When the Rocky Mountain Institute (RMI), an entrepreneurial nonprofit think-and-do tank driving the efficient use of energy and resources, determined to build a new office building, wood was a natural choice. Completed in 2015, RMI’s new Innovation Center in Basalt, Colorado was required to meet ambitious goals: utilize sustainable construction materials while providing a net-zero, adaptable, commercial office building with a 100-year design life in one of the country’s harshest climates. Both light-frame wood construction and mass timber were chosen for their ability to simplify and reduce structural systems, meet energy efficiency and natural daylight requirements, and utilize locally sourced materials. This case study presentation will examine wood’s role as both structure and finish in this 15,600-sf office building.
LEARNING OBJECTIVES

» Review the role of wood framing and finishes on energy efficiency, sustainability, and durability of modern office buildings.

» Highlight cost and occupant comfort benefits associated with the use of exposed wood framing.

» Explore the benefits of wood framing systems in open office designs to accommodate evolving work styles and technologies.

» Discuss how underutilized wood and locally sourced wood can be effectively used in mass timber structural framing systems.
AGENDA/OUTLINE

» Project Overview
  Vision & Goals
  Process
  Performance & Innovation Elements

» Design Overview
  Site & Region
  Inspiration
  Passive Energy Features

» Wood Elements
  Structural Insulated Panels
  Glulams
  Cross Laminated Timber
  Juniper Siding

» Performance Benefits
RMI VISION & STATEMENT

RMI’s vision is a world thriving, verdant, and secure, for all, for ever. Our mission is to drive the efficient and restorative use of resources.

**ELECTRICITY**

Meet 80% of electricity demand with renewables by 2015

**INDUSTRY**

A building stock that is 50% more efficient by 2050

**BUILDINGS**

Reduce energy consumption below 2010 levels by 9% by 2050

**TRANSPORTATION**

Eliminating oil for transportation by 2050
“THIS BUILDING WILL CREATE DELIGHT WHEN ENTERED, HEALTH AND PRODUCTIVITY WHEN OCCUPIED, AND REGRET WHEN DEPARTED”

AMORY B LOVINS, RMI
PROJECT VISION

» Create a building that exemplifies RMI’s mission and program
» Create the highest performing building possible
» Create a replicable process and business case
» Create a beautiful structure focused on community outreach and occupant experience
REPLICABLE
Design Process & Building

90% of buildings are <25,000 SF

Office buildings are the single largest function of building area under 25,000 SF

Half of commercial buildings under 50,000 SF are owner occupied

By 2035, about three-fourths of U.S. floor space will be new or renovated.
"THE TEAM WAS SO COHESIVE, I COULDN’T TELL WHO WAS FROM WHAT DISCIPLINE. THE ARCHITECT, CONTRACTOR, ENGINEERS WERE ALL SPEAKING THE SAME LANGUAGE..."
GREEN

Our building will demonstrate deep green results

NET ZERO → RESTORATIVE

ENERGY
WATER
SITE/LANDSCAPE

TRANSPORTATION
MATERIALS
INDOOR ENVIRONMENT

RESOURCE USE
OCCUPANT ENGAGEMENT

LIVING BUILDING CHALLENGE
LEED PLATINUM
PASSIVE HOUSE
EDUCATION

Our building will ‘teach’ and ‘learn’

- Energy Dashboards
- Thought Leadership
- Industry Outreach
- Building Tours and Events
CLIMATE ANALYSIS

Climate | Wind | Solar Path | Cloud Cover | Illumination | Precipitation
CLIMATE ANALYSIS

Typical Low/High Temperatures

<table>
<thead>
<tr>
<th>Degrees °F</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
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<tbody>
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<td>Low</td>
<td>12</td>
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<tr>
<td>High</td>
<td>33</td>
<td>50</td>
<td>78</td>
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<td>Δ</td>
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<td>25</td>
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<td>25</td>
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Max Daily Temperature Swing (°F)

<table>
<thead>
<tr>
<th></th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
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<tbody>
<tr>
<td>Winter</td>
<td>39</td>
<td>36</td>
<td>41</td>
<td>38</td>
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Low/High Temperatures at Max (°F)

<table>
<thead>
<tr>
<th></th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
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<tbody>
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<td>-14</td>
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<td>Spring</td>
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<tr>
<td>Summer</td>
<td>30</td>
<td>72</td>
<td>79</td>
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</tr>
<tr>
<td>Fall</td>
<td>30</td>
<td>68</td>
<td>68</td>
<td>68</td>
</tr>
</tbody>
</table>
PERFORMANCE & INNOVATION

Envelope | Glazing | Daylight | Thermal Comfort | Materials

Automated External Shades
Electrochromic Glazing
Quad pane Glazing
Bio PCM Light Shelves
R5 Insulating Blinds
DESIGN INSPIRATION
A BUILDING THAT FEELS LIKE IT GREW FROM ITS SITE...
Curved walls grow from landscape seating into building enclosure
Interior soffit reflects curve in plan
Roof curve captures water and opens towards view
DESIGN FEATURES

1. Airflow
2. Daylighting
3. Thermal Mass
4. Open Office
5. Temperature Control
6. Photovoltaic Panels
STRUCTURAL INSULATED PANEL (SIP)
STRUCTURAL INSULATED PANEL (SIP)

- High R Value
- Thermal Bridging Reduction
- Simple Skin For Air Barrier Installation
- Fewer Penetrations
- Schedule
Exposed Elements
Long Spans/Trade off for Depth
Unique Conditions and Integration with Other Trades
CROSS LAMINATED TIMBER

» Use of Beetle Kill
» Floor Assembly Depth and Services and Flexibility
» Daylight Penetration
» Aesthetic
CLT Under Floor

Raised Floor

10’ - 6”

9’ - 5”

CLT Under Floor  Raised Floor
JUNIPER

» Durability Exterior
» Maintenance
» Sourcing – Invasive Species
» Beauty
INTERIOR FINISHES

- Biophilia
- Aesthetic
- Light Quality and Levels
- Acoustics
- Constructibility curves
IF ALL U.S. WORKERS REDUCED THEIR WATER USE BY THESE AMOUNTS WE WOULD SAVE AN AMOUNT IN 2 MONTHS EQUIVALENT TO THE ANNUAL FLOW OF THE COLORADO RIVER.
IF EVERY COMMERCIAL BUILDING IN THE US INCREASED ITS ENERGY EFFICIENCY TO THIS LEVEL WE WOULD SAVE ENOUGH ENERGY IN 1 MONTH TO POWER NEW YORK CITY FOR A YEAR.
IF ALL LOW-AND MID-RISE BUILDINGS IN THE US WERE CONSTRUCTED FROM RECLAIMED COLORADO BEETLE-KILL TIMBER WE COULD MEET THE NEW BUILDING DEMAND FOR THE NEXT 17 YEARS.