Spec This, Not That

GreenSpec's Guide to a Healthy, High-Performing Building Envelope

Tristan Roberts
Editorial Director
BuildingGreen Inc.

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Session Description

- We'll look at key product choices in the building envelope
- How to maximize performance while avoiding toxic and environmentally damaging tradeoffs
- Systems we'll look at will include: spray insulation, rigid insulation, doors, windows, weather barriers

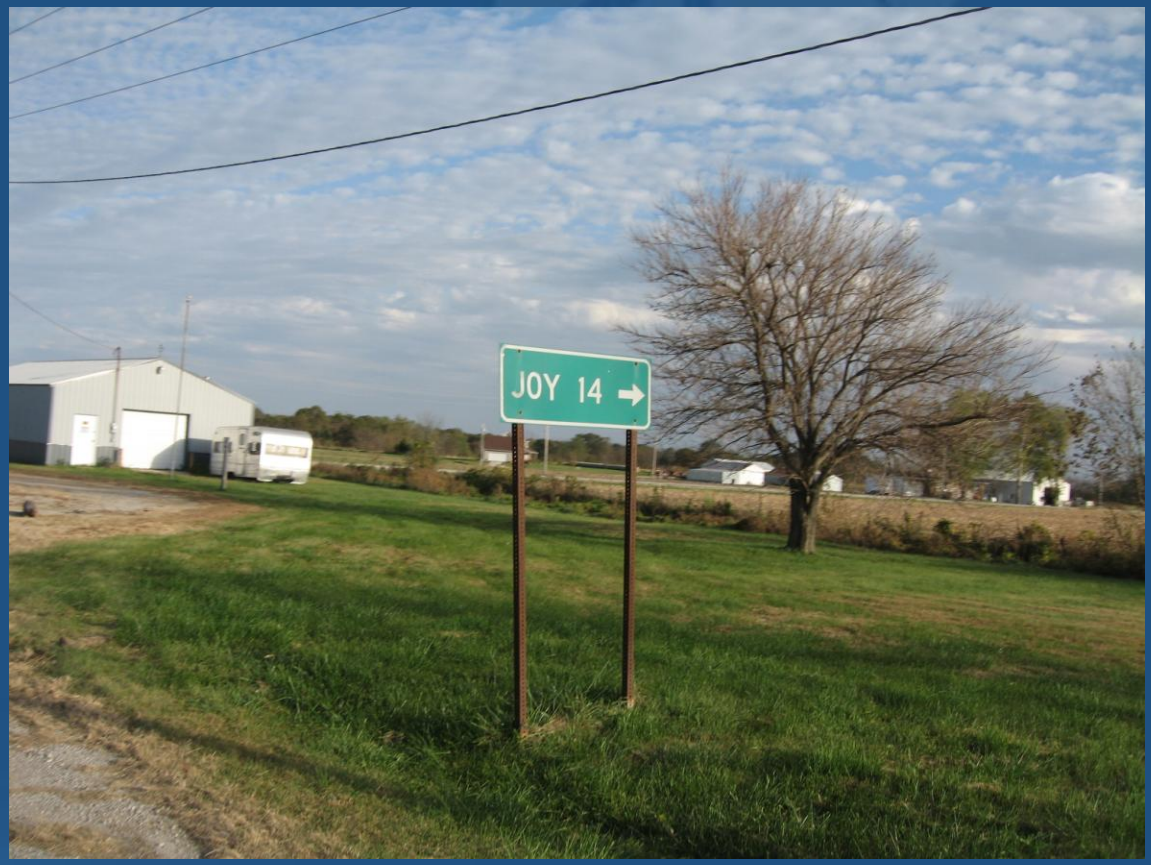


Photo: Martin Solomon

Learning Objectives

- Identify key context in product choice in several product sectors
- Describe health and environmental compromises of key building materials
- Specify products that provide optimal balance of cost, performance, and environmental considerations
- Describe products to avoid due to performance and environmental issues

About GreenSpec

- From BuildingGreen, Inc.
- Screened product listings
- Based on criteria developed over 20 years
- Easy to search
- Reliance on 3rd-party certifications and standards when available
- Over 2,600 greenest-of-the-green products listed

Weather barriers: GreenSpec's Take

It doesn't have to be that complicated: Choose a product that contributes to durability and reduces the potential for problems associated with moisture and mold

- ✓ Establish clarity on your air barrier location
- ✓ Look at vapor profile of the assembly
- ✓ Choose the most durable product available for your budget
- ✓ Modern weather barriers are typically made from "clean" plastics

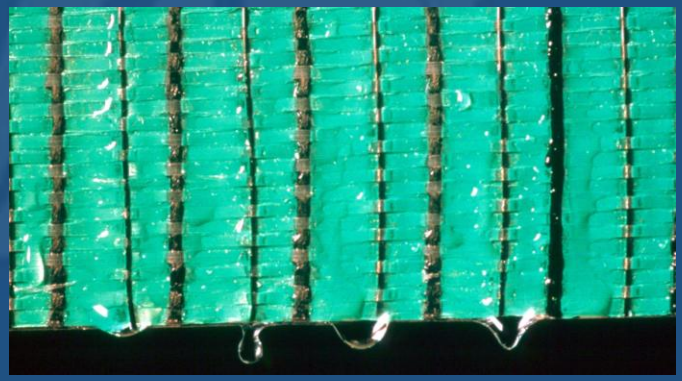
Photo: Alex Wilson

Spec this: Weather barriers

- Flexible sheet products that comply with ASTM E2556-10, "Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment" Type II Minimum Performance Requirements
- Most high-quality, well-known, affordable spun-bonded polyolefin housewraps comply with the ASTM E2556-10:
  - ✓ Tyvek
  - ✓ Typar
- Consider products that integrate a drainage plane
  - ✓ HydroGap Drainable Housewrap
- High-performance Passive House projects with bigger budgets are choosing imported products such as:
  - ✓ Pro Clima Solitex Mento 1000 and Mento Plus
  - ✓ SIGA Majvest

Not that: Weather barriers

- Check for ASTM E2556-10 Type II compliance
- Avoid cross woven or perforated products that don't act as air barriers and that can let bulk water through:
  - ✖ Owens-Corning PinkWrap
  - ✖ Pactiv GreenGuard Raindrop Classic



"PinkWRAP® Housewrap reduces the air infiltration through residential and commercial exterior side wall construction. PinkWRAP® Housewrap has microperforations that permit trapped moisture to escape from the wall to the exterior."

http://insulation.owenscorning.com/homeowners/new-construction/products/pinkwrap-housewrap/

Spray-applied insulation: GreenSpec's Take

- All polyurethane foams contain isocyanate and are extremely hazardous during installation; proper mixing and curing are required to avoid lingering indoor air quality issues
- Most also contain TCPP, a persistent, bioaccumulative toxic chemical
- When installed according to strict EPA guidelines, risks with polyurethane foams are lower for occupants than for installers, however
- There are non-polyurethane options, but SPF is hard to beat in specific applications

Closed-cell SPF – John Straube photo

Not that: Spray-applied insulation

- Avoid spray-polyurethane foam except when absolutely necessary for the assembly. Why?
  - ✖ Relatively expensive
  - ✖ Installer health issues
  - ✖ Occupant IAQ complaints
  - ✖ High global warming potential

Open-cell SPF – Icynene photo

Spec this: Spray-applied insulation

Consider insulation material during design. Not relying on cavity-fill insulation for your air barrier opens up more material options without compromising performance

Use spray-applied insulation products that fill cavities completely, impede air infiltration, and have low embodied energy and low toxicity

- ✓ Cellulose
- ✓ JM Spider

Look to acrylic spray products for “flash and batt” installations:

- ✓ Knauf EcoSeal
- ✓ Owens Corning EnergyComplete

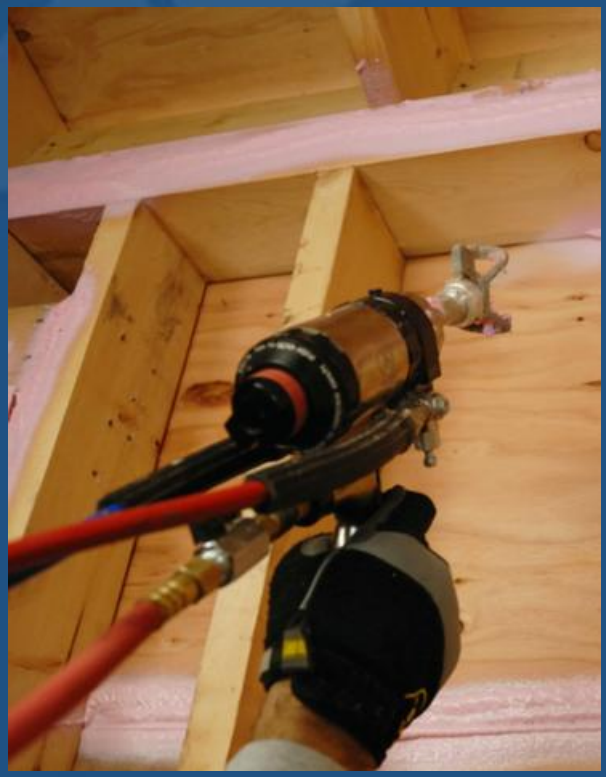


Photo: Owens Corning

Boardstock Insulation: GreenSpec's Take

Virtually all plastic foam boardstock contains halogenated flame retardants, which are persistent, bioaccumulative toxic chemicals.

Occupant exposure is unlikely from exterior-applied products. However, these chemicals enter the environment during manufacturing and after disposal. Many types of rigid insulation requiring no flame retardant are available.

Jordan Dentz, The Levy Partnership

Hudson Passive House in New York State using 12 inches of XPS

Not That: Boardstock Insulation

- Avoid petrochemical-based foam when it's practical
  - ✖ Halogenated flame retardants
  - ✖ High global warming potential with some blowing agents
  - ✖ Susceptibility to insects, fire
  - ✖ Resource depletion

Jordan Dentz, The Levy Partnership

Hudson Passive House in New York State using 12 inches of XPS

Q: Is Global Warming Potential Still An Issue?

A: Yes, but there's light at the end of this tunnel

- Example: HFC-245fa still used in SPF, has huge GWP
- Solstice Blowing Agent with much lower GWP slowing replacing

GWP of Blowing Agents from Fifth IPCC Report

Common Name	Listed by IPCC as	Lifetime	20-Year GWP	100-Year GWP
Carbon dioxide (baseline)	Carbon dioxide	–	1	1
Solstice Liquid Blowing Agent	(E)-1-Chloro-3,3,3-trifluoroprop-1-ene	26 days	5	1
Pentafluoropropane	HFC-245fa	7.7 years	2,920	858

Source: Intergovernmental Panel on Climate Change

Spec this: Boardstock insulation

Use judiciously: Consider envelope details such as double-stud walls minimizing use of rigid foam insulation.

Boardstock with no flame retardants, lower toxicity, and higher durability:

- ✓ Mineral wool
- ✓ Cellular glass
- ✓ Cork

If using plastic foam, polyisocyanate insulation uses TCPP flame retardant, which is persistent, bioaccumulative, and toxic, but generally seen as less harmful than HBCD.

Photo: Pittsburgh Corning

Exterior Doors: GreenSpec's Take

- We have hundreds of energy-efficient windows available—What about doors?
- Doors with good overall thermal performance are rare
- Commercial doors have standards
- Residential, not so much

Exterior Doors: GreenSpec's Take

- Wood, metal, and decorative glass are lousy insulators
- Well insulated doors can flex and lose their seal
- Commercial doors are metal and require insulated glass, thermal breaks, and replaceable seals
- Cost-effective residential doors are hard to find

Ceco and Curries doors from ASSA ABLOY

Don't spec this: Exterior doors

- ✖ Uninsulated wood doors
- ✖ Metal doors without thermal breaks

Spec this: Exterior Doors

- ✓ Commercial doors with thermal, breaks and replaceable seals set into the door stop (not adhered to the jamb
- ✓ Commercial doors NFRC-rated for U-factor and SHGC that have an IGU certification
- ✓ Residential Passive House-certified doors or those with innovative insulation.
- ✓ Commercial doors include LaCantina thermally broken doors, Ceco and Curries doors by ASSA ABLOY. Residential doors include Intus and Hammer & Hand; and innovative VIP vacuum insulated doors that can reach an overall R-30

- Vacuum Insulated Doors (VIP)

Windows: GreenSpec's Take

- Energy performance is our primary green consideration for windows
- Cost considerations loom large—fortunately there are high-performing choices for varying budgets.
- Frame type and layers of glazing are main choices

Photo: Bieber

Spec This: Windows

- FSC-certified wood windows or wood clad
- U-values of 0.20 or less in cold climates, U-0.35 or less in the hottest climates
- SHGC based on climate and orientation: greater than 0.40 in cold climates, less than 0.30 in hot climates
- Argon fill, low-e coatings
- Good values:
  - ✓ Pella Designer Series
  - ✓ Marvin Windows and Doors
  - ✓ Jeld-Wen Wood and Vinyl Windows
- So you want Passive House performance?
  - ✓ Casagrande Windows
  - ✓ CaliPassiv Wooden Windows
- Both Passivhaus certified AND made in the USA

Photo: Bronwyn Barry

Not that: Windows

- ✖ Metal frames without thermal breaks—highly conductive
- ✖ Cheap plastic windows with U-values and SHGC not suitable for your climate: U-0.30 and SHGC 0.30 as universally applicable
- ✖ “uPVC” thinking that it’s better than PVC

Low-Slope Roofing: GreenSpec's Take

- Durability should be top priority: a leaky roof, or one with a short lifespan, isn't "green"
- What do local subcontractors work with? Installation quality and maintenance are key to durability for any product
- Ok, what about chemistry? Membrane constituents vary by manufacturer, and even year to year as formulas are updated.
- VOCs a concern with wet-applied products
- Mechanically attached systems reduces emissions, while also making recycling possible

Photo: GAF

Spec this: Low-slope roofing

- Some polymers, like PVC, start out with a greater inherent hazard burden
- TPO and EPDM appear to be much cleaner membranes than PVC, but each may still contain constituents of concern.
- Low-slope standing-seam roofs (also referred to as low-slope SSR) using hydrostatic joinery another option, but not a free pass in terms of runoff
- In the absence of rigorous leaching data on specific products, choose low-hazard polymers and formulations.
  - ✓ GAF EverGuard TPO
  - ✓ Sure-Weld and Spectro-Weld TPO
  - ✓ UltraPly TPO

Photo: GAF

Spec this: Low-slope roofing

- Low-slope standing-seam roofs (also referred to as low-slope SSR) using hydrostatic joinery
  - ✓ Kalzip
  - ✓ Zincalume
  - ✓ Galvalume

Photo: The Kubala Washatko Architects, Inc. / Mark F. Heffron

Not that: Low-slope roofing

Avoid roofing with durability questions, and toxicity issues.

- ✖ Built-up roofing (BUR)
- ✖ Modified bitumen
- ✖ PVC roofing
- ✖ TPO Roofing without adequate performance data

Thank you for your time!

Questions?

Tristan Roberts
Editorial Director
tristan@buildinggreen.com

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