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The Greenest Building

The new
Bullitt Center
mimics
nature's way



TOM REESE / SPECIAL TO THE SEATTLE TIMES

The photovoltaic array on the Bullitt Center's roof produces enough electricity to cover all the building's needs, even in cloudy Seattle, just as the leaves of trees next door capture daylight and turn it into energy. The Bullitt Center has no on-site parking, by design, to encourage tenants to walk, bike or use public transportation.



ENRICHING THE URBAN HABITAT The greenest, most energy-efficient commercial building in the world aims to change the way buildings are designed, built and operated to improve human health and long-term environmental performance. This dream, to promote sustainability as the world's population grows rapidly, is becoming a reality. **Left:** Bullitt Foundation president Denis Hayes on the roof, where solar panels will generate as much electricity as the building uses. **Right:** About five miles from the new building, a harbor seal survives in the urban environment but is threatened as humans continue consuming and polluting the place they live - behavior the Bullitt Center hopes to change.

FINDING A BALANCE

The Bullitt building follows nature's lead in elegant efficiency

By Lawrence W. Cheek, Special to The Seattle Times • photos by Tom Reese, Special to The Seattle Times

CITIES BEHAVE so much like living organisms that it is time to begin thinking of them as such. They consume oxygen, water, fuel and other natural resources, and burp out the waste. They have circulatory systems and neural pathways and at least a reptilian sort of brain to provide governing impulses. They struggle with diseases, social and physical, and sometimes they grow and prosper and sometimes they die.

Every organism finds either an equilibrium within its ecosystem or its doom. If it spends more energy to gather food than it gains from consuming that food, it's in an unsustainable condition. A large organism may be able to hedge against its reserves or steal to delay its demise, but eventually nature will shut it down — sometimes the individual, sometimes the species. As Emerson said, nature is no saint. We do not like thinking of civilization as subject to such immutable law; our narrative since the start of the Industrial Revolution has been all about defying nature.

But resources are finite, the judge is not infinitely patient, and reckoning will come.

What if buildings, neighborhoods and then cities could study nature to find their equilibrium?

There's an ambitious experiment under way on Seattle's Capitol Hill, where the Bullitt Foundation is about to open what they're calling the "world's greenest office building." If all systems work as planned, the building will draw all its power from sunlight falling on the roof, all its water from rainfall on the site, all its heat and cooling from closed-loop heat pumps mining the geothermal energy 400 feet below.

"The building doesn't look a lot like a Douglas-fir forest," says Denis Hayes, Bullitt Foundation president, "but it behaves remarkably like one."

The technical complexity of the building is staggering, its cost prodigious, and it may or may not hit the sustainability targets. But it is still a provocative challenge to the way we've

become conditioned to thinking about architecture and cities for the past 200 years. Where could it lead?

OVER THE PAST 20 years, an interesting branch of environmentalism called "biomimicry" has emerged. It's not so much about echoing natural forms in architecture — mall storefronts that look like trees, or rock 'n' roll museums that resemble clumps of mushrooms and jellyfish — but rather about studying the processes of nature, observing the solutions that have been worked out through evolution, and then applying them to the products of industry and civilization.

We've biomimicked for centuries without consciously thinking about it. Cantilever a bookshelf off a wall, and you'll wisely install a corbel, an arching support structure, below it. That's precisely what a tree does as it shoots a branch off its trunk. Or consider FedEx: a circulatory system like any mammal's, with Memphis as its heart.

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A more abstract example is photovoltaic cells, of which Bullitt has 14,300 square feet on its hatlike roof. A tree's leaves convert sunlight to usable energy through photosynthesis; photovoltaic cells accomplish the same. Though the process is different, the operating principle is what's important: The tree only gets to make use of the energy that happens to fall on it; it can't roam the forest to conquer and colonize more resources. Bullitt is trying to follow its example.

Biomimicry branches naturally from biophilia, a concept popularized by the pathbreaking and often controversial biologist Edward O. Wilson. Very simply, biophilia is the natural human tendency, wired into us through eons of living in direct interaction with nature, to be attracted to the forms and processes of nature. We prefer a leafy city park over a shadowy urban alley. In architecture we instinctively respond positively to complexity, ambiguity and richness of forms and textures, because that's what the natural world offers. We intuitively dislike human-made environments that seem monolithic, monotonous, predictable.

Besides being energy gluttons, our cities over the past century have gone badly out of biophilic whack in this regard. Take a walk through a 1990s Redmond or Issaquah residential neighborhood, then a 1920s Wallingford or Madison Park street in Seattle. The modern suburban neighborhood is drearily monotonous, and the monotony is enforced by regulations curtailing homeowners' idiosyncratic impulses. The old neighborhood is rich with surprises, like the natural world.

Some natural surprises, of course, are unpleasant. Civilization arose so that we could mitigate the dangers and discomforts of the raw environment. Pure nature is not a welcoming environment for us to live in, and anyone forced to do it will instinctively begin improvising a little envelope of civilization — a fire, a shelter, a weapon system.

What seems to have happened is that we went so far in our creation of environments to repel nature that we're no longer conscious of our rightful place in it. Wilson laid it out succinctly. "Humanity accelerated toward

the machine antipode, heedless of the natural desire to keep the opposite as well," he wrote in 1984. "Now we are near the end. The inner voice murmurs You went too far, and disturbed the world, and gave away too much for your control of Nature."

Those are strong and emotional words to hear from a scientist. But maybe the murmur is a warning and not certain fate.

As far as we can know, we're the only animal species with the ability to assess present trends, predict what they might lead to, and adapt through application of intellect rather than waiting for evolution. We're rapidly becoming much better at the predicting, if not at the adapting. Farmers directly provoked the disastrous Dust Bowl of the 1930s because there was no experience on this continent with large-scale cultivation of semi-arid land and no computer models to forecast what would happen. We now have the benefit of both.

A biophilic civilization, if we can envision such a thing, would use the best tools we have, both philosophical and scientific, to carve out a balanced place for the human species in nature.

Some of the philosophy might seem radical. With apologies to the biblical believers who still maintain that man is divinely endowed with dominion over all the beasts, the biophilic conscience would recognize that all living things are equal in the sense of having vital roles in the global ecosystem, and thus a right to the stability of their own environments. This doesn't translate into welcoming rats and roaches into the house, but it does mean preserving all creatures' habitats as diligently as we work to preserve the obviously more appealing orcas and elephants.

MORE RADICALISM: We're a species uniquely equipped to limit our own population growth without war or famine limiting it for us. The biophilic mind will recognize the carrying capacity of the earth and act accordingly.

A biophilic city would look, on the surface, something like Seattle. Thanks to the Olmsted park plan, we already enjoy nature woven through the city and its watery edges. The increasing



MAKING IT LAST A painstaking review of all potential building materials ruled out 362 toxic substances that are commonly used in building construction, even today. **Top:** The chemistry of this brushed-on vapor barrier was reformulated to meet the Bullitt Foundation's standard. It retains its effectiveness as long-lasting moisture protection that will allow the outer metal skin of the building to be replaced efficiently when the time comes. **Above:** In a similar way, the bark on this madrona tree adapts and protects according to moisture and aging cycles.

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densification of Seattle, though, will at some point — maybe it already has — run counter to biophilic design. It is impossible to make apartment buildings 400 feet high that feel humanely scaled; they are intrinsically alienating. Paris is often cited as the world’s most humanely scaled big city, and it’s essentially six stories high — as is the Bullitt Center.

Architecture in a biophilic city would relate to the local landscape, climate and culture rather than international fashions. It would make creative use of fractals, the repeating but varying patterns in nature (like the arms of a snowflake or the striations of a clamshell). It would be sensual and rich in variety and surprise. It would not always be beautiful; it would include places that are provocative, confrontational, baffling and outright weird — just as in the natural world.



WOULD IT HAVE to be truly sustainable? Now we’re into a thorny conundrum. The only thing nature truly sustains is change. Habitats and food supplies shrink and expand, new species arise and others blink out. Nobody wins an eternal warranty even when appearing to be doing everything right. However, there is one clear principle: A city should do its level best to move toward an equilibrium in its environment, where it doesn’t use up or lay waste to resources any more rapidly than they can be naturally renewed. Every increment of progress toward that ideal can be considered a bank deposit, buying humanity a bit more time.

In one way, civilization biomimics without consciously trying. Natural selection operates on our built environment as it does on living organisms: The fittest survive. Denis Hayes, who is not reluctantly radical, says bluntly:

“Almost no buildings are being built in the world now that will make sense 30 or 40 years from now.”

He hopes that whatever the Bullitt Center’s faults turn out to be, it will inspire a whole new way of thinking about the built environment; that people of a future generation will point to it and say, “That was smart.”



SEEING THE LIGHT To be visible and accessible, the Bullitt Center grows where an ancient forest once dominated. Now a large urban population will be able to learn from the project’s achievements. Just as forests know how to sustain themselves in order to survive, the hope is that a city full of people can do the same. **Top:** A pedestrian leaves an ephemeral trail in the headlights of passing cars. **Above:** Responsible campers aim to have as small an impact as possible, to honor the special places they inhabit for a short while.

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MUSHROOMING INTEREST The building is spreading its ideas and philosophy to industry professionals through tours during construction and by constantly monitoring performance for all to see. To further its education goals, the ideas planted will be evaluated to show how new concepts prove out over time. **Top:** Industry professionals on a tour during construction. **Above:** Mushrooms from a nearby park sprout and spread quickly when conditions are right.

About this project and the building that inspired it

FotoDocument, a United Kingdom-based nonprofit dedicated to exploring global cultural, social and environmental issues through photography, sponsored Seattle photographer Tom Reese's project to explore how human beings can improve buildings by seeking guidance from the natural world. Because most of the planet's people will live in cities for the first time in human history, the nonprofit believes we have an urgent environmental need to make the places we live and work healthier and more sustainable.

To make the connection between human systems and nature, Reese has photographically documented what will be the greenest and most energy-efficient commercial building in the world alongside some of the best systems and designs found in nature.

The new Bullitt Center in Seattle's Capitol Hill neighborhood serves as headquarters for the Bullitt Foundation. Established by philanthropist Dorothy Bullitt in 1952, the foundation has refined its goals to focus on environmental philanthropy, in essence a mission to safeguard the natural environment through responsible practices.



During construction, the Bullitt Center takes command at the intersection of Madison Street and 15th Ave.

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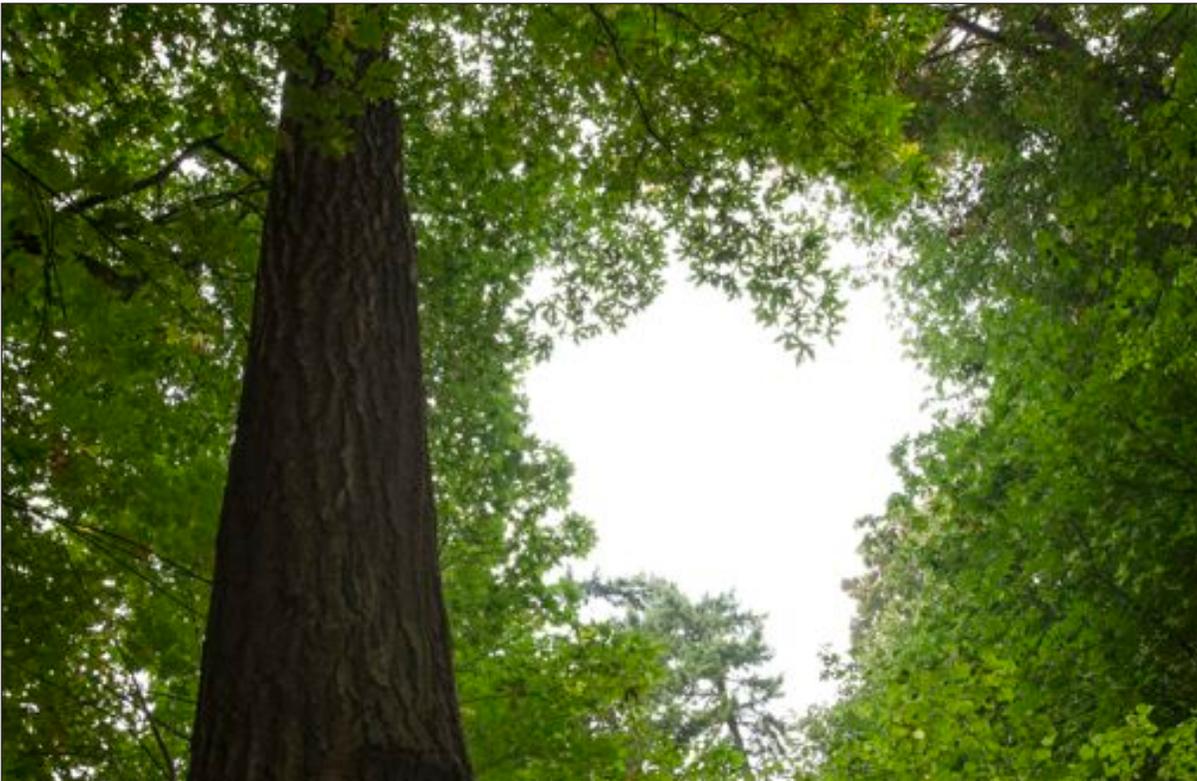
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LIKE ROOTS, GOING WITH THE FLOW Like branching roots, the mechanical heating system carries fluid through a series of tubes. The plastic tubes are now sealed within cement floors and transport heat through a water and glycol mixture. **Above:** Tree roots transport what they need from within the soil in a water and nutrient mixture.

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FINDING THE BEAUTY IN CONSERVING We know that the experience of nature is vital to a healthy human intellect and emotional state. One of the building's imperatives is beauty, which can inspire human productivity. To give the building a long life and to preserve old-growth forests, the structural beams, ceilings and floors are composed from smaller wood pieces instead of cut from large, whole trees. To conserve electricity, precise calculations of daylight determine how the window and skylight design minimizes the need for supplemental lighting.