



How to Keep Green Buildings from Failing:

A Greenprints Interview with Master Speaker Joseph Lstiburek

It is impossible to be sustainable if a building is not healthy, safe and durable. The following excerpts are taken from an interview between the Director of EarthCraft House™, Jim Hackler, and Dr. Lstiburek during the Greenprints 2002 Conference in Atlanta. Interviews were conducted with many of our plenary and master speakers, which will be highlighted in future issues of the Journal.

Joseph Lstiburek, Ph.D., is an acclaimed lecturer in the field of building science. He is a principal of Building Science Corporation of Boston, MA, an industry team member of the U.S. Department of Energy's Building America Program. A forensic engineer who investigates building failures, he is internationally recognized as an author and as an authority on moisture-related building problems, indoor air quality, building science, durability and energy efficiency.

Q: Your presentation is going to be “Why green buildings fail.”

Or how to keep them from falling down. We've changed our construction practices quite dramatically. We've added thermal insulation, a lot of it, and we are building with new materials. Sounds like what “green” buildings are about, right? Well, as we build with these different materials, they turn out to be much more water sensitive and adding thermal insulation reduces the ability of these assemblies to dry when they get wet.

My interpretation of what's important for “green” is a building that lasts a very long time, meaning durability is a key element because we can't squander resources. I think this is a self-evident truth, if something is going to be around for a very, very long time, it is going to consume energy. So, if it's going to be around a long time and consume energy, we'd like it to consume as little energy as possible. So, we want a very durable structure that is ultra energy efficient.

Well, the two are incompatible with each other with the way we're building now. What we have been doing to make our buildings more energy efficient is adding a great deal of thermal insulation and that reduces energy flow. Energy flow reduces the ability of assemblies to dry once they get wet. We reduce drying potentials. If we are going to add insulation to reduce drying potentials, we have to intervene to keep the moisture balance in place.

We've not done the second part of that balance. We've reduced drying potentials but we haven't reduced wetting potentials. We are building with materials that are much more water sensitive. We've gone from trees to boards, from boards to plywood, from plywood to OSB, from OSB to hard board, from hard board to particle board, from particle board to paper face gypsum and everywhere along the line, we are now much more water sensitive so the buildings have a lesser tendency to dry out.

We have also gotten rid of the ability to store moisture in our buildings. We've gotten rid of the hydric buffer. When we built with masonry or concrete, we could store thousands of gallons of water in the assembly and nobody cared. We reduced hydric buffer when we went to wood-frame structures. Now we've got steel studs and paper faced gypsum, there's no buffer capacity at all.

So, three big changes, right? Thermal insulation materials aren't able to tolerate much moisture, and we don't have an ability to temporarily store it and the building assemblies are hollow. They've got these complicated three dimensional airflow networks in the buildings, when buildings' walls used to be solid. Now you've got these airflow pathways that are wreaking havoc with our indoor air quality. So, the other fundamental thing of a "green" building is going to be durability, ultra-energy efficiency, and it would be nice if people didn't get sick in them.

We are managing to institutionalize buildings that aren't durable and that make you sick. I don't think that's what the "green" movement wants to be known for.

Q- Are there a lot of people that are doing it wrong?

Most of them are doing it wrong and it's not just "green" building, it's basically building in general. I mean, the "green" trend is leading the path but the regular industry is going down the same path.

We are adding more and more thermal insulation, our building materials are more water sensitive, our hydric buffer capacity is being reduced and we have more complex airflow pathways. That's the same whether we are talking about new commercial buildings and institutional buildings or new residential buildings.

Just look around you and you can see the end results. We have this major mold problem and people are terrified. Well, you know why we have a mold problem today? Because we have more mold. We have more mold because we have more water. Why do we have more water? Well, it's hanging around longer because the dwell time [in buildings] has gone up and the materials can't take it. Then it's migrating because of the three-dimensional airflow network.

It's the same story whether it's "green" or standard construction. The "greeners" are just getting there faster.

Q- What about liability?

The liability is that builders can't get insurance. The insurance industry is pulling out of insuring builders, contractors, architects and engineers.

There are two major problems. First of all, we have serious problems and these are real and legitimate. Secondly, we have attorneys.

What a bad combination. They are showing no mercy. There are going to be many production builders that are not going to survive this. We are going to reap the whirlwind within five years.

We are seeing this now. Most of the big builders are becoming self-insured because they can't get any insurance.

Imagine what it's going to be like when the cost of the house is going to go up five to seven thousand dollars just to cover the insurance policy for two years.

Q- Is it very complex to solve these solutions? Is it just kind-of a basic building science, or a completely different approach?

It is easily solved. The principals are easy but the problem is trying to teach people easy principals when they've done their whole careers without understanding any of it.

Architects are trained as artists, they're not trained in technology and construction. What I've learned with architects is that you shouldn't leave your artwork out in the rain. Engineers are taught to break concrete cylinders and bend beams. We haven't got a clue about controlling heat and air and rain.

Q- Are people starting to get the message?

The insurance industry got the message. They only want to make money. You're not going to make money if buildings fail. I need insurance to be there when I need it.

The whole insurance industry's idea of insurance is to not have to pay anything. Well, we now have a problem. They're having to pay out. What's the reaction? "I'm outta here."

The big builders figured this out. They're terrified. The people who haven't figured it out are the mid-sized to small-sized architects. The larger firms have figured it out because they are getting whacked. They're catching on.

Q- What do you see as being the long term aspects?

My personal observation is that things get intolerably bad before they change. They're not quite intolerably bad right now. They're bad and they're getting worse, but they're not bad enough to get a fundamental change on the design side.

The construction industry is reacting in a panic right now because of the insurance issue and the approach is typical. The first approach is: let's rewrite our contracts and policy arrangements so that we will not cover that. Instead of eliminating the problem, they're going to try to basically do the typical American approach – it's not our fault. Rather than fixing the problem, we're figuring out a way of how we're not responsible for it.

Q- What should builders be doing?

I would give them two pieces of advice: Don't put plastic on the inside of your building, don't put plastic on the outside of your building. No vinyl wallpaper, no polyethylene vapor barriers, except if you're in Minnesota.

I've seen more buildings trashed because of vapor barriers on the interior because of misguided information on energy conservation requirements than any single failure. Take radiant barriers in Florida for example – they're putting these aluminum foil surfaces on the inside of assemblies which are vapor barriers on the wrong side.

Also, don't build with steel studs, steel is 300 times more conductive than wood. You need to insulate on the outside or inside of the steel, but you shouldn't insulate the steel cavities. And, get rid of paper: paper-faced gypsum is used as sheathing on the interior and the exterior. We're building paper buildings!!! Even the dumbest of the three little pigs didn't build their houses out of paper.

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