

Bio-based Materials Database for Building Envelope Applications

Andre Desjarlais, Residential Buildings Integration Program Manager

Research Challenge/Need/ Problem Addressed

- Numerous new bio-based materials are being developed to address the embodied carbon issue. These materials require characterization.
- Buildings today contribute almost 40% of CO₂ emissions.
- Approximately 25% of these emissions are because of embodied carbon.
- By 2050, it is estimated that more than 50% of building emissions will be associated with embodied carbon.



Current Research

- Identify and procure 25 bio-based materials.
- Perform the hygrothermal (heat and moisture) property evaluations.
 - Density, $R = f(T, RH)$, heat capacity, permeance, sorption isotherm, porosity, liquid diffusivity
- Produce a database that can be readily added to energy and durability simulation tools.

Discoveries/Major Impacts

- Thermal resistivity of low-carbon insulation materials is lower than traditional insulations.
- Moisture content of low-carbon insulation and sheathing materials is higher than traditional building materials.
- Data of low-carbon insulation materials is typically more variable owing to their base material sources.
- Many of these materials are not available in large quantities at this time (found that several sources were out of stock).

