The progress in Europe and the United States in sustainable design and technology has involved a process of coevolution. When the U.S. Green Building Council (USGBC) set out to establish a method to assess green buildings, it did so by assembling the best American minds it could find. The result was a tool—the Leadership in Energy and Environmental Design (LEED) green building rating system—that was in the right place at the right time. This national standard for developing high-performance, sustainable buildings—launched in 1998—has grown and blossomed with minimal public funding and has raised the consciousness of the entire American building community. Beneath the surface, LEED tapped into a well of design potential that was, in fact, already prospering elsewhere in the world.
The green roofs in Germany have been a strong source of innovation and design technology for U.S. green roofs. The main motivation for these roofs has been the control of stormwater runoff and the intent to keep the moisture actively circulating in the microclimate. In Denmark, many Americans were fascinated by the concept. Chris Scott Harrison, a development consultant and coauthor of 1996’s The Co-Housing Handbook, visited Europe to study the idea, and brought it back to Seattle (see “Aging Together,” May, page 72). Co-housing probably can even be credited with inspiring the communal and ecological aspects of housing that have been employed more recently in Beddington, England, at the Beddington Zero Energy Development, or BedZED. (See “Living Green,” page 54.)

Human behavior in the workplace was also being extensively studied in such countries as Canada, Japan, and Germany as researchers began to link human performance at work with a definition of healthy building performance. The idea of controlling access to sunlight, providing operable windows, and allowing individual employees to control their personal work environment took root in Germany, sparked by concerns that overexposure to sunlight of the building envelope for energy reasons was creating unhealthy indoor air. There were isolated pockets of such research in the United States as well. Vivian Loftness and Volker Hartlapp, professors at Carnegie-Mellon University, pioneered such efforts and shared their experiences with the design community. The new main ingredient was the idea of assessing and documenting how buildings were being occupied and used.

In 1990, the British national laboratory (since privatized) launched its first issue of the Building Research Establishment Environmental Assessment Methodology (BREEAM), an effort spearheaded by British architect/engineer John Doggett that helped inspire LEED. As part of the assessment, BREEAM calls for a professional facilitator to visit a building to take key measurements and review user records; the first building type to be assessed in this manner was the office building. BREEAM’s most important achievement was to define sustainable design in a specific way, bringing together ecological consciousness, social consciousness, and economic consequences in an integrated system. The result was a scoring method for buildings similar to the one LEED uses today. The BREEAM idea soon spread to other countries—Scandinavian nations, South Africa, Hong Kong, and Canada. The world outside the United States was beginning to get a clear idea what might constitute a valid approach to evaluating environmentally responsible construction.

Also in the early 1990s, half a planet away in Brazil, architect Jaime Lerner was putting the finishing touches on the transit portion of his town plan for Curitiba. The climate of Curitiba is almost ideal for low-energy use, never getting too hot or too cold; many rooftops have no heating or cooling equipment at all. In his new town plan, Lerner, who was mayor of Curitiba then became governor of the surrounding region, concentrated his efforts on the inclusion of ample plant life and parks, leading the United Nations to honor the town for its quality and high quality of its green space. A strong industrial base served as the economic cornerstone for the town, and an innovative social structure even pro-

A new subway for Curitiba, Brazil, was studied by architect/mayor Jaime Lerner as part of early plans for reducing automobile use. The below-ground version was eventually abandoned, but elevated train stations were kept as a reminder of the scaled-down costs that the new dedicated bus lanes represent.

SUSTAINABILITY

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The Sony Center serves as the entertainment hub at the north end of the new Potsdamer Platz in Berlin, Germany. The multipurpose cluster of buildings, designed by Chicago architect Helmut Jahn, has a massive open-air atrium dramatically capped by a 45,000-square-foot, tinted fabric-and-glass envelope. Some of the technology that has flourished in Europe was in some way a product of the similar creative effort In the United States, in the late 1970s and early 1980s, decimated by the Arab oil embargo and largely sponsored by the U.S. Department of Energy (DOE). The Building Energy Performance Standards (BEPs) program, commissioned by the DOE at a cost of $4.5 million, has educated hundreds of professionals, and computer technology was developed for it. After Ronald Reagan took office as president in 1980 and his administration all but eliminated such research, some of the researchers and much of the technology left the country for Europe and ended up in places like Switzerland, Sweden, and the United Kingdom. Ironically, when Reagan succeeded in helping bring down the Berlin Wall, he also unwittingly helped give birth to a tremendous real-life laboratory for understanding ecological environmental planning and design—the reunified Germany. The 1980s was also a decade when human behavior was being extensively studied. Behavioral researchers who had prospered in the concentrated study of gerontology and housing for seniors in the 1970s branched into related housing areas, helping spawn the cohousing movement in Denmark. Many Americans were fascinated by the concept. Chris Scott Harrison, a development consultant and coauthor of 1996’s The Cohousing Handbook, visited Europe to study the idea, and brought it back to Seattle (see “Aging Together,” May, page 72). Cohousing probably can even be credited with inspiring the communal and ecological aspects of housing that have been employed more recently in Beddington, England, at the Beddington Zero Energy Development, or BedZED. (See “Living Green,” page 54.)

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The importance of naturally ventilated interior corridors encouraged design innovation by British architect Alan Short in the Queen's Building at De Montfort University in Leicestershire, England. It was one of the first educational buildings to successfully use new natural ventilation technology.

The Global Wind Energy Council reports that the countries with the highest installed wind-generated electricity capacity are Germany (8,438 megawatts), Spain (7,037 megawatts), and the United States (5,919 megawatts). In 2001, the European Union adopted a directive that strongly encourages use of renewable energy sources.

Foster was commissioned to transform the old German Reichtshaus into a building for the new unified German parliament. Surprised by his own interest in the subject, but also prodded by the German leadership, Foster designed the building as a showcase of sustainable design innovation and a symbol of the new unified German democracy. The main theme of the reconstruction was linking the past, the present, and the visible and bright new sustainable future.

In the heart of Berlin, other architects designed buildings for the new Potsdamer Platz development. German-born American architect Helmut Jahn played a leading role at the site, designing the signature Sony Center complex, a seven-building mixed-use complex arranged around a circular atrium that required no heating or air conditioning.

Other old-world European cities were starting to get the message. In 1994, at the first European Conference on Sustainable Cities and Towns in Aalborg, Denmark, 80 European representatives signed the Aalborg Charter committing themselves to work toward sustainable cities and a viable action plan. Ideas started to flow across borders that were once devised to contain them, American cities like Cleveland, Pittsburgh, Chicago, and Seattle were listening.

At the building scale, much of the innovative thinking involved sophisticated high-tech mechanical systems. But at the same time, British architect Alan Short was designing a ground-breaking, low-tech thermal mass—infilled building for De Montfort University in Leicester, U.K., called the Queen's Building, which was entirely passively ventilated.

By the late 1990s, European advances in large-scale sustainable design projects were stimulating interest in the United States. Between 1996 and 1998, American planner Timothy Beatley visited 11 countries and 32 cities while researching his 2000 book Green Urbanism: Learning from European Cities. Beatley, the Teresa Helms Professor of Sustainable Communities in the Department of Urban and Environmental Planning at the University of Virginia—the same place where McDonough was dean of the School of Architecture—chronicled in the book both European advances on sustainability and the parallel moves being made in the United States. Beatley described the progress in Europe and the United States as "coevolution." He documented that unlike the United States, the U.K. and the rest of Europe had made saving energy a way of life.

The green roof on Chicago's city hall has provided a sustainable model for lower-city control of accumulated heat from dark, heat-absorbing roofs. Chicago Mayor Richard M. Daley was a strong advocate of the project and alternative energy use in city-owned buildings.

The 1990s saw the rekindling of international interest in wind energy on a significant scale, with Germany leading the way with hundreds of wind turbines erected in wind farms. In this case, the United States has kept pace with Europe in the development of the technology, much of it supplied by the National Aeronautics and Space Administration. Highly visible wind farms are present in such places as San Francisco, Palm Springs, and San Antonio. But the scale of wind energy being captured in Europe is much greater than that in the United States, largely because the European Union is publicly committed to it. In 2002, the EU adopted a directive on promotional strategies for electricity from renewable energy sources in EU countries, which also has resulted in the mounting of hundreds of square meters of solar collectors on roofs.

In the United States, also in 2001, the Chicago city hall green roof pilot project was completed by McDonough. He had seen dozens of green roofs in his travels to Germany, and his engineering counterpart, Charlie Miller, had made a pilgrimage there to visit and understand their design details. The city hall green roof was the first big-city showcase of such technology in the United States.

The motive for the green roof in Chicago is to reduce the heat-island effect that would be exacerbated by a flat black roof in the center of the city. In Germany, howeyer, the purpose of most green roofs is to control stormwater and rechannel the moisture while generating minimal wastewater. In dry climates, the rather base and plant life of a green roof also provide Insulation; in wet climates, the water-laden earthen base serves as thermal mass to moderate energy consumption. The basic concept behind a green roof in Germany is to replace the benefits of the land consumed by construction and its benefits with a similar green plot on the roof. There, it is not unusual to recycle the water used to irrigate the green roof.

By 2002, the LEED success story was being written, and USGBC was beginning to understand the importance of bringing the international story to the United States. Two conferences that year brought European designers and design experience to the United States. A similar conference held in April and cosponsored by the USGBC and the Urban Land Institute, brought both Lerner and Beatley to Seattle as keynote speakers.

Today, people on both sides of the Atlantic are prepared to acknowledge a common economic fate: the cost of oil. The cost of a gallon of gasoline in the United States has topped $3, and in the U.K. and Germany, it is over $6. Even those not interested in the complexity required for designing a truly sustainable environment for future generations recognize that the need for a more rational rate of energy consumption is now urgent.

Richard D. Rush is a LEED-scrutinized practicing architect and has taught sustainable design at several universities.

(Green Office Buildings: A Practical Guide to Development, published by ULI, is available at www.bookstore.uli.org, or call 800-548-5011.)