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Specification & supply of natural insulation systems:

Airtightness detailing &
Installation and sharing learning on working towards the WELL Standard

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NEIL TURNER

Technical Sales Manager

- Former TIMSA/BBA-competent U-value scheme member
- Involved in development of CEN European Standards
- Extensive experience within the natural insulation sector
- 14 years manufacture of Warmcel Cellulose fibre

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MISSION STATEMENT

"To **support** the construction sector in the creation of a better built environment through the **supply** of innovative, sustainable, ecological building materials and solutions to **deliver** quality, affordable products and training"

1906 Our parent company MacCann & Byrne founded. MacCann & Byrne successfully traded as an independent retail hardware merchant supplying hardware and timber products

2000 Ecological Building Systems launched

2002 pro clima wins the first of many awards at PLAN EXPO, SOLITEX PLUS breathable roofing underlay named Best Roofing Product

2006 Ecological Building Systems becomes the largest distributor of pro clima in Europe

Thermo Hemp Natural Insulation awarded Best Eco Product at the *Grand Designs Magazine* Awards

2007 Ecological Building Systems UK Ltd is established, based near Carlisle in Cumbria

2009 Centre of Knowledge training centre officially opened

2017 Diasen Thermal Plaster wins Best Energy Efficient Product at the SEAI Energy Show

2018 Pro clima INTELLO PLUS airtight system certified as a Passivhaus component achieves the best airtightness test results ever by any airtightness membrane system

One-day intensive nZEB course commended in the Best Services Provider catagory at the SEAI Energy Show

www.ecologicalbuildingsystems.com

pro clima

GUTEX NATURALLY MADE FROM WOOD

DIASEN

CALSITHERM CLIMATE BOARD

THERMO JUTE 100

wellhöfer ATTIC HATCHES

opyme

esb elka strong board

BOSIG

AURO natural paints

FINSA solutions in wood

INVENTer

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OUR EXPERIENCE

- Building materials
- Technical support & Engineering
- Education and training
- Architectural Technology
- Energy & moisture in buildings
- Construction techniques and standards
- Heritage and Conservation
- Passivhaus
- Low impact fabric first approach
- Customer support

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Passive House

Airtight & Windtight

Healthy Living

Natural Insulation

Renovation & Retrofit

Damp & Mould Prevention

Soundproofing

Heat/Cold Protection

Our leading range of ecological building products support healthy, low energy sustainable buildings.

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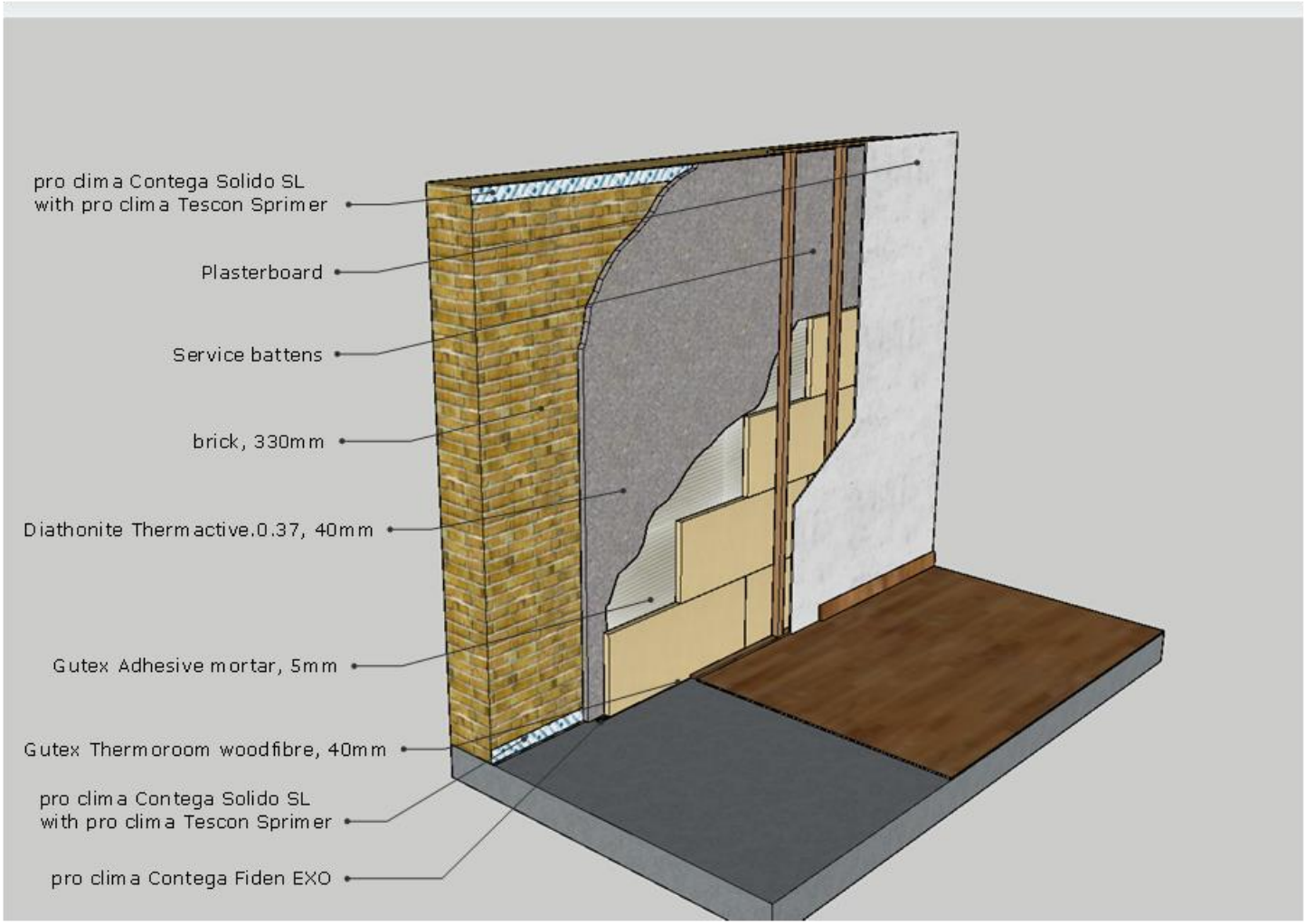
PRESENTATION OVERVIEW

- ENTOPIA BUILDING FABRIC INSULATION SPECIFICATION AND OUTCOME
- ENTOPIA PROJECT NATURAL FIBRE – MEETING THE TECHNICAL BRIEF
- SPECIFICATION AND SUPPLY OF NATURAL FIBRES FOR THE ENTOPIA PROJECT
- AIR TIGHTNESS AND WELL STANDARDS

EXTERNAL WALL BUILD UP/OUTCOME



- **<0.7ACH/hr**
- **U Value: 0.33-0.35W/m2K**
- **WELL Complaint**
- **WUFI Modelled Moisture Safe**

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OTHER BUILDING ELEMENTS WHERE NATURAL FIBRE WAS USED

- PITCHED ROOF AND BASEMENT: Gutex Thermoflex and Pro Clima Intello Plus
- INTERNAL PARTITIONS: Thermo Jute Natural Fibre Insulation
- AIR TIGHTNESS: Pro Clima Tapes and penetration seals

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CISL ENTOPIA BUILDING TECHNICAL BRIEF – SPECIFICATION OF NATURAL FIBRE INSULATION

- EMBODIED CARBON/RESOURCE EFFICIENCY
- ENERPHIT STANDARDS
  - Low U Values
  - Maximum 1ACH/hr Air Permability
  - Moisture Safe (No Interstitial Condensation/Moisture Issues)
- WELL STANDARDS
  - Indoor Air Quality (VOC Emissions etc)
  - Responsible sourcing of materials

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NATURAL INSULATION PRODUCTS USED ON THE CISL ENTOPIA BUILDING

- GUTEX Thermoflex (Roof and partition Walls)
- DIATHONITE THERMACTIVE External Walls
- GUTEX Thermoroom: External Walls

- Hemp Flax Thermo Hemp Combi Jute (Partition Walls)

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GUTEX WOOD FIBRE INSULATION

The Benefits:

- Optimum combination of Thermal insulation in Winter & Summer (0.036W/mK Thermoflex and 0.039W/mK Thermoroom – Specific Heat Capacity 2100J/kgK)
- Effective acoustic properties
- Speed of application
- Nature Plus Certified
- Extremely diffusion open (μ = 3), reducing condensation risk
- Consistent quality and reliable application
- Inherently windtight material
- Recyclable & Optimum Sustainability

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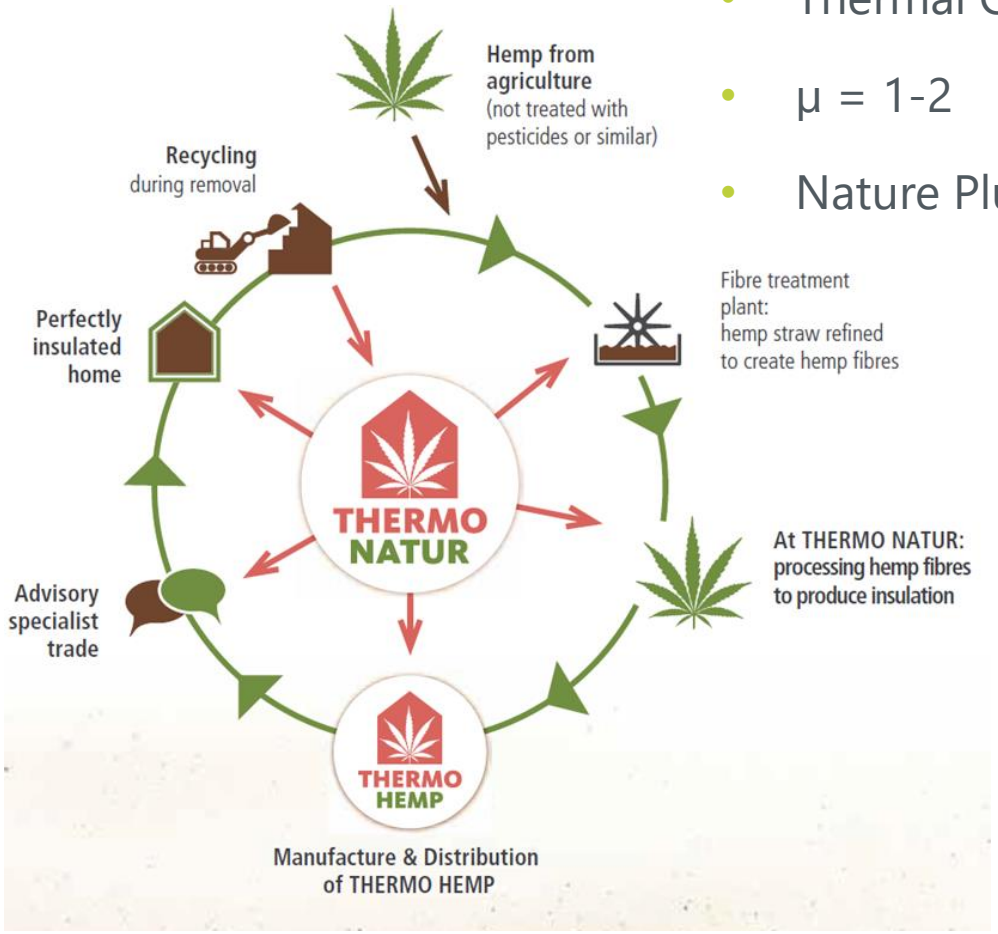
THERMO HEMP COMBI JUTE INSULATION

- Thermal Conductivity: 0.039W/mK
- μ = 1-2
- Nature Plus Certified



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Insulating Plaster containing cork harvested from the cork oak and recycled cork

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DIATHONITE THERMACTIVE.037

Thermal Conductivity | λ = 0,037 W/mK

Breathability | μ = 3

Density | 250 kg/m^3

Consumption | 2,60 kg/m^2 *

Fire Reaction | Euroclasse A1

Compression Resistance| 2,80 N/mm^2

Flexibilty| 1,00 N/mm^2

Recycled Cork Content: 85%

Thermal Resistance | R = 0,27 m^{2}K/W *

* for 1 cm of thickness

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DIASEN GREEN BUILDING FUTURE

Other ingredients in the mix

EXPANDED AMORPHOUS SILICIUM

- Excellent insulating properties

NATURAL HYDRAULIC LIME NHL

- Breathable and hard
- Anti-bacterial

PUMICE STONE

- Resistant to fire
- High mechanical resistance

DIATHOMEIC POWDERS

- High hygrometric capacity

CELLULOSE FYBERS

- Elastic and flexible
- Solvent-free

PERLITE

- Excellent thermal capacity
- Resistant to fire

Cork

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MEETING THE BRIEF: EMBODIED CARBON

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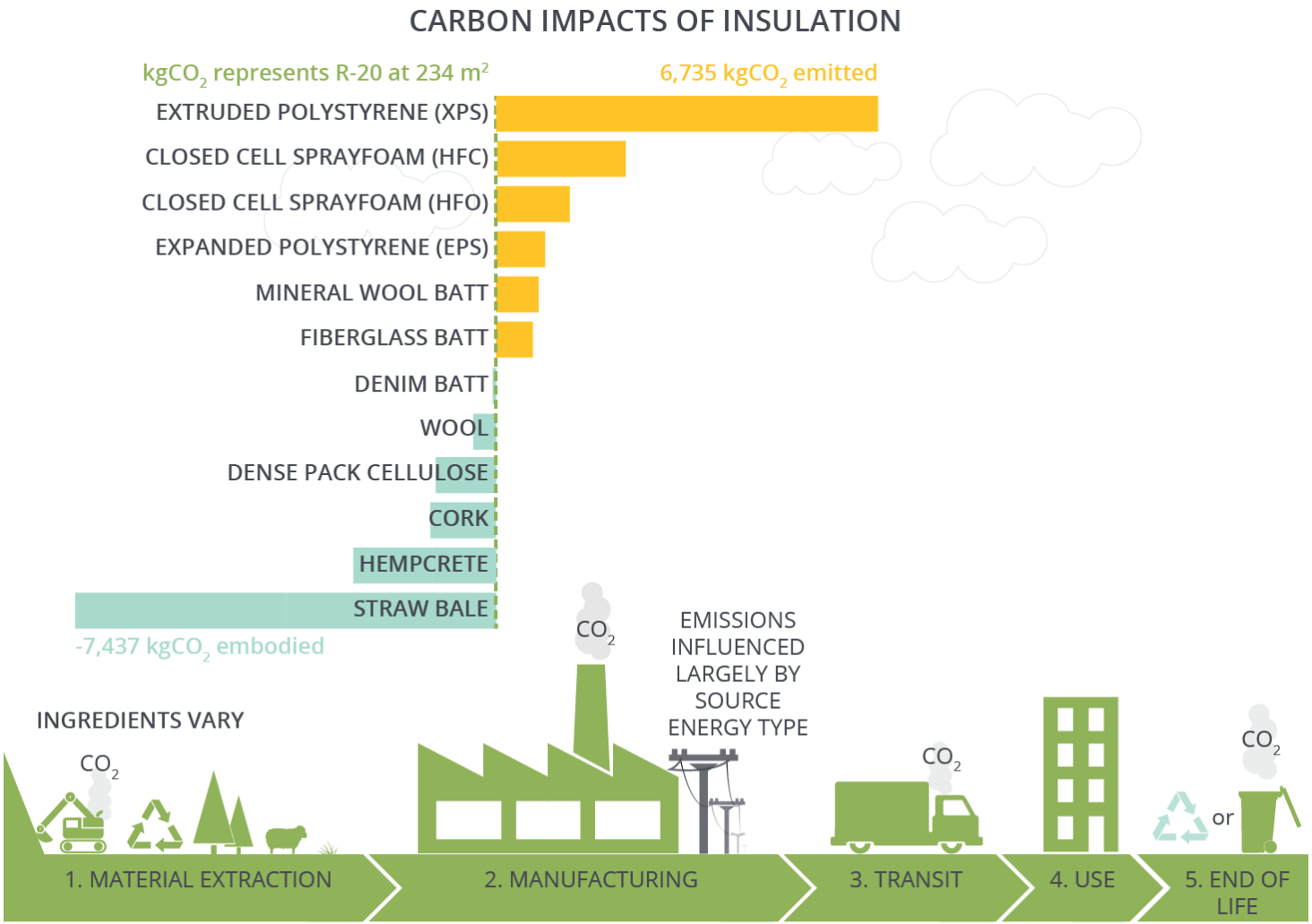
EMBODIED CARBON: BENEFITS OF NATURAL INSULATION



Carbon impacts data source: Builders for Climate Action - 2019 White Paper "Low-Rise Buildings as a Climate Change Solution", Chris Magwood, 2019;

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EMBODIED CARBON: NATURAL INSULATION USED IN THE CISL ENTOPIA BUILDING

Environmental Product Declaration

EPD®

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

DIATHONITE Family: Diathonite Evolution, Diathonite Acoustix, Diathonite Acoustix+, Diathonite Deumix+, Diathonite Massetto, Diathonite Thermactive.037, Diathonite Sismactive

From ***DIASEN SRL***

DIASEN GREEN BUILDING FUTURE

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-03516
Publication date:	2021-04-12
Valid until:	2026-04-05

- 1 kg of dried timber can sequester 1.8kgCO_2eq/kg stored as Carbon (Ref: Berge, B., 2009)
- 1m^3 of manufactured Hemp Insulation sequesters 13kg of CO_2 (Ref: IFEU Heidelberg 2001
- Diathonite Thermactive contains a high level of recycled cork
- Gutex Woodfibre insulation products are made from sawmill waste (wood chips) that originated from trees grown in sustainably managed forests.
- Thermo Jute produced using recycled Cocoa sacks

GUTEX® NATURALLY MADE FROM WOOD · CALSITHERM® CLIMATE BOARD · DIASEN GREEN BUILDING FUTURE · CELENIT NATURAL INSULATORS · BOSIG · AURO my world ... naturally · therma fleece COSYWOOL · THERMO HEMP PREMIUM

MEETING THE TECHNCIAL BRIEF WITH NATURAL INSULATION

RESOURCE EFFICIENT PRINCIPLES MEANS LOWER OPERATIONAL AND EMBODIED CO_2

Passive House

- ✓ FABRIC FIRST
- ✓ CAREFUL MATERIAL SELECTION & PLANNING
- ✓ BUILD QUALITY & ENERGY EFFICIENCY
- ✓ HEALTHY BUILDINGS
- ✓ LOW ECOLOGICAL IMPACT
- ✓ ULTRA LOW ENERGY DEMAND
- ✓ MODELLED CARBON INTENSITY

Source: WWW.IGBC.IE

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SUSTAINABLE BUILDING MUST TAKE ADVANTAGE OF THE EARLY OPPORTUNITIES

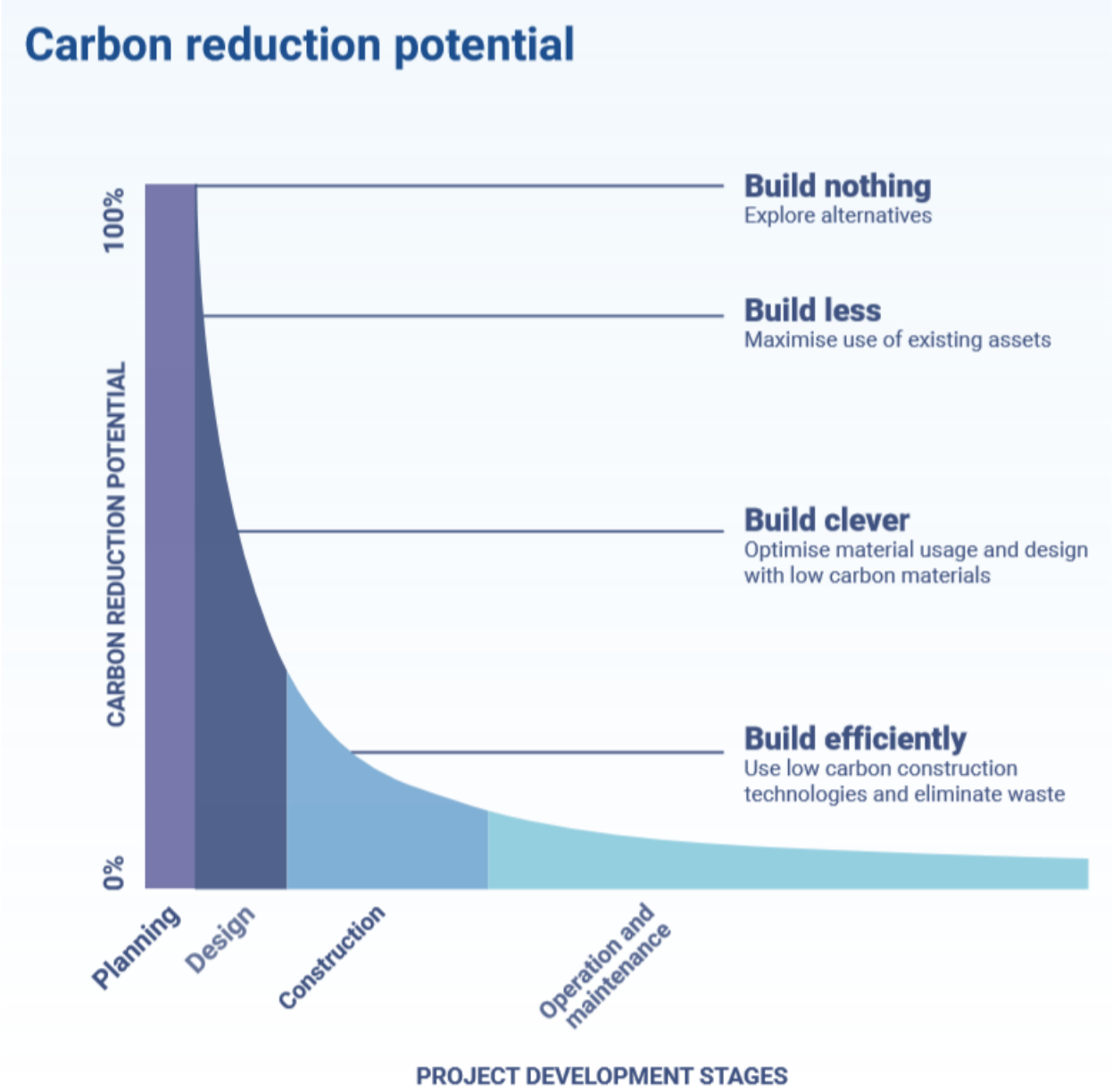

Figure 4: Opportunities to reduce embodied carbon from stage of design process.
Source: HM Treasury: Infrastructure Carbon Review, 2013

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MEETING THE BRIEF: AIR TIGHTNESS

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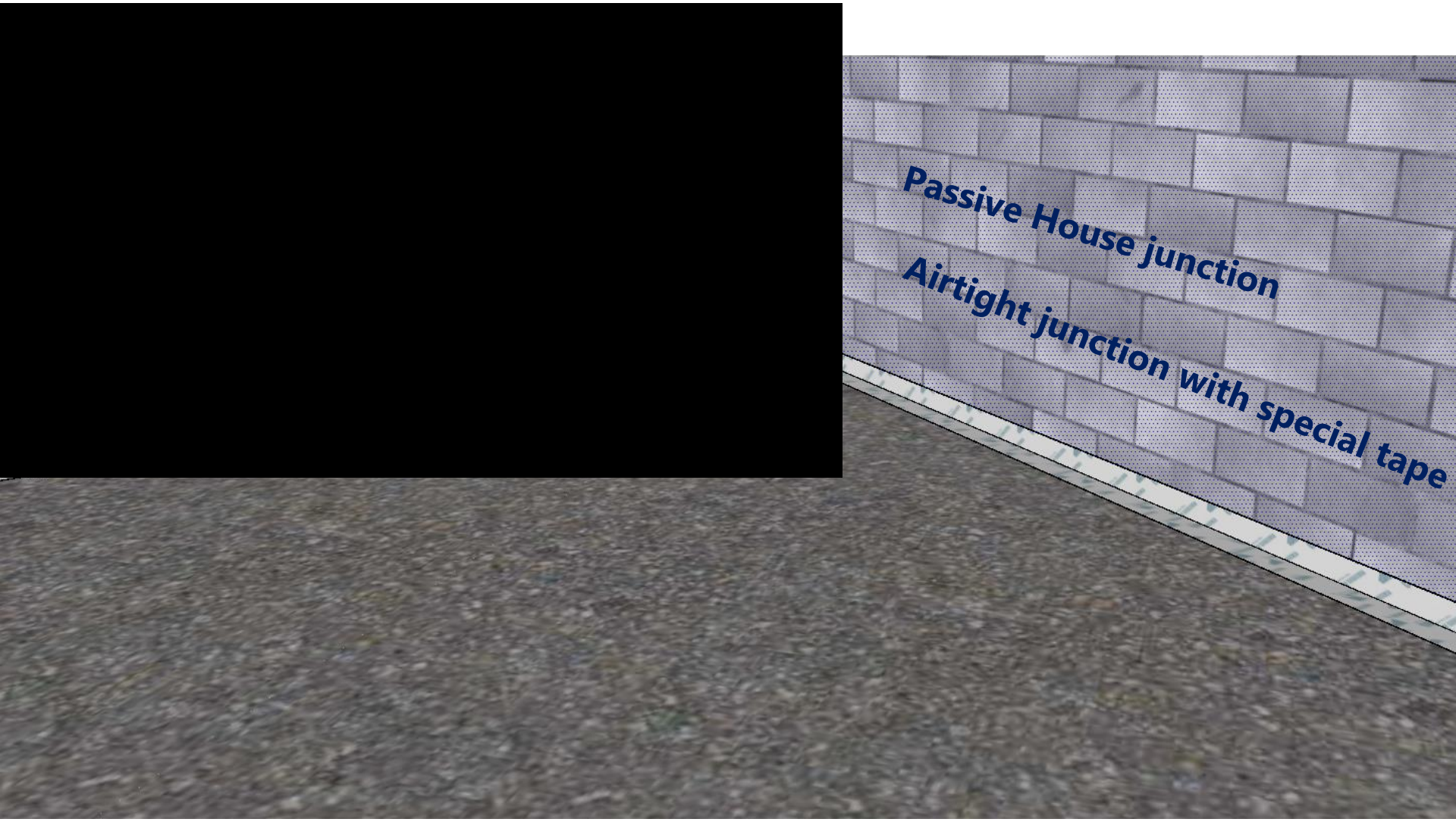
AIRTIGHTNESS: PRE-SEALING JUNCTIONS BEFORE DIATHONITE IS APPLIED: PRO CLIMA CONTEGA SOLIDO SL



AIRTIGHTNESS: PRE-SEALING JUNCTIONS BEFORE DIATHONITE IS APPLIED: LIQUID MEMBRANE

AEROSANA® VISCONN

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AIR TIGHNTESS WINDOWS AND OPENINGS

- Tape wall to the Winframer and then Diathonite over

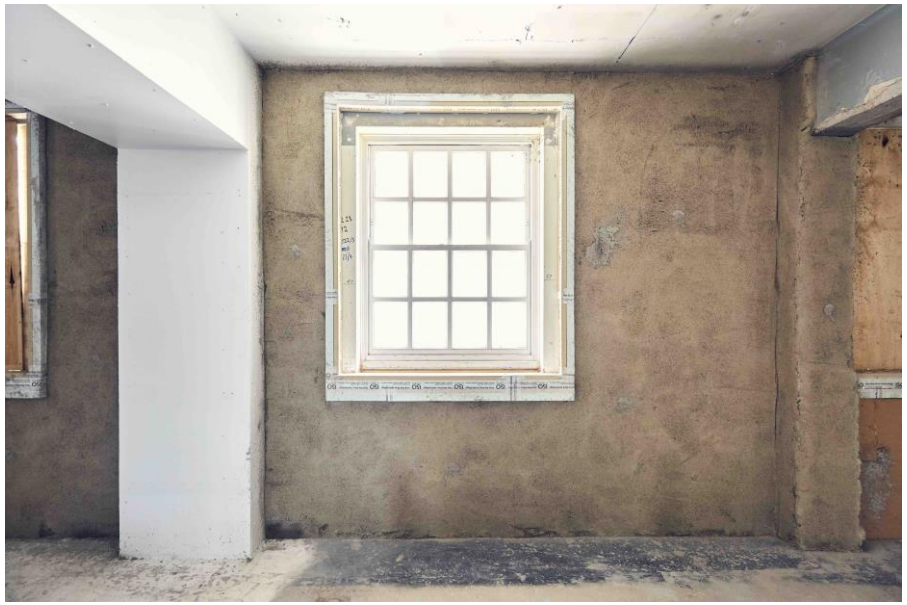

Photo Credit: Soren Kristensen

- **Contega Solido SL**

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AIR TIGHNTESS: GUTEX THERMOROOM ADHESIVE

- Gutex Thermoroom bonded to the Diathonite Thermactive

No Fixings required – No penetration of the airtight line

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MEETING THE BRIEF: MOISTURE ASSESSMENT

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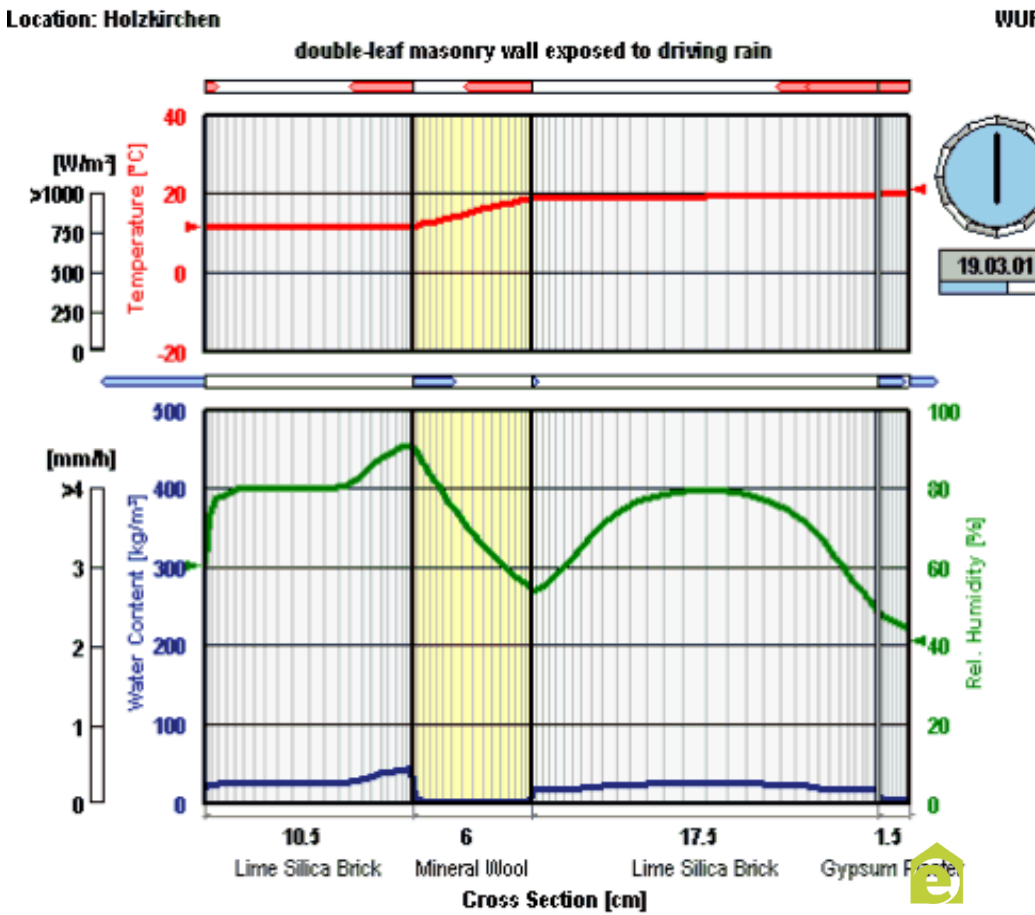
AVOIDING THE RISKS: MOISTURE MODELLING

Hygrothermal Modelling

Computer- assisted simulation program for heat and humidity transports (dynamic) WUFI

- Real climatic data
- Inside and outside temperature
- Inside and outside humidity
- Light absorption
- Moisture storage capability
- Capillary action
  (Data of one reference year at intervals of 1 hour)



Current EN 15026: 2007 provides higher accuracy compared with EN 13788:2011 in BS 5250.

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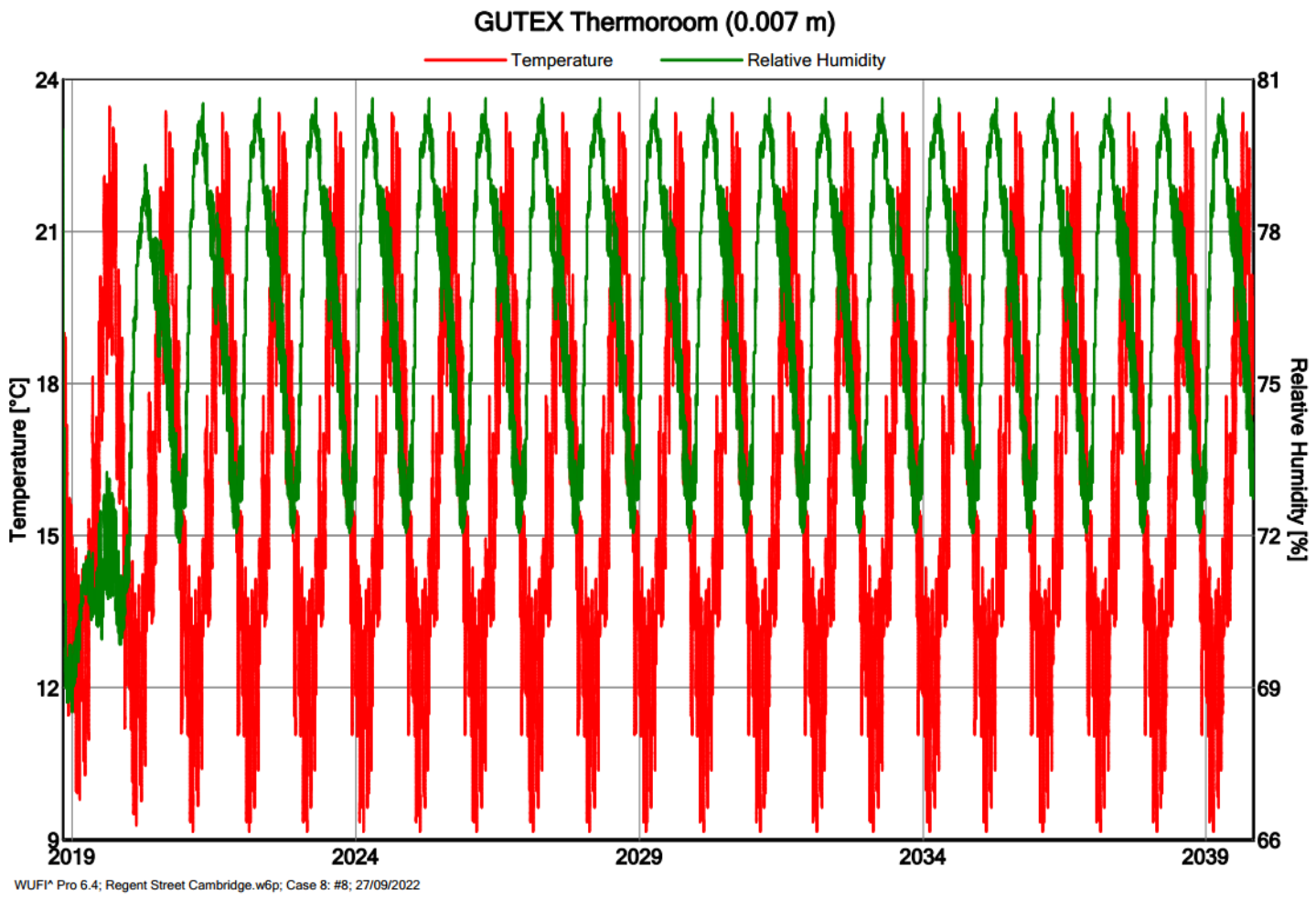
AVOIDING THE RISKS: MOISTURE MODELLING



- %RH at the Gutex Thermoroom/Diathonite Interface <80% - safe value

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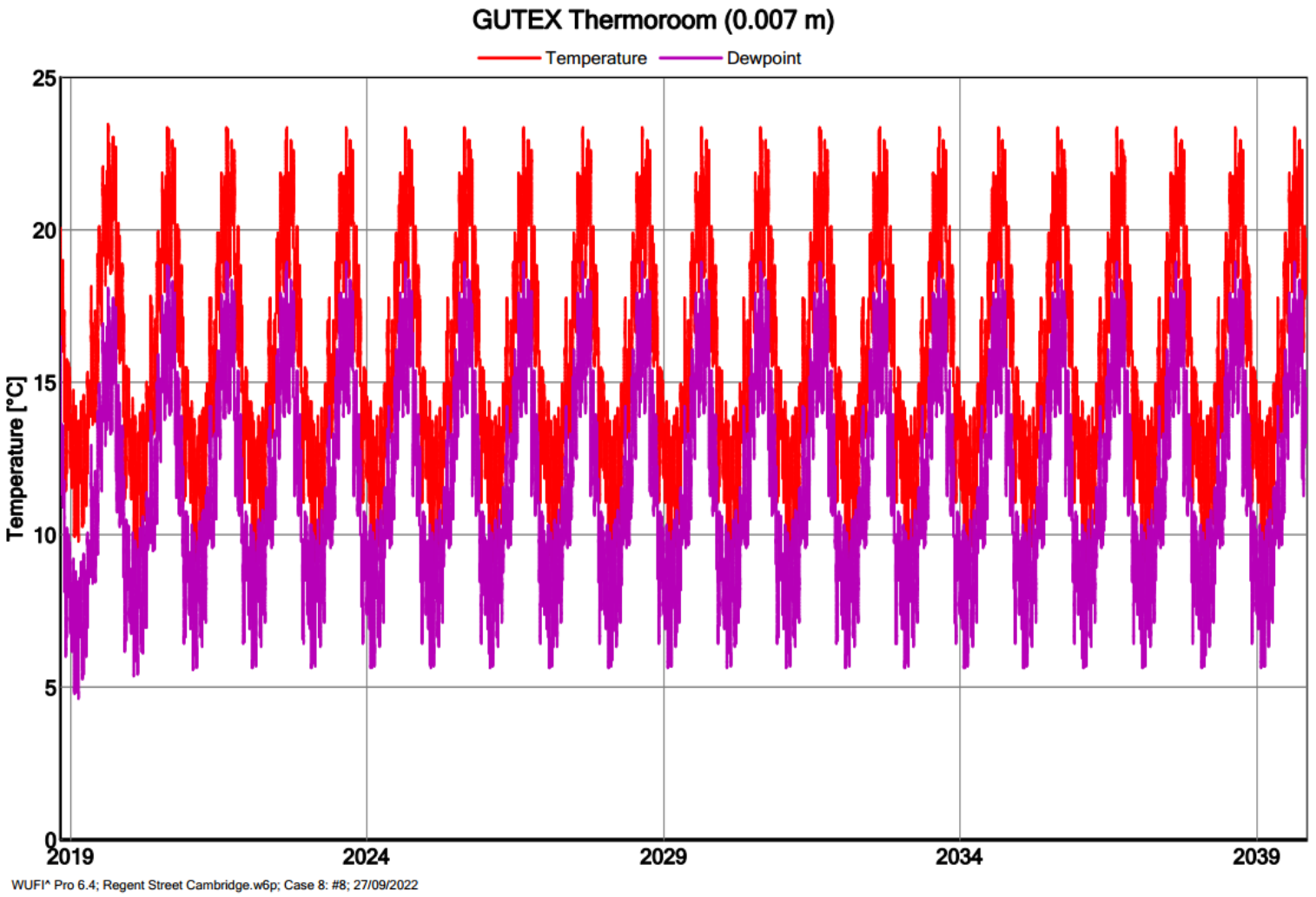
AVOIDING THE RISKS: MOISTURE MODELLING



- Temperature at the Gutex Thermoroom/Diathonite Interface > Dewpoint temperature- no interstitial condensation

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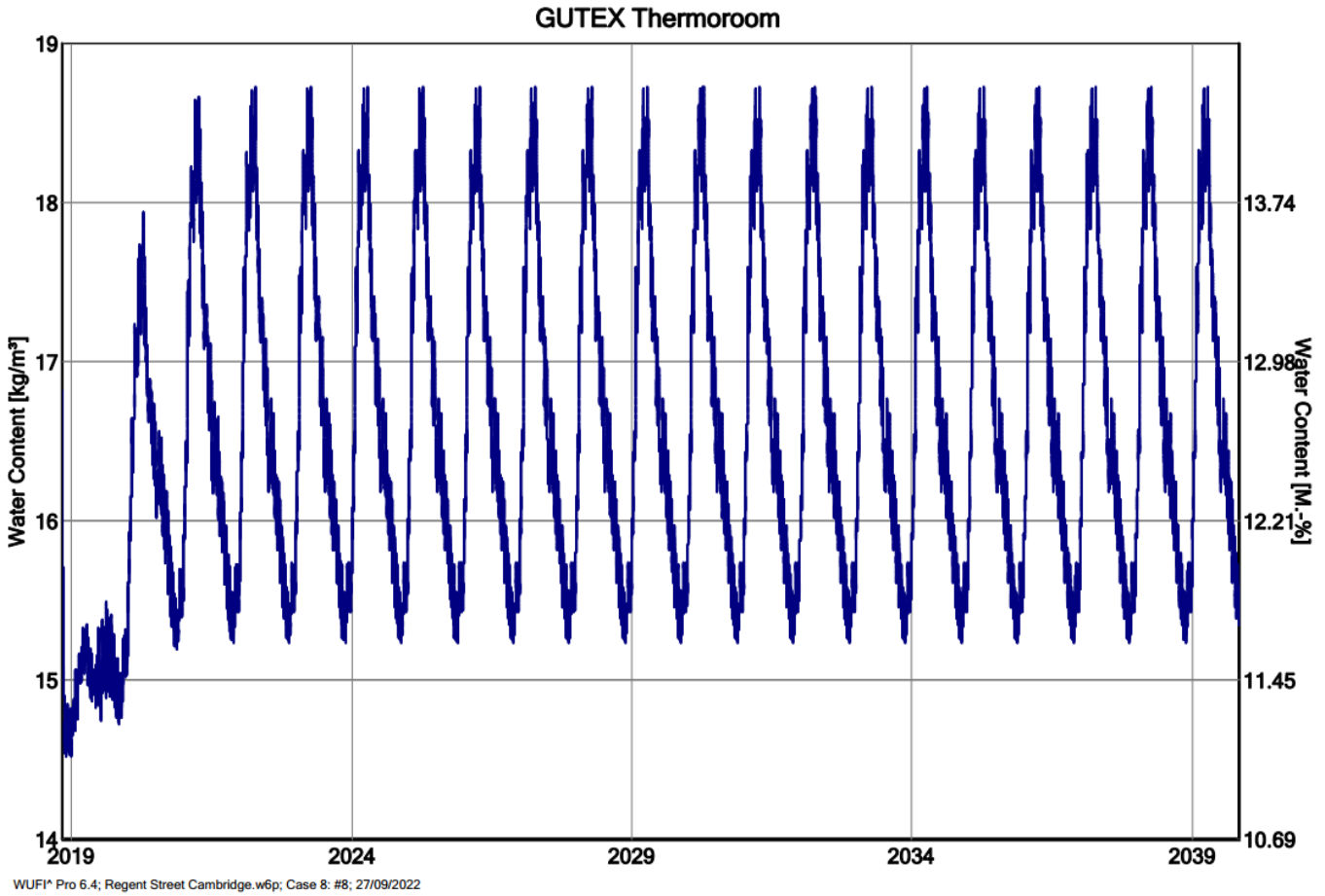
AVOIDING THE RISKS: MOISTURE MODELLING



- Moisture Content at the Gutex Thermoroom/Diathonite Interface <<<18%

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DIATHONITE: BENEFIT OF WATER CAPILLIARITY

- Moisture and insulation buffer for the wood fibre

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MEETING THE BRIEF: WELL STANDARD

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WELL STANDARD – INDOOR AIR QUALITY

- No Asbestos, Lead, Mercury
- Measurement of VOC's (Volatile Organic Carbons – BS EN ISO 16000-9
- Air Flow Chamber Test and then analyse using GC/MS (Gas Chromatography/Mass Spectrometry
    - Can detect exceptionally low levels of VOC ($\mu g/m^3$)
- California Department of Public Health (USA)
- Natureplus (EU)

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WELL STANDARD – INDOOR AIR QUALITY

- Gutex Thermoroom, Thermo Jute: Nature Plus Certified (hence VOC Tested and compliant)

- Diathonite Thermactive and the Pro Clima Membranes, Tapes and seals all tested to EN16000-9 and VOCs fall below the threshold limits

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SUMMARY

- Natural fibre has made a significant contribution to the carbon profile, air tightness and compliance with the WELL standards in addition to thermal insulation

"The greenest building is the one that already exists"

Carl Elefante,
former president of the American Institute of Architects