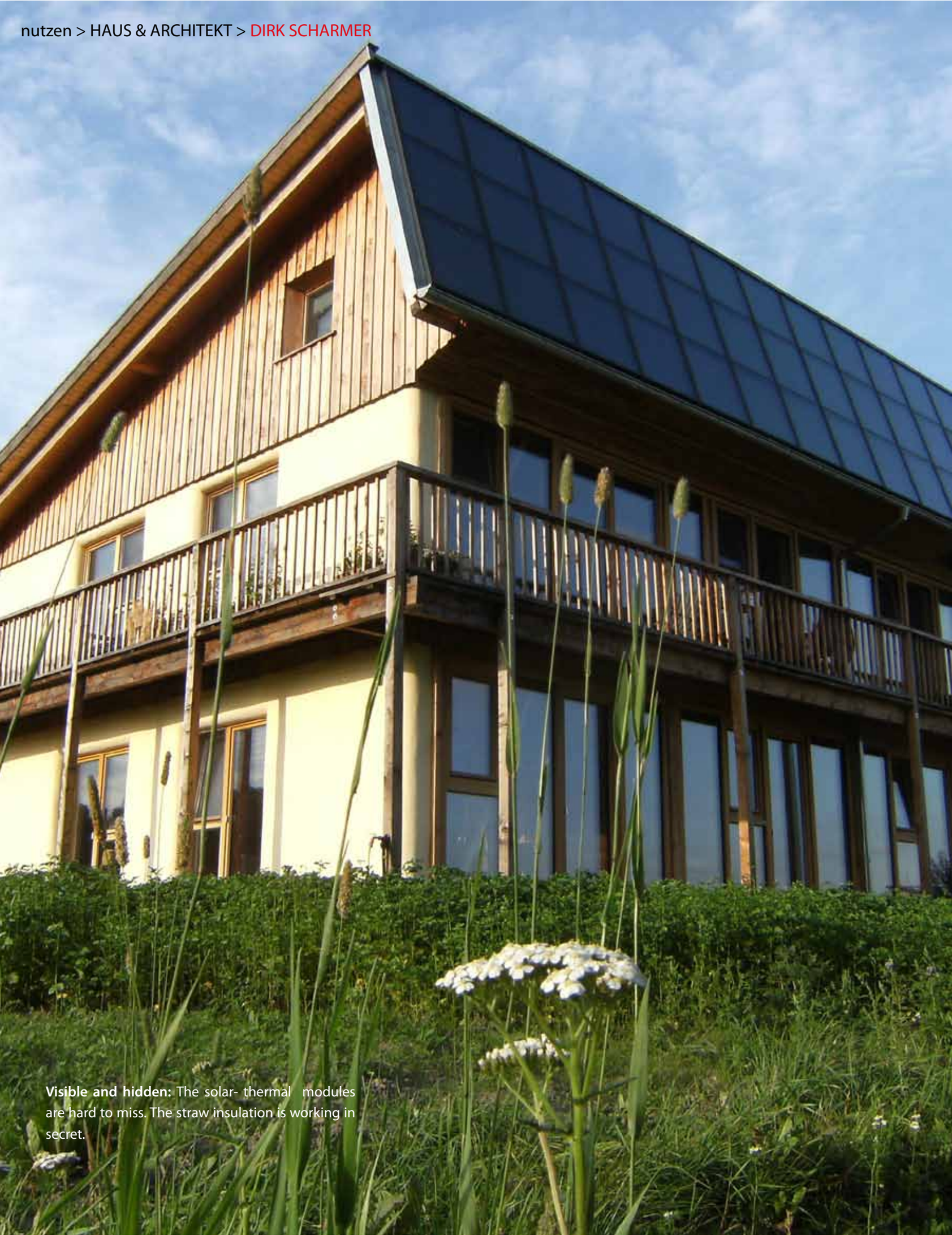


Visible and hidden: The solar- thermal modules are hard to miss. The straw insulation is working in secret.

Translated into english by Liane Wilmes with kindly permission of the author Michael Drotleff/ greenhome

Sun, clay and **BALES OF STRAW**

The architect Dirk Scharmer has very clear ideas of his homes. They must be eco-friendly in design and in everyday life. Thereby straw plays an important role.

Wood, clay, straw – these are three building materials Dirk Scharmer particularly likes to work with. „The highlight for me is the combination," says the in Südergellersen, Lower Saxony, domiciled architect. According to Scharmer, things get more sense when you consider them together: „If you plaster straw with clay, it will become a new material. And if you infill a timber frame with straw, it will become a completely different house."

A house called „Dragonfly"

Building with lots of wood, clay and straw was also an important goal in the house called „Dragonfly" („Libelle") that Dirk Scharmer planned for the ecovillage Sieben Linden in Saxony-Anhalt. The residents of the village in the municipality Beetzendorf wished for a home and community center that would live up to their ecological building requirements. And so step by step the house named „Dragonfly" took shape.

„In the beginning, the two project initiators, a clay builder and I were inspired by the idea of a very organic architecture," remembers Dirk Scharmer. Two oval structures with a central block of a stairwell were planned, plus a very large solar storage – viewed from above, the building would have resembled the shape of a dragonfly, hence the project name.

But gradually, the focus shifted more and more away from the target of fancy architecture towards energy and cost efficiency. „The curves and the outline of the preliminary draft vanished. Instead a structure was created combining economic production and energy-saving compactness with high active and passive solar energy use", says Dirk Scharmer.

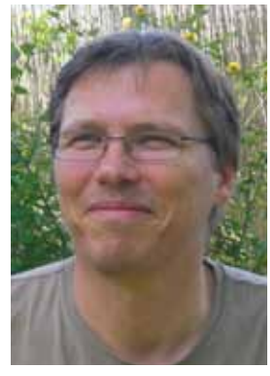
Discarding the fancy curves was no disaster for the architect. „Every construction project always carries both. A bit of dreaming and a little disappointment about compromises", he says. Even restrictive building specifications Scharmer does not regard as bad, as in essence they bear correct and proven solutions. „The main enemies are the money, the weather and gravity," laughs the architect.

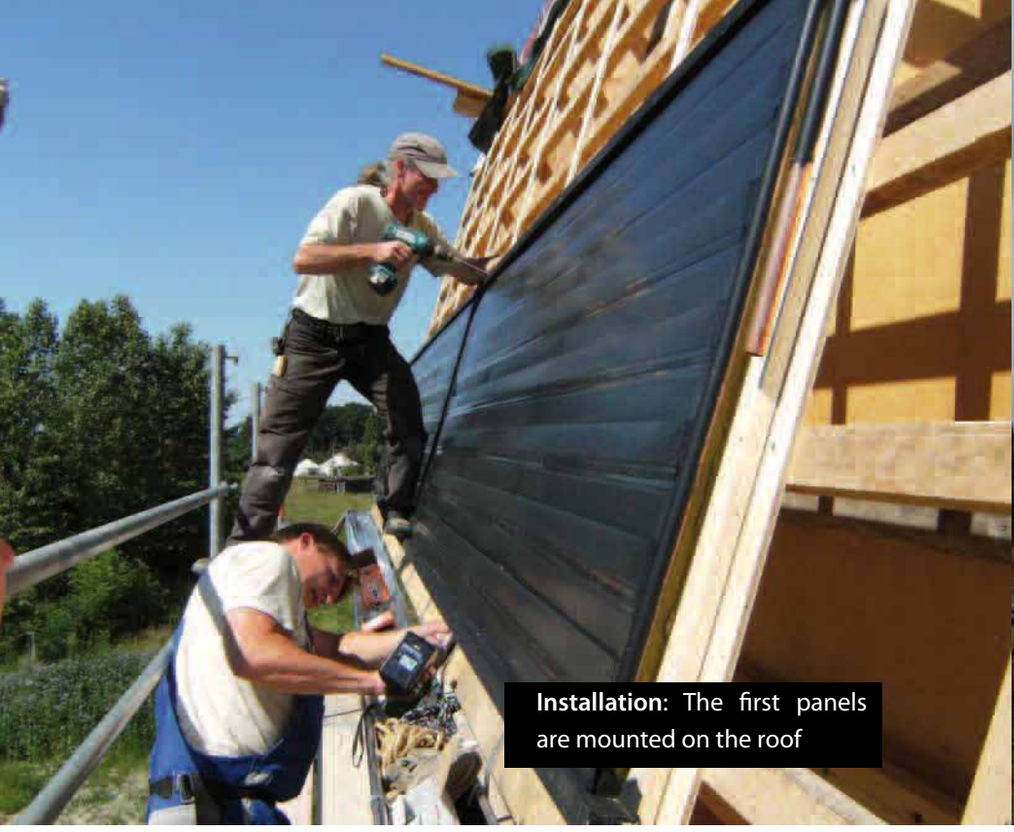
With courage to ecological building

Unconventional solutions become difficult when the client lacks courage. „I had a lot of luck here," says Dirk Scharmer. Because the housing cooperation Sieben Linden not only contributed their ecological requirements to unusual solutions, they even demanded them. „The ecovillage has imposed on itself a kind of basic building regulation with which a preferably future-oriented, ecological development shall be ensured", explains Scharmer, who already worked with the village during his studies.

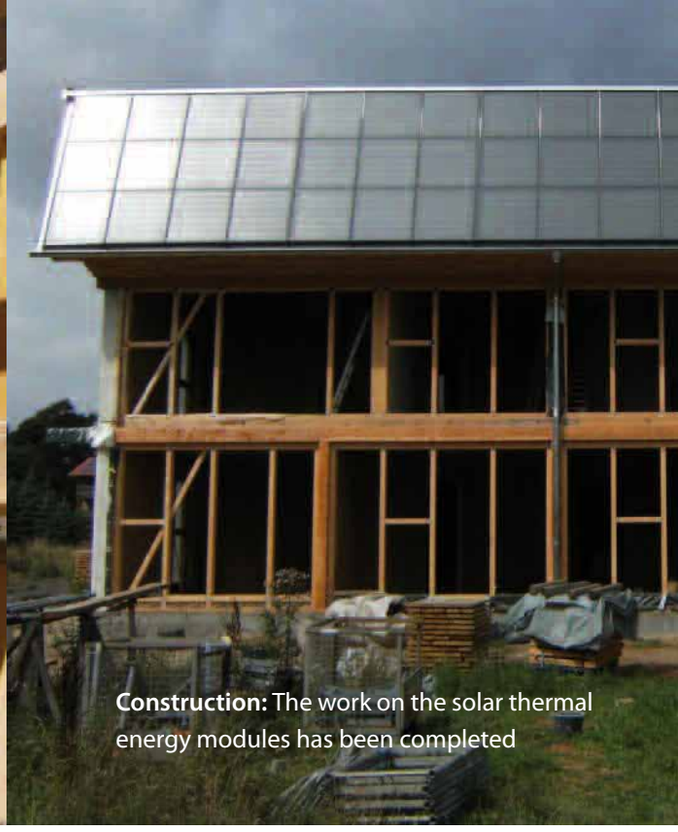
Dirk Scharmer

Ecological building has always been a big concern to Dirk Scharmer. It all began with Scharmer's carpenter apprenticeship. Back then, his master craftsman aligned his own company with sustainable construction and tradition.
It was not to be historicizing, but to combine the essence of materials and structures with typical regional construction methods. Scharmer remembers with pleasure the independent and autonomous work, even if it means more mistakes happened.
As the company contained a sawmill and a carpentry Dirk Scharmer learned about the material wood in all its facets. „What I had started in the apprenticeship I wanted to continue, but also in a new context. I wanted to plan and construct buildings that were closer to nature and tradition", remembers Scharmer. And that was followed by his studies and many unique projects.





Installation: The first panels are mounted on the roof



Construction: The work on the solar thermal energy modules has been completed

All natural

For Dirk Scharmer, wood, clay and straw are not the only building materials. „In addition, I need lime plaster for the outer shell, because it has shown that the clay plaster on the exterior walls often does not have sufficient weather resistance", reports the architect. „Moreover, it is becoming increasingly clear that we need the sun as active and passive energy source. Therefore you need glass for collectors as well as triple-glazed windows." Photovoltaic elements, says Scharmer, were as a complex, resource intensive mix of materials not in his focus yet. The solar thermal energy, however, all the more, as the large collector area monstrate at the „Dragonfly" house.

Costs and benefits

Dirk Scharmer wants to relate environmentally friendly building technology to space for people and vibrant rooms. That shall provide protection and increase wellbeing. „While planning and building I try not only to put effort in the construction, design and use, but also to consider the ecology and the life", the architect explains and criticizes that it is the vibrancy of buildings that declines more and more

After finishing his apprenticeship he planned and built cellulose-insulated timber frame constructions for the village. Then came several straw bale buildings and finally the house „Dragonfly". Its compact structure was to enable energy saving, especially by using active and passive solar power. Therefore, the building was consequently oriented to the south, featuring a glass facade and a solar system over the entire length of the building. Nearly 70 square meters of solar modules provide thermal energy for the house. The system is complemented by a wood gas stove in the common room. „The storage is done in a 13 cubic meters water reservoir. The solar heat is also stored in the ground beneath the building and distributed via radiators," explains Scharmer the heating technology.

Well insulated, naturally built

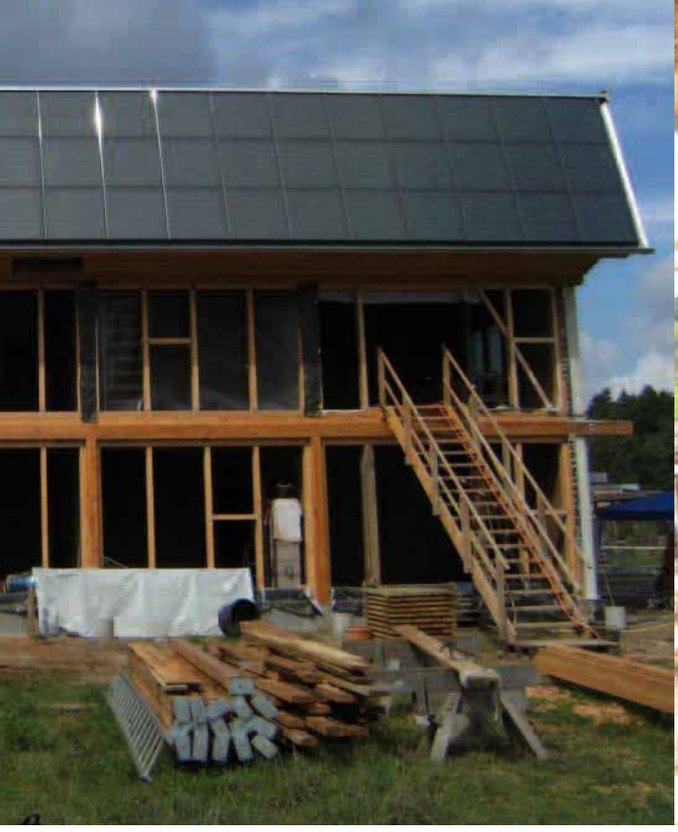
In order not to lose the thermal energy, the architect consequently planned with triple-glazed windows for the large glass surfaces. The insulating effect of the straw greatly reduces the consumption, too, says Dirk Scharmer. The architect is convinced of building with straw as well as of building with clay and wood. Of course, straw and wood are sensitive to moisture. And certainly clay is not as weatherproof and stable as conventional building materials. „But ecological building also means building with nature and in relation to it. It is never just a game against transience, but also one with it," Scharmer counters. „How much strength, durability and load capacity do we really need? And at what environmental and financial cost? I am firmly convinced that there is a great possibility and potential to build with wood, clay and straw", says the architect.

Good cooperation

The house „Dragonfly" became real in the space of time from March 2010 to December 2012. Even the construction phase was to be as environmentally and resource-efficiently as possible. Local materials and construction partners were preferred, construction debris, waste and noise at most avoided. And according to Dirk Scharmer, something else was important on the building site: „Time for mutual understanding as well as learning from each other rather than authoritarian architect demeanor." Good cooperation was also necessary because the rainy May 2010 impeded building. The need for protection of the prefabricated straw-insulated exterior walls had been underestimated, given the exceeding rainfall. „With the result that a few square meters of wet straw had to be replaced," remembers Dirk Scharmer.

Unexpected learning effects

„At the beginning of the building we were all convinced that the future of the straw bale construction lies within the prefabrication of straw bale walls," says Scharmer. Following the involuntary replacement of the wet straw on the erected walls made clear that the infilling in the existing wall is at least on a par. „So from bad luck and mishaps an interesting and unexpected learning effect evolved," chuckles the architect. Also



Caption: The straw bale insulation completes the wall construction

the interaction of self-supporting, solid inner walls with the remaining timber frame did not succeed smoothly at first. The logistical effort was high and it was time-consuming. „Next time I would return to first finishing the roof and then establishing the interior walls in the dry after completing the timber construction," says Dirk Scharmer.

Tradition and high tech

A straw bale house is about 10 percent more expensive than conventional buildings, and for good reason. „Straw bale constructions usually cost more money because they require more craftsmanship, rely on high-quality natural materials and energy-saving technology," explains Dirk Scharmer. Equate traditional building materials such as clay or straw with antiquated methods is in fact a mistake. The straw bale house „Dragonfly" demonstrates this with its solar thermal as well as its ventilation system including heat recovery function. According to Scharmer, this lowers the ventilation heat loss by 80 to 90 percent.

Calculating figures and facts

The annual demand of wood for auxiliary heating in addition to the solar system, the project team had estimated to be less than four cubic meters of firewood. „The first winter this amount was significantly exceeded, because the building and the solar system had not yet been warmed up by a summer," says Scharmer. In the second relatively mild winter no more than four cubic meters were needed. And that was when the regulation of the thermal storage system in combination with the solar panels and the wood stove was not yet optimal. „With optimal regulation during a cold winter with average sunshine it is likely that the heat requirement for the building settle at under four cubic meters of firewood – with 315 square meters of net floor area and ten people." The initially targeted zero consumption of wood has not yet worked out though. „Whether it is the regulation, a few missing hours of sun in the previous two winters or conceptual weaknesses has to be resolved," says Dirk Scharmer.

Too much sun, too much heat?

A small further shortcoming can be observed depending on the position of the sun: „Caused by the low sun, sometimes in the spring and fall some rooms of the house get rather warm." On the other hand, according to Scharmer, residents agree that the actually planned sun protection is not necessary. Also the wood gas stove delivers more heat to the surrounding room than planned. „On the one hand the room with about 34 square meters is quite small, based on the good thermal insulation. On the other hand the stove was often used, probably due to not ideal regulations on cold, overcast days", says the architect.

Suggestion from a professional

Dirk Scharmer knows about the importance of a home for each client and advises to consider in detail what the main requirements are. „Include thereby any impact of the building on you, the people around you, on the regional and global economy and the environment", demands the architect. „Why not involve oneself a little more in the circle of life by the usage of wood, straw and clay and go into the risk of transiency rather than stick to the supposedly safe traditional construction?" You notice that the relationship to nature is important to Dirk Scharmer in every aspect. The architect views the two-story residential community building „Dragonfly" as his conceptually and structurally most mature straw bale house. The picture below shows the thermal energy storage next to the straw bale insulated wall.

„I am firmly convinced that there is a great possibility and potential to build with wood, clay and straw”

Dirk Scharmer relies on natural building

The way to a straw bale building

In March 2010 the construction work on the house „Dragonfly“ started. The timber prefabrication was carried out right next to the construction site under a provisional roof in the snow. In mid-April the topsoil was removed, the filling soil and the solar piping were installed beneath the building. This was followed by concrete strip foundations, limestone gravel and above that the concrete base. At the end of April the prefabrication of the timber frame was completed and in early May the construction of the solid interior walls began on the ground floor. Also the glass facade construction now took shape. At the end of May the timber construction was finished and the following month the solar roof installation was done. Then the plastering could begin so that by late September the exterior was completed. The construction work continued with the plastering work in the interior, which was completed in late October. In December 2012 time had finally come: The house „Dragonfly“ was ready to move in

Beyond plain cost calculations

But Dirk Scharmer’s convictions are not changed by these trifles. Conventional construction methods may be more cost effective. „But my straw bale buildings are mostly made of natural materials“, says the architect not without pride. There is no PVC and other plastics can only be found where there currently are no safe alternatives. Up to now, air seals, humidity foils or seals are such applications. Furthermore, as little as possible concrete or other energy-intensive building materials are being used.

And how do Scharmer’s future projects look like? They seem to assume new dimensions. There currently is a particularly tall building, the 4.5-story building, as the architect calls it. More than four floors in the straw bale building will be ready for occupancy at the end. And for the time after that Dirk Scharmer has made plans as well. First, he wants to continue to optimize the three-story straw bale construction. „The load-bearing construction with large rectangular bales is still on my mind. For the former I am looking for clients, the latter will probably be, like my very first straw bale house, initially a self-experiment.“