Mass Timber Research Workshop
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Hygrothermal Performance of Mass Timber Construction

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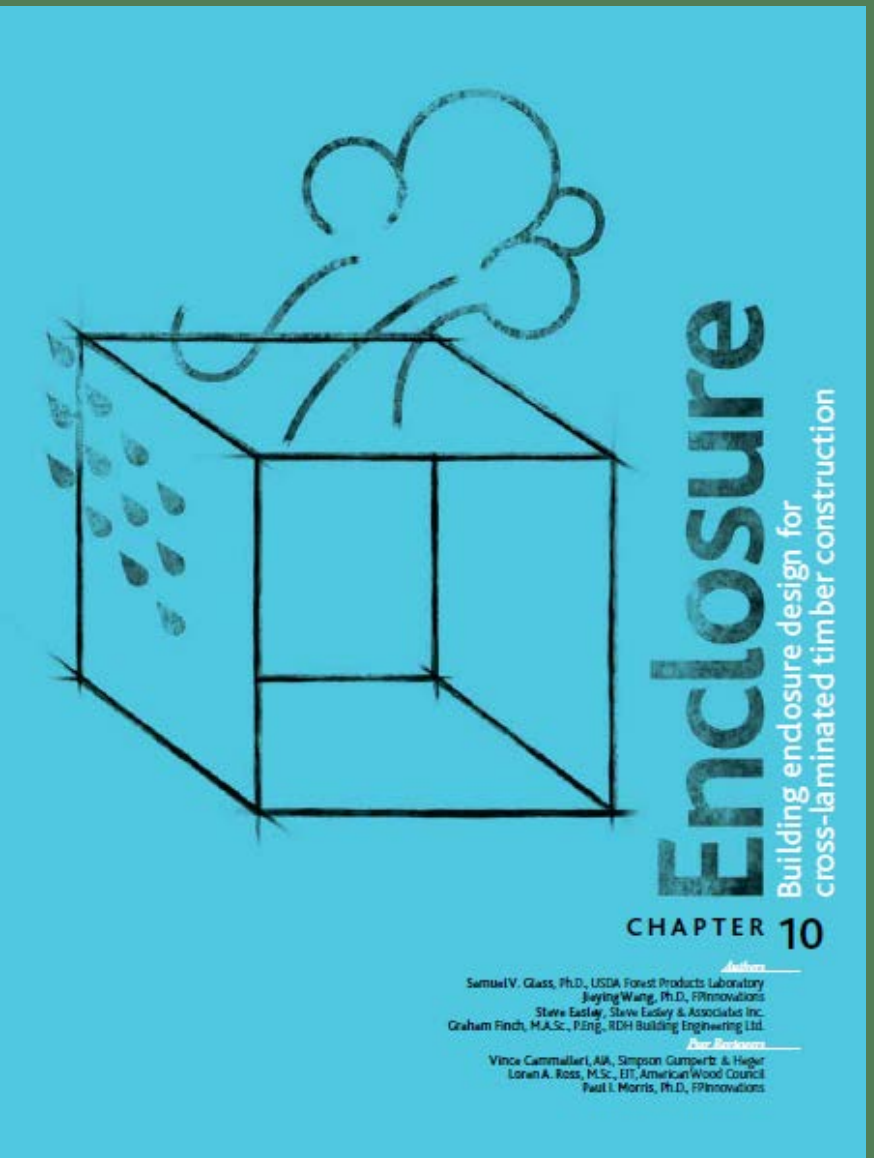
an ounce of prevention is worth a pound of cure

(Benjamin Franklin)

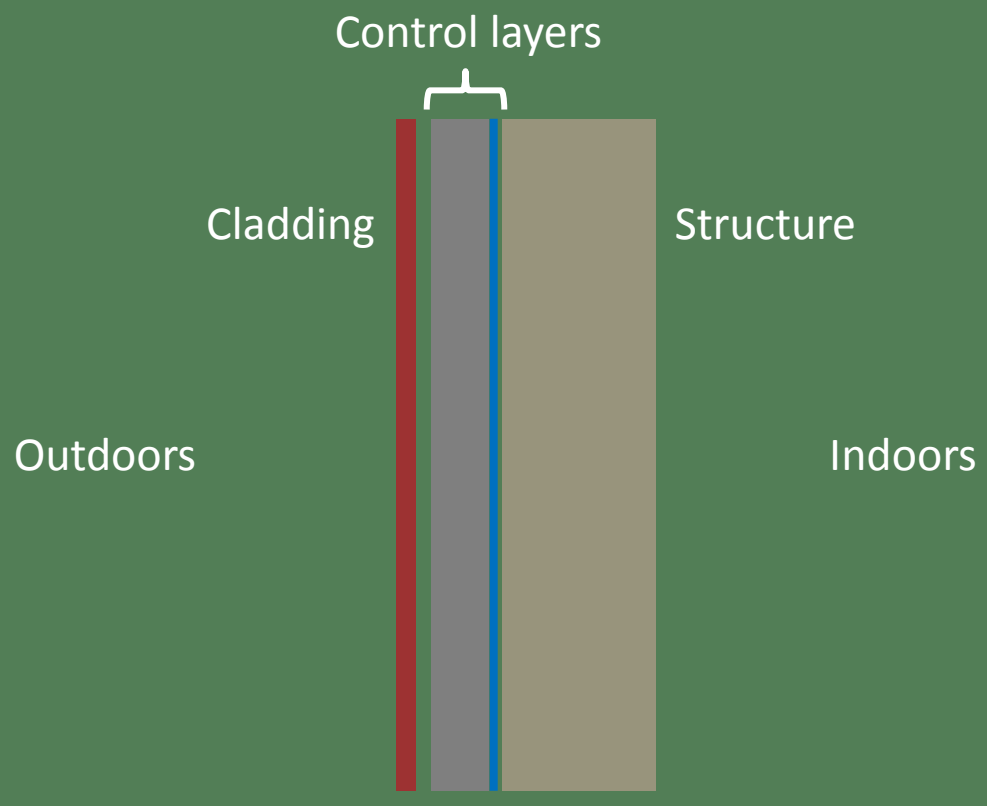
Building envelope is an environmental separator



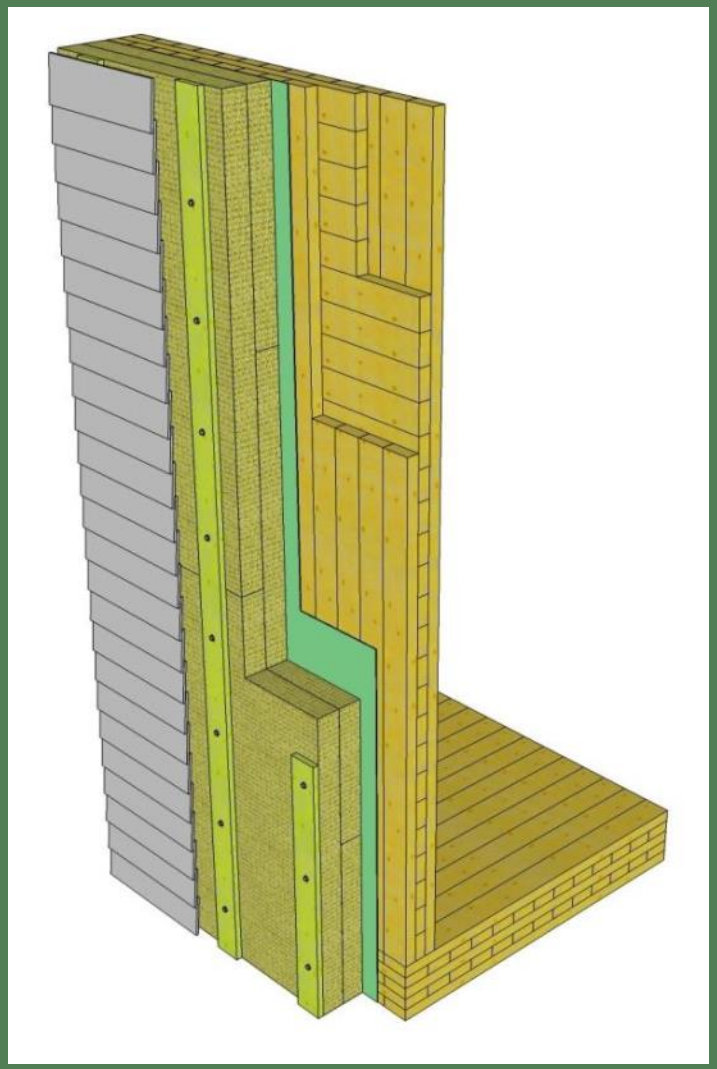
Critical functions:

1) Prevent water intrusion
2) Manage air flow
3) Manage vapor diffusion
4) Manage heat flow

“Perfect Wall” concept is apt for mass timber



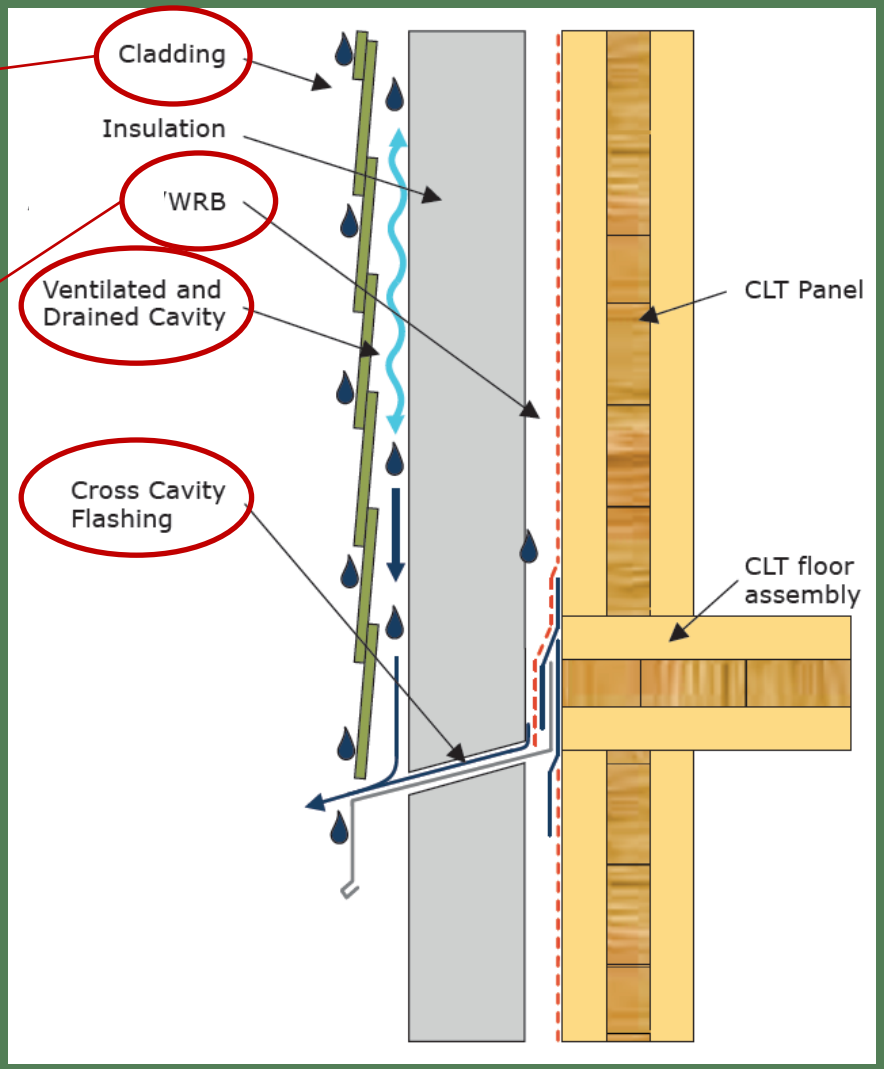
The Perfect Wall by J. Lstiburek
www.buildingscience.com



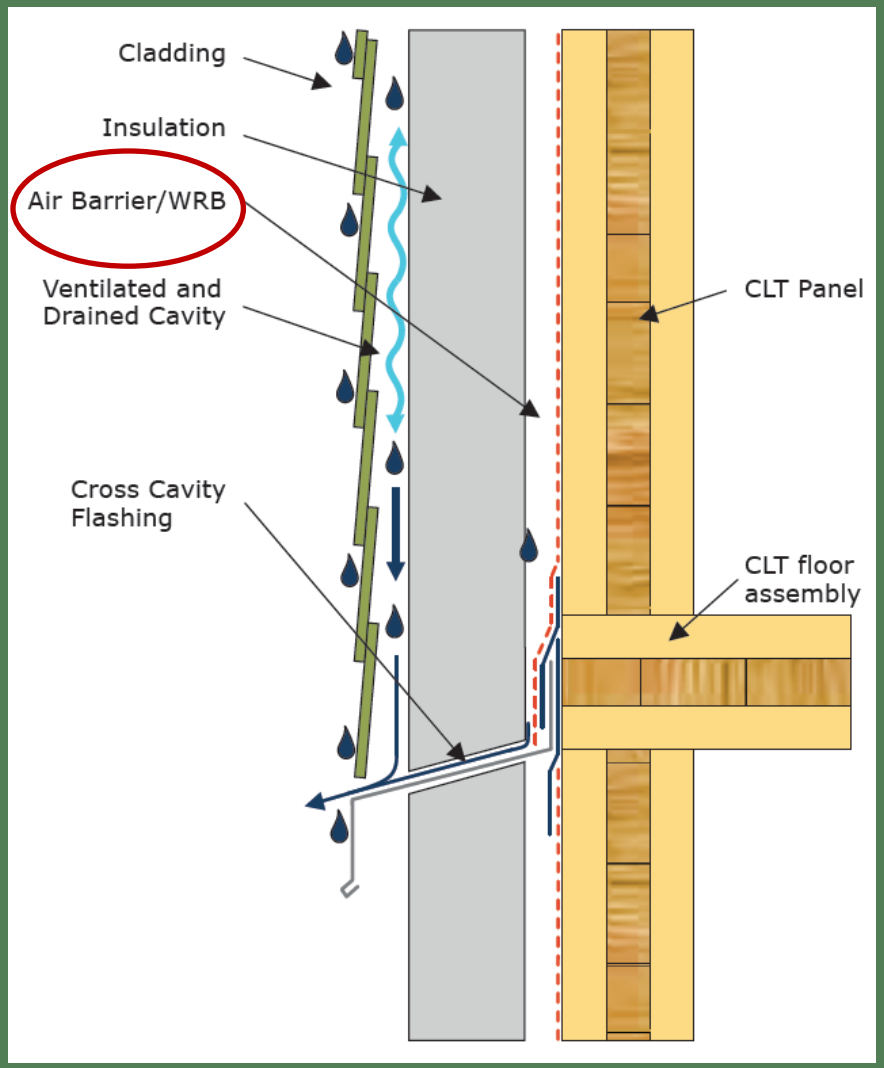
Water management is most important

Water-shedding surface

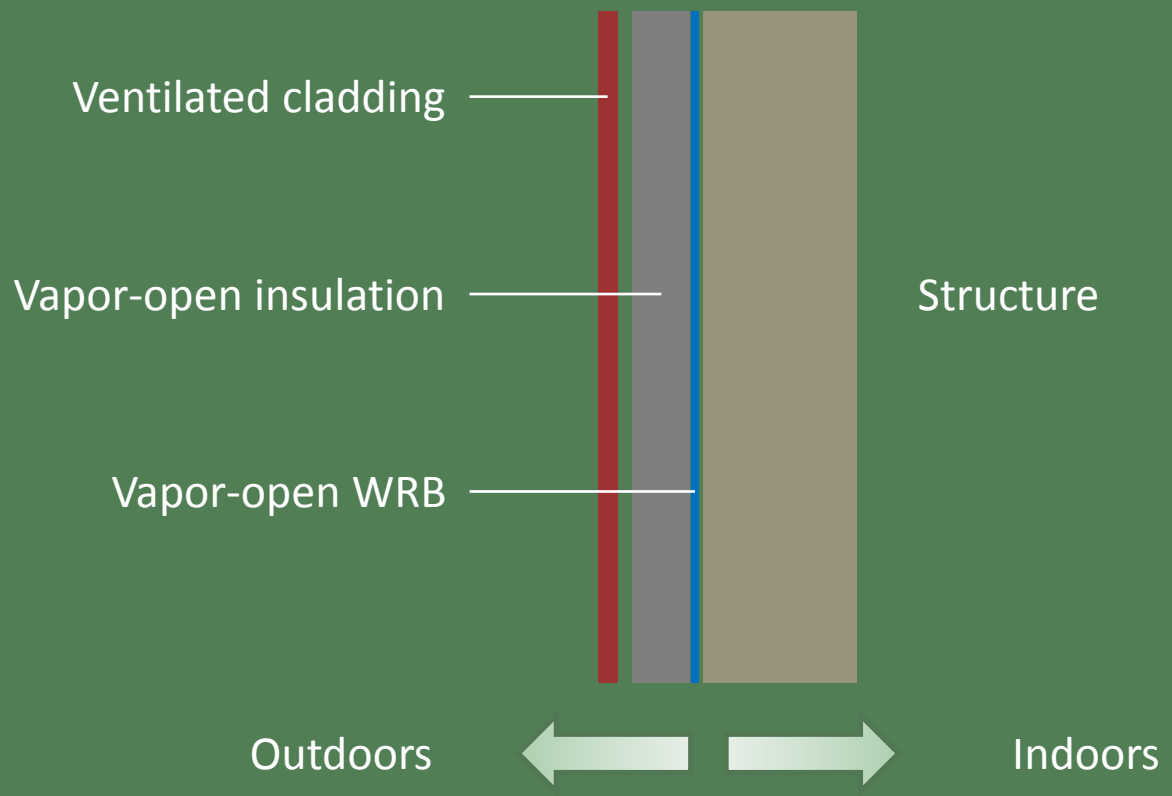
Water-resistive barrier (WRB)



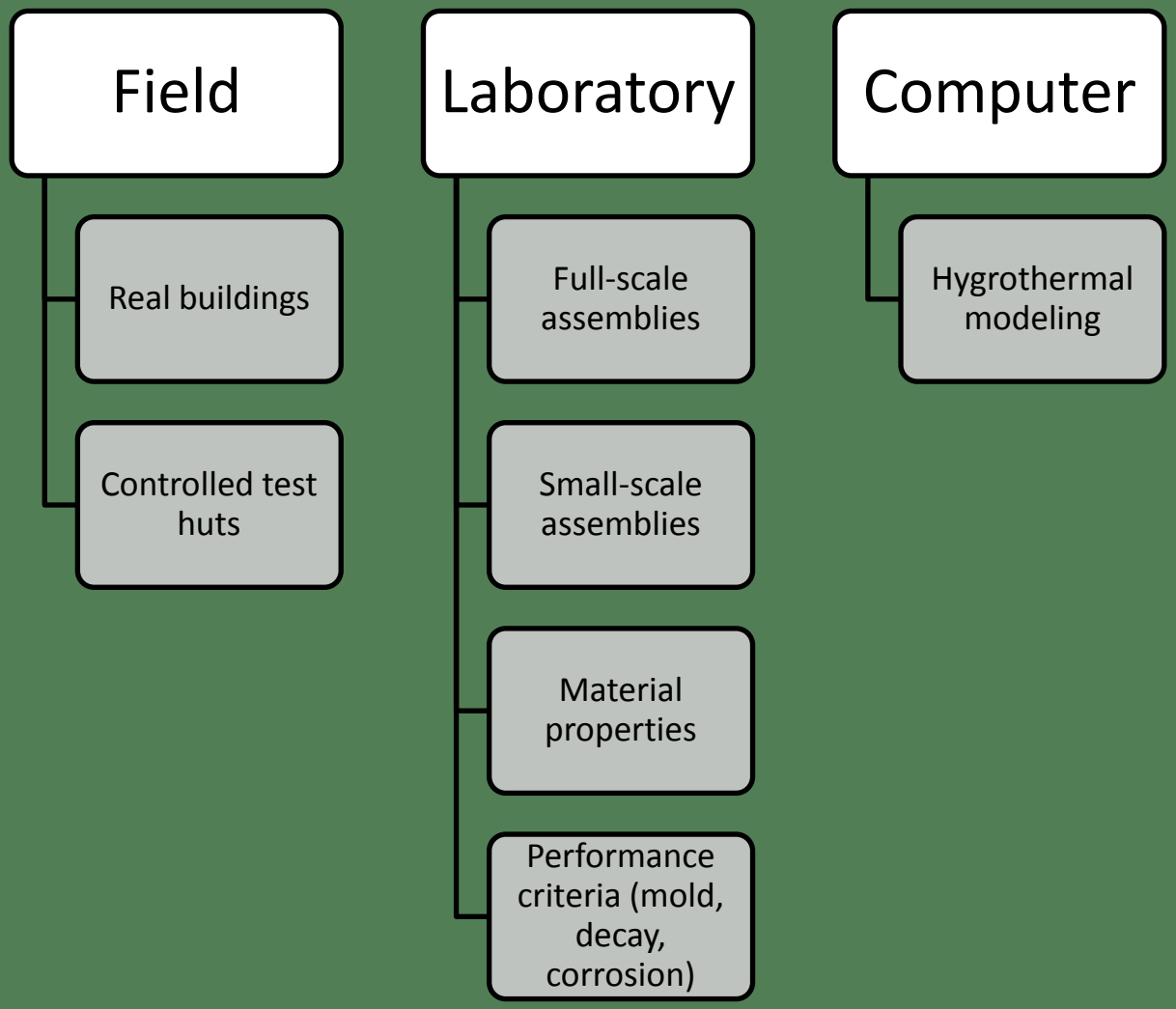
Water-resistive barrier doubles as air barrier



Vapor-open assemblies dry in both directions



Approaches to moisture performance research

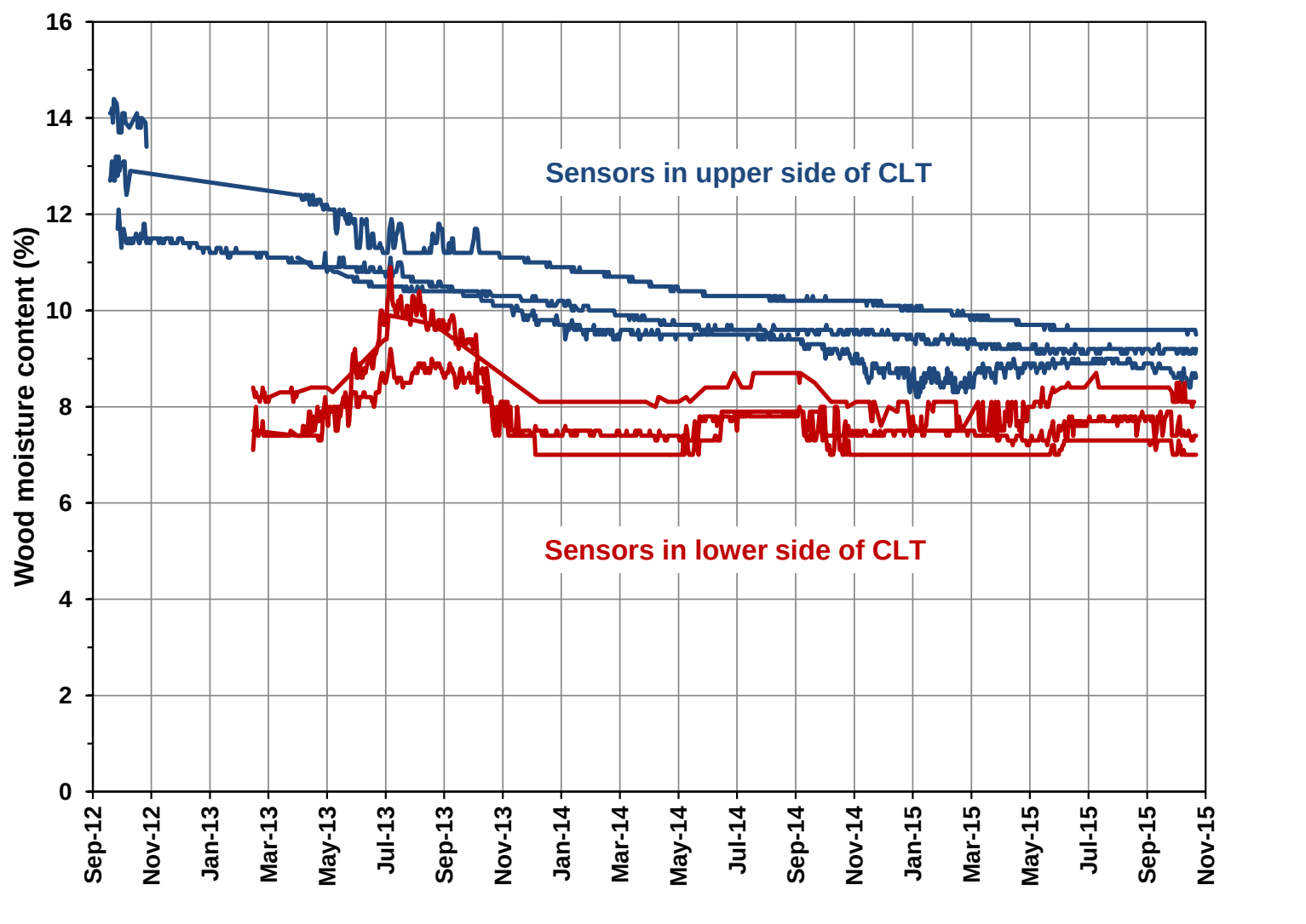


FPL monitoring moisture in CLT roof

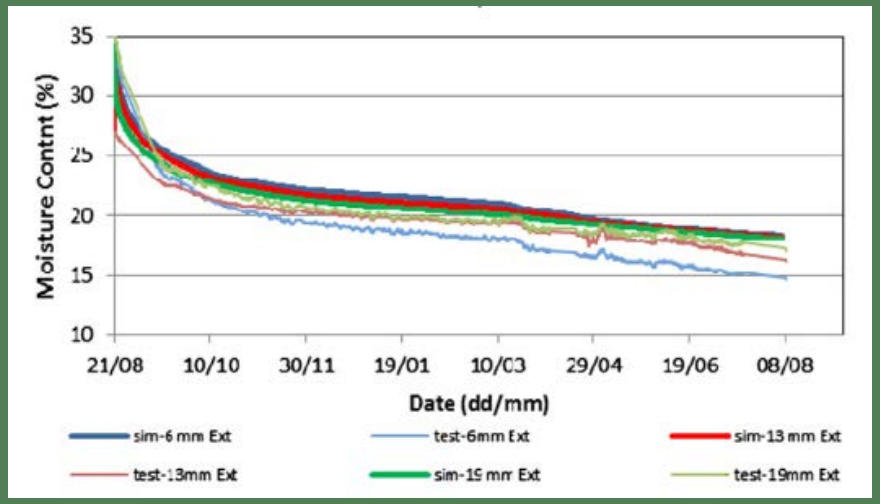
ID 120B01

STRUCTURAL WOOD

Monitoring demonstrates good moisture performance

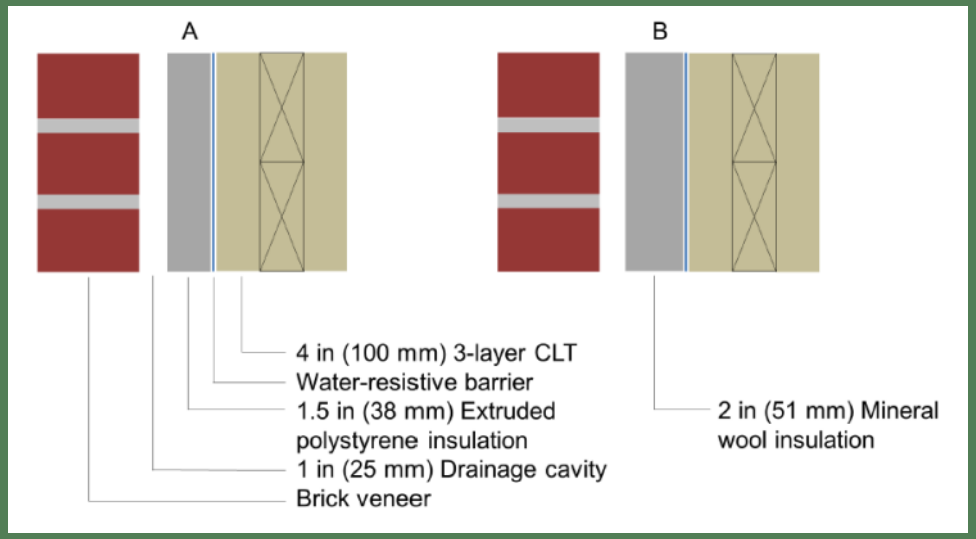


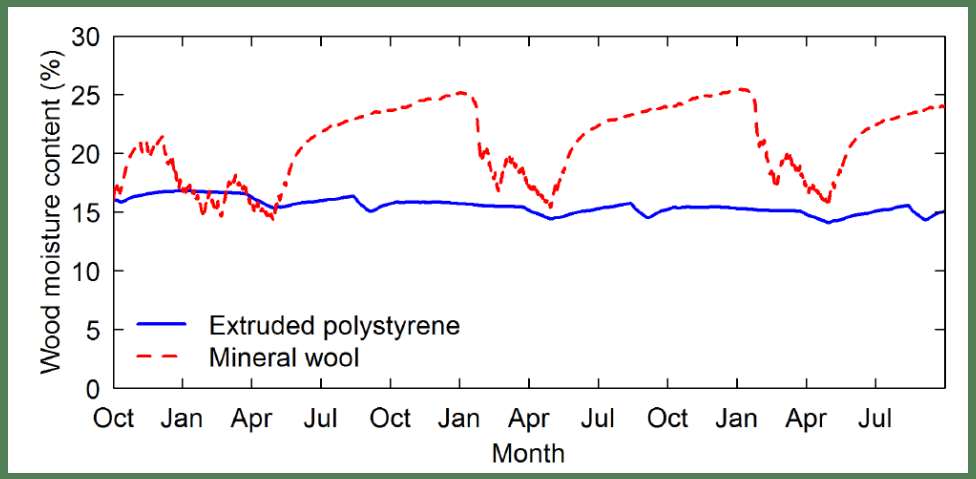
Test hut study shows CLT walls dry predictably



McClung, R.; Ge, H.; Straube, J.; Wang, J. 2014. Hygrothermal performance of cross-laminated timber wall assemblies with built-in moisture: field measurements and simulations. *Building and Environment* 71:95–110.

Hygrothermal modeling identifies potential risks





Glass, S.V.; TenWolde, A.; Zelinka, S.L. 2013. Hygrothermal simulation: a tool for building envelope design analysis. *Wood Design Focus* 23(3):18–25.

Interlocking CLT: low-rise buildings, dry climates

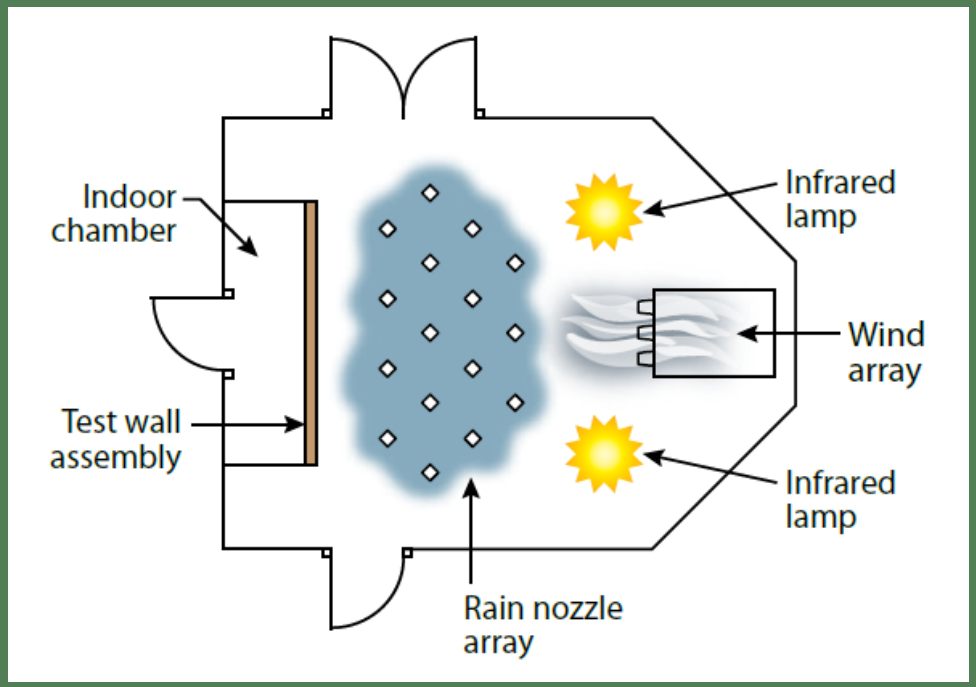
Rio Mesa Center Bath House

Cooperators:

- University of Utah
- University of Idaho
- Brigham Young University
- Euclid Timber Frames

How will ICLT perform in other climates?

Chamber for Analytic Research on Wall Assemblies exposed to Simulated weather (CARWASh)


Indoor chamber
Test wall assembly
Rain nozzle array
Infrared lamp
Wind array
Infrared lamp

AIRFLOAT

Hygrothermal performance research needs

- Monitor in-service performance of real buildings
- Quantify wetting and drying during construction
- Gauge risk of solar-driven inward diffusion from absorptive claddings
- Measure variability in key material properties

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