POWERING COMFORT: Electricity and the Techno-Politics of Cooling in Bahrain

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> It's a problem. And if you want to realize how big of a problem it is, I'll just say that the difference between power generation in winter and summer is a ratio of 1 to 3. We're multiplying power *just* for the summer. That's an issue because now you have to design your grid for the maximum load, and the rest of the time, you've overdesigned. It's like designing a Ferrari when mostly you're just driving down the street for a pack of chips, at 30 miles per hour. And why do you need a Ferrari? Because once in a while you gotta go fast.
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> — Faisal, engineer, Energy Sustainability Unit, Manama, August 2019

When I met with Faisal,[1] I asked him to tell me about Bahrain's electricity infrastructure, particularly as it related to the supply of cooling. I was keen to understand what lay behind the icy blasts of air-conditioning that define everyday Bahraini life. Faisal's response—highlighting three-fold summer energy increases and Bahrain's Ferrari-like grid—proved illuminating in more than one sense. On the one hand, it revealed the hefty energy cost of air-conditioning in

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the Gulf, where nearly 60 percent of the domestic consumption of electricity goes to cooling. On the other, it demonstrated that behind the regulation of thermal spaces lies a particular kind of infrastructure: high-functioning, reliable, and constantly delivering uninterrupted comfort.

Prior to my fieldwork, and as a Bahraini myself, I would have taken this infrastructural arrangement as self-evident. Situated in the Gulf, Bahrain is characterized by high temperatures and humidity, particularly during the summer months. As I conducted fieldwork for this project—in bursts punctuated by the COVID-19 pandemic—I felt both the heat of the climate and the coolness of air-conditioning. I experienced the oppressive temperatures as I walked to and from my car, or when I ventured into non-cool spaces, such as air-conditioning workshops or open markets. Most of the time, however, I took notes and conducted interviews in air-conditioned offices, houses, malls, and conference venues. At times, the presence of air-conditioning provided a welcome respite from the relentless weather. At others, it left my skin shivering in response to undesirable coolness, a coolness that I have come to anticipate and that prompts me to always carry a jacket, regardless of the temperature outside.

What my project revealed was that despite its seeming neutrality, the use of air-conditioning is far from a neutral response to Bahrain's climate. As a burgeoning scholarship of critical thermal studies has shown, the control of temperature never lies outside of culture and politics. Rather, its manipulation always constitutes a socio-political exercise (Hobart 2022; Starosielski 2021). Following this premise, this article tells a story of air-conditioning grounded both in Bahrain's electricity infrastructure and in the historical and political context that gave it its shape. Inspired by the engineer Faisal's response, it argues that the proliferation of air-conditioning has resulted from what I call infrastructural excess: a technical arrangement whereby seemingly endless expansion has shaped—and been shaped by—heavy dependencies on air-conditioning.

By examining the dynamics of infrastructural expansion, this article contributes to anthropological scholarship on infrastructure. Over the past decade, anthropologists have examined the multiple ways in which infrastructures mediate social and political experience, attending to their incompleteness, breakdown, repair, maintenance, and retrofitting (Anand 2017; Buser and Boyer 2021; Hetherington 2014; Larkin 2013; Şalaru 2025). I extend this infrastructural spectrum by focusing on yet another configuration that has received comparatively little attention: infrastructural excess. I define infrastructural excess as a socio-technical system whereby increased consumption and production launches the system

into ongoing, and seemingly infinite, expansion. As such, infrastructural excess is not concerned with the spectacle of infrastructure and its operation as a fantastic object (Dalakoglou 2010; Günel 2019). Rather, it refers to a system that drives limitless growth and produces daily norms that exceed sustainable limits.

A focus on excess, I suggest, also offers methodological and conceptual tools to trace how infrastructures act as anthropogenic forces. Everywhere we look, we encounter infrastructures driving our planet on a suicidal journey of insatiable expansion, or what Julie Livingston (2019) identifies as "self-devouring growth."[2] In cities, for instance, highway extensions rarely solve congestion (Duranton and Turner 2011). Instead, they paradoxically induce more traffic and feed into a cycle of road expansion (Downs 1962). In places such as Greece and Australia, water reservoirs are generating rebound effects, whereby increasing water supply leads to more demands and calls for larger reservoirs (Di Baldassarre et al. 2018). The scholarship on shipping containers has also identified a similar trajectory toward oversizing, with dire ecological consequences for waterways (Carse and Lewis 2017). Infrastructural excess is thus not exceptional to Bahrain but a hallmark of the contemporary moment and a testament to how most design practices, as Arturo Escobar (2018) argues, serve the modern/colonial vision of a limitless world that does not recognize the planet's boundaries.

No doubt infrastructural expansions are inseparable from processes of capital accumulation. Infrastructures not only facilitate the circulation of commodities into the global economy. As capital-intensive enterprises, they also serve as key "spatial fixes" (Harvey 2006) that can absorb capital and prevent a crisis of capital overaccumulation.[3] This article, however, contends that we cannot reduce infrastructural expansion to economic rationalizations alone. As the anthropologists Hege Høyer Lievestad and Elisabeth Schober (2021) explain, the principle of the "economies of scale"—the anticipated low production costs that accompany increased production—does not always hold true. Instead, this article makes the case for heeding infrastructural excess as an ethnographic category not only shaped by economic determinations but also unfolding within particular sets of material and sociopolitical relations. Drawing on the case study of cooling in Bahrain, I argue that infrastructural excess involves political priorities, experts' perspectives, cultural practices, and persistent forms of exclusion. I further engage with infrastructural excess as a historical category insofar as infrastructures, following Susan Leigh Star's (1999) observation, do not replace older networks, but are always layered onto and extend earlier infrastructural arrangements. By adopting an ethnographic and historical approach to infrastructural excess, this article promises new understandings of the impulses behind the spiral of self-devouring growth.

To trace electrical excess and its associated abundance of air-conditioning, I divide the article into two main sections. The first section tracks the colonial genealogy of electrical excess, focusing on the period when the British converted Bahrain into a headquarters of colonial modernization policies in the early twentieth century (Fuccaro 2009).[4] In so doing, I draw on a critical scholarship that urges an understanding of contemporary Gulf cities as a product of preexisting sociopolitical structures marked by colonial domination (Fuccaro 2009; Menoret 2014a). The section explores how, starting in the 1930s, the British turned cooling supply into a key electrical priority. Far from economical, this commitment was a response to multiple socio-material needs that collectively produced a norm of excessively cheap and wasteful cooling among Bahrain's white residents. The second section examines how this commitment became entangled in a broader project of state legitimacy following independence in 1971, ultimately generating a grid in a constant state of expansion. Multiple forces fuel this expansion. Responding to public pressure, state utility policies have turned uninterrupted and affordable cooling into a central promise of modern citizenship. At the same time, the labor of engineers, the materiality of the grid, local sensorial expectations, and structures of inequality have also played a role in propelling expansion. While it was not until 2009 that Bahrain's grid could offer dependable cooling, these forces worked on it much earlier in ways that set up the contemporary cycle of infrastructural excess.

THE COLONIAL GENEOLOGY OF EXCESS

In a 1938 press interview with staff at the Bahrain Petroleum Company (BAPCO), an Englishman commented, "The heat is bad, but I'm living like an English millionaire. I had to come to an Arab desert to get air-conditioning, plenty of ice, and a tile bathroom" (IOR/R/15/2/178).[5] The luxurious tones of the statement offer insight into the centrality of air-conditioning to colonial, everyday life in British Bahrain. Arriving at the crucial juncture of oil discovery, air-conditioning became central to the colonial project, creating a precedent for cheap and abundant cooling that would set the grid on a seemingly inevitable path toward electrical excess.

Concerned with what the colonial record repeatedly described as "the worst climate in the world," the British adoption of air-conditioning in the second half of the 1930s reflected deep anxieties about the ability of white bodies to inhabit hot climates (Koheji 2025). Such anxieties were by no means specific to Bahrain but extended back to the colonial encounter with the tropics (Arnold 1998). By the nineteenth century, as confidence in white acclimatization was

waning, the desire to control heat became increasingly integral to the colonial civilizing mission. With these shifts, colonial discourses reinforced an enduring belief in temperate climates as conducive to human progress and a view of hot climates as places of physical, moral, and intellectual degeneration (Hobart 2022; Livingstone 2024). Such racial-climate ideologies persisted well into the early twentieth century, when air-conditioning emerged, turning the technology, particularly in colonized geographies, into a marker of whiteness and civilization (Ackermann 2002; Hobart 2022; Jain 2021). Unlike in other colonies, however, the arrival of air-conditioning in Bahrain was closely bound up with oil extraction, becoming a hallmark of a new, oil-driven lifestyle and fundamentally shaping the country's nascent electric grid.

With American and British technocrats arriving at the desert oil fields in the early 1930s, air-conditioning emerged not only as a solution to the thermal anxieties of the workers and their families (Koheji 2025). The air-conditioned, "millionaire" lifestyle of BAPCO employees also stood as a marker of a new cultural geography brought about by oil. As Nelida Fuccaro (2013) notes, the commercialization of oil in 1932 ushered in a culture of consumption and opulence among white expatriates living in Awali, an oil town BAPCO built in 1937 in the desert of Bahrain. Air-conditioning, as such, represented the technological possibilities of oil while normalizing a new ethos of consumerism and luxury. Beyond addressing white comfort and desires, air-conditioning further reshaped Bahrain's thermal landscape in the service of colonial, profit-making. In the desert oil fields, it supported an economy predicated on continuous extraction, enabling engineers and managers to oversee oil production around the clock regardless of the heat outside (Koheji 2025).

These new air-conditioning dependencies quickly fueled the uptake of air-conditioning in the urban centers of Bahrain. Inspired by Awali, the colonial Electric Department dedicated significant resources to cooling private and public buildings, with air-conditioning now propelling grid expansion in significant ways. In 1939, the department expanded its power plant in the capital Manama to operate twenty-two air-conditioners in public and private buildings, mostly belonging to white residents and local elites (IOR/L/PS/12/3720A). In 1940 and 1941, the department raised the number of air-conditioners to more than fifty (IOR/R/15/2/299), and in 1945 and 1946, new generators were installed in Muharraq "only for air-conditioning" (IOR/R/15/2/836). By the end of the decade, the provision of cooling had become a central policy for the department, turning this technology into an "essential in the Persian Gulf" (IOR/R/15/2/198).

For a grid in its formative years, air-conditioning further became "essential" to addressing a problem of an electricity supply that lacked demand (Hughes 1979). Since electricity cannot be stored and must be consumed once produced, insufficient demand can render the system economically inviable (Özden-Schilling 2021). That was particularly the case following the economic meltdown of 1929 and the decline of the pearl-diving industry in Bahrain. The advent of the Second World War prolonged such conditions, rendering the power plants severely underutilized, so much so that it was at times more feasible to shut them down than to run them (IOR/R/15/2/1222). To address this chronic problem, the Electric Department mapped its cooling efforts onto a new electricity pricing scheme that made air-conditioning particularly cheap to operate. In 1939, the department introduced a pricing formula structured on a sliding scale to incentivize consumption: the more consumers used air-conditioning, the less they paid per unit of electricity (IOR/R/15/1/750/4). Yet while the scheme encouraged consumption, it did not spike profits. Instead, the scale was set well below the cost of electricity production, making air-conditioning unusually cheap for those who could afford it. As a result, the Electric Department persistently yielded low returns, prompting concerns within the British Foreign Office, which warned that the British in Bahrain were using air-conditioning "at the state's expense" and were "deliberately wasting energy" to reach the lowest electricity tariff (IOR/L/PS/12/3736A).

Ostensibly addressing a crisis of underconsumption, the air-conditioning pricing scheme thus generated a norm of excessive cooling among Bahrain's white residents, who were exclusively reaping the benefits of an emerging oil industry. More crucially, it worked to maintain racialized and classed, thermal hierarchies long central to capital accumulation and empire-making (Hobart 2022; Starosielski 2021; Venkat 2022). Within Awali and beyond, colonial cooling policies reflected such hierarchies, making air-conditioning available primarily for white residents and local elites. Awali, for instance, was organized according to a model of racialized, urban segregation that granted air-conditioning to white residents exclusively.[6] Often justified by colonial officials on the grounds that Bahrainis were used to heat (IOR/R/15/1/343), such claims facilitated a racialized structure of labor exploitation by framing white bodies as inherently vulnerable to heat and nonwhite bodies as particularly suited to heat and, consequently, to grueling labor. The sliding scale further entrenched these thermal inequalities, making air-conditioning eight times more expensive for the Bahraini public while excessively subsidizing it for white residents. It is, therefore,

unsurprising that a 1945 state electricity budget noted that "the general public are still expected to contribute indirectly to the comfort of a few selected officials" (IOR/L/PS/12/3736A).

Far from inevitable, the necessity of air-conditioning in Bahrain was as such historically produced at the intersection of colonial thermal anxieties, a nascent oil industry, electricity underconsumption, and racialized and classed forms of domination. What is striking is how these factors together encouraged an electrical commitment to excessively cheap and abundant cooling—albeit among a privileged few. In the wake of a nationalist, anticolonial movement that swept Bahrain in the 1950s, the department would increasingly extend this commitment to the general public, reducing electricity rates by 20 percent and expanding the cooling of public facilities.[7] However, it was only after independence in 1971 that cheap and readily available air-conditioning became a norm for many Bahrainis. As air-conditioning became associated with the stability of an independent state, it would also launch the grid into cyclical, excessive expansion.

POST-INDEPENDENCE AND THE TECHNO-POLITICS OF INFRASTRUCTURAL EXCESS

Comfort Citizenship

"I turn my AC on even in the winter, for its sound. I can't sleep without it. I like the sound of it, and it blocks outside noise." Ahmed, a thirty-six-year-old male, was among many who developed acoustic attunements to air-conditioning, prompting them to use their machines regardless of temperatures outside. These sonic attachments often entwined with other sensorial feelings, such as the pleasure many described feeling when they layered their bodies with heavy fabrics, a desire that seems ironic given Bahrain's climate. As Ahmed proceeded to explain, "I like my room also to be cold, not neutral. That's why I turn the AC on even when it's cold, because there's nothing like snuggling under a heavy quilt and going to sleep."

Ahmed's experience illustrates the extent to which air-conditioning has come to shape everyday life in Bahrain, often in indulgent and excessive ways. Extending an earlier colonial pattern, this heavy reliance on air-conditioning was not an inevitable development. It speaks to the enrollment of air-conditioning into state-citizen relations following independence, generating a mode of citizenship increasingly predicated on comfort security.

With independence ushering in a period of national development, the use of air-conditioning multiplied significantly. While during the colonial period,

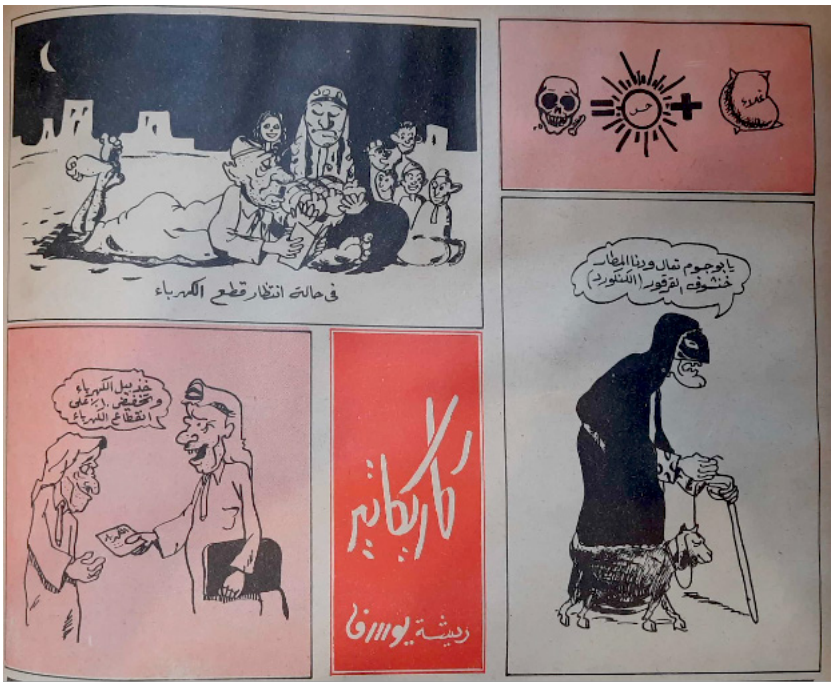


Figure 1. Editorial cartoon on summer power outages: a family sleeps outdoors for air (upper left) while state personnel offer a citizen a bill discounted 10 percent for service interruptions (lower left). ***Al-Athwaa*****, August 1974.**

air-conditioning propelled energy consumption to satisfactory levels, for the newly independent state, it posed a new challenge: an insufficient energy reserve during the summer. In response, the Ministry of Works, Electricity, and Water (currently the Electricity and Water Authority, EWA) established a scheme of scheduled shutoffs to alleviate pressure on the grid. Power was periodically cut off during peak periods, when air-conditioning use increased (Al-Huwayhi 2007). These summer outages quickly became a source of growing public frustration. Starting in the early 1970s, letters, petitions, and editorial cartoons peppered the local press, criticizing the state for failing to provide uninterrupted and affordable air-conditioning for its citizens.

Initially, the state responded by displacing responsibility onto consumers, citing lavish use as the main reason for the cuts. Such an approach, however, became insufficient amid persistent inflation and in the wake of a resurging, popular movement that called for political and economic reforms (AlShehabi 2019). Armed by the oil revenues of the 1973 energy crisis, the state thus shifted its approach to focus on "improving the living conditions of citizens."[8] In this respect,

it closely aligned with the strategies of other Gulf monarchies, which likewise distributed material and social benefits as a means of manufacturing consent in the absence of formal political participation (Al-Nakib 2016; Jones 2010; Menoret 2014b). Accordingly, in 1974, the Ministry of Works eliminated the electricity sliding scale in favor of a subsidized rate that reduced electricity rates by 50 percent.[9] These pricing reforms were further accompanied by large-scale technical expansions to address summer outages. Although such upgrades slowed down with the economic glut of the 1980s, they nonetheless facilitated the spread of air-conditioning beyond wealthier Bahrainis (Al-Huwayhi 2007). Despite such efforts, the grid remained inadequate. Scheduled power cuts continued, and so did popular pressure on the state, as citizens increasingly insisted on air-conditioned comfort as a right and a basis for making political and moral claims on the state.

To a large extent, grid expansion following independence reflected the growing influence of a local and regional capitalist class that viewed the electricity sector as a key site for profit-making (Hanieh 2018). With the liberalization of the energy sector in the late 1990s and early 2000s, opportunities for capital accumulation multiplied as EWA began partially enlisting the private sector to boost its generating capacity. As this article argues, however, grid expansion also served a key political imperative, allowing the state to make promises of progress and well-being to its constituents in the face of persistent public demands. With private plants selling electricity exclusively to EWA, officials, addressing the Bahraini public, promised the state would manage to satisfy local cooling demands



Figure 2. Editorial cartoon by artist Abdulla Al-Muharraqi, capturing persistent public frustrations with electricity provision. A Bahraini father scolds his son for using a battery-powered radio, "Turn off the radio, damn it! It will increase electrical pressure and cut off our power!!" ***Akhbar Al-Khaleej*****, August 1989.**

without summer interruptions.[10] This commitment to accommodate cooling desires reached new heights in 2009 with Bahrain's connection to "the backbone," a regional grid connecting the six countries of the Gulf Cooperation Council (GCC). The main purposes of the backbone were to create a regional energy market and, crucially, to also address the shared problem of summer outages that had started to create public unrest in other GCC countries as well (Günel 2018). With Bahrain plugged to the backbone, EWA announced that the era of scheduled shutoffs had finally passed (Mirza 2020). Cheap and readily available cooling, once an exclusive privilege of the few, now had become the norm.

In its commitment to provide air-conditioned comfort, the state has thus produced a techno-politics of excess by focusing on supply-side rather than demand-based reforms: the aim is to ensure constant and cheap air-conditioning without changing how citizens use these machines (see also Günel 2018). The result is an electricity infrastructure locked in constant expansion, as cooling demands fuel electrical expansion and electrical expansion shapes cooling demands. Such excess performs a political feat in more than one sense. Constant cooling reinforces state power by signifying its technical capabilities. Particularly in a monarchial context, where channels of formal political participation are limited, affordable and uninterrupted comfort—through ongoing electrical expansion—has also materialized a social contract, as citizenship becomes constituted not through rights and obligations but on technical grounds and through the provision of material services (see also Anand 2017; von Schnitzler 2016).

With accelerating privatization over the past decade, state anxiety about political stability shifted from a material to a financial register (Günel 2018). Following the decline of oil prices in mid-2014, fiscal deficits have prompted GCC states to introduce pricing reforms, with the end goal of selling electricity at profitable rates that would attract private investors (Hanieh 2018). In Bahrain, EWA instituted such reforms in 2016 when it removed subsidies from non-citizens and citizens with second accounts. Faced with much public outcry, and the possibility of another upheaval following the 2011 uprising, the state has continued to assure citizens that they will be exempt from further subsidy cuts or compensated for them through cash allowances (*Daily Tribune* 2025).[11] Other GCC states have followed similar strategies, with Saudi Arabia transferring cash to citizens to compensate for price hikes, and Kuwait and Qatar exempting citizens from pricing reforms. Amid such shifts, affordable and reliable air-conditioning has remained central to state-citizen relations. Yet the terms of this relationship shifted from securing a durable grid to maintaining affordable prices.

By offering such an analysis, my aim is not to propose a "rentier state" explanation, often popularized in Gulf studies as "the ruling bargain" (Davidson 2008). Such a paradigm posits that citizens have traded political rights for energy-intensive, comfortable lifestyles. In so doing, it has often excised the region from its history and overlooked the variety of actors who produce urban life (Kanna, Le Renard, and Vora 2021). As shown, the provision of cheap air-conditioning in Bahrain extends a colonial pattern that predates the formation of an independent state. Access to reliable and affordable cooling has also been demanded from below, challenging rentier accounts that portray Gulf citizens as complacent recipients of state benefits (Boodrookas 2026; Kanna, Le Renard, and Vora 2021). State utility policies, furthermore, are not only the driver of grid expansion. Engineers also play a crucial role in propelling the cycle of electrical excess through their mundane yet critical labor.

Infrastructural Work

During one of my visits to EWA, the national utility authority, I met with Mohammed, an engineer who had been at the authority for nearly fifteen years. As I sat in his cubicle office following a sketch he had drawn to illustrate the grid, Mohammed took care to point out that the ability to deliver constant cooling was no minor feat. "We've made concerted efforts, and everyone notices the effect. As a child [in the 1990s], I remember the power would at times go off in the summer, and we'd drive around just for the car AC. That was normal. But now, if the power goes off for one hour, it's total chaos," he noted. These efforts, or "infrastructural work" (Bowker 1994), involve a set of technical and organizational procedures that make air-conditioning an ever-present reality in contemporary Bahrain.

Most of this infrastructural work involves protecting the grid from an escalating air-conditioning load, reducing weak joints in the grid, upgrading cables and equipment, and closely monitoring electrical loads during the summer to preempt interruptions. Less immediately, however, engineers ensure continuous electrical expansion by folding cooling expectations back into the grid. This is most apparent in the way EWA services buildings with electricity. On a second visit to Mohammed's office, as we sat amid ringing phones and churning fax machines, Mohammed clarified how this process begins with engineers reviewing electricity requests that customers submit to EWA. These requests detail the power voltage of all the appliances they intend to install. As Mohammed shuffled a pile of requests, I was stunned to see the significant electrical loads approved only for air-conditioning. When asked how they evaluate these cooling loads,

Mohammed responded, "We don't use formal guidelines. . . . It's what makes sense for its use here, locally. For instance, we know that, here, a 4x8 room uses this AC tonnage. Sometimes we see two ACs in a room or in places like garages . . . as long as we find it reasonable and we can meet that demand, we approve it." In describing his work as an exercise of common sense, Mohammed, and other engineers who similarly described their assessments, underscored the cyclical manner through which infrastructures are shaped by the values they sustain. While Bahrain's excessive infrastructure has generated air-conditioning dependencies, such expectations, in turn, get folded back into infrastructure by becoming input for the work of engineers.[12]

This does not mean to suggest that engineers do not rely on standards in their work. As science and technology studies (STS) scholars have long noted, standards make up the invisible skeleton of infrastructures and set norms for those building them (Bowker and Star 1999; Busch 2011). For EWA engineers, one standard key to their labor is the calculated usage rate for air-conditioning. When assessing electricity requests, engineers also calculate the maximum energy demand of a building to determine whether the network can meet it. In this calculation, air-conditioning receives special consideration, and its use is calculated at a standardized 100 percent usage rate. As such, engineers supply electricity with the assumption that all air-conditioners in a given building will operate simultaneously. I was puzzled by that standard, since it seemed unlikely that all units would be constantly running in a given building.

Ongoing conversations with EWA engineers, however, revealed that the 100 percent standard very much relates to the fragility of the grid. As Jane Bennett (2010) notes, the electricity infrastructure is particularly vulnerable joining heterogenous elements that do not always cooperate: cables, auxiliary equipment, labor, and so on. That became clear when I connected with Fatima. Having worked with EWA for more than twenty years, Fatima clarified that the standard is meant to protect the grid from potential disruptions. The aim, she remarked, is to let the grid "breathe more easily." Over the phone, she explained, "Assume there's an overload because we accounted for three instead of five ACs. The fuses can get burned, the cables can get hurt, or the transformer in the power station might need to be replaced with a bigger one. . . . We don't want any of this to happen, so we always assume the maximum demand for AC: a 100 percent use factor."

In light of the state's creation of the Sustainability Energy Unit in 2014, I was curious to understand how the engineering practice of inflating and recycling cooling patterns squared with sustainability commitments. Several

engineers shared a recognition that their practices and the state broader utility policies were fundamentally unsustainable. At a regional sustainability conference that I attended in Kuwait, a Kuwaiti state engineer expressed this view. As we casually chatted in the conference lobby, he noted, "Our problem in the Gulf is a problem of excess. We say we're facing water scarcity, so what do we do? We make all this effort to find additional resources and enhance our generating capacity, but why don't we teach people to reduce their consumption?" At the same time, however, many understood that such infrastructural approaches served the state's objectives of safeguarding political stability and were consequently difficult to transform. This awareness of the political status of infrastructure was most reflected in the reluctance of many engineers to voice their critiques in public forums. Instead, they mostly reserved their commentaries for private conversations, where they mobilized terms such as *excess*, *overdesign*, and the illusion of *infinite* resources to describe the problems of supply-side reforms.

What this further reveal is that the infrastructural work that sustains electrical excess also involves what Gökçe Günel (2018), in her analysis of the Gulf's regional grid, describes as "boundary work." Such boundary work allows engineers to separate the technical from what they understand as the political dimensions of infrastructure.[13] Among the engineers I spoke with, boundary-making was apparent not only in discussions of supply-side practices but also, particularly, of electricity pricing. Husam, a former EWA consultant working at a university in Bahrain, illustrated this tension. As I spoke with Husam in his university office, he shared the research recommendations he had submitted to EWA, which drew a clear line at electricity pricing. "We definitely need pricing reforms," he noted, "but since this is sensitive, we can do other things, like retrofitting the grid with smart meters to allow greater load control."

To a large extent, this boundary draws on a top-down distribution of organizational labor that produces certain topics as political and "off-limits." This became particularly clear at one national sustainability conference I attended, where an expert brought up subsidy policies, prompting a state official to intervene and blatantly state that electricity rates were a state matter, not open to discussion. By engaging in boundary work, engineers, like Hussam, thus produce air-conditioning consumption as a "technical" problem that requires technical fixes. Viewed in this way, measures including smart meters, energy-efficient air-conditioners, or insulation codes typify a way of addressing ecological problems that Günel (2019, 10) terms "technical adjustments," which extend technological complexity "while foreclosing others (such as asking larger-¬scale moral, ethical, and political questions regarding how to live)."

While the infrastructural work of engineers sustains the state's techno-politics of excess, everyday users, for their part, also contribute to electrical expansion, although in unequal capacities. As anthropologists have demonstrated, infrastructure operates through uneven regimes of distribution that differentially shape everyday life (Anand, Gupta, and Appel 2018). I contend that such inequalities are fundamental to cyclical expansion, allowing the grid to grow while reconfiguring older, thermal hierarchies along new social lines.

Infrastructural Access

If intensive air-conditioning use has become normalized among many Bahrainis today, such usages form part of the techno-politics of excess insofar as they require substantial electrical extensions. This dynamic becomes particularly visible among wealthier households, where large cooling loads can spur significant grid expansion. Huda, the owner of a high-end villa, recalled how extensive air-conditioning use tripled the household's electricity consumption. With her children's preference for heavily cooled interiors—cool enough to wear jumpers indoors during the summer—and successive house extensions, the household's cooling load steadily increased. Over a decade, the house's electricity distribution boxes grew from one to three. "We incorporated three garages into the house to make the living room bigger and built new garages behind the house. . . . We also built two male guest rooms and a room for the driver, so we paid EWA for more electricity," she explained. At times, the demand generated by large homes and their cooling systems is so great that, as one engineer told me, meeting it can require the construction of an entirely new electrical substation.

Formal requests for increased cooling loads are only one mechanism through which citizens fuel grid expansion. Many act beyond state authority to meet their cooling desires. These cooling loads, which EWA staff referred to as "unauthorized loads," critically compromise the grid, calling for the state to embark on further infrastructural upgrades that perpetuate the spiral of expansion. Rather than constituting acts of resistance (Scott 1990), unauthorized cooling is facilitated in ways that allow citizens to fulfill their needs without directly challenging the state. Yet far from ensuring seamless access, such loads can make air-conditioning an intermittent and, sometimes, hazardous experience.

I first learned about unauthorized cooling from Lubna, a thirty-two-year-old citizen living in middle-income social housing. During the summer, I often accompanied Lubna in her air-conditioned car while she ran errands or just cruised during her free time. One day, Lubna surprised me with urgent news. Their house

had almost burned down. She explained that their electrical problems began when her family installed additional air-conditioners after expanding the house. These additions started to cause occasional power interruptions. The family would respond by shutting off the air-conditioners temporarily, turning on the fuse button in the electricity box, and resuming their use. Over time, however, the electrical pressure became so significant that it caused the electricity box to burst into flames. When Lubna called EWA's emergency line, they sent a technician whom Lubna paid to temporarily fix their problem. "They sent someone who went to buy a piece of something, and we paid him for it. I don't know what he did, but it was temporary. Eventually, we'd have to request electricity upgrades."

Lubna's story was not exceptional. It mirrors that of many middle-income and limited-income Bahrainis. Particularly as real estate has become increasingly expensive and waits for affordable social housing have grown to twenty or more years, many families resort to extending their houses to accommodate additional family members as their children get married (al-Khenaizi 2018). Such expansions result in the installation of air-conditioners that can create significant additional energy loads. According to EWA's regulations, additional installations require a formal request for electricity upgrades, which can cost a hefty fee depending on the electrical extensions required. Oftentimes, however, homeowners bypass EWA to avoid incurring these fees, instead hiring informal electricians, mostly migrant workers for whom air-conditioning installation is a lucrative enterprise.

While such overloads constitute a violation, the state approach has been not to actively prevent them but to ensure that they do not affect the grid through further electrical expansion. Abdul-Rehman, a retired EWA engineer I spoke with over the phone, explained that these overloads always became visible during the summer because they destabilize the grid. However, when Abdul-Rehman suggested to his supervisor launching an inspection campaign to identify such overloads in houses, his proposal was rejected because "it would cause trouble." Other engineers similarly explained how suggestions to conduct surveys to locate overloads were discouraged by the utility authority, revealing how air-conditioned comfort has become a cornerstone of state-citizen relations. At times, EWA engineers even facilitate these unauthorized loads by choosing not to report them when detected. While adamant about addressing overloads, Abdul-Rehman, for instance, also sympathized with citizens resorting to such measures. "Especially if the violations are minor," he explained, "you don't report them because you don't want to get someone else in trouble. At the end of the day, we're all Bahrainis." Personal connections with utility users or additional income through informal electrical work—such was the case with Lubna—can also drive engineers not to report overloads. Regardless of motivation, willful

ignorance on the part of EWA employees forms part of the techno-politics of excess. It permits lower- and middle-income citizens to unofficially increase their air-conditioning use without openly challenging state regulations.[14]

Viewed in this way, unauthorized loads do not interrupt the cycle of expansion but further accelerate it. At the same time, however, they produce unequal conditions of comfort by potentially making the operation of air-conditioning far from seamless. For Lubna, unauthorized loads caused the house electrical box to burst into flames. In some lower-income households I encountered, they instead compelled family members to negotiate and compromise their use of air-conditioning, recognizing that several units could not operate simultaneously because the household's cooling installations far exceeded the capacity of its electrical connections.

But if electrical expansion is driven by citizens' cooling demands, such expansion fundamentally depends on racialized labor regimes that exclude low-income, migrant workers from cooling benefits. With underpaid contracts and strict legal controls, migrant workers comprise the lowest class of the racialized capitalist economy in the Gulf, rendering them both transient and disposable (Khalaf, AlShehabi, and Hanieh 2015). In their disenfranchised position, they contribute to infrastructural excess in both direct and indirect ways. Directly, they provide the cheap labor required to build and extend the grid, both through formal employment or informally as they help citizens meet their needs.

Indirectly, the exclusion of migrant workers enables the state to manage the problem of infrastructural "capacity" (Chahim 2022). By externalizing thermal burdens onto disposable labor, the state can sustain intensive air-conditioning use among citizens without overwhelming an already strained electric grid. Although my fieldwork did not include migrant workers due to logistical and political constraints, others have extensively documented how migrant workers, particularly men employed in industries such as construction, are systematically exposed to dangerous heat (Gardner 2010; Iskander 2021; Croser and Jawed 2023). Such exposure has produced what Nicole Starosielski (2021) terms "thermal violence," which manipulates heat in ways that enact physical and mental harm. Testimonies of such violence across the Gulf abound. An Indian electrician in his thirties working on laying underground cables in Saudi Arabia, for instance, recalled the effect of heat on his body, "Ten minutes after the bus dropped us off at the work site, I felt like life was exiting my body" (Croser and Jawed 2023). In a different testimony, a former construction worker recounted, "Our socks and T-shirts would become so soaked that we had to wring them out multiple times a day" (Human Rights Watch 2023).

Although Bahrain's labor regulations have instituted summer bans on outdoor work, which extends from noon to 4 p.m. between mid-June and August

31, these bans do not take into account actual weather conditions. In a climate-changed Gulf, temperatures outside the restricted hours can still remain unsafe. Moreover, the ban does not stipulate the provision of air-conditioned shelters during the rest period. Many workers, instead, languish in the heat, seeking shade under trees or against the sides of buildings as they remain dressed in heavy work gear, a sight I encountered numerous times on hot days.

Access to air-conditioning in workers' accommodations is also not always guaranteed. Despite legal requirements, reports of housing without air-conditioning or of companies failing to maintain electricity service remain common (Human Rights Watch 2023). With EWA removing subsidies from non-citizens, such thermal exclusion has become more pronounced, as migrants now even absorb the financial cost of operating the grid. Particularly for permit-holding workers responsible for their own accommodation, this represented a particular strain, and users have taken to social media to anonymously complain about it. As one resident tweeted, "EWA [Electricity and Water Authority] bills are very expensive during summer. I just have one AC on and the bill is more than BD100 [US $265]" (MRRORS 2022).

At their core, such forms of thermal violence extend long-standing racialized ideas of adaptability that produce particular bodies as naturally suited to heat. In her ethnographic study of migrant workers in Qatar, Natasha Iskander (2021) explains how this perceived adaptability is inseparable from racialized assumptions of skill. Despite developing considerable expertise on the job, migrant workers are formally classified as "unskilled" labor and relegated to tasks considered menial, uncreative, and manageable even under the stress of extreme heat. In turn, their vulnerability to heat often becomes blamed on their lack of skill and their inability to protect themselves. She writes, "Heat, in compromising the embodied cognition that is the basis for all skillful practice, turned workers' own bodies against them in ways that mimicked the skill politics that were arrayed against them" (Iskander 2021, 225). With heat further eliminated in labor regulations as a work "injury," its effects on the workers, including kidney and cardiovascular conditions, are often interpreted by companies as natural developments related to inherent weaknesses in migrant bodies, rather than to systemic thermal violence (Iskander 2021).

Thus while during the colonial period, luxurious cooling was supplied at the expense of Bahrainis, in this newer, neoliberal context, it is the endless supply of supposedly unskilled migrants that contribute indirectly and directly to the comfort of citizens, enabling the cycle of infrastructural expansion in profoundly unequal ways. In so doing, the workers also face a different, and more dangerous, kind of excess in their exposure to extreme elements.

CONCLUSION

In many ways, the story of electrical excess in Bahrain is specific. Yet this article also argues that we can locate similar infrastructures in other geographies. I have suggested that infrastructural expansions involve more than their apparent pragmatism. In Bahrain, abundant cooling is not simply a response to high temperatures. In both colonial and postcolonial Bahrain, it served both social and political purposes. At the same time, infrastructural excess cannot be reduced to regimes of economic calculations alone. It also involves a set of socio-material relations that exceed capital accumulation. As Bahrain's example demonstrates, multiple actors fuel the cycle of electrical expansion: the state ensures constant and cheap cooling through supply-side and subsidy policies. Engineers, for their part, build and inflate cooling expectations back into the grid, and residents propel grid growth in unequal capacities.

Approaching infrastructural excess as a historical and ethnographic category can also reveal possibilities for disrupting the cycle of self-devouring growth. If infrastructural excess is sustained through patterns of inequality, then prioritizing questions of access and the lived experiences of users can encourage a rethinking of whom infrastructures serve and how they might otherwise operate. In the case of air-conditioning, this might involve designing systems around actual thermal needs rather than assumptions of limitless cooling desires. In a place like Bahrain, such assumptions have often led engineers to deliver overcooled environments that exceed comfort thresholds and that are needlessly unsustainable (Koheji 2025). Centering access can further reorient air-conditioning toward those most vulnerable to heat while opening possibilities for cooling solutions less dependent on expensive energy and technological complexities. Climate-responsive architecture and green urban planning practices may offer lessons in this regard. Whatever the form of intervention, tracing the multiple drivers behind the spiral of infrastructural growth can allow a reenvisioning of infrastructures not as engines of perpetual expansion but as foundations for sustainable and just worlds.

ABSTRACT

The proliferation of air-conditioning in Bahrain is not a neutral response to high temperatures but the outcome of an electric gird marked by what I call infrastructural excess: a socio-technical configuration locked into continuous growth. This configuration emerged from a colonial project that prioritized the provision of abundant air-conditioning in the service of white comfort and interests. Following independence, it became folded into a broader project of state legitimacy, setting in motion a cycle of grid expansion. Multiple actors drive this cycle. Responding to public

demands, the state has turned uninterrupted and cheap cooling into a cornerstone of political consent. Engineers propel electrical expansion by inflating and embedding cooling expectations into grid planning, while residents, acting even beyond state authority, push the grid's boundaries in pursuit of thermal comfort. By framing infrastructural excess as historical and ethnographic, this article offers insights into the planetary crisis of infinite growth. [infrastructure; techno-politics; the Gulf; air-conditioning; heat; comfort]

NOTES

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1. All names used in this article are pseudonyms.
2. The anthropologist Dean Chahim (2022) insightfully mobilizes Julie Livingston's (2019) concept of "self-devouring growth" to analyze the management of Mexico City's overburdened sewage infrastructure amid urban expansion. Here, I deploy the concept differently: rather than describing infrastructures under strain, I employ it to characterize infrastructures that are themselves continuously growing beyond sustainable limits.
3. Since independence, the electricity sector has offered a key arena for local and regional capital accumulation (Hanieh 2018). The relationship between capital accumulation and electricity, however, lies outside the scope of this paper.
4. Bahrain being a British Protectorate from 1861 to 1971 (Fuccaro 2009).
5. BAPCO was established in 1929 as a subsidiary of Standard Oil Company of California (SOCAL) to monopolize oil exploitation (Fuccaro 2013). SOCAL registered it in Canada as a British company to satisfy British imperial requirements.
6. As Robert Vitalis (2007) argues, oil towns in the Gulf drew heavily on models of racial separation developed under Jim Crow in the United States.
7. "Lowering Electricity Rates," *Al-Najma al-Usbu'iyya*, May 20, 1959, 19:1; "Awali Restaurant," *Al-Najma al-Usbu'iyya*, May 7, 1958, 15:3.
8. "The State to Shoulder Half of Citizens' Electricity Consumption," *Al-Athwaa*, September 5, 1974.
9. "The State to Shoulder Half of Citizens' Electricity Consumption," *Al-Athwaa*, September 5, 1974.
10. As expressed in the statement of the minister of work: "Al-Jowder: The Utility Authority Is Turning into a Private Company," *Alwasat* website, February 4, 2008. http://www.alwasatnews.com/news/276582.html
11. As Adam Hanieh (2018) argues, the economic restructuring that was implemented across the Arab World in 1990s and the 2000s played a key role in triggering the massive upheavals that became known as the Arab Spring in 2011. Bahrain was part of the Arab Spring uprisings.
12. For a discussion on the reiterative relationship between infrastructure and society, see Harvey, Jensen, and Morita 2017.
13. Gökçe Günel draws on Thomas Gieryn's (1983) concept of "boundary work," which concerns the construction of boundaries between "science" and "non-science."
14. On deliberate ignorance as politics, see Scott 1990 and Anand 2011.

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