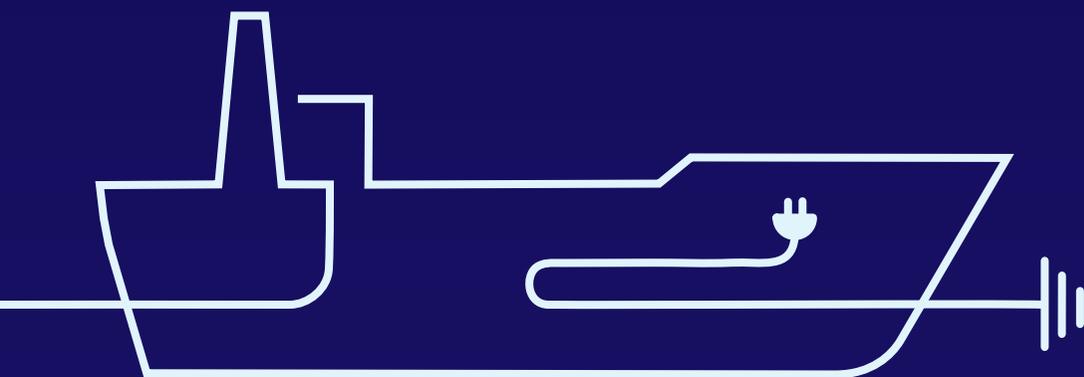


# FLOATING POWER

Energy, Infrastructure, and South-South Relations



Gökçe Günel

Floating  
Power



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# Floating Power

Energy,  
Infrastructure,  
and South-  
South Relations

GÖKÇE GÜNEL

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Duke University Press *Durham and London* 2026

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Printed in the United States of America on acid-free paper ∞

Project Editor: Lisa Lawley

Designed by A. Mattson Gallagher

Typeset in Arno Pro and Quadraat Sans Pro by  
Westchester Publishing Services

Library of Congress Cataloging-in-Publication Data

Names: Günel, Gökçe, [date] author

Title: Floating power : energy, infrastructure, and South-South relations /  
Gökçe Günel.

Other titles: Experimental futures

Description: Durham : Duke University Press, 2026. | Series: Experimental  
futures | Includes bibliographical references and index.

Identifiers: LCCN 2025040661 (print)

LCCN 2025040662 (ebook)

ISBN 9781478038511 paperback

ISBN 9781478033615 hardcover

ISBN 9781478062110 ebook

ISBN 9781478094630 ebook other

Subjects: LCSH: Energy transition | Power resources | Hydroelectric power  
plants—Ghana—Case studies | Power-plants—Ghana—Case studies |  
Geopolitics—Turkey | Nonrenewable natural resources | Environmental  
management | Renewable energy sources | Energy storage | Energy  
consumption—Environmental aspects | Turkey—Foreign economic  
relations—Ghana | Ghana—Foreign economic relations—Turkey

Classification: LCC HD9502.A2 G87 2026 (print) |

LCC HD9502.A2 (ebook) | DDC 333.91/41509667—dc23/eng/20251120

LC record available at <https://lcn.loc.gov/2025040661>

LC ebook record available at <https://lcn.loc.gov/2025040662>

This book is published in an open access edition and released on University  
Press Library Open (UPLOpen.com) as part of the “UPLOpen Climate  
Change Collection.” UPLOpen is an initiative of Paradigm Publishing and  
the De Gruyter eBound Foundation.

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## Introduction: Technologies of Deferral

Serkan and I met in a Turkish restaurant in Accra's East Legon neighborhood in December 2016 and nibbled at some *pide* over a languid lunch. A meticulously dressed, compact man in his mid-thirties, Serkan had been the director of Karadeniz Holding's East Legon office for the past six months and managed relations between Karadeniz and the various energy-related institutions in Ghana with the help of eleven employees. There was an element of savviness about him. On Fridays, he wore dashikis to demonstrate his appreciation of local attire.

A day before, his driver had taken us to the fishing harbor in Tema to tour *Ayşegül Sultan*, the Turkish-built floating power plant Serkan's employer, Karadeniz Holding, had leased to the Ghanaian government. At a time when Ghana's electricity production was about 2,500 megawatts, the barge produced 235 megawatts of power or about 10 percent of Ghana's electricity.<sup>1</sup> The morning after our visit, the intense heat, loud reverberating noise, and endless vibrations that characterized the ship's hold lingered with me (see figure I.1). The crew members had suggested that it had taken them no time to adapt to the sensory environment of the floating power plant, given that many of them had backgrounds as ship engineers. But Serkan did not have to spend time on the ship very often and therefore partly shared my surprise at the harsh interior of the power plant amid the seeming calm of the ocean. Now he was enjoying

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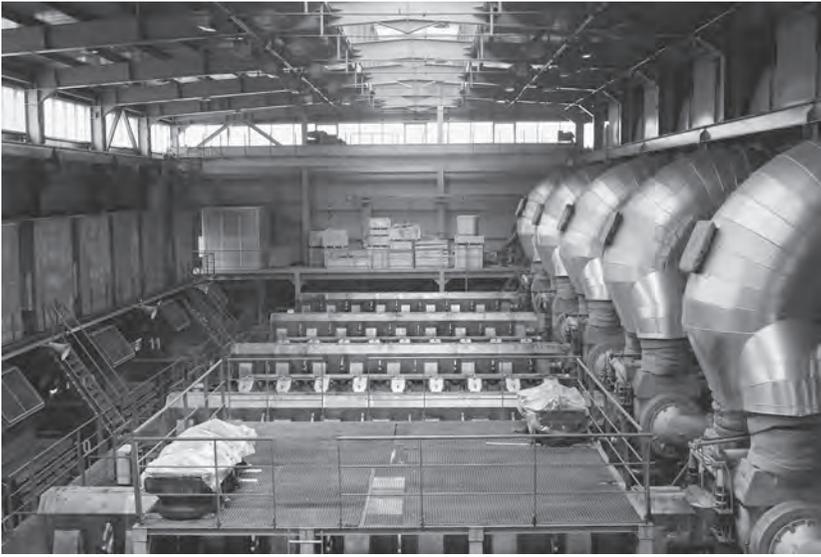


FIGURE I.1. *Ayşegül Sultan's* engine room, Tema, Ghana, 2016. Photo by the author.

lounging on the patio of the restaurant in East Legon, slowly picking at his food.

As we chatted about Serkan's expatriate experience in Accra, we could overhear some men assessing the latest updates in Turkish soccer and complaining about harmattan, dusty winds that blow from the Sahara to the Gulf of Guinea, leaving a beige haze hanging over the West African coast. Serkan identified the men eating at neighboring tables as employees of Akxa, another Turkish energy company, which had built a land-based power plant in Tema.<sup>2</sup> Karadeniz Holding and Akxa were two of the independent power producers operating in the Ghanaian electricity market. Relying on investments mainly from Turkey, China, and the United Arab Emirates, independent power producers in Ghana produced electricity from imported heavy fuel oil and from domestic and imported natural gas. Karadeniz Holding's *Ayşegül Sultan* stood out among these power production facilities mainly because, unlike them, it was not land-based. It was also larger than most of its competitors.

"Karadeniz could have built a land-based power plant here, but they did not," Serkan said. "Instead they built the plant on a barge. If Ghanaians gave us a concrete slab and allowed us to place a plant on that slab, Karadeniz could have done that, but we did not." He picked up a clean white napkin

off the table and then folded it four times until it was the size of a stick of gum. “This is how much space our barge takes,” he said. “This is how much more effective it is when compared to a land-based power plant. And if the authorities do not pay, or if there is a war, then we take our barge and leave.”

By folding the napkin, Serkan was taking a seemingly two-dimensional land-based power plant that was flat and spread out, and rendering it three-dimensional. Unlike a regular power plant, the floating power plant was thick and densely packed. The act of folding represented a transformation from a horizontal organization to one that was layered and vertical, a space where everything was stacked up. With scrubber towers on the top, workers in the middle, and engines at the bottom level, the ship constituted an enclosed world for power production, attached to the Ghanaian grid with high-voltage transmission lines stretching over the harbor. According to Serkan, the innovative barge had many advantages both for the company and for the Ghanaian authorities.

In addressing urgent electricity demands, many countries look toward quick power generation systems. One emergent system is powerships: floating power plants that anchor at a harbor, plug into a national grid, and generate electricity using heavy fuel oil or natural gas. The Turkish company Karadeniz Holding—or Karpower, as it is known to its many clients—has become an increasingly popular producer of powerships in the past decade.<sup>3</sup> A family-owned business, Karpower builds the ships on spec in various shipyards in Istanbul and leases them to places with unmet energy demands. Their barge *Ayşegül Sultan* (figure I.2) produced power for Ghana’s grid between December 2015 and September 2017, initiating the company’s operations in Africa. The larger powership *Osman Khan* replaced *Ayşegül Sultan* in late 2017 and now provides 470 megawatts, almost doubling Karpower’s production volume. In late 2019, the Liberia-flagged *Osman Khan* switched its fuel source from heavy fuel oil to natural gas, a less expensive and more environmentally friendly fuel, by moving its operations from Tema to Takoradi, a port much closer to the country’s own natural gas reservoirs.<sup>4</sup>

At the time of my first visit to *Ayşegül Sultan* in December 2016, Karpower had experience with projects in Iraq, Lebanon, Pakistan, and Indonesia. Their presence in Ghana also precipitated the company’s expansion into Zambia, Sierra Leone, Mozambique, and Gambia, among other countries. As of March 2018, the company owned forty-three vessels operating worldwide (table I.1). More than twenty of these were powerships, while



FIGURE I.2. *Ayşegül Sultan*, Tema, Ghana, 2016. Photo by the author.

others were service ships that delivered fuel or provided housing to crews in locations where it was difficult to accommodate them. In South Africa, the powership encountered concerns and criticism, mainly due to the high costs associated with the proposed twenty-year contracts (see Cirolia et al. 2025). Critics also pointed to the lack of transparency in the tendering process and underlined how, given its financial footprint, working with Karpower for twenty years would defer the arrival of renewable energy power stations in the country. Such criticism has had little impact on the company's presence worldwide. In late 2024, news agencies announced that Karpower would provide electricity to Syria, contributing to the country's postconflict reconstruction efforts. Karpower used the slogan "The power of friendship" to promote their project, presenting it as a broad and cordial campaign to bring quick and cheap electric power to those in need.

Powerships represent a move from what power companies have called permanent power to temporary power. Across the industry, permanent power denotes installations designed for long-term, continuous operation, integral to urban and regional networks, and delivering more reliable and affordable electricity without a preordained end date. In contrast, temporary power is short term, installed during events, construction, or emergencies, and often less stable and more expensive. This distinction shapes electrical codes and safety standards worldwide. Yet, as floating power

TABLE I.1. Karpower's Forty-Three Ships

No.	KPS ID	Name of the Vessel	Ex Name
1	KPS 1	Karadeniz Powership <i>Ali Can Bey</i>	X-Kim Heng 301
2	KPS 2	Karadeniz Powership <i>Iraq</i>	X-Karadeniz Powership <i>Iraq</i>
3	KPS 2	Karadeniz Powership <i>Yurdanur Sultan</i>	X-GTO 396
4	KPS 3	Karadeniz Powership <i>Doğan Bey</i>	X-Melpomeni
5	KPS 4	Karadeniz Powership <i>Rauf Bey</i>	X-A Raphael
6	KPS 5	Karadeniz Powership <i>Kaya Bey</i>	X-Kamari
7	KPS 6	Karadeniz Powership <i>Irem Sultan</i>	X-Enterprise
8	KPS 7	Karadeniz Powership <i>Orhan Bey</i>	X-Atlas 1
9	KPS 8	Karadeniz Powership <i>Osman Bey*</i>	X-DN143
10	KPS 9	Karadeniz Powership <i>Fatmagül Sultan</i>	X-Sainty No 9
11	KPS 10	Karadeniz Powership <i>Ayşegül Sultan</i>	X-Sainty No 10
12	KPS 11	Karadeniz Powership <i>Zeynep Sultan</i>	X-Explorer
13	KPS 12	Karadeniz Powership <i>Osman Khan</i>	X-Pacific Triangle
14	KPS 14	Karadeniz Powership <i>Onur Sultan</i>	X-Abyo Four
15	KPS 15	Karadeniz Powership <i>Orka Sultan</i>	X-Kohyohsan
16	KPS 16	Karadeniz Powership <i>Orhan Ali Khan</i>	X-Nisshin Trader
17	KPS 22	Karadeniz Powership <i>Gökhan Bey</i>	X-HR Indication
18	KPS 23	Karadeniz Powership <i>Yasin Bey</i>	X-HR Intonation
19	KPS 24	Karadeniz Powership <i>Ibrahim Bey</i>	X-Transpine
20	KPS 25	Karadeniz Powership <i>Mehmet Bey</i>	X-Transwood
21	KPS 32	Karadeniz Powership <i>Ela Sultan</i>	X-SKS Trent
22	KPS 33	Karadeniz Powership <i>Deniz Sultan</i>	X-SKS Tweed
23	KPS 35	Karadeniz Powership <i>Suat Bey</i>	X-Stolt Egret
24	KPS 36	Karadeniz Powership <i>Enis Bey</i>	X-Fryken
25	KPS 40	Karadeniz Powership <i>Gültekin Bey</i>	X-Sea Power
26	KPS 41	Karadeniz <i>One</i>	X-Normand Skarven
27	KPS 42	Karadeniz Powership <i>Refakat Sultan</i>	X-Pacific Warrior
28	KPS 43	Karadeniz Powership <i>Remzi Bey</i>	X-Pearl
29	KPS 44	Karadeniz Powership <i>Ragıp Bey</i>	X-Seacor Valor
30	KPS 45	Karadeniz Powership <i>Faruk Bey</i>	X-Maersk Puncher
31	KPS 46	Karadeniz Powership <i>Asım Bey</i>	X-Maersk Provider
32	KPS 50	Karadeniz Powership <i>Koray Bey</i>	UT 745, X-Maersk Finder
33	KPS 51	Karadeniz Powership <i>Metin Bey</i>	UT 745, X-Maersk Fighter
34	KPS 52	Karadeniz Powership <i>Nezih Bey</i>	UT 745, X-Maersk Forwarder
35	KPS 53	Karadeniz Powership <i>Göktay Bey</i>	UT 745, X-Maersk Feeder
36	KPS 54	Karadeniz Powership <i>Barış Bey</i>	UT 745, X-Normand Vester
37	KPS 55	Karadeniz Powership <i>Göksel Bey</i>	VS 483, X-Siem Carrier
38	KPS 60	Karadeniz Powership <i>Ebru Sultan</i>	X-Lamnalco1
39	KPS 61	Karadeniz Powership <i>Filiz Sultan</i>	X-Lamnalco2
40	KPS 62	Karadeniz Powership <i>Selma Sultan</i>	X-Lamnalco3

(continued)

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TABLE I.1. (continued)

No.	KPS ID	Name of the Vessel	Ex Name
41	KPS 100	OWK	X-Stena Explorer
42	KPS 101	OK	X-Super Servant 3
43	KPS 102	Karadeniz Powership <i>ISTANBUL</i>	X-Cable 1

Source: The table reproduces a photograph of Karpower's inventory, taken by the author in March 2018, Istanbul, Turkey.

Note: KPS stands for Karpowership.

plants evidence, this conventional industry binary does not always reflect the complexities of electricity infrastructure. For instance, a 2014 article in *POWER*, the go-to trade publication that has been published in North America since 1882, asks, "When 'temporary power' supplies nearly a quarter of a grid's demand, is it still temporary power? How about when a project lasts 10 years?" The article continues, "Calling power service temporary doesn't quite capture all of its distinguishing attributes. It's temporary rather than permanent, rented rather than owned, and mobile rather than fixed. It's also modular and easily scalable" (*POWER* 2014). The article foregrounds how temporary power increasingly satisfies electricity demand for longer durations worldwide, especially when electricity utilities face financial constraints, rendering investments in permanent infrastructure more difficult. Others from the industry also argue that rapid installation and low up-front capital requirements are a compelling case for temporary power stations.<sup>5</sup>

Temporary power infrastructures such as powerships have capitalized on the potential for long-term development and linear progress in the places where they have been put to use. Karpower representatives present their ships as provisional systems whose eventual demise will spawn post-fossil fuel modernization. The formal qualities of the floating power plants serve as evidence of such a possibility: Since their only connection to the land is through high-voltage transmission lines, powerships seem a less permanent infrastructure than land-based plants, as they can leave at any time, especially if and when their presence in lessee countries no longer makes financial or political sense. Electricity producers have been financially and politically invested in prolonging such provisional periods as far into the future as possible, absorbing the lessee country's resources and delaying the arrival of an age beyond their obsolescence. In this sense, temporary power structures have constituted what I call *technologies of deferral*, which satisfy present needs while postponing fossil fuel phaseout to a future date.

How, then, did floating power plants become a mechanism for forestalling progress? More importantly, what does the proliferation of such technologies of deferral mean for the global future of energy and climate change?

### **All of the Above: The Fossil Fuel Industry Promotes Energy Justice**

A West African delegate I met during the United Nations Framework Convention on Climate Change (UNFCCC) COP 17 meeting in Durban, South Africa, in December 2011, insisted on the necessity of fossil fuels as a tool for development: “We can’t improve our industry on solar power. We need to uplift our people, and we will need fossil fuels to do that. Germany has educated its people, and now it’s time for it to clean up.”<sup>6</sup> The delegate stressed a common opinion among energy industry professionals, reiterating that it was time for Global North countries to relinquish fossil fuels, even as the Global South needs them longer to create industrial infrastructures that match those of countries such as Germany. This perspective follows the arguments propagated by the Kyoto Protocol, an international agreement signed in 1997 acknowledging that developed countries have been liable for the high levels of carbon emissions that put the planet’s future at risk and therefore have a heavier responsibility to mitigate climate change. Broadly, the delegates supported technologies that enable the proliferation of fossil fuels in the Global South, linking their propagation to the advent of industrialization and development.

Perhaps the West African delegate’s emphasis is not surprising—some would even describe it as a cliché. Across convention centers worldwide, policymakers repeat the significance of energy justice, often referring to the necessity of carbon-based fuels as a tool for development. In rendering energy justice achievable as a goal, they point to developing fossil fuel infrastructure in the Global South, which would help countries industrialize and, therefore, prosper.<sup>7</sup> Even though such imaginations of the future are often ambiguous, they create a dominant discourse in the industry when they coalesce.

Over a decade after the COP 17 in South Africa, this perspective on energy justice continues to structure how representatives of the global fossil fuel industry frame climate change. At CERAWeek 2024, the world’s largest energy conference, which takes place in Houston, Texas, every March and attracts about ten thousand industry representatives, one US-based executive suggested that “oil is intrinsic to the world economy,” stressing how

the world has had to embrace an “all of the above” approach to fossil fuels and renewable energy infrastructures.<sup>8</sup> An autobiographical detail helped support this point: The executive’s parents’ move from India to the United States had allowed him to enjoy a range of goods provided by the fossil fuel economy, and this incentivized him to make such goods available to those in India who could not yet access them. In this framework, calling for fossil fuels to be phased out—a perspective stressing the gradual elimination of fossil fuel production and use that has gained prominence among climate change activists in the past decade—is a call to promote global inequality, to deprive these abstract populations in India of the opportunities that this executive had accessed as a child growing up in the United States. “Did you know that Heathrow Airport uses more energy than Sierra Leone?” he reminded the audience when introducing his main point. According to the presenter, questioning the all-of-the-above scenario meant setting unfair goals for all the African ministers who wanted to “decarbonize after they carbonized.” “No one deserves to be poor,” the executive concluded.

Yet it is important to return to the West African representative I quote and recall his emphasis on the responsibilities that Global North countries have in upholding energy justice and allowing for African countries “to decarbonize after they carbonized.” Other decision-makers shared his perspective. For instance, at CERAWeek 2025, a panelist who directs one of the leading environmental nonprofits in India told the audience that the Global North countries needed to abide by various emission reduction mechanisms to allow for fossil fuel–based development to continue in the Global South. Most often, however, energy professionals missed this critical layer, evading responsibility regarding emission reduction protocols in the Global North and instead stressing the significance of expanding fossil fuel infrastructure in the Global South.

In the early 2010s, representatives of the fossil fuel industry often claimed that climate change was not anthropogenic, citing historical transformations in the planet’s climate such as the Little Ice Age and obfuscating the role that fossil fuel production and consumption have played in instigating climate change.<sup>9</sup> However, in the 2020s, this discourse has given way to a perspective that emphasizes energy justice, coupling the emergence of equity and development with the consumption of fossil fuels. Adopting an energy justice framework has given the fossil fuel industry a new moral valence.

This emphasis on all-of-the-above solutions, meaning using all energy sources, including fossil fuels and renewables, to ensure a stable and secure energy supply worldwide, defers the implementation of impactful climate

change mitigation strategies. In this context, insisting on the necessity of fossil fuels illustrates how providing energy and petrochemical products to the world's population for the longest extended period is more important than reducing the disproportionate impacts of climate change worldwide, prioritizing energy justice over climate justice. For instance, at the CERA-Week meeting in March 2024, a prominent energy economist, who held a PhD from the University of Chicago and had written a dissertation on the US petroleum market in the 1990s, suggested that oil and gas demand will keep growing until the world experiences what he called a “Lake Erie moment,” referring to a crisis of overpollution in the lake in the 1960s that prompted the Nixon administration to impose environmental regulations across the United States, including the Clean Water Act.<sup>10</sup> Even though climate scientists stress that it is already too late to mitigate climate change, this projection of the future posits that it is actually too early for policymakers to intervene and that fossil fuel-sponsored development can continue until a moment of significant rupture, such as a Lake Erie moment (see Hulme 2019).

In this book, I investigate how this all-of-the-above approach makes itself known in the Global South by focusing on the emergence of Karpower's floating power plant in Ghana alongside solar power stations and electric vehicles. This perspective relies on technologies of deferral, such as the power-ship described earlier, which allow for the fossil fuel economy to be extended while keeping the horizon of transformation intact.<sup>11</sup> Even though some, including the delegate from West Africa, may value this approach, a close investigation of the dynamics between energy professionals in Ghana, Turkey, and beyond demonstrates that subscription to all of the above does not actually generate a level playing field for these diverse actors. As I set out in this book, geopolitical and geoeconomic differences between countries, meaning countries' varying capacities to use geographic resources or economic investments to expand their global influence, scaffold the terms of engagement between actors from Turkey and Ghana, further entrenching inequality. Even when technologies of arrival associated with post-oil modernity, such as solar power stations and electric vehicles, are put to use, the dynamics of social, political, and economic inequality persist.

Despite the global context I have described, many contemporary accounts of energy transition portray a shift from fossil fuels to renewable energy sources, document how the politics of renewable energy vary in distinct social contexts, and investigate how governmental and corporate intervention impacts energy technologies. Many proponents of this shift

imagine that the transition will take time and occur in response to price incentives and profit motives (Malm 2016). But rarely does the scholarship on energy and climate change acknowledge how humans have consistently added new energy sources to the mix and subscribed to the all-of-the-above approach (Wenzel 2022; Barak 2020; Fressoz 2024). For the past two centuries, the consumption of all energy sources has grown extensively. In spite of the conventional narratives around energy transition today, older sources of energy are rarely completely abandoned or replaced. Instead, such sources support the production of other fuels—consider, for instance, how much petroleum is necessary for manufacturing and installing solar and wind power stations. While some scholars criticize the energy transition narrative (Kuzemko 2016; High and Smith 2019), there is a general agreement in the literature that an expected transition from fossil fuels to renewable resources is and should be around the corner. The linear thinking associated with energy transition assumes a substitutive logic, where energy infrastructures may be replaced in a progressive modernizing trajectory, whereby certain items become obsolete while others emerge. Instead, this book shows that the various fuels and associated energy infrastructures expand and grow symbiotically and suggests that energy infrastructures have changed in cumulative ways. I call this transformation *energy accumulation*.

### **Energy Accumulates**

“If you’re in trouble, you don’t think straight,” said Ibrahim, an electrical engineer with the Electricity Company of Ghana (ECG), describing Ghana’s power crises. In a meeting room on the fifth floor of the Electro Volta House building, our windows looked out onto Accra’s Black Star Square, a modernist public square built in 1961 by the country’s first president and pan-African statesman, Kwame Nkrumah, in celebration of Ghana’s independence from colonial rule. On the wall a monthly calendar featured newly completed electrical substations nationwide. A promotional sign hanging from the ceiling celebrated the company’s fiftieth anniversary, suggesting that the company had been powering Ghana’s socioeconomic growth and development for half a century. Like many other employees I met there in late 2019, Ibrahim wore a button-down shirt featuring the ECG logo, tailored for him with fabric printed in recognition of the company’s fiftieth anniversary.

Ibrahim took time to explain to me what he meant by “trouble.” Originally from northern Ghana and the recipient of a scholarship from the

Islamic Development Bank, he had earned his undergraduate degree from a top engineering school in Istanbul. He was exactly my age. Considering how close his university campus had been to my apartment in Istanbul, we could have met each other in Turkey between 2000 and 2004. Ibrahim peppered his comments with Turkish words and sentences here and there, and he grew somewhat nostalgic about his years in Beşiktaş, where his university campus had been located and where I had lived before emigrating to the United States in 2007. He had not been back to Istanbul since his graduation and asked me to describe in detail how the neighborhood had changed. Then he gave me a lengthy account of Ghana's recent struggles with electricity provision as he understood it, foregrounding the contemporary condition of electricity excess.

Until 1997, state-owned hydroelectric power plants produced all of Ghana's electricity (Awopone et al. 2017). In the words of historian Stephan Miessler, the opening of Ghana's Akosombo Dam in 1966 and the creation of Lake Volta—the world's largest human-made lake by surface area and the fourth largest reservoir by volume—“produced different temporalities of an industrialized future that would transform the country's rural past and create new cities, factories, and infrastructures” (2014, 341). In 1961, only four years after the country's independence from colonial rule, the government of Ghana also embarked on the Ghana Nuclear Reactor Project with the aims of integrating nuclear science and technology into the nation's agenda, cultivating expertise, and paving the way for potentially incorporating atomic power into electricity generation (Osseo-Asare 2019). The process that historian Elizabeth Chatterjee (2020, 14), in the context of postcolonial India, labels “fossil developmentalism” placed an explicit emphasis on state power and large megaprojects. In the inauguration ceremony of Lake Volta, Kwame Nkrumah announced, “It is in this spirit of fruitful collaboration for a better world for all that I . . . inaugurate the Volta River Project. Let us dedicate it to Africa's progress and prosperity. Only in this way will Africa play its full part in the achievement of world peace and for the advancement of the happiness of mankind” (quoted in Ayensu 2013, 19). Nkrumah was overthrown by a military coup a few months after this ceremony. “The future envisioned by Nkrumah, in which each would give according to his ability and receive according to his needs,” as the literary scholar and cultural historian Sadiya Hartman (2007, 177) observed, “had been eclipsed.”

Inadequate rainfall and rising temperatures have negatively impacted the hydroelectric power station at Lake Volta, at times completely incapacitating it (Silver 2015; see also Yarrow 2017). As Chatterjee (2020, 19)

writes, “Under fossil developmentalism, electricity could no longer be kept confined as an abstract, profit-making commodity that served only elite interests. Increasingly large sections of the population gained access, albeit unevenly.” Electricity production symbolized the era of independence, standing in opposition to the period marked by British colonialism (Diouf 2005). The process of fossil developmentalism also meant that electricity emerged as a right, leading to novel modes of claim-making. In the early 2000s, however, when power demand was increasing across the country, the dams could no longer satisfy national electricity needs. Most of the new power producers that started operating in Ghana in the early 2000s were thermal stations that rely on natural gas, stockpile light crude oil, and burn heavy fuel oil. Unlike Nkrumah opening the Akosombo Dam, these power producers have not claimed to fulfill the teleological narratives about progress but have instead offered quick stopgap solutions that bring immediate relief to Ghanaian consumers, bridging electricity shortages until a time when the renewable energy infrastructure starts producing electricity for the country.

Between 2012 and 2015, an electricity crisis resulted in unprecedented levels of load shedding, where grid operators interrupted the electricity supply to avoid an excessive load on generating plants throughout Ghana. Power for industries and homes was turned off for twenty-four hours at a time and turned back on for only twelve-hour periods. *Dumsor*, the name given to the crisis, meaning “off and on” in Twi, was brought about by low water levels in hydroelectric dams, disruptions to natural gas flow from Nigeria, and alleged mismanagement of the grid infrastructure. *Dumsor* impacted all areas of life in Ghana. Newspapers reported on the buzzing sound of generators that now characterized Accra’s central neighborhoods, yet another stopgap measure that was affordable only to a select few.<sup>12</sup> The reliance on these backup options not only resulted in additional expense for households and industries but also increased fuel consumption, leading to higher energy costs and contributing to environmental concerns. According to the Ghana Employers’ Association, about thirteen thousand people lost their jobs. Businesses collapsed. The uncertainty surrounding power availability also deterred foreign investors. Power outages resulted in limited access to essential services, such as health care, education, and communication. Sparking political unrest and demonstrations against the incumbent National Democratic Congress government, the electricity crisis earned Ghana’s then president John Mahama the nickname “Mr. *Dumsor*.”

Publicized widely in major media outlets worldwide, the crisis jeopardized Ghana's newfound position as a lower-middle-income country.

In response, Ghanaian decision-makers such as Ibrahim saw a further expansion and diversification of the country's energy portfolio as a potential solution to the crisis, shifting the nation's energy production portfolio further away from hydropower and toward fossil fuels. In seeking to resolve *dumsor*, ECG, the sole electricity distributor servicing the south of Ghana, signed forty-three new power purchase agreements with different vendors.<sup>13</sup> "Prices were so high during the emergency," Ibrahim said. "And many of the contracts we signed stated that we would pay whatever we agreed, which was double or more what we would usually pay, say, for instance, eighteen cents per kilowatt-hour for energy that should cost perhaps nine cents, for the next decade. After paying double for a decade, you renegotiate." Critics of these agreements from within and outside Ghana argued that government representatives had aggregated more electrical capacity than necessary in a nontransparent manner. In agreeing to these measures, decision-makers at ECG, such as Ibrahim, found themselves participating in processes that exacerbated the electricity crisis (Mbembe and Roitman 1995, 325).

Regardless of popular narratives on energy transitions and leapfrogging, the future did not always hold the promise of stability for energy professionals in Ghana. Instead, many energy professionals anticipated regular power outages and looked for creative ways to maintain and repair existing systems. Joseph, a senior engineer at the Ghana Grid Company (GridCo), who had been working with the organization for more than a decade, told me that he lived very close to the headquarters of the grid company in Tema because he wanted to arrive at the control room as quickly as possible when a blackout occurred. He prioritized proximity to the control room above all else. A devoted member of one of the most popular charismatic churches in West Africa, Joseph often referred to the teachings of his evangelist-pastor when describing Ghana's energy issues. During our conversation in December 2019, he summarized *dumsor* with an analogy: "Can you kill the devil? The world would be a very beautiful place if you could kill the devil. . . . But you can't kill it. You have to stay away from its control." According to Joseph, unstable flows and increasing electricity costs will continue to characterize the Ghanaian grid for years to come. Despite countless complications, Joseph hoped the new electricity generation contracts would keep the devil away temporarily.

In an insightful article, literary critic Jennifer Wenzel points out that the two terms *transition* and *impasse* characterize contemporary understandings of energy. For her, “Transition refers to the social, cultural, economic, political, and technological processes involved in a society transitioning from one predominant fuel source to another—say, the shift from wood and whale oil to coal and kerosene in nineteenth-century United States or the planetary imperative to shift from energy systems built around fossil fuels to renewables and greener energy sources today” (Wenzel 2022, 155). Where certain fuels and infrastructures acquire social, political, and financial centrality at a particular time but do not necessarily replace former fuels, the moment is one of a transition from fossil fuels to renewable energies. Impasse, however, is “the immobilizing sociopolitical predicaments of the present: that is, everything in petromodernity that stands in the way of energy transition” (Wenzel 2022, 155; also see Simpson and Szeman 2021).

Yet the transformation in energy infrastructure in Ghana followed neither of these trends, appearing out of sync with the imagination of energy in the early twenty-first century. Instead, Ghana experienced an accumulation of various kinds of energy infrastructure with varying and changing degrees of importance to its economy. Each project constituted diverse political rationalities, mobilizing various geopolitical and geoeconomic goals in the process. What has taken place in Ghana since the turn of the twenty-first century, and accelerated as a result of the final episode of *dumsor*, is therefore best understood not as an energy transition or impasse but as energy accumulation (also see Günel 2020).

Paul, an energy specialist I met in Accra in January 2020, recognized the linearity of the dominant energy transition narrative. “Maybe we are transitioning in reverse,” he said. Indeed, many of Ghana’s generating plants, powered by natural gas and heavy fuel oil, had previously been used in countries like China and Turkey and had been broken down into pieces and transported in cargo ships to serve the Ghanaian grid. For instance, the country’s first and largest independent power plant, Sunon Asogli, had been used in China between 1991 and 2007 (figure I.3). The natural gas-fired plant started selling electricity to the Ghanaian grid in 2009 after its value had already depreciated. During a conversation in March 2023, one of the engineers at the Turkish-built Akso power plant in Tema described their plant as a “museum,” referring to how they had collected used Wärt-silä engines from disused power production facilities in Turkey, Sri Lanka, and India and transported them in cargo ships to serve the Ghanaian grid.



FIGURE 1.3. Sunon Asogli turbines, Tema, Ghana, 2019. Photo by the author.

Stranded assets of the energy industry, unwanted elsewhere, found their way to the Aksa plant in Tema's Heavy Industrial Area, only a few miles away from the GridCo office where Joseph worked. These plants may have been replaced with newer, perhaps more efficient plants in their places of origin, but they continued to produce electricity for Ghana and were part and parcel of the global expansion of energy sources described earlier. The infrastructures that were obsolete in other parts of the world became the basis of Ghana's transition in reverse. In some ways, Paul had accepted the linear narrative of a transition and expected a move from fossil fuels to renewable energy resources to take place in Ghana.<sup>14</sup> Yet, given how the energy landscape he had observed closely did not correspond to the expected timeline of energy transition, Paul wondered if Ghana as a country was actually moving backward when it should be moving forward. By arguing that Ghana was transitioning in reverse, he made sense of his environment while keeping his attachment to the seemingly one-dimensional terms of the energy debate. Paul's comment demonstrated how he maintained his investment in energy transition even when the concept of energy transition did not match everyday realities.

But Paul's comment is not only a reflection on Ghana. It also offers an essential corrective to the global debate on energy transitions, demonstrating how such apolitical, seamless, and unidirectional development

is a reconstitution *ex post facto* of a messy process that rarely finds empirical support. The emphasis on energy transition also obfuscates the empirical transformations that are taking place, obscuring the all-of-the-above approach that fossil fuel company representatives, such as those I quoted earlier in this introduction, advocate and implement. Finally, energy transition narratives prevent the realization of what environmental historian Jean-Baptiste Fressoz (2024, 13) describes as “energy amputation,” the challenge of eliminating three-quarters of the world’s total energy consumption by stopping fossil fuel use.

While the imagined transition to renewable energy sources is tempting, as it allows humans to extend existing social, political, and economic relations into the future while eliminating carbon emissions from fossil fuels, the evidence suggests that the development of renewable energy infrastructure only minimally displaces fossil fuels (Thombs 2018; see also York 2012). As sociologists Richard York and Shannon Elizabeth Bell (2019) contend, “historically, no established energy source has undergone a sustained decline with the addition of a new energy source. Rather, consumption of all energy sources has typically grown, a trend that has been maintained for over two centuries.” York and Bell make a second important point, suggesting that “adding new energy sources may, in some circumstances, actually accelerate consumption of other resources, even in areas outside the energy sector” (2019, 42). Using whales as an example, they overturn a standard narrative regarding how the use of fossil fuels in the last decades of the nineteenth century might have helped whale populations: “the discovery of petroleum did not suppress whale oil consumption, helping to save the whales; rather, it actually spurred a dramatic increase in whaling. This increase occurred because fossil-fuel-powered ships could catch more and larger whales more rapidly than could sail ships and rowboats, and new uses were developed for whale oil (e.g., for margarine after the development of hydrogenation)” (2019, 42). In this context, new fuels such as petroleum contributed to the growth and development of former resources, such as whales, for new purposes. The whaling industry peaked in the 1960s, a century after the advent of fossil fuels, with about eighty thousand whales being killed every year, and only came to an end in the 1980s through the adoption of a moratorium on commercial whaling due to the significant decline in whale populations (Fressoz 2024). Others have echoed York and Bell’s critique of the energy transition narrative, suggesting that the term *transition* should be reevaluated, as “the advent of new sources of energy does not lead to the abandonment of earlier sources”

(Gellert and Ciccantell 2020, 216). Instead, energy accumulates, rendering the Ghanaian case emblematic of energy dynamics globally.

An examination of the Ghanaian case also reveals the specific mechanisms that lead to such energy accumulation, adding a critical layer to historical arguments regarding infrastructure and illustrating how all of the above is enacted when it takes place between South-South partners such as Turkey and Ghana. On the one hand, Turkish representatives vouched for fossil fuel-based development perhaps as a necessary evil to allow Ghana to move along a modernization timeline in the way that Turkey had done over the past century and finally catch up. At the same time, Ghanaian representatives perceived Turkish decision-makers as having a more equitable and friendly approach than Global North countries, which have exploited resources across Africa for centuries. This imagination of Turkey's difference from other international actors supported the proliferation of powerships as technologies of deferral, keeping the geopolitics of linear progress alive. In this context, the relationship between Turkey and Ghana ensured an all-of-the-above approach, maintaining fossil fuel-based forms of progress as tools for safeguarding development. In short, the emergence of the Turkish powership demonstrated what liminality without transition might denote.

Why is energy transition such a popular notion? The promise of energy transition acts more as a myth than as an empirically viable explanation. However, the literature on energy and climate change is laden with this perspective and even features a subdiscipline called transition management (see, for example, Loorbach 2007). Much of the scholarship in this field stresses how the world is decarbonizing thanks to advances in renewable energy power stations. According to York and Bell (2019, 41), this labeling is mainly due to a "common mistake made in analyses documenting so-called energy transitions," where scholars focus on "the proportion of the energy supply that is generated from various sources."<sup>15</sup> At the same time, the discourse on energy transition depoliticizes and obscures a wide variety of social, political, and ethical transformations (Kuzemko 2016) and "has narrowed the scope of how anthropologists understand and engage with the ethical dilemmas posed by energy" (High and Smith 2019, 11). Despite its force as an ambition for the future, the idea of energy transition also cloaks how the fossil fuel industry makes claims for its staying power while deferring the phaseout of fossil fuels and seeking to reinvent itself.

Beyond the issues of miscalculation, it is important to remember that the narrative on energy transitions mirrors modernization theories, where

progression through stages of national economic development ensures technological innovation and overall social and political welfare. Modernization theory emerged primarily in the 1950s and '60s to explain how agrarian societies might become urban and industrialized and gained prominence during the Cold War era as a response to the challenges of economic precarity in newly independent countries, such as Ghana. Despite its many limitations, such as its emphasis on Eurocentric and unidirectional transformations, this theoretical framework has had a significant influence on development studies and international development policies around the world. As I argue in this book, it continues to shape global energy politics today.

Perhaps the most well-known theory of modernization, Walt Rostow's (1990) *Stages of Economic Development: A Non-Communist Manifesto* argues that economic development also results in innovative energy systems. Theories of progress such as Rostow's reproduce the assumption that innovation stems from the Global North and only slowly spreads to the Global South, ensuring "takeoff" and "sustained consumption" in these regions.<sup>16</sup> While Rostow did not initially acknowledge the environmental footprint of such stages of development, he points out in the preface to the third edition of his classic work the "strains on the physical environment that global industrialization and urbanization may impose," suggesting how "existing strains on the forests, arable land, and species as well as increasing pollution of air and bodies of water make it difficult to contemplate complacently a more than doubling of global population, with the increase overwhelmingly concentrated in countries likely to be experiencing dramatic increases in those technologies that now carry with them the greatest threats of pollution" (Rostow 1990, xx). All in all, modernization projects categorize people and places in terms of whether they belong to the past or the future (Fabian 1983; Barnes and Matthews 2016). The authors of these theories investigate what the future should hold and provide instructions on how to achieve it.

The narrative on energy transitions reproduces the familiar tropes of these theories, relying mainly on national-scale analyses, seeking technological breakthroughs in the Global North, and hoping that they will be appropriately applied in the Global South. Given the historical context in which the term *energy transition* developed, this alignment is perhaps inevitable. In his book *More and More and More*, environmental historian Jean-Baptiste Fressoz (2024, 142–59) explains how energy transition as an idea did not grow out of empirical analyses of the past but rather projections

regarding the future. Coined by Caltech geochemist Harrison Brown in November 1967, the term *energy transition* emulated the postwar ideal of demographic transition, a theory that mapped demographic stages onto stages of development, propagating the assumption that progressing societies should transition from high birth and death rates to lower ones. If demographic transition offered a toolkit for calculating and managing population growth worldwide by promoting birth control (Davis 1945), energy transition attempted to estimate future energy use and, accordingly, build nuclear capacity (Brown 1967). In its contemporary usage, the idea of energy transition also adds an existential significance to this telos: If countries do not transition to renewable energy, the world loses its chance to mitigate climate change.

Yet it is essential to underline that the definition of energy transition is not static among the representatives of the energy industry. Instead, it derives its force from its malleability and ambiguity. At CERAWeek 2023, one speaker suggested that energy transition now has a different meaning for every context and should not be universalized as a movement from fossil fuels to renewable energy power stations. “In Africa, it might mean moving from burning wood to burning gas,” he summarized, placing the African continent in a premodern position on the modernization ladder, “but in other places, it might mean moving to net zero.”<sup>17</sup> During the same conference, the current ExxonMobil chief executive officer Darren Woods announced, “Our strategy is to basically do both; as I said, we believe it’s an ‘and equation,’ so we are going to continue to invest in traditional sources of energy and the critical products society needs, but we have also built our business to be flexible where we can invest in emissions reductions” (CNBC Television 2023). At times, the ambiguous definitions of the energy transition narrative also encapsulated the all-of-the-above approach. When I saw Paul again later that month in Accra, he ended our conversation by saying that the transformations in Ghana’s electricity infrastructure no longer appeared anachronistic to him.

This does not mean that people in Ghana or elsewhere worldwide are no longer building renewable energy and clean technology infrastructure. In a context where the energy transition narrative remains mainstream, many decision-makers in Ghana hope that the country will leapfrog to renewables and imagine that new business models, technological innovations, and design solutions will support this leap. “Have you seen the solar map of Ghana?” Raymond, then a legal adviser to GridCo, asked me enthusiastically during a meeting in July 2018. An alumnus of the prestigious

Achimota School, where Kwame Nkrumah himself had once been a student (Ahlman 2021), Raymond had earned law degrees in both Accra and Cambridge, Massachusetts, and had written a thesis and later a book about the impacts of *dumsor* in Ghana. My younger sister was Raymond's classmate in Cambridge, and we met for the first time at their graduation in May 2017. During the ceremony, Raymond wore a custom stole marking his Ghanaian heritage in red, yellow, and green. His reputation within the energy industry in Accra is impeccable, and, given his interest in politics, many energy professionals firmly believe that Raymond has the potential to become a future president of Ghana. He summarized, "We are missing opportunities by not building solar here."

By evoking the idea of leapfrogging, Raymond attempted to challenge modernization theory's basic assumptions and to argue against the notion that the countries of the Global South must fulfill specific stages of progress. Yet the prospect of leapfrogging maintains the teleological horizons of modernization theory, offering those who are left behind the seeming opportunity to spring forward while maintaining their roles as disadvantaged participants in a modernization rat race. The preordained path of development remains unchanged by their forward spring. Inspired by novel paradigms of development, Raymond referred to the most commonly used examples of technological leapfrogging, pointing out that people in Africa have adopted cell phones, mobile payment systems, and digital banking applications. Renewable energy infrastructures may constitute the next stage-skipping technology, allowing Ghana to avoid fossil fuels.<sup>18</sup> Like many of his colleagues in Ghana's electricity sector, Raymond celebrated the green financing programs recently offered by some Ghanaian banks, which provide funding for domestic and institutional consumers to build rooftop solar panels. "Once you prove that your project is lowering emissions, your interest rates fall. There are incentives for building solar," representatives at Ghana's CalBank confirmed. Dressed in polo shirts advertising their green financing programs, four CalBank men told me that they offer three- to five-year loans for rooftop solar projects but have had trouble attracting individuals with stable enough jobs for these loans (see chapter 3).

While seemingly contradictory, the emphasis on leapfrogging complements energy industry representatives' insistence that carbon-based fuels will ensure development in the Global South. Both future projections draw on ideas of linear progress, where countries skip from one energy stage to the next, depending on where they are situated on the modernization ladder. Yet financial incentives and technological innovation do not create the

conditions for transitioning from one fuel to another; instead, they result in energy accumulation. How, then, have energy infrastructures historically transformed? The University of Chicago-trained energy economist I referred to previously, in fact, answers this question by invoking the Lake Erie moment—when dire environmental problems spurred popular protest and significant policy transformations—and underlines how policy mechanisms could bring the end of fossil fuels if and when a crisis erupts.

Energy industry representatives concur that the countries of the Global South will drive the future of energy infrastructure in the coming decades. Therefore, it has become ever more important to describe and analyze the social, political, technological, and financial conditions under which corporations and governments deprived of ample resources invest in new energy infrastructures, how decision-makers and users envision their energy futures, what services they are able to afford under existing circumstances, and which infrastructure providers they are able to approach. By answering these questions from an ethnographic perspective, this book seeks to critique liberal assumptions regarding linear progress and demonstrate how South-South relations structure the future of energy and climate change.

### **Patchwork Ethnography**

During my first meeting with Karadeniz executives at their Istanbul headquarters in May 2016, I asked whether I could visit their ships *Orhan Bey* and *Fatmagül Sultan* in Lebanon to learn more about their floating power plants. Although they did not explicitly say no, many people I met in their office that day encouraged me to travel to see their ship in Tema, Ghana, instead because it had played a unique role in the company's expansion. One employee of the company told me how inspiring it was to start working in an African country because the company was "bringing light to places that were dark." Taken aback by their racially charged language and their faith in this developmental mission but encouraged by their openness in guiding me through their projects, I told company representatives that I would visit Ghana in December 2016 and looked forward to meeting their staff there.<sup>19</sup> I had never been to Ghana before. Given various professional and familial obligations in the United States and Turkey, I also knew that long-term fieldwork in Ghana would not be possible. In 2016, I had started a tenure-track position at the University of Arizona and was completing my first book, *Spaceship in the Desert* (Günel 2019), to be eligible for tenure there. Visa and permanent residency applications in the United

States came with travel restrictions that prevented spending extended periods abroad. A long-distance relationship with another academic, known as the “two-body problem,” also shaped my professional and personal life. Whenever I could, I traveled to Turkey to visit my family, and I was able to stop by the Karadeniz Holding headquarters in Istanbul in May 2016 and introduce myself to staff and board members there during one such visit. Overall, these conditions were not unique, but they informed my conceptual questions regarding how a researcher’s personal life shapes the processes of knowledge production (Günel and Watanabe 2024, 2026). By the time these restrictions were alleviated in 2020, we had entered a new era of COVID-19 shutdowns. In sum, I could not conduct research in Ghana as I had done in the United Arab Emirates, where I had spent several summers and then a whole year documenting and analyzing energy infrastructure when writing my first book. Still, I followed this initial offer to visit the plant and took a three-week trip to Accra. Despite having no experience of doing research in West Africa, I saw this new research site not as a radically unknown place but rather as an extension of the energy, climate change, and infrastructure networks I had examined and cultivated for more than a decade (Howell 2017, 18).

This book draws on ethnographic work on electricity production in Ghana between 2016 and 2023. It also relies on research in Turkey during the same period, working with businesspeople and government representatives who specialize in building or sustaining geopolitical or geoeconomic relations with African countries. In carrying out this project, I have benefited from speaking to energy experts employed at Ghanaian institutions, including the Energy Commission, the Electricity Company of Ghana, and GridCo, as well as to engineers who work with independent power producers such as Beijing Fuxing Xiaocheng Electronic, Meinergy, Sunon Asogli, Aksa, and Karpower to generate electricity for the Ghanaian grid. In some ways, the grid itself (figure I.4) has offered me a map of the people who should be involved in the research, guiding me to spend time with electricity generators, distributors, and users. In the following pages, I examine some critical transformations to the Ghanaian grid in the 2010s and 2020s. The book historicizes the presence of Karpower’s ships in Tema Fishing Harbour by documenting their emergence in Iraq (chapter 1). It also charts the powership operators’ emphasis on the temporariness of their connection to the grid (chapter 2), looks at the uneven development of solar power stations during a period of electricity excess (chapter 3), and explores how developers of electric vehicle infrastructure

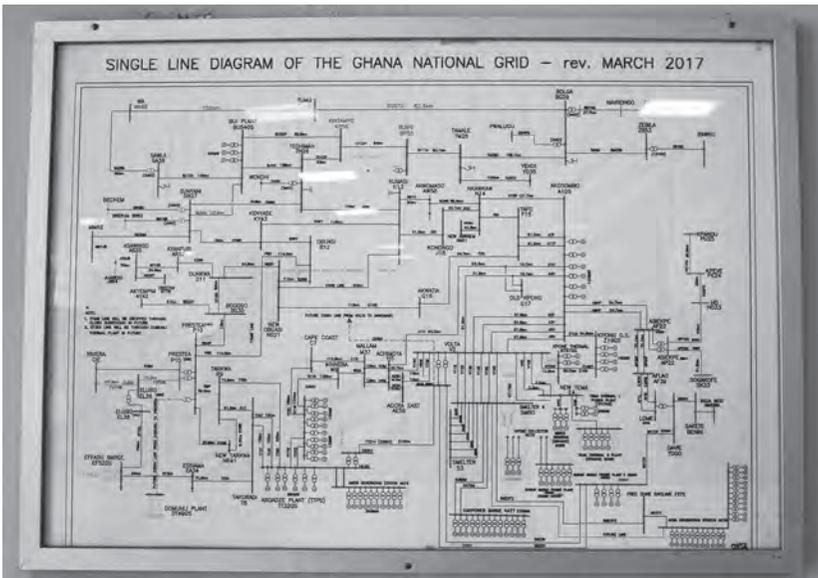


FIGURE I.4. Single-line diagram of the Ghana national grid as drawn in March 2017, Tema, Ghana. Photo by the author, 2019.

tended to the grid by trying to curb the problem of electricity excess (chapter 4). As I will show, many of the connections I established with actors in these industries stemmed from personal and professional networks outside Ghana and Turkey. One such example is the relationship I developed with Raymond through my sister's graduate program in the United States.

Between 2016 and 2023, I spent about six months in Accra, mainly during the winter and summer breaks. During that initial visit in December 2016, my husband and I stayed with Joe Addo, a Ghanaian architect I had met at an infrastructure- and climate-change-focused event hosted by the Lafarge Holcim Foundation in Detroit in April 2016. Joe had recently opened a coffee shop and gallery called Jamestown Café in Jamestown, Accra. Even though I did not stay at Joe's house on subsequent visits to Accra, I stopped by Jamestown Café regularly throughout my research trips to Ghana. In addition to following Karpower executives in Tema and Accra, meeting people through a diverse array of energy-related institutions and companies in Ghana, and exploring other networks of Turkish expatriates, I saw Jamestown Café as a hub where I could encounter people informally outside these three main groups.

My relationships with Karpower staff had been crucial in facilitating visits to the floating power plant, especially on my first two trips to Ghana in 2016 and 2017. However, my research also benefited considerably from my friendship with Doris Edem Agbevivi, a staff member at the Energy Commission.<sup>20</sup> A colleague I met during an energy-focused event at the European University Institute in Florence, Italy, introduced me to Doris in November 2019. After meeting in person in December 2019 and January 2020, Doris and I continued to chat on WhatsApp several times a week. In April 2022, after we had both been vaccinated against COVID-19, I invited Doris to Houston for a ten-day stay. We also spent time together investigating transport electrification projects in Ghana in March 2023 and shared a hotel room while attending the United Nations Climate Change Conference, COP28, in Dubai in December 2023 (see conclusion). The fact that we navigated a male-dominated industry perhaps strengthened our friendship. Doris and I could interact casually in Accra, Houston, and Dubai and remained in touch with each other regularly. Throughout my research for this project, I rarely joined groups of male energy professionals in such informal activities.

In Turkey, I spent about eight months over seven years researching this project. Having grown up in Istanbul, I had access to an extensive network of people through family and friends. I knew my way around the city and had an apartment in Beşiktaş, a convenient and central neighborhood on the European side. I visited Karadeniz Holding's office in Kağıthane and met with several employees outside office hours. I also toured the Sedef Shipyard in Tuzla, where the company did much of its retrofitting work. Participating in large industry-specific events had been a valuable strategy during my fieldwork on renewable energy and clean technology development in the United Arab Emirates. In extending my research in Turkey, I joined Economic Community of West African States (ECOWAS) summits and Turkey-Africa business gatherings, events that I perceived not only as ethnographically significant sites but also as places where I could meet new research collaborators, such as Turkish businesspeople who had investments in African countries. Beyond these business networks, I met journalists and academics who explored the relationship between Turkey and Africa. One of my journalist friends, Cem, introduced me to press relations experts at Turkey's Foreign Economic Relations Board (Dış Ekonomik İlişkiler Kurulu; DEİK), the organization that manages Turkish foreign business relations and that organized a diplomatic trip I attended in February and March 2018. Most of my research occurred in office towers in Levent,

an established central business district in the European side of Istanbul. Beyond visiting offices, I met some interlocutors for coffee and lunches at malls in and around Levent, such as Kanyon and MetroCity. Some of the businesspeople I came to know had offices in Ümraniye, a growing business center on the Anatolian side that I had never visited before my fieldwork for this project but that was now easily accessible through subway lines. Given the increasing number of residential gated communities in the area, many people in these business communities either lived in or were moving to Ümraniye. Since emigrating to the United States to start my PhD in 2007, I had not spent this much time in Turkey. By carrying out research there between 2016 and 2020, I became refamiliarized with Istanbul's new and ever-changing social, political, and spatial dynamics.

In February and March 2018, I participated in a diplomatic trip to Algeria, Senegal, and Mauritania with the Turkish president, Recep Tayyip Erdoğan, and his entourage, a trip that also informed this book (see Günel 2022a). My participation in the diplomatic trip was made possible thanks to a press relations representative from DEİK, a friend of my journalist friend Cem, who enjoyed having a female US-based Turkish scholar analyze the work that went into solidifying geopolitical and geoeconomic relations between Turkey and Africa. In this context, the press relations representative practiced what political scientists call “street-level discretion,” offering an invitation that stemmed from her own political and professional convictions and moral dispositions rather than DEİK's (see Zacka 2017). Because I was the only woman in the business delegation of 120 members, my presence attracted attention and led to the assumption that I was an administrative assistant at DEİK. Still, the diplomatic trip offered opportunities to discuss the geopolitics of floating power plants with businesspeople and government representatives over four intensive days (see Günel [2022a] for a more extensive analysis of this trip), complementing my research in Turkey and Ghana.

While researching this project, I collaborated with anthropologists Saiba Varma and Chika Watanabe on ethnographic research methodologies formulated mainly around what we labeled *patchwork ethnography*. In a manifesto published in June 2020, we defined patchwork ethnography as “ethnographic processes and protocols designed around short-term field visits, using fragmentary yet rigorous data, and other innovations that resist the fixity, holism, and certainty demanded in the publication process” (Günel et al. 2020). Work on research methodologies tends to focus on the changing lives of research subjects, but what if we looked at

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how researchers' own lives shape ethnographic practices? Ultimately, we conceptualized patchwork ethnography as a feminist intervention that recognizes researchers' intersecting personal and professional responsibilities and draws on fragmentary yet rigorous data to foster a more inclusive research community. With patchwork ethnography, we wished to reimagine "what counts as knowledge and what does not, what counts as research and what does not, and how we can transform realities that have been described to us as 'limitations' and 'constraints' into openings for new insights" (Günel et al. 2020).

This book seeks to extend this question by drawing on a patchwork of research experiences between 2016 and 2023. These research experiences are supplemented by my daily life in Houston, Texas, where I have been observing the transformations of the energy industry regularly through both private and public events at Rice University's Baker Institute for Public Policy, where I have been a fellow, and attending key energy industry conferences, such as CERAWeek (discussed earlier). In this sense, since I became a faculty member at Rice University in 2019, my home has doubled as a field site, endowing me with unique ways of thinking about energy infrastructure. This book would have looked very different if it had been written elsewhere.

As the following chapters will show, conducting patchwork ethnography allowed me to traverse various vantage points over several years of fieldwork. Broadly, this book is a critique of the idea of linear progress. As I have explained, such illusions situate Ghana behind Turkey and Turkey behind the United States. They place heavy fuel oil infrastructure in the past and solar power stations and electric cars in the future. By conducting research in Ghana, Turkey, and the United States simultaneously and examining fossil fuel infrastructure, solar power stations, and electric vehicles within the same time frame, I could highlight the copresence of these spaces and observe how energy infrastructures transform in a cumulative manner, often in symbiosis with each other. Overall, my research praxis facilitated and reinforced this critique of linear progress, letting me represent various infrastructure projects as interconnected nodes and networks that complement each other rather than existing sequentially. In many ways, patchwork ethnography enabled me to bring all these contexts into a shared present by swiftly moving between them.

Patchwork ethnography has given me the tools to conduct multi-sited research across Ghana, Turkey, and the United States while at the same time

allowing me to analyze the gaps and interruptions that characterize the research process, thereby instilling ethnographic research with humility. This “seam-full” engagement with knowledge production—that is, an engagement that foregrounds the seams in ethnographic research—differentiates patchwork ethnography from multi-sited research, foregrounding how all research happens amid other personal and professional responsibilities. In this book, I seek to show that such fragmentary but rigorous data can and does foster theoretically ambitious claim-making.

I learned about the differences in electricity production by visiting various power stations and, as a US-based Turkish scholar with expertise in energy and climate change issues in diverse contexts, I could communicate with decision-makers using their professional vocabularies. I have mainly asked how new energy infrastructures emerge and tracked the actors who make these emergent infrastructures possible. While much of the scholarship on new energy infrastructure focuses on the Global North, prioritizing European countries (see, for instance, Dracklé and Krauss 2011; Henning 2008; Knight 2017; Krauss 2010), my inquiry concentrated principally on Turkish-built electricity generation infrastructure in Ghana and spotlighted South-South collaboration between Turkish and Ghanaian engineers and policymakers (chapters 1 and 2) as well as Chinese energy professionals in Ghana (chapters 3 and 4). Overall, I am drawn to examining how conceptions of temporality impact energy infrastructure and, therefore, humanity’s ability to mitigate climate change.

### **Chapter Summaries**

This book investigates how the all-of-the-above approach finds a footing in Ghana. I show that this approach relies on technologies of deferral, such as the powership at the center of the first two chapters, as well as technologies of arrival, such as solar power stations and electric cars, which form the basis of post-oil modernity and which I discuss in the last two chapters. Yet the proliferation of narratives regarding energy transition obfuscates the empirical realities of the approach, offering modernization timelines that promise to achieve both energy justice and climate justice by replacing dirty fossil fuel-powered technologies with clean ones. Such transformations in energy infrastructure uphold the inequalities between actors from Turkey, Ghana, and elsewhere. Each chapter of this book offers discrete but complementary illustrations of the broad context, bringing together

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people and places not always thought of in combination. My priority is to deliver a concise account of energy infrastructure while explaining global patterns in a transformative manner.

I start by delving into Karpower's origin story, exploring the intricate processes involved in creating and sustaining this infrastructure. Many people in the Turkish business community described Karpower's ships as *cin fikir*, a quirky, effortless, but genius idea that circumvents expectations. Chapter 1 documents and analyzes how this *cin fikir* materialized, studying the emergence of Karpower's floating power plants in the early 2000s and tracking how they were integrated into the Ghanaian grid in the 2010s. I suggest that Karpower's powerships took shape as a *cin fikir* intervention, responding initially to military incursions in Iraq and later to power outages in Ghana and beyond, perpetuating a hegemonic global energy order that positions infrastructure in the Global South as requiring ongoing remodernization to remain on a linear developmental path. Within this framework, Karadeniz Holding's *cin fikir* unfolded through two interrelated processes operating across distinct scales, simultaneously mobilizing and transforming geopolitical and geoeconomic relations as well as quotidian labor practices. As a result, fossil fuel-powered infrastructure continued to generate electricity for countries in the Global South, such as Iraq and Ghana, enabling ongoing energy accumulation.

The infrastructural liminality of powerships positioned Karpower as a provider of short-term help that is necessary only until Ghana moves along the imagined telos of energy transitions, thus differentiating Karpower from Global North imperialist actors and imbuing the company with an ethical function. However, installing powerships required long-term, multiscalar connections between Ghana and Turkey, which established Turkey as a soft power in the region and ultimately deferred the promised transition to renewable energy, resulting instead in energy accumulation. These longer-term thick relationships supported and maintained the geopolitical and geoeconomic dynamics associated with a linear timeline of progress—that is, some countries, such as Turkey, are slightly ahead on this trajectory and therefore assist in developing others, such as Ghana. Chapter 2 analyzes how much work goes into maintaining this trajectory, even if it does not fully reflect empirical transformations, especially regarding energy infrastructure.

Chapter 3 segues into Ghana's clean energy future. I document and analyze the emergence of utility-scale solar power stations and rooftop solar panels in various parts of the country and investigate what leapfrogging

looks like materially. I suggest that attempts to leapfrog toward solar energy showcase Ghana's potential to enter the next phase of an emergent modernity, simultaneously reaffirming a linear narrative of progress and representing a "clean" future where cleanliness conveys environmental as well as social and political accountability. In practice, however, the effects of renewable energy power stations have followed the logic of energy accumulation, as these infrastructures are unevenly experienced and ultimately perpetuate and reinforce global and domestic disparities. On the one hand, large-scale solar power projects reproduce global inequities, extending relationships with Chinese investors. On the other hand, small-scale rooftop solar panels create what energy professionals call a "utility death spiral," a spiraling decrease in revenue and increase in costs for the government-owned utility company ECG that reinforces class status and income inequalities, shifting Ghana's solar-powered future from a technological to a financial operation.

In chapter 4, I document the aftermath of excess electricity. A diverse network of actors, including government agencies, established companies, emergent start-ups, and interested individuals with widely varying political and social ideals, reformulated the definition of excess as an opportunity to generate space for the emergence of electric vehicle infrastructure, which could consume the excess electricity on the grid and offer some financial relief to the Electricity Company of Ghana. Despite their different political and social ideals, these decision-makers share specific goals and methods. Most importantly, together they imagine creating a space for electric vehicles and charting new futures that will prevent Ghana from being the dumping ground for old technology, namely secondhand gas-powered cars. In doing so, they push back against the dominant timeline of development, opting instead for new affordable vehicles, such as the Chinese Ora Black Cat, further intensifying Ghana's geopolitical and geoeconomic connections with Chinese companies and looking for a new timeline they can help produce and follow. In certain respects, the campaign to advance electric vehicle infrastructure undermines the established flow of goods associated with the linear energy transition timeline—where Global South countries such as Ghana become sites for the disposal of the Global North's aging gas-powered cars—and unsettles assumptions about the appropriate conditions in which electric vehicle infrastructure can and should emerge. Overall, transport electrification in Ghana has shifted the Global North's sequencing of energy infrastructure development, creating alternative material pathways.

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INTRODUCTION. **Technologies of Deferral**

Parts of this introduction appeared in Gökçe Günel, “Energy Accumulation.” *e-flux*, September 9, 2020, <https://www.e-flux.com/architecture/accumulation/339454/energy-accumulation/>; and Gökçe Günel, “Accumulation: Exploring the Materiality of Energy Infrastructure,” in *The Handbook for the Anthropology of Technology*, ed. Brit Ross Winthereik and Ayo Wahlberg (London: Palgrave, 2022), 689–703.

1. These percentages are commonly used by decision-makers but are not always accurate. Every day, power producers in Ghana offer different amounts of electricity to the grid, based on a system of merit order dispatching that is administered by the control room at GridCo, the national grid company. I use these percentages to symbolize the ship’s impact but acknowledge that they are not factual indicators.

2. The other independent power producers in Ghana are TICO, Sunon Asogli, CENIT Energy, AMERI, and Karadeniz Holding. For more on the Ghana power market, see Ahlijah (2017).

3. Waller Marine, Power Barge, Modec, Chiyoda, Wison Group, Samsung Heavy Industries, Sevan Marine, Hyundai Heavy Industries, IHI, Mitsui O.S.K. Lines, and Mitsubishi Heavy Industries are some of the other actors in the floating natural gas–fueled power plant market. Karpower distinguishes itself from these other players by using secondhand equipment and retrofitting existing ships. Karpower executives told me that this allows them to offer their clients more affordable prices, which makes them popular in Africa. For an overview of independent power producers in Ghana, see Eberhard et al. (2016).

4. For an insightful analysis of how energy infrastructure bridges land and sea in Takoradi, see Chalfin (2018).

5. Floating vessels as a component of the temporary power market face competition from distributed generation facilities, which produce electricity close to points of end use. Most distributed generation facilities offer electricity outputs with a capacity smaller than 100 megawatts, but planned blackouts, power quality problems, unexpected power outages, and general increases in electricity prices have incentivized institutional and residential consumers to use such equipment. Given their relatively small and scalable size, distributed generation facilities are available for purchase to a variety of

consumers, including residential consumers. Around the world, companies such as Aggreko, APR Energy, Atlas Copco, Energyst, United Rentals, and Symbion rent out temporary generation equipment that is often powered by diesel, heavy fuel oil, and natural gas. However, none of these companies currently provides a significant portion of Ghana's electricity. While floating power plants tend to generate higher volumes of electricity for a grid and to enter into contracts with governments, distributed generation facilities have a more diverse range of clients.

6. The same delegate defended the implementation of carbon capture and storage (CCS) technology, which I analyze in chapter 2 as a technology of deferral. CCS, which is controversial outside fossil fuel circles, is a climate change mitigation technology that obtains carbon dioxide from industrial compounds, carries it to storage sites, and injects it into the ground. By injecting carbon dioxide into fields and forcing oil out, oil producers can extend the lifespan of their oilfields. While this technology has gained global appeal over the past decade, some policymakers and scientists have argued that CCS could cause concentrated amounts of carbon dioxide to leak out into the atmosphere. They also point out that liability protocols related to such incidents are ambiguous. CCS has received additional criticism because it can cause a crowding-out effect whereby funds are pulled away from developing renewable energy and instead put toward a project that prolongs the use of fossil fuels.

7. These conversations mainly refer to fossil fuel consumption as a tool for development. But as anthropologist Gisa Weszkalnys (2015) shows, the possibility of finding and exporting fossil fuels also generates expectations for future wealth. Oil extraction has been beneficial to Ghana's economy since 2007, with crude petroleum constituting one of Ghana's most important exports. For reflections on the way expatriate oil workers reflected on the potential of extraction in Ghana, see Destrée (2023).

8. All of the above became popular in the United States in the early 2000s in response to domestic energy security concerns, with Republican congressperson Benjamin A. Gilman (Congressional Record 2000) suggesting in a speech that "an effective national energy policy, must at a minimum allow for all of the above." By arguing that the United States was under attack from OPEC nations, and therefore suffered from high energy prices, this approach gave further grounds for the 2003 invasion of Iraq (see chapter 1). Legal scholar Albert C. Lin (2014) argues that all of the above was ratified with the Bush administration's 2005 Energy Policy Act and became formalized as a policy framework with the Obama administration's Blueprint for a Secure Energy Future in 2011, receiving extensive criticism because it did not adequately plan for fossil fuel phaseout. In 2025, the idea of all of the above still characterizes the ways energy professionals approach the future. Yet rather than foregrounding domestic energy security, such professionals spotlight the demands for fossil fuel-based development in Global South countries, rationalizing the expansion of fossil fuel infrastructure by reminding audiences of the significance of energy justice.

9. In 2012 and 2013 I conducted ethnographic research on how fossil fuel executives in Houston, Texas, and beyond understand the emergence of CCS policy (see Günel 2016). I also conducted research on CCS policy in the United Arab Emirates between 2010 and 2012 (see Günel 2019).

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10. For a reflection on a corporate history of the Lake Erie moment, centering on Dow Chemicals, see Müller (2018).
11. A proliferation of such technologies in the world of energy and climate change, including CCS, receives support from governments and corporations worldwide.
12. For an analysis of generators in Nigeria, see Larkin (2016).
13. Northern Electricity Distribution Company (NEDCo), the second electricity distribution company in Ghana, services the north. Because the northern part of the country has fewer industrial facilities, the power supply of NEDCo is significantly lower than ECG's, which makes ECG the most significant actor in electricity distribution. Since the unbundling of the country's electricity sector in the early 2000s, these two companies have served only as distributors and have no power production capacity.
14. As sociologists Louise Seamster and Victor Ray (2018, 317) argue, debates over progress often take three shapes: "slow cumulative progress in knowledge and morality; cataclysmic social change attained through upheavals, violence, or innovational leaps; and regression (anxiety about society moving backward, coupled with the normative assumption society should move forward)."
15. Although York and Bell's (2019) article is illuminating, the conclusions they offer, such as a cap-and-trade system, could leave countries of the Global South stranded with no access to electricity, while favoring the maintenance of existing patterns of consumption in the Global North.
16. Perhaps not surprisingly, Rostow (1990, xix–xx) concludes that "corrective action [would] depend on forehanded domestic and international public policy."
17. This statement is a reference to what many in the energy industry refer to as the "energy ladder" argument that posits a linear movement from old fuels to new fuels. Yet scholars have criticized the idea of the energy ladder and demonstrated how empirical evidence points to "fuel stacking" in households instead, where many different sources of fuel remain in use concurrently, rather than one fuel replacing another.
18. For an example of this argument, see Batinge et al. (2017).
19. Anthropologist Ezgi Güner (2023, 2024) has written about the emergence of Turkish whiteness in Africa, examining how Turkish humanitarian actors build upon and change an existing racialized affective regime between Turkey and African countries.
20. I use Doris's real name here as I believe she is uniquely situated in the field of electric vehicles in Ghana. Doris has read and commented on a draft of chapter 4 and a draft of the epilogue and is aware that I am not anonymizing her. In making this decision, I have been inspired by Weiss (2021). All other names I include in this book are pseudonyms.

#### CHAPTER 1. *Cin Fikir*

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Parts of chapter 1 appeared in Gökçe Günel, "Cin Fikir: Infrastructure, War and Progress," in *Against Catastrophe*, 2025 online exhibition edited by Orit Halpern, Eylül İçsen, and Nadia Christidi, <https://againstcatastrophe.net/cinfikir>; and Gökçe Günel, "Offshore Grid: The Rise of the Power Ship," *Architectural Review*, February 2025, 110–13.

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