Reimagine Spring Labs Insight Briefs

Reimagine Buildings Collective–SPRING 2026

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Introduction

"The cushions don't blow away in the storm. The house stays comfortable for a week without power. The mortgage doesn't get underwater because your energy bills doubled. All of it is the same thing." — the Selling Passive House in a Time of Insecurity Lab

That idea—security in the broadest sense—is a strong current in this collection, born of a moment when grid failures, extreme heat, and volatile energy costs are on everyone's mind. But a second current runs just as deep here: the conviction that what we each learn on individual projects should become knowledge the whole movement can use. These five Insight Briefs come out of the Spring 2026 session of Reimagine Labs, the small, practitioner-led "think and do tanks" inside the Reimagine Buildings Collective where members organize themselves around the most urgent questions in their work.

You'll find passive survivability pushed beyond the envelope to backup power, dehumidification, and redundancy; buildings designed for disassembly and reuse; a practitioner's map to the crowded landscape of bio-based and healthy-materials tools; the blueprint for an open, searchable database of retrofit case studies; and clear-eyed guidance on talking with clients about comfort, cost, and security.

That second current is one you can join today: several of these briefs are invitations as much as findings, with surveys to take and databases to seed.

I hope you enjoy reading—and that something here strengthens your work.

– Zack Semke
Host, Reimagine Buildings Collective

Passive Survivability: No Power, No Problem?

Lab Members:

- *Lloyd Alter*
- *Eric Zeise*
- *Ryan Adanalian*
- *Stephen Magneron*
- *Stephen Stuart*
- *Valerie Amor*
- *Mike Fowler*
- *Chloe Hellerman*
- *David Komet*
- *Al Mitchell*
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Executive Summary:

1. **Resilience means more than efficiency** — Passive survivability is about maintaining habitable, safe indoor conditions during power outages or environmental extremes, not just saving energy.
2. **Heat is the bigger threat** — Over the past 30 years, extreme heat has caused more deaths than any other weather event, making summer overheating and humidity control critical priorities.
3. **Passive only goes so far** — Superior insulation and airtightness help, but without ventilation, dehumidification, or backup power, survivability in heat, smoke, or long outages is limited.
4. **Optimization strengthens resilience** — Smart passive design (shading, form, fire-safe detailing, low embodied carbon) paired with right-sized, all-electric systems and backup energy makes buildings both survivable and part of the climate solution.

What do we mean by Passive Survivability?

When considering passive survivability, or building resilience, it is important to define the terms used as well as the specific hazards that a building is resilient to. In general, resilience can be defined as a building's ability to maintain or return to habitable conditions following a loss of power or a change in the environment. Whether this relates to thermal extremes, wildfire, or other natural disasters, passive building practices promote buildings that are able to weather these events and protect the health and safety of the occupants. For some time now, passive house, Passive House, Passivehouse, or Passive Buildings has been promoted as a "thermal battery," most prominently after the 2014 polar vortex.

Active Survivability

Building on the work of the previous group, recent events make the issues of survivability even more relevant and immediate. The war in Iran has caused people around the world to look at where they get their energy and how much they use. As Paul Krugman recently noted,

> "The whole world now knows that relying on imported fossil fuels is a major economic and security risk. By contrast, the sun will shine and the wind blow whatever may be happening overseas. Renewables were already rapidly becoming cheaper than fossil fuels. Now it's clear that they are also far safer."

Joseph Coughlin of the MIT Aging lab asks,

> "How dependent are you on a car in a world where driving may become difficult or costly? How exposed is your home to volatile energy costs, and how hard would it be to reduce that exposure? How far are you from the healthcare you will eventually need, not the healthcare you need today? These are not amenity questions. They are resilience questions."

The Build Better Group notes,

As summer heatwaves push municipal grids to the breaking point, active air conditioning is no longer a guaranteed safety net. In 2026, air conditioning is shifting from a comfort feature to a single point of failure. When extreme, localized summer heat domes stress regional power grids, the resulting outages can leave high-density residential and commercial spaces without power for days. Without active HVAC, standard modern buildings can become heat traps within 24 hours.

*The solution is to design for **Thermal Autonomy**—the inherent capacity of a building's physical envelope to regulate interior temperatures and maintain habitable conditions without grid input.*

They call for automatic exterior shading and high mass interior partitions:

> "Utilize structural concrete slabs or raw earthen masonry partitions inside the insulated envelope boundary. This thermal mass acts as a low-tech energy sink, dampening thermal swings without mechanical intervention."

Thermal Mass has not been on the Passive House radar for many years, but Susan Roaf asks,

How long will it take Spain to re-introduce the siesta the authorities cancelled in June 2005? How long will it take young architects and engineers to learn how to put mass back into buildings and re-learn to design a good window? How long will it take developers to come to terms with the fact that they have to put a courtyard or light well into the heart of their building so it can be naturally daylight and ventilated when energy gets too expensive to permit the alternatives, or the grid regularly fails on hot afternoons?

Passive House calls for insulation under the slab, but one study looking at thermal mass concluded,

> "The findings highlight the critical role of thermal mass and soil buffering in maintaining safe indoor conditions without active systems. Under

certain circumstances, omitting under-slab insulation can improve summer resilience without significantly compromising winter performance. Passive ground coupling thus emerges as a low-cost, maintenance-free adaptation strategy with co-benefits for mitigation and occupant safety."

We need to look at planning of our dwellings, so that more people can stay in them longer. As the Futurology report noted,

"Demographic changes, such as a rapid increase in the number of elderly people and the worsening issue of young people unable to afford to leave home, will drive demand for multi-generational accommodation. More homes will be designed with flexible layouts to suit different generations, which can be adapted as families' needs change."

Lessons learned:

- Passive house is about energy but doesn't go far enough anymore. Holistic worldview. A lifeboat isnt good enough you need food and water.
- Recent geopolitical events have refocused people around the world on the issues of resilience, independence and autonomy.
- It is no longer enough to focus on high performance, we need redundant systems, designs where a single failure is not catastrophic.
- Scale of redundancy and systems provide multiple co-benefits the whole becomes greater than the parts
- As Passive House designers we have concentrated on shelter, but we cannot forget about water and food and must develop systems for producing and storing both.
- Simple systems of using water that is sitting in the pipes and the walls and the water heater.
- Renewable sources like solar are wonderful, but passive house is necessary to minimize peak loads.
- Revisit thermal mass and phase change materials as additional tools in shaving peaks.

are other challenges beyond keeping the cold at bay; we must view survivability within the context of local climate conditions and technical risks. Threats to occupant health and safety may include:

- Extreme heat or cold
- Fire and particulate matter pollution from smoke
- Flooding
- Electrical grid outages
- Energy shortages

In discussing survivability, the definition of resilience synonymous with security and comfort, anticipation of future escalating events and social impact, potential conflict of urban vs. rural issues, building and zoning codes that can create both barriers and opportunities, the need for redundancy, low tech vs. high tech solutions, the integration of food and energy systems, typical vs. Passive house construction capacity to withstand weather events.

Some questions to consider - Who defines resilience/security? How does it differ among different communities/demographics? How far into the future can we / should we plan for?

For purposes of this paper, passive survivability is defined as the ability of a building to maintain safe thermal conditions in the event of an extended power outage or loss of critical services like heating or cooling.

A reason passive survivability prioritizes summer overheating above winter cold is because heat and heat related deaths kill more people each year, and on average over the past 30 years, than from any other weather-related event. [source: National Weather Service: www.weather.gov/hazstat/] In passive designed buildings, due to its superior insulation and airtightness, once heat from air temperature or sunlight enters it stays inside until it can be flushed out with cooler nighttime air or mechanical cooling.

- Sufficiency matters; it is easier to manage and takes less energy in small spaces than it does in large. There might even be yet smaller spaces, like “safe rooms” on the north side away from the heat.
- Design for flexibility and adaptability, needs can change more rapidly than you can imagine.
- Encourage missing middle or “goldilocks density” to promote sharing of resources, less thermal exposure per person.

- We have to look at our community and shared systems- solar, geothermal,
- transportation, food and water. We need to think about micro-resilience (the individual building) versus macro-resilience (the community around it)
- Strength of pre-existing community bonds, social resilience critical to survivability (raise threshold of recovery to better than before - regenerative)

One Size Does Not Fit All

Too often we throw the same solutions at vastly different conditions and risks. Dealing with cold is almost easy compared to the problems of dealing with smoke, heat, and in particular, how climate change is driving dangerous "wet-bulb" temperatures.

Research published by Penn State University in the Journal of Applied Physiology in 2022 revealed that young, healthy adult subjects in a warm-humid environment begin to experience heat stress at a 31oC / 87oF wet-bulb temperature, at critical point where the body can no longer effectively regulate its core body temperature. Prolonged exposure at and above this level can potentially lead to heat stroke or death. For older and disadvantaged populations, who are more vulnerable to heat, that heat stress point is likely even lower. This wet-bulb temperature threshold corresponds closely to the NOAA Heat Index danger level which starts at 40oC / 104oF.

Passive house can only go so far as a thermal battery for keeping cool if the wet-bulb temperatures stay high; dehumidification will also be essential.

The Need for Active Systems as Well as Passive

Building to passive building standards alone does not ensure survivability. It is assumed that a passive building can "coast" for a couple of days through a cold or smoke event because of its insulation or airtightness. Eventually, interior air quality begins to deteriorate due to buildup of CO2 and humidity, and passive house does not provide ventilation when the power goes out. Consideration should be given to installing small backup battery systems to keep HRV/ERV

fans operating, as well as some emergency lighting. The backup battery system can be small and simple, as the ventilation fan power and lighting provided by high-efficacy lighting is a low power draw. With the increasing commonality of on-site renewable energy generation, the batteries can be recharged during the event without dependence on the broader grid.

In hot and humid climate zones, humidity is the dominant factor in thermal comfort during extreme heat. A 'heat index' is a measure of how hot it feels to the human body when both air temperature and relative humidity are considered together. At higher humidity levels, sweat evaporates less effectively, reducing the body's ability to cool itself, making it feel hotter than the actual temperature.

While passive enclosures can significantly lower indoor air temperatures compared to the outdoor temperature during extreme heat events, they are not able to address humidity control without dehumidification. In hot, humid climates, managing humidity is not only a matter of comfort, but also a fundamental need, making **battery backup and other distributed energy resources** a critical component to ensuring health, safety, and survivability.

Optimization of Passive Design

Andrew Michler writes from experience in Building Forward in the Face of Fires how simple forms eliminate corners and crevices where firebrands can grab hold. Eliminating vents, careful selection of materials, and a continuous wrap of non-combustible insulation can improve fire resilience.

In an increasingly hostile climate, additional forms of building optimization should be considered. Rather than contributing to the problem of climate change, we ought to reduce the use of materials with high embodied carbon. Plans should be optimized to **reduce building area and the absolute demand for energy**. Sean Armstrong of Redwood Energy has demonstrated that with careful optimization and with smart choices of appliances, an all-electric 2000 square foot home including an EV can be run on a 100 amp panel.

Where passive first design can excel is limiting summer heat gain with an

optimized building enclosure and proper shading. Perhaps the most important metric in design is a low BTU-h/sf to minimize peak cooling. That single metric reduces mechanical equipment sizes that are grid friendly and creates the favorable conditions of survivability during periods of power outages and extreme heat events.

Passive buildings should not just be a well-equipped lifeboat riding out the storm; from first principles it should be part of the solution, reducing demand and perhaps even giving back.

Construction for Deconstruction (AI Summary of Lab Insights)

Lab Members:

- *Rayan Ghazal*
- *Emory Baldwin*
- *Greg Bishop*
- *Ilka Cassidy*
- *Paris Remillard*
- *Ryan Adanalian*

Construction for deconstruction (often called Design for Disassembly or DfD) is a sustainable building strategy that plans a structure's end-of-life from the start. By using modular components, mechanical fasteners instead of toxic glues, and easily separable materials, it allows buildings to be safely disassembled so materials can be reused rather than bulldozed into landfills.

Key Strategies of DfD

Designing a building for eventual deconstruction involves a fundamental shift in how structures are engineered:

- Mechanical Fasteners: Avoid adhesives, welds, and chemical bonding. Use screws, bolts, and interlocking joints so pieces can be unscrewed rather than smashed.
- Material Separation: Ensure different material types (e.g., wood, steel, and concrete) are easily separated to prevent contamination and simplify recycling.
- Standardized Components: Use repeatable, standardized, and modular building elements. This allows components to be easily cataloged and repurposed in future construction projects.

- Accessible Connections: Structural joints and fasteners must remain visible and accessible, not buried behind permanent walls or concrete pours.
- As-Built Documentation: Keep accurate, digital logs of the materials used, their chemical compositions, and how they are fastened. This creates a "material passport" for the next builders.

Benefits of the Deconstruction Model

While traditional demolition is faster and cheaper upfront, deconstruction drastically reduces environmental impact and generates long-term circularity:

- Waste Diversion: Keeps massive amounts of construction and demolition (C&D) waste out of landfills.
- Embodied Carbon Reduction: By reusing existing wood, brick, and metal, builders avoid the carbon-heavy process of manufacturing new virgin materials.

Greg Bishop: Expand the arguments listed above to include the following:

- Rainscreen Exterior Skin
- Biodegradable and Reusable materials
  - & Example Cork House: https://www.matthewbarnetthowland.com/cork-house Biodegradable and compostable material
  - Healthy Building Materials Lab: https://healthymaterialslab.org
  - Locality of panel construction
- Structural System
  - Integral panelization of structure and building skin or
  - Independent structural system from building skin panels
- Mechanical systems:
  - modularized and demountable without incursion into building skin or wall, floor, roof framing
  - Use of chases to route electrical, plumbing, HVAC
  - Decentralized small mechanical systems that minimize routing
- Code advocacy to use repurposed or recycled materials .
- Locality of materials & Construction
  - Local on site construction vs prefab construction offsite
- Insurance Issues: Validation of prefab components to be reused.

Resources

Here are a few links to projects:

https://www.moontoweraustin.com/our-work/cross-cabin
From what I've seen, all of the electrical is in conduit runs inboard of the CLT. I'm not sure about the plumbing. So, easily accessible for maintenance, repairs and upgrades.

https://batesmasi.com/projects/mohegan-trail/
I don't know how the MEP is run in this building, but it's a similar design. And anywhere where the framing isn't exposed is shiplap. So also very easy to open up with a couple of screws to access mechanicals.

https://derrington.co/work/architects-studio-montopolis-austin/
You can see in one of the photos here the baseboard area around the perimeter where all of the mechanicals are run. Super easy access built into the design

https://www.youtube.com/watch?v=4mNTHP-Y_GE&list=PLDYh81z-RhxgCk1qJD6AJktVHZH7-BLSR&index=8
Longer perfect wall video that shows how accessible everything is to repair, maintain, upgrade, or replace.

All of these are a specific design aesthetic that everyone may not love. But I think the same idea could/should be incorporated into even more traditional interiors to allow for the same access. It's not only easier for the occupants to maintain, but will also keep materials out of landfills since you won't have to demo a wall to gain access. And in the case of the cork or the exposed framing or no drywall or latex paints or synthetic materials in these designs, anything that does need to be thrown out as a result of fire or water damage or wear will compost and turn back into dirt without leaving other nastiness behind.

https://c2ccertified.org/
https://urban-mining-index.de/en/
https://aap.cornell.edu/people/felix-heisel/
https://www.circularbuildingscoalition.org/blueprint-projects/concular
https://nitowoodenbrick.com/nito-gallery/
https://www.technometalpost.com/en-US/
https://www.piertech.com/
https://www.goliathtechpiles.com/
https://www.blueprint-robotics.com/
https://urbanmachine.build/
https://www.circularbuildingscoalition.org/
https://concular.de/
https://www.soilconnect.com/
https://doorsunhinged.com/
https://www.ecosupplycenter.com/
https://passivehouseaccelerator.com/podcast/211-working-toward-the-uks-net-zero-targets
https://passivehouseaccelerator.com/podcast/192-revolutionizing-material-reuse-with-concular
https://passivehouseaccelerator.com/podcast/193-urban-mining-and-circularity-with-anja-rosen
https://passivehouseaccelerator.com/podcast/194-closing-the-loop-circular-construction-in-

north-america
https://corkon.com/

Clay wallboard panels
https://hart-keramik.de/en/products/clay-building-boards/

BLDUS Architecture. Healthy materials library in use
https://bld.us/

Design for Disassembly in Mass Timber
https://issuu.com/perkinswill/docs/design_for_disassembly_in_mass_timber

This whole project was built around circularity and construction for deconstruction

https://www.archdaily.com/974658/taisugar-circular-village-bio-architecture-formosana
https://www.bioarch.com.tw/en/work/taisugar-circular-village/?tm=205

These are a kind of mini panelized system. Although not a self-contained wall assembly like the larger commercial panelized systems. Designed for modularity, adaptability, reuse of materials, and self-buildability, if that's a word. In this particular project all of the MEP is also exposed, which gives easy access, but would also keep the modules intact for reuse if deconstructed.
It was also built with a planned future extension:

"Originally designed for Roxie and her partner, Box House was thoughtfully planned with future expansion in mind. The initial design included hidden doorways and pre-laid foundations to accommodate a growing family when the time was right.
During the extension project, we carefully dismantled the areas to be extended, recovering all materials such as insulation and U-Build boxes to create a new upstairs room. Not only did this save materials, but also cut down costs and minimises heat-loss."
https://u-build.org/projects/u-build-box-house/
https://studiobark.co.uk/projects/box-house
https://www.buildconstrux.com/

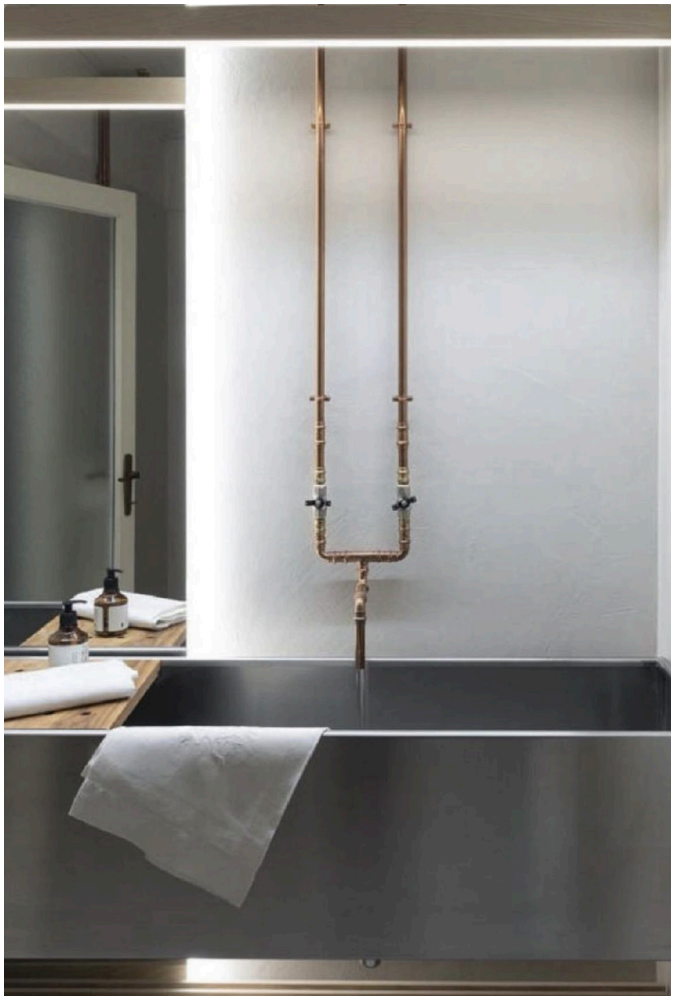
Deconstruction companies

Using robotics and AI to prepare salvaged materials
https://urbanmachine.build/
https://www.ouroborosdecon.com/projects

Material salvage
https://urbanore.com/
This place has been around for a long time- still operating .
https://driftwoodsalvage.com/

San Mateo guidelines and resources
https://www.smcsustainability.org/wp-content/uploads/CD-2019-Final.pdf

Minneapolis building material reuse grants.
https://www.hennepincounty.gov/services/grants-funding-opportunities/environmental-grants-funding/building-material-reuse-grants?from=building-reuse

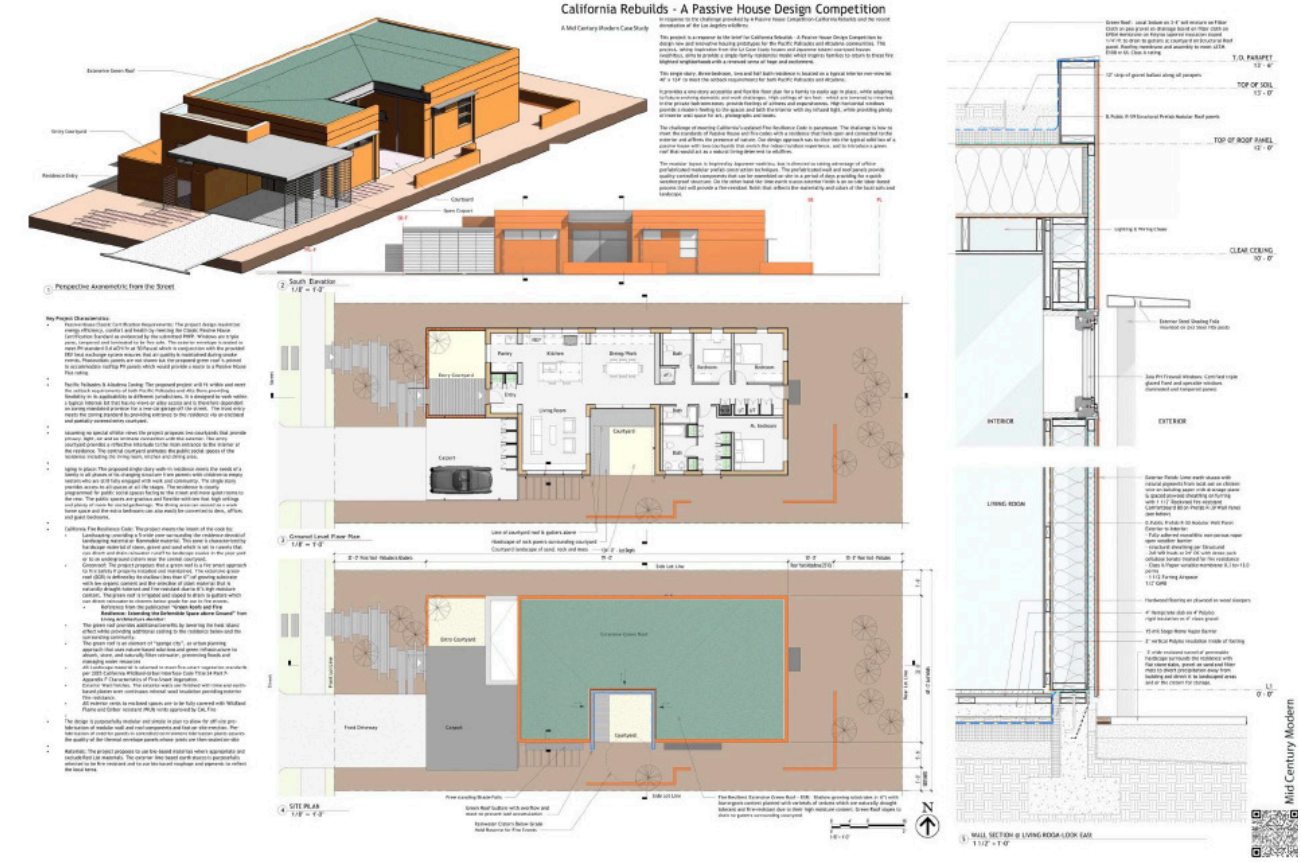



LUNOS

Build Reuse: Build Reuse is a registered 501(c)3 nonprofit established in 1994 that serves as the premier national organization encouraging the recovery, reuse, and recycling of building materials in the United States. https://www.buildreuse.org/about-deconstruction

<<"Prefab Prototypes: Site-Specific Design for Offsite Construction" by Mark and Peter Anderson is a highly regarded architecture book that breaks down offsite construction and prefabricated building systems. It details six distinct manufacturing methods—from timber CNC framing to modular systems—using case studies from the US and Japan. Published in 2007 but still good resource for modular prefab construction with a lot of case studies https://www.amazon.com/Prefab-Prototypes-Site-Specific-Offsite-Construction/dp/1568985606

Mass Timber: Design Research by Susan Jones: Mass Timber / Design and Research presents new research and design work with Mass Timber, a new construction technology, well-known in Europe, but relatively unfamiliar in the United States. https://www.amazon.com/Mass-Timber-Research-Susan-Jones/dp/193962195X/ref=sr_1_2?crid=4JLIKMCGHJFR&dib=eyJ2IjoiMSJ9.OwcAHQM2ZDIsSM9VdXGQ6DNgei7dE3TN_VLYCWbgR7k.skGh0kiwouqbo_EwB6sj57dCHFn_ITtRU8rMopc6GPU&dib_



Straw Bale panels: https://www.buildwithnature.us/

Finding the Tool That Fits Your Goals: A Practical Guide to Bio-Based and Healthy-Materials Resources

Nature-Based Performance Lab, Reimagine Buildings Collective. Spring 2026. Our aim is simple: demystify the resources available so you can engage with the ones that match your priorities best. This brief shares what we found and what we are building; the two surveys linked below are how to contribute.

Lab Members:

- *Rainger Pinney*
- *Brent Watanabe*
- *Paul Herron*
- *Bo Green*
- *Paris Remillard*
- *Susan Bloomquist*
- *Minot Weld*
- *Sunny Thermal*

The Challenge

We asked how we could make it easier for someone with limited or no experience with bio-based or healthy materials to identify and substitute alternatives to problematic conventional materials. Is there an accessible guide available to get started? The answer we found was yes, but...

There are many comprehensive tools and guides available to find, select, and compare bio-based and healthy materials. Each one differs by the lens it applies: carbon, health, disclosure, circularity, and yet,overlap so much to still leave you unsure which to open. Like the practitioners who use them, each tool has its own parameters for deciding what counts as an optimal choice,

and those priorities are not always made clear. The barrier is rarely a lack of information; it is the opposite, what is referred to as the paradox of abundance: the volume of information can be overwhelming, leading to deferred engagement. Every tool is its own rabbit hole. No tool advertises its own blind spots. The newcomer is left with a sea of information and no map for which resource answers their particular question.

Top Takeaways

1. The most useful thing to build is a map, not another tool. There are already plenty of good tools. What is missing is a way to differentiate one tool from another and to identify the blind spots of each. So rather than add another to the pile, we are building a plain-language, annotated guide to the existing tools: for each one, identifying what it is genuinely best suited to address, the lens and parameters it uses to evaluate materials, and where it falls short, so you can match a tool to your priority rather than guess. The guide is still taking shape, and the surveys below are its foundation.

2. A critical mass of aware practitioners is what unlocks availability. The first barrier is not supply; it is knowing what exists and whether the options are practical, durable, and code-compliant. People are curious about bio-based materials but often do not know what is out there, or whether they will hold up on a real project. Because they do not know what to ask for, the demand never reaches the lumberyard, where builders default to what they can get today. Distribution is a genuine constraint (special orders, minimum quantities, long lead times), but it sits downstream: it moves once enough specifiers are asking for the same things. Rockwool got far easier to specify once it reached the shelves at Home Depot. That is the order of operations our guide is built around: by helping a growing number of practitioners find and trust the right options, it builds the collective demand signal that pulls supply into place and surfaces the regional gaps where no viable supply exists yet.

3. Careful detailing is not unique to natural materials. The oft repeated

concerns about bio-based materials - susceptibility to fire, moisture, pests - often apply just as much, or more, to conventional ones: foam burns rapidly and produces toxic smoke and burning droplets, vapor-tight sheathing exposed to condensation can harbor mold and rot, and fiberglass insulation is a favorite nesting material for pests. There is rarely a novel risk inherent to a bio-based swap that a practitioner isn't already managing in a conventional material. At the same time, bio-based is not risk-free, and our guide is more credible for saying so: certifications can mislead, and bio-based materials supply chains deserve the same scrutiny we give conventional ones.

What We Are Building

The guide is the centerpiece, continuously curated and updated by practitioners like you.. Two companions sit alongside it. They do not help you choose a tool; they help a newcomer act once they have a direction, and both are usable today.

A starter swap list. Many of the tools available today include extensive swap matrices; ours is a short example, a place for a beginner to see what is possible, not the catalog. It shows some of the lowest-friction, one-to-one swaps available in much of North America now. The right swap always depends on location (project region and climate zone), the project's typology and size (which drives code, risk, and cost), and time-period(tariffs and supply shifts move cost and lead times), so treat any specifics as time-stamped.

Conventional Product	Bio-Based Starter Swap	Watch For
Fiberglass batts	Hemp, wood fiber, or wool batts; or dense-packed cellulose or wood fiber	A direct batt swap is the lowest friction; dense-pack needs an installer with the equipment
Exterior foam board (continuous insulation)	Wood fiber board, cork board, or hemp board	North American supply is growing, but distributor stocking still varies

Below-grade foam	Foamed glass aggregate (Glavel, Aero Aggregates)	A different application, but it installs much like gravel
OSB or plywood sheathing	Solid wood boards	Options are still limited; grass-based OSB (Plantd) is in development
LVT or composite flooring	Cork, linoleum, or wood	
Vinyl, metal, cement-board, or stucco/EIFS cladding	Cork; wood (cedar shake, shou sugi ban, thermally modified); or lime render	Wood needs periodic resealing or repainting and cork and cedar change color; lime render needs a suitable substrate (masonry, or a lath system over exterior continuous insulation)
Latex paint	Clay, lime, mineral, or linseed oil paint	May need additional primer or dry time
Gypsum drywall	Solid wood boards, hemp-lime, or lime plaster over lath	

A friction framework. A swap that looks easy on paper can stall on a single practical detail. The friction framework helps you score each bio-based product on eight key criteria that impact the ability to exchange that material for a conventional one. Use the table below to score each axis as low, medium, or high foyour projec. As a beginner, start with the lowest-friction swaps; a negative early experience can be more detrimental to growing adoption than lack of exposure. Scoring this way keeps the decision yours to make, with eyes open. These are practical factors, not moral criteria; the goal is to help you run your own risk assessment, not to tell you what to use.

Friction Axis	**What to Assess**
Precedent in a comparable climate	How much track record exists in a similar climate zone? Assessing this may involve looking at analogous climates overseas.

Cost premium	Final installed cost versus conventional (material plus any added logistics or labor), not material price alone. Some swaps carry no premium, or even cost less.
Lead time	Days or weeks from order to site.
Minimum order quantity	Does it work for a single-family project?
Code and inspector familiarity	Will this raise questions on your project?
Insurer or rep posture	Known exclusions, conservative reps, liability flags.
Installer experience required	Can a typical crew handle it? Is your specific builder comfortable installing it?
Assembly implications	Does the swap change adjacent details, like vapor control or fasteners?

How to Contribute

Rather than try to master every tool ourselves and hand down our own verdict, we realized a more effective path would be to tap our network. The one thing we cannot get from a tool's own website is how it actually performs in practice, and that knowledge lives only with the people who have used these resources on real projects. The guide reaches useful depth only with that input, so contributing is also how it comes to cover your tools, your climate, and your swaps. Two short surveys:

Tool review: Bio-Based and Healthy Materials Selection Tools: Practitioner Field Review. If you have used one or more of them, your read on what a tool is best for, what it quietly does not cover, where the interface falls down, and what to pair it with becomes the part of the guide that saves the next person hours. It takes a few minutes per tool, and you can review up to five in a session. Reviews are grouped by tool and synthesized into each guide entry; we distinguish what reviewers observed from hands-on use from what is drawn from a tool's published materials. We credit reviewers by name unless you would rather stay anonymous, and email is optional, used only for follow-up.

Swap field report: Bio-Based Swap Field Report. If you have replaced a conventional petroleum-based or carbon-intensive mineral-based product with a bio-based renewable alternative, or even explored the idea, share your experience: the conventional product, the alternative, where you sourced it and how that went, the lead time, and the cost. Dead ends count as much as wins; when nothing is available in your region, that is a gap worth recording.

What's Next

None of this is finished; the surveys are a first step in leveraging our collective knowledge, and we welcome suggestions of additions or corrections to any of the material here. We also want to avoid reinventing work that exists: the Bio-Based Materials Collective's Primer and the Healthy Materials cohort both overlap with what we are building, and coordinating beats duplicating. We hand this forward to the next Lab group with one open question: the right final form for the guide, a PDF flowchart, a living web resource, or both, and how to get it in front of the people who need it most.

Retrofits Cookbook

Lab Members:

- *Eric Zeise*
- *Peter Holtzman*
- *Paul Herron*
- *Kim Cloutier*
- *Fabrizio Maso*
- *Jackson Lehr*
- *Rayan Ghazal*
- *Andy Allwine*
- *Brandon Nicholson*
- *Allan Horvath*
- *Mark Attard*

Open & Crowd-Sourced, Searchable Database of Passive House Case Study Projects.

Ideally create structure to allow submission of projects that allow for regularized categories (pull-down menu vs text field)

Purpose/Goals of Database:

- Information/Best Practices sharing among the PH Community
- Education/Upskilling of New and Existing PH Practitioners
- Reference Information
- Starting Point Templates
- Useful in Client Communication / PH Adoption

Potential Categories/Tags:

- Climate Zone
- Location
- Primary Structure
- Certified / Pretty Good / Improved

- Exterior / Interior Insulation
- Exterior / Interior Air Barrier
- Exterior Limitation (e.g exterior cladding preservation, city regulations)
- Interior Limitation (e.g interior finish preservation)
- Building Element - Wall, Roof, Floor, Foundation.

Data Formats/Types Collected:

- Drawings - Especially Details
- Photos
- Building Materials / Products Used
- Genericized Model Data
- Narrative Summary?
- Pitfalls/Challenges?

Challenges for Implementation:

- Proprietary Data Formats (PHPP/WUFI)
- Photos
- Building Materials / Products Used
- Genericized Model Data via PHX Needs a persistent output/export file format.
- Creation of Database & Contribution Pipeline
- Hosting of Data
- Maintenance

Future Wishlist:

- Open-Source, interactive model for design iteration.
- Building Materials / Products Database
- Rough Costing Implications in model?

Selling Passive House in a Time of Insecurity

From the Reimagine Buildings Spring Lab 2026 Selling Passive House Group:

Lab Members:

- *Lloyd Alter*
- *Trey Farmer*
- *Bo Green*
- *Paul Herron*
- *Paris Remillard*
- *James Turner*

By following these principles, homeowners can achieve high-performance retrofits over time without the costly mistakes that come from improper sequencing or inadequate planning.

The Challenge

At present, there are echoes of the energy crisis that led to movement toward making buildings more efficient back in the 1970s. The scenario is not the same, and perhaps not even the feeling, but bills are already high and seem to be going up indefinitely, which is making people rethink choices.

In some ways, this can work against passive house, (arguably incorrectly) viewed by some as a "premium" or luxury; a nice-to-have. The challenge, then, as always, is one of education, but in this case not just about "what is passive house?" but more about "did you realize passive house is actually this?" or "did you realize this was possible in a building?"

Top Takeaways

- Fear, Uncertainty, and Doubt (FUD) is not the way forward.
    - Sell security. Not financial security specifically — stability in the broadest sense. "The cushions don't blow away in the storm. The house stays comfortable for a week without power. The mortgage doesn't get underwater because your energy bills doubled. All of it is the same thing.
    - Being overly alarmist - even if warranted - can backfire. People want to be told that we have a solution that will keep them o.k.
- Work with loss aversion, not against it.
    - People resist change, and will avoid pain to a greater degree than they will pursue desire.
    - Share the now long-proven performance results to say, "hey, this is new to you, but it's actually old news and is the best way for you to avoid having to change.
    - Make them see that the minor change to passive house/high-performance is actually much preferable to the major change of dealing with higher bills and unlivable spaces.
- Different pain points for different audiences.
    - Listen to the client's concerns first, then offer the solution, rather than leading with an alarmist viewpoint in the hopes the client agrees.
    - Two tiers of clients: those who want the best, those who want a good deal.
    - Another niche is people who care about the environment and "doing the right thing," BUT who don't want to sacrifice comfort.
        - To reach these people, we have to counter the comfort objections by presenting the elements that are good for the environment AND provide superior comfort.
        - A good rule of thumb is to tackle both at once at every point - never present the environmental benefit without commenting on the comfort it provides (and vice versa).
        - "It's a terrible time to talk about carbon, but not a terrible time to talk about energy costs." - Lloyd Alter

What's Next?

As extreme climate events happen more often — such as the recent heatwaves in the UK and Europe — people's awareness of the gap between what they have and what they need will continue to grow.

Without being alarmist about the insufficiencies of code-built homes, this moment is an opportunity to raise awareness of the benefits that passive house and passive building techniques can provide, with relatively little change to lifestyle, in the hopes of dispelling the myth that passive house is only for the wealthy.

Office to Residential Conversion Lab

Lab Members:

- *Matt Soltys*
- *Mike Wong*
- *Nelson Yuan*
- *Michael Dudek*
- *Tom Hootman*
- *Shaun St-Amour*

A tough topic to discuss, from pre-design to design to Construction
The solution is not easy! – a developer's perspective

To sum up the conversion process and risk, it falls into the "Very Hard Project".

My perspective is that the process is at the highest risk during the "pre-design process".

Unlike new construction, there are existing conditions to deal with, evaluate, and analyze. An unfortunate move can make the project "too hard to accomplish".

Construction is semantics; applying Passive House brings value "if it can be applied".

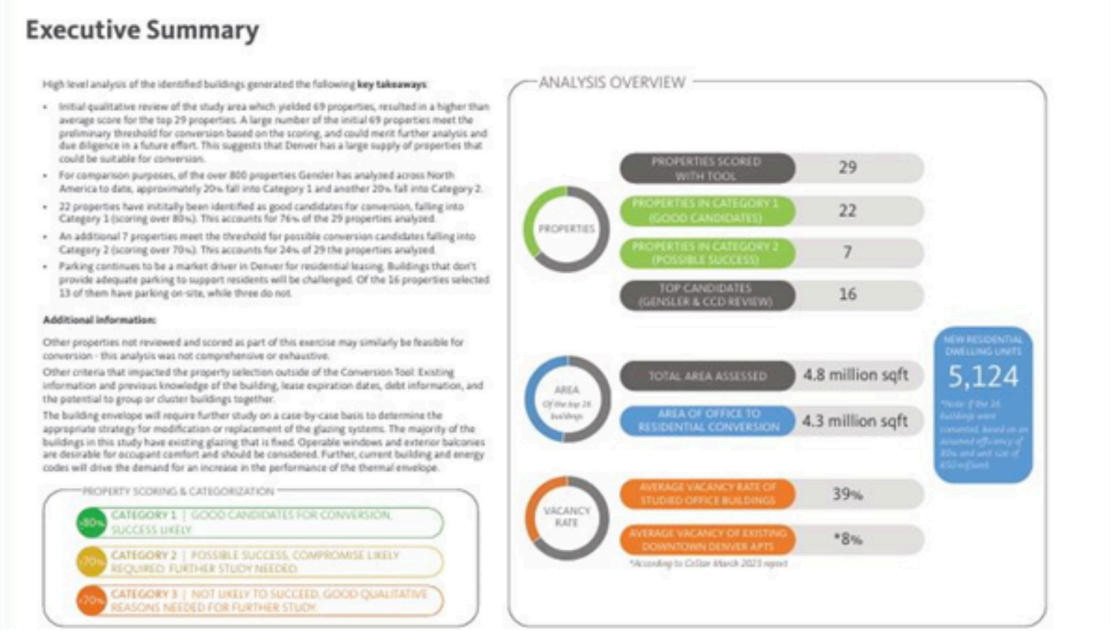
After multiple days of discussion, the team decided there is market-rate and Low-income housing, but no middle market, and many commercial buildings are sitting vacant with available space. Our group discussed this in great detail with many viewpoints from two experienced developers (Rockford, IL, and Montreal, Quebec), Architects, and Reimagine Educators. Wall learned a great deal.

We referenced a Gensler Architects Denver study about downtown Denver and selecting the "Right" building to renovate and the criteria approach the A/E firm used.

We felt the 2023 repositioning report came short of addressing the development issue and excluded too many buildings. Gensler felt that 20% of 74 buildings were adaptable for "Office to Residential" based on Building form, Floor plate, Servicing, Envelope, and Site context.

Our group felt that 80% of the buildings have the potential, but required a more creative approach, hence why you hire an architect! Both Development team members felt the "Pre-design" element is a very important element that was not even discussed.

We feel pre-design of a project could be an additional category for each project.



Financing is also an additional element that needs to be addressed. But happens with any project. In the case of "Passive House," the lending partner may be institutional, who is looking for a higher quality and more durable product/ lifespan.

> "Where are you going to get the money? And what is the capital stack to make the project go?"

Pre- design Elements:

Many pre-design items become barriers to entry or deal killers. Some projects don't even get to the drawing stages.

- **Marketing, Marketing, Marketing (much like "Location, Location, Location")** - You have a successful location already; "marketing for momentum is so important". Even if the vision is only 80% complete, communicating the concept design to the public helps gain support from all parties involved and the general public.Sell security. Not financial security specifically — stability in the broadest sense. "The cushions don't blow away in the storm. The house stays comfortable for a week without power. The mortgage doesn't get underwater because your energy bills doubled. All of it is the same thing.
- If you were a neighbor and knew the new project was sustainable and of

high quality, you'd probably support it!

- The point is to **"State the Mission"**
- **Cooperation with the City Building Department and City Council.** The possibility of the ability to be creative and add floors to expand capacity may be the answer to a renovation.
- Also, discuss the inspection expectations and propose options to expedite the construction process.
- A good example is "unit by unit" inspections, or allowing partial inspection. Also, possible temporary occupancy of lower floors to allow early occupancy.
- The Fire Department has life safety issues to discuss in "pre-design" and is a separate jurisdiction! You need a fire inspection to get temporary or final occupancy.
- **Neighborhood Support** – opposition can delay or kill a conversion deal. Neighbors need to be informed and support the project. Although they may object early on, they will give the development team constructive feedback that may be resolved.
- A June 2026 opinion article in the New York Times by Binyamin Applebaum titled "One City Might Just Have Cracked the Housing Crisis".
- It is about a Vancouver high-rise building built on tribal land that was allowed to bypass the standard approval process and allowed the development flexibility to build a high-rise with neighbor objections successfully. Some reader comments stated the article was biased, but it solved a need for housing, with "modifications of building regulations" to allow the project to succeed.
- **Pre-leasing** – In many financing agreements, a percentage such as 50% to 75% of pre-leasing is a critical goal for financial institutions. The higher the percentage, the lower the risk to the lender. This goes hand in hand with the marketing aspect. If you have 50% of the units pre-leased within a reasonable construction window, then the lender has little problem with backing a construction loan and/ or mortgage loan. Some developers keep these loans separate in an economy of higher interest rates
- **On-Site Parking** – The ability to allow no parking requirement helps make projects that do not have parking become a reality. New to Vancouver, B.C. and Montreal, Quebec. Ask cities to drop required parking requirements to allow the project to move forward. Maybe parking is

offered by an adjacent city parking lot. An example is the Northern Trust Building in downtown Rockford, IL. Residents purchase monthly parking from the adjacent city lot.

- **Labor Unions/ Prevailing wages**- Labor unions can create a large problem for owners/ developers.
- Certain items need careful orchestration. In the case of Union and Non-union work, non-union work can take place via an owner-supplied contract.
- Many cities have rules: if you get any form of city incentive, a **"prevailing wage clause"** will most likely be included within the city final agreement. This increases cost. This requires Union workers or other worker getting a prevailing wage and benefits, in return for city contributions to a project. Similar criteria apply to the state and federal government, but vary by location,
- **Incentives, forgivable loans, TIFF districts, and Rebates** – As a follow-up to a good marketing plan and good PR, it pays off in the way of getting City, State, and Federal incentives, including utility rebates or tax credits. Utility companies and financiers want good PR Projects.

Architectural Design:

- **Design:** "Planning is Everything"
- **Consulting Team/ and IPD Method**
- Have a team with the experience to move efficiently through the incentive or requirements process to keep the project on schedule. Too many variables to manage. Having a G.C. & Fee General Contractor (cost plus) is a huge benefit to "The Team"!
- **Security (especially if it is mixed-use)**. Dedicated access-controlled elevators and security cameras need to be heavily considered.
- Have a separate entry point for residential owners to minimize security issues. Also, fire exits.
- **Envelope - Insulation and windows are a major expense!** Most older buildings have none!

Existing Conditions:

- **Existing utilities (what do you have to work with?)**

- **Power** – You need individual submeters for each tenant. Appliance load from the energy model should provide a reduced size for a Passive House Standard. These are typically new service and is a long lead item to get utility meters installed and activated,
- **Common Water** – It's hard to provide electric hot water in individual apartments, so it is recommended that a common electric or gas water heating system be used for all apartments. Cold water should also be supplied by the Landlord and made part of the rent of the apartment unit.
- **HVAC Comfort** – Each unit should have its own electric heat pump unit wired directly to the tenant subpanel.
- **HRV/ Ventilation** – In an apartment scenario, HRV units need to be maintained and are important to the occupants. It is best to find the right installation. It is recommended that a common HRV is used for multiple units and the filter access is in a public space where maintenance can change the filters on a regular basis. In a historic building, ventilation grills can be a significant challenge and may not be allowed on major elevations.
- **Daylight/ emergency window exit access** - Most buildings have no operable windows. **Window replacement is probably the most expensive element of a project. This cost needs to be evaluated at pre-design for installation and removal at a high façade elevation.**
- Because of limitations and interpretation of fire codes. Predesign meetings shall take place before drawings are prepared. Based on agree building code interpretation. The operation of windows could severely impact the overall cost of the project.

Construction: (Stage 3 after drawings are done)

- By the time you hit the construction period starts, the G.C. needs to be utilizing every minute during construction.
- **IPD process** - This leads to good drawings, which are a godsend. I recommend this to all owners to reduce change orders. Since the contractor is involved during the design process, it buys more time to refine the scope of work for each subcontractor and receive feedback. This will shorten the bidding process and get more accurate numbers. Or in some cases, allow for "Value Engineering".

- **Time Schedule** - Good, Fast, Cheap. Pick two! Time is money. The contractor GC's of "General Conditions is dictated by the time spent on the job. Any savings of time reduce costs. This can be done by identifying and pre-ordering long lead items. Obtain approval on inspections in an expedited manner or deliver and install the product (prefabricated or manually constructed). In the case of Passive House certification, during construction, on-site testing and post-construction testing may need to be pre-planned and scheduled. This would allow possible temporary occupancy for completed units on a floor-by-floor format.
- In closing, as an Architect, Construction Manager/ G.C, Developer, doing any Office to Residential conversion requires a large amount of pre-design/ due diligence, and an integrated team of professionals (including the contractor). In the bigger picture, there is a good amount of pre-design field work needed that requires investigation and as the project evolves. The G.C. can be competitively bid on a G.C. & Fee basis, so you have the contractor involved in the design, prior to construction. This will drastically reduce change orders and cost overruns. Conversions are not an easy task that requires a team of experts.