Cederlöf, Gustav. 2023. *The Low-carbon contradiction: Energy transition, geopolitics, and the infrastructural state in Cuba*. University of California Press. ISBN 9780520393141. $29.95.

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Reducing fossil fuel dependency is not a choice—it is a necessity. Beyond curbing climate change, it is key to limiting the power of fossil fuel-rich nations over global politics. The option we have is either to seriously embark on intentional and planned transition pathways (fast) or to face the consequences of forced and likely chaotic transitions. Recent trade conflicts and Russia's war in Ukraine merely hint at the risks behind taking the second route. History offers lessons too. Cuba's energy struggles, though unique in its context, serve as a crucial example. The country's seemingly continuous challenge to satisfy national energy demands amidst geopolitical upheavals indicates that decentralizing and downscaling energy distribution, next to diversifying power sources, are the most promising ways forward to build resilient and sustainable energy futures.

In his book *The Low-Carbon Contradiction*, Gustav Cederlöf deconstructs Cuba's energy pathway, providing unprecedented insight into a forced degrowth experience necessitating an energy transition. He uses the concept of the "infrastructural form"—understood both as shape and process—as a theoretical and methodological starting point to follow the electrical current from the socket of an empty and "hopelessly warm" refrigerator in a Cuban home (p. 1), through the plug into the national electricity system, tracing its physical and ideological origins. Crossing spatial and temporal scales of analysis, Cederlöf takes the reader on a journey through Cuba's revolutionary past and present, focusing on the changing energy imaginaries that have supported and legitimized Cuba's political economic projects to this day.

The book chronologically covers Cuban post-Spanish colonial history beginning with the turn of the 20th century. Chapter 1 highlights how US imperialism first enabled independence from and then replaced Spanish imperialism, maintaining the island's dependency on sugarcane exploitation. The emerging energy infrastructure saw significant investment during this period but was concentrated on delivering electricity to the sugar mills and predominantly urban population groups who were able to pay for it. The Cuban Revolution, partially fed by a popular discontent with the unequal geography of capitalist development, overthrew the established political system in 1959.

But the revolutionary forces did not object to the ideal of progress and modernity and indeed sought to grow and industrialize the country (one side of the low carbon contradiction). The difference was that socialist development was meant to be driven by equal distribution, not by profit. According to Leninist thought, such distribution was guaranteed through central state control. In Cuba, a handful of large oil-powered thermoelectric plants, imported from the Soviet Union, and a unified national grid started to deliver electricity to every household for a fixed price (disregarding of individual consumption) in the early 1960s. The changed infrastructural form not only "brought the masses out of the darkness and into the light" (p. 31) in the literal sense but also, figuratively, created a bond between the people and state ideology. Soviet oil enabled this revolutionary project.

While the 1960s and 1970s saw the rapid growth of Cuba's infrastructure and its electricity (supplied by Soviet fossil fuel) demands, the 1980s started to reveal the limitations to the system as elucidated in Chapter 2. First, though Fidel Castro maintained that industrialization would follow electrification automatically, the country's main product was still sugar, which was exchanged with the Soviet Union for oil and its derivatives. Even though the agricultural sector was mechanized, it only furthered dependency on Soviet fuels. Second, the shutdown of any of the five power stations resulted in a blackout for a substantial part of the population, which made regular maintenance difficult. The efficiency of this infrastructure drastically decreased with its advancing age in the 1980s. And third, the centralized physical network was vulnerable to tropical storms that regularly threatened the system at large. As a result, Fidel Castro introduced *ahorro*, thriftiness, as the new revolutionary ideal. A good revolutionary would not waste energy and would use it cautiously. Additionally, Castro sought to diversify the energy mix, most importantly by building a nuclear power plant.

Despite these efforts, the collapse of the Soviet Union in 1990 hit the Cuban islands hard. Chapter 3 discusses how the relations with former communist partners deteriorated. Together with an unfinished nuclear power plant, an aging infrastructure and "the storm of the century" in 1993, the lack of oil put the energy system into crisis. As a novel tool for legitimizing the widespread blackouts, fuel and food shortages, Fidel Castro

announced a "special period in times of peace"—complementing the weakened infrastructural power (Mann, 1984) with discursive power (Svarstad *et al*., 2018, p. 356). He called upon his people to "resist" the external, imperial (US) forces that wanted the revolutionary project to fail by being even more thrifty and by being innovative, finding solutions to problems at the household and community level. Encountering hardship during this forced degrowth period was the temporary and collective price to pay to secure the survival of the Cuban Revolution.

In Chapter 4, Cederlöf leaps into a rich ethnographic account of families' every-day energy struggles in post-Soviet Cuba, their acts of saving, sharing and inventing within gendered spaces, and in urban as well as rural contexts. The author discovers that people "did not try to find alternative energy sources within the existing system or to make energy use economically more efficient, but rather, by entering into new infrastructural relations, they tried to make the centralized energy infrastructures redundant" (p. 106). In other words, the population didn't just find temporal workarounds to limitations encountered with the central energy infrastructure, but they sought to become independent of it.

The new millennia brought relief to Cuba's energy system in several ways. For one, the newly formed PetroCaribe trade alliance with Venezuela provided a renewed, stable influx of fossil fuels. For another, Fidel Castro's government undertook a "paradigm shift" in the organization of electricity generation and distribution. The proclaimed "Energy Revolution", as discussed in the final Chapter, focused on "non-growth-based social values", the decentralization and diversification of the energy system (which was the other side of the low carbon contradiction). National politics prioritized self-sufficiency, building on the place-based strategies of energy saving and innovation and investing in decentralized grids powered by diesel generators, wind turbines, and solar panels. Through this energy transition, the Cuban political leaders formed a more resilient energy infrastructure and managed to reinstate the centralized logic of the state (and socialist ideology). The transition decreased the economy by 32% which effectively reduced Cuba's carbon emissions.

In effect, Cuba "degrew" it's economy in material terms. But it also maintained high educational and health standards. The Cuban population became more physically active and largely switched to agroecological and renewable practices, making Cuba one of the few countries reaching a high standard of human development with a small ecological footprint (see Hickel, 2020, 2022). Therefore, the Cuban example partially reflects what the theory of degrowth tries to achieve, namely downscaling consumption while quality of life thrives, independent of economic growth (Paulson, 2017, p. 427). However, as the book notes, the Cuban nation did not take this pathway in a voluntary or coordinated manner, rather out of changing geopolitical pressures.

Cederlöf's detailed and illuminating analysis of Cuba's Low Carbon Contradiction offers novel and in-depth insights into the "revolutionary minds" not only of Cuba's political leaders but of its people. It also offers key contributions to political ecology: first, it reminds us of the value of case research, of diving deep and exploring the specific and often diverse experiences and relations that coexist and shape larger societal processes (see Helmcke, 2022). Second, it directs attention to the essential role that individual households and communities play in finding and enacting transition, and perhaps degrowth pathways; and third, it calls for caution when considering Cuba as a "real-life" example of degrowth. As Cederlöf argues, "inserting Cuban experiences in a degrowth narrative risks doing epistemic violence to these experiences" of everyday struggles (p. 160). Nevertheless, fossil-fuel economies currently (and increasingly) face pressures similar to the Cuban experience, either through climate change and depleting oil and gas reserves or through political conflicts, that urge us to consider alternative energy pathways. It is important that we build on lessons learned and prepare to adapt to a post-growth and low-carbon future rather sooner than later. The book the *Low-Carbon Contradiction* provides perfect grounds to start the process.

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