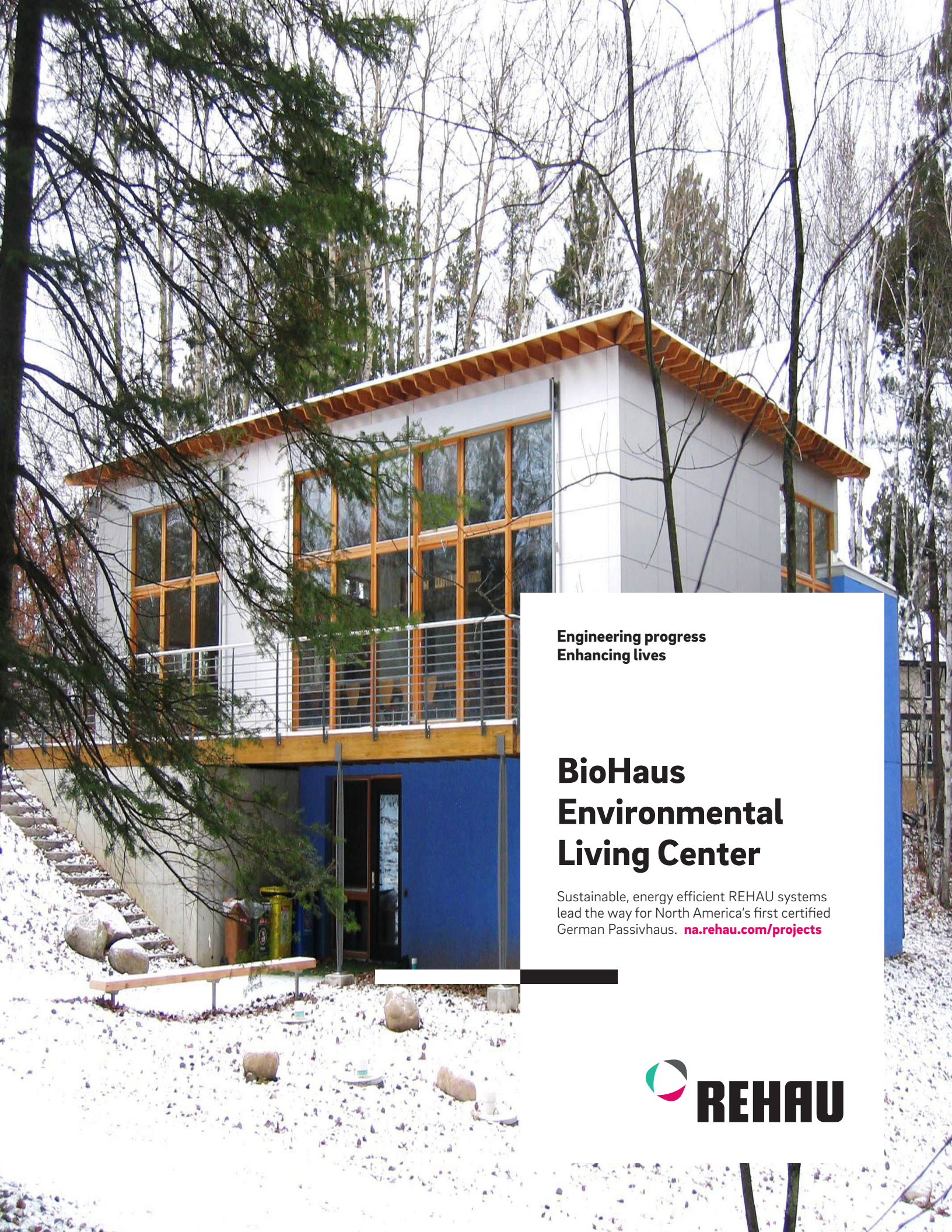

Engineering progress
Enhancing lives

BioHaus Environmental Living Center

Sustainable, energy efficient REHAU systems lead the way for North America's first certified German Passivhaus. **na.rehau.com/projects**

REHAU

REHAU helps Waldsee BioHaus achieve North America's first German Passivhaus Certification

In creating its Waldsee BioHaus in Bemidji, MN, the first certified German Passivhaus in North America, Concordia Language Villages wanted to showcase Germany's position as a leader in environmental practices, through a paradigm-changing green building design. The educational facility provides a level of energy efficiency beyond that of the US Green Building Council's LEED standard, using 85 percent less energy than comparable US structures.

When it passed the official certification by Germany's Passivhaus Institute, the BioHaus laid claim to being the nation's tightest building – a notable achievement in light of the structure's location in an extreme climate zone.

Sustainable design dialogue

The BioHaus at Waldsee is part of a larger effort by the Concordia Language Villages and Germany's Deutsche Bundesstiftung Umwelt (DBU) – Europe's largest environmental foundation dedicated to environmental practice, education and construction – to create a "transatlantic green bridge" between German-speaking Europe (Austria, Germany and Switzerland) and the United States. It is expected to promote a dialogue on and exchange of sustainable building components and technologies, as well as encourage the cooperative development of innovative educational curricula on sustainable building practices.

"What is truly revolutionary about Waldsee BioHaus is its use as an innovative, natural extension of our experiential, community-based approach to language and cultural immersion," said Dan Hamilton, dean of Waldsee at Concordia Language Villages. "Waldsee BioHaus fosters an exciting exchange on environmental education between the United States and the German-speaking world, and provides a modern snapshot of the German culture. Waldsee villagers will cook, clean, play, sleep and learn in this amazing facility – there is nothing like it anywhere."

The Waldsee BioHaus is funded in part by DBU's first grant to a North American institution, as well as a design planning grant from the Kresge Foundation in Detroit. "Waldsee BioHaus is an innovative means to convey aspects of German and European environmental protection to young Americans.

It will forge a transatlantic green bridge between the two continents," said Dr. Fritz Brickwedde, DBU Secretary General. "Waldsee BioHaus is a world-class platform for environmental and cross-cultural education, connecting new generations of Europeans and Americans for our common future."

Innovative Global Technologies

Designed by lead architectural and consulting firm INTEP Planning, with European offices in Munich, Germany, Zurich, Switzerland and a satellite office in Minneapolis, MN that specializes in high-performance and sustainable construction, the Waldsee BioHaus features several innovative building systems and components.

"As a transcontinental firm that understands the importance of bringing sustainability concepts and the Passivhaus standard to the US, we designed the Waldsee BioHaus as a model for how these practices work to achieve a level of energy efficiency not yet seen in North America," said Stephan Tanner, project architect from INTEP Planning. "We have offices here in the US, as well as overseas, and we looked to like-minded companies with ties around the globe, like REHAU, to help us achieve this goal."

REHAU systems, several of which are new to the North American market but commonly used in Europe, were specified for the project. These systems include ground-air heat exchange, geothermal ground loop, radiant heating and solar-thermal hot water as well as high performance vinyl tilt-turn windows.

"With a heritage rooted in Germany's sustainable building practices, REHAU has significant experience in providing integrated, high-quality building solutions that collectively enhance energy efficiency and comfort," said Mike Maher, a manager for REHAU's construction strategic business unit. "Working as integrated systems, these components deliver the maximum economical and environmental benefits sought in typical German building practices. We are proud that our package of integrated construction products contributed to the Passivhaus certification rating."

Radiant heating

PEXa pipes also increase the reliability and performance of many of the systems used inside the BioHaus. The REHAU radiant heating system, comprising RAUPEX pipes and compression-sleeve fittings, provides one of the most comfortable and efficient types of residential heating available today. The system's operating temperature range (90° to 140°F or 32° to 60°C) produces consistent heat, and is also ideally compatible with alternative energy sources such as geothermal.

"Integrating REHAU radiant heating systems with alternative energy sources such as geothermal offers added energy conservation," Maher stated. "Independent of the heat source, radiant heating offers up to 30 percent savings as the system operates at lower temperatures. When a radiant heating system is linked with a ground source heat pump energy supply, the savings increase even more."

As a non-forced-air system, radiant heat additionally contributes to improved indoor air quality via the reduction of airborne dust and circulation of allergens.

Solar-thermal hot water

The solar-thermal system produces hot water for use by residents as well as for the radiant heating system. The solar panels most ideally increase energy efficiency when combined with the geothermal heat exchange system which is able to store excess energy in the ground for use in colder months.

PEX plumbing

RAUPEX pipes offer yet another benefit in the BioHaus's potable water plumbing system. PEXa pipes are natural insulators, reducing the overall heat loss and condensation experienced when using copper pipes. Flexible and with a yield strength that allows it to absorb the noise associated with water hammer, "PEXa pipe also offers a quieter plumbing system than copper, which frequently requires the installation of water hammer arrestors to reduce noise," said James Mullady,REHAU Midwest sales director.

Vinyl window designs

A pair of tilt-turn windows, custom-fabricated for the BioHaus project by EuroLine Windows in Richmond, B.C., Canada, is installed in the sleeping quarters. Featuring REHAU window profiles manufactured with high-quality PVC, these windows are engineered to deliver thermal efficiency and comfort in alignment with the benefits delivered by the overall Passivhaus design. In addition, REHAU window designs are mold resistant, protecting indoor air quality.

Project: Waldsee BioHaus Environmental Living Center at Concordia Language Villages, Bemijdi, MN
Type of Construction: Educational facility
Project scope: 5,000 sq ft
Owner: Concordia Language Villages
Architect: Stephen Tanner of INTEP, LLC
Construction: Zeta Construction
Project Production Managers: Howie Zetah and Doug Pearson
REHAU systems used: Sustainable building technologies including ground-air heat exchange, geoexchangeground loops, radiant heating, vinyl tilt-turn windows