# Built Environment Smarter Transformation

#### Identifying high value uses for British Wool in construction

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# Identifying high value uses for British Wool in construction

- Introduction to BE-ST
- Operational Carbon vs the Embodied Carbon
- The Current Insulation Market
- Synthetic Vs Natural performance
- Global Warming Potential
- Sisaltech Blended Wool Batts
- Innovation Opportunities
- Key Take Aways



Our identity	BE-ST is an international centre of excellence for zero carbon built environment transformation
Our vision	A better built environment that delivers inclusive and sustainable economic, social and environmental impact
Our strategy	Enable the connections, infrastructure and culture needed to tackle the built environment's most pressing challenges
Our mission	To accelerate the built environment's transition to zero carbon

#### The built environment's impact



## **BE-ST** pledge



#### **BE-ST Insulation Hub**

Our Pilot Insulation Line is a prototype scale equipment for producing thermally bonded non woven materials



#### **Embodied Vs Operational Carbon**





Figure 5.1 - Diagram showing operational and embodied carbon and trajectories

# Questions of current insulation products

- Extraction of raw materials The majority of inorganic and fossil fuel derived materials are based on an extraction model utilising methods that impact negatively on biodiversity.
- Carbon intensive manufacturing A1 Non-Combustible products are usually defined by the need for extreme manufacturing temperatures to increase the products ignition point.
- Health Considerations Installers require PPE to prevent skin, eye and lung irritation. Once installed some products off-gas and can contribute to poor Indoor Air Quality.
- Circularity Materials that can be recycled are often soiled or damaged as they are skipped preventing recovery. Lightweight and volumetric insulation materials are low value and are sent to landfill or are sent to Waste to Energy, which is considered recycling.
- Moisture Movement Vapour closed materials prevent vapor transfer and need to be carefully detailed, especially important in Retrofit projects.

### Where are we now?

Sustainable Insulation products in the Scottish construction industry



Key stakeholders: University of Edinburgh Zero Waste Scotland Scottish Construction Leadership Forum – Supply Chain Sub Group

- Knowledge Specifiers default to what they know, emerging products are competing with very well established market where the distribution network takes on Specification support.
- £££ vs Carbon At what cost? Whole life carbon assessments are still bedding in and are not a requirement in Building Standards, yet...
- Thermal Performance Synthetic products can achieve 0.03 W/mK compared to 0.04 W/mK for Natural fibres, this performance gap equates to an extra 70-80mm of materials.
- Place of Origin The majority of natural insulation available in the UK is shipped from its origin, however, sheep's wool is manufactured and sourced in the UK.
- More than just U-Values There is a tendency to only look at thermal conductivity, fire performance and cost. There are benefits to natural material choices unique to the fibre being used, such as – having a higher heat capacity and higher density that can help improve temperature regulation during extreme highs and lows. Wool has its own USP.

#### Where are we now?

#### **MINI WOOL SURVEY**

- Would recommend wool
  Found wool problematic
  Wanted to use wool but was replaced
- Not used wool yet
- Wool is not appropriate for my projects



Maslow's Hierarchy of Needs Insulation – Insulation is just becoming a more common topic of discussion, but it is not visible to the client and is less of a talking point than high end finishes.



#### Synthetic Vs Natural



Figure 8: Mineral wool & PIR baseline wall

U - Value = 0.14<sup>4</sup>W/m K Wall Thickness = 485 mm Insulation Thickness = 270 mm



Figure 9: Hemp insulation wall example

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### **Global Warming Potential**



## **Global Warming Potential**



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#### Sisalwool – by Sisaltech

Sisal fibre and pre-consumer waste wool blend being pioneered in Scotland.

www.sisaltech.com



## Innovation Opportunities?

- Make it visible Wool doesn't just have to be for filling wall cavities, other building applications may include acoustic insulation, wall dividers, pipe lagging in exposed services exploit its characteristics, but make it visible
- Binders and Adhesives What can we do to remove oil based products from the manufacturing process? How can Wool be processed to increase certain performance criteria.
- Bio Based Borax Replacements Boron is on the EU Critical Raw Material list, it has a higher rating than Lithium and Cobolt that are needed for battery production. Will its scarcity push processing prices higher? What bio alternatives are there for fire retardants and insect repellants?
- Circularity Adding value to the by-products of other processors helps create more wool products but also drives value from preconsumer wool waste and closes the loop.
- Innovation should be underpinned by supporting animal welfare, the farmer and the planet.

# In Summary

Access the Sustainable Insulation report



- Wool Visibility If you can make a product visible to the end user its less likely to get value engineered out of a project.
- Market Growth Natural and Circular materials are the underdog in a big industry, health outcomes and embodied carbon are nice to haves rather than essential, but more clients are asking questions of the status quo.
- Embodied Carbon <u>will</u> become the focus We are still early in the journey of designing for and reporting whole life carbon, there are more gains to be made in decarbonising Operational Carbon.
- Skills and training There are new products coming to market all the time, we need to bring a big construction industry on the journey with us.

Access the report – At <u>www.be-st.build/accelerate-to-</u> <u>zero/sustainability/embodied-carbon/sustainable-insulation</u> Or with the QR Code.