



Bagged and boxed salads at a Western Beef supermarket. Photo: Elisa Iturbe.
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Architecture And the Death of Carbon Modernity

*If man had to acquire the conditions of survival in order to live . . .
now he must acquire the conditions of life in order to survive.*

—Murray Bookchin, *Post-Scarcity Anarchy*

Although the carbon footprint of the built environment can be empirically measured, the relationship between architecture and the climate crisis is elusive in regard to space and form. Until now, most environmental discourse in architecture has focused on carbon as a by-product of building and construction, making it seem that at the ecological brink, architecture's most pressing concern is energy efficiency. This stance compartmentalizes the discipline and dislocates the origin of the climate crisis from the dominant political, economic, and spatial organizations that are its cause. In response to this dislocation, this issue of *Log* reconsiders the link between architecture and climate by exploring the reciprocity between energy and built form. To do so, energy must be understood beyond its technical capacity, viewed instead as a political and cultural force with inevitable spatial repercussions.

There have been three paradigms of energy capture throughout human history – foraging, agriculture, and carbon-intensive fossil fuels.¹ At each transition from one paradigm to the next, the productive capacity of human society was transformed, restructuring the existing social order and engendering a corresponding spatial and architectural paradigm. The shift from a nomadic to an agricultural society gave rise to towns, villages, and cities. The shift from an agricultural to an industrial society driven by fossil fuels gave rise to factory towns, global trade networks, suburbs, and megacities. This most recent of these spatial paradigms, which I call *carbon form*, is the focus of this issue. The aim here is twofold. First to identify our current energy paradigm as a driver of urban and architectural form. When the adoption of fossil fuels established a new horizon of possibility for production, society reorganized itself around the availability of abundant energy. This reorganization became immediately

1. For more on energy capture, see Andreas Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (London: Verso, 2016); Ian Morris, *Foragers, Farmers, and Fossil Fuels: How Human Values Evolve*, ed. Stephen Macedo (Princeton: Princeton University Press, 2015).

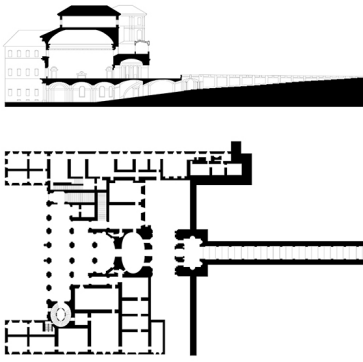
legible in space as new architectural typologies and urban growth patterns emerged. The second is to implicate architectural and urban form in the creation and unfolding of the anthropogenic climate crisis in a way that looks beyond the immediate quantification of a carbon footprint. Our current built environment, designed under the premise of abundant energy, has created spatial configurations that enmesh the cultural, economic, and political aspects of social life within an energy-intensive network of space and form. As a result, we cannot think of the built environment as passively receiving energy from the grid but rather as actively giving form to energy-intensive ways of life, from individual consumption to the larger dynamics of global capitalism. This, more than the day-to-day energy use of buildings and cities, is the more significant obstacle to meaningful change in the face of a worsening ecological disaster. Regardless of increases in energy efficiency and reductions in the carbon emissions of individual buildings, the built environment as we know it will be fundamentally unable to supplant the current energy paradigm or to address the climate crisis as long as its core is constituted by carbon form. Any proposal for the future must first deal with overcoming this cultural and architectural legacy. To do so, it is necessary to recognize the spatial expression of carbon energy – carbon form – as a site of intervention, which in turn reveals that architecture has a significant role in defining the outcome of this increasingly uncertain phase of human and planetary history.

To define carbon form, it is first essential to understand how the relationship between energy and built form has changed as primary energy sources have evolved. The first two energy paradigms – nomadic and agricultural – were solely reliant on the consumption and combustion of available biomass. While sedentary farming practices allowed humans to harness more energy than did the hunter-gatherer paradigm, given the new ability to store food and predict its availability, all sources of energy still came from the cultivated field or the wild. As such, the economies and social structures during these first two paradigms of energy capture had to contend with the limitations of available land and labor. In contrast, the third and current system emerged in the late 18th century when humans began to fuel machinery with ancient stores of energy derived from the combustion of detrital fossil carbon – vast sources of energy beneath the surface of the Earth composed of the layered and compressed remnants of dead plants and animals. These are known as

hydrocarbons, or fossil fuels, and they take the form of coal, petroleum, and natural gas, producing large amounts of energy when burned. Reaching into these stores of carbon brought about an unprecedented condition of energy abundance, which in turn led to major changes in the productive capacities of society, restructuring the existing social order and sparking a new phase in the development of capitalism – what many have called the fossil economy, or carbon capitalism. As geographer Andreas Malm writes, “The fossil economy has the character of a totality, a distinguishable entity: a socio-ecological structure, in which a certain economic process and a certain form of energy are welded together.”² This new phase of capitalism brought with it a new paradigm of space and form: new architectural typologies, infrastructural networks, and taxonomies of urban form emerged as abundant energy brought about mechanized production processes, demographic displacement, the reorganization of labor dynamics, urban density, economic growth, and commodity culture. This in turn produced warehouses, factories, and worker housing, and, with further technological advancements, office towers, apartment buildings, department stores, skyscrapers, suburbs, strip malls, train lines, highways, airports, etc. – in other words, *carbon form*. In the 20th and 21st centuries, society has become an increasingly complex network of interlocking carbon forms, each of which replicates the myth of a limitless supply of energy and resources that is characteristic of a carbon-fueled culture of abundance. These forms are the physical building blocks of contemporary capitalism, and they are configurations that architects, designers, and builders continue to replicate over and over again. But in order to overcome carbon form, further definition of the term is necessary.

Carbon Form

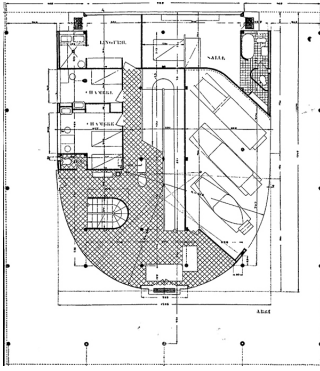
Several kinds of carbon form are possible, not only urban and architectural typologies but also the spaces and objects of our everyday lives: fast food chains, roadside motels, a delivery truck full of bottled water idling on an asphalt street, the appliance section of a department store, military installations, the internet, Las Vegas, natural gas pipelines, the Indy 500. Carbon form can also constitute cultural artifacts or behavioral patterns that propagate and reinforce petro-culture – tailgating, rolling coal (see Lindquist, page 31), Happy Meals, the James Bond film franchise. Carbon form can also refer to specific relational or positional matters. For example, a spinach leaf in itself is not a carbon form. But a spinach leaf



Gian Lorenzo Bernini, Francesco Borromini, and Carlo Maderno, Palazzo Barberini, Rome, 1629. Plan and section.

grown with petroleum-based pesticides and fertilizers, sown and harvested with gasoline-fueled machinery, packed in a plastic container, delivered on a truck, and sold in an air-conditioned Walmart superstore surrounded by open expanses of asphalt is, if not a carbon form in itself, a commodity that circulates within a complex network of carbon forms and defines specific relationships within that network. The idea of carbon form allows objects and activities to be understood in relation to the larger sociospatial and energetic organizations that determine their formation, making visible their position in land-use patterns, economic and political relations, and specific configurations of built form. In other words, the scope of carbon form is vast, thus the authors in this issue approach the topic in varied ways.

This essay is concerned with carbon form as the building block of the contemporary city and with its architectural expression. At the architectural scale, the relationship between energy and space has always existed, for the simple reason that the availability and density of energy have always determined how things move and how quickly. For example, Palazzo Barberini in Rome, built between 1556 and 1629, before the advent of fossil fuels, includes on its central axis a ramp that is calibrated to the precise slope and width necessary to take a horse and carriage from the front of the building to the carriage houses at the rear. The dimensions, proportions, and scale of the entry sequence in relation to the piano nobile and the overall volume of the building register the power and movement of human and animal bodies through the space. With the advent of carbon energy, machines revolutionized mobility. When the movement they enabled and the movement of the machines themselves were registered in architectural form, new formal configurations emerged. For example, Villa Savoye, built in the outskirts of Paris in 1929, is a carbon form because its ground floor plan explicitly registers the turning radius of automobiles through the radius of the architectural figure. Here, a carbon form is defined by its formal or spatial organization, which indexes the specificities of carbon energy. This reframes the relationship between energy and architecture. In contrast to mainstream environmental discourse, which is largely limited to a building's rate of energy consumption, these two examples show architectural form registering specific characteristics of energy through slope, width, radius, plan, and section – that is, through the architecture itself – such that each architectural typology registers the dominant energy system



Le Corbusier, Villa Savoye, Poissy, France, 1929. Ground floor plan.

of its respective time period. As such, carbon form is not defined by the size of its carbon footprint, but by its ability to index the spatial implications of a carbon paradigm.

This reading can be applied at the urban scale as well. In the early 20th century, architectural projects for the city also began to register the rise of carbon energy, proposing new urban organizations for a carbon-intensive society. Responding to petro-mobility, Le Corbusier's urban plans proposed to separate office towers and parks from streets and highways in a full reorganization of the city. Similarly, *The Athens Charter* proposed to arrange the modern city according to the logic of the emergent social relations of mechanized production, separating work from leisure and prizing efficiency as though the city itself operated according to the logic of the factory and the machine. By means of total planning, the modernists sought to reorient the social and spatial dynamics of the city toward an industrial economy, and the implications for urban space were significant. The Plan Voisin, which juxtaposes a modern organization to the historical fabric of Paris, reveals that the difference between energy paradigms – precarbon versus carbon – could create vastly different possibilities for urban form.

This dramatic contrast, in addition to the project's tabula rasa mentality, helped to produce the belief that modernism was a wholesale break with the past. However, evidence against this can be found in Le Corbusier's and Ludwig Hilberseimer's open admiration for the ancient cities of Greece, the Roman Empire, China, and Egypt. The modern distaste for the past was not a sweeping rejection of history but rather a specific critique of the transformation of the 19th-century city since the advent of industry. As Hilberseimer notes in *The New City*, "Machines and industry destroyed the essential structure of rural and urban settlements. The disorder in which we live follows as inevitable consequence of a changing world."³ These changes – the introduction of automobiles to the historic city fabric, the demographic shifts caused by the transformation of urban labor, the haphazard new construction caused by a rapidly growing economy – were wrought by carbon energy and they lent the 19th-century city a new formal disposition characterized by growth and disorder. The modernist reaction against this emergent disposition, then, should not be considered part of an indiscriminate rejection of the past, but rather a reaction to the early expressions of carbon form that emerged in the late 18th and early 19th centuries. Arguably, rather than

3. Ludwig Hilberseimer, *The New City: Principles of Planning* (Chicago: Theobald, 1944), 18.

instigating a historical rupture, modern urbanism was a reaction to a rupture that had already occurred: our last energy transition. The fascination with technology, the reorganization of transit, and the separation of residential space from labor that came with the rise of the factory became characteristics of the modern vision of the city, which, despite its declaration of a new era, was responding to the existing conditions of a carbon energy paradigm already over a century old. Architectural historian William Jordy describes the modern period as one in which “the architect did not need to conjure the fantastic. He had only to open his eyes to the laconic facts of modern experience around him.”⁴ One could argue, then, for a different timeline of modernity that is not defined by the Modern Movement but instead by the new social conditions that started with the onset of carbon enabled industry and technology, what one might call carbon modernity.

The modernist urban project was not a critique of this rising form of modernity, but rather a passionate attempt to give this new paradigm order and form. In *The City of To-morrow and Its Planning*, Le Corbusier writes:

*In the last hundred years a sudden, chaotic, and sweeping invasion, unforeseen and overwhelming, has descended upon the great city; we have been caught up in this, with all its baffling consequences, with the result that we have stood still and done nothing. The resultant chaos has brought it about that the Great City, which should be a phenomenon of power and energy, is to-day a menacing disaster, since it is no longer governed by the principles of geometry.*⁵

Le Corbusier recognized that the full potential of industry could not be realized without a new spatial organization, because the irregularity of the preindustrial urban fabric was restraining its power and potential. What the industrial city lacked was *form*. This realization instigated a period in which carbon form underwent intensive development. The city would no longer grow haphazardly, nor would its overall form be the consequence of impromptu social processes. Instead, its form would anticipate the needs of the industrialized economy and organize space according to the presumption of a productive urban subject. Rather than generating a historical break, the morphological transformation of the modern pushed carbon form into a new stage in its evolution, adding to its attributes a powerful union between economy and form.

Of course the modern zeal for industry was not sustained throughout the 20th century, and the postwar era did not produce a body of urban thought so explicitly concerned with the proper functioning of a carbonized economy. Yet, even

4. William Jordy, “The Symbolic Essence of Modern European Architecture of the Twenties and its Continuing Influence,” *Journal of Architectural Historians* 22, no. 3 (October 1963): 179.

5. Le Corbusier, *The City of To-morrow and Its Planning*, trans. Frederick Etchells, 3rd ed. (New York: Dover, 1971), 25.



Figure-ground plan of Wiesbaden, Germany, circa 1900. From Colin Rowe and Fred Koetter, *Collage City*, 1978.

as architectural discourse moved on to different concerns, such as the death of the modern, the rise and fall of post-modernity, and, eventually, the emergence of digital design and fabrication, the production of architecture has remained rooted in the same energy paradigm that sparked the Modern Movement. The idealization of technology so characteristic of modern discourse lost some of its fervor with the onset of postmodernism, but its use in architectural production did not. Toward the end of the century, digital technology reactivated technocentric debates, but these have largely disassociated the technologies in question from the dynamics of carbon energy in favor of theorizing the relationship between the digital and form generation. This has ensured the persistence of carbon form and allowed the development of a built environment ever more reliant on dense and abundant energy, despite the stylistic and technological permutations in architecture. So, while modernism as a cultural ideology did indeed die, we have failed to notice that the necessary death has not yet come, for *carbon modernity* has not yet died, and – as Walter Benjamin said of capitalism – it will not die a natural death.

Architecture cannot address the causes of the climate crisis without recognizing carbon modernity as a continuous cultural and material foundation for building and form. So what has allowed carbon modernity to persist and flourish after the fall of the modern, given that postmodern urbanism explicitly rejected the industrial city and the techno zeitgeist that drove modern urbanism to exalt carbon-intensive processes? In 1978, Leon Krier declared industrialization a total failure,⁶ while the broader movement, according to urbanist Nan Ellin, strove for “contextualism, historicism, the search for urbanity, regionalism, anti-universalism, pluralism, collage, self-referentiality, reflexivity, preoccupation with image/decor/scenography, superficiality, depthlessness, ephemerality, fragmentation, populism, apoliticism, commercialism, loss of faith, and irony.”⁷ However, these concerns largely ignored the role of production in the formation of the city, failing to address how carbon form had come into being, even as postmodern architects lamented the loss of urban fabric precipitated by carbon form. For example, in *Collage City*, Colin Rowe and Fred Koetter reframe the contradiction between historical and modern urban form as the difference between two spatial dichotomies: figure/ground and solid/void. The spatial inversion that occurred in the transition to the modern city was evident in their comparison of the Uffizi Gallery in Florence with Le Corbusier’s Unité d’Habitation

6. Leon Krier, “The Consumption of Culture,” *Oppositions* 14 (Fall 1978): 59.

7. Nan Ellin, *Postmodern Urbanism* (Cambridge: Blackwell Publishers, 1996), 133.

8. Colin Rowe and Fred Koetter, *Collage City* (Cambridge: MIT Press, 1978), 83.

and in their well-known figure-ground plan of Wiesbaden, which can be read today as a contrast between precarbon and carbon form. Rowe and Koetter proposed putting these urban models in tension with each other through strategies of “cross-breeding, assimilation, distortion, challenge, response, imposition, superimposition, conciliation” – in other words, collage.⁸ The capacities of carbon form to destroy and dissolve the integrity of an urban fabric would be arrested by locking the city into an unending spatial dialectic, by which the urban fabric itself could once again be active against the distended voids of the modern city. Through the lens of carbon form, however, the success of the dialectic strategy would lie in the ability of the historical fabric to resist the logic of carbon.

The postindustrial economy did not offer the historical city this kind of agency. The displacement of industry to the East and Global South changed the nature of urban economies in Europe and North America. In the face of postindustrial decline, real estate development became an economic engine; after all, individual homeownership had been instituted as national policy for postwar recovery. The result was a privatized process of growth in which land is widely platted for the sale of single-family homes as part of a business model indifferent to problems of urban form. In many cases these developments were similar in form to Rowe and Koetter’s historic fabric, but as part of a consumerist development model, low-density and largely residential neighborhoods became a new expression of carbon form. Similarly, although the postmodern urban movement largely prized the historic city, often favoring the pedestrian over the car, postmodern urbanism tended not to propose a systematic transformation of urban circulation. Instead, it relied on images of carless streets that were largely unattainable for cities that had been built according to the logic of the automobile. Rather than transforming the asphalt landscapes of the modern city, these ideas gave rise to conservative movements such as New Urbanism, which have largely tended toward exclusionary enclaves that reify the carbon economy by reinforcing consumerism and further entrenching a culture of private property (see Aureli & Giudici, page 175, and Bell & Seong, page 131).

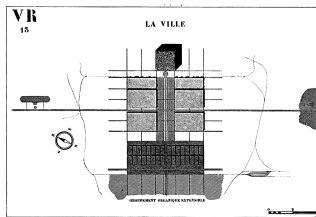
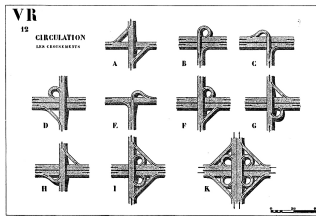
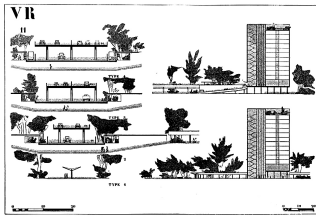
In a different approach to the postmodern, Denise Scott Brown and Robert Venturi generated a careful study of modern conditions through a critical aesthetic project. However, *Learning from Las Vegas* was ultimately a study of carbon form as vernacular, legitimizing its logic by focusing on its aesthetic presentation. In the 1970s and ’80s, architectural agency

seemed distant from the roots of carbon form and the causal conditions of carbon modernity. Environmental projects such as those appearing in the work of Buckminster Fuller, the pages of *Whole Earth Catalog*, or the writings of eco-anarchist Murray Bookchin openly attacked the environmental damage wrought by capitalist society, but they nonetheless championed a carbon fueled technoscape that they thought would lead to postlabor abundance. The underlying conditions of carbon energy were left uninterrogated and undisturbed.

By the end of the 20th century, the digital revolution brought about a new techno zeitgeist that has ignored the problems of carbon modernity in its own discourse. From the environmental costs of building the exuberant shapes of the digital paradigm to what Miguel Shvartzberg Carrió calls “architecture’s love affair with a neoliberal script of productivity at all costs,”⁹ the architectural experimentation made possible by the digital has further cemented the relationship between an architectural avant-garde and the fossil economy. Moreover, digital design evolved simultaneously with intense globalization, wherein corporate real estate deploys architecture itself as a form of capital. The result is a further proliferation of carbon form, in which spectacular architectural designs are deployed as anchors for more development, making carbon form self-replicating (see Luarasi, page 76). Architecture legitimizes these modes of production and enables the continued evolution of carbon modernity, which can ultimately be understood as an uninterrupted episteme in which architectural thought has evolved for over 200 years. In this context, projects that have had exceedingly different roles in architectural discourse and history can be correlated and compared as carbon form and as vehicles for the perpetuation of carbon modernity.

If we seem at risk of equalizing all modern and contemporary architecture under the rubric of carbon form, negating the possibility of agency or difference, this is precisely the point. In the totalizing framework of carbon modernity, architectural thought is constantly subsumed by the ideology of the fossil economy, making it impossible to decouple both the discipline and the practice of architecture from environmental collapse. Carbon form *is* everywhere, and the possibility of a critical architecture is negated by its breadth. As such, it is both necessary and urgent to recognize the extent to which carbon modernity has shaped how architecture is both thought and built. As anthropologist Dominic Boyer writes, carbon energy systems have “crucially supplied the intensities of power for modern life and governance, and through these

9. Manuel Shvartzberg Carrió, “Complexity and Contradiction in Infrastructure: On the Schumacher-Trump Hegemony” *Avery Review* 21 (January, 2017), <https://www.averyreview.com/issues/21/complexity-and-contradiction-in-infrastructure>.



Le Corbusier, *Radiant City*, 1930. This proposal was a reorganization of urban form to facilitate the functioning of the fossil economy.

dependencies, subtly shaped the trajectory and forms of modern political power.”¹⁰ These systems have also shaped the trajectory of modern space, far beyond the Modern Movement’s interest in the industrial city. Carbon modernity has become a way of life, a mode of thought, and a social order that has preceded and outlasted the major architectural movements of the past two centuries.

What might architecture be capable of in this context? The death of carbon modernity involves all aspects of civilization, and cannot be the task of architecture alone. While carbon modernity must be addressed across the realms of politics, economics, energetics, and ecology, the aspects of carbon modernity that are expressed in built form can be addressed specifically through architecture. If architecture recognizes carbon form as a site of intervention itself, then its contribution to the death of carbon modernity could be the overcoming of carbon form – a multifaceted project for architecture in which the concept of carbon form gives rise to an alternative history of modern space, linking form and energy in order to expose architecture’s entanglements with power – in the sense of both energy and politics – and perhaps to unearth new sites of architectural agency.

Overcoming Carbon Form

The idea of carbon form posits that architecture is an index of energy flows, which in turn implies that *form follows energy*. However, an architecture dependent on energy and its corresponding technologies for its form is condemned to reflect and give shape to the dominant energy paradigm, capitulating to a timeline of existing technologies and maintaining its given role in the fossil economy. Thus architecture that is operative in the prelude to energy transition, rather than its wake, must be catalytic of new spatial, social, and energetic organizations and not rely on energy for the derivation of its form. In other words, we must denounce carbon form for its reduction of architecture to an epiphenomenon so that the overcoming of carbon form can bring about new sites of architectural agency, a necessary precondition for addressing the climate crisis. Given architecture’s current entanglement with carbon capitalism, architecture is clearly in need of a new ambition, creating an unlikely parallel to the Modern Movement, for both, then and now, call for a radically new organization of the city. Le Corbusier writes, “Modern life demands, and is waiting for, a new kind of plan, both for the house and for the city.”¹¹ Our moment also demands new architectural and

10. Dominic Boyer, “Energopower: An Introduction,” *Anthropological Quarterly* 87, no. 2 (Spring 2014): 323.

11. Le Corbusier, *Toward an Architecture*, trans. John Goodman (Los Angeles: Getty Research Institute, 2007), 86.

urban organizations, a new plan for how we live. But unlike the modernists, for whom the relevant energy transition had already occurred, our energy transition is yet to come. While their present was the raw material for their proposed futures, our present is one from which we cannot build. Furthermore, as the modernists aligned architecture with prevailing modes of production, they exacerbated and magnified the trajectory of capitalism, accelerating carbon modernity. The impact of this has been felt for a century, and all subsequent carbon form bears the legacy of that union between economy and form. We can no longer afford this union. But while one interpretation of this phenomenon is the debilitation of architecture in the face of economic forces, another is to notice the power of architecture to *give form*. Today, the fossil economy continues to govern the production of architecture, and architecture gives form to and strengthens its logic. Architecture is both as powerful and as powerless as it has ever been. The question is whether architecture can harness that power, for if it had the capacity to give form to emergent social structures at the beginning of the 20th century, then it should also have the capacity to give form to an alternative today. Architecture's ability to transform the city in our time will not result from the incorporation of technological advancements in building systems, fabrication, or design software, but by how radically architects are willing to reject the carbon fueled myth of unlimited growth and lay the groundwork for the coming transitions in energy and social form.

This undertaking presents a double bind. Despite the need for a radical rejection of foundational aspects of culture, discourse, architecture, and infrastructure, the coming transition cannot be premised on a notion of a tabula rasa. The hard lessons of colonialism, capitalist extraction, and urban renewal have shown that a tabula rasa does not exist. Rather, it is created through erasure, displacement, and expropriation. As the policy lead for the Green New Deal, Rhiana Gunn-Wright, has said many times, the costs of social rearrangement must be recognized and accounted for. Moreover, population displacement and migration will be one of the primary consequences of climate change. Flooding, drought, and wildfires will cause some cities to grow and others to shrink, leaving them to grapple with an unprecedented pace of expansion or retrenchment. This displacement should not be further exacerbated via the fiction of a tabula rasa. Furthermore, the material realities of carbon form – concrete, asphalt, steel, plastic – are characterized by degrees of permanence that hinder their removal,

or even modification (see Lumley, page 24, and Halland, page 35). It might seem at times that there is nowhere from whence to start anew, a perception fueled by the sacrosanct neoliberal axiom, *there is no alternative*. How, then, might change be theorized?

It is common to associate change in architecture with historical rupture and the transgressions of an avant-garde. This was the case not only during modernism but also in the postmodern rejections of the modern and in the debates over architectural language and image that have arisen with digital design. The language of rupture, however, is suspect. First, as previously mentioned, the ability of carbon modernity to withstand the breaks and ruptures in architecture discourse has allowed carbon form to evolve without interruption well past its obvious obsolescence, and second, because the present is already confronted with three significant conditions of rupture.

The first condition of rupture is the onset of a metabolic rift: the widening gap between the biophysical processes of nature and those of human society. This rupture between the natural and the social stems from social activity operating according to nonecological rules, driven instead by political and cultural forces that emerge from interhuman dynamics such as the invention of private property or international markets. That same social activity, however disconnected from natural processes in its origins, still draws from natural resources, often through processes of extraction that ignore the ecological dynamics that produce and reproduce those resources. As a result, society can be viewed as separate from nature, while at the same time human activity is altering the metabolic exchanges that support all life.¹² This metabolic rift has become an inherent characteristic of carbon modernity, for the extraction of subterranean fossil carbon is fundamentally responsible for decoupling human labor from the biodynamics upon which life otherwise depends. This decoupling has led to unprecedented economic development and population growth, but rather than showing that a divide between nature and society is possible, the flourishing of human activity that has accompanied the adoption of carbon energy has led to a condition of climate collapse and mass extinction. It is clear that this rift cannot hold.

The second rupture comes with the pronouncement of a new geological epoch: the Anthropocene. Characterized by the registration of human activity at the geological timescale, this epoch presents itself as a temporal break, a point of no return.¹³ In the Anthropocene, the traces of human activity

12. For a summary of metabolic rift theory and the current debates around it, see Andreas Malm, *The Progress of This Storm: Nature and Society in a Warming World* (London: Verso, 2018).

13. The idea that the Earth has entered a new geological era was popularized by Paul J. Crutzen, who has argued that human impact on natural processes has become legible at the geological scale for the first time, creating a departure from the previous era, the Holocene. Although the term *Anthropocene* emerged in the field of geology, it has opened up new terrain in the environmental humanities by interrogating the causes of climate disruption, begetting other new terms such as the *Capitalocene* (Jason W. Moore), the *Technocene* (Herminio Martins), and the *Cthulucene* (Donna J. Haraway).

14. Malm, *Fossil Capital*, 9. Emphasis original.

do not remain in the past but become a geological force in themselves, in particular because the carbon dioxide released into the atmosphere through human activity stays in the atmosphere for hundreds of years. Emissions in the present are added to previous accumulations of carbon dioxide, which in the aggregate transform the future for millennia to come. As Malm writes, “The grip of yesteryear on today intensifies – or, put differently, the *causal power of the past inexorably rises*. . . . The significance of that terrible destiny, so often warned of in climate change discourse, is the final *falling in of history on the present*.”¹⁴ Indifferent to this temporal disarrangement, carbon modernity persists, giving rise to a third point of rupture: the disjunction between the geological discontinuity of the Anthropocene and the cultural continuity of carbon modernity.

These manifold ruptures complicate the possibility of an insurgent architecture, for neither techno-utopian innovations nor an avant-gardist tabula rasa can address the complexity of this fractured landscape. Yet these three conditions of rupture should inform the project of overcoming carbon form, which requires not only a forward-looking gaze but also a full grounding in the conditions that have led to this point. Despite a penchant for rupture and transgression, architects and theorists of built form are not unfamiliar with this way of thinking, for the city itself carries the past forward in time, constantly collapsing it onto both the present and future as architecture outlasts the conditions of its making. Today, however, the weight of the past, embodied by carbon form, is felt more heavily due to its ability to reify the fossil economy in the present and thus extend the environmental impact of built form far beyond its immediate spatial and material circumstances. In this context, decarbonization is not solely a question of technology and buildings systems, but also a theoretical question for architecture and the city, one that questions carbon modernity as an obsolete cultural and material foundation for architecture. In that light, this issue treats decarbonization both as a cultural project and a formal problem, one undergirded by the theme of transformation, for carbon form cannot be erased. It must be overcome – supplanted and transformed.

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