

CHAPTER 10

The Challenge and Promise of Green Buildings: Lessons from Europe

Green buildings are growing rapidly in the United States, with cumulative new project registrations under the LEED rating system growing 50 percent in 2006, 75 percent in 2007, and more than 80 percent in 2008.¹ Yet more than half of LEED project certifications are still at the lower levels of Certified and Silver, indicating that the ability of design and construction teams to deliver high-level green buildings is still at an early stage of development. By contrast, the BREEAM system has certified about 9 percent of its buildings at the Excellent level, equivalent to LEED Platinum, the highest level, against about 5 percent in the LEED system.²

Green buildings in the United States are certified at only one-fifth the number (per capita) as in the United Kingdom. What might appear to be a stretch for U.S. design teams is considered normal design practice in the United Kingdom, Germany, and other countries. U.S. green building practice is still inhibited by the notion that the costs are significantly higher than conventional buildings; for example, one survey of more than 800 construction industry executives in 2007 showed that more than 40 percent of them thought that green buildings added 10 percent or more to cost, and almost 75 percent thought that the cost premium was at least 5 percent.³ Fighting a heavy bias toward lowest-first-cost solutions, green building in the United States needs a stronger business case to succeed. In Europe, by contrast, cultural and political factors are stronger drivers for low-energy, green building solutions.

LESSONS LEARNED

We've taken a brief excursion through what for many American and Canadian building team professionals might be a strange and exotic world, intriguing and a bit familiar, perhaps, but still largely outside the realm of their daily practice. What lessons can we learn and apply from the European experience? What will need to change in North America before we can bring some of these ideas, systems, and technologies into more widespread use? What might be some of the competitive implications for North American design professionals, contractors and subcontractors, and manufacturers?

We started this exploration of European green building and sustainable design practices by

recalling Nicolai Ouroussoff's challenging article from 2007. In that article he concluded that obstacles still remain but that progress might be made from a surprising quarter:

Will America ever catch up with Europe's impressive green record? Mark Wigley, the dean of Columbia's graduate school of architecture, has noticed a sea change in how students here approach sustainability. Increasingly, he said, they see it as a central aspect of their work. . . . At the same time, Wigley admits that architects cannot accomplish anything without willing clients. "My prediction is that if we have a change in America, it won't be driven by politicians or architects but by the developers," he said. "We're at the moment where developers can gain a significant advantage if you reduce energy [costs]. For the first time you have clients who are willing to pay for this. So I think the one group we associate most with greed and inefficiency will lead the way in the future."⁴

I've seen this happening throughout the United States, where the most avid adopters of green building technology have been speculative office and mixed-use developers, ranging from the Durst Organization in New York City, to Hines in Houston, to Gerding Edlen Development in Portland, Oregon.⁵

We began this book with a Foreword from Behnisch Architekten's David Cook. The Behnisch firm is probably the foremost German architect involved with U.S. projects (there are many from the United Kingdom, of course). The systems used in the Norddeutsche Landesbank in Hannover (Figure 10.1) are good examples of what we might see in the United States. Considering both user well-being and low-energy systems, this 75,000-square-meter (807,000-square-foot) building for 1,500 people was built with no air conditioning. Daylighting was optimized, while avoiding unwanted solar gain and glare on computer screens. A double façade was installed, protecting against noise, vehicle emissions, and wind while serving as a supply air duct to adjoining offices. (To be sure, this is a benign climate, exceeding 72°F only 5 percent of the year, but most large American office buildings in a similar climate would be sealed and provided with massive heating, ventilation, and air conditioning systems.) Supplement cooling was supplied by inducing chilled water into the slab, with cold water provided by a ground-source heat exchanger connected to the foundation piles. And the story goes on.⁶

So what are the lessons learned?

- So much more is possible: European green building design and construction practice shows that it's possible to design a much better built environment, one that creates more livable buildings using far less energy than we do today. The prevalence of advanced design solutions also spurs industry toward product innovation. As Transsolar's Helmut Meyer remarked, it's easy in Europe to find six to eight good façade suppliers for advanced design ideas, whereas in North America it's hard to find more than two.
- A change in North American design culture is clearly needed; what's considered a good result today in the United States and Canada would not be considered very good in much of Western Europe. Although nearly 60,000 American architects, engineers, and other building industry participants have become LEED accredited professionals, the fact that fewer than 2,000 buildings have been LEED certified by October 2008 indicates that most of them have yet to put this knowledge into practice. Europeans are quite comfortable liv-



FIGURE 10.1 Designed by Behnisch Architekten, this bank headquarters incorporates natural ventilation and daylighting into a unique twisted geometry that still maintains human scale at the street level. (Roland Halbe fotografie)

ing with order, predictability, and clear limits, things that are anathema to the American spirit. We use twice as much energy as Europe (Figure 9.1) yet are no wealthier or happier. There must be a happier medium between tying ourselves in political and regulatory knots and continuing to trust in the laissez-faire approach of unbridled free enterprise to achieve the response we need to the perils of climate change. Among other things, the sense of entitlement to cheap energy has to go if we are to provide an economic rationale and set of signals that will encourage zero-net-energy solutions in the built environment.

- Culture and regulation should fit together more closely, as they do in Europe. For example, German law provides that every office worker has a right to fresh air, natural ventilation, and daylight. As a result, in Germany no one can be more than 5 meters from a window (unless ceiling heights are raised), making building floorplates much narrower than in North America. In other words, by law and custom, the health and comfort of office workers are valued much more than the concept of real estate “efficiency,” defined as net leasable area as a percentage of gross floor area.
- The role of engineers in the building design process must be elevated. A European project wouldn’t start without having the mechanical and electrical engineers at the table; most American architects design a building, at least preliminarily, before they engage the engineers. We need a revolution in design, toward a more integrated design process, one that puts the issue of zero carbon at the forefront of the design process.⁷

- Building design and construction practice will change only when there is a strong feedback from actual results, measured through post-occupancy evaluations, with the results communicated to the designers and builders. Bill Bordass of the Useable Buildings Trust indicated that this is still an issue in the United Kingdom, especially getting funding for this purpose. The obvious solution is to include funding for both advanced building commissioning and formal post-occupancy evaluations in the original building budget, as a quality assurance and performance verification measure. Most architects and engineers I've encountered are concerned that post-occupancy evaluations will only lead to lawsuits rather than constitute a critical element of the industry's learning curve.
- Educational practice for both architects and engineers must reemphasize building physics as a core element of the curriculum, not only in terms of building energy use but also with respect to all the elements that make buildings habitable and healthy places: fresh air, natural ventilation, moisture management, heat recovery, and use of radiant surfaces to promote comfort. The fact that more U.S. universities are inviting European architects and engineers to teach this subject indicates a wider recognition of the issue.
- A strong government role must be liberating, not oppressive. Right now, the U.K. building industry is having a very difficult time with the British government's eco-towns scheme and the requirement for zero-net-energy homes throughout the country by 2018. It's one thing to mandate zero-carbon results, then demand that 20 percent be provided by on-site renewables, and another to get builders to produce homes that don't cost 20 to 40 percent more to get that result.
- In the United States and Canada, the national government can play a much stronger role. Although the LEED rating system has grown up without much government oversight, mandating it has fallen primarily to state and local governments. What's needed is a quick update to the national building codes to incorporate LEED performance objectives into all codes; moreover, we will need a national energy code for new buildings and major renovations if we are to have a fighting chance to reduce energy use and carbon emissions to 1990 levels. States such as California could adopt stricter codes, but every state and municipality should be required to adopt a stringent building energy code that raises the standards every few years toward a zero-carbon goal. If we can have national energy efficiency standards for automobiles, why not for buildings?
- The European Union's Energy Performance of Buildings Directive, requiring all buildings to be labeled with their energy consumption, provides strong feedback from the marketplace to individual building owners and occupants. A similar system in the United States, going beyond making LEED a mandatory measure in public buildings, would require the Energy Star rating to be posted prominently on all buildings and would assign letter grades (probably A through F in our case) to all properties, would allow the marketplace to put a value on that information, and would pressure building owners and managers to perform the necessary upgrades.
- Formal commitments mean a lot. The fact that Sweden is committed to eliminating oil imports by 2020 or that Germany plans to reduce greenhouse gas emissions 36 percent below 1990 levels by 2020 wonderfully drives decision making at all levels of government, business, and society. Specific goals, such as 20 percent on-site renewables in U.K. housing, help to focus attention and bring forward capital, people, and innovations to make them happen. As the saying goes, "If you don't know where you're going, any road will take you there." Conversely, a strong social and political goal pushes and pulls the innovative energy of society in a specific direction.

- The North American housing sector has a lot to learn. My own research into U.S. and Canadian green homes convinced me that it's possible to design a home that reduces energy consumption by 50 percent without sacrificing comfort or adding significant cost.⁸ The German PassivHaus standard shows that we can push the envelope even further, aiming at a 90 percent reduction in heating and hot water use, through a more comprehensive and systematic approach based on building physics.
- European cities offer clear models for U.S. cities. The example of Vaxjö, Sweden, reducing greenhouse gas emissions by 30 percent since 1993 while increasing gross regional and domestic product per capita by 20 percent, shows that we can decouple economic well-being from carbon dioxide production. Cities such as Freiburg, Germany show the power of citizen involvement in creating low-carbon futures. Many American city planners and developers have begun taking the grand tour of these European examples to gather ideas for urban redevelopment and mixed-use projects in the United States. What we need are changes in development incentives, zoning laws, and green building ordinances to turn these examples into reality.
- The German government has demonstrated that even a northerly country can promote solar power in cities with dedicated incentives ("feed-in tariffs" in the case of Germany and Austria, paying much more for solar electricity generated than just the current residential price of electricity). In North America, we are just beginning to encourage solar power in a serious way; in fact, in 2008 the U.S. Congress finally extended the federal solar power tax incentives through 2016, indicating that we're beginning to consider renewable energy not as an expensive luxury but rather as a vital national need.

WHAT WILL WE NEED TO CHANGE TO USE THE EUROPEAN EXPERIENCE?

In the Introduction we argued that the four key issues were climate, culture, politics, and economics. As I've pointed out, the climate regions of the United States and Canada are far more diverse than those of Western Europe, but I think that many of the "design with climate" approaches can be extended beyond their current narrow range of 45° to 60° latitude, in climates with little humidity to worry about.

European culture has grown up since the 1950s with a sense of place, resource scarcity, and land scarcity. There's no "back 40," no "outback" to dump waste or to site new cities. The idea of a closed loop is more real there, especially in an island nation such as the United Kingdom but also in small countries with more stable populations such as Norway, Denmark, and Sweden. There is also a stronger sense of social justice, primarily because of the greater strength of labor-dominated left parties, but also a greater coherence of community, with far more homogeneous populations.

There is also a sense that cities must become more like nature, more biomimetic, to become truly sustainable. An example might be the green wall placed on the side of a two-story conference center at Bennetts Associates' New Street Square to provide carbon dioxide production in the midst of a busy urban area (Figure 10.2).

Politics and economics are the bigger issues. Most Americans tend to view current resource

FIGURE 10.2 One of the many examples of a green wall, this two-story conference center in central London's New Street Square attempts to bring nature back into the city. (Jerry Yudelson)



scarcities or rising costs as temporary market imbalances or inconveniences rather than a look at the most likely future. As a result, our politics has yet to come to terms with higher energy prices and greater demands on coherent policy formulation for a sustainable future. What I see coming is a growing consensus that will play out over the next presidential term toward a national building code for green buildings and a national energy code for homes and structures, which will result from a firm commitment to a low-carbon future.

The economic arguments for green buildings are strong, but not as strong as in Europe. Until we see gasoline prices at \$7 or \$8 per gallon, we're likely to make few structural adjustments in urban design and settlement patterns. Until we see average electricity prices above \$0.15 or \$0.20 per kilowatt-hour, we're likely to see only incremental improvements to new and existing buildings.

Over the long haul, this trend toward more sustainable buildings is irreversible. But it will take a change in thinking to move us more quickly along this path. Understanding the European experience can help with that change in outlook, understanding, and intention. I encourage all of you to continue to follow European green building developments as closely as you follow those in the United States and Canada. There's much to learn, digest, and implement.

WHERE SHOULD WE BE HEADING?

One of the clear lessons from this book is that there are major competitive implications to lagging behind in adopting new approaches to sustainable design and development. The first

competitive implication is for North American firms wanting to stay in the running for major U.S. and Canadian projects as their clients become more demanding of low-carbon solutions and more aware of what's available from European architects and engineers. The second is for manufacturers of building products and systems having to compete with companies that have learned the art of sustainable design, products, and systems in the much larger European Union marketplace. The third is for the contractors and subcontractors as this market starts to become increasingly global, especially for major projects. How will they stay competitive if they don't know how to price and install the systems that leading architects and engineers will be specifying?

These are all meaty questions, far beyond the scope of this book. Nonetheless, the clear intention of this book is to force answers, to issue a wake-up call to North American building teams to learn how to design, build, and operate for an increasingly low-carbon future, to combine elegance with economy in design, creature comfort with cradle-to-cradle considerations. In a way, it's a revolution to return to the roots of North American design, learning how to design with climate.

Bob Berkebile is principal of BNIM Architects in Kansas City, Missouri. He's not sure that we should focus so much on learning from Europe if that means adopting only high-tech solutions to low-carbon demands. After all, these solutions are driven largely by conditions that might be very different there and also by the demands of the global economy. Here's what he thinks should happen instead:⁹

I find that high-tech double-skin buildings are often too complicated and sophisticated. That means they're too expensive and/or too difficult to operate and maintain. Ultimately, they're fairly resource-intensive even though they may ultimately consume a little less energy. Typically the most published European projects are the most copied by Americans; they are often clever but complex and not integrated or elegant.

In other words, they're not using nature as a model; they're using ever more sophisticated but outdated Western scientific thought. If you were to talk with Janine Benyus, author of *Biomimicry*,¹⁰ she would suggest using nature as our source of innovation. This approach requires a deeper understanding of how nature works to achieve efficiency, diversity, and resilience. I believe that if we are creating design solutions for a more crowded, polluted, resource-constrained planet we must look for more elegant solutions.

Berkebile is a strong advocate for shifting our thinking and developing "a more holistic regenerative approach" that seeks "to understand the principles of nature well enough to divorce ourselves from the 'heat, beat, treat' strategy that much of the award-winning European architecture currently is using."

A British architect, Robert Adam, provided a similar sentiment in railing against purely technical fixes for glass boxes that perhaps shouldn't be built in the first place:

What makes a building last a long time is really quite simple. It needs to be robust and adaptable. Robust buildings are made of solid, low-maintenance and preferably local materials. Adaptable buildings are daylit, easy to subdivide and service, and don't depend on machinery such as lifts and air-conditioning. In other words, they'll be solid, low and narrow. We're surrounded by buildings like this that have lasted for centuries.¹¹

You'll have to make your own choice about whether to adopt more contemporary (and more technologically advanced) European green building approaches or to take the road less traveled and follow Berkebile's and Adam's recommendations. Should we be adopting high-tech but low-carbon solutions from Europe or taking a different approach entirely, one based on biomimicry?

This might be a good place to pause in our journey and take stock. As we look to accommodate over the next 40 years a projected 50 percent increase in the U.S. population and perhaps even a 30 percent increase in world population, with the pressures of resource depletion and climate change growing yearly, should we still be committing so many resources to the building sector?

Can we figure out how to build more timeless contemporary buildings that imitate nature in the way that indigenous buildings throughout the world always have, by using local materials, human ingenuity, passive systems, and natural water, wind, and sunlight? Can we understand and communicate human comfort and health considerations to building designers who are increasingly removed from the people they are serving with their work?

Ultimately, resolving these questions is more about culture than technology, ecology than economics, behavior than biofuels. It's about using the collective human intelligence, applied to design of products, systems, technologies, and buildings, to allow our urban civilization to be sustainable over the long haul. In that respect, we might take another, more humble look at the European experience, because they've operated cities, governments, cultural institutions, and places of learning for at least 500 years longer than we have in North America and done a pretty good job of it. It's time for more voyages and conversations of discoveries between two great civilizations.

Bon voyage!