

Rethinking Codes: Enabling the Best, Not Just Preventing the Worst



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Methven, New Zealand
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Development Center for Appropriate Technology

- The notes that accompany this presentation are an approximation of what I said, or at least what I intended to say. Thus they may vary from what I actually said. For this presentation, I took a few slides out that were in my original version, so that it would fit the time I had to give this talk. I have put them back in so that anyone who is interested will have the full talk that I had prepared in advance. My intention, in sharing my presentations in this form, is that what may be of value will have more lasting and widespread effect. Some of the commentary that accompanies the slides was written previously for other presentations and where it usefully expands on what I may have said in this talk, I have left it in. I hope you will pardon my taking such liberties.

My Granddaughter Juliette



*Our greatest responsibility
is to be good ancestors.*

- Dr. Jonas Salk

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- This Jonas Salk quote is one I use to start almost all of my presentations. It is a jewel: “Our greatest responsibility is to be good ancestors.” This is our granddaughter Juliette, who is approaching five years old. She and her brother Joe, now 17, (and of course, all the other children in the world) are all the motivation I could ever need for my work. Frankly I think we’re failing at the job of carrying out our responsibility to be good ancestors.

My Big Question



Where in our current regulatory systems or decision-making processes is the continuous and explicit representation of the health, safety, welfare, and rights of our children's children?

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- ▣ This question goes to the heart of what is missing in our thinking and decision-making processes, and our regulatory systems. I can't imagine a greater gap, a more significant failure in responsibility.



- I have a checkered past – a very diverse background starting with a couple of years of architecture school and then a lot building experience. That experience includes building with all kinds of conventional materials and a lot of alternative ones. The large concrete house in the upper left is in Tucson, Arizona and used 1400 cubic yards of concrete. I was troubleshooter onsite for the construction of the spaceframe and glazing systems of Biosphere 2 in Oracle, Arizona in the photo just below. I co-authored The Straw Bale House book, worked on the straw bale and compressed earth block prototype house for the Navajo Nation in northern Arizona that is documented in the publication “House of Straw” shown, built the rammed earth house featured in Fine Homebuilding Houses, and was vice chair of the ASTM E-6.71 Subcommittee on Sustainability for buildings where we developed an ASTM standard for earthen wall systems, the lowest tech ASTM standard in existence.

Finding the Trailhead...



In 1997, I found myself up in front of about a thousand building officials at an annual code conference in Phoenix, Arizona—with only ten minutes in which to deliver the 20 minute talk I had prepared...

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- In September 1997, I was to give a talk on a plenary panel at the annual business meeting of the International Code Council (ICC) - the organization representing the building officials for the western half of the U.S. Bob Fowler, the man who lead the effort to consolidate the three regional building code organizations and their codes into a single, national organization and set of codes, the International Code Council and the I-Codes, had invited me to talk about our fairly new program, Building Sustainability into the Codes. We were to each have 20 minutes for our presentation to an audience of perhaps a thousand building officials. I was intimidated by the size of the audience and who they were, so I'd prepared and rehearsed my twenty minute talk. As fate would have it, the session before ours ran halfway into our time and as they finished up, Bob informed the panelists that we'd only have ten minutes each. He said he hoped that would not be a problem and reminded me that I was to go first. I had the terrifying realization that I didn't have time to turn a 20 minute talk into a ten minute talk and that I was just going to have to wing it. We went up and sat down as Bob introduced all the panelists and then introduced me and sat down. I got up and just launched into my talk. A short way in I remember thinking that it felt like the best talk I had ever given. It was just flowing. And then as I was finishing up a point, I realized that I had used my 10 minutes and needed to wrap up. At the same time, I realized that the ending that I had was based on the other 10 minutes of material that I hadn't talked about and didn't have time to talk about. As I finished my point and tried to figure out what to say next, I heard myself talking. I remember thinking that I had better pay attention to this. What I said was something I had never thought before so we all got to hear it for the first time at the same time - even though it came out of my mouth.

Finding the Trailhead...



In 1997, I found myself up in front of about a thousand building officials at an annual code conference in Phoenix, Arizona—with only ten minutes in which to deliver the 20 minute talk I had prepared...

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□ What I said was this: “I want to ask you a question. What happens when someone comes into your jurisdiction wanting to do something crazy like build a house out of bales of straw, or use the dirt, the earth, for adobe or rammed earth, or cob - something you've never even heard of? Or maybe they want to use bamboo as a structural material. Or perhaps they want to harvest water off the roof and drink it, or put in a greywater system, or not have a sewer connection or septic system and use composting toilets. Or maybe they want to be off the electrical grid and have photovoltaic panels up on the roof and batteries. Or maybe, they're worried about electro-magnetic fields and don't want any electrical outlets in their bedrooms.

What goes through your mind when people come in seeking permission to do these things? My guess is that your first thought is 'These people need to be protected from themselves.' And your next thought is 'Not in my jurisdiction!' As the laughter died down, I continued, "I want you to think about what's really happening because it is extremely important. The vast majority of people who come in wanting to do these things have made a crucial discovery. They've realized that their lifestyle choices have consequences, many if not most of which are negative. Not negative for them, though. Negative for their children and grandchildren, and my children, and your children. These people are trying to take responsibility for the consequences of their choices. I asked, "Is there anyone in this room who thinks that's a bad thing? I don't think so. So what is your job as a building official? Is it to keep those people from pursuing that goal of taking responsibility for what they do? Or is it to help them find the way to do it well and safely?" And I said to myself, “Shut up and sit down!” I thanked them and sat down to great applause. I thought to myself, “I don't know where that came from but it was really good” and I wrote it down because I didn't want to forget it. Then I started thinking about what had just happened.

Finding the Trailhead...

What I learned that day:

the power of an authentic heart-to-heart message

the importance of knowing what the people you're trying to influence think and care about

that asking the right questions is more important than having the right answers

that I could speak the truth about what motivated me deeply and that it could be heard

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- How, I wondered, in the last two minutes of a ten minute talk to a thousand building officials, cold, had I said something that cut through the resistance to these ideas in a room full of mostly conservative people. As I thought about it, I realized that the power came from a few sources. First, it was an absolutely authentic heart to heart message about what we all care about - what we are trying to protect, why we have codes. Then I realized that I had connected also because I knew what they cared about and how they thought about it. And I also realized that I had just asked them a bunch of questions. I hadn't told them anything. I had just spoken from the heart about what really mattered to me and I trusted that would also care and that they could understand it. And I acknowledged the importance of their work and invited them to a higher place from which to do it.

Finding the Trailhead...

Among the many things I learned that day, was that I wanted what they wanted...and more. None one wants unsafe buildings, but I was seeing a much larger set of hazards attributable to the built environment needing to be addressed.

An alignment of purpose emerged for me, and the work ceased to be adversarial.

That changed me and it changed the work.

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□

I have called that talk in Phoenix, “Finding the Trailhead into the codes work,” because it was the first time that I really got at a cellular level that these were people who cared about safeguarding the public. That they were a caring community. And I saw that I wanted what they wanted and more, not less, because the last thing I want is people building unsafe buildings. But I had a much bigger field of view and a broader definition of the categories of risk and responsibility - I wanted a safe planet on which to build those buildings as well... Recognizing the alignment of purpose was huge for me, it changed me, and it changed how I went about doing the work.

An image formed - codes as a train on a track with code officials as the crew. I was flying in the same direction, but with a much larger field of view... ...including...

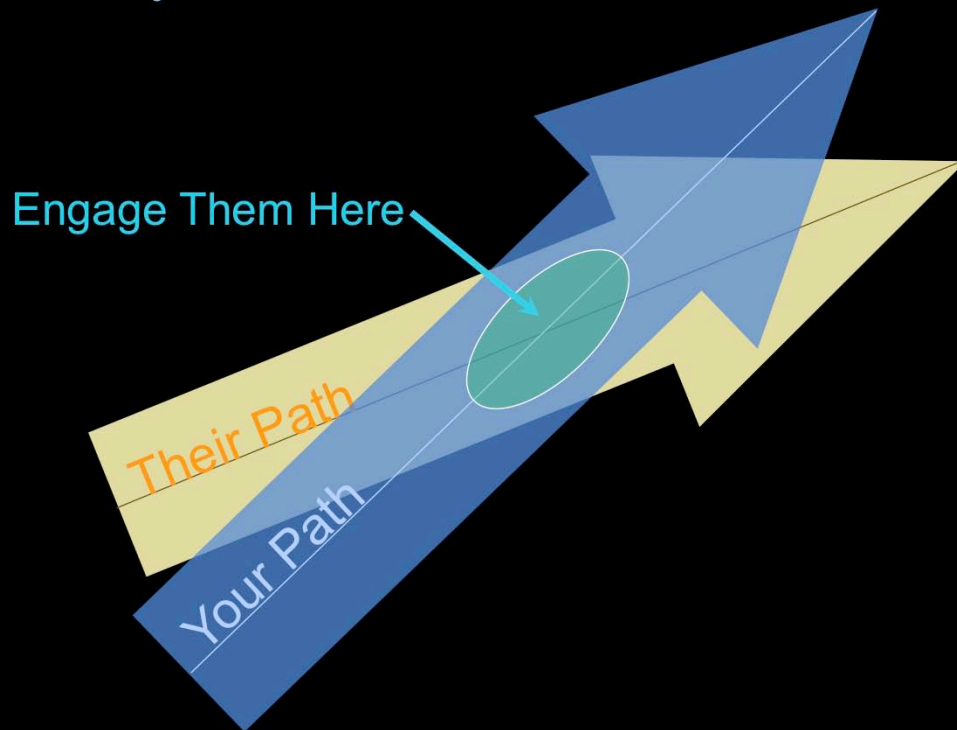


The work then became inviting them up to see what I was seeing.

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- The image that came to me was of codes as a train on a track and the code officials as the crew. But I saw this from above, flying in the same direction, but with a much broader field of view, including being able to see risks they couldn't see, like the bridge out up ahead – the enormous risks that they were not looking for so were unable to see. And I realized that the work and the real opportunity was in finding ways to invite them up to see what we were seeing.

Clarity from a Dream — Path of Commitment



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- Shortly after that talk in Phoenix I woke from a dream with a concept and phrase in my mind and got up and wrote about it. The phrase was Path of Commitment. The concept was that when you are trying to influence someone or a group of people, start by mapping out their path of commitment – what they are committed to achieving, where they're heading, what they care about. And then map yours over it and if there is any authentic overlap, construct your engagement with them as close to the center of their path of commitment as you honestly can. Visually, it might look like this. There is potentially a sweet spot for this work of engagement. Look for it.

Our frame of reference
determines what we see.



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I like to talk about frames of reference because they define what we see and how we see it. It's important also to remember that focus is an exclusionary process—by definition—when we focus on something, what we're actually doing is blocking out everything else. Our frame of reference absolutely determines what we are able to see. So we need to pay attention to whether we're working in the details or the big picture or some intermediate level so we can understand the context in which we are working.

Our frame of reference determines what we see.

To see things in context we have to learn to shift our focus between the *details* and *big picture* — so we can see both the *things* and their *relationships*.



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- To see things in context we need to develop the habit of constantly shifting our focus between the details and the big picture, looking for the patterns while also paying attention to the relationships and spaces between things, not just things themselves. This is how we keep things in perspective and proportion.

The Purpose of Building Codes

International Building Code (USA) - 2012 edition

101.3 ***The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.***

Big Picture in White - Details in Blue

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Here is an example of the focus issue. This is the purpose statement from the International Building Code (USA). The statement I've highlighted in white is the Big Picture. The rest is Detail, albeit, very important detail. However the purpose is to safeguard the public from hazards attributable to the built environment. Those hazards, and thus the responsibility to address them, are not limited to just the hazards that occur at the building site or only to hazards occurring during the life of the building, because hazards attributable to the built environment begin far from the building site and often extend far from it as well, and they begin long before the building exists and extend out into the future.

Systems Thinking - A Bigger, Better Frame

"Places to Intervene in a System" by Donella Meadows began shaping my thinking at about this time also...

From the least to the most effective places to intervene...

9. Numbers (subsidies, taxes, standards).
8. Material stocks and flows.
7. Regulating negative feedback loops.
6. Driving positive feedback loops.
5. Information flows.
4. The rules of the system (incentives, punishment, constraints).
3. The power of self-organization.
2. The goals of the system.
1. The mindset or paradigm out of which the goals, rules, feedback structure arise.

www.donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system

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□ Systems Thinking is also a much more integrated frame of reference for nearly everything. I was also greatly influenced by the work of, and eventual friendship with Donella Meadows, a profound systems thinker who co-wrote the landmark books *Limits to Growth* and *Beyond the Limits*. Her essay "Leverage Points: Places to Intervene in a System" is brilliant and points out that most of the time we are engaging at the least effective places rather than addressing the rules, goals, and mindsets that govern systems. That gave me a bigger framework to be thinking about the systems I was interested in changing. I've highlighted in yellow the elements of her list that are most relevant, in my view, to building regulatory systems.

When You're Working with a System...

English does not contain a suitable word for "system of problems." Therefore I have had to coin one. I choose to call such a system a "mess." The solution to a mess can seldom be obtained by independently solving each of the problems of which it is composed. - Russell L. Ackoff

Or, more simply put...

Optimizing components in isolation tends to pessimize the whole system.

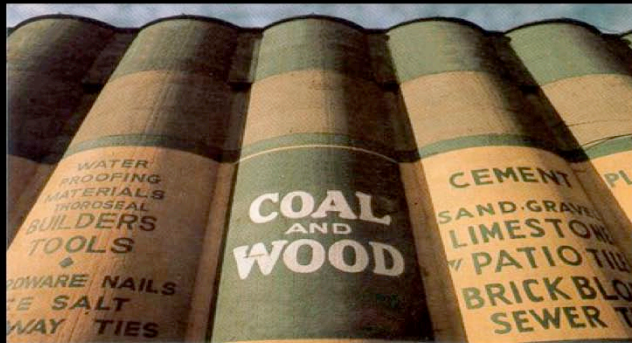
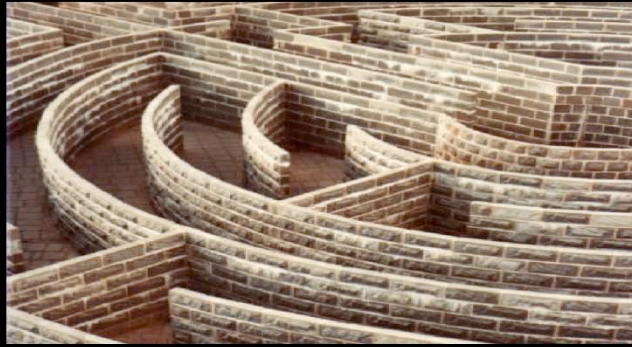
- Paul Hawken, Amory & L. Hunter Lovins

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I love these two quotes. Russell Ackoff was a thinker and innovator and professor in Systems theory and practice, design, management and more. The second quote is from the book Natural Capitalism. If we think about codes and regulations, we'll realize that they tend to be embedded at the level of the problem because they are reactions problems. Building regulations don't acknowledge that buildings are systems of systems nested in larger human and natural systems. They typically treat each problem as though it was isolated from everything else.

Are these Actually Regulatory *SYSTEMS*?



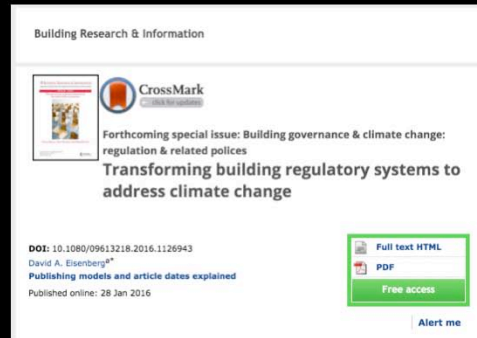
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- A big part of the problem is the fragmentation of the regulatory realm for the built environment. We have a maze of regulatory organizations and entities, jurisdictional silos, and nested levels of responsibility and authority. There are gaps and overlaps. Where there are gaps the risks and hazards are externalized from the projects and systems being regulated to future generations and to the commons – in other words, to everyone including our children and grandchildren and to our commonly held resources and birthrights, like clean air and water, healthy and productive soil, vital and thriving oceans and all ecosystems. And, where there are overlaps, they don't typically give us more or better coverage – instead they tend to complicate everything, making change and true progress more difficult, as well as often having the effect of relieving each of the regulatory entities of full responsibility.

Let's Fast Forward for a Moment...

Building Research & Information journal invited me to contribute to an upcoming special issue on “Building governance & climate change: regulation and related policies.” The full issue will be published this summer but my commentary is online now for free until late July 2016.

BRI has allotted 50 free downloads* and unlimited free viewing for 6 months.



<http://www.tandfonline.com/doi/full/10.1080/09613218.2016.1126943>

* Contact me if they're no longer available.

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- I'd like to jump ahead for a moment to talk about a commentary that I wrote recently that is now available online. It was written for an upcoming special issue of the international peer-reviewed journal, Building Research and Information. The issue, which will be published this summer, is on “Building Governance & Climate Change: Regulation and Related Policies.” My commentary is entitled “Transforming building regulatory systems to address climate change.”

Problematic Patterns

“Transforming building regulatory systems to address climate change,” identifies key problematic patterns:

- First – they’re rarely intentionally designed, fully-integrated, comprehensive *systems*.
- They’re focused on keeping known bad things from happening again and lack anticipatory capability to address emergent risks.
- They lack a process to assess and balance risks across silos of regulatory responsibility, hazard types, locations, scales, and timeframes.
- They are almost universally based on minimum standards.

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□ The commentary focuses on a set of common and highly problematic patterns in regulatory systems for the built environment. Actually, these are similar to problems inherent in most regulatory systems. I will go into a bit of detail about these in what follows, but this offers a quick overview and the commentary goes into much more depth than I can here.

A Constant Challenge

Regulations result from problems that become large, persistent, and serious enough to demand official action. So the main regulatory navigational tool is...



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- Because we don't get regulations or regulatory entities until problems are large, serious and persistent, the main navigational tool in the regulatory realm is.....the rear-view mirror. And since we rarely have preventive or precautionary regulatory structures with anticipatory capabilities built into them, we lose the chance to deal with new risks when they're small and manageable – or better yet – avoidable. Worse, emergent risks or new kinds of risk tend to be problematic for the regulators and so they are often reluctant to acknowledge them or respond to the need for change. The regulatory mindset tends to be powerful in reinforcing the status quo. This is especially true when new knowledge or evidence reveals harm from practice previously accepted as “safe.”

Minimum Standards: This IS the Regulatory Realm

Minimum Standards Set an Intricate and Often Arbitrary Boundary Between what is Illegal and Barely Acceptable.



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- Because regulations rely almost universally on minimum standards, what they establish is a very intricate boundary between what is illegal and what is barely acceptable. The setting of these thresholds, even when based on good science and extensive research, still requires judgment and so they are nearly always somewhat arbitrary.

Crucial to Recognize System Limits

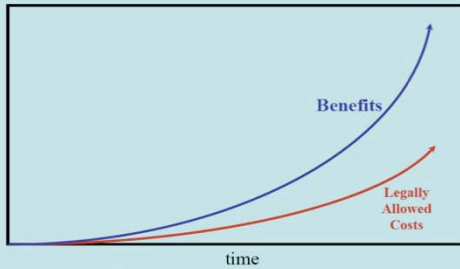


Figure 1: The law promotes all economic activity having a net benefit, allowing both benefits and costs to grow forever as the economy grows

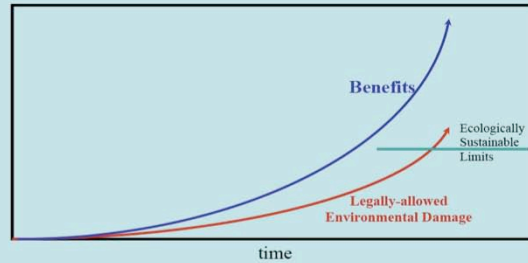


Figure 2: As the economy grows, cumulative environmental damage must eventually surpass the Earth's ecologically sustainable limits

Minimum standards typically set *acceptable levels of harm* using individual, incremental cost-benefit analyses, disregarding the existence of upper limits: unlimited increments of risk = unlimited risk.

Graphics & concept: Joe Guth, Science & Environmental Health Network www.sehn.org

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There is another issue that needs to be addressed in our regulatory systems and that is the reality that there is such a thing as cumulative harm and that there are, in fact, system limits. The current legal framework for most regulations is based on establishing acceptable levels of risk by doing cost-benefit analyses. As long as the potential economic benefit of each individual increment of activity is greater than the potential economic harm, the activity is permitted. Since we allow infinite economic activity and growth, we have legalized infinite harm. There are in fact system limits and cumulative harm happens all the time. The regulatory system has yet to accept this scientific reality. This has contributed greatly to the challenges we are facing in adequately safeguarding the public from hazards attributable to the built environment.

Minimum Standards

The minimums tend to become standard practice rather than merely establishing a threshold for “safe” performance.

Credit: “R. Crumb and his Keep on Truckin’ Orchestra”



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- A more general problem with the reliance on minimum standards in regulations is that the minimums tend to turn into standard practice, essentially lowering the bar for what is good and acceptable.

Codes Do Well with the Risks they Address



Modern building codes enable us to design and build structures that are relatively safe for their occupants, making it seem that we've eliminated or greatly reduced the risks associated with buildings...

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- ▣ Today, our modern building codes are extraordinarily good at enabling us to design and build buildings that rarely burn down, fall down, trap people in emergencies, expose them to raw sewage, electrocute them, let them fall from high places, or, as I often say, suffocate them too quickly. Because they are effective at managing these types of risks, many people think we've eliminated or greatly reduced the risks associated with buildings.

But What About Systemic and Future Risks?

In reality, what we've actually done is to just *move* many forms of risk in space and time:

- away from the building site, out into the natural systems that support us, and
- into the future.



- In reality, we've created a very fragmented building regulatory system that doesn't consider systemic risk, cumulative harm, hazards created away from the building site, or risks to future generations. As a result, what we're actually doing is just moving many types of risks in space and time. We're moving them away from the building site out into all the natural systems on the planet - our life support systems - and from the present to our children and grandchildren and all the future generations of all the other species on whose welfare our welfare also depends.

Many Huge Hazards Are Hidden in Plain View



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- ▣ Looking at buildings through codes is a lot like looking through a microscope. We can see important hazards to people in and around buildings. But important as they are, these building-scale or project-scale risks completely fill our field of view. They're important because they're risks to real people. But outside the field of view are other real risks being created that are many orders of magnitude greater - generalized, cumulative, aggregated and distributed risks - to billions of people - that can't be seen through that lens.

Risk - Through the Microscope of Codes...

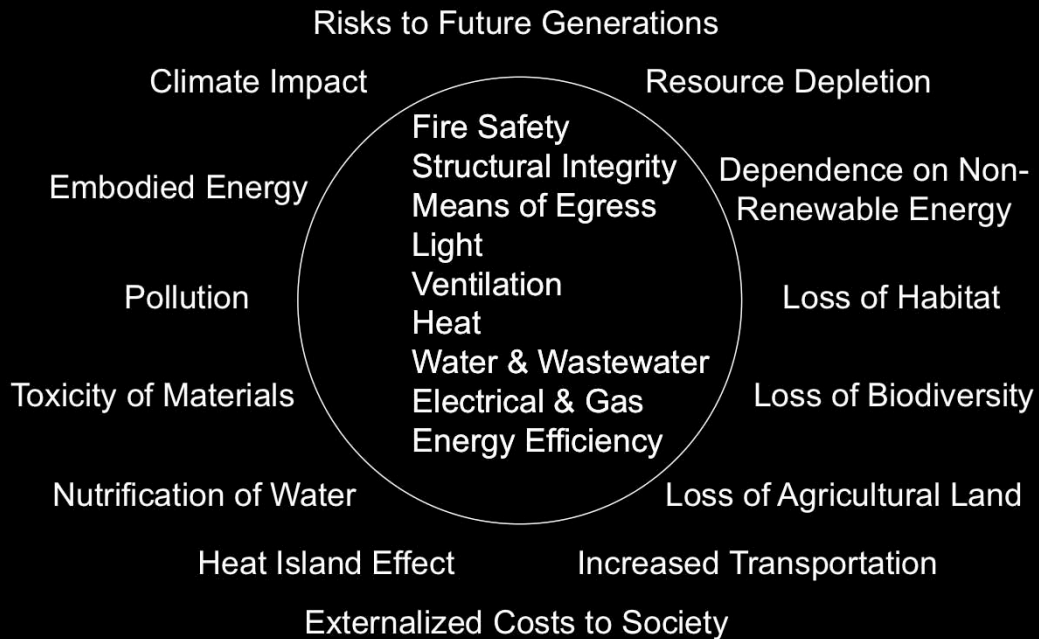


Fire Safety
Structural Integrity
Means of Egress
Light
Ventilation
Heat
Water & Wastewater
Electrical & Gas
Energy Efficiency

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- ▣ These are the categories of risk and responsibility laid out in the codes. This is the view through that microscope...

Risk - The Bigger Picture...

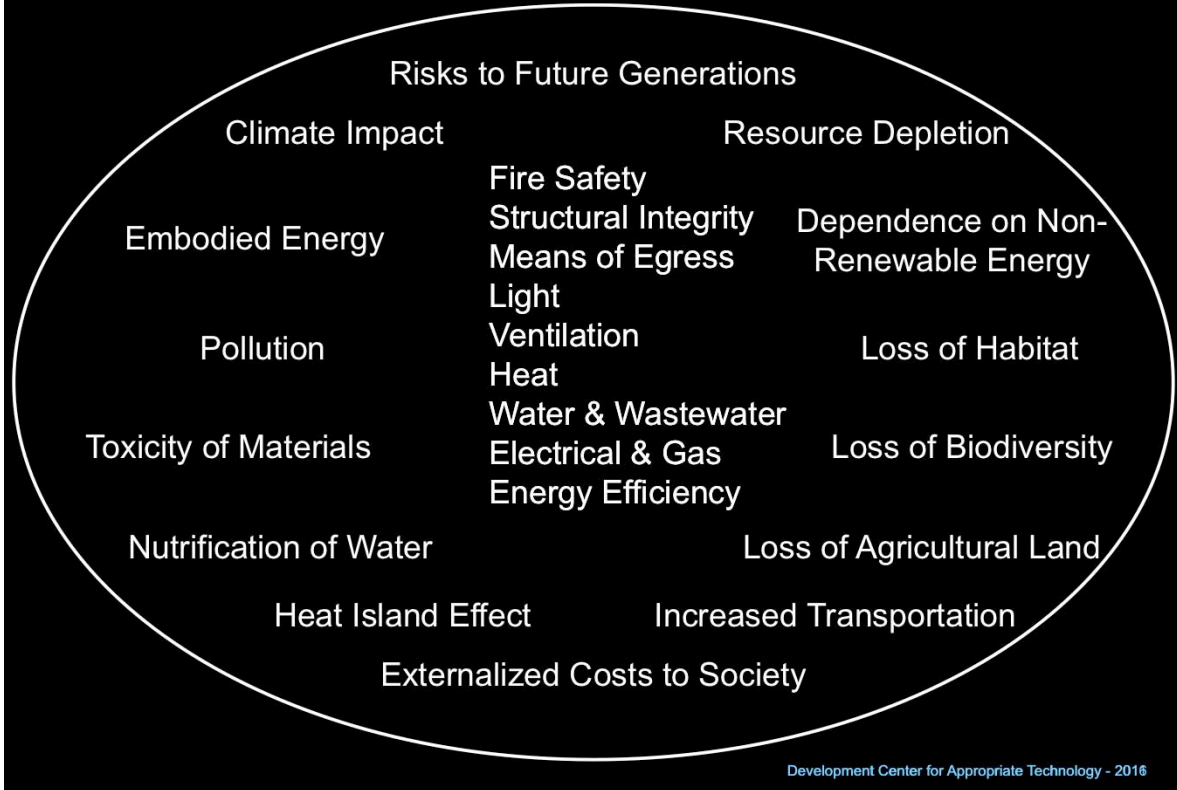


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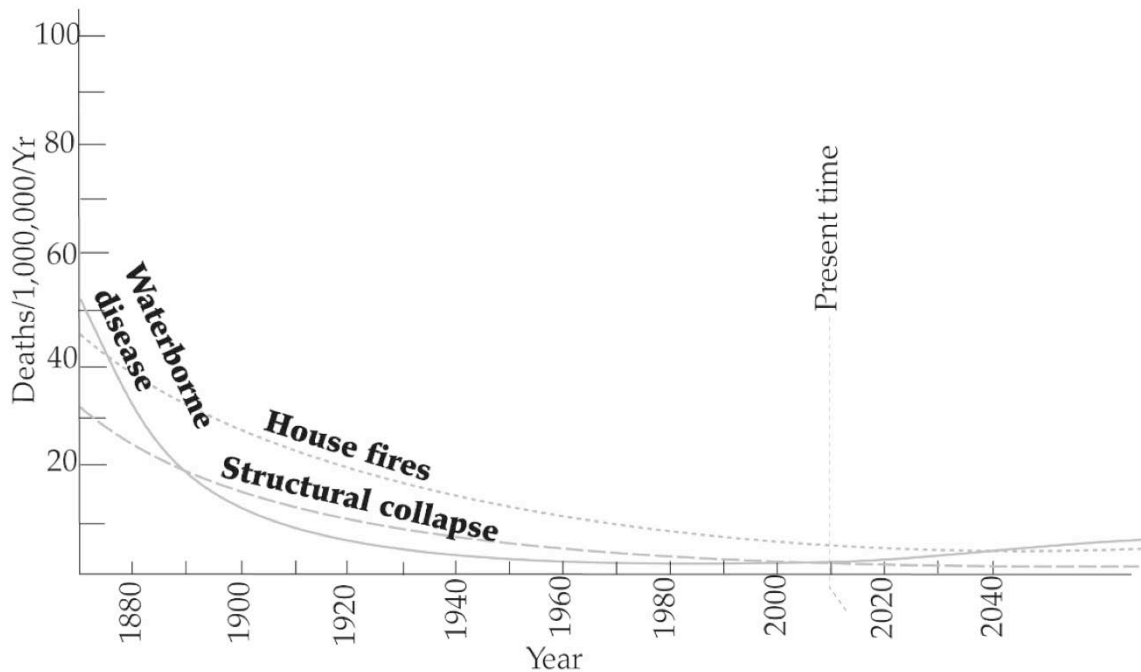
Here are some of the larger risks which are also attributable to the built environment and therefore part of the responsibility for safeguarding the public. However, most of these types of hazard are not currently addressed in building codes, and many not addressed in any current regulatory system.

It Isn't Either/Or...It's About Balance...



- It isn't either-or... we have to learn to address all these risks at the same time. What is needed is a more complete and balanced regulatory response to address and balance all these risks together.

Changes in Hazards Attributable to the Built Environment

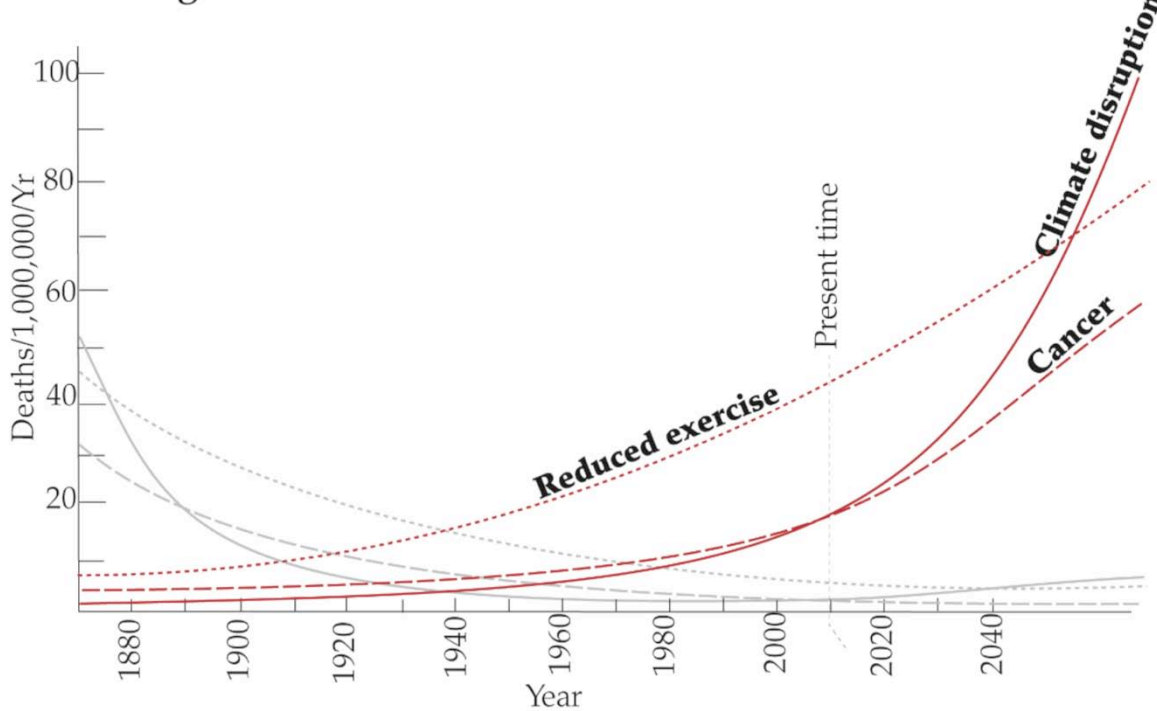


Credit: Art Ludwig, Oasis Design

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A colleague of ours, Art Ludwig from Oasis Design in Santa Barbara, California has pointed out that our codes and regulations largely focus on old risks - he calls them mostly 19th Century hazards like waterborne illness, structural integrity, fires. And, though we've dramatically reduced the incidence and threats from these hazards they maintain the highest place in our regulations and regulatory thinking.

Changes in Hazards Attributable to the Built Environment

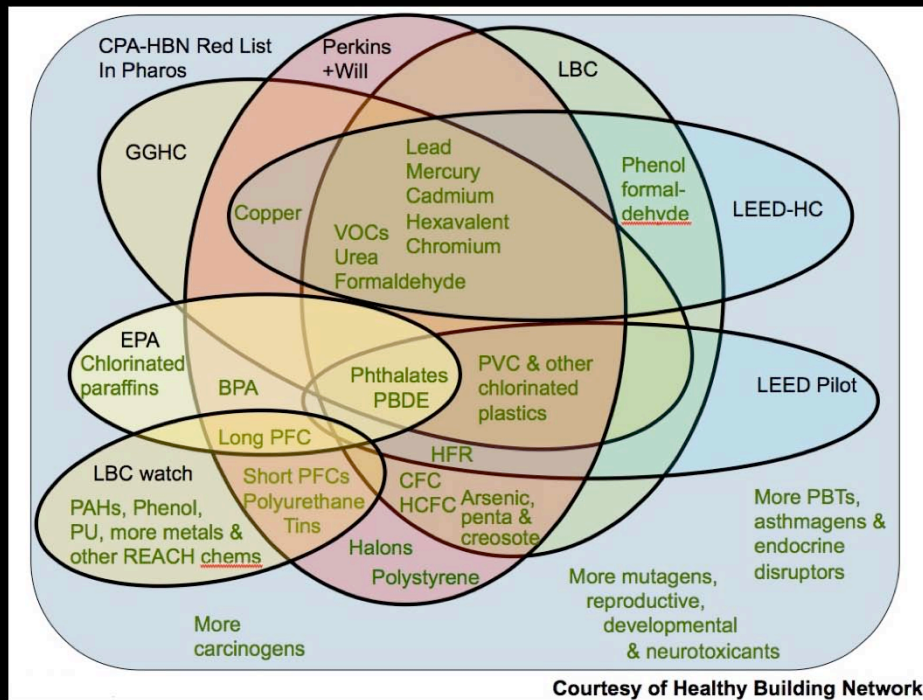


Credit: Art Ludwig, Oasis Design

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Art points out that these older hazards are now dwarfed by emergent hazards that are accelerating rapidly and yet efforts to address these larger and growing risks in codes are resisted and lag behind the continued ratcheting up of requirements dealing with the old risks. The incidence of cancer and respiratory illness related to indoor air environmental quality and the toxicity of materials in buildings, though difficult to prove direct cause and effect, is without a doubt related. And the hazards that will accrue related to climate change will be far larger still.

Building Materials/Chemicals Red Lists

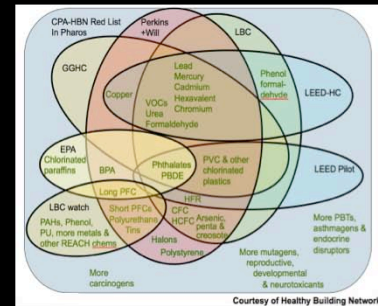


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- This graphic from the Healthy Building Network gives an overview of the various chemicals and materials in buildings and building products that have been identified as dangerous by various groups, organizations, agencies, rating systems, etc. These are real, serious hazards that have until very recently been almost entirely ignored by building regulations.

What Process Identifies & Balances Hazards Across Categories?

Accepted current practice is generally assumed to be “safe.” Rarely is it recognized that the determination of “safety” may have been based on the exclusion of, or lack of knowledge about, certain hazards—especially if the harm occurs in a different regulatory silo. New information revealing previously unrecognized harm from those practices is often deemed irrelevant or another agency’s responsibility.



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- A common and serious flaw in most regulatory structures is a deep-seated assumption that what is already accepted practice, what is already in the codes and in use, is “safe.” What is rarely recognized is that the determination of “safety” is typically dependent on which hazards were considered and which were not. A fragmented regulatory system can lead to serious hazards going unrecognized and unregulated.

New Work- Toxic Flame Retardants in Foam



BUILDING RESEARCH & INFORMATION (2012) 40(6), 1–17



INFORMATION PAPER

Flame retardants in building insulation: a case for re-evaluating building codes

Vytenis Babrauskas¹, Donald Lucas², David Eisenberg³, Veena Singla⁴,
Michel Dedeo⁴ and Arlene Blum^{4,5}

www.saferinsulation.org

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□

Here's a good example of narrow focus on safe performance in only one area – fire performance – ignoring the enormous implications from the lifecycle impacts of toxic chemicals enabling that performance. Lately we have been drawn into working to get toxic flame retardants out of plastic foam building insulation. We're working with the Green Science Policy Institute. I was one of the authors of a peer-reviewed paper on this issue.


New Work- Toxic Flame Retardants in Foam

Safer Insulation Solution

Working towards energy efficient, non-toxic buildings that are fire safe

Fire safety without harm

Safer Insulation Solution



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Leading the way

Involved in energy efficiency? Green building? Care about health? Live, work, design or build with foam insulation?

With flame retardants in nearly all foam insulation, buildings with foam insulation will never be green and healthy buildings unless we make a change. Our work has a simple goal- to open the door to allow flame retardant free foams to be used in buildings in fire safe conditions such as where thermal barriers provide adequate protection.

- Flame retardants in foam insulation don't keep foam from burning. Instead, they introduce chemicals that can pose serious health and environmental harm and can be both persistent and bioaccumulative. It's possible to meet fire safety standards in most cases without these chemicals, as is done in Sweden and other countries.

Learn more in this video:

Flame retardants in foam plastic building insul...

What You Can Do

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- [Learn More](#)
- [Sign the Resolution](#)
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Resources

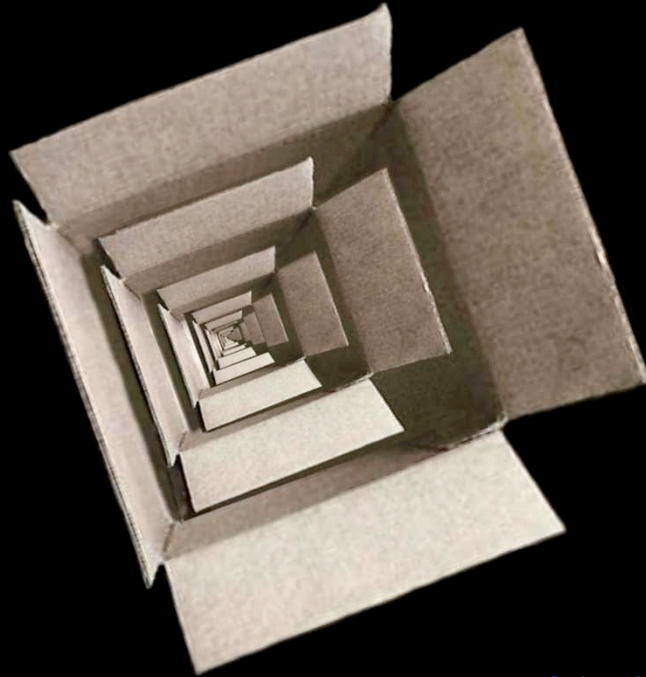
- [Safer Insulation Solution Brochure](#)
- [Safer Insulation Solution Fact Sheet](#)
- [Alternative Insulations](#)
- ["Flame retardants in building insulation: a case for re-evaluating building codes"](#)
- [How to Reduce Toxics in Your](#)

www.saferinsulation.org

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- It is important to get these chemicals out of our buildings because they are toxic and dangerous throughout their lifecycle, and also because they don't provide a real fire-safety benefit. For more information go to the Safer Insulation Solution website.

Thinking Outside the Box? Which one?



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- ▣ People talk about thinking outside the box, getting out of the box, etc. In my experience it's just an infinite set of concentric boxes. You have a revelation, something happens and you get out of the box you're in into the next bigger box. This image reminds me that no matter how big or complete or accurate my worldview or paradigm is, it's a tiny, inaccurate fraction of reality...

What If?

What if codes were based on a set of principles for what buildings should and shouldn't do?

A good first principle — a corollary to the Hippocratic Oath: *buildings should first do no harm.*

Another principle — *when accepted practices are shown to have serious unintended human or ecological consequences, alternatives are not to be merely tolerated, but sought and preferred.*

The goal: a system designed to enable positive outcomes as well as prevent negative ones.

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□

I've long thought that codes should be a set of principles for what buildings should and shouldn't do. A good first principle would be a sort of Hippocratic corollary - that buildings should first do no harm—but across the whole spectrum of impacts and throughout its lifetime. Another important principle would be that when currently accepted practices are shown to have serious unintended consequences, that alternatives are not merely tolerated or accepted but that they be searched out and preferred. And the ultimate goal of this system must be positive outcomes, not just trying to prevent negative ones.

What If?

What if we recognized the dependencies created by regulatory requirements – for sources of power, materials, water and wastewater, functioning mechanical systems, etc.? - “*Passive Survivability*”

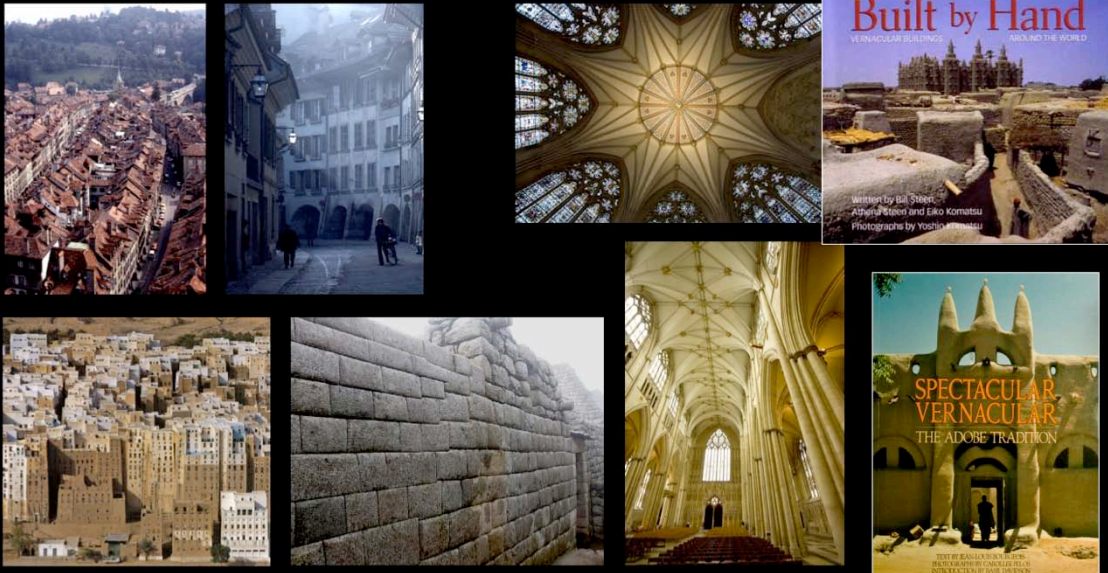
What if you found the full range of acceptable solutions whether high, intermediate or low-tech, based on system goals for positive outcomes?

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- But what if... What if entering the building regulatory realm didn't feel like a detailed exploration of the boundary between what is illegal and what is barely passable? What if we could actually find a range of possibilities and resources to make better choices and decisions?

What If...

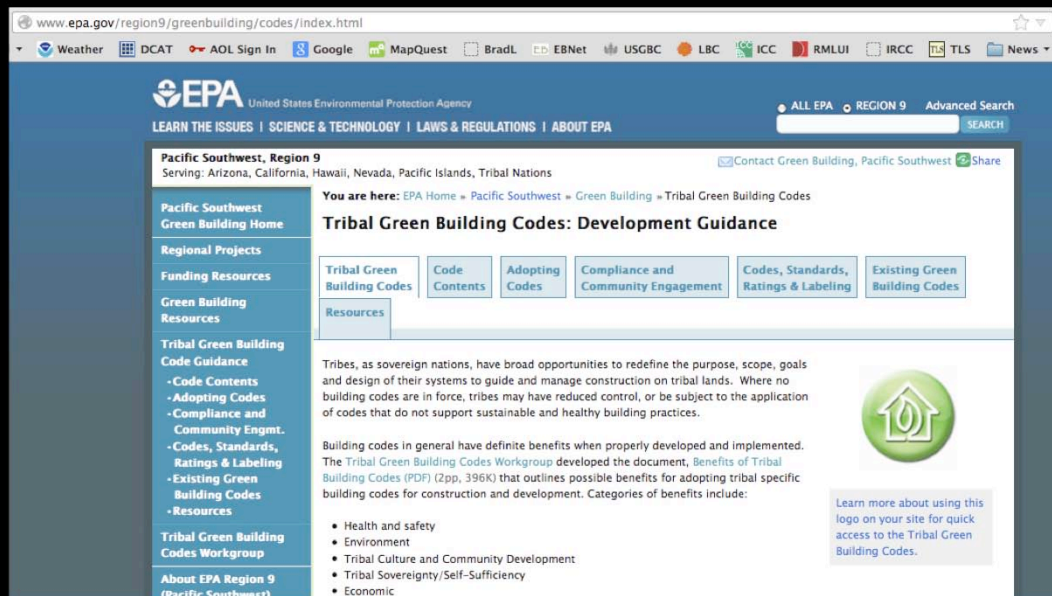
What if there was clear recognition that non-industrial does not mean primitive?



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- I think it's worthwhile to mention that our codes are nearly exclusively designed around industrialized building. There is a very strong resistance to the idea that non-industrial or pre-industrial building materials or systems could be acceptable. In fact there is a widespread belief that non-industrial means primitive. What you see in these pictures defies that thinking. The two photos in the upper left are of Bern Switzerland. You're looking at buildings that have been in continuous use for 800 years. The two right hand images next to the books are of the cathedral at York in England, which I visited a year and a half ago. This is one of the most magnificent buildings I have ever been in and it is also 800 years old, predating the industrial revolution by many centuries. We have much to learn from the past including from traditional ways of building developed in indigenous cultures over thousands of years.

EPA Tribal Green Building Code Development



<http://www3.epa.gov/region9/greenbuilding/codes/index.html>

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Through a number of contracts with EPA, we've also been doing work over the past few years with Native American tribes to help them develop their own systems to manage building on tribal lands. We helped develop this EPA Tribal Green Building Codes Development Guidance website.

It may be valuable, as we look at codes, to think about what has been happening as a kind of evolution, with traditional codes focusing on protecting human health and safety, as well as property, primarily from physical threats related to the built environment. The advent of green codes has added to that set of responsibilities protection of the natural environment as well as some things like indoor environmental quality and resource conservation. Taking this to the next step, tribal codes would also recognize, respect, reflect and protect cultural values.

It is also important to remember the limitations of codes - they can only do certain things well and there are other things that they can't do at all. So the universe of possibility and potential systems that might emerge from this process is bigger still...

An Indigenous Worldview

- A different starting place - Reverence for all life and all relationships in a very long time frame.
- All of the existing building codes and standards, organizational structures and organizations, regulations, and policies are **RESOURCES** for this process, they **ARE NOT** the **UNIVERSE...**



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□ These are a few slides from my introductory comments at a Tribal Green Code Summit held in Denver in 2011. The mainstream regulatory system we have now, the codes and standards and all the rest are the result of reactions to failures and disasters of various sorts and they are attempts to keep bad things from happening again. They tend to be fear-based and restrictive. And while what they are striving to do is very important, it isn't sufficient. They typically grow out of a reductionist world view that sees the world as a collection of objects, and therefore tends to be fragmented. On the other hand, indigenous cultures around the world, including most tribal cultures are based on seeing the world in terms of relationships - between humans and the natural world, within the natural world, and between humans and human communities. It is also a worldview grounded in respect and reverence for those relationships. While there are elements of reverence in these other systems, it is not foundational like it is in tribal cultures. If we started with reverence for all relationships in creating a regulatory system or codes, we would end up with something quite different from what we have now.

It is also important for all of us to remember that what we're doing here is in support of tribes - a tribally-driven and owned process. And it is worthwhile, I think, for us to think of all the existing codes and standards and organizations and policies, etc, as important resources to this process, but to fully recognize that that does not represent the universe of possibility in this realm.

Critical Context for the Tribal Codes Project

- And, similarly, a reminder for those of us supporting this process — the federal agencies, nonprofit organizations and others...

- we and whatever we bring to the process are also just resources in support of tribes developing what they want and need. We are not in charge of the process or in setting the values and goals.



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- Similarly, it's important for all of us who are supporting this emerging process, whether nonprofit organizations, federal agencies or others, to remember that we too are resources, and that we are bringing our knowledge and various other resources to this process in support of the tribes developing what they want and need. And to remind ourselves that we aren't the ones in control of the process or in setting the values and goals for this process.

Critical Context for the Tribal Codes Project



Caminante no hay
camino se hace
camino al andar.

The road is not
made - we make it
as we walk along.
-Antonio Machado

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- The Spanish poet wrote this and it seems appropriate for what we're doing here. It is unprecedented and as this says, the road is not made, we make it as we walk along. And that is what we are doing.

A Potential Evolution of Codes...

Protecting Human Health and Safety

(Traditional Building Codes),

while also Protecting the Natural Environment

(Green Building Codes),

while also Respecting, Protecting (and Expressing)

Cultural Values

(Tribal Building Codes)...

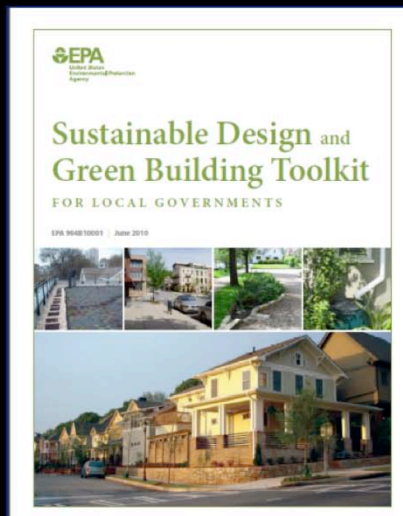
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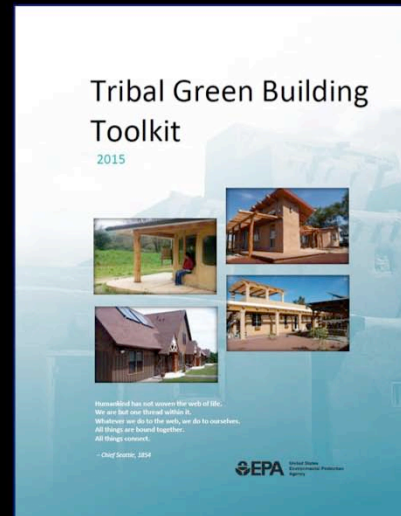
It may be valuable, as we look at codes, to think about what has been happening as a kind of evolution, with traditional codes focusing on protecting human health and safety, as well as property, primarily from physical threats related to the built environment. The advent of green codes has added to that set of responsibilities protection of the natural environment as well as some things like indoor environmental quality and resource conservation. Taking this to the next step, tribal codes would also recognize, respect, reflect and protect cultural values.

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EPA Green Building Toolkits



Earlier EPA General
Green Building Toolkit



New EPA Tribal
Green Building Toolkit

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- We then helped develop the new EPA Tribal Green Building Toolkit, which was based on the model Sustainable Design and Green Building Toolkit for Local Governments that we also helped develop in 2008. While that existing (non-tribal) Toolkit provides a useful framework for local governments, it doesn't address many realities that are different for tribes. For example, many tribes have not adopted building codes nor have permit or inspection departments. Tribes also have important cultural priorities and often face rural and infrastructure barriers that make the adoption of state or local building codes unreasonable. We will be piloting the new toolkit with two Arizona tribes in the near future.

EPA Tribal Green Building Toolkit



<http://www3.epa.gov/region9/tribal/greenbuilding-toolkit.html>

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□ This Toolkit includes a comprehensive assessment tool for tribal decision makers to use when evaluating how “green” a Tribe’s existing codes are, or in determining how “green” a Tribe wants newly developed codes to be. In both cases, the Toolkit provides extensive suggests and resources for how to achieve the most sustainable outcome.

EPA Tribal Green Building Toolkit

Questions, Potential Tools and Techniques	For Tribe WITH Building Codes	For Tribe WITHOUT Building Codes
Do current or planned regulations or policies include provisions for the use of Environmentally Preferable Materials for building components or assemblies?	Green <input type="checkbox"/> Required by code/ordinance <input type="checkbox"/> Incentivized	Green <input type="checkbox"/> Will be required or incentivized by code/ordinance
<ul style="list-style-type: none"> Foundations – such as rammed earth, earth bags, stone; Floors – such as earth, concrete, wood, stone; Exterior Walls – such as rammed earth, adobe, compressed earth block, cob, straw bale, advanced framing with wood, stone; Roof framing and decking – such as wood sheathing, framing, timbers or trusses; Roofing – such as recycled content, local, salvaged 	Yellow <input type="checkbox"/> Expressly allowed <input type="checkbox"/> Code/ordinance silent, but typically allowed	Yellow <input type="checkbox"/> Will be expressly allowed in code/ordinance
	Red <input type="checkbox"/> Code/ordinance silent, but not typically approved <input type="checkbox"/> Expressly prohibited	Red <input type="checkbox"/> Will be prohibited or discouraged
	<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Not Applicable
<i>Potential Tools and Techniques:</i> <ul style="list-style-type: none"> Green building program or ordinance with environmentally preferable purchasing requirements EPA Comprehensive Procurement Guidelines (CPG) for recycled content products Certified wood product requirements USDA BioPreferred products 		

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- The Toolkit covers several areas where codes can influence building practices to achieve a Tribe's sustainability goals. For example, to reduce waste generation, reduce water and energy use, and improve in-door air quality for residents.

EPA Tribal Green Building Toolkit

Straw Bale Wall Information

- Straw Bale Construction Appendix for 2015 International Residential Code – http://www.ecobuildnetwork.org/images/PDFfiles/strawbale_code_support/IRC_StrawbaleConstructionAppendix_Approved_10.4.13r3.pdf
- Earthen Plastered Wall Passes ASTM E-119 – 1-hour fire resistance test of a non-load bearing straw bale wall. http://www.dcat.net/about_dcat/current/Non-Bearing_Clay_Wall.pdf
- Cement Stucco Wall Passes ASTM E-119-05 – 2-hour fire resistance test of a non-load bearing wheat straw bale wall. http://www.dcat.net/about_dcat/current/Cement_Stucco_Wall.pdf
- City of Boulder, CO Ordinance 5891 – Concerns alternative building materials, including adobe and straw bale construction and recycled lumber. http://www.dcat.net/about_dcat/current/Boulder_Straw_Bale_Code.pdf
- Ecological Building Network Straw Bale Construction Code – Supporting documents and research information on straw bale construction code issues. <http://www.ecobuildnetwork.org/projects/straw-bale-code-supporting-documents>

Tribal Green Building Toolkit ■ 66

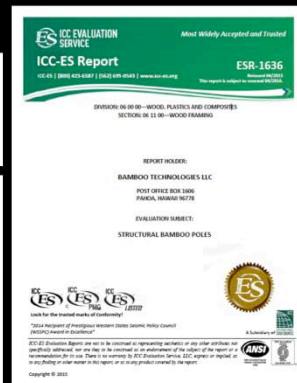
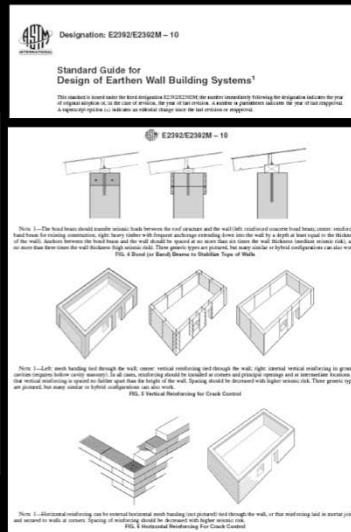
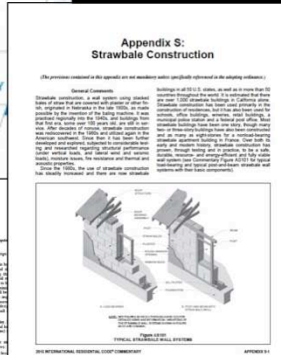
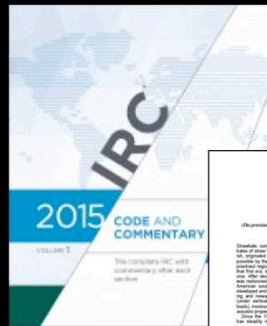
Earthen Building Information

- Ecological Building Network Earthen Building Resources – Covers resources on adobe, cob, sprayed earth, bags/tubes/tires, plaster and other earthen building resources. <http://www.ecobuildnetwork.org/library/building-materials/earth>
- ASTM Standard Guide for Design of Earthen Wall Building Systems ASTM E2392/E2392M - <http://www.astm.org/Standards/E2392.htm>
- Sustainable Sources: Earth Materials – Information and guidelines on building with stone, brick, soils, caliche and soil block and rammed earth. <http://earth.sustainablesources.com>
- State of New Mexico 2009 Earthen Building Materials Code – <http://www.nmcpr.state.nm.us/nmac/parts/title14/14.007.0004.htm>
- The Earthbuilders' Guild – Information on preserving and promoting the age old building methods of adobe, rammed earth and compressed earth block construction. <http://www.theearthbuildersguild.com>
- Earthbuilding – Links to global organizations working on earthen building. http://www.earthbuilding.info/gb/07_links/07-2_links_resources.htm

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- This is an example of some of the kinds of resources that are included in the toolkit.

Multiple Pathways for Alternatives Acceptance



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Over the years we've been involved in a great many things, most of them related to the built environment and many related to helping gain acceptance for more appropriate and sustainable building materials and systems. We helped carry out thermal testing of straw bale walls at Oak Ridge National Laboratory and fire testing of straw bale walls in Texas. We initiated the development of a new "appropriate" ASTM standard for earthen wall systems. And more recently, in 2009, the Cascadia Green Building Council hired us to produce a report on Code, Regulatory and Systemic Barriers Affecting Living Building Projects. And I was on the original drafting committee for the first public version of the International Green Construction Code (IGCC). All these and more have been part of the work of making the use of these alternative ways of building possible and legal, and helping ensure that they are also safe and perform well.

Multiple Pathways

Less Formal or intensive...

-Build “without benefit of code” (where there's no code or illegally)

-Individual project approval (Alternative Materials & Methods)

-Develop strong supporting research (like the ASR for Strawbale
– both for individual project approvals and code development efforts)

*-Develop a local, regional, or statewide support
system for alternatives* (like the City of Portland, Oregon)

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- There are a range of ways to deal with the building regulatory arena, from informal to formal. The least formal is to not deal with it at all – by either building illegally or where there are no codes. Or, you can also use the alternative materials, methods and designs provisions that exist in nearly all codes and get approval on a project by project basis. You can help both individual projects and moving some type of more widespread approval by developing and compiling strong supporting technical information. And you can help develop local, regional or statewide codes or guidelines for alternatives.

Multiple Pathways

More Formal...

- Get an Evaluation Service Report* (as for bamboo poles)
- Develop a building code* (local, regional, national)
- Develop a consensus standard* (like the ASTM Earthen Wall Standard)

More Urgent (I know, it's all urgent...)

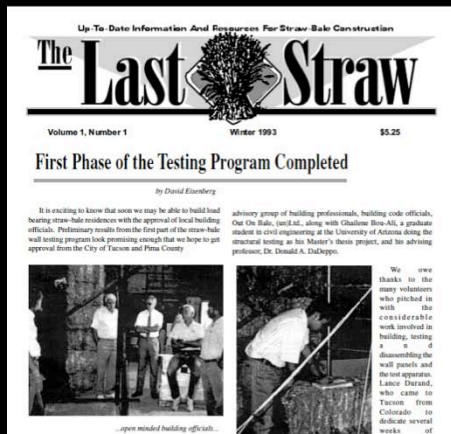
- Use a disaster or emerging widely recognized problem to push for change and acceptance* (as after a major wildfire, severe drought, or in response to the threat of climate change)

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□

Moving along the spectrum towards the more formal, it is possible to go to the International Code Council's (in the US) partner organization, the International Evaluation Service to get a technical report that outlines the required criteria that need to be met and verifies that a given material or product has been shown to meet them. This is very expensive and time consuming but it can be done – there's an ES Report for bamboo poles, for example. You can also do the work of developing a code at the local, regional, state or national level. And it is also possible to develop an industry/consensus standard such as the one we developed for Earthen Wall Systems. And, of course, it is also often possible to use a natural disaster to push for more immediate change and acceptance of more appropriate and viable alternatives.

A Code Success Using Most of These Pathways



At the start, a Masters Degree Thesis and low-tech testing... followed by some guidance on codes...

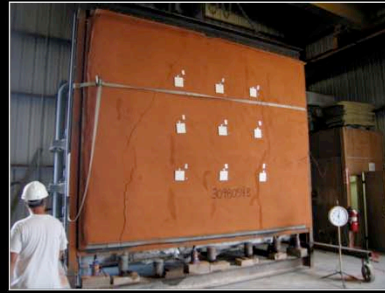
Winter 1993 - TLS Vol. 1, No.1 Winter 1994 TLS Issue #5

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- When I got involved in straw bale construction and earthen building I began to question why it was so much harder to get building permits for more sustainable buildings than for the most toxic, wasteful, and awful building systems. We knew that we needed to do a lot of testing, which we started doing, but In the process of focusing on helping people get their permits for these kinds of more sustainable buildings, I realized that the codes were focused on a narrow set of issues – there was something really important that was missing. And straw bale construction brought me to the edge, and then pushed me over the edge and down the slippery slope into building codes. On the left is feature article I wrote for Volume 1, Number One of the The Last Straw Journal, written for this Winter, 1993 first issue about the completion of the testing we did for the City of Tucson and Pima County, Arizona. A year later I wrote the fateful article, “Building Codes, Straw Bale Construction, and You,” which immediately made me the ‘straw bale codes guy.’ This was not what I was imagining and put me on a path I am still on two decades later... working to create a sustainable context for building regulation.

Then a lot of testing and R & D...



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We knew we needed to know a lot more than we did so we continued to do testing as we could afford or figure out how to get it done, including carrying out thermal testing of a straw bale wall at Oak Ridge National Laboratory and fire testing of straw bale walls in Texas. The fire testing established that earthen plastered bale wall is a one-hour fire wall and a cement, lime stucco wall is a 2-hour fire wall. These tests can be found at the DCAT website - www.dcat.net - or at the Ecological Building Network website - www.ecobuildnetwork.org

...and more testing and R & D

EBNet
Ecological Building Network
the art and science of building well



<http://www.ecobuildnetwork.org/projects/research/straw-bale-test-program>

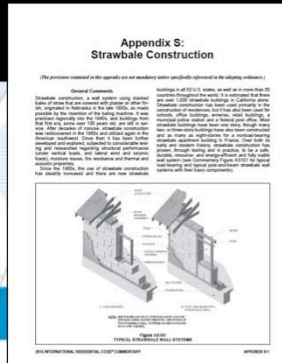
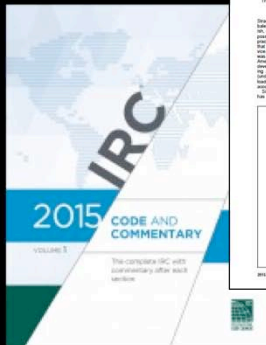
Development Center for Appropriate Technology - 2016

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plus interim codes & more & just 20 years later...

The Strawbale Appendix for the 2015 IRC!

Approved at the Public
Comment Hearings in
October 2013 in Atlantic
City, NJ



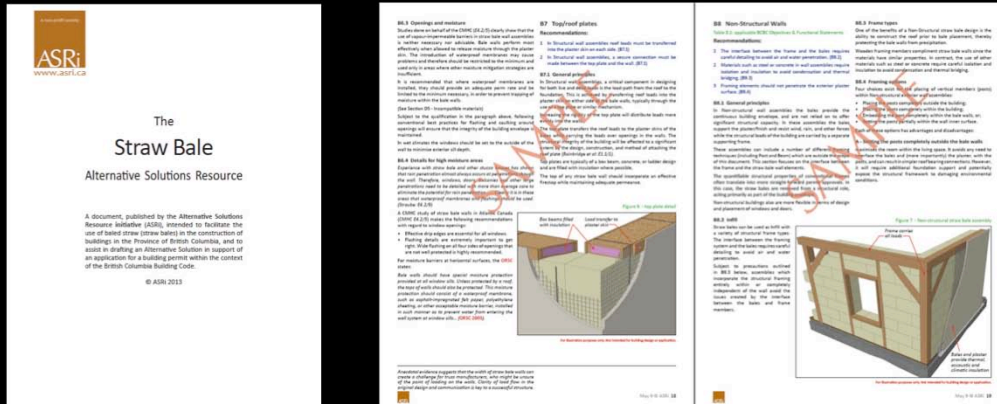
Also a 2015 IRC
Light Straw-Clay
Appendix in
much less time!

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- Some good news! Last year we got a strawbale appendix approved for the 2015 International Residential Code. The photo shows us at the code hearings in Atlantic City, NJ afterwards – with Marc Aschheim, structural engineer on the left, Martin Hammer, Berkeley architect who took over the straw bale codes work years ago and was largely responsible for getting this done next to Marc, me, and Laura Bartels, with COSBA, the Colorado Straw Builders Association, who also played an important role in getting this done. The 2015 IRC will be available in the Summer of 2014. And we are in the process of writing code commentary to guide code officials and designers in the appropriate use of the code.

ASR for Straw Bale Construction

An excellent Canadian resource is the Alternative Solutions Resource Initiative and their ASR for Straw Bale Construction—useful for both individual approvals and support for more formal acceptance.

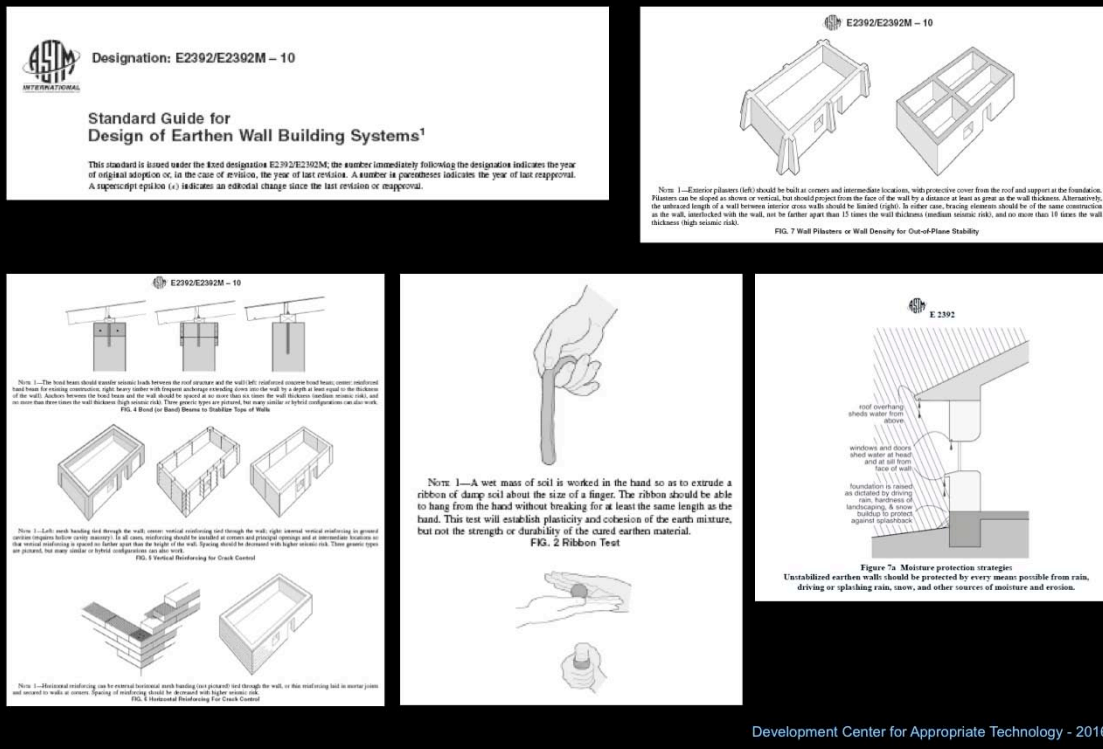


<http://www.asri.ca>

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The ASR for straw bale construction is an excellent example of how to put together a strong and comprehensive technical document in support of an alternative building solution/material. This document compiled all the relevant research and testing, design information, analysis of specific issues relevant to this building system and precedents and examples of existing codes and guidelines.

ASTM Earthen Wall Standard



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I mentioned that this standard was also submitted for inclusion in the IGCC but was rejected by the committee. The reason was that it is not written fully in mandatory code language, something that, hopefully, will be remedied as soon as possible. A bit of background on this. Almost 10 years ago I started hearing from more and more people that earthen building was being made illegal in many developing countries because it was seen as unsafe and a poverty material. All the while, wealthy people in the U.S. and elsewhere were building beautiful buildings of adobe and rammed earth, though many struggled to get their buildings approved by local building authorities. Knowing that earthen building systems were in need of guidance for incremental improvement and better design and detailing, not abandonment, and that they typically had a much smaller environmental footprint while providing greater comfort and beauty, I started thinking about what could be done. I thought if we could create new, appropriate standards for earthen building in the U.S., you could take those standards anywhere in the world and say "If these are inferior, unsafe building methods, why would the United States have just created new standards for them?" For five years I served as vice-chair of an ASTM (American Society for Testing and Materials - a standards organization) sub-committee on sustainability for buildings, where I led the effort to create such a new standard. We had to stop doing that work because of lack of funding, but it was resumed under the guidance of our colleague Bruce King of the Ecological Building Network (www.ecobuildnetwork.org) and the new standard now finalized! It is hoped that this will become an ISO standard which will make it more easily available internationally, but having this standard developed and in the world is a big step forward.

The Living Building Challenge

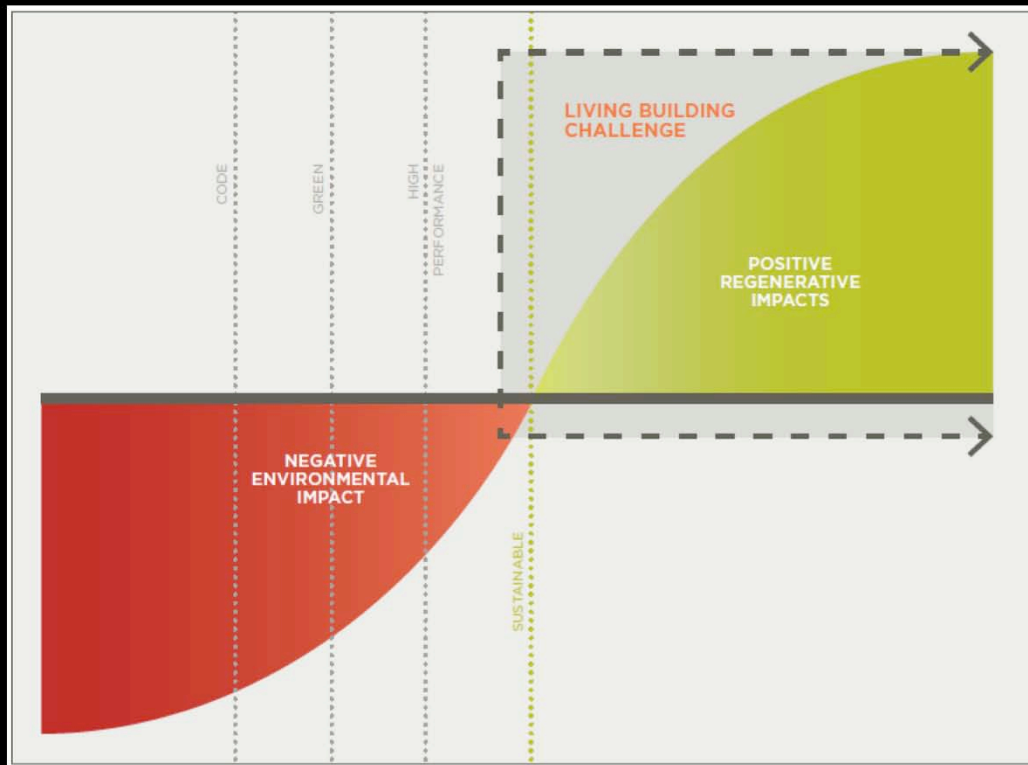


www.ilbi.org

Development Center for Appropriate Technology - 2010

- One of the real leading edge programs is the Living Building Challenge, a program designed to help define something beyond all the other green building rating systems and program goals I'm aware of. The Living Building Challenge 3.0 uses a set of 20 imperatives - mandatory requirements - aimed at moving us toward creating projects that meet or exceed net-zero impact or better performance across the spectrum of impacts of built projects – all types of built projects.

The Living Building Challenge



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- This graphic shows the goal of the Living Building Challenge to move design and building practices to net zero and then to regenerative projects – that produce more good than harm across the spectrum of impacts over the life of the project.

The Living Building Challenge

The 20 LBC Imperatives

Place

1. Limits to Growth
2. Urban Agriculture
3. Habitat Exchange
4. Human-powered Living

Water

5. Net Positive Water

Energy

6. Net Positive Energy

Health and Happiness

7. Civilized Environment
8. Healthy Interior Environment
9. Biophilic Environment

Materials

10. Limits to Growth
11. Urban Agriculture
12. Habitat Exchange
13. Human-powered Living
14. Net Positive Waste

Equity

15. Human Scale + Humane Places
16. Universal Access to Nature + Place
17. Equitable Investment
18. JUST Organizations

Beauty

19. Beauty + Spirit
20. Inspiration + Education

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□

Here are the LBC's 20 imperatives: place, water, energy, health and happiness, materials, equity and beauty, inspiration and education. Those last ones, though harder to judge, are there because many of us believe that people don't take care of things they don't care about - they don't care for what they don't love - and people love beautiful buildings and so they last longer - which is much more sustainable.

The Living Building Challenge

LIVING BUILDINGS IN EVERY CLIMATE ZONE AND COUNTRY

Living Building Challenge Projects can be built in any climate zone anywhere in the world—as evidenced by the unique array of projects currently underway in many countries around the globe.

This map shows a snapshot of project locations as of April 2014.

Since the Challenge is performance based, the guiding principles and performance metrics apply well regardless of where in the world the project is located—what changes is the specific mix of strategies and technologies—leaving it up to the genius of the design team to choose the most appropriate design response.

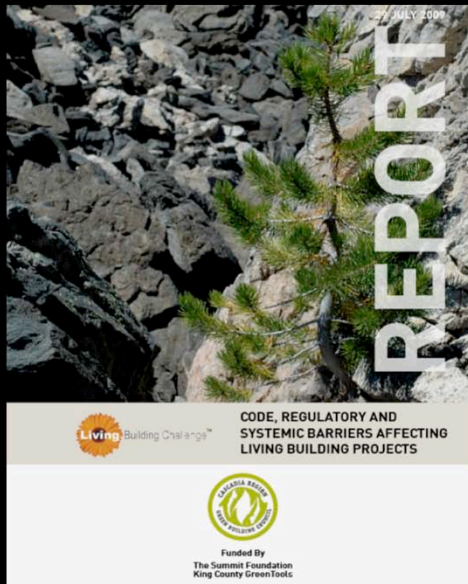


14 | Living Building Challenge™ 3.0

Development Center for Appropriate Technology - 2016

- The LBC is now global and growing all the time. And the types of projects and climate zones are also expanding.

The Living Building Challenge



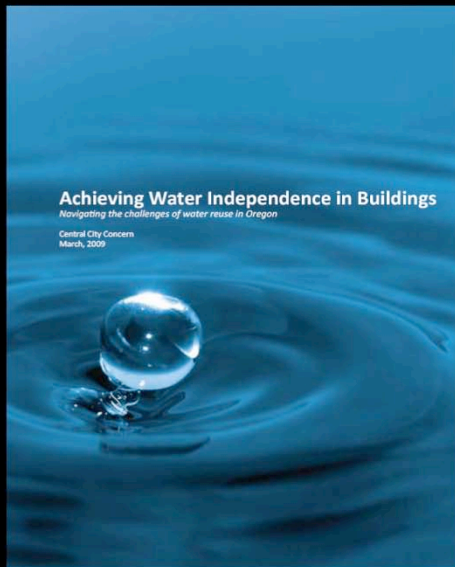
This is DCAT's 2009 report on the spectrum of regulatory issues affecting Living Building projects. There are many more excellent resources on the International Living Future Institute website.

<https://living-future.org/ilfi/ideas-action/research/building-codes>
www.dcat.net/resources/index.php

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- For a much more comprehensive overview of the issues related to codes and standards, DCAT was hired by the Cascadia Green Building Council to produce a report on the code and regulatory barriers to Living Building Challenge projects. This report covers a wide range of regulatory issues in depth, and offers many recommendations. You can download it from the DCAT, ILBI and Sustainable Alternatives (www.sustainable-alternatives.ca co-author Sonja Persram's Toronto-based company) websites.

A Different Response to Regulatory Barriers



This report documents a project striving to achieve the net zero water supply and discharge requirements of the Living Building Challenge in Portland, Oregon. Though the project was not built, those involved went on to change the regulatory system because of what they couldn't do.

<http://living-future.org/ilfi/research/research/water>

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- There is an excellent report on the ILBI website about a project seeking to meet Living Building Challenge requirements for water in Portland, Oregon, a very progressive city in a very progressive state. What they found was a surprising number of places where the codes, standards, policies and approvals processes made it illegal to do the right thing - design a building to be water self-sufficient in the middle of a city. The cool thing about this project is that the design team and clients embarked on an effort to change the regulatory systems to enable these kinds of projects to be done and they succeeded in doing that.
The regulation of almost all aspects of water reveals the problematic patterns of regulatory systems related to incremental and systemic risk, comparative risk and more. Here's how I describe the normal and, finally, evolving situation.
In most places all water entering a building is required by law to be potable water—drinking water —regardless of how it will be used. And once used, regardless of the use, it's required to be treated as black water—as if it had gone through the toilet. In most places, if a public sewer system is available you're required to connect to it and if not you're required to put in a water-based septic system of some kind. In most places it's also illegal to use grey water or rainwater for toilet flushing...meaning that in most places we are required by law to intentionally pollute drinking water with human excrement, an act that in any other circumstance would be both illegal and so socially reprehensible as to result in excommunication from nearly any community... but we mandate that behavior in buildings.

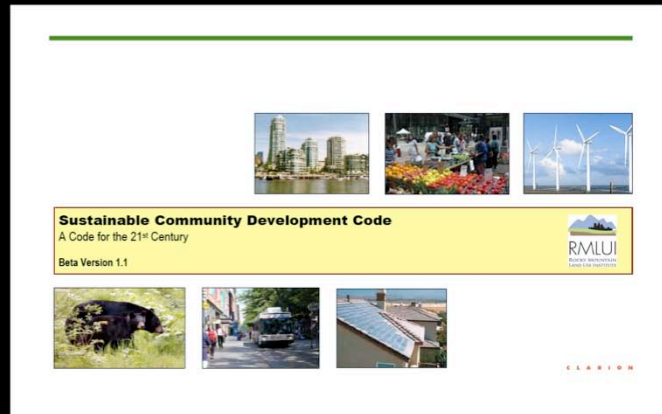
Achieving Water Independence in Buildings
March 2009

OREGON ROADMAP

- The architects involved in that Portland project came up with this ingenious idea – a regulatory approval/barrier flow chart – in which they showed all the places that truly exemplary practices were illegal. This turned out to be highly effective in convincing the regulators that change was needed and in fact they changed the laws in the State of Oregon in the process.

For Land Use Codes RMLUI's SCDC

The Rocky Mountain Land Use Institute's (RMLUI) Sustainable Community Development Code is an excellent resource—a template for community flexibility in sustainability goals & policies.



<http://www.law.du.edu/index.php/rmlui>

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- There are some excellent resources for land use codes as well. Many of us know about Smart Growth and similar efforts to address land use issues more responsibly and sustainably. The Rocky Mountain Land Use Institute at the University of Denver, has produced a draft Sustainable Community Development Code (SCDC), that puts this all together in a powerful and useful way. This is really a framework for land use codes that incorporates and integrates many crucial sustainability requirements into workable codes. There is a huge amount of information and resources embedded in this document, but it is also the structure of the framework that is useful.

Sustainable Community Development Code

Table of Contents

The topics covered in the Sustainable Community Development Code are listed below. Chapters currently available are highlighted in blue. New chapters will be available soon. Other topics are under consideration. Background research monologues have been prepared for many of these topics and are available online at www.law.du.edu/rmlui. Work is continuing on individual sections.

1. ENVIRONMENTAL HEALTH AND NATURAL RESOURCES

- 1.1. Climate Change
- 1.2. Low Impact Development and Green Infrastructure
- 1.3. Natural Resource Conservation/Sensitive Lands Protection (forthcoming)
- 1.4. Water Conservation
- 1.5. Solid waste and recycling (forthcoming)

2. NATURAL HAZARDS

- 2.1. Floodplain Management (forthcoming)
- 2.2. Wildfires in the Wildland-Urban Interface
- 2.3. Coastal Hazards
- 2.4. Steep Slopes (forthcoming)

3. LAND USE AND COMMUNITY CHARACTER

- 3.1. Character and Aesthetics (forthcoming)
- 3.2. Urban Form and Density (forthcoming)
- 3.3. Historic Preservation (forthcoming)

4. MOBILITY & TRANSPORTATION

- 4.1. Transit Oriented Development
- 4.2. Mobility Systems

- 4.2.1. Complete Streets
- 4.2.2. Bicycle Mobility Systems
- 4.2.3. Pedestrian Mobility Systems
- 4.2.4. Public Transit
- 4.3. Parking

5. COMMUNITY

- 5.1. Community Development (forthcoming)
- 5.2. Public Participation and Community Benefits

6. HEALTHY NEIGHBORHOODS, HOUSING, FOOD SECURITY

- 6.1. Community Health and Safety
- 6.2. Affordable Housing
- 6.3. Housing Diversity and Accessibility
- 6.4. Food Production and Security

7. ENERGY

- 7.1. Renewable Energy: Wind (small- and large-scale)
- 7.2. Renewable Energy: Solar (including solar access)
- 7.3. Energy Efficiency and Conservation (forthcoming)

8. LIVABILITY

- 8.1. Noise (forthcoming)
- 8.2. Lighting (forthcoming)
- 8.3. Visual Elements

- The SCDC covers a wide range of issues starting with climate change, resource conservation, low-impact development and more, and includes wildfires, coastal hazards, and a great deal on streets and transportation including transit oriented development, complete streets, bicycle and pedestrian mobility systems, public transit and parking. Though it focuses on urban and suburban land use mainly, it also has relevance to rural communities and can be adapted as needed. It also includes a section on public participation and goes on to health, affordable housing, housing diversity and accessibility and food production and security. And it has extensive information about renewable energy - both wind and solar.

Sustainable Community Development Code

Site Design Strategies for Solar Access

INTRODUCTION

A great deal of attention has been placed on the role of sustainable building design and construction techniques in recent years. Many communities have adopted standards that encourage or require compliance with programs such as The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™. The LEED system has become the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. The program encourages the use of products and techniques to promote sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.¹

Much less emphasis, however, has been placed on the role of site planning in a sustainable design program—and more specifically, on site design for solar access. The incorporation of both active and passive solar techniques are highlighted in any discussion of green building design, yet in order for either approach to be viable, they must have unobstructed solar access for a certain period of each day. Without careful consideration during the planning stages of a new neighborhood, future opportunities for the installation of active or passive features can be dramatically reduced or even eliminated altogether.

In order to ensure that the concept of sustainability encompasses the entire development site, not just what falls within the building envelope, additional steps must be taken. A pilot program currently being developed by the U.S. Green Building Council (USGBC) entitled LEED for Neighborhood Development or LEED ND², represents an important step towards broader consideration for solar access. For now, however, the application of these provisions is limited primarily to the individual developers who choose to use them. Zoning regulations play a significant role in the implementation of solar energy technologies at the local level, defining where, how, and when they may be used. Many communities have recognized the importance of addressing solar access within their zoning regulations and have taken steps to define the degree to which solar will be allowed, encouraged, or even required.

IMPLICATIONS OF NOT ADDRESSING THE ISSUE

The implications of not establishing provisions for solar access at the local level can be significant. At the most basic level, the opportunity for a community to reduce its energy consumption is diminished substantially. Without provisions in place to ensure solar technologies are allowed and that access to them is protected, they become more difficult and more costly to implement—and thereby may be passed over by all but the most "green" developers and homeowners. Choosing not to establish solar access provisions may also be costly to local governments as staff time needed to process variances and other requests increase.

On the other hand, establishing solar access provisions can be beneficial at a variety of levels. At a site planning level, organizing new development to achieve proper solar orientation can improve the energy efficiency of buildings on the site at little or no additional cost. When combined with other sustainable building techniques, the benefits of requiring and/or protecting solar access can be dramatic. For example, placing a building's long face on an east-west axis with a large percentage of its windows on the south side can reduce fuel consumption by up to 25%.³ In its Solar Access Design Manual, the City of San Jose, California states that it found that proper solar orientation of new homes built in the San Jose area produced total energy savings of 11 to 16.5 percent—with up to 40 percent savings from space cooling.⁴ In addition to promoting a measurable reduction in energy usage, solar access provisions can also help



ensure that the conversion of homes from traditional energy sources to solar energy over time can be accomplished relatively easily. Homes that are pre-designed to accommodate solar devices, not only from a site planning standpoint, but from a plumbing, wiring and structural standpoint as well can make future installations much easier and less costly.

GOALS FOR SOLAR ACCESS

While numerous examples of local governments adopting regulations to protect solar access opportunities are cited in this chapter, there is much yet to be done. This section outlines specific strategies and actions to be taken by communities wishing to take their policies to the next level. A range of examples are provided to help illustrate how the strategies can be adapted to a range of situations depending upon the level of policy commitment, available staff resources, and political environment.

The primary goals of this chapter are to:

- Remove regulatory obstacles and streamline processes for the installation of solar technologies
- Implement protective regulations to ensure that property owner investments in solar technologies are protected
- Preserve the opportunity for increased use of solar technologies in the future;
- Provide incentives for the use of solar technologies in new construction and in the renovation of existing homes; and
- Promote an overall reduction in energy usage



Photos: Left and right, "Calling the Land to Building Orientation: Solar Solar Screen", by Robert Hildebrand, [Available online](#). Last accessed online 10/29/08. Center, U.S. G. [Produce Smart, High-Performance Home Technologies: Solar Thermal and Photovoltaic Systems](#), [Available online](#). Last accessed online 10/29/08.

¹ U.S. Green Building Council, LEED Rating Systems. [Available online](#). Last accessed online 10/30/08.



² U.S. Green Building Council, LEED Rating Systems. [Available online](#). Last accessed online 10/30/08.

³ Guide: Putting Renewable Energy to Work in Buildings. [Available online](#). Last accessed online 10/30/08.

⁴ City of San Jose, California. Solar Access Design Manual.

Each section starts with an introduction, implications of not addressing the issue and goals.

Sustainable Community Development Code

DRAFT Sustainable Community Development Code Framework					
RENEWABLE ENERGY					
<p>KEY STATISTICS:</p> <ul style="list-style-type: none"> About 9 percent of electricity in the U.S. is generated from renewable sources Most electricity in the U.S. is generated by burning nonrenewable fossil fuels Proper solar orientation of new homes built in the San Jose area produced total energy savings of 11 to 16.5 percent—with up to 40 percent savings from space cooling Placing a building's long face on an east-west axis with a large percentage of windows on the south side can reduce fuel consumption by up to 25% Between 200,000 and 250,000 U.S. homes and businesses have solar panels today, a number that has increased by more than 40 percent a year since Congress passed a federal tax credit for solar energy in 2005 					
					
SITE DESIGN STRATEGIES FOR SOLAR ACCESS					
	ACHIEVEMENT LEVELS			References/Commentary	Code Examples/Citations
	Bronze (Good)	Silver (Better)	Gold (Best)		
	<p>Remove Obstacles</p> <ul style="list-style-type: none"> Identify limiting provisions (e.g. accessory structure limits, historic district regulations) and craft exceptions to permit solar energy devices Prohibit solar restrictions in new private CCARs in subdivision regulations 	<ul style="list-style-type: none"> Allow modest adjustments to side, front and/or rear yard setback requirements (or other conflicting regulations) that allow applicants to meet solar access requirements 	<ul style="list-style-type: none"> Override existing private covenants restricting solar devices Allow solar panels as a by-right accessory use except in special districts (e.g., historic districts) 	<ul style="list-style-type: none"> In the last five years, advances in technology have resulted in photovoltaic systems that can be installed in some roofing systems to make them nearly invisible—providing an alternative to traditional panels in areas where aesthetics are of significant concern (e.g. historic districts). See US Department of Energy, Building America Best Practices for High-Performance Technologies: Solar Thermal & Photovoltaic Systems. Available online. Last accessed online 2/11/09. The LEED ND pilot program incorporates a section on Solar Orientation intended to, "achieve enhanced energy efficiency by creating the optimum conditions for the use of passive and active solar strategies." The section is one of twenty potential credits under the section entitled Green Construction & Technology. Available online. Last accessed online 2/11/09. 	<ul style="list-style-type: none"> Los Angeles, Historic Preservation Overlay. Available online. Last accessed online 2/11/09. Fort Collins, Colorado Land Use Code, Solar Access, Orientation, and Shading. Available online. Last accessed online 2/11/09. Gresham, Oregon Development Code, Solar Access Standards. Available online. Last accessed online 2/11/09. Multnomah County, Oregon Solar Access Provisions for New Development. Available online. Last accessed online 2/11/09. City of Berkeley, California, Title 23 (Zoning Ordinance) Section 230.04: Lot and Development Standards. Available online. Last accessed online 2/11/09. Teton County, Wyoming, Solar Access Regulations. Available online. Last accessed online 2/11/09.

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- Then each section has key statistics and begins with various suggested achievement levels to remove barriers - with links and references and commentary and examples of codes and other policies where these things have been done.

Sustainable Community Development Code

DRAFT Sustainable Community Development Code Framework						
RENEWABLE ENERGY						
		Bronze (Good)	Silver (Better)	Gold (Best)	References/Commentary	Code Examples/Citations
	Create Incentive	<ul style="list-style-type: none"> Reduce or eliminate permit fees for the installation of solar devices on an existing structure 	<ul style="list-style-type: none"> Reduce building permit fees for projects that incorporate solar concepts in the overall design Provide staff assistance to homeowners to orient new homes for solar access 	<ul style="list-style-type: none"> Allow applicants to "earn" additional density or height by incorporating solar concepts into a project's overall design 	<ul style="list-style-type: none"> Database of State Incentives for Efficiency and Renewables (DSIRE). Available online. Last accessed online 10/26/08. The City of Tucson offers a Scaled Solar Fee Incentive Waiver for new construction and renovation. Available online. Last accessed online 2/11/09. The City of Oakland, CA expedited its solar energy use through a 2001 initiative that waived design review requirements for installation of solar production facilities. The initiative expired in 2003; however, the city is evaluating the impact of this ordinance and evaluating the feasibility of its continuance. A range of articles and other materials on renewable energy are available in the American Planning Association's February 2008 PASinfoPacket entitled Planning and Zoning for Renewable Energy. Available online. 2/11/09. 	<ul style="list-style-type: none"> Eagle County, Colorado Efficient Building Code. Available online. Last accessed online 2/11/09. Austin, Texas, Development Code: Subchapter E: Design Standards and Mixed-Use. Available online. Last accessed online 2/11/09. Pullman, Washington, Development Code, Planned Residential Development: Section 17.107 (incentives for solar access). Available online. Last accessed online 2/11/09.
	Enact Standards	<ul style="list-style-type: none"> Require key features of a development plan to have access to sunshine Enact regulations to preserve solar access 	<ul style="list-style-type: none"> Require variation in width of lots to maximize solar access Include solar access as an optional or required standard in residential and commercial design guidelines Establish a tree dispute resolution process and criteria by which property owners may resolve issues regarding the obstruction of solar access to a property by a tree or trees on a neighboring property 	<ul style="list-style-type: none"> Require a minimum percentage of solar-oriented lots or buildings in new developments Require a minimum percentage of energy in new developments to come from solar 	<ul style="list-style-type: none"> State of New Mexico Solar Collector Standards Act. Available online. Last accessed online 2/11/09. US Department of Energy, Building America Best Practices for High-Performance Technologies: Solar Thermal & Photovoltaic Systems. Available online. Last accessed online 2/11/09. Guide: Putting Renewable Energy to Work in Buildings. Available online. Last accessed online 2/11/09. 	<ul style="list-style-type: none"> Fort Collins, Colorado Land Use Code, Solar Access, Orientation, and Shading. Available online. Last accessed online 2/11/09. Portland, Oregon, Solar Access Regulations. Available online. Last accessed online 2/11/09. Teton County, Wyoming, Solar Access Regulations. Available online. Last accessed online 2/11/09.

- Next each section addresses creating incentives and enacting standards in the same structure of suggested levels of achievement information resources.

The Shift to Performance-Based Codes

The image is a screenshot of the Inter-Jurisdictional Regulatory Collaboration Committee (IRCC) website. At the top, the title "The Shift to Performance-Based Codes" is displayed in a large, light blue font. Below it, the IRCC logo is shown, featuring a globe with the acronym "IRCC" and a row of flags from various member countries. The main header reads "Inter-Jurisdictional Regulatory Collaboration Committee" in a bold, black font. To the right of the header is a link that says "Contact IRCC". Below the header, there is a paragraph of text explaining the purpose of the IRCC, followed by a list of member organizations and their acronyms. A yellow-bordered box on the right side of the page contains the text: "The IRCC, supporter of the international shift to performance-based building regulations, held a Global Policy Summit on Sustainability in 2005." At the bottom of the page, there is a navigation bar with links for "Home", "Events", "Documents", "Private", and "Members". The website URL "http://www.irccbuildingregulations.org" is displayed in a large, blue font at the bottom center. The footer text "Development Center for Appropriate Technology - 2016" is located at the bottom right.

<http://www.irccbuildingregulations.org>

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There has also been an increasing shift toward performance based codes, in part because they enable more rapid change and innovation and in part because they allow clearer definition of the goals and objectives rather than focusing exclusively on what we are trying to avoid or prevent. There is an international organization, the Inter-Jurisdictional Regulatory Collaboration Committee (IRCC) which is made up of national building code organizational representatives from countries developing or using performance-based building code systems. I have had the pleasure of presenting at four of their international conferences and meetings, including in 2005, their Global Policy Summit on Sustainability. There are excellent resources on their website and they are working to appropriately incorporate sustainability into performance based systems.

One Wales: One Planet

Charlie and Meg's Roundhouse, Pembrokeshire Council, Wales...**Approved!!!**



<http://gov.wales/docs/desh/publications/090521susdev1wales1planeten.pdf>

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- Some of you may have heard, over the past few years, about this beautiful home in Wales that the local council decided had to be torn down because it wasn't built with proper prior approval and which they claimed degraded the local landscape. After hundreds of thousands of people from around the world objected and a new review process was completed, the house was given retroactive approval. This house comes as close to meeting the objectives of Wales' sustainable development goals as anything in existence there and eventually this was recognized. A very encouraging sign.

Leaders ~~Wanted~~ Needed!

Low carbon and low impact building materials, technologies and designs have a significant role to play in climate change mitigation and adaptation. Such risk reduction should be formally included in risk assessments for all materials and systems.

There's much work to be done in pushing this up into view in the mainstream world, especially in the context of resilience, relocalization, local economic development and more.

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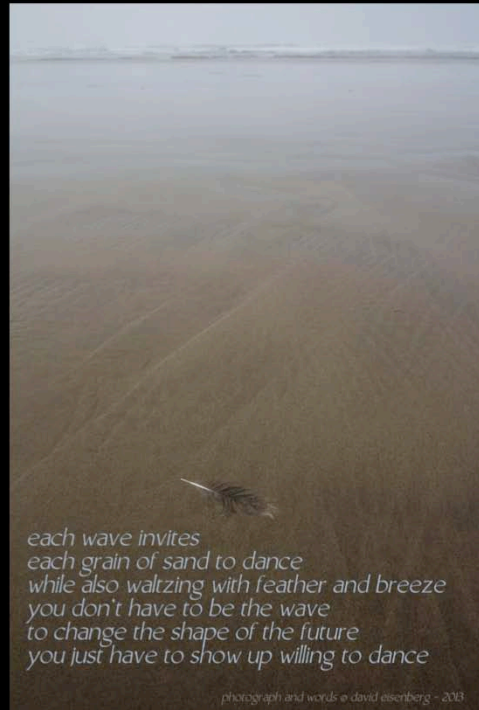
- ▣ The reality is that there is a lot of work to be done and a great need for people to step into leadership roles to carry this work forward.

How Do We Get Everyone Home Safe?

The challenges are huge — some people have looked at what's happening to the biosphere and think it may be too late to reverse the trends.

No one knows how this will all play out. Let's keep our minds, eyes and hearts open and make the best choices we can every time.

Let's get to work (and play)...



photograph and words © david eisenberg - 2003

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- But the reality is that these changes are changes that must take place within each of us first, not out there in the world of technology and economics. This journey to a sustainable and regenerative future will be the real heart work as we remember what we are part of, what we are capable of, and what our true nature is. This is a journey of the heart and those of us with the luxury and privilege of options have an added task of making room in our own hearts for future generations and for all those who don't have options and can't speak or act for themselves.

And Finally, Remember

The way to subvert the dominant paradigm is to have more fun than they do *and* make sure they know it!



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- ▣ And finally, a critical piece in this puzzle is that we must nurture our spirits and find joy in this work.



Thank you!

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▣ Thank you.