which kind of entanglements?

2. Highlights from the Four Articles and Our Argument

The four articles in this thematic issue sought to engage with the aforementioned issues, and the conclusions reached in all articles suggest electricity system transition pathways are rather less predictable, nested, and in a state of constant flux. As shown in the articles, the socio-economic and ecological impacts of the direction of electricity system transition would depend on local circumstances and a complex set of conditions, e.g., in Kenya and Turkey. And even in cases of obvious transition towards decentralised electricity systems, the co-existence of both systems is still inevitable and desirable. Furthermore, transitioning to energy efficiency technologies like electric vehicles (EVs) does not automatically guarantee desirable decarbonisation pathways (e.g., in Germany) and decentralised electricity transition is not always driven by defossilisation considerations, especially in Norway where the electricity sector is already fully decarbonised. The issue of just energy transition becomes even more complicated when entitlement notions, development priorities, and aspirations of different countries are compared and put in context. We discuss in this editorial politics and (self)-organisation of (just) energy transitions to expose how messy, convoluted, and fluid future electricity system transitions can be in both the Global North and Global South.

3. Centralised–Decentralised Electricity System Dichotomy, Self-Organisation, and Just Energy Transition

Centralised electricity systems, which have dominated the electricity regime in most countries for decades,

depend on fossil fuel-powered generation plants. The governance mode of these systems limits the capacity of consumers to produce energy and proactively mitigate power supply shortfalls and unreliable power supply. The mainstream discourse of the Anthropocene and characteristic features of a centralised electricity system are rendering this dominant power supply paradigm less desirable mainly due to the fast depletion of fossil fuels and attendant negative climate change impacts. Furthermore, the desire of investors to minimise risks through the deployment of smaller-scale, modular generation and transmission systems, as well as public reservations about system corruption, gross inefficiencies, and other uncertainties play a role in this tendency (Boamah, 2020b; Bouffard & Kirschen, 2008). Small-scale decentralised systems are emerging as suitable alternatives or complements to centralised systems. They are mostly based on renewable energy technologies or on high-efficiency fossil fuel-based technologies such as combined heat and power or have the capacity to use diverse sources of energy simultaneously, thereby mitigating many power generation and supply uncertainties (Bouffard & Kirschen, 2008). The flexibility and opportunity to integrate renewable technologies to drive decarbonisation initiatives add vitality to calls for a radical transition towards decentralised electricity systems particularly in Global North countries generating high carbon emissions and urgently seeking to mitigate their high carbon footprints out of 'ecological guilt'—primarily per moral considerations.

Meanwhile in Africa, Asia, and Latin America, over 800 million people live without electricity access (World Bank, 2019). In these geographies, a single focus on state-led centralised electrical grid extension to territorially remote and lower-income locations is either unfeasible or costly. The transition to flexible, commercially viable, and scalable decentralised electricity systems seems to be the obvious option to move toward in the near future (Banal-Estañol, Calzada, & Jordana, 2017; Bisaga & Parikh, 2018; Taylor et al., 2015). Another important avenue for decarbonisation is the energy efficiency measures and/or practices that result in reduction of energy demand as well as the transition to EVs or heat pumps (Geels, Sovacool, & Sorell, 2018). It is worth clarifying that the term self-organised, decentralised system used here denotes a system of energy generation and distribution primarily initiated, owned and/or predominantly financed by users themselves rather than the state, parastatals or private companies and where electrical power is generated from (local) sources other than conventional centralised grid systems. Self-organisation of energy therefore encompasses embedded generation or net metering, private sector-driven mini-grid electrification, and complete stand-alone solar photovoltaic (PV) systems where even regulatory frameworks and incentives are driven by the state, parastatals, or by private companies.

The transition to self-organised decentralised electricity provision has gained much prominence in the Global North (e.g., Germany, UK, Switzerland, Australia, Norway, Spain, and some areas in the USA), primarily to encourage the transition to low-carbon energy solutions (Bach, Hopkins, & Stephenson, 2020; Dharshing, 2017; Inderberg, Tews, & Turner, 2018; Passey, Watt, Bruce, & MacGill, 2018; Schmid, Pechan, Mehnert, & Eisenack, 2017). Particularly prominent is the emerging phenomenon of electricity users simultaneously becoming consumers and producers of electricity—often referred to as 'prosumers'—using small-scale solar PV systems as well as offset electricity tariffs usually with centralised grid connection. The deployment of these systems facilitates effective involvement of users in electricity provision by sharing excess power—produced from renewable sources—with the grid and other electricity users, supports peak load demand management, energy system efficiency and plays a vital role in ensuring reliable and sustainable electricity supply in the future (Inderberg et al., 2018; Razzaq, Zafar, Khan, Butt, & Mahmood, 2016; Zafar et al., 2018). While the potential contributions of decentralised, self-organised electrification systems to decarbonisation and the empowerment of consumers are pretty clear, the expectation that particular transition pathways would ipso facto produce just outcomes for all groups, communities, and sectors of the economy in different geographies is still debatable. The 'just energy transition' approach entails a critical discussion of the social, economic, and political repercussions of decarbonised energy transition or decarbonisation strategies to avoid potential re-production of exploitation in the quest to eschew carbon lock-in (Healy & Barry, 2017; Unruh, 2002; Newell & Mulvaney, 2013). Studies show that decentralised systems grant consumers some autonomy, provide increases in the uptake of low-carbon energy technologies, alter the political power wielded by energy companies, and still have the tendency to create social inequalities in favour of more affluent groups who can afford and undermine the operation of conventional energy players who may lose customers (Brisbois, 2019; de Wildt, Chappin, van de Kaa, Herder, & van de Poel, 2020; Sovacool, Lipson, & Chard, 2019). The transition to prosuming will reconfigure the electric utility sector towards low-carbon solutions with many unpredictable risks, and so policymakers and planners are advised to proactively consider effective and efficient measures for their entry into competitive electricity markets (Parag & Sovacool, 2016). As promising as this sounds, the implications for just outcomes remain open to question. Another conundrum is that most Global South countries are transitioning towards a decentralised paradigm primarily to complement centralised power supply systems and mitigate the accompanying spatial inequalities. Accordingly, decarbonisation is the least important consideration for the transition. Whereas the wealthy carbon-dependent Global North countries are compelled decarbonised their energy systems out of moral and political obligations.

The most crucial motivating factors behind the transition processes, entitlement notions, and other contex-

tual conditions in specific geographies deserve attention here since different transition pathways are possible. In Norway, for example, where electricity prices are relatively low, and centralised electricity generation is significantly based on renewables, the transition to self-organised grid-connected solar PV systems may be less inspiring (in the future). At least out of ecological sustainability and financial concerns since the electricity sector is already cost-effectively "de-carbonised" compared to that of Germany, and UK, for example (see Inderberg et al., 2018). This does not suggest a seamless transition in Norway, as shown by Inderberg (2020) in this volume. The grid companies and their interest organisations certainly still hold key positions but their interests have become increasingly less unified since 2011. Higher fragmentation is likely to yield reduced political influence. On the other hand, the grid companies have endorsed the idea of nationally determined regulations. Although depending on the details, the policies analysed either favour or discourage further developments toward decentralised electricity systems, Inderberg (2020) suggests that the centralisation–decentralisation dichotomy obscures many nuances involved on three accounts. First, decentralising initiatives in the energy system can go hand in hand with centralised political steering. It is pretty clear that nationally mandated initiatives have developed digitalisation and prosuming provisions that may lead to increased decentralisation. Second, this complexity underlines the fact that a rough categorisation of actors into incumbents and new entrants is not sufficiently fine-tuned: Analysis of decentralisation requires significantly more refined categorisation and contextualisation to enable more precise predictions. Thirdly, transitioning includes several development paths, which may lead to diverging interpretations. Even though Norwegian electricity sector is fully decarbonised, there are still several different transitions underway. This indicates that even in countries where much of the policy drive is mandated by a decarbonisation goal, subtler causal agents are likely to exist. It is, therefore, necessary to contextualise and make a nuanced analysis to clarify factors influencing ongoing energy transitions, paying a keen attention to pathway directionality complexities as well as the energy justice implications of the ongoing changes.

Developments in Germany are not straightforward either. Carbon emissions from the road transport sector are still significant and so the transition from fossil fuel vehicles to EVs has been featured an as important decarbonisation initiative. Since early 2010, the German government implemented a series of measures to promote the use of EVs, including purchase subsidies and the development of charging infrastructures. The article by Zink, Valdes, and With (2020) discusses the impact of an increasing share of EVs on the electricity grid and suitable locations for charging stations with examples from a case study in Lower Bavaria. The impact of purchase subsidies on EV purchases in Germany, a high-income country characterised by an important automotive industry and an increasing share of private vehicles, is also examined. The authors conclude that neither an increasing electrical charging infrastructure nor EV subsidy policies are sufficient in accelerating EVs transition per se. And even if the two conditions did facilitate the transition, they still do not warrant successful decarbonisation since Germany generates approximately 30% of its electricity from coal. The overall effect of the EV transition must be set in relation to the nature of the country's power generation mix and the fraction that may be constituted by renewable energy sources in the future. Also, it should be pointed out that the total carbon dioxide balance of EV production (e.g., the battery system) can cast doubts on the proposed climate neutrality associated with the transition from fossil fuel-powered cars to the electric types.

Socio-economic conditions and political systems in Turkey make the co-existence of centralised and decentralised systems more desirable, as shown in Dolunay's article (2020). Instead of approaching centralised or decentralised transitions as two separate paths, in which an entire energy system and/or institutional structure need to be revised accordingly, partially managed models could provide faster transitions to renewable energy and enable practical solutions for people. Indeed, from a technical perspective, a centralised grid-connected energy system is a combination of many decentralised energy systems into a grid. Depending on the particular sources of social power in a country, region, or government as discussed in this article, a different model of renewable transition with different layers of liberalisation, privatisation, or self-organisation is also possible. This could in some cases facilitate a faster renewable transition than purely centralised or decentralised options. The organisation of the (de)centralised electricity transitions are dependent on the history, geography, and the overlapping relations of these sources of social power. Nevertheless, the answer to the question of who is prepared to take responsibility within a given country will determine how social power will play out in renewable energy transitions.

In the foregoing, analysis of geographies of self-organisation and just energy transition notions are necessary to expose the nature and cause of conundrums and conflicting perspectives surrounding electricity system transition in different geographies. Self-organisation is seen as a way of institutionalising new social relationships deriving from (or establishing) a variety of local networks, which potentially offer new pathways for the emergence of 'alternative forms of governance.' It is achieved through encounters—perhaps of a serendipitous nature—that lead to the identification of mutual interests, positions, and relations based on shared space, knowledge, values, and norms (Atkinson, Dörfler, & Rothfuß, 2018, p. 2). Fundamentally, self-organisation is a way of representing processes that institutionalise the social relationships deriving from a variety of local networks. These interactions initially generate trust derived from individual relationships which, over time and

through further interactions, become transformed into collective forms of trust and create practice(s) with 'collective intentionality' (Hasanov & Beaumont, 2016). This does not imply that they operate in an 'anarchical' manner as they have to institutionalise some of their procedures, although they always try to uphold a certain 'fluidity' and openness of social processes and internal innovation. However, self-organisation can take on many different forms as it develops within local and regional contexts in response to locally experienced and defined 'problems.' Given this, in attempting to identify a somewhat general 'definition' of self-organisation, we need to exercise caution. There are multiple ways of conceptualising self-organisation that are not necessarily mutually exclusive. Two examples will suffice to illustrate this (see Atkinson et al., 2018, p. 170). Nederhand, Bekkers, and Voorberg (2016, p. 2) define self-organisation as a "collective process of communication, choice, and mutual adjustment of behaviour resulting in the emergence of ordered structures"; while for Boonstra and Boelens (2011) it is the absence of government involvement, and thus, of external control (see also Boonstra, 2015). We do not see these two approaches as necessarily contradictory. However, we should also acknowledge that some forms of self-organising may consciously choose not to engage with established forms of governance, indeed they may seek to demonstrate that there are alternative ways of organising society. Meerkerk, van Boonstra, & Edelenbos (2013) point out that self-organised initiatives represent a challenge to existing governance structures yet evolve together within existing institutional settings. We want to argue that the most fruitful way of doing this and of understanding self-organising is a discursive approach that identifies particular 'local issues,' 'frames of orientations,' and which develops associated narratives, visions and practices and then seeks to construct particular courses of action—appropriate to local contexts. Here self-organising is a dynamic process that emerges in response to the development of shared local understandings and ways of addressing these (Rothfuß & Korff, 2015). Moreover, as the experience and knowledge of such groups evolve, they themselves are likely to change and, perhaps, expand their horizons beyond local contexts, making connections with wider national and global causal processes. Self-organisation as a means of action 'from below' emphasises interaction and discussion between participants leading to the identification of relevant local issues and the formation of an accompanying 'discourse/narrative' of problem definition that may challenge and subvert existing governance forms or enhance them. It provides alternative ways of doing things, it potentially offers new ways of 'governing from below' that reflect local contexts, understandings of problems, and solves them through innovative practices (see Joas, 1996).

In the energy transition literature, self-organisation encompasses a variety of topics ranging from active participation of the population and local ownership of projects by citizens and communities in local energy initiatives to the resultant 'transformative outcomes' in the transition to new energy systems and how these create promising avenues to facilitate energy transition towards a low-carbon future (Hasanov & Zuidema, 2018). Self-organisation of distributed generation in the Global North, for example, ensures reliable energy supply and sustainable energy practices, grants some autonomy to energy users (Bulkeley, Powells, & Bell, 2016; Strengers, 2013; Strengers, Pink, & Nicholls, 2019; Zafar et al., 2018), not excluding availability of financial incentives, relevant technical information, as well as the existence of clear regulatory frameworks (Boamah, 2020b).The driving forces behind self-organisation of energy and their consequent effects in the Global South vary markedly not only from experiences in the Global North but also even within and between countries. Major drivers of the transition include unjust billing systems, inefficiencies in state-driven centralised electricity provision, and unreliable and unavailable grid power supply particularly in Ghana, Kenya, Uganda, Tanzania, South Africa, and many other African countries. Self-organisation of electricity towards decentralised electrification systems seems like a promising approach to addressing energy injustices, and thus, economic challenges in the Global South. In Africa in particular, self-organised electrification initiatives are expressions of despondency, aspiration for autonomy in energy generation and consumption, and thus, remediation responses to energy injustices considered realisable through limited or no dependency on state institutions (Boamah, 2020a, 2020b).

Decentralised, self-organised models of electricity production have thus been perceived as an opportunity for countries in the Global South to leapfrog directly into the future of electricity. That said, in the Global South where decentralised electricity systems appear as the better alternative, outcomes of the mode of governance present yet additional dilemmas. Despite interest in self-organised decentralised electrification, states are still ambivalent due to potentially negative effects on their monopolistic practices. States have strong vested interests in power generation and aspire to retain substantial control in centralised electricity provision in order to directly drive their socio-economic development agenda throughout the country. This is particularly striking where centralised electricity distribution is structured around state monopoly primarily for 'developmental state' visions in order to secure revenue flows and/or in response to a history of unsuccessful private sector-led development approaches (Boamah, 2020a, 2020b; Van der Merwe, 2017). Central governmental structures and parastatals strategically organise decentralised electricity provisions in a way that keeps citizens perpetually within the bounds of patronising state-driven electricity services. Even in South Africa, a country that supports embedded electricity generation or net metering through state-driven initiatives—such as tax incentives and cost reductions to reduce its huge carbon foot-prints

(Didiza et al., 2016; Van der Merwe, 2017)—regulations on permissible power exports by net-metered customers are designed to prioritise the financial sustainability of state electricity distribution against the interests of customers who want to mitigate impacts of unjust electricity provision in 'self-fulfilling' ways (Boamah, 2020b).

Similar ambivalence occurs in Ghana and Kenya where the centralised electricity sector also serves as the state's cash-cow and any aberration from this tradition spells financial doom for the state electricity distributors and the implementation of collectively binding decisions by the state (Boamah, 2020b, in press). Kenya Power has reservations against self-organised, decentralised electrification systems due to its cyclical financial challenges and financial obligations to numerous power producers, sometimes with contracts extending beyond 20 years (Boamah, 2020a). Unless decentralised electrification systems are organised within the state apparatus and tailored to specific rural electrification visions of the state, decarbonisation considerations through self-organised mechanisms do not present any practically compelling motivation for the promotion of self-organised, decentralised initiatives of the population. This is especially the case given that renewables constitute approximately 85% of power generation mix (43.50% geothermal, 27.61% hydro, and 15.12% wind) as of May 2019 (Boamah, 2020b) and given the existence of 3.2 million off-grid solar PV installations as of December 2017—which are mostly private sector-driven. Furthermore, neither decentralised nor centralised systems provide precise instructions for socio-economic transformation especially for territorially remote areas.

The spatial concentration of centralised electrical grids in urban and higher-income locations of Kenya affects the development of micro-business enterprises in remote areas (Boamah, 2020a). Well-to-do households who invest in more efficient solar PV systems to serve as power back-up systems are able to satisfy energy needs for social and business activities even in areas noted for unreliable grid supply. Poorer households, on the other hand, have to restrict dominant social and economic practices according to the energy services of inefficient solar PV systems, which eventually hinders the development of home-based and other rural business enterprises. The emergence of precautionary energy practices contributes to unintentional production of low-carbon landscapes in the periphery but reveals inherent injustices associated with complete dependence on decentralised systems too. This also exposes governance challenges since decentralised systems are usually organised with little or no adherence to state regulations and the desperate customers are often exploited by unscrupulous solar energy service providers (Boamah, 2020a). The governance mode of either centralised or decentralised electricity systems can play an important mediating role in terms of impacts on rural livelihoods. The article by Klagge, Greiner, Greven, and Nweke-Eze (2020) sheds light on this issue. The types of multilevel governance in geothermal energy development in Kenya include institutional interplay, co-management, and the Geothermal Development Corporation as a bridging organization. Their study shows that centralised electricity generation can, as with decentralised electricity systems, have strong local impacts, with local communities playing an active part. The Baringo community in Kenya, for instance, is not a passive recipient of benefits but rather an active participant in negotiations as well as acts of resistance and sabotage when important demands are not met or if Geothermal Development Corporation activities are regarded as unfair. Community action and responses, therefore, have the potential to disrupt project advancement. The conclusion reached by the authors is that cross-scale links need to be considered to understand how power relations impact the implementation and governance of large-scale electricity generation.

There are certain distinct motivating factors and frictions in electricity system transitions which are exclusive to particular countries in the Global South. Ghana is a classic case in point. The strategic handling of tariffs and the quality of electricity supply present governments with the opportunity to shape the public's impression of the ruling government. Ghana experienced acute power outages caused by power generation shortfalls, grand energy sector corruption, and controversial tariff increases between 2012 and 2016. Rampant power outages were satirically represented in the Ghanaian media as *Dumsor* whereas 'hyper-speed' recording of electricity units by alleged 'faulty meters' were termed 'Usain-Bolt Meters' due to public perceptions of unfair billing systems (Boamah & Rothfuß, 2018; Pyman & Boamah, 2019). *Dumsor* is a word in the Ghanaian Twi language which refers to frequent and unexpected power outages within a short period of time. The satirical term was invented by the frustrated Ghanaians to ridicule the government's poor management of energy crises, especially prior to the general elections in December 2016. These developments made the incumbent government unpopular in the run-up to the 2016 general elections. The Ghanaian government introduced off-grid solar PV subsidy program primarily to mitigate the energy crisis. Net metering policy which had been in existence was given a more serious attention by the government before the general elections. The net metering sub-code was published by the Energy Commission in 2015 and on the 30 September 2016 the Public Utilities Regulatory Commission of Ghana published the net metering rate to guide the policy implementation. The Ghanaian government and energy sector agencies, however, continue to express ambivalence on net metering system policy implementation due to cyclical financial indebtedness of its main electricity distributor, Electricity Company of Ghana (ECG), and the state's obsession with monopolising the means of electricity generation and distribution. The ECG has refused to offset monthly electricity bills of net-metered customers for over 5 years contrary to tariff regulations published by the public reg-

ulatory commission of Ghana (Afful, in press; Boamah, 2020b). Beside financial considerations, the obstinacy of the ECG has been attributed to the fact that power generation shortfalls between 2012 and 2016 and related power supply instabilities—which reinforced the idea—have been reversed with excess power generation capacity of approximately 2400 megawatts after 2017; hence, the policy has outlived its usefulness, at least in the meantime (Boamah, 2020b). Players in the renewable energy sector and state energy agencies argue that since the country does not feel morally obliged to promote low-carbon energy solutions and does not have any political obligation to do so, decarbonisation of the sector would be largely dependent upon the cost-effectiveness of the technology (Boamah, 2020b). Reference to excess power supply—although Ghana currently produces almost 70% of its power from fossil fuels—and financial considerations, which are largely decisive of the electricity system transition pathways, suggest that decarbonisation cannot be on the radar of relevant agencies until it coincides with certain desirable conditions and emergency situations.

Moreover, in other circumstances, self-organised energy initiatives imply that there are citizens who are almost fully fending for themselves via self-financing of power back-up systems, making direct negotiations with private sector energy providers at exorbitant costs, and/or depending on mini-grid electrification systems (particularly in remote areas) with tariffs significantly higher than that of conventional centralised electrical grids while the state may have limited control over the matter (Boamah, 2020a, 2020b). Although self-organisation of decentralised electricity systems may mitigate energy injustices and satisfy energy needs of lower-class social groups in extreme areas of Kenya and Namibia (Boamah, 2020b), it results in feelings of entrenched energy injustices and misrecognition particularly in countries like Ghana where individuals and groups deem limited or no access to state-driven grid as characteristic denial of privileges of national citizenship, sometimes regardless of socio-economic status, class, place of residence, and so on (Boamah & Rothfuß, 2020). Even within Ghana, state-led decentralised solar PV electrification produced conflicting responses regarding the issue of justice: The government-sponsored free dissemination of 500-Watt solar PV to off-grid communities created a collective consciousness of misrecognition due to the social preference for centralised grids, whereas a 50% subsidy of the same program for urban households generated contrary feelings (Boamah & Rothfuß, 2018, 2020). The off-grid community had voted for the incumbent government in expectation for centralised electrical grids and the offer of free solar PV systems was perceived as misrecognition of citizenship rights when compared with fellow Ghanaians living in grid-connected locations. This had been the case despite the widespread outcry of injustices around dependencies on centralised electricity provision (Boamah & Rothfuß, 2020). This is a clear case of frustration born out of relative deprivation; the disenchanted off-grid residents issued subtle threats to vote against the ruling government during 2020 election upon failure to provide electrical grids (Boamah & Rothfuß, 2020). Self-organisation and the politics of electricity system transitions in contemporary Ghana shows a situation where the quality of electricity supply and spatiality of electrical grid access has been a driver and sometimes an outcome of elections. Therefore, the organisation of energy infrastructure is intertwined with multiple interests at different geographical scales—from local to national.

Again, in the Republic of South Africa, the state-sponsored Free Basic Electricity project increased energy access for lower-income groups and residents of off-grid communities, and yet the energy output of decentralised solar PV systems was way below energy needs of the population relative to the more privileged groups who had access to more efficient and lower-cost centralised electrical grids (Masekameni, Kasangana, Makonese, & Mbonane, 2018; Monyei, Jenkins, et al., 2018; Monyei, Adewumi, & Jenkins, 2018). Both state-driven centralised electricity systems and decentralised ones do not guarantee just outcomes; and neither do self-organised decentralised systems offer satisfactory remedy due to the above-mentioned contested entitlement notions. The transition to self-organised, decentralised electrification systems in the Global South is driven by quite different motivations in rather ambiguous energy policy regulatory frameworks and public ambivalence.

The transition is not any less seamless in the Global North where regulatory mechanisms and clear incentives exist. There are tensions in Germany as big energy companies have been affected by state subsidies supporting small scale self-organised grid-connected solar PV installations. Experiences in Australia are even more complex. The transition to net metering and battery energy storage systems in Australia have caused significant reductions in grid electricity consumption (and hence reduced revenues of utilities) and yet the resultant peak load demand reductions can, in certain situations, adequately offset grid network investment costs (Passey et al., 2018). Depending on the electricity regime, energy politics and other local conditions, frequent power supply interruptions, poor access to centralised electrical grids, and hikes in electricity tariffs present a comingling of opportunities and challenges in the transition to self-organised solar PV systems in Global South and Global North countries.

Self-organised decentralised electricity provision is decidedly reconfiguring the role of civil society organisations and state actors in electricity regimes of Global North and Global South countries. The conflicting viewpoints about what a 'desirable energy future' should look like and the governance structures to realise these revolve around a choice between self-organised decentralised systems—inclined towards renewable energy

promotion, energy efficiency, autonomous and 'democratic' electricity provision by individuals/local entities—traditional centralised systems (Schmid et al., 2017), or the co-existence of both systems.

4. Locked between the Scylla of 'Energy Bullying' and Charybdis of Decarbonisation Apathy

Concerns about a fair distribution of the benefits and burdens of the energy system for all in society is certainly a necessary call within the just energy transition debate (see Jenkins, Sovacool, Błachowicz, & Lauer, 2020; Healy & Barry, 2017; Newell & Mulvaney, 2013; Sovacool, 2014), but they are certainly bundled with some constraints too. The justice advocacy in the decarbonisation debate has placed huge political and moral obligations on the major emitters of carbon and this might have obscured necessary contributions from least emitters (predominantly in the Global South) who may suffer from the brunt of climate extremes in the future. According to Anderson et al. (2020), the planned carbon emission reductions of "climate progressive nations" such as the UK and Sweden, will still exceed their fair share of a Paris-compliant global carbon budget by at least two times, and even in the UK where moderate progress has been registered, emissions from international aviation and shipping are excluded. Norway has fully decarbonised its electricity sector and great strides in the transition to electric cars suggest a big leap forward, but these gains are still negated by huge carbon emissions from its cash-cow (oil and gas sectors, aviation and shipping industries). Calculations by Anderson et al. (2020) show that an immediate 10–15% per year carbon emission reduction target is required for Norway to meet its Paris-based temperature and equity commitments, and this also requires a completely zero-carbon energy system in the shipping and aviation industry by 2035. President Trump blatantly flouted the Paris Agreement, repealed anti-fossil regulations to revive coal mining industry in the USA—to honour electioneering promises in 2016—even in the face of evidence suggesting that the coal mining industry and coal jobs decline occurred three decades earlier and that mining workers have become accustomed to transitioning to alternative livelihoods (Sanya, Evans, & Konisky, 2018). President Trump claims adherence to the Paris Climate Agreement could endanger the US economy which thrives on massive production and consumption of fossil fuels, and that he can backtrack this position on the condition that renegotiation of the terms of the agreement is deemed fair to the American economy and workers. The date of formal withdrawal (4 November 2019) is in contravention of the terms of agreement which prohibits termination earlier than three years from the effective start date of the agreement by the signatory—which was 4 November 2016 for the USA under the administration of former President Obama. In other words, the earliest permissible withdrawal date must be after 4 November 2020, but President Trump flouted the agreement out of politics against de-fossilisation. Therefore, decarbonisation initiatives and the set timelines in the Global North can be nothing more than wishful thinking due to the obvious negative impacts they may have on the economies of these wealthier nations and other vested interests around continuous burning of fossil fuels. Lock-in syndromes reinforce energy bullying behaviour in even wealthy and 'ecologically guilty' countries, as for countries in the Global South, it reinforces the stance in which they, understandably, do not feel morally obliged to make strenuous commitments to low-carbon energy solutions. The fact that many least-developed countries in vulnerable geographies (e.g., Indonesia, Bangladesh, and Sahelian countries) lack the wherewithal to make effective climate change adaptation—in contrast to wealthy western countries—reveals the weaknesses of the just transition framework. The skewed attention to the distribution obligations of causative agents without analysis of primary victims of climate extremes may mislead some Global South countries to sit aloof and continue with business as usual. In fact, carbon emission statistics of newly industrialising countries (e.g., Brazil, South Africa, Indonesia, China, and India) place them in the same league of 'heavy emitters' as the wealthy western countries or sometimes even higher (e.g., China). Hence, Global North's energy bullying practices cannot justify ignoring the issue of decarbonisation. Of course, technical, financial, and other forms of support from the Global North are required to equip climate mitigation efforts, on just grounds, but the obsession with justice considerations may stall decarbonisation initiatives in the electricity sector. The just energy transition perspective can thus be not only enabling and but also constraining.

5. Final Reflections and Unresolved Questions Needing Attention

The thematic issue has sought to explore emerging technological, geographical and political trends in different regions of the world as our electricity systems are clearly moving away from the centralized, utility-based, and state-controlled power generation models. No matter how hard opponents may try, a paradigm shift in centralised electricity systems toward self-organised decentralised electricity systems is inevitable be it now or in the future. The shift is a result of a combination of motivations and the relevance of the driving forces shaped by changing circumstances, which are both predictable and unpredictable in specific geographies. The consequences and drivers of electricity transitions are so variable and mixed that attempts to provide blueprints may give rise to new lock-ins. Predicting the trajectory of the transition pathways and governing it towards desirable outcomes are still complicated given the uniqueness of electricity regimes within specific countries, the varying levels of national economic development, different state priorities, and ever-changing energy visions of electricity

consumers. Even though the direction and governance mode of electricity transition systems necessary for the realisation of decarbonisation targets are not far-fetched, the pathways that offer just outcomes make electricity system transitions amorphous adventures. We cannot pretend to have settled these issues, but our contribution could perhaps be enhanced by raising some refreshing questions in the hope of informing future research. These include, but are not limited to, the following:

- What are the possibilities for countries of the Global North that have developed excellent centralised electricity systems to make a switch to more flexible and modular energy systems which are predicted to be the dominant model of the future?
- Are Global North countries witnessing a path dependence leading to unforeseen institutional consequences where countries like the UK—with its highly centralised electricity system—are now facing bigger challenges in making the transition to more flexible and sustainable energy systems compared to countries like Denmark and Germany where stronger elements of decentralised electricity generation have been maintained?
- Does transition to a decentralised electricity system create the necessary preparatory grounds to mitigate entrenched energy injustices in the Global South, or does it rather create a dual system where commercial and rich consumers could manage their own energy needs while a less efficient public electricity system is left to serve the poor?
- Should the framing of the electricity system transition debate be shifted from justice issues to pragmatic challenges awaiting residents in vulnerable geographies?
- Does self-organisation of energy and unpredictable outcomes complement or destabilise the dominant electricity systems and state capacity?

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Conflict of Interests

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