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SPECTERS OF MODERNISM



Authors' note: This essay was first drafted in late 2025. In light of recent events in the Middle East, where energy infrastructure has been under direct threat, and the cascading impact on fuel availability and energy security is compounding at multiple scales worldwide, resilience (energy and otherwise) has taken on renewed global urgency. At the building scale, design is one of the most direct and actionable contributors to that resilience, shaping energy demand, thermal comfort, and human experience. The principles of the new heliomorphism, grounded in solar performance and climate-responsive form, carry a renewed and critical relevance.

INERTIA

On an April morning several years ago in Kuwait City, one of the authors of this essay, equipped with a thermal camera, roamed around one of the country's architectural landmarks: the Kuwait Foundation for the Advancement of Science (KFAS) designed by The Architects Collaborative (TAC) in 1982. Scanning the atrium with the camera, the envelope's formal and material language was translated into data. At the southeast facade, adjacent to the entrance, is a floor-height window that frames passing cars and the sand-colored fabric of surrounding buildings. The window is slightly recessed and shaded with a layer of glass fins placed at a forty-five-degree angle—creating, from the inside, a prismatic shimmer of the hot world outside. During this particular visit, two of the fins were broken, waiting to be replaced. Aiming the camera's crosshairs toward this gap, the temperature gradient sharpened, and the building's thermal strategy became legible. The missing fins showed heat gain and revealed the otherwise invisible impact of this modest-looking solar control element in a hot climate.



Many architects commissioned to work in the Middle East during the expansion of modernism in the late twentieth century designed with a pronounced environmental vigilance in response to the region's climate, clearly expressed through conspicuous strategies of solar control—blocking the sun, that is, before radiation could enter the building. Of the Arab Investment Building in Riyadh, Saudi Arabia, TAC wrote of their aim to “respond creatively and directly to the demands of climate and orientation with particular respect to sun and heat gain.”¹ For their first commission in the Middle East, a 273-building campus for the University of Baghdad in 1957, they produced a catalog of mid-century solar geometries: a ziggurat figure; offset shaded walkways; small, recessed apertures; and large clerestories with angled extrusions to bounce light (not heat) downward into spaces for education and administration. Only a few were built.²

This vocabulary of radiation management was elaborated, again and again, by TAC and countless other architects in the years leading up to the KFAS megalith. A refraction of postmodernism, a solar brutalism with a delicate thermal logic, the building is grounded and austere in the relentless and intensifying sun. Aside from a large atrium-lighting window, the KFAS's thick walls are broken only by a few recessed openings and thin, lengthy ribbons of glazing, blocking heat while bringing light to the interior. The windows are single pane with a dark sun-shading tint; no fenestration is left exposed, everywhere solar protected either through deep recession, an external shade, or both. The strategies proliferate: thick envelopes; small, recessed windows; deep, shaded arcades with slits at the top for daylight and air circulation; an atrium that simulates a courtyard, adorned and illuminated with skylights. The *pièce de résistance* is the motor-driven polarizing skylight domes, opening and closing to block the sun according to seasonal and diurnal cycles.

↵ The Architects Collaborative (TAC), Kuwait Foundation for Advancement of Science (KFAS), Kuwait City, Kuwait, 1987

The entry of KFAS celebrates solar control: The floor-height opening of the main facade is recessed back to create a deep overhang and overlaid with a closely spaced screen of angled vertical fins, which intercept and refract direct solar gain, while allowing daylight and views. From the interior, the fins produce a characteristic visual shimmer and an abstract distance from the exterior, an analogy for the compromised and contingent distinction—in thermal terms—between inside and outside.

↵ This thermal image shows how the missing glass fins on the southeast facade of the building allow for increased heat gain, thereby proving the effectiveness of the fins still in place. The reading was taken in 2017.

EXCHANGE

Two lessons can be drawn from this thickness, this vocabulary, this environmental vigilance. First, aside from the motor, the thermodynamic system of KFAS eluded operational energy demand. Design produced performance—not the air-conditioned performance of the curtain wall building, but performance nonetheless.

KFAS is just one example, an entanglement of strategies and tactics that emerged in dialogue with and alongside other proposals and imperatives, experiments in living with the sun in the vast not-yet-air-conditioned regions of mid-to-late-century hot modernism. This experimental array reconsidered and refigured heliomorphic architectures—shaped for and preoccupied with solar life—that have been around literally since the dawn of time.

Thus, the second lesson embedded in this thickness: KFAS and other examples of modernism's environmental vigilance resonate across history less as technology, or as design method, and more as a specter, or chimera. KFAS, as with other examples, offers a sociomaterial approach distant from contemporary energetic practices and policies, remote in its political economy, and yet beckoning, shimmering like the street outside viewed through the shaded, tinted windows of TAC's late modern building. How to grasp this intelligence and its contradictions?

The new heliomorphism that is the subject of this issue suggests, as well, a new relationship to history. A counter-chimerical archival and narrative method, which involves polarizing the glare, not shielding our eyes from the shimmer but devising a means to look through it, to establish a working relationship with the ghosts of modernism. How could heliomorphism possibly be new? Two possible approaches: First, by seeing the historical import of architecture since modernism as largely concerned with energy consumption, throughput of fuels, as a physical substrate and cultural medium for a seemingly endless acceleration of carbon emissions. Second, by seeking new methods to understand and celebrate the inflections and refractions of heliomorphic knowledge, buildings, and projects, not only from within modernism but also from periods before, and since. These specters haunt us less with "what could have been"—or what we could have been, were we to have been modern—and more with the temptation of a transformed future. The new heliomorphism is, perhaps surprisingly, less about the sun, or form, or even about returning to lost principles of solar performance, and more about reimagining ourselves and our relations—to collectives, to economies, to building forms, and to technologies, to cycles of construction and destruction, and to seasonal and diurnal relationships to comfort and radiation. It is about becoming heliomorphic subjects.

Architecture all around us is both *not fit for purpose* and *able to be decarbonized*. The brief or long episodes of environmental vigilance, patterns of thought, technologies, and practices that arose from microclimate and microcultural aspirations are the chimeras to be refracted. But are there actual lessons associated with these old heliomorphisms, for the new? Like so many solar modern architectures, KFAS shimmers in part due to its inutility and misapprehension: its delicate "just barely" capacity for effective operation; its naivete vis-à-vis today's analytics and approaches; its comfort conditioned by expectations. Irreconcilable for its functional incapacities and its political-economic interventionism, it is simultaneously an object lesson and at the same time *promising*, elevating our aspirations, offering different contours to both historical narratives and projected futures.

From this refracted perspective, the focus of the last few decades on the *air-conditioned performance of the curtain wall building* as a means for environmental impact can be seen not only to have ossified building industry practices and supply chains, but also to have prescribed path dependencies in the infrastructure of knowledge production; an architectural, historical, scientific, and regulatory pursuit. Strategies to *reduce absolute energy demand* have steadily disappeared from architectural pedagogy and practice; energy justice is barely emergent as a topic of concern. The curtain wall, the complex building, the smart facade, decades of research, modeling, and testing: Architecture is persistently reinforced with technological advancements in material and mechanical methods of climate control. The pace at which these measures are adding energy exchanges far outstrips the time-delayed computations of complex efficiency measures. See also data farms, AI, and other bubbles.

The vocabulary and syntax of architecture's sustainable methods have become both overwhelming and beside the point—overdetermined, over-carbonized, operating within a sealed bubble, a cyclic technological trajectory *consumed with solutionism*. What appears as "sustainability" or "energy transition" (or "resilience," "net-zero," and so forth) in architectural schools and industry headquarters is in fact both rhetorically and materially *in the way* of climate action, an obstacle to environmental vigilance. The building industry-academic complex offers a salve, not a solution, to architects, clients, regulators, policy makers, and publics. It has neither effectively resisted nor offered alternatives to trends toward building larger, and ever more luxuriously; trends that are forever increasing the dependence of buildings and societies on fossil-hungry mechanical HVAC systems, along with the supply chains and development models they invoke and require.

→ Mária Telkes and Aladar Olgyay, *Solar Wall Prototype Studies for the Christmas Hill Subdivision*, New York, 1958 (unbuilt)

The “Solar Wall” was proposed for a number of buildings, complexes, and subdivisions in this period; the drawing here is intended to indicate the numerous configurations that the process allowed, adaptable to a range of situations. This variability allowed for heat storage to be located at the point of use, at some distance from the collector wall.

↘ Mária Telkes and Aladar Olgyay, *Prototype Studies for the Christmas Hill Subdivision*, New York, 1958 (unbuilt)

Telkes and Olgyay offered the developer a number of different housing shapes and dispositions, indicating summer and winter settings for the collector wall with chemical phase-change storage solutions as a means for direct heat storage. “Shading eyebrows” could be extended seasonally to manage direct radiation on the fenestration. The thick interior partitions in plan indicate heat storage elements where the phase-change chemical solution released heat into the room as needed.

PHASE CHANGE

The historical and historiographic complexity invoked by the “new” presents another obstacle. The new heliomorphism doesn’t only look back past fossil-fueled modernism but rather tries to understand the history of architecture, and its use value, from a different perspective altogether—to explore it for the emergence of alternative technologies, forms, and values, that might, surprisingly, be useful today. There is an “old” heliomorphism that is not so much a time frame as an attitude, a method, that persists.

Another chimera: the assumption that utilizing the sun, whether for the provision of heat, or daylighting, or for the production of electrical energy, is a heroic means to compensate for architecture’s outsized contribution to carbon emissions. Such a focus not only reduces complex socio-energetic interdependencies to those governed by the envelope but also highlights a principle in the underlying physics: There is no energy use without a corresponding thermal emission, no matter the source.

And thus, another socio-energetic chain of causal interdependencies: from local and discretionary heat for supporting human survival to an enclosed steady state thermal surround, intended to optimize labor and preserve capital. Few traditions or practices, however near or distant historically, have tried (or managed) to *heat* through design means, without the substantive aid of fuel. Strategies for optimizing radiant surfaces and stack effect ventilation are rare and highly dependent on precise regional and climatic conditions. The addition of heat to a building has most often been generated internally, not externally, and has again

been starkly local—whether heated stones, charcoal braziers, ovens, and, much later, fireplaces. Across the millennia, architecture’s concern with the sun has mostly been through blocking it, as at KFAS, by shading and deploying the inertia of thermal mass to mitigate excess heat. Solar heating, unlike shading, was only a modern architectural phenomenon *in res potentia*.³

A counter-chimera emerges, a spectral inflection, a ghost that haunts us in the form of the avid Hungarian engineer Mária Telkes. At the Space Heating with Solar Energy conference at MIT in 1947, Telkes demonstrated phase-change materials (PCMs), an inertial heat storage system that effectively translates the highly variable radiation of the sun into a steady state thermal engine—able to maintain modernity’s ideal interior environment, or something approaching it, through radiation and chemical storage. Telkes tested a PCM heat storage prototype with Eleanor Raymond for the Dover Sun House, in Dover, Massachusetts (1947). With architect Aladar Olgyay she designed a wall thickened with PCMs for the main building at the Curtiss-Wright Solar Lab in Princeton (1957), and they later proposed a Solar Wall variable phase-change system for a subdivision in Upstate New York. Telkes was a catalyst for postwar solar discussion, co-founding the Association for Applied Solar Energy, establishing a solar energy lab at New York University, and developing solar desalination systems and solar ovens as part of US aid programs. She ended her career at the University of Delaware with “Solar One,” a hybrid demonstration house with phase-change elements and an early experiment in terrestrial photovoltaics (1971).⁴

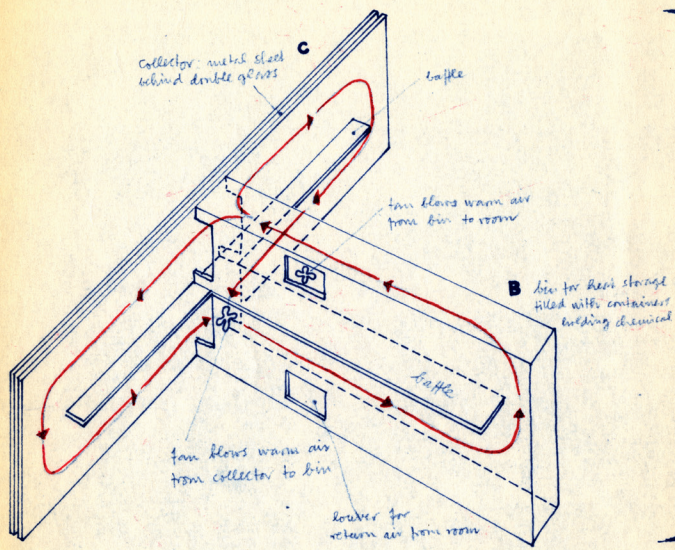
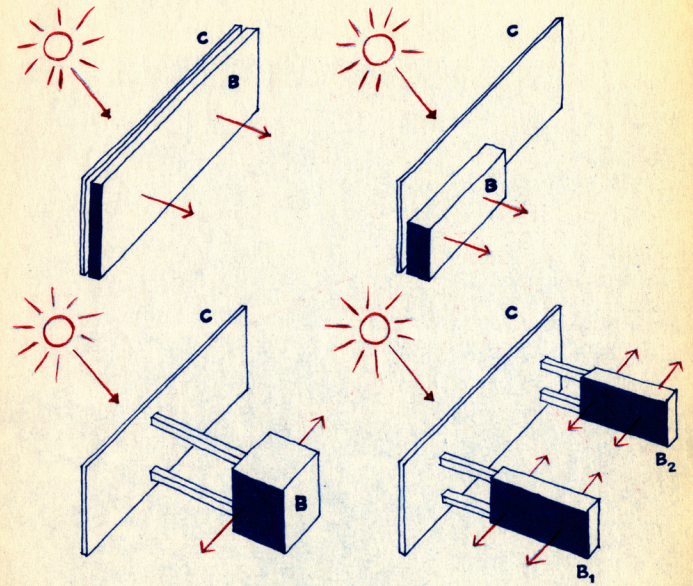


Diagram of the collector (C) and heat storage bin (B)

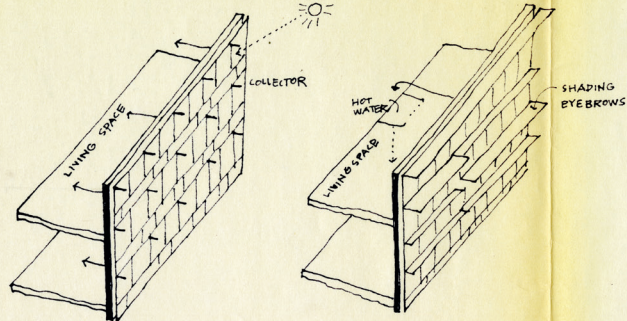


Alternative arrangements

PRINCIPLE :

1. WINTER

2. SUMMER



CHRISTMAS HILL 1

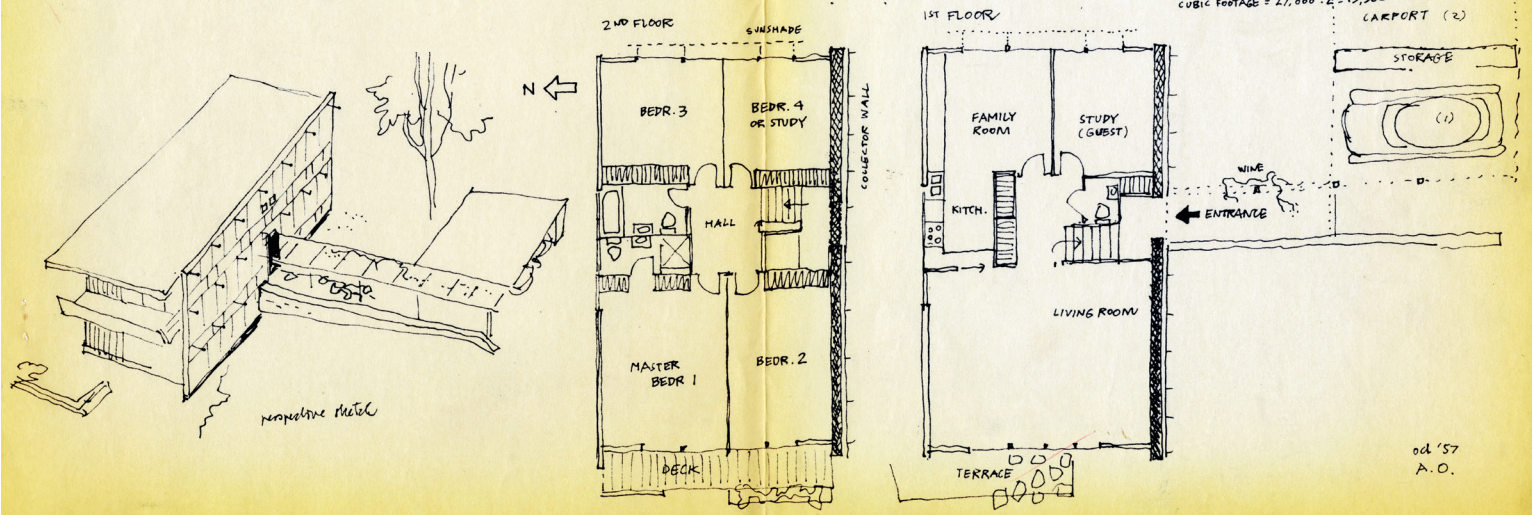


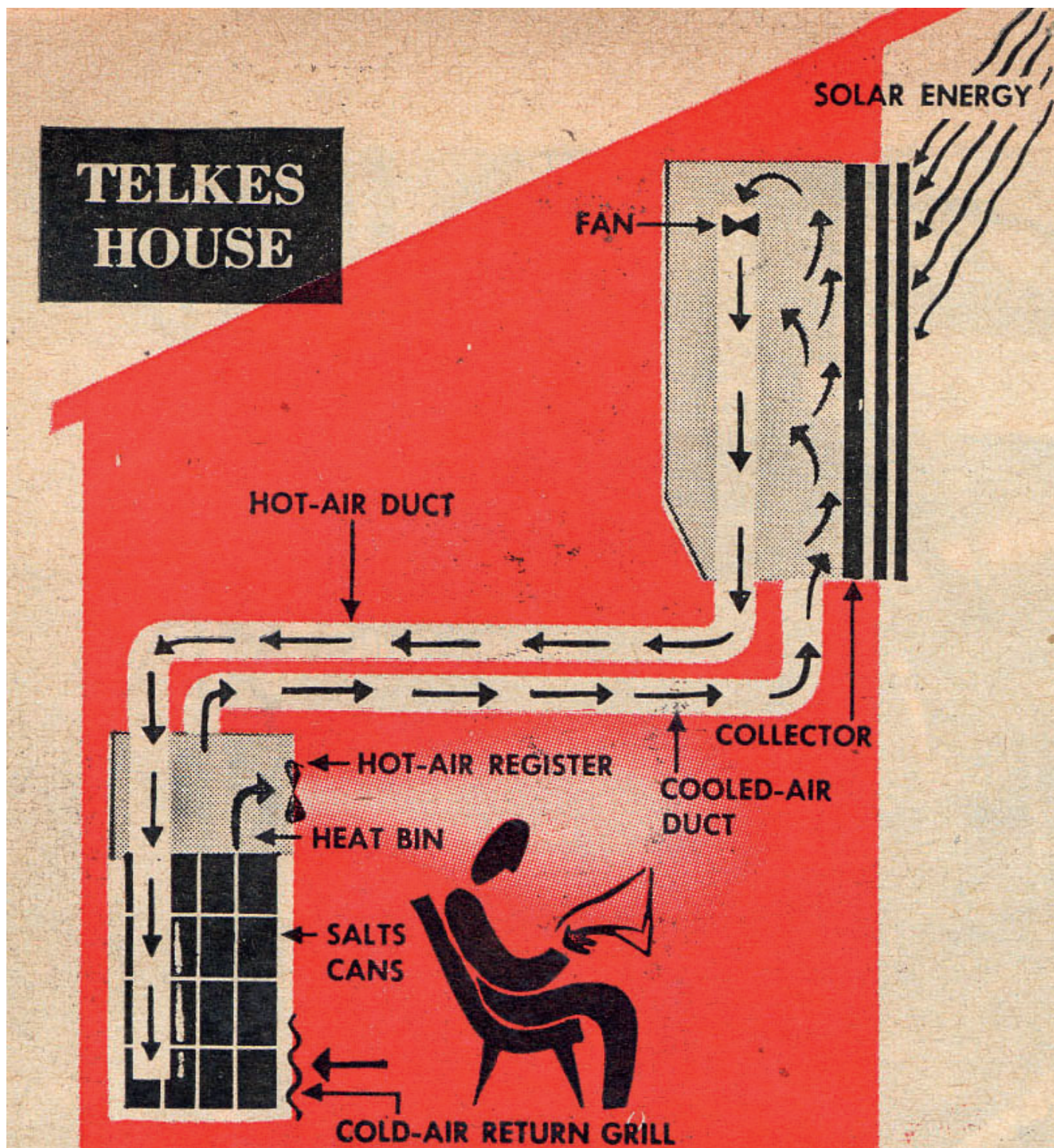
HOUSE
SCALE
1/8" = 1'-0"

4 BEDROOM TYPE
SPLIT - LEVEL

HEATED
SPLIT AREA = ~ 1500
COLLECTOR ~ 600
CUBIC FOOTAGE = 27,000 : 2 = 13,500

CARPORT (2)





↑ Mária Telkes and Eleanor Raymond, the Dover Sun House, Dover, Massachusetts, 1947, as published in *Popular Science* magazine, March 1949

While houses have of course been heated by the sun for millennia, much of the rhetoric around the Dover Sun House focused on the viability of the system and the inevitability of solar heating—even though the phase-change system

strained against the frigid northeastern winter. Here, the system is diagrammed schematically, from the large radiation-collecting panel to the “heat bins” and “salt cans,” which were distributed throughout the house—in the living room, bedrooms, and dining area—so that sensible heat would be released as the air cooled.

- 1 The Architects Collaborative (TAC), "Office Building Design Competition, Arab Investment Company, Riyadh, Saudi Arabia," 1975, MIT Museum Collections, <https://mitmuseum.mit.edu/collections/object/2024.034.folder.24>.
- 2 Hoda A. S. Al-Alwan, "Assessing the Efficiency of Sunscreens in University of Baghdad Campus," *IOP Conference Series: Materials Science and Engineering* 745 (2020): 012179.
- 3 Daniel A. Barber, *A House in the Sun: Modern Architecture and Solar Energy in the Cold War* (Oxford University Press, 2016); see also Daniel A. Barber, *Modern Architecture and Climate: Design Before Air Conditioning* (Princeton University Press, 2020).
- 4 On Telkes, see the PBS documentary *The Sun Queen*, <https://www.pbs.org/wgbh/americanexperience/films/sun-queen/>.
- 5 Langdon Winner, "Do Artifacts Have Politics?," *Daedalus* 109, no. 1 (1980): 121–36.

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USE VALUE

The Solar Wall shimmers, as with KFAS, at an uncertain distance. It suggests a useful approach, a transformative array of adaptive opportunities. Yet it demands so much: new ways of living; new models to test and optimize performance; new standards and values; inflected design methods.

What shines through is this: Because it was able to manufacture reasonably comfortable conditions at the same time that standards for thermal comfort were themselves being debated, the Solar Wall integrated a matrix of *behavior* into expectations for technologized conditioning. Do we really need all of this sealed up space, heated, cooled, and conditioned? The answer is: sometimes—whether at a hospital or archive, or in settings frequented by those at risk. Other times, most times, the variability of human physiology can be taken into account. Thermal gradients are designed in space as much as in response to self-conception, attitude, and aspiration; the gradients are within individuals, awash in the physiological stimuli of thermal alliesthesia. We are, generally considered and within a limited range, healthier when we are less consistently conditioned. Holding thermal practices of occupation in dynamic relationship to design, in conjunction with thoughtful policy, can balance out revised regulatory targets with less carbon.

A shimmering vigilance to *reduce absolute energy demand*, through design, behavior, and collective care begins to clarify the novelty embedded in an emergent helio-subjectivity: the architect not only as form-giver but as an agent of

decarbonization, leeching toxins and bad habits out of existing built fabric. As the new heliomorphism demands a renewed vigilance, so it suggests a deep humility, encouraging designers to rescript professional and disciplinary relations, to emphasize energy transition over cultural distinction, to move from performance for those in power to comfort for those in need, and to shift from the computations of complex buildings to a focus on habit, practice, and tacit knowledge of collective thermal practice. The new heliomorphism envisions the architect as form-giver and facilitator, proffering adaptive opportunities for inhabitants to consider new patterns and pathways—not to render a building more aggressively efficient, but to support a community that is eager to adapt.

The spectral and chimerical disposition of heliomorphic historical knowledge conjures anew a familiar question in the histories of architecture, technology, and the environment, the sociology of behavior, political economy, and so on: What are the operational relations between knowing and doing, analyzing and prescribing? As historian of technology Langdon Winner famously asked in 1980, "Do Artifacts have Politics?" Is there something inherent to technological systems that they invoke a specific form of collective? Comparing the techno-governance profiles of solar and nuclear energy, Winner concluded: "A ship at sea may well require, as Plato and Engels insisted, a single captain and an obedient crew. But a ship out of service, parked at a dock, needs only a caretaker."⁵ Another reflective glare in which the new heliomorphism bathes.