“What is Free?”: How Sustainable Architecture Acts and Interacts Differently

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“In our every deliberation, we must consider the impact of our decisions on the next seven generations.”

-Great Law of the Iroquois Confederacy

Generations ago in New York State, the dominant law of the land was a democracy practiced and safeguarded by five nations of Native Americans. These five peoples, the Iroquois, had a participatory government centuries before American colonists formed the Houses of Congress that anchor our political system today. The Iroquois ‘council fires’ were forums for debate and deliberation over shared lands and interests, held among delegations of elected representatives. Here in New York, a place to gather and talk among nations about matters impacting the common good is part of a long legacy.

My partner, Bob Fox, and I both grew up in the Hudson Valley of New York State, and still live there today. The council fire is an institution that is native to our upstate area. As architects, we are always concerned with the heritage that endows a place with its distinct qualities, and it is something we seek to engage when we design a building. This place-based inquiry is what led us to begin seeing how the built environment and natural world impact—and should inform—one another. We have emerged with a new lens, trained on local solutions that arise organically from a place. In rediscovering what it means to be resourceful, we have become convinced that driving local change is the best contribution we can make towards resolving environmental problems on a global scale.

In the 17th century, the tallest elements of the Manhattan skyline were windmills built by early Dutch settlers. A 1620s engraving, the first known view of what was then New Amsterdam, depicts a windmill adjacent to the settlers’ fort—the original development that evolved, over time, into our urban metropolis. People in this city once made their own energy, taking advantage of the natural resources local to the environment. In fact, windmills have such symbolic value that they still serve as the centerpiece of the official seal of New York City. Wind power, then, is part of the city's natural and cultural heritage and a gives us an image to draw on as we go forward.

Sustainable architecture demands that we rethink the extractive habits of our industry in this country, and reconnect with the natural world and ecosystems that support life. Most importantly, we must reinvent our mindset as designers, developers, and builders. We believe that this starts with looking for local abundance and challenging our buildings to be self-sufficient citizens of the urban community. Architecture is a lasting endeavor—we make choices not only in cooperation with our clients, but also on behalf of future generations. They will inherit what we create, and must live with the consequences of our decisions. Because of this, the architecture profession is inclined to reflect on its legacy, and is obligated to take the lead in the transition to sustainability.

Case Study: One Bryant Park

In partnership with the Durst Organization, our firm is designing the new Bank of America Tower at One Bryant Park, situated in the very center of Manhattan. This 2.2 million square foot (204,387 sq m) high-rise office tower will be the first to achieve our industry's highest standard for sustainable design, the US Green Building Council's Leadership in Energy and Environmental Design (LEED) Platinum certification. It will use 50% less energy than a conventional building, discharge zero stormwater to the city's sewer system, generate 70% of its annual energy needs on-site, and 90% of the construction debris will be recycled. What is more, the scale and position of this project give us a chance to put sustainable design in the limelight—where we hope it can bring about a transformation in our history, economy, and standard way of thinking.

Our design process begins with a simple question: "what is free?" Through observation and analysis, we have discovered that our site—located in one of Manhattan's most densely developed districts—is in fact gifted with tremendous natural resources.

First, we have a natural endowment of sunlight. Based on studies of the site's different solar patterns in winter versus summer, the building's faces will be oriented to work optimally with the sun. It will have floor-to-ceiling exterior walls of high-performance, low-emissivity glass—filtering out infrared rays but admitting abundant daylight—letting occupants access the views and connect to the elements outside. We will be able to further scale back the use of artificial light through daylight-dimming lighting fixtures. A custom silkscreened ceramic frit pattern will be graded to leave a clear field of vision from the inside, while partially blocking incoming rays. The building's low-iron glass will be exceptionally clear, enhancing the structure's faceted, crystalline nature. In an atmosphere of plentiful daylight and impressive views, we think workers in the building will enjoy significant advantages in terms of health and productivity.

Second, we have water—approximately four

Looking for what is freely available has led us to think differently about building waste, and to start seeing plentiful resources instead. In New York City, solid waste is an enormous problem; at the same time, a significant amount the waste stream is biodegradable material. For One Bryant Park we are designing an anaerobic digester plant, still under review, that would convert food waste from the building's cafeterias into compost and electricity. The compost can be used on the planted portion of the building's roof, and we will also donate fertilizer to Bryant Park, our neighbor across the street. As another means of reducing waste, the concrete slabs we are using will substitute blast furnace slag (a waste product from steel manufacturing) for 45% of the cement in the concrete. While giving a new life to what is normally a waste material, this practice will also prevent nearly 56,000 tons of carbon dioxide from being released in the manufacture of new concrete.

A New Standard of Self-Sufficiency

Today, instead of windmills, the roofscape of New York City is dotted with thousands of cylindrical, wooden water towers. These cone-topped tanks are an unmistakable element of the city's character, derived from the practical need to elevate and store water supplies. Most buildings higher than six stories need a tank to create water pressure; they also provide a defense in case of fire. While filling the tanks may not be especially efficient—water must travel long distances underground, then be pumped mechanically to rooftops—they provide a model for buildings housing their own support systems on-site. These water towers deserve their status as local icons, for suggesting that New York City buildings can provide for themselves.

One Bryant Park will produce 70% of its energy on-site with a 5.1 megawatt, natural gas-burning co-generation plant. While generating electricity, the system will also capture almost all heat created by the process—whereas typical large power plants lose 66% of the energy they make, in the form of waste heat. Off-site power—the "grid" that presently supplies most buildings in cities throughout the United States—loses another 7% in the process of transmitting electricity long-distance.

The building's co-generation plant will operate most efficiently when it is run evenly, 24 hours a day. This presents us with a further opportunity to use energy as resourcefully as possible. At night, when energy demands in an office building are low, the system will make ice—a decidedly low-tech cooling agent—and simply let it melt throughout the day to chill liquid in the cooling system. The building's central chiller plant will be able to work less hard at providing a comfortable indoor temperature.

New Yorkers will all remember August 14, 2003, the day the city experienced a major blackout that affected the greater part of the northeast United States. This massive failure exposed the reality that our electricity grid is an antiquated, expensive infrastructure that is subject to tremendous stress, especially in the summer. The hottest days, when the system is overtaxed, are when the least efficient and most polluting power plants are pressed into service. Known as ‘peaker’ plants, these are responsible for the city’s alarming levels of summer smog—in fact, 90% of smog comes from 50% of our power plants. Buildings that generate energy efficiently and on-site help relieve the strain placed on the municipal infrastructure. Moreover, the more that buildings in this country start drawing on renewable energy sources and take responsibility for their own power needs, the less our society has to negotiate who bears the burden of pollution from energy generation. Buildings that provide for themselves efficiently and locally will produce compounding economic, social, and environmental benefits. We believe this is within the reach of our generation, if we can demonstrate to our peers that a better way is possible.

No matter the energy source, distributing power vertically in a tall, 5870103 j0.0eff,i 038ve0009e bj

Given the enormous and accelerating growth of urban areas worldwide, sustainability must be at the top of the agenda for architects and planners alike. We believe that tall buildings can and should play an important role in containing sprawl and the associated ills of poor tr