



# “When Europeans think of the USA, they think of energy-guzzling air conditioning systems.”

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PHOTOS Andrew Geiger

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Energy-efficient construction is new territory in the USA. This is why for Terry Beaubois, architect and professor at Montana State University, the planning and construction of the ecosmart house in Bozeman is a flagship project.

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[Terry Beaubois, you are the Director of the Creative Research Lab \(CRLab\) at the College of Arts & Architecture at Montana State University in Bozeman, USA, and the leader of the ecosmart project, in which REHAU is also involved. How did this collaboration come about and what is the goal?](#)

In the beginning the idea was to work together with the CRLab at Montana State University to develop a house project that would feature sustainable, low-energy design suitable for use by the disabled. In Bozeman, Montana, we found a suitable plot of land and then found in REHAU the perfect partner for the technology. That's how the ecosmart house project was born. Our central goal was energy efficiency at all levels.

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[Why did you need to do research for this?](#)

Ecosmart is a pilot project concerned with recognising how the different systems can be integrated in order to achieve a balance between energy consumption, comfortable living and lifecycle costs – while of course observing all the international construction standards. This means that an interdisciplinary approach is essential. Thus, right from the start, we incorporated the three key parameters: sustainability, energy efficiency and what architects call “universal design”.

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[What does that last term mean?](#)

It denotes an internationally recognised design concept which can be translated as “design for all”. The design has to be configured in such a way that it can be used by people with varying abilities and in different situations, and also with assistive technologies, such as wheelchairs, walking frames, etc. The principles to be followed are those of usability, flexibility and ease of use or even minimal physical effort.

## Terry Beaubois (61):

studied Architecture at the University of Michigan, graduating with a master's degree in 1973. From 1980 to 1985 he was one of four partners at a firm of architects with 40 employees in San Francisco. After 30 years as a practising architect in Silicon Valley, during which time he also worked with computer graphics and computer animation, his career path changed and he became a professor at the College of Arts and Architecture at Montana State University in Bozeman. Because he initially didn't want to leave his home in California, he set up a virtual classroom for his students – the Creative Research Lab. The “CRLab” combines applied research with creative, multidisciplinary projects.



Ecosmart house:  
the subject of a two-year experiment.

> What is so revolutionary about this “holy trinity”?

The revolutionary aspect lies in the combination of all three components. In this context, we at the Creative Research Lab have conducted international research and have discovered that the majority of the literature on passive houses (Passivhaus) is written in German, for those territories where this issue is clearly already more strongly rooted in the public consciousness. So, one of our research students from Germany was involved in coordinating that information. In Japan, the issue of “universal design” is a huge issue. Thus we were able to link these two pieces of information together with the help of a Japanese student.

> Thus combining these elements constitutes the truly new approach. What does this mean for the people who will one day be living in houses such as the ecosmart?

Let’s start with sustainability, a term that first appeared in 1987 in a report by the World Commission on Environment and Development. Initially this term described nothing more than the fact that something should “last longer”. Thus, the materials used in construction and the systems installed in a house should last longer. Since then, the meaning of the term has expanded. The idea of sustainability has now grown to include the idea that alternative or renewable energy sources and regenerative or at least recyclable building materials should be used. Energy efficiency is concerned with the technical standard of systems and materials that enable the most efficient use of alternative energy sources and also fossil fuels. People living in an ecosmart house will therefore be living in an environment where their living requirements such as a comfortable room temperature, cold/hot water systems and heating systems are met in a state-of-the-art manner that does not harm the environment.

> It is somewhat astounding that this should be happening in the USA of all places – a country not exactly seen as being avant-garde where issues of sustainability and energy efficiency are concerned.

I know. While the United States are making huge advances in issues relating to energy use, some energy-conscious Europeans probably still associate the USA with energy-guzzling heating and air conditioning systems.

> So you’re entering new territory in the USA?

You could see it like that. Here’s an example: ecosmart will be one of the first houses in Montana to be fitted with a so-called smart meter, which will be installed in conjunction with local energy company, North Western Energy. The meter is an “intelligent” electricity meter, which displays at all times the actual consumption and period of usage and transmits these data to the energy company and the homeowner automatically. That is hi-tech – and it will also raise the awareness of the homeowner about how much energy he’s using.

> But there is no tradition of an energy strategy in the USA as yet, is there?

Yes, actually there is. Programmes such as LEED and others are already making great progress. But we could do a much better job of communicating what is being done in the USA. Back in 1985, for example, I worked on a project for NASA that was concerned with the issue of how space technologies could be transferred to building services engineering. Just think of how the windows of a space shuttle or an Apollo shuttle have to be designed in order to handle the enormous differences in temperature. We have to contend with these kinds of issues in building services engineering, too.

“For the time being, the eco-smart house is for us primarily a research laboratory.”

> Building services engineering and ecosmart: What are the state-of-the-art features that are being installed?

Ecosmart will be fitted with the latest technology available. This includes features such as geothermal heat exchange, solar panels/photovoltaics, web-based air conditioning control and even a telemedicine communications centre. The latter will enable those living in the house to communicate with nursing staff or doctors at the local hospital when travelling to see them in person is no longer possible.

> And so in this way, a fully-equipped ecosmart will then become the prototype for a rollout of this new type of house?

That's still a long way off. For the time being, ecosmart is for us primarily a research laboratory. Following its completion in December 2011, the house will remain vacant for about two years. During this time we will be testing all the technical systems. We have installed redundant systems in order to gain optimum research results. For example, a ventilation system has been installed underneath the house, with a second installed outside of the building. So we will then be able to switch between the two systems, comparing them on the same day and under the same circumstances. In this way we will obtain optimum comparative figures, which will then allow us to draw conclusions on the ideal location.

> So the ultimate idea isn't to plant endless rows of ecosmart houses in the land of opportunity?

No, the project is much more of a research laboratory than a house to be replicated. But the research results obtained from the project will provide important information for building many different types of houses. As Albert Einstein once said: "If we knew what we were doing, it wouldn't be called research." And this project is definitely a wonderful research experiment. <



## REHAU's contribution:

The ecosmart house was designed and built by the Creative Research Lab (CRLab) at Montana State University in Bozeman (USA) with support from REHAU.

### REHAU MONTANA ECOSMART HOUSE

The passive house is a flagship project in the USA and is not only the house that the architect Bill Hoy will be living in with his family in two years from now, it is also a project that engineering and architecture students at Montana State University have been involved in.

For Professor Terry Beaubois, who leads the CRLab, and his students the ecosmart house is a stroke of luck in every respect. This is because it is the first time that American students have been involved in a sustainable construction project that is actually going to be occupied afterwards. Among other tasks, the students have the job of setting up a study to test the climatic conditions under which the house has to function. They want to prove that, even in winter in an extremely cold region like Montana, an ecosmart house can function without any problems.

The three-year project is extraordinary in many respects. It is not only designed as a passive house and consequently with no CO<sub>2</sub> emissions, the house is also fitted with technical components and systems from REHAU: thermally insulated windows and door frames, for example; geothermal and solar thermal energy for heating and cooling; heat pumps and underfloor heating.  
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