

Sustainable Modern Homes: Historical Context

AROUND THE WORLD THERE IS growing recognition that our lives are intricately connected with the natural world and that its fate and ours are inseparable. In response, we have begun to focus our attention not only on halting the damage we are causing to the environment but also on developing new ways of living in it, ways that may save us both. To borrow from Dylan Thomas, we have lit a green fuse. As it burns, it is igniting explosions of creativity that may prove to be the primary sources of a bright and sustainable future. And yet, if we allow this burning fuse to fizzle as an eco-chic fad, we will surely find ourselves in another dark age. At this critical point in the history of the earth and in the history of our built environment, it is encouraging to note signs that our green fuse is burning with increasing luminosity.

Many former antagonists in the ecology wars now agree that what is good for the earth can also be good for the economy, including the corporate bottom line. GE, Google, and even Shell are among what some call the “corporate greens,” joining activists, innovative designers, and the so-called Green Glitterati in pursuit of a more ethical and earth-friendly way to live. This partnership is in its fragile infancy, and the debates will no doubt continue. But we have begun to explore a variety of paths leading away from the unacceptably wasteful habits of the past to an incompletely imagined way of living that can protect the future—that of our planet and ourselves. This book is about one of those paths, the process of de-

signing the sustainable eco-modern house.

By “modern,” I mean something not only current but also a collection of design strategies rooted in the Modernist principles of early twentieth-century architects. It is instructive to note how many of these principles support the basic tenets of eco-friendly design and how, in a largely unacknowledged fashion, they are being incorporated in the most successful approaches to a carbon-neutral residence. It may be that Modernist architecture, now relegated to the past, may find a celebrated and enduring place as the foundation of sustainable residential design. Indeed, the convergence of modernism and sustainability, what we may term Eco-modernism, is now emerging as one of the most important design movements in history.

I am not advocating a uniform look; nor am I saying that a sustainable house should be a green version of Mies van der Rohe’s Farnsworth House or Pierre Koenig’s Case Study House #22. What I am suggesting is that the blend of modern and green is a natural one. Modernist principles cohere to a remarkable degree with green design and can help guide our explorations of the varieties of expression possible in the evolving green house.

Frank Lloyd Wright has not been celebrated as an environmentalist, but the architectural record, so to speak, reveals him as the father of the modern house and a revolutionary pioneer in sustainable design. As early as 1935, Wright had promoted “an Organic Architecture” where “the ground itself predetermines all features; the cli-

*The force that through the green
fuse drives the flower
Drives my green age; that blasts
the roots of trees
Is my destroyer.*

DYLAN THOMAS

“The Force That Through the
Green Fuse Drives the Flower”
(Modern Poetry, Volume VII,
Prentice-Hall, 1961)

mate modifies them; available means limit them; function shapes them” (*Frank Lloyd Wright’s Usonian Houses*, 1984). Modern sustainable design has its roots in his Usonian Houses, beginning in 1936 with the Herbert Jacobs House in Madison, Wisconsin. The Jacobs House and other Usonian homes incorporate thoughtful site planning and an elegant economy of means. They also offer innovative and enduring ideas within residential architecture as they combine affordability and functionality with low-tech energy-conserving strategies. These homes pushed the envelope of residential architecture in a way that had never been done, until recently not equaled.

With the first Jacobs House, we have a prototype for a sustainable modern house some 30 years before the first energy crisis; here was an instructive attempt to develop a low-cost, low-energy architecture deriving from a lyrical form. This gave clients comfortable and efficient homes where aesthetics were not forgotten. With Wright’s second Jacobs House, we have a design that ushers in—however unacknowledged—the notion of sustainability with the first solar hemisphere home, accommodating the warming winter sun and screening out that of the punishing summer. Until recently, too few designers have tapped into the resources and strategies exhibited in these projects. With open planning, cost-efficient slab designs, and radiant heated floors, the Usonian houses comprised a model of efficiency and responsible design. The open plans blurred the line between indoor and outdoor space, and interior rooms flowed into one another. This universal spatial strategy not only created wonderfully

modern space but also brought in the natural landscape, seamlessly. The result was cool and comfortable indoor spaces that spilled out onto warm and pleasant exterior patios, even in the most extreme summer heat.

Wright, in his brilliant 1954 manifesto *The Natural House* (Horizon Press), noted, “If the dictum, ‘form follows function,’ has any bearing at all on building, it could take form in architecture only by means of plasticity when seen at work as complete continuity. So why not throw away entirely all implications of post and beam construction? Have no posts, no columns, no pilasters, cornices

I’d like to see what Philip Johnson’s energy bills were for his Glass House.

SIM VAN DER RYN

Dwell Magazine, November 2007

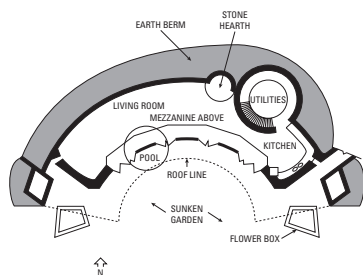
or moldings or ornament; no divisions of the sort nor any fixtures whatsoever to enter as something added to the structure. Any building should be complete, including all within itself. Instead of many things, one thing. The folded plane enters here with the merging lines, walls and ceiling made one.” Clearly this statement is alluding to a simplification of the building plan and envelope, a move toward a more universal space and a reduction of inefficient complexities.

Wright’s attention to site brings to mind the work of Alvar Aalto, whose projects clearly have

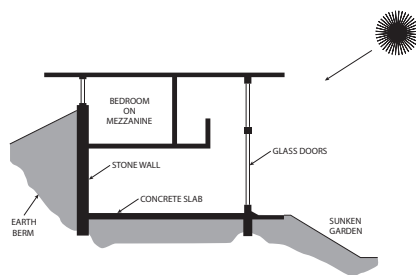
site-specific characteristics in line with the Scandinavian architectural tradition. His Villa Maria, for example, blends a sod roof with corrugated metal and wood, design strategies now becoming increasingly familiar. Along with Aalto, Rudolf Schindler and Richard Neutra produced projects that explored the concept of universal space. With overlapping rooms and primary living quarters dissolving into a much more open planning strategy, both employed ideas they learned while apprenticing in Wright’s office, and simplified them to a level he never achieved.

In one of Schindler’s first designs, the Kings Road House, in West Hollywood, California, he created what some consider the world’s first modern house. Known today as an architect of materiality and novel construction techniques, he crafted the home as a design for living. If ever universal space was present in design theory and in practice, this is the place. Sleeping quarters spill outside onto patios; sliding panels create spatial variety, while deliberate landscaping extends the spatial experience outside. Inventive construction methods reduced costs, and tilt-up slab construction reduced the need for excavation, thus limiting the impact on the site while significantly reducing the construction footprint. The house is rather large at just 2,500 square feet, but its open planning and passive cooling strategies make what would have been an energy glut an early model of energy efficiency.

Neutra built on the notion of universal space with a West Coast regionalist attitude and aesthetic. His architecture emphasized the interpenetration of interior and exterior space, and his contributions to architecture were groundbreaking. Here we are particularly concerned with the availability of good design to people of modest means. These ideas made him an ideal contributor to the Case Study Houses of the 1940s, projects that emphasized thoughtful construction, passive cooling systems, and the flow between indoor and outdoor rooms. These designs were sparked by the challenge of introducing inexpensive and efficient homes to the masses, and the goal of their architects was to create quintessential models of the modern house. Along with Neutra, Alfonso Soriano contributed to the



The second Jacobs House plan shows the berm and hemicycle incorporating passive solar principles.



The section shows sun angles in winter and summer sun angles, allowing the home to respond to passive solar energy.

collaborative effort. The emerging designs became immensely popular, but they were largely unsuccessful in tapping into the mainstream market. The model was scrapped as a feasible approach to mass housing programs as inflation grew and prices soared while standardized elements did not reduce costs. At the same time these architects should be celebrated for their prescience it is important to note they did not recognize the need to forge relationships with industry, alliances that would have helped them to achieve their goal of economic efficiency.

Whereas Modernism championed simplicity in design, the Modernist design gods did not keep things simple. Or sustainable. A case in point is Soriano's 1950 Case Study house: Although beautiful, it was a model of inefficiency. Universal space and other Modernist principles were evident, but single-pane, western-facing glass and other inefficient strategies left fully half of the Case Study goals unresolved. Modernist icons like Mies' Farnsworth House or Philip Johnson's Glass House are other obvious examples—lacking overhangs, insulated glass, or operable windows. Other Case Study projects, such as the Lovell House, were also ridden with cost overruns, a factor that also made the designs unmarketable to the general public.

Today, these projects would be considerably cheaper to construct, with prefabrication becoming more widely used and markets shifting toward environmentally conservative designs with Modernist sensibilities. Notable architects such as Morphosis and Pugh + Scarpa have been influential in this shift, employing Modernist principles to promote green thinking. The latter's Solar Umbrella House, for example, uses both high-tech and low-tech solutions, including photovoltaic panels that double as a roofing system, shielding the interior from the harsh California sun. Not only do the panels reduce the heat gain within the interior, they enable the building's electricity meter to essentially run in reverse. The panels generate more electricity than the building uses and so actually supply power to the grid. Universal spatial strategies continue here, as Scarpa takes cues from other early California modernist architects like Neutra, conceiving of

exterior spaces as interiors. This blurs the line between indoor and outdoor space and combines flexible design with sustainable approaches.

Morphosis, too, has been on the forefront of environmental design with the San Francisco Federal Building, a daring approach in a large-scale building project with 70 percent of the building area naturally ventilated and cooled without the use of conventional heating and air-conditioning systems. The building's façade in essence breathes as computer monitoring systems track building temperatures and allow for mechanical windows to open at a moment's notice when the building begins to overheat. The building's narrow width also allows for it to be cooled by daily breezes and for light to filter into the entire space, negating dark interiors usually evident in typical office towers.

Energy conservation, energy generation, low environmental impact, and affordability are only a few of the goals of green design. The wise selection of materials is, of course, another. And by that I mean not only the use of eco-friendly and recyclable materials but also partnering with industry to create new materials. As noted previously, the Case Study projects tell an instructive tale in the failure of their designers to collaborate with manufacturers on materials and standards. Fortunately, a remedial tale became available in the 1960s with the evolution of the green movement.

Rachel Carson's 1962 best seller *Silent Spring* (Houghton Mifflin) is often cited as sparking the environmental movement. The book raised the consciousness of Americans and helped usher in necessary challenges to widespread industrial practices. Many now argue, however, that the resulting adversarial relationship between ardent environmentalists and defensive corporations created a model of activism that has, ironically, retarded change. While the movement blossomed, a lesser-known but more collaborative model of approaching industry also came into play. In the early sixties, Buckminster Fuller declared that the Bell Telephone kiosk was his archetype for the successful building, citing its prefabricated, sustainable nature and the varying locales in which it was effective. The prefabricated capsule provided equal comfort in the

*We need a new
industrial revolution.*

WILLIAM McDONOUGH
Vanity Fair, May 2008



The exterior street view of Beals' residence in Atlanta, Georgia, designed by Lightroom Studio, shows the entry trellis and roof overhangs, which protect the low-e glass during the harsh Atlanta summers.



coldest of climates and in the heat of the desert, giving it a wide array of practical applications. Until comparatively recently, however, designers have failed to follow his lead.

The failure did not stem from a paucity of complementary ideas. Environmental design books of the sixties and seventies featured passive solar and airflow logic to minimize the need for conditioned space. Victor Olgy analyzed regional physics with elaborate charts about thermal transfer and proper site analysis. His book *Design with Climate* (Princeton University Press, 1966), featured a concrete dome house by Paolo Soleri. David Wright produced *Natural Solar Architecture: A Passive Primer* (Van Nostrand Reinhold Co., 1978), easy to follow with diagram sketches. And the most thorough and popular book of this genre was *The Passive Solar Energy Book* by Edward Mazria. It remains a staple for any serious sustainable designer. These books now provide us with exceptionally useful ideas; but when they were published, readers failed to incorporate these ideas in practice. Most architects understood the principles, but their leadership abilities were weak, and they cashed in on what the mob was asking for.

Increasing numbers of architects have begun to heed the spirit behind William McDonough's injunction that "Designers must become leaders, and leaders must become designers." McDonough and Michael Braungart's *Cradle to Cradle: Remaking the Way We Make Things* (North Point Press, 2002) gives us an enlightening next step in green design, offering not only the ethos for environmentally successful collaborations with industry, but practical examples of how such collaboration has created eco-friendly and waste-free materials. Moreover, McDonough's recent projects demonstrate that damage wrought by the Industrial Revolution can be reversed on an unexpected scale and with unexpected partners.

Finally, this book, *Modern Sustainable Residential Design*, will be an informative approach to the design process while exploring the basic elements of modern sustainable housing. It is the first to recognize and articulate the design process of architects when approaching the development of a modern sustainable residence.