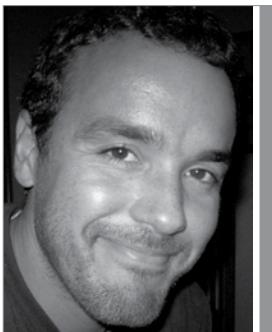


DEEP GREEN CALIFORNIA: CODES, STANDARDS, AND CREATIVITY IN RESIDENTIAL BUILDING

by **Jalel Sager**



Image courtesy of Mariko Reed



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1 Margarido House **2** A courtyard and filtration channel at the Last Resort

"If you have an iPhone with a light, maybe you can get a picture."

I was being shown a giant toilet in West Marin, a network of sunny hills hard on the San Francisco bay—where the air is as clean and crisp as a piece of freshly unwrapped peppermint gum. This remained true even as I stood by a large cement chamber the size of a tool shed filled with worms, landscaping clippings, and what my host, the well-known tea importer David Lee Hoffman, called "humanure". As he spoke, Hoffman held a large handful of the dark humus—mature compost—from the chamber. Bringing it to his nose, he took a deep breath, exhaling happily. I took a deep breath and did the same. The mixture smelled like the floor of a pine forest after a rain. As I sniffed again, the graphic designer and tea enthusiast with us, Michael Pieracci, stepped forward and took a photo, but declined to use the flash; he thought it might "disturb the worms", hard at work converting something we don't like to talk about into something essential.

This is California at its deepest shade of Green.

"MY LOVE OF THE PLANET IS GREATER THAN MY FEAR OF THE LAW."

The compound Hoffman continuously builds—while introducing the US to fine teas from Tibet and China, and conducting experiments in closed-loop human-ecological systems—is now 40 years old. Its name, the "Last Resort", today carries several dimensions of significance.

For one, after decades of looking the other way—or enjoying the relaxed, otherworldly

atmosphere of the Last Resort for hours on inspection visits—Marin county authorities have taken legal action against Hoffman for his many admitted building-code violations. He attributes this to the changing of the guard at the building office—the retirement of an older generation he believes deeply appreciated the dozens of buildings on his sprawling hillside compound: equal parts tea shrine, Tibetan Buddhist temple, and cluttered laboratory for a lifelong salvager, tinkerer, and visionary. Stacks of tools and pipe fittings surround Buddhist statues and share table space with pewter figures engaged in traditional methods of making *Pu'er* tea—a specialty of Yunnan province, China—which Hoffman introduced to the US many years ago.

Realising that good tea was nearly impossible to find in the US, Hoffman began his tea importing business in the early 1970s, after 10 years spent enjoying it in Tibetan monasteries while making recordings of the Dalai Lama, among other Buddhist luminaries. His desire to bring joys discovered in the East to his life in the US clearly transcended the realm of tea: his architecture and "guerrilla" civil engineering both draw on Eastern forms and philosophy. Yet this is not simply a case of an infatuated Westerner copying exotic flourishes: the plainspoken Hoffman, who received me in well-loved work clothes, is nothing if not authentic. His 40-year project has been called "an important and significant example of East-West folk art" by Berkeley professor of architecture Sim Van der Ryn—who is also the appointed California State Architect, as well as an admirer of, and consultant to, Hoffman's great project.

Nevertheless, the graceful timbers and cosy



Image courtesy of Michael Pieracci

"One of the jokes is when someone says, 'I want a LEED building', the answer is, do you want a LEED building or do you want sustainability?" says Levy. "Because they're not always the same thing. CalGreen is LEED-lite."

Last Resort

3 A passage through the Hoffman compound
4 David Hoffman pointing out an aspect of his composting toilet system **5** After moving through the "worm palace", water from the house is further filtered in a series of channels containing fast-growing plants like duckweed **6** David Hoffman explains the "living wall" filtration component of his composting toilet system **7** A handful of clean (and clean-smelling!) compost from Le Grand Pissoir

tea nooks of the Last Resort, guarded by metal renderings of dragons and phoenixes, seem to place third in Hoffman's affections behind two other loves: tea and worms. The latter weave the compound into the cycles of life, the gold standard of ecological design. "Charles Darwin's last book was on worms," says Hoffman, unrolling a display poster for his grey water/compost system, presented at an ecological conference in 1972, when the worms at the Last Resort, like its owner, were still in their salad days. "He thought they were the basis of all life."

They are also the basis for Hoffman's composting toilet, "Le Grand Pissoir", a name duly recorded in Marin County records. Though Marin, like California in general, sees itself as one of the Greenest places in the world, its codes prohibit composting toilets (a restriction often more about preventing new development than public health). Nor do they permit grey water recycling, even if done through the bellies of earthworms. The beating heart of the Last Resort is the "Worm Palace", a smaller concrete chamber that filters food scraps and water from the kitchen sink. The worms eat the scraps in their moist kingdom, while the water flows into channels where fast-growing plants, such as duckweed, remove the remaining nutrients, cleaning the water

for use in site landscaping and a solar-powered shower. Hoffman harvests compost from the Worm Palace and Le Grand Pissoir at intervals to feed his extensive food and ornamental gardens. Meanwhile, captured rainwater augments the piped water that gets the Last Resort through California's dry season. Little that goes down the drain is wasted.

Even in water-stressed California, this is a rarity.

Hoffman is submitting the Le Grand Pissoir design to the Bill & Melinda Gates Foundation, which has \$6.5 million for inventors who join its quest to "Reinvent the Toilet". Hoffman's solar-powered pumps, rooftop "digester", wetland integration, and sweet-smelling worm chambers seem perfect for the contest, which aims to provide privies to 2.6 billion people it claims have no access—without the miles of pipes and millions of gallons of water Western plumbing requires. The Gates Foundation also wants toilets that recycle humanure into energy and fertiliser. Check.

Nevertheless, it is an uphill battle. Hoffman acknowledges that expensive, high technology

projects often win such prizes, while more traditional systems, integrated with natural cycles, often get pushed aside. He draws a connection to organic food—grown with ancient methods, they should be cheaper than petro-foods, he believes. They're not, he says, mainly for "political reasons".

Can I disagree? These days, ecological solutions are often sold as luxury consumption—margins often trump Mother Earth. Clearly, this must change.

CODES, CREATIVITY, AND THE ECOLOGICAL TRUTH

Here lies the heart of the issue disturbing Hoffman's bucolic life. California has always been a process, a testing ground for US environmental policy. Here the "rubber" of radical environmental thinking meets the "road" of construction practice, economics, and politics. It recently adopted Green building codes known as CalGreen, becoming the first state to write ecological standards into construction regulations. Yet this triumph hides a problem for those who worry about ecology and climate change (and creativity).

In short, Green codes and standards let us get away with things ecology and climate may not. Projects based on such systems, facing the exigencies of construction, often transfer their ecological responsibilities to them. They meet requirements for a given level and then

often take liberties with the rest. Thus unless a system perfectly accommodates the natural laws constraining growth, its products may exceed the limits necessary to holding our planetary ground.

So we may identify three versions of residential Green—the "high standard" (see sidebar), the "no standard", and the "anti-standard". Each works on a different level of ecological vision and embodied responsibility.

Hoffman's 40-year project, the anti-standard case, reflects a deep understanding of ecological systems and, perhaps more importantly, spiritual and creative attitudes we need to work in harmony with them. Unfortunately, that stance now threatens the Last Resort's existence; it faces a \$200,000 fine, or even worse: Marin authorities may force him to tear it down. Such are the perils of "loving the planet more than the law", a philosophy difficult to convert into practice.

Two other projects I discovered in Northern California, a "zero-energy" renovation in San Francisco and a new Green palace across the Bay in Oakland—less exotic productions of architects and contractors—face no such threats. Both display ecological awareness. Nevertheless, one misses the worms, their hint of grand solutions.

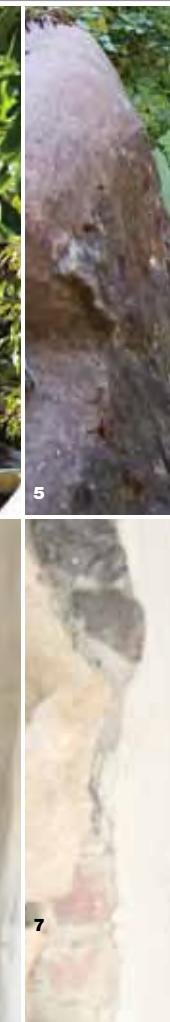
THE NO-STANDARD "NET POSITIVE ENERGY" HOME

Levy Art and Architecture's 25th Street renovation project, undertaken for a San Franciso-

based solar energy executive, avoided Green standards altogether—though like all California residential projects, it observed the stringent Title 24 energy codes, adopted in 1978, after US energy price shocks. Many energy experts believe California's excellent performance in per capita energy use since the 1970s rests on Title 24 and its updates.

The 25th Street client wanted a "net positive energy" home that generated surplus power to the grid while providing integrated electric vehicle charging. "His premium for 8 kilowatts of solar and other bells and whistles was about \$60,000, and he looked at his simple payback as nine years," says Ross Levy, the principal at LAA (and—Disclosure—a friend of mine). The renovation aimed to be the first "completely self-powering and carbon neutral" project of its type in California. Neither client nor architect pushed for a Green rating, focusing on energy aspects and integration of a historic Victorian façade with modern design ideas.

"One of the jokes is when someone says, 'I want a LEED building', the answer is, do you want a LEED building or do you want sustainability?" says Levy. "Because they're not always the same thing. CalGreen is LEED-lite." Finishing his salad in a sunny Berkeley café, he ponders Green standards and codes. "There's kind of a less-bad phenomenon. 'Code', such as it is, doesn't necessarily make things that much better. LEED is a system that you can game. You



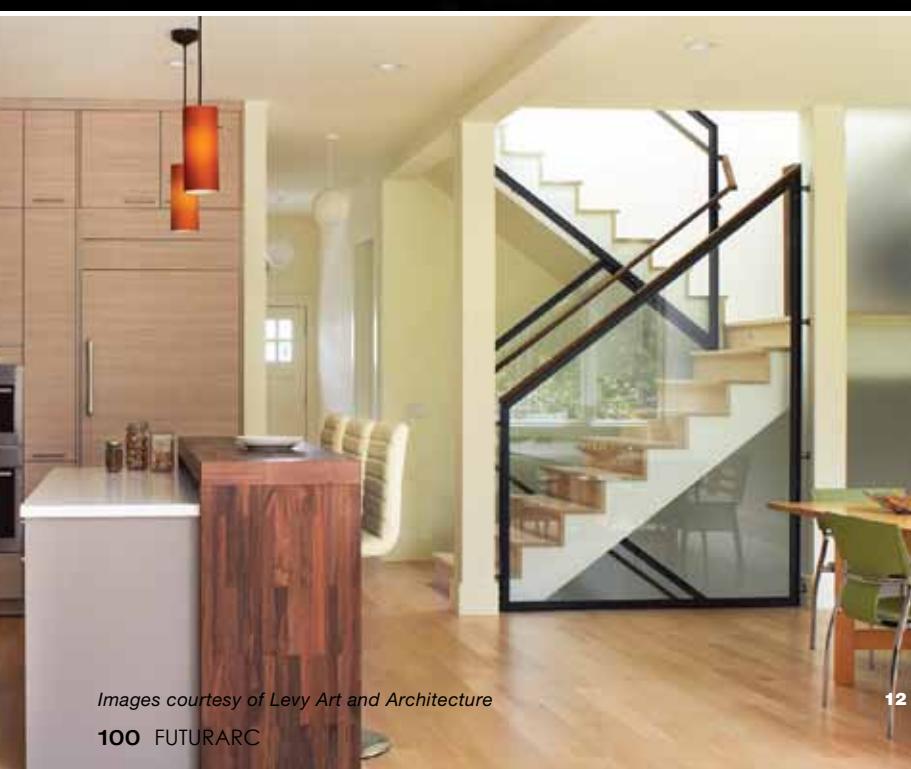
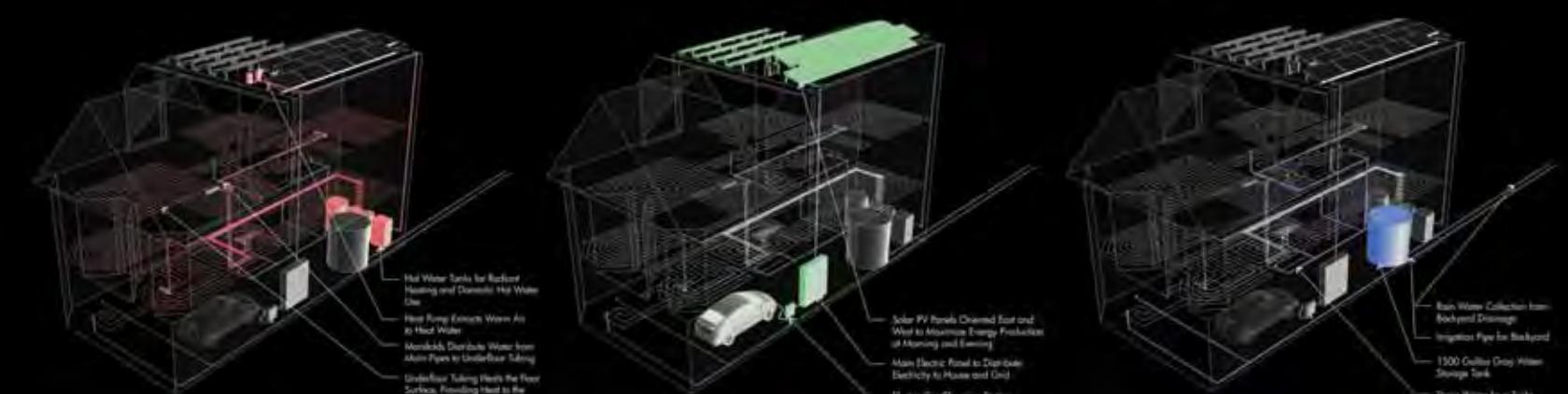
Images courtesy of Michael Pieracci



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Images courtesy of Levy Art and Architecture

can choose whether you want a highly efficient envelope or a bike rack, depending on how many points you're after."

Like many people in the Green building world, Levy is a renaissance man. With a graduate architecture degree from Harvard, he runs a respected small residential firm in San Francisco while immersing himself in the Bay Area's vibrant culture of ecological thinking. Recently he served as the sustainability guru for Ratcliff Architects, a large East Bay firm founded in 1906; today he's "moonlighting" with innovative water reclamation technologies.

Levy believes Green codes can push better building indirectly. "If you actually integrate your planning and you're looking at [LEED] Platinum, where you have to be pretty progressive out of the gate to get there, it doesn't cost anymore, because you've just planned well." With experience in the smaller, often more creative residential process, and in larger works at Ratcliff, he sees massive differences in residential and commercial practice. His tone becomes incredulous while discussing the recent "discovery" of integrated project delivery (IPD), in which teams break out of isolated work flows to plan in a more holistic manner, eliminating inefficiencies along the way.

"When I heard about them doing this, I thought, 'you guys, we've been doing residential work for 20 years and if we didn't do that, my clients would have had my head a long time ago'. I can't believe that you think you discovered something new here. I can't believe that your business-as-usual has been, 'I just draw whatever I want, then I hand it to you and let you figure out how to make it work. That's just ridiculous.' Levy sits forward, holding a hand palm up, his eyes wide open.

"I mean, really? You get away with that?"

OUR LAST RESORT

Integrated design and Green standards that reflect greater ecological responsibility are important. Yet are they bold enough? Or does such incremental change merely allow us to build more houses, which look increasingly alike? Here we meet the controversial "rebound effect", where more efficient resource use allows more consumption in absolute terms—in this case of residential square footage. For example, mainstream Green home building in the US (from roughly 2000 on) coincided with massive overbuilding, with millions of relatively efficient but unnecessary homes built nationwide. When the market crashed in 2008 the full scale of overconsumption, stemming from perverse financial incentives, became apparent: US excess housing stock stood in the millions.

These twin developments highlight the problem—building is not just building, but an

essential element of our economic system. Its needs, peculiarities, and instabilities embed Green practice. Its contradictions mirror those of the larger system. Can compounds like Hoffman's translate into dense urban neighbourhoods and the "industrial" home production codes and standards regulate? Can improvisation, tinkering, or ecological visions rooted in spiritual beliefs weave themselves into the urban fabric?

In the end it is a question of mindset. One might draw a connection between the Hoffman-like longing for tranquil, ancient spiritual forms and a non-fear of humanure. Such settings and building types reflect a willingness to be close to the workings of the earth, a love of its cycles and built-in fertility. We must consider deep Green aesthetics, explore forms and symbols that communicate with life in all its aspects.

By doing so we approach the contradiction we must resolve. Generalising Hoffman's passion for, or even comfort level with, worms and humanure seems difficult. Yet we find hope not only in the Gates Foundation's embrace of the latter. In the last six months Hoffman has sniffed compost with reporters from the *New York Times* and national television outlets. Perhaps our ultra-modern world is preparing itself to reconcile the split between urbanist human reality and natural cycles—a chasm as evident in our psychology and culture as in our structures. A cabinet full of busy worms in every garage? Why not? Of course, we can't completely disregard sanitary and health concerns.

Not everyone can, or should be allowed to, invent their own toilet.

Thus Green architects and urban thinkers must address this split. While LEED and CalGreen have virtues, they are strictly transitional forms. Beyond them waits a negotiation between gridded city Green—with its tight specs and high-tech products—and salvaged timbers, guerrilla piping, and worm havens. Building codes must support cheap deep Green solutions, such as compost toilets and straw bale housing. Progressive communities must produce flexible guidelines that allow Hoffmans to spring up everywhere, relentlessly refining their relationship to natural cycles. With luck they will form pockets that grow and thrive in the existing urban fabric—eventually transforming it into something entirely different. Health and aesthetic crises need not follow. The tradition of cultures where everything is art, each person an artist, comes to mind.

In the absence of radical new energy technologies (i.e., cold fusion), massive cities will likely disintegrate into connected villages. The energy, ecological, and psychological costs of maintaining hyper-metropolises, split from nature, is too high. Modern, ancient, and radical design will coexist, cooperate, and compete. Imagine such cities, so different from the cloned nightmare of, say, modern Las Vegas, where identical homes like

cancer cells spread endlessly into the desert. This bears the stamp of a senseless, indifferent authority—a force builders, architects, and eco-mechanical dreamers will need to confront as the century matures, as we fight to preserve the planet we know and love.

The Last Resort finds another dimension of significance in the face of our overarching global threat—climate change. Recently on the other coast, New York was crippled by the largest storm in its history. A block from my old East Village apartment, water stood 5 feet deep; this water blew up a nearby substation in a blinding explosion that lit the entire skyline, seeming more like a nuclear flash more than electrical fault. Hoffman's benign neglect of Marin's codes sprang from adherence to natural cycles increasingly, devastatingly, out of balance. For decades local authorities implicitly acknowledged this. Given the planet's accelerating changes, such creativity and fascinated devotion to ecological systems must be encouraged, allowed to grow wherever it takes root, on the largest scale possible.

Uncertainty in the climatic future demands it. Agglomerations such as New York, designed when the war between engineers and nature seemed over, become more brittle every day. Wind and water paralyse their forms and flows. Centralised, dependent on massive networks, their life support systems fail, requiring government intervention—or else human suffering the affluent West thought it had left behind (see New Orleans, 2005). The fabric, supply, and infrastructure of urban areas require complete reimaging; broken down in the same way Hoffman's worms process food, their elements could nourish sustainable and resilient growth, a renewal of our deal with nature.

For many, certainty melts with the Arctic ice cap. One day we may all live in a "last resort", whether in Tibet, Northern California, or Shanghai. If we can bring to bear the love and ingenuity of Hoffman—opening our minds and settlements to the imperatives of nature, tradition, and our most vivid dreams—it will be a very fine place indeed.

Sources:

¹ Whirlpool/re:Source: video feature on Margarido House

² inhabitat: "Oakland's Stunning LEED Platinum Margarido House"

³ ArchDaily: "Margarido House / Onion Flats"

25th Street

8 PV panels on the roof **9** Radiant Heating System

10 Electric System **11** Water Recycling System

12 Interior view **13** Exterior view

High Standard: Margarido House

Margarido House, the work of Oakland builder Mike McDonald and his brother, architect Tim McDonald, represents high-standard Green. Nestled in the Oakland hills, its site burned, along with 3,000 homes around it, in a 1991 fire. After purchasing the lot in 2006, Mike McDonald began work on the first LEED-H platinum home in Northern California. A 4,600-square foot (427-square metre) residence for three generations of his family, Margarido House was for him a "statement of what was possible in high design and high sustainability".

The builder emphasises that even "before the project was even sketched", aspects of design, construction, and operation all came into consideration. According to McDonald the scale of the home made a LEED-H certification daunting: "Because of the size of the house, in a 100-point game, we started out negative 15 points in the hole." The project team nevertheless "thought of it as a way for a third party to hold us accountable for what we were up to". McDonald credits the LEED process with identifying areas in which the design could be made more sustainable, such as energy efficiency and construction waste, without raising costs to unacceptable levels.

Margarido House key features:

Water and site:

- Planted roof garden and deck
- 4,000-gallon rain and ground water reclamation tanks

- Drought tolerant landscaping
- Pervious paving

Energy

- In-floor hydronic heating
- Solar electric power
- Solar thermal (hot water)

- Smart house automation system
- LED lighting

Health

- No-VOC paints and finishes

- Interior air quality management system

Materials

- Locally sourced thermally broken doors and windows
- Concrete with a minimum of 25 percent fly ash

- Recycled concrete and glass counters
- Soy-based spray foam insulation

Margarido House, like the Last Resort (see main story), raises questions of how deep sustainability interacts with scale, cost, and material usage. Neither can easily be envisioned as a general solution for dense, low- to middle-income urban areas. Yet both reflect a desire for environmental change, filtered through the vision of their creators. In the case of Margarido House, solar panels produce, on average, 120 percent of the power needs of the home; hand-glazed local tile graces the bathrooms; site water is captured; daylighting is extensive; and construction practices leaned toward closed loops. This menu of "snippets", in McDonald's words, is being picked up and used by the students of architecture, as well as bungalow and apartment dwellers, who visit his home.

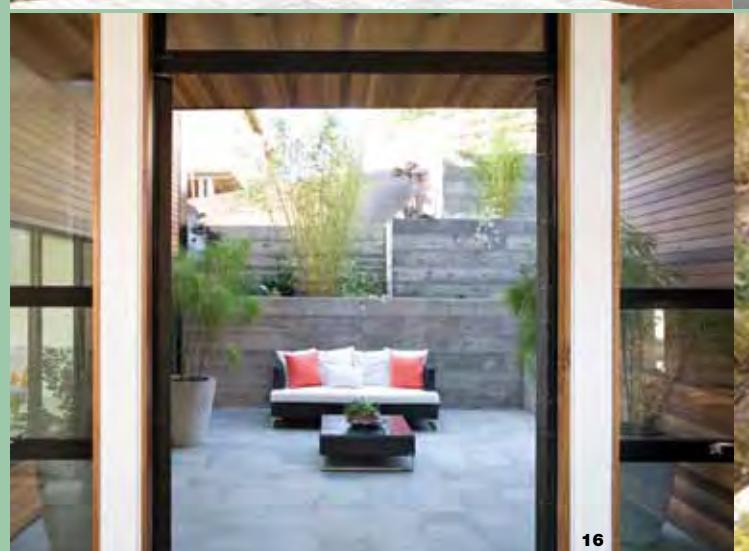
Margarido House
14 Section **15** Entrance **16** View of stepped garden from entrance
17 Living room **18** Exterior view **19** Stepped garden



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Images no. 15-19 courtesy of Mariko Reed