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Advanced Moisture Management In Cold Climates

Building Envelope Science | Passive House Design | Air & Moisture Flow Management

Advanced Moisture Management

- review moisture-driven damages
- evaluate the impact of cold climate conditions on building durability
- compare different risk assessment methods (dewpoint vs dynamic)
- review data collected from occupied passive house buildings in cold climate zones

Emu's Builder Training

CERTIFIED
PASSIVE HOUSE
TRADESPERSON

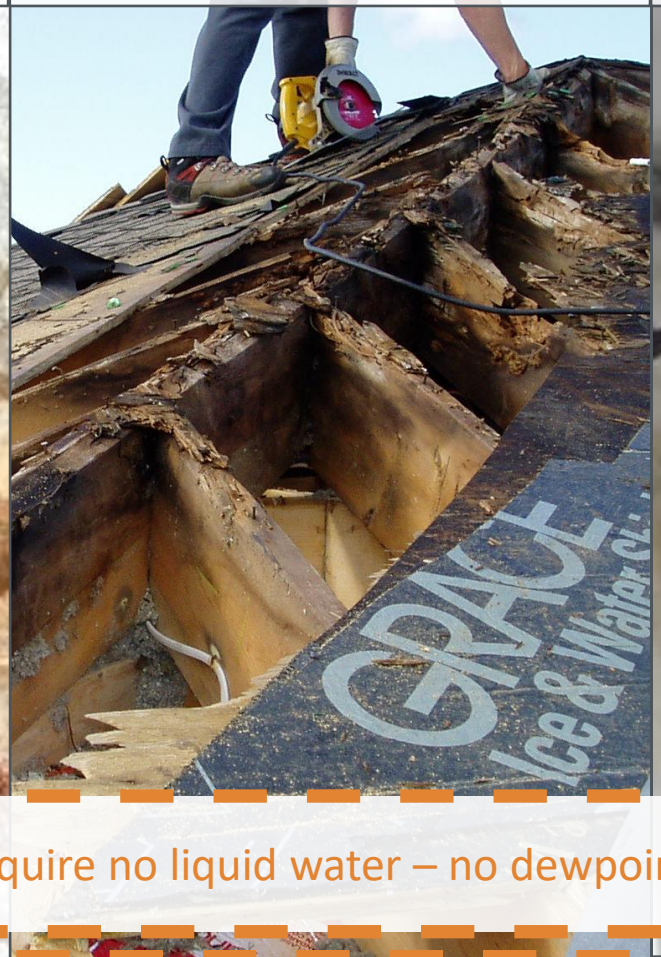
TRADESPERSON

Emu Pilot Program

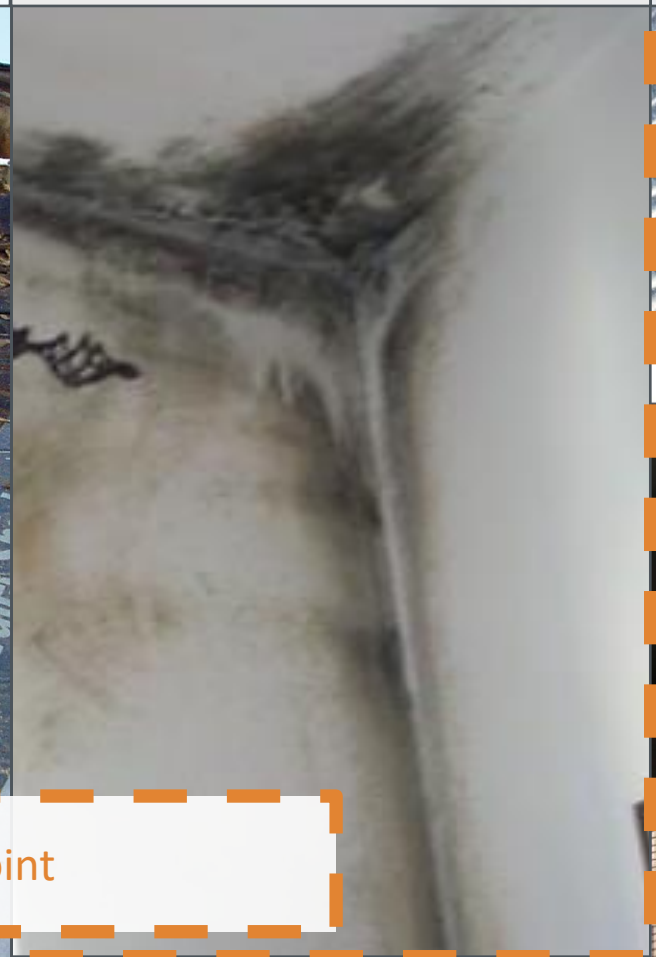
Moisture-Driven Damages

Corrosion

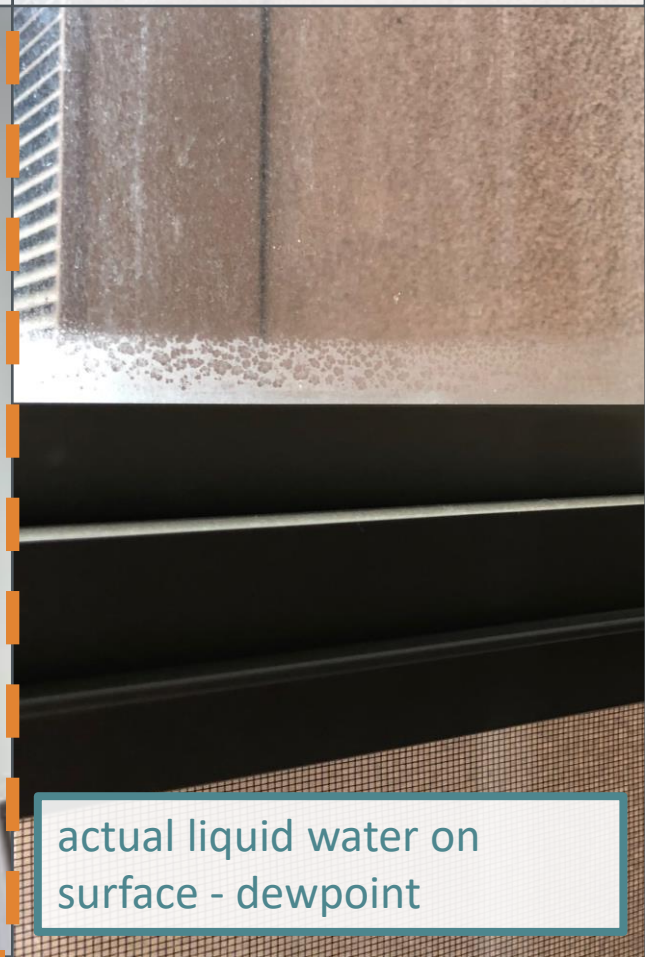
Biological Decay (wood rot)



Mold



Condensation



require no liquid water – no dewpoint

actual liquid water on surface - dewpoint

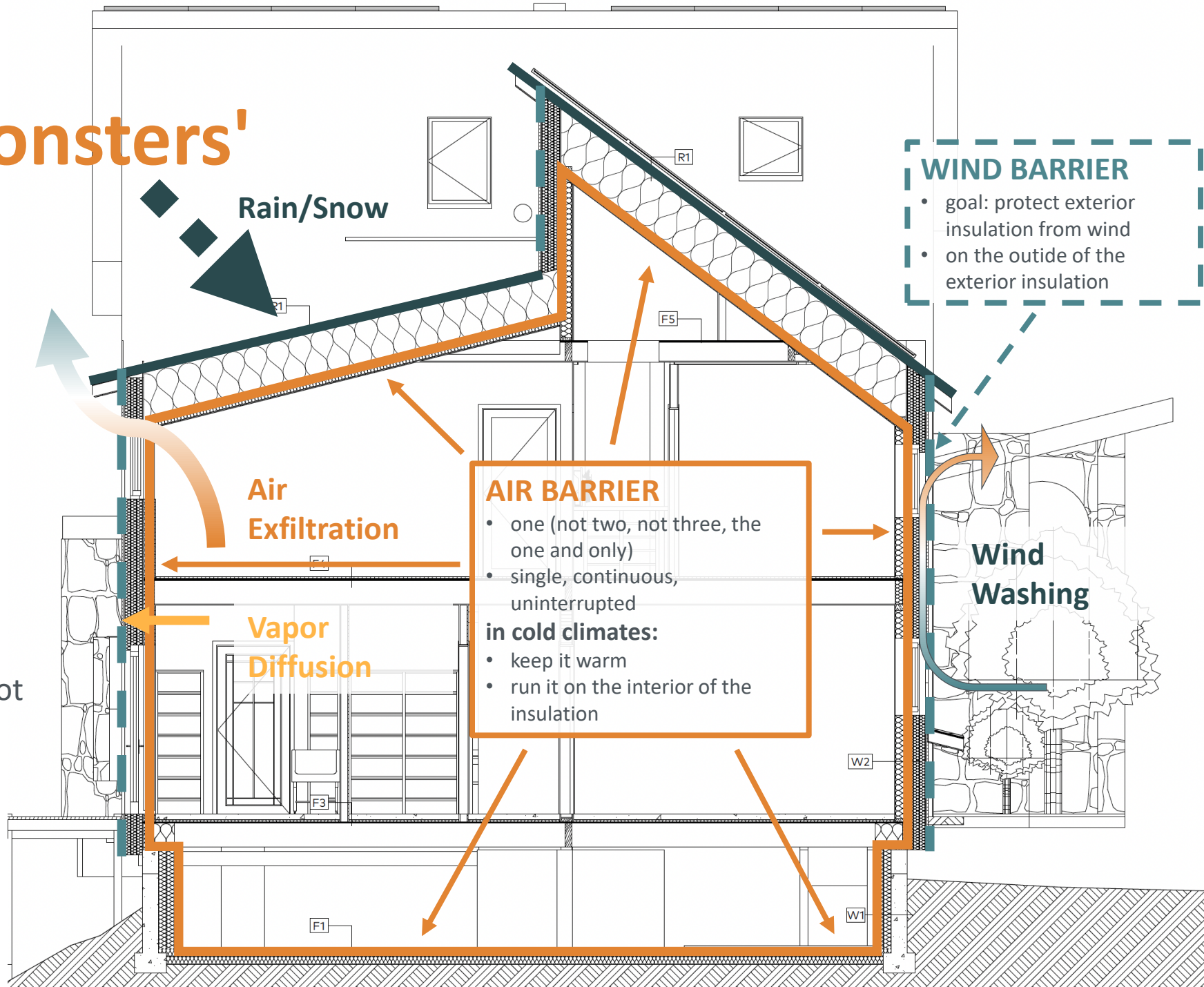
'Moisture Monsters'

If the 'Moisture Monsters' were money:

- Rain/Snow: $100
- Air Exfiltration: $30
- Vapor Diffusion: $1

Wind Washing:

- not a moisture monster (i.e. does not lead to moisture-damages)
- can cut your wall R-values



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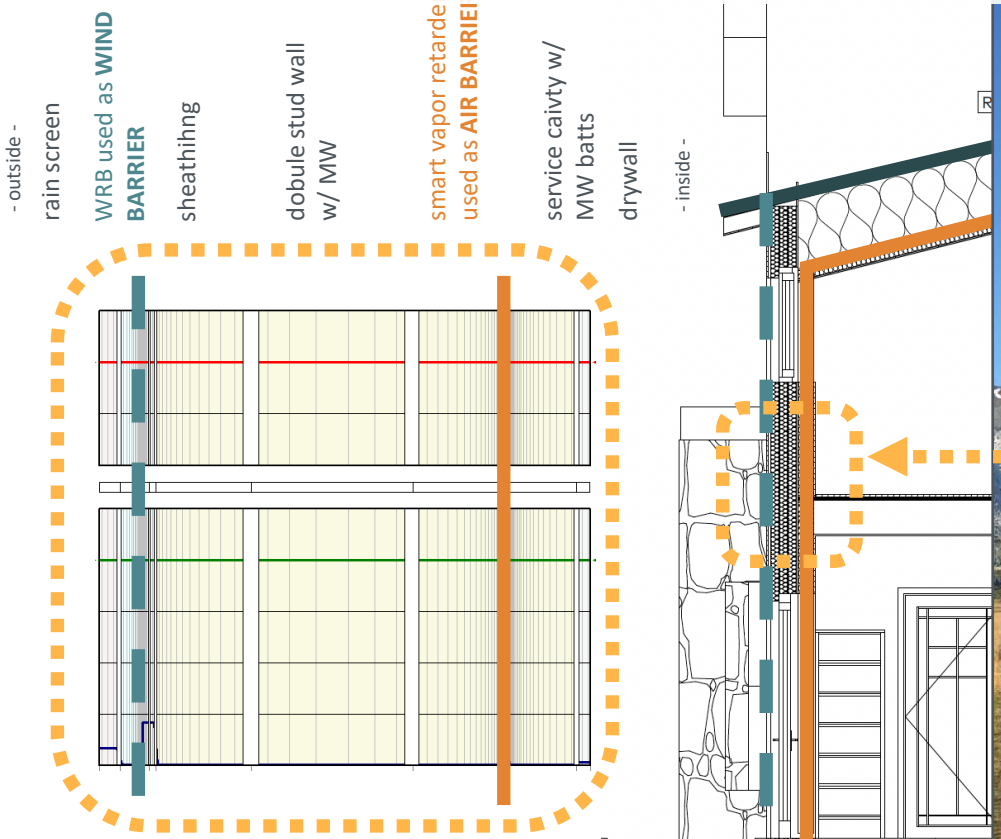
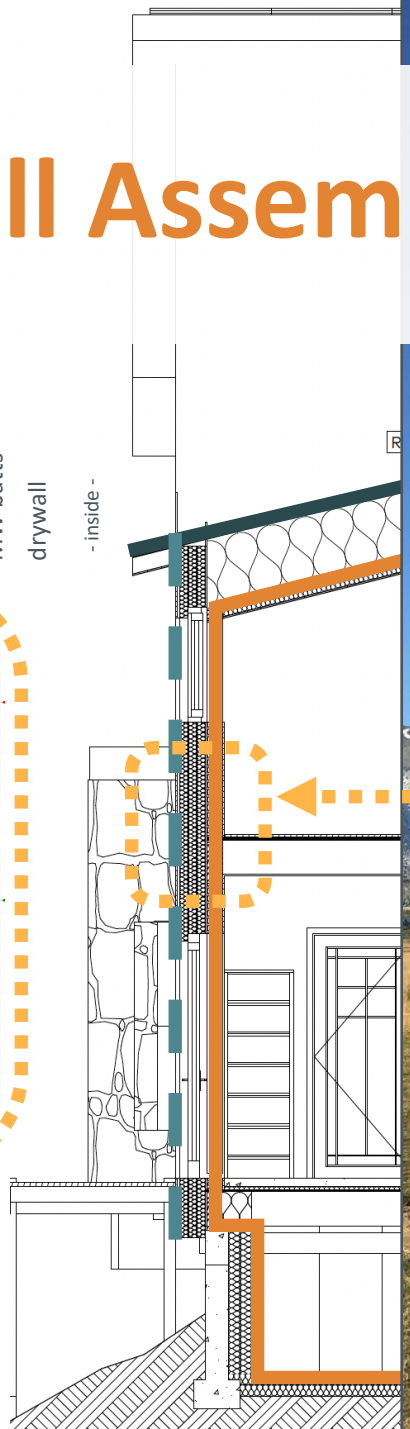
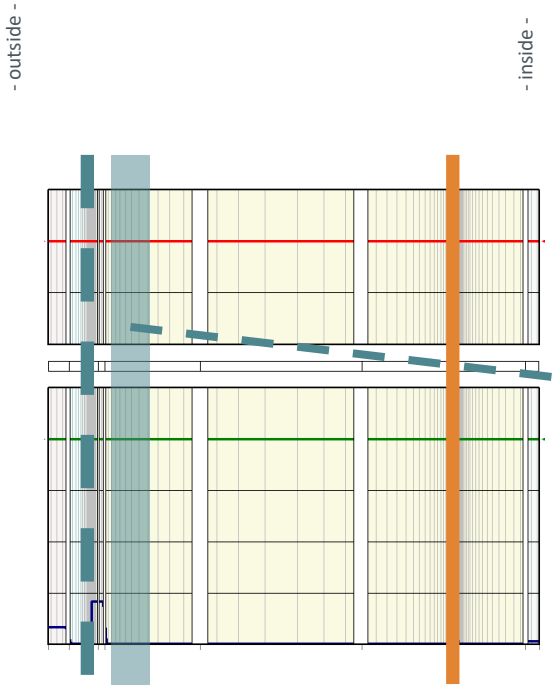
Typical Wall Assembly – PH in CZ 6-7



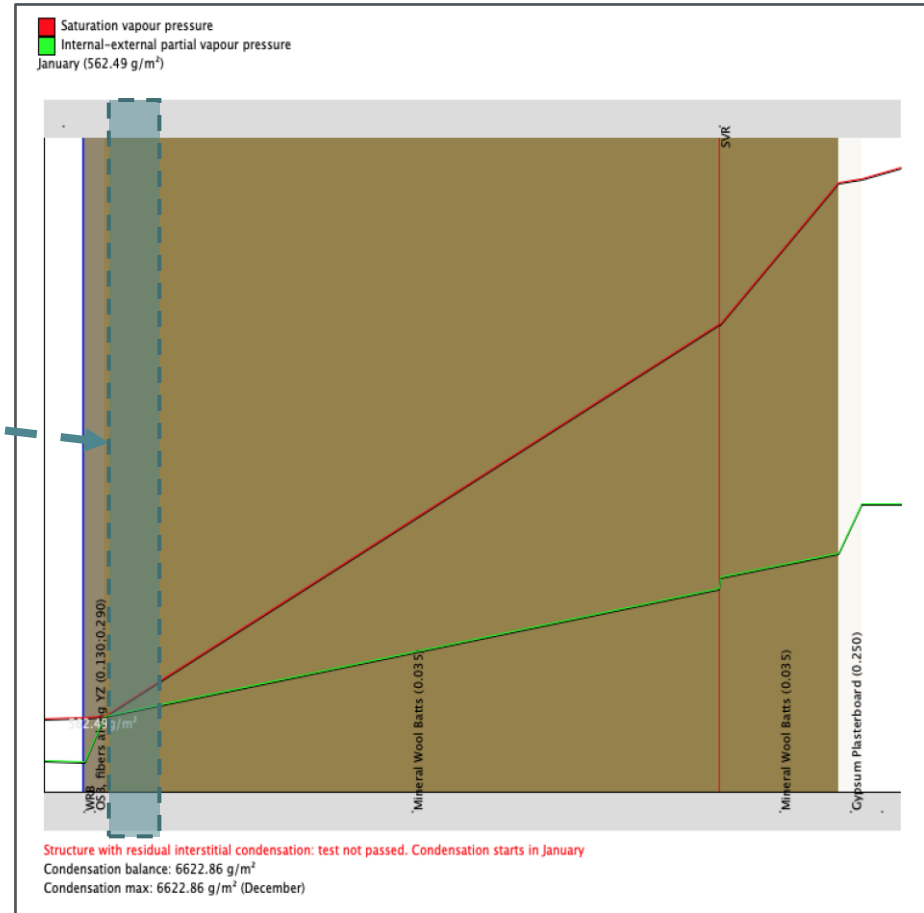


Moisture Risk Assessment A: Dewpoint

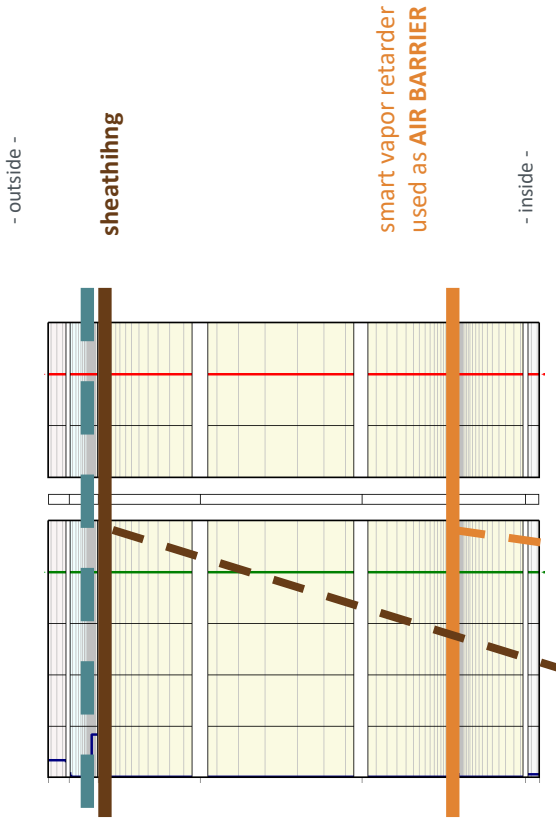


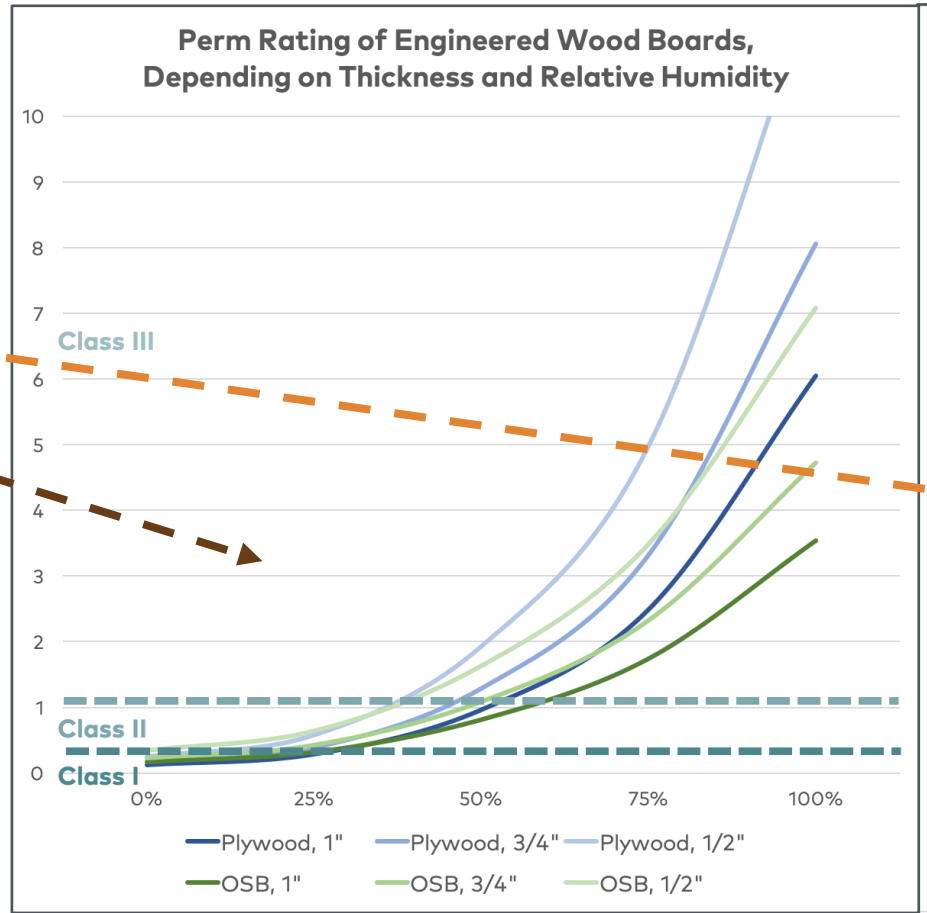
Dewpoint Calculation Of Building Assemblies

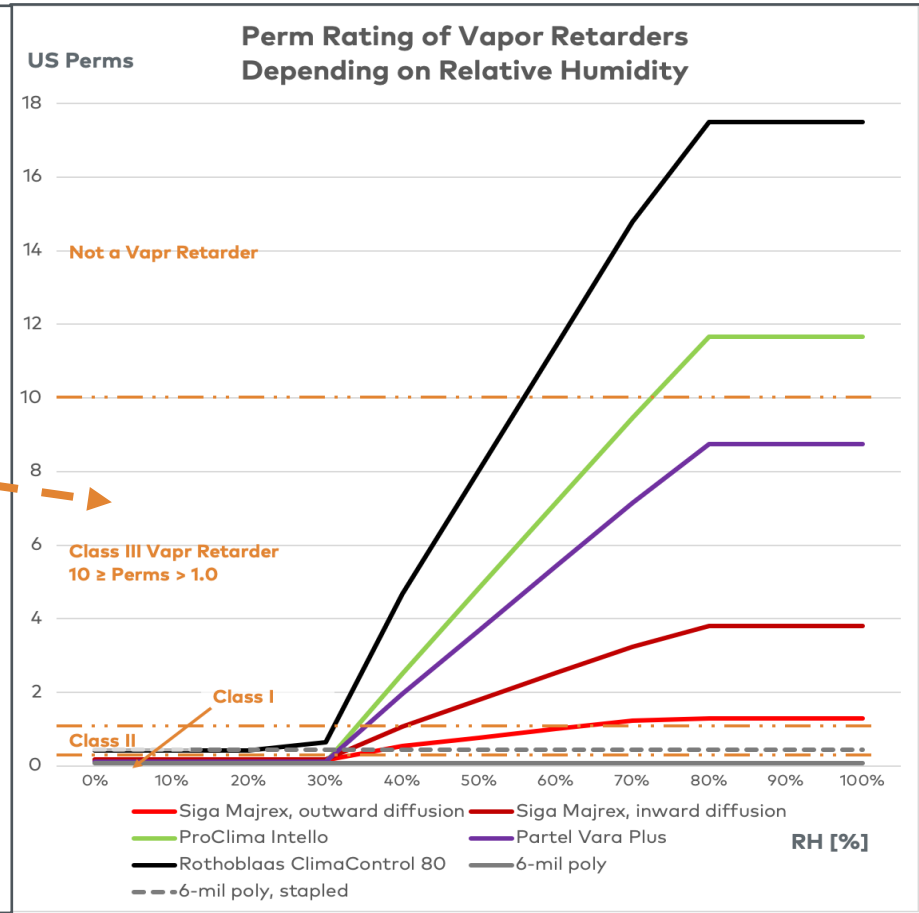
- First developed in the 1930s
- Oversimplified calculation that could be done by hand
- Only accounts for vapor diffusion



Dynamic Behavior Of Materials Re Moisture







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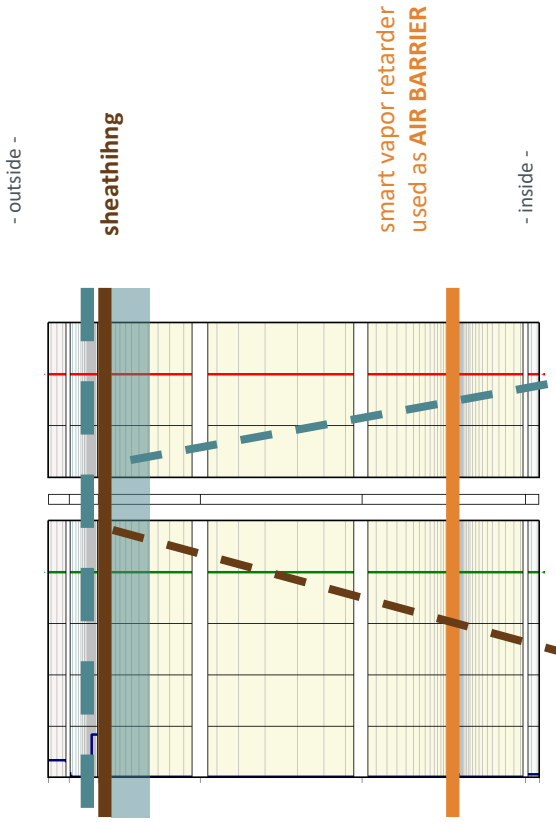
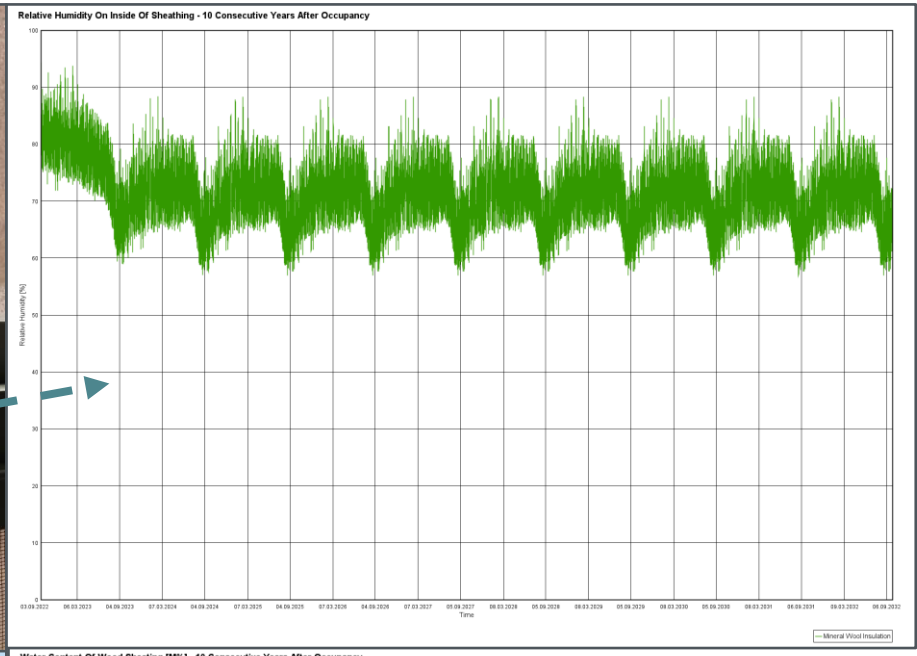
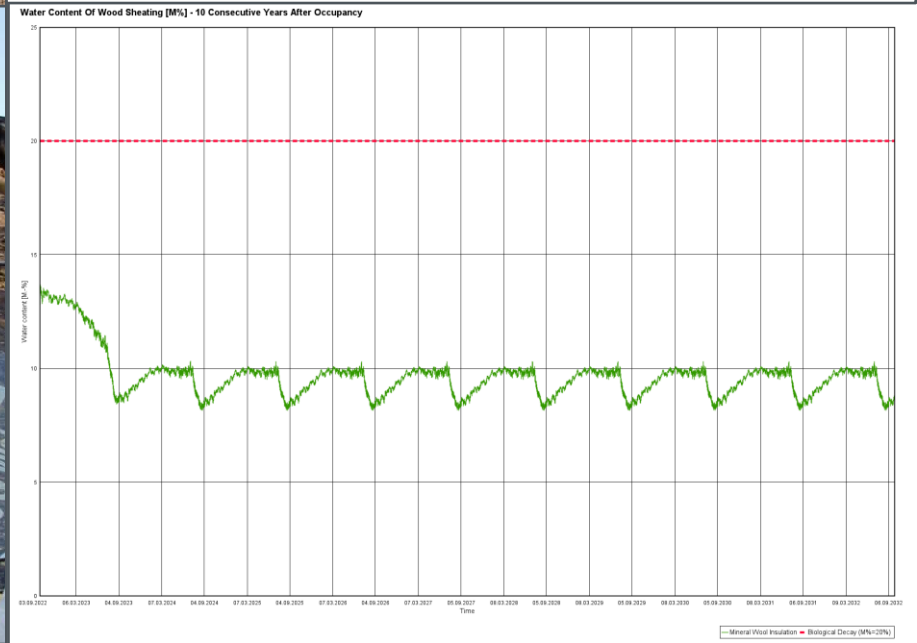
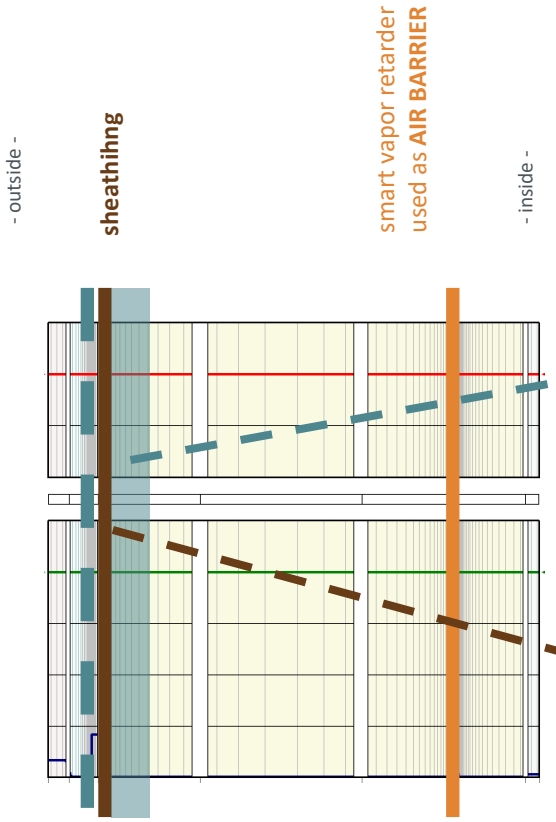
Moisture Risk Assessment B: Dynamic

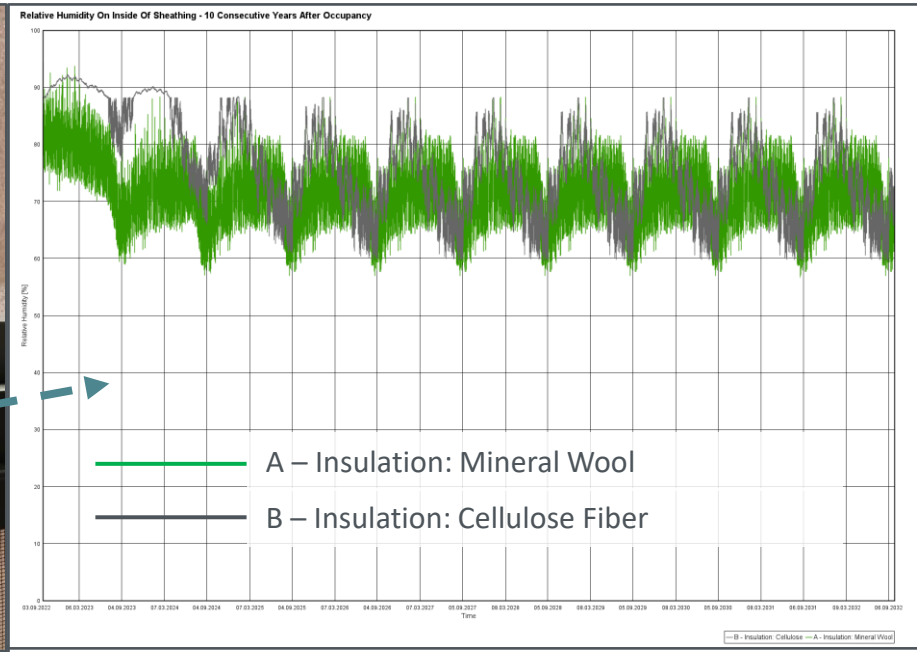


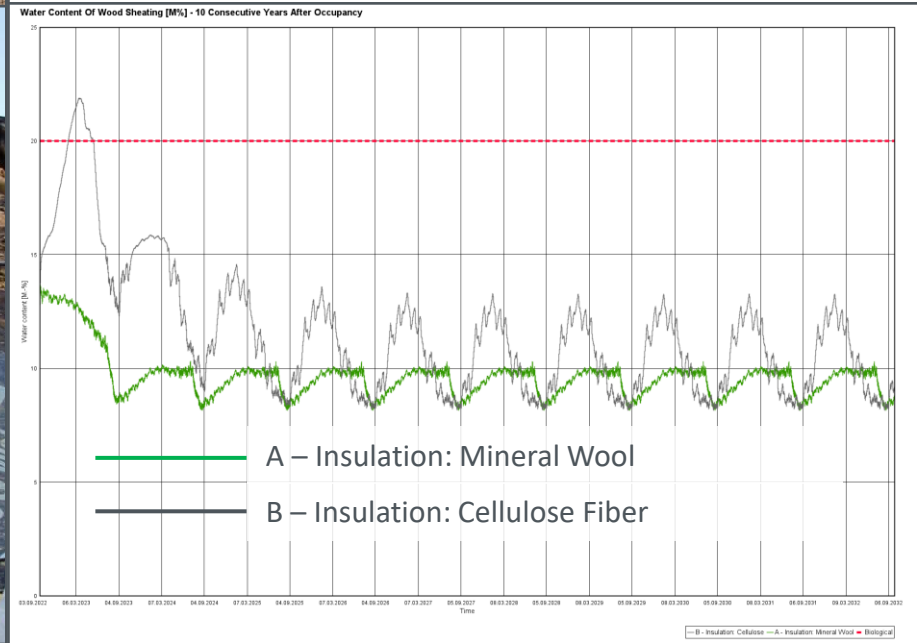




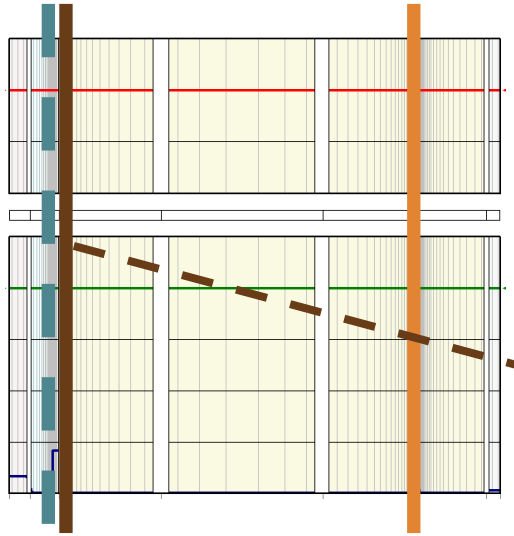
Moisture Risk Assessment B: Dynamic

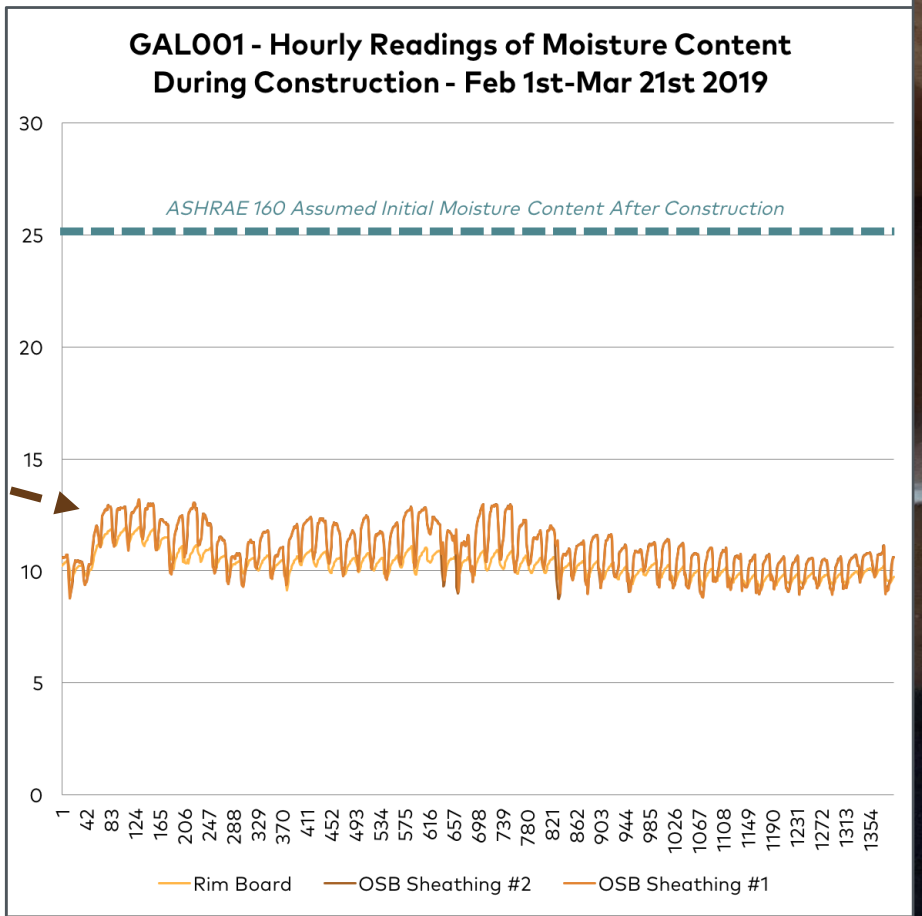




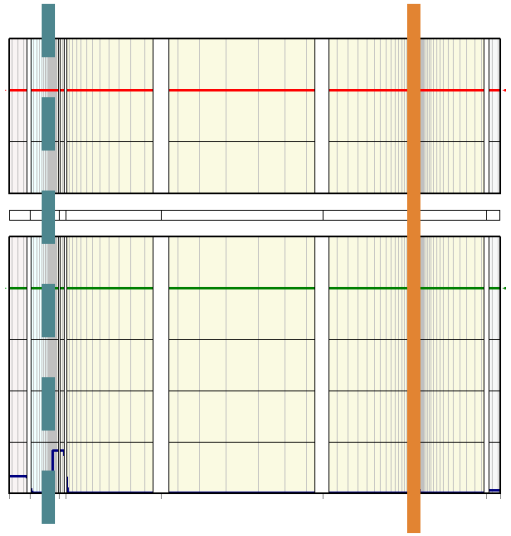


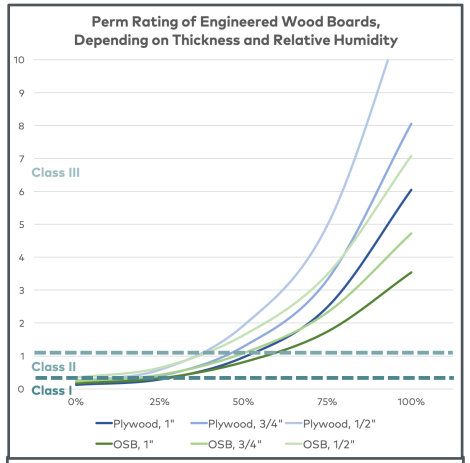
Moisture Behavior – In Real Life

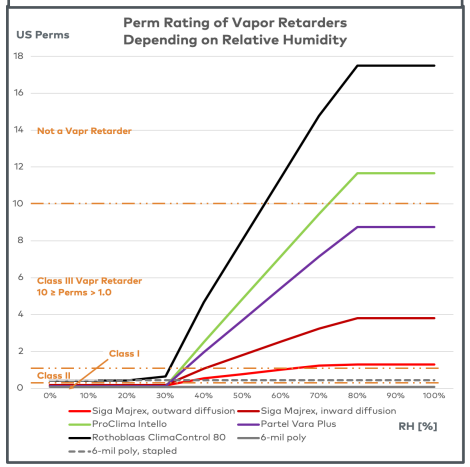


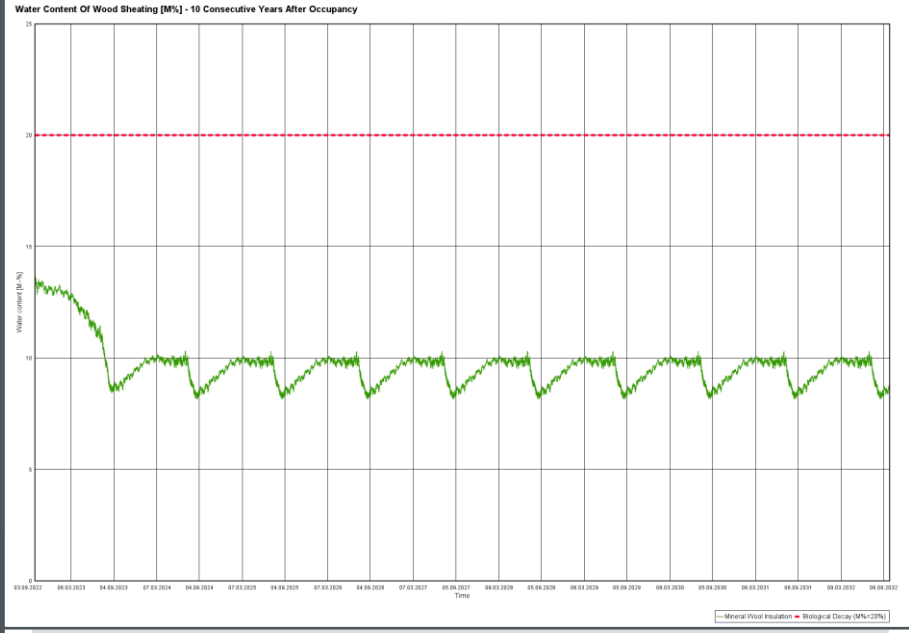


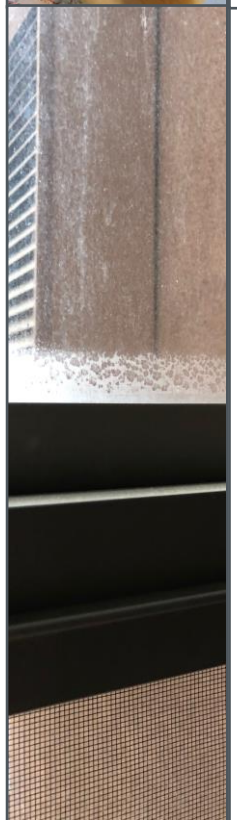
Comparison: Dewpoint vs Dynamic

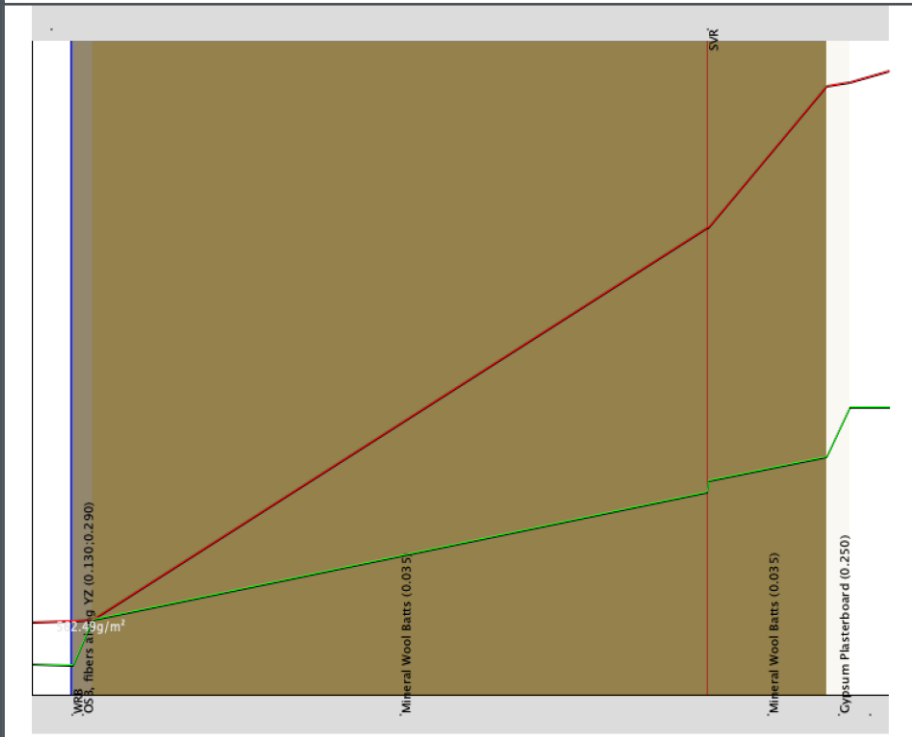












Structure with residual interstitial condensation: test not passed. Condensation starts in January
Condensation balance: 6622.86 g/m²
Condensation max: 6622.86 g/m² (December)

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Interior Relative Humidity

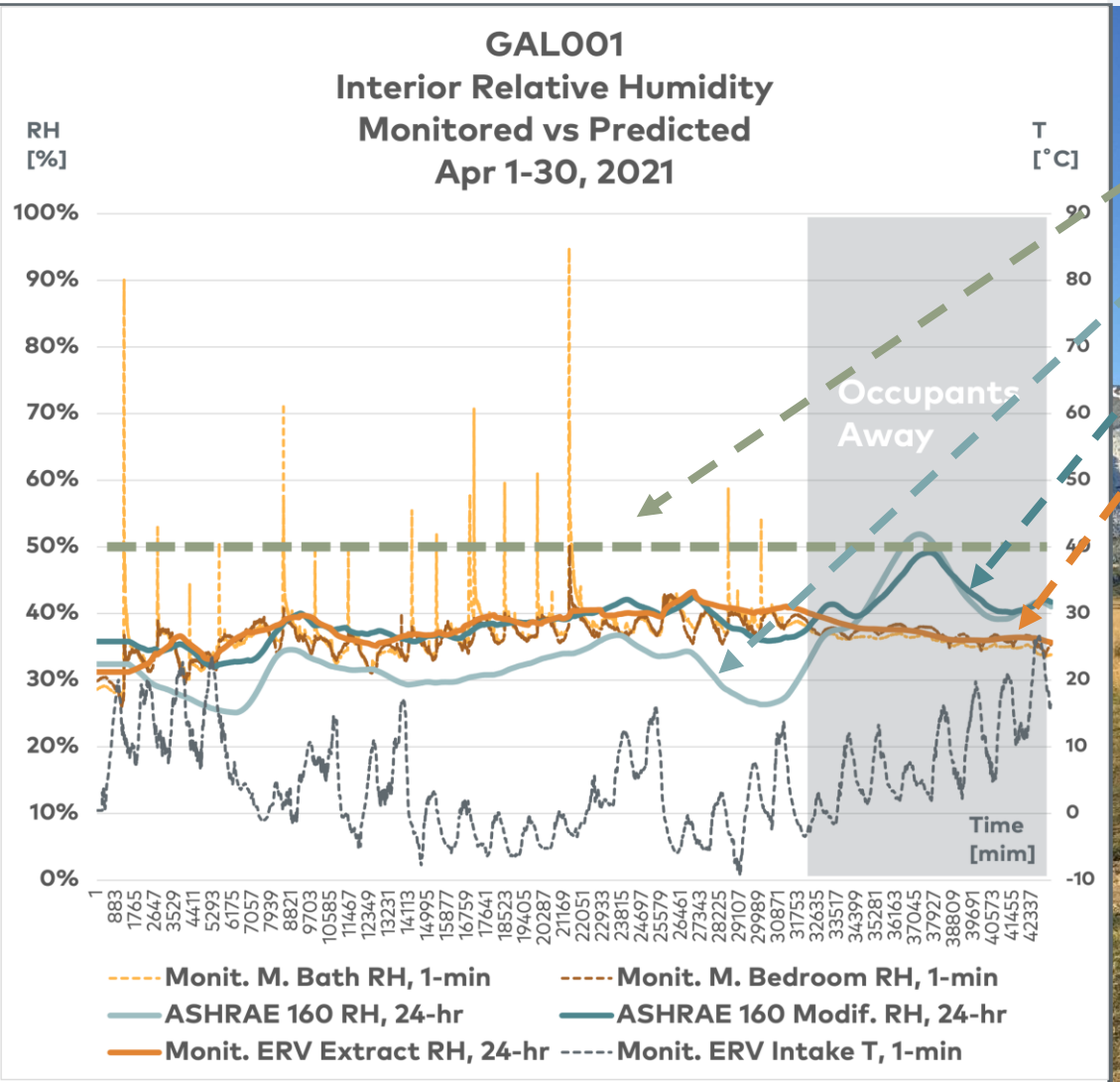
Target:

- RH ≥ 30% for human comfort
- RH ≤ 50% for building durability

Impacted by:

- Occupancy
- Climate
- Building Air Tightness
- Ventilation Rates
- Moisture Recovery (ERV vs HRV)

Interior Relative Humidity - Monitoring

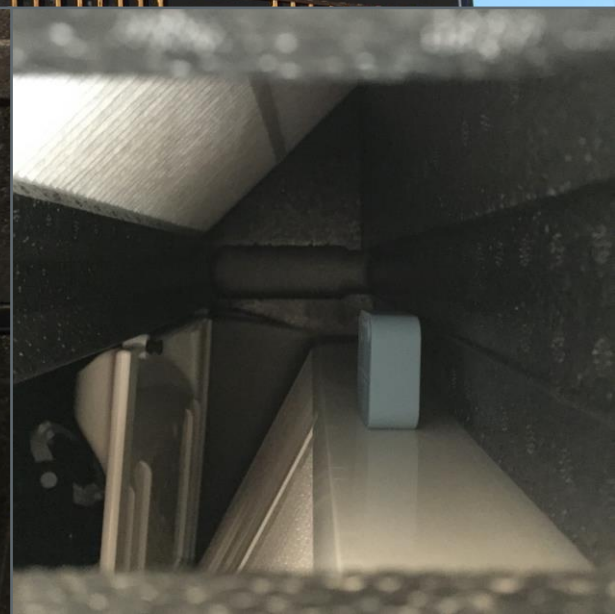


Simplified Assumption (ISO 13788)

Predicted: current ASHRAE 160

Predicted: modified ASHRAE 160

Monitored



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Thank You!

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