Innovating with Low Impact Products
is a leading distributor of insulation solutions that deliver; thermal, moisture and overheating control
What is the Challenge?
Drives

1. Rising energy costs

2. Legislation
Average UK Energy Use

Key (large pie charts) (labelled clockwise in numbered order):
1. Space Heating
2. Hot Water
3. Cooking
4. Consumer Electronics
5. Computing
6. Cold Appliances
7. Wet Appliances
8. Lighting
9. Miscellaneous

Key (small pie charts) (labelled clockwise in numbered order):
1. Windows
2. Doors
3. External Walls
4. Ground Floors
5. Roof
6. Draughts
Essential Principles

- Thermal Performance
- Breathability
- Overheating Control
Repeating linear thermal bridges

Changing U-values

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U insulation</td>
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</tr>
<tr>
<td>U proportional</td>
<td>0.20</td>
</tr>
<tr>
<td>U combined</td>
<td>0.24</td>
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</tbody>
</table>

200 mm of loft insulation

- U proportional = 0.20 (thermal bridging of joists taken into account)
- U combined = 0.24 (gap above joist taken into account)
- Increase in U-value = 33%
Repeating linear thermal bridges

More seriously calculations can include;
- incorrect ration of timber to insulation
- incorrect k-values
- ventilated cavities classed as unventilated

Changing U-values

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y-values

**y-value** – a notional additional U-value, spread uniformly over the whole thermal envelope.
Non-repeating linear thermal bridges

- **GF** – ground floor to wall
- **GFP** – ground floor to party wall
- **IF** – intermediate wall to floor
- **RRE** – roof rafter at eaves
- **RRG** – roof rafter at gable
- **RRGP** – Roof to party wall
- **RRGF** – roof to party wall at gable end

- **WL** – window to wall at lintel
- **WJ** – window to wall at jamb
- **WC** – window to wall at cill
- **WEC** – wall external corner
- **WIC** – wall internal corner
- **WP** – external wall to party wall

NB: insulation at RAFTER level
Typical UK Building Stock

- Principle Heat-loss. u-values
- Heat loss through non repeating thermal bridging y-values

Natural Building Technologies
UK Building Stock Part L 2010

Principle Heat-loss. u - values

Heat loss through non repeating thermal bridging y - values
Calculating y-values
Air tightness

- Eaves
- Window frame to wall
- Around opening window
- Through porous building materials
- Via ventilated cavity
- Door frame to wall
- Around door opening
- Via suspended floor
Relative Humidity Control

Decrease in bar width indicates decrease in effect

- Bacteria
- Viruses
- Fungi
- Mites
- Respiratory infections
- Allergic rhinitis and asthma
- Chemical interactions
- Ozone production

Optimum Zone

10 20 30 40 50 60 70 80 90 100
Keeping a building warm in the winter months using very little energy is relatively simple.

Additional dynamics

The Larch House UK’s 1st affordable Passivhaus
Essential Principles

• Thermal Performance
• Breathability
• Overheating Control
Pavatex **outperforms** any synthetic insulation. No other insulation will **breathe, wick moisture** and regulate building temperature, both in the summer as well as the winter.

Add to this the fact that it is **100% natural** and locks up more Carbon than is used to produce or transport it, combined.
Fabric durability (moisture control)

Vapour check based system

Vapour open system
8mm Meshed BAUMIT BAYOSAN External Render

PAVATEX DIFFUTHERM woodfibre board

EJOT insulation fixing

Timber Stud

PAVAFLEX

WARMCELL, ISONAT (Hemp/Cotton) or Sheepwool Insulation

OSB (Racking & Air Tightness) 9mm / 11mm

Service Void 25mm

Plasterboard 12.5mm with skim and NBT emulsion paint

Inside

Outside
Relative Humidity Control

Decrease in bar width indicates decrease in effect

<table>
<thead>
<tr>
<th>Relative Humidity (%)</th>
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<tbody>
<tr>
<td>10</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
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Rot-riddled homes cost builder dear

It seemed like such a good idea at the time, building an award-winning housing estate with a bargain price-tag, but eight years on Taylor Wimpey’s dreams of prestige and prizes have turned into a £12 million headache (Kathryn Hopkins writes).

And it all started so promisingly, too. John Prescott, then the deputy prime minister, launched a competition to produce low-cost, energy-efficient homes and the High Wycombe-based builder won. Rogers Stirk Harbour + Partners, Lord Rogers of Riverside’s architectural practice, designed 122 houses for a site in Milton Keynes that would cost £60,000 — a relatively cheap price even then — and a year later the estate won the Royal Institute of British Architects’ Maxwell Medal for best new homes.

Since then, though, the good news has tailed off significantly. The houses described in the Wimpey sales brochure as a "truly innovative and outstanding development of sustainable homes" became riddled with damp and rot after cladding panels fell off.

According to a report commissioned by the housebuilder: “There is likely to be wet and dry rot and fungal infestation behind the rainscreen of each dwelling, due to poor detailing and poor construction.”

In October, a resident called Paul wrote on the Oxley Woods Living blog: “We... from first-time buyers, to families, to retirees, are in a terrible situation. We personally fear we may have lost all that we have put into our homes — the huge investment, but also the time, energy and money spent making these our homes.”

Taylor Wimpey must spend millions repairing rot at Oxley Woods, designed by Lord Rogers of Riverside’s practice.
Taylor Wimpey set aside £12.4 million in provisions at the end of 2014, compared with £100,000 the previous year, according to its annual report. Most of this will go towards repair work on the Oxley Woods homes.

Cue the legal battles. The company is seeking £5 million in damages from Rogers Stirk Harbour + Partners, Wood Newton Developments, which went into liquidation four years ago, and Coxbench Manufacturing. The legal proceedings are ongoing. RSH said in October that it would “defend the claim vigorously.”

Overall, the problem is
Overheating Control

3. Heat passing directly through the walls.
Decrement Delay

Is about thermal conductivity not just thermal mass.
System for Timber Frame
Clad
System for Timber Frame
Render
Cost Innovation!

Building Regulations
Approved Document Part L: ‘Conservation of fuel and power'

- U-values
- Y-values
- Air-tightness
Rather than focusing on U Values, NBT can provide your SAP and SBEM, or work with your Assessor, to develop a balanced approach to the performance of the fabric, saving money and delivering a more robust long term solution.

*NB the example above is indicative and can vary*
Simple Solutions for a Complex Problem

www.natural-building.co.uk