June 1992 URBAN LAND

ENVIRONMENT

In project design and construction, "green" means putting environmental concerns first. Doing so can mean big pay offs, as this Amsterdam office building proves.

NMB Bank Headquarters

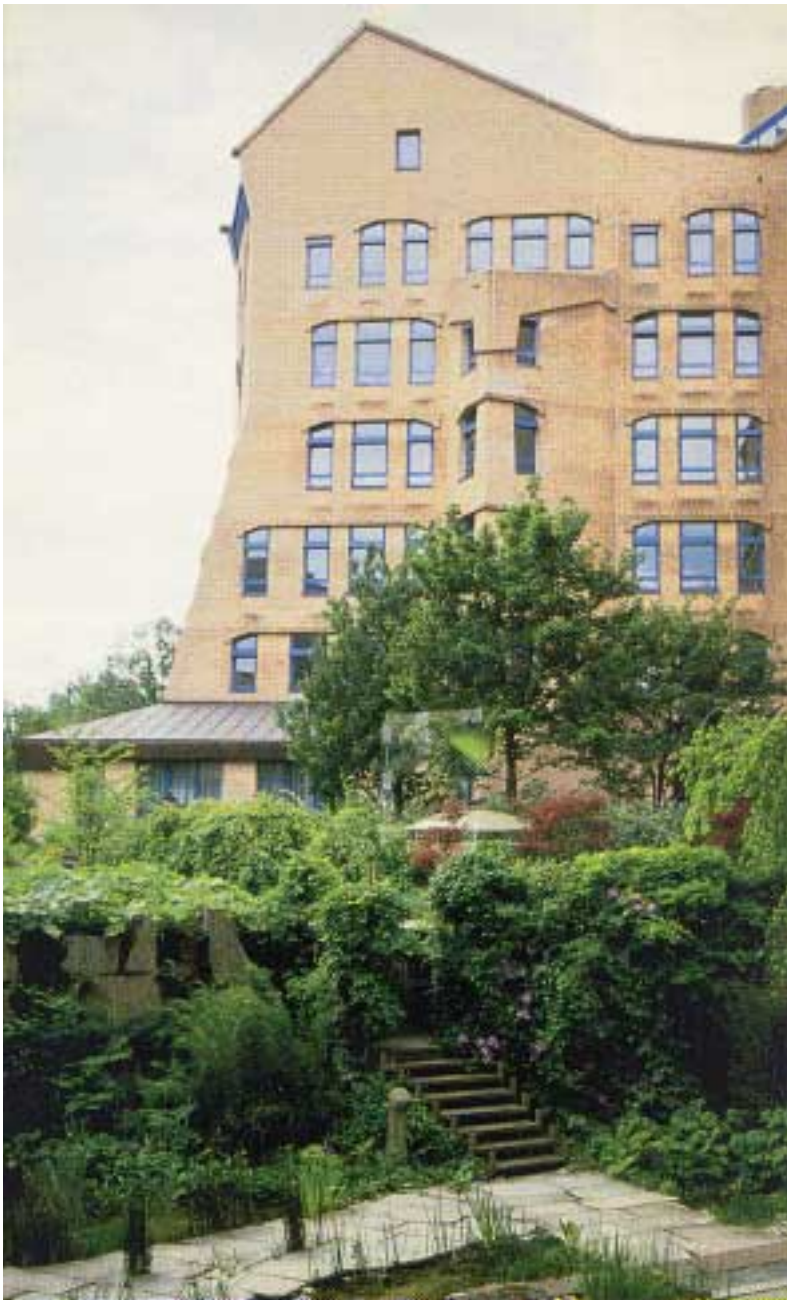
The Impressive Performance of A Green Building

WILLIAM BROWNING

When Nederlandsche Middenstandsbank (NMB), then the number four bank in the Netherlands, felt the need, in 1978, for a new image and a new headquarters, its board of directors set out some unusual criteria. The board asked for an organic building that would integrate art, natural materials, sunlight, green plants, energy conservation, low noise levels, and water, reports Tie Liebe, head of Maatschappij voor Bedrijfsobjecten (MBO), NMB's real estate development subsidiary. Per vote of the bank's employees, the new headquarters would be built in a growing area south of Amsterdam.

An integrated team instructed to work across disciplines–an architect, a construction engineer, a landscape architect, an energy expert, and artists–worked for three years designing the building. Construction began in 1983 and was completed in 1987.

The NMB building is no monolithic tower. To the contrary, its 538,000 square feet (50,000 square meters) of office space housing 2,400 employees is broken up into a series of 10 slanting towers arranged in an irregular S-curve with gardens and courtyards interspersed. Portions of the complex are supported by a 301,280-square-foot structure (28,000 square meters) containing parking and service areas. Restaurants and meeting rooms line the internal "street" that connects the towers on the mezzanine level.



Surrounded by high-density residential, office, and retail development, the NMB building's 10 slanting, brick-faced towers resemble a castle in a medieval village.

The building is an undulating "groundscraper" that hugs the earth, in the view of architectural historian Charles Jencks.[1] It is surrounded by high-density residential, office, and retail development, which gives it the image of a medieval castle with its surrounding village.

As is common in northern Europe, the NMB building's floor plates are narrower than is usual in the United States. In this case, maximum floor depth was determined by a heavy reliance on the use of daylight (and by the design criterion that no desk can be more than 23 feet, or seven meters, from a window). Interior louvers bounce daylight entering the top third of each exterior window onto the ceiling of office spaces. This daylighting technique, in combination with window-lined atriums in the towers, provides a significant portion of the building's lighting. Task lighting, decorative wall sconces, and a few overhead fixtures provide the rest.

The building's thermal design is equally important. Built before the development of high-efficiency super windows, it has double glazing. The precast concrete structure is sheathed with insulation, then faced with brick. The structure itself stores heat supplied by simple passive solar measures as well as by lighting, power equipment, and people.

Hydronic radiators are connected to a 26,420-gallon (100-cubic-meter) hot water storage system, which obtains its heat from an on-site cogeneration facility. Additional heat is recovered from the elevator motors and computer rooms. Air-to-heat exchangers transfer heat from the building's exhaust air to its intake air. Like many buildings in northern Europe, the NMB headquarters is not air conditioned. The thermal storage capacity of the building fabric intercepts some summertime heat, and spaces are cooled by mechanical ventilation, natural ventilation through operable windows, and a back-up absorption cooling system powered by waste heat from the cogeneration system.

The careful integration of building design, daylighting, and energy systems for energy conservation has yielded some impressive results. NMB's former headquarters consumed 422,801 BTUs per square foot (4.8 GJs per square meter) of primary energy per year. This one consumes less than one-tenth as much: 35,246 BTUs per square foot (0.4 GJs per square meter). An adjacent bank constructed at the same time at roughly the same cost consumes five times as much energy per square foot.[2]

The special characteristics of the building's energy systems added about $700,000 to construction costs. Annual energy savings, however, are approximately $2.4 million.[3] Liebe claims that the NMB building achieves the lowest energy costs of all Dutch office buildings and one of the lowest in all Europe.

In keeping with the building's organic theme, other elements–art, natural materials, water, plants–are also carefully woven into the design. Circulation spaces are filled with artwork that is not merely "plop art" and with other artistic touches. Pieces of colored metal at the tops of the atriums, for example, reflect light onto sculptures on the

mezzanine level, which, in turn, bathe the surrounding walls in colored light. And the brass plates covering expansion joints in major corridors are recessed into the wall and surrounded by a fan of colored marble and cove lights.

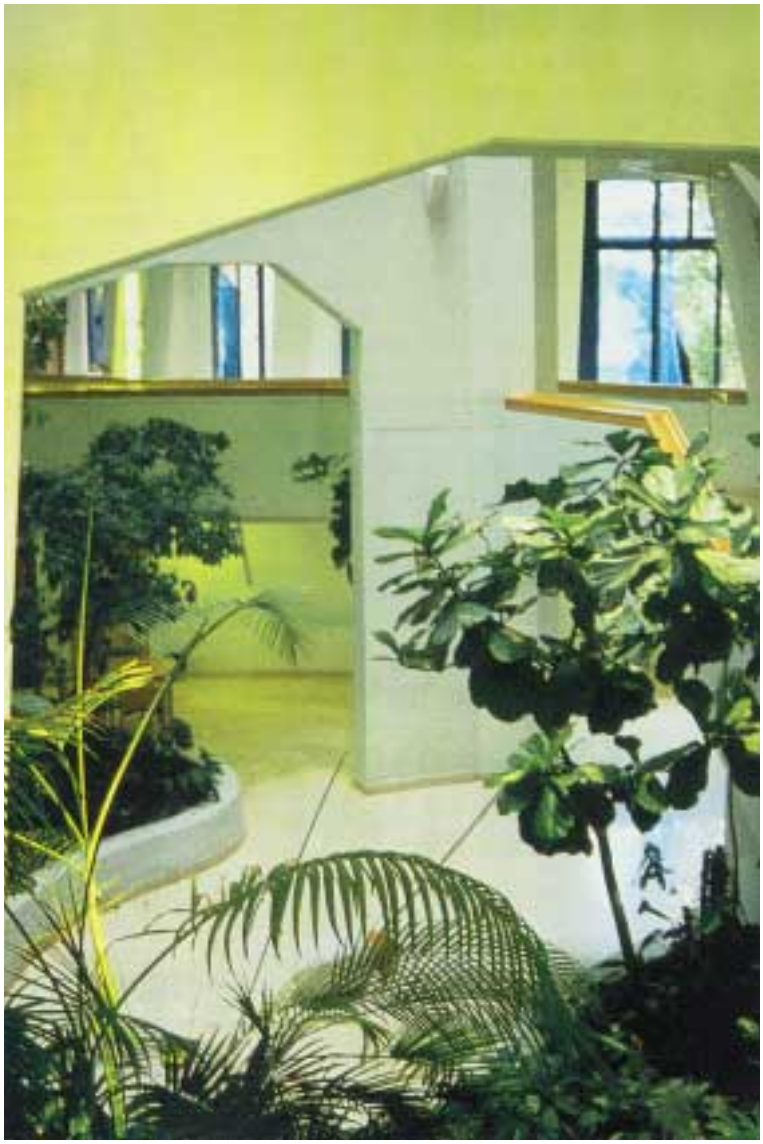
The interiors are finished with a simple palette of natural materials–texture paint over the precast concrete, wood trim, and wood slats for some ceilings.

Rooftops, courtyards, and atriums (and other interior spaces) are landscaped in a variety of styles. Cisterns capture rainwater for use in fountains and landscaping. Pulsing, gurgling streams of water–called "flow-form sculptures"–are used extensively, even in ramp handrails. The water features are not only visually appealing, but also add moisture to the air and a pleasing level of white sound to otherwise very quiet corridors.

Construction costs covering land, structure, landscaping, art, furniture, and equipment came to 3,000 guilders per square meter[4], which is about $162 per square foot (in 1991 U.S. dollars). Liebe says this is comparable to or cheaper than the cost of other contemporary office buildings in Holland.

Significant energy cost savings is only one of the building's benefits to NMB. Employee absenteeism has dropped, which Liebe attributes to the attractive work environment. And the building has done wonders for NMB's image. Liebe says "NMB is now seen as a progressive, creative bank, and its business has grown dramatically."

NMB's headquarters is a prototypical "green" development, that is, a development that goes beyond merely meeting the design and use requirements that are imposed on projects by regulators to proactively address various environmental concerns. Clearly, green development necessitates an unconventional approach to design and construction. Its hard costs may be higher than for conventional development. But it also may have a quick payoff. NMB used early-1980s energy-conservation technologies that have now been improved. Even so, the additional costs it incurred for its energy-efficient design were paid back in operational savings in three months. ❖



Window-lined atriums in the towers provide a significant portion of the building's lighting.

Notes

[1]Charles Jencks, "Post-Modernism between Kitsch and Culture," in *Architectural Design, Post-Modernism on Trial* (New York: St. Martin's Press, 1990).

[2]David Olivier, *Energy Efficiency and Renewables: Recent Experience on Mainland Europe* (Herefordshire, England: Energy Advisory Associates, 1992).

[3]Brenda Vale and Robert Vale, *Green Architecture, Design for an Energy Conscious Future* (Boston: Bulfinch Press, Little, Brown and Company, 1991). And David Olivier, *op.cit.*

[4]NMB Bank's Head Office (Amsterdam: NMB Bank Corporate Publications, 1988).

William Browning *is a senior research associate and head of green development services for Rocky Mountain Institute. Located in Snowmass, Colorado, RMI is a nonprofit resource policy institute with programs in energy, water, agriculture, economic development, transportation, and security. Browning will be writing a number of building energy conservation case studies for* Urban Land. *All photos@ 1991 William Browning.*