European Decortication

& Fibre Market

Biomaterials – Back to the Future

Gary Newman

Plant Fibre Technology

March 18-19th 2008

Structure of Presentation

- Introduction to Plant Fibre Technology.
- Current situation in EU
- Hemp decortication & nonwoven technology (cost)
- Markets (construction)
- Market drivers (climate change and legislation)
- Conclusions

Plant Fibre Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre Technology

Isonat® Natural Fibre Insulation

Product marketing

Hemp Insulation
Strawboard

Hemp Particleboard

Research and development

Novel fibre treatment technology / Next generation insulation / LCA / Passive moisture control

Current EU situation

Short fibre subsidy:	90 Euros/tonnes fibre (< 7.5% hurd)
Long fibre subsidy:	160 Euros/tonne fibre
Fibre flax area:	100,000 hectares (247,000 acres) *1
Seed flax area:	50,000 hectares (123,500 acres) pers. comm
Hemp area:	15,000 hectares (37,050 acres) *1
Long flax fibre sales:	115,321 tonnes/annum– Textiles China (€1600/t) *2
Short flax fibre sales:	73,000 tonnes/annum *2
Short flax fibre sales:	40% textiles (€350/t), 34% paper (€350/t) & 26% nonwovens (€600/t) *2
Hemp fibre sales:	27,106 tonnes/annum *2
Hemp fibre sales:	75% paper (€350/t), 25% nonwovens (€600/t) *2

*1 – 2006 Michael Karus - Nova Institute
*2 – Evaluation of the Common market organisation for flax and hemp

Therefore……..

- Long fibre heavily subsidised and nearly all the further processing is in China
- While subsidy remains there is little opportunity for whole crop industrial flax processing in EU
- Cigarette Paper represents the largest market for hemp (but low value and believed to be static)
- Hemp based nonwovens are generally seen as representing the medium value growth opportunity

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

EU Hemp Processors – Some common characteristics

- Processors increasing capacity from 2 to 7-10 tonnes/hour
- New high capacity plants will process un-retted hemp (more consistent, less risk)
- High capacity plants based on hammermilling
- Reduction of stem length in the field generally required
- Processors forming strategic relationships to secure long term supply contracts
- Viability depends on sale of fibre and hurd

Primary processing equipment costs			
Supplier	**Capacity (tonnes / hour)**	**Budget Quote (Euros)**	**Estimated total cost (Euros)**
Temafa	2	2,700,135	3,530,135
CFM	2	648,000	1,478,000
Technoboard (1)	5-6	6,742,410	7,407,910
Technoboard (2)	10	9,926,010	11,136,010
Van Dommele (1)	3-4	2,122,250	4,024,750
Van Dommele (2)	6-8	2,901,750	5,227,750
NaFiCo (1)	5	3,439,000	3,439,000
NaFiCo (2)	10	4,979,000	4,979,000
Nonwoven equipment costs			
DOA	1.0 to 2.0	2,950,000	4,600,000
Technoboard (1)	1.2	8,948,190	9,698,190
Technoboard (2)	2.0	9,209,700	9,959,700
Laroche	1.0 to 2.0	1,707,200	2,957,200
Jeftex	2.6	1,893,200	3,043,200

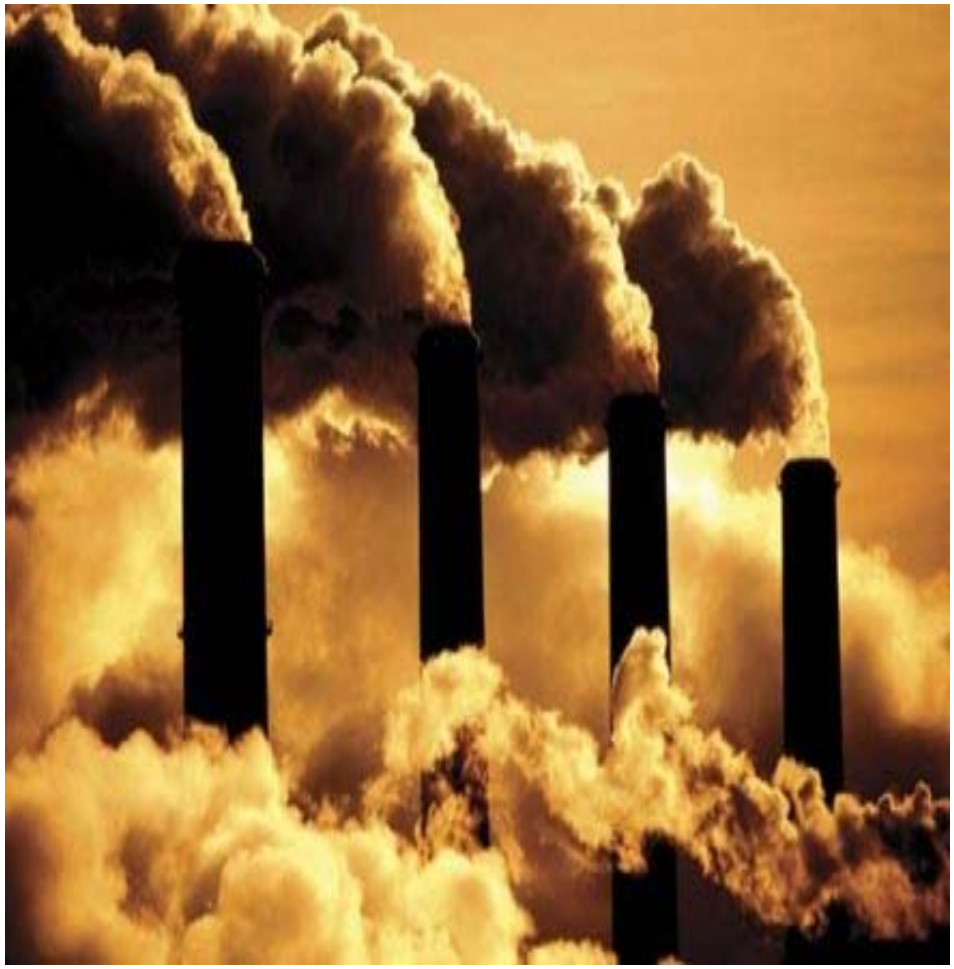
Budget quote – cost provided by the equipment supplier
Estimated total cost – Estimated total cost of fully installed and commissioned plant

Some positive indicators for the European hemp industry…….

- Hemp industry now attracting investment from venture capital as well as large corporations (Steico / Lhoist)
- Processing scaling up from 2 tonne to 7-10 tonne
- Hemp building materials moving from niche to mainstream markets
- Demand for hemp fibre and hurd is outstripping supply
- **Climate Change** is now the key legislative driver for non-food crop policy

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Construction accounts for **40%** of the UK **carbon emissions.** The construction sector is the single most important route to achieving carbon reduction targets.



Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

If all the insulation used in the UK was replaced with hemp, all the fibre could be grown on **230,500** ha of land. This would also provide sufficient hurd for **200,000** new homes/annum (*Govt. target*)

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Hemp in Construction

- Natural Fibre Insulation
- Hemp & Lime Construction

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

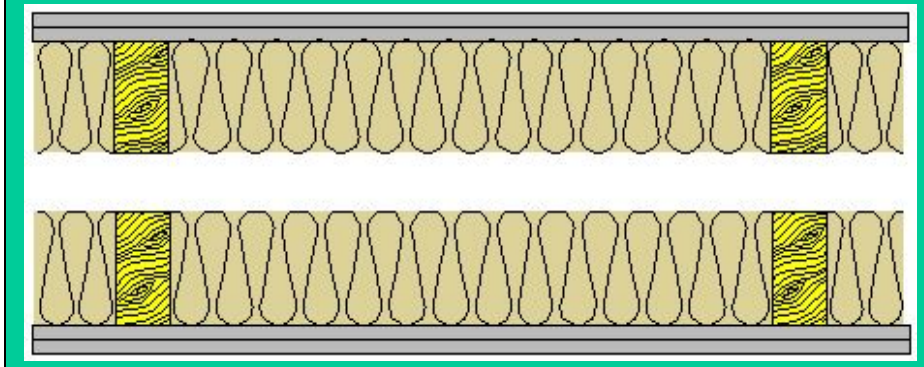
Thermal performance

- Thermal conductivity – 0.039w/m.K
- Heat capacity – 2 to 4 x mineral fibre
- Maintains thermal performance over time and in dynamic conditions

Plant Fibre Technology Ltd
bioproducts - plant fibres - innovation
Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Acoustic performance

Separating wall / Timber stud



Description

2 x 12.5mm plasterboard each side

100mm x 50mm timber studwork at 600mm centres with 50mm gap between each wall

100mm ISONAT insulation in each wall.

Sound Reduction Performance

59 RwdB (53 RwdB + Ctr)

Part E Requirement

45 D_{nTw} + C_{tr}dB for New build

43 D_{nTw} + C_{tr}dB for New build

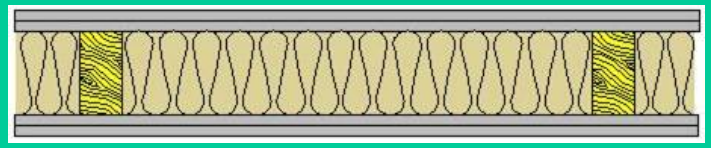
PASS

Plant Fibre Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Internal Wall / Timber stud



Description

2 x 12.5mm plasterboard each side

100mm x 50mm timber studwork at 600mm centres

100mm ISONAT insulation

Sound Reduction Performance

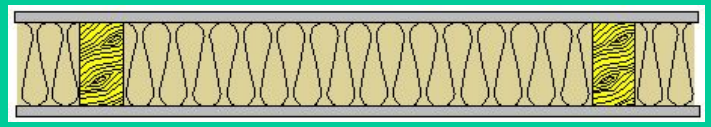
48 RwdB

Part E Requirement

40 RwdB

PASS

Internal Wall / Timber stud



Description

1 x 12.5mm plasterboard each side

100mm x 50mm timber stud work at 600mm centres

100mm ISONAT insulation

Sound Reduction Performance

45 RwdB

Part E Requirement

40 RwdB

PASS

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Fire Performance

- Euroclass E
- Combustible but fire safe
- Improves the fire resistance of partition walls

Other benefits

- Durability
- ‘Breathability’
- Health
- Environment
  - Disposal
  - Better than carbon neutral

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Hemcrete®

Collaborative venture between:

- Lhoist
- Lime Technology
- Hemcore

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Properties of Hemcrete®

- Carbon capture (‘better than carbon neutral’)
- Low density
- High thermal insulation
- High sound absorption
- High thermal inertia (heat capacity)
- Good vapour permeability (‘breathability’)
- Creates comfortable healthy buildings
- Fire and pest resistant

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Adnams Project

Hemcrete diaphragm wall

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Lime Technology Office

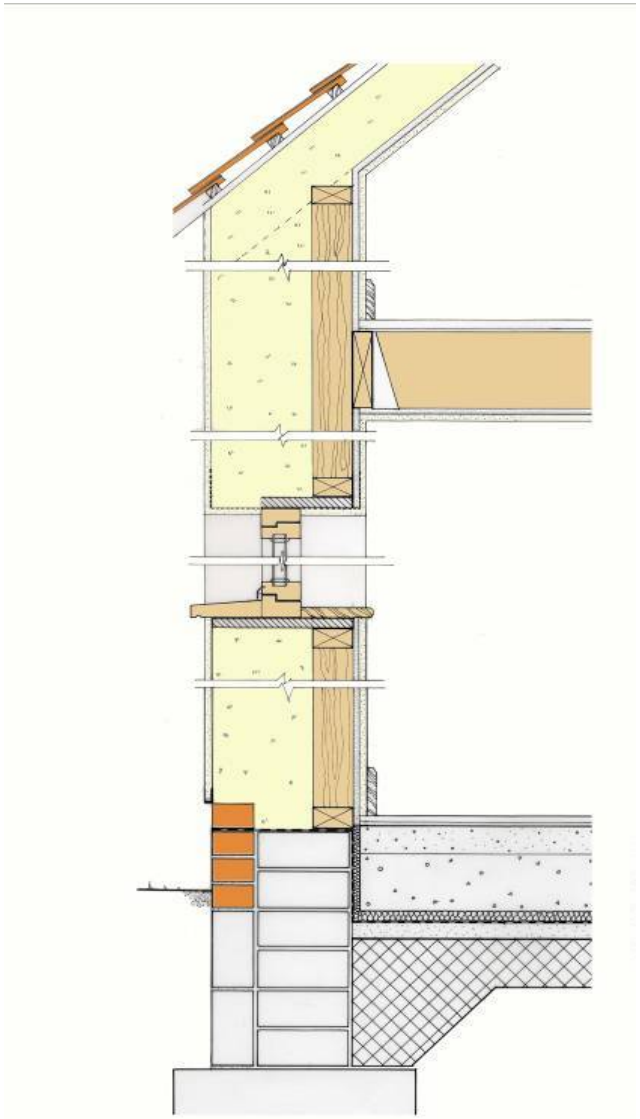
Before

Plant Fibre Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Sprayed Hemcrete



Plant Fibre Technology Ltd

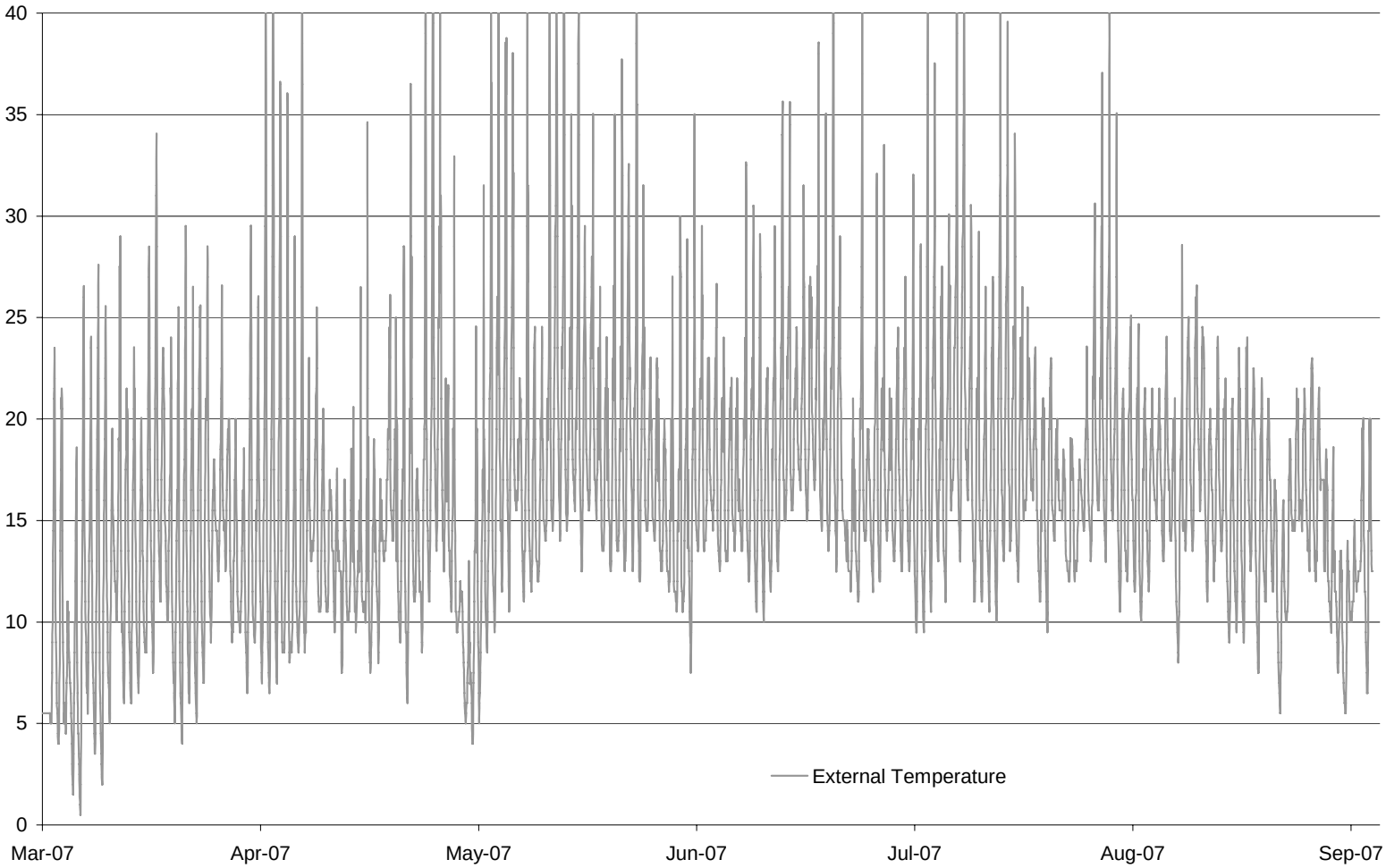
bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

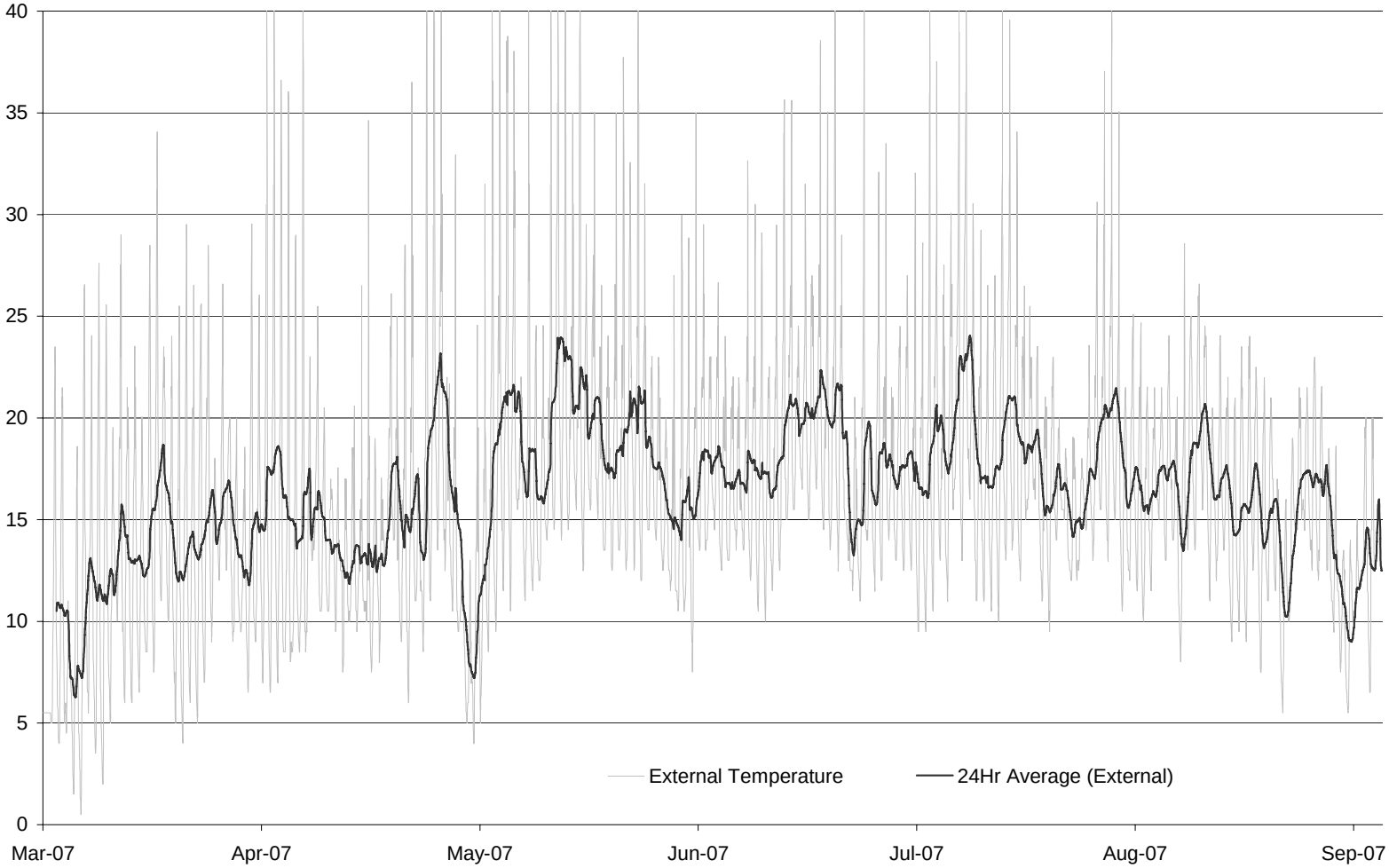
Spray Limetec® render

The finished office

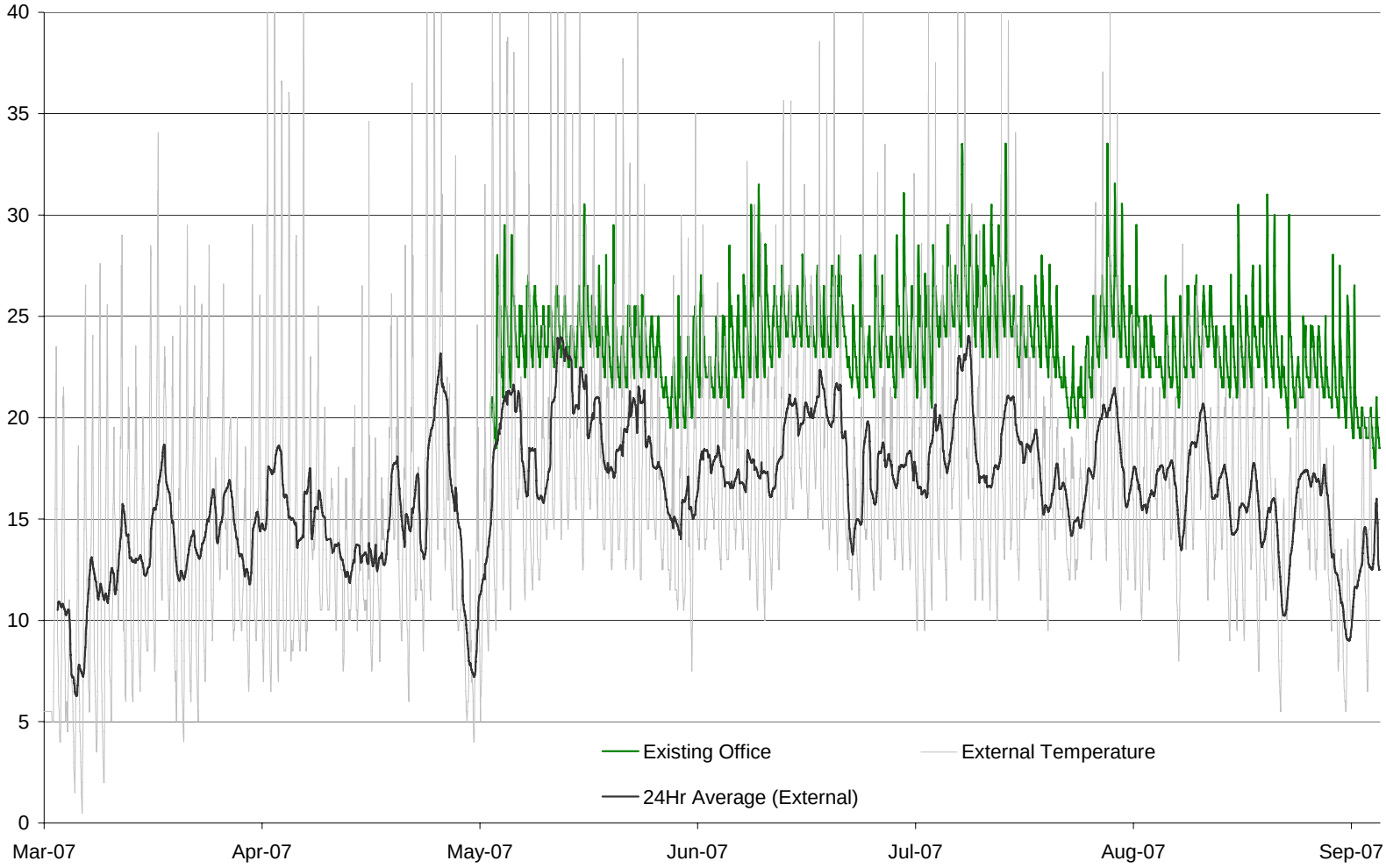
External recorded temperature – April to September 2007



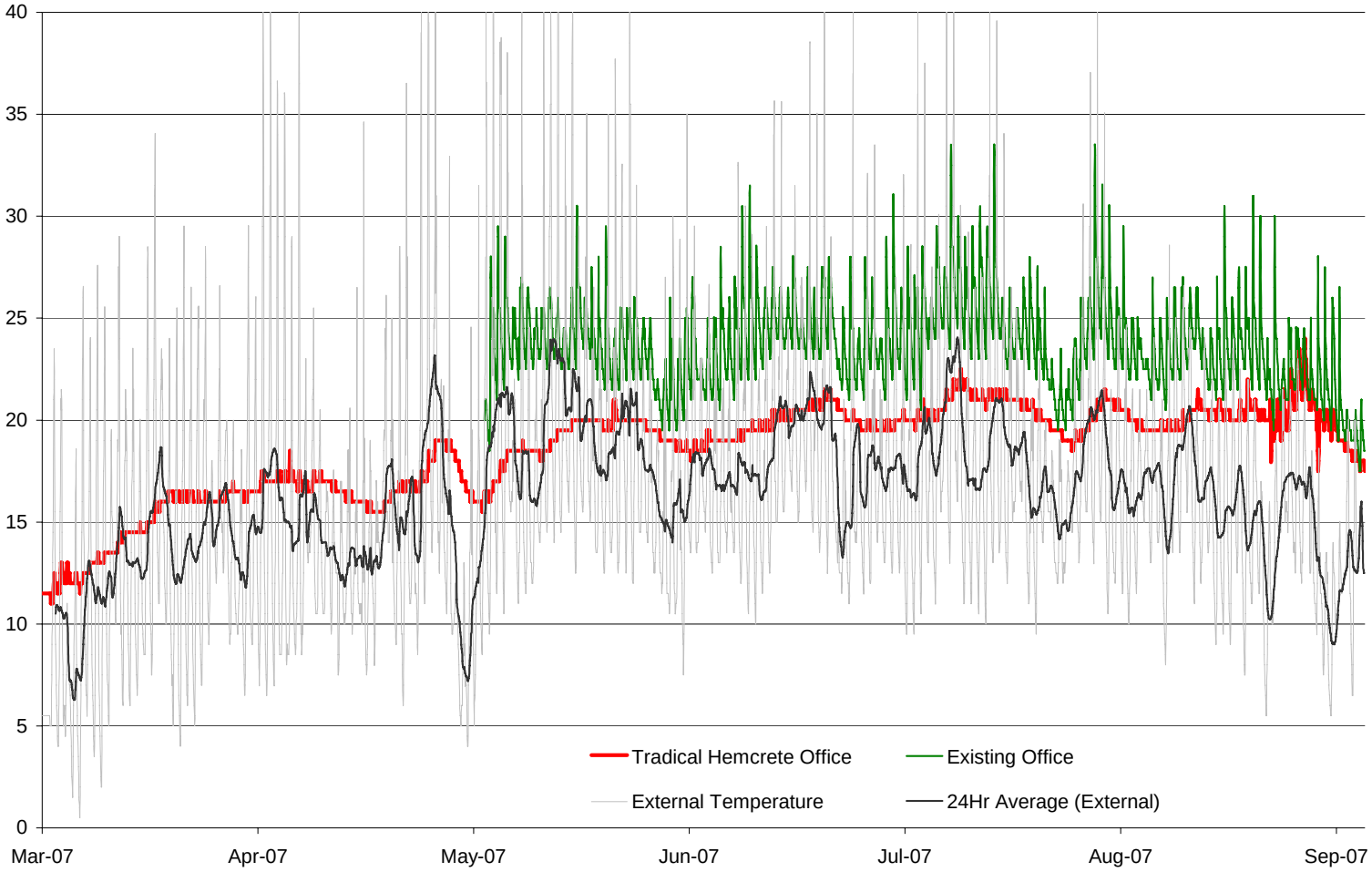
Addition of 24hourly average external temperature trend line



Existing offices (monitored June onward) showing high internal temperature swing



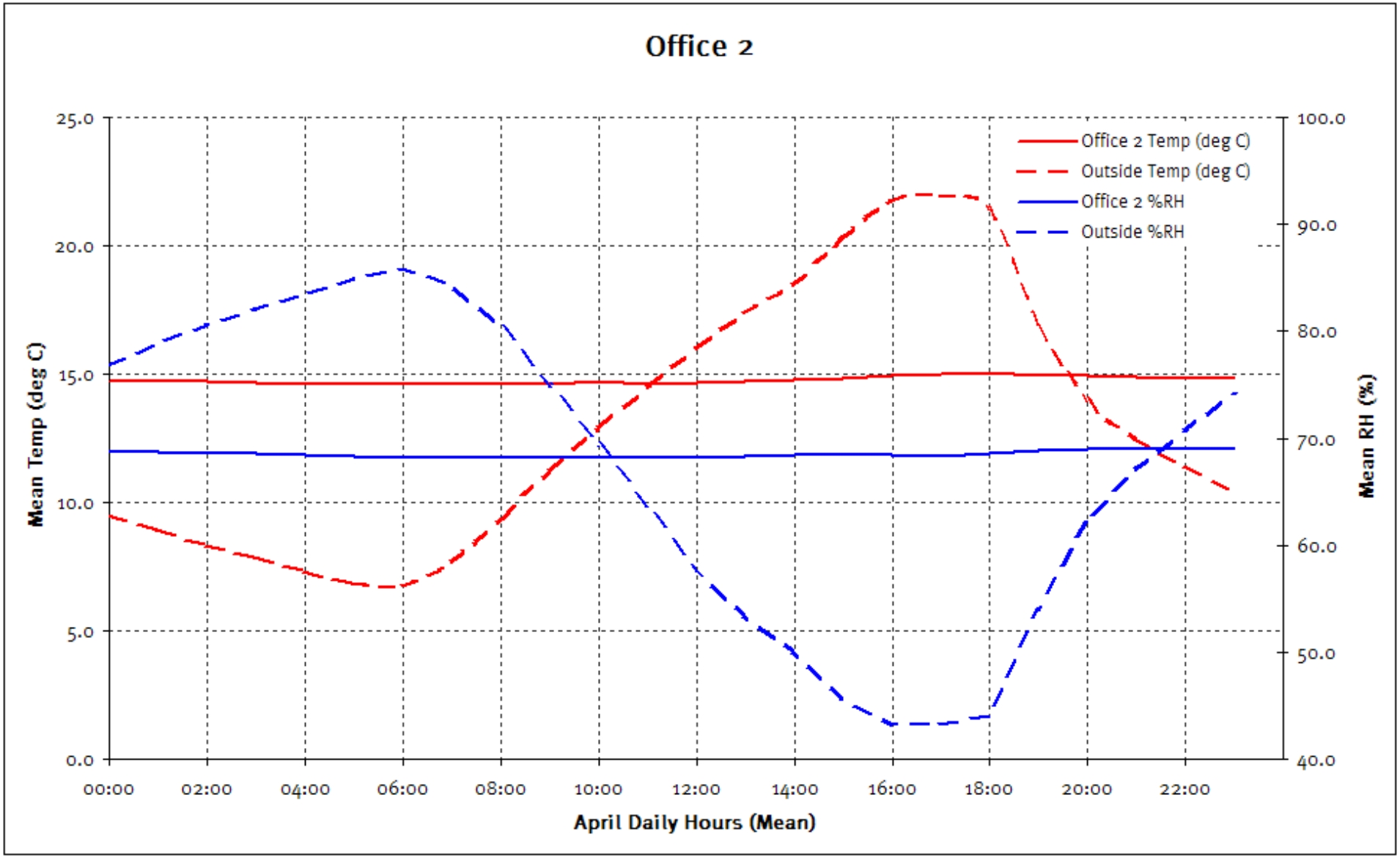
By comparison, the Hemcrete® offices show a low internal temperature swing.



Plant Fibre
Technology Ltd

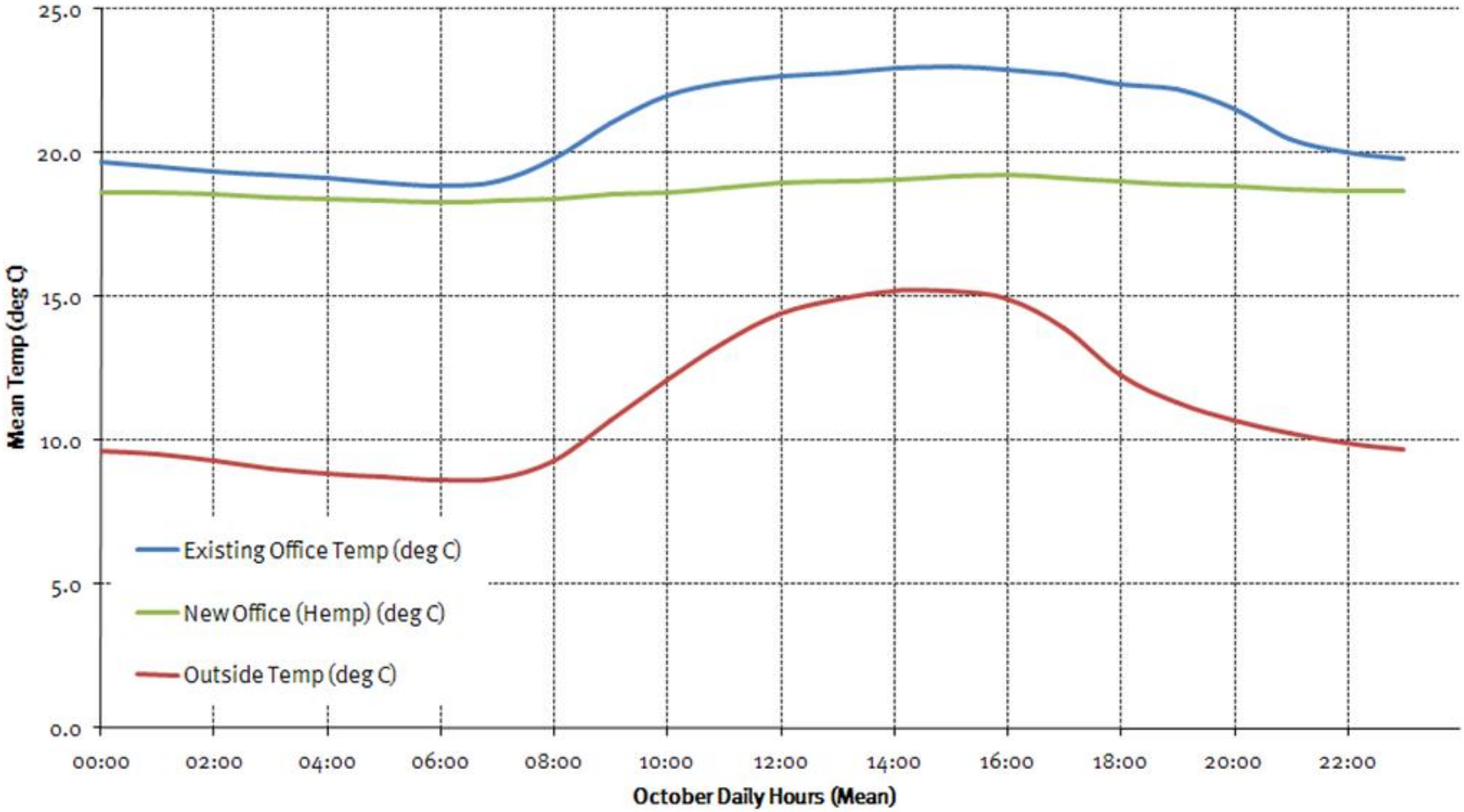
bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com



Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

New Office 2 (Hemcrete) + Existing Office (Masonry)



Plant Fibre
Technology Ltd

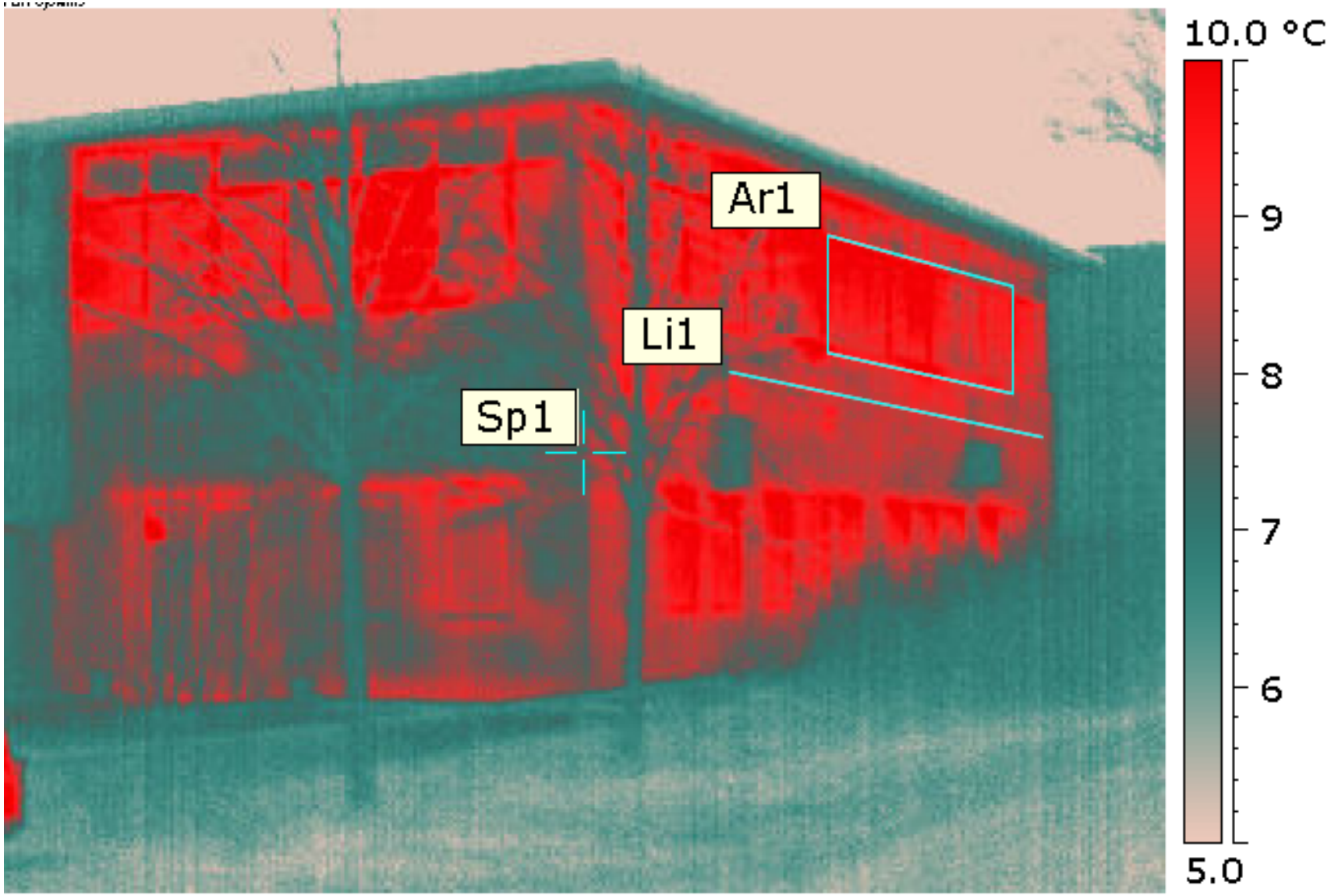
bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com



Plant Fibre
Technology Ltd

bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com


Tradical
Tradical® HF
Hemp shiv
Tradical® HF
Tradical

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Renovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

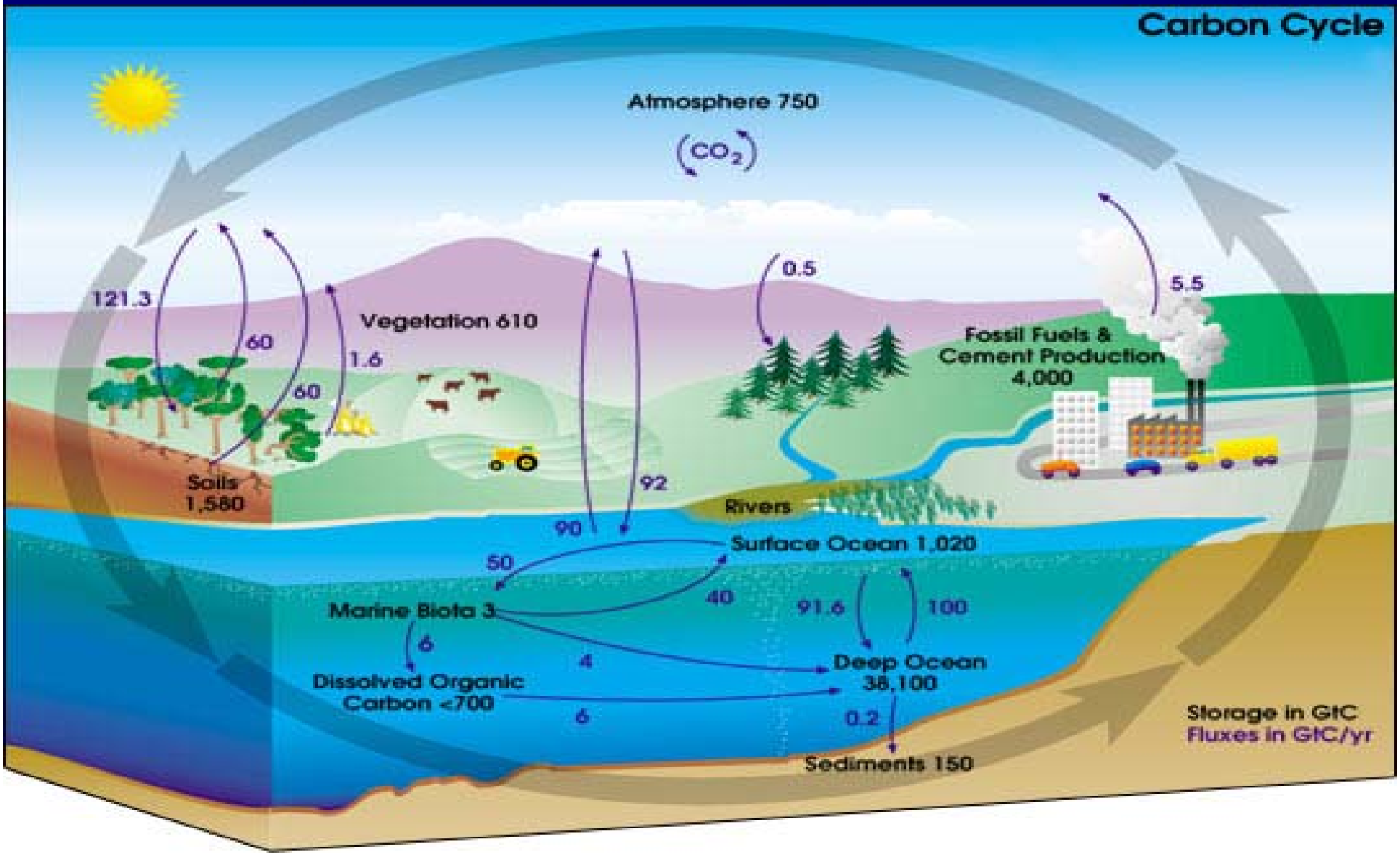
Market Drivers

- Climate Change
- 'Peak Oil' and resource availability
- Government Legislation
- Health
- Technical Performance

Plant Fibre
Technology Ltd

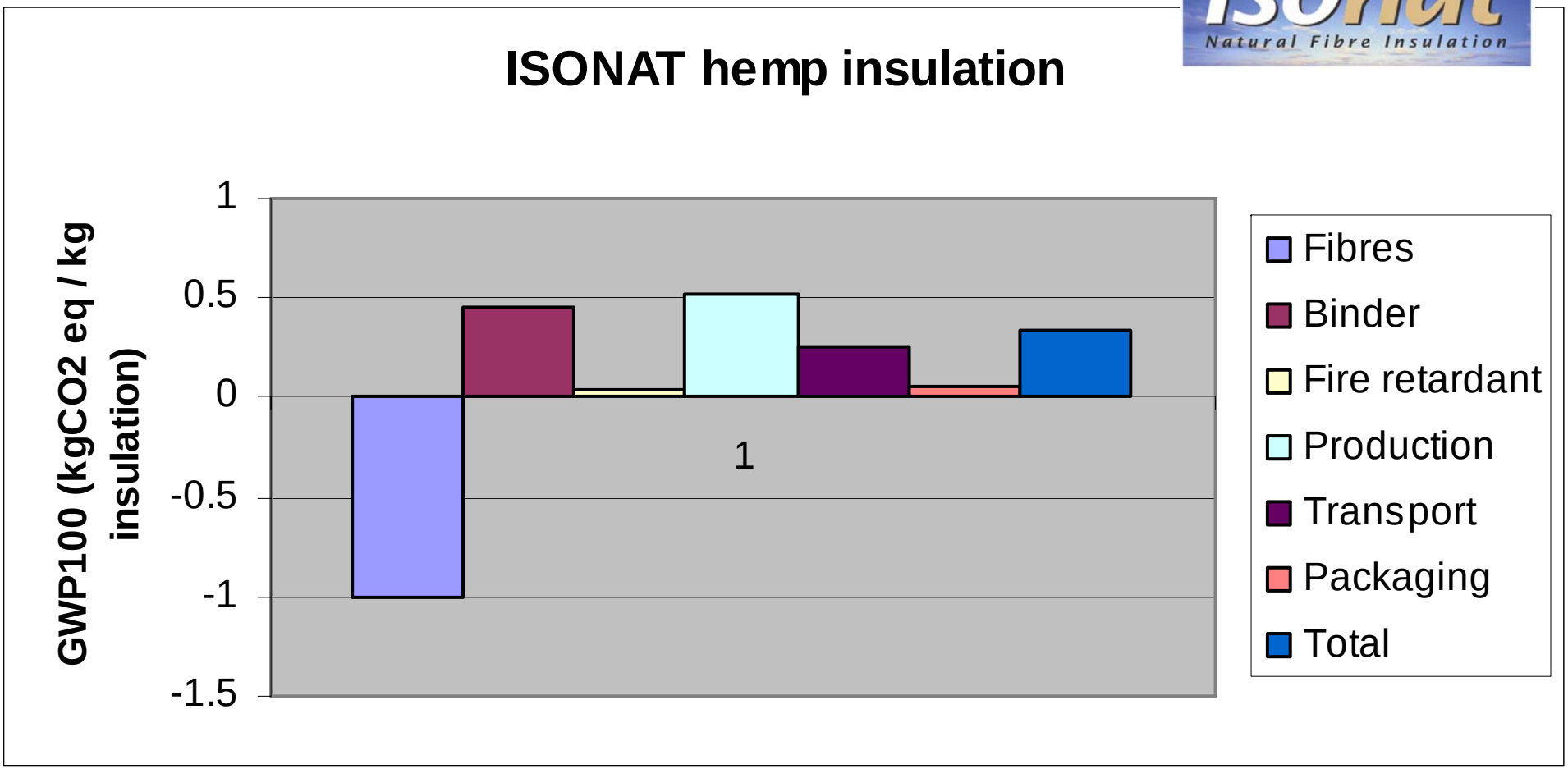
bioproducts - plant fibres - innovation

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com



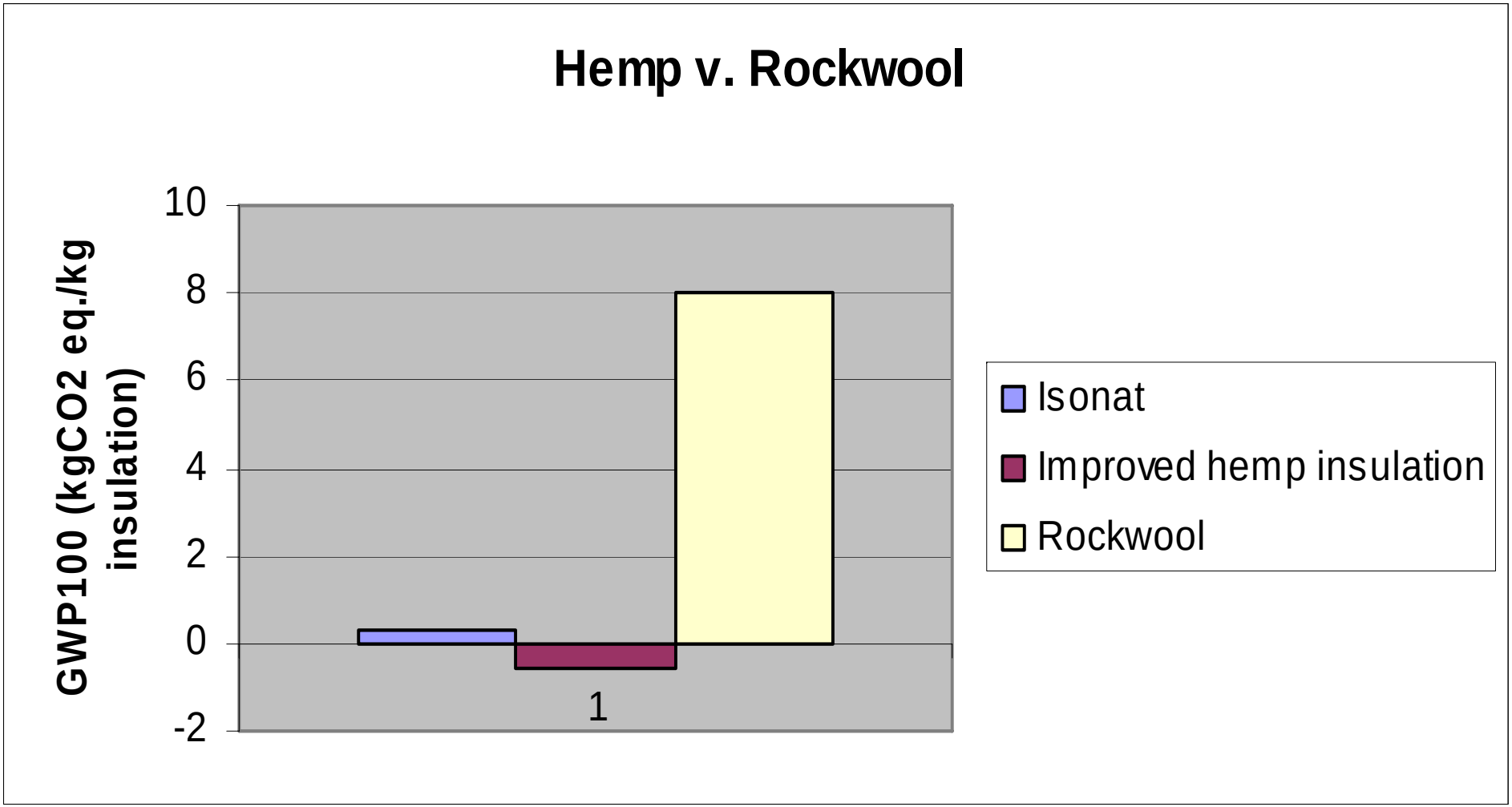
Market drivers – climate change

Isonat® Natural Fibre Insulation



Market drivers – climate change

Market drivers – climate change



Market drivers – climate change

Hemcrete CO_2 emissions

- Typical cavity walls 100 kg/m^2
- 300mm Hemcrete® wall - 31 kg/m^2
- 500mm Hemcrete® wall - 53 kg/m^2

Market drivers – climate change

Tradical®

Hemcrete CO_2 emission savings

- It is possible to save up to 150 kg of CO_2 emissions per square metre of wall area by changing materials
- This could save up to 30T in the walls of a typical house
- If Hemcrete® is used for the floor slab and roof insulation this can increase to 50T

Legislative Market Drivers

Legislative

- EU (CAP health check, Lead Market Initiative)
- DEFRA/DTI (strategy for non-food crops).
- Construction Regulation (Part L Building Regulations 2007, Code for sustainable homes, BREEAM)

Legislative Market Drivers

European Union

- CAP health check
  - Climate change, Biofuels, Water management, Biodiversity
  - Processing aid 90 Euros/tonne short fibre / 190 Euros/tonne for long fibre
- Lead market initiative – accelerating the development of the market for bio-based products in Europe.
  - Reduce GHG by 20% by 2020
  - Improve energy efficiency by 20% by 2020

Legislative Market Drivers

UK Government

- Strategy for non food crops (2006)
  - Environment, Economic Competitiveness, Social Benefit.
  - ‘Non-food crops strategy includes a commitment to examine the scope to set a target for the use of renewable building materials’.
- NNFCC (www.nnfcc.co.uk)
  - Supply chain development
  - “One stop shop” for non-food crops

Legislative Market Drivers

Building Regulation

- Part L - 2006: Conservation of fuel and power
  - Relates to CO_2 (not simply elemental 'U'-values)
- Code for Sustainable Homes
  - Method of scoring environmental performance of a building at the design stage.

Category of Environmental Impact	**Weighting Factor**
Energy and CO_2 emissions	36.4%
Health and Wellbeing	14.0%
Ecology	12.0%
Management	10.0%
Water	9.0%
Materials	**7.2%**
Waste	6.4%
Pollution	2.8%
Surface Water run-off	2.2%
Total	100.0%

Legislative Market Drivers

BREEAM

(Building Research Establishment Environmental Assessment Method)

- Full Life Cycle Analysis (cradle to grave analysis) of building material
- Different categories of impact weighted to allow a final score

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Environmental Issue	Weighting (%) – 2006
Climate change (GWP100)	**21.6%**
Water Extraction	11.7%
Mineral resource depletion	9.8%
Stratospheric ozone depletion	9.1%
Human Toxicity	8.6%
Ecotoxicity to Water	8.6%
Nuclear waste	8.2%
Ecotoxicity to land	8.0%
Waste disposal	7.7%
Fossil fuel depletion	3.3%
Eutrophication	3.0%
Photochemical ozone creation	0.2%
Acidification	0.05%

Contact us on T: 01248 388486 or email: info@plantfibretechnology.com

Conclusions

Key driver:	Climate change
Key USP:	Carbon sequestration ('better than carbon neutral')
Key sector:	Construction
Key fibre market:	Nonwovens
Key hurd market:	Construction

'If you can see the band wagon, you've probably already missed it.'

‘Thanks for listening’

Gary Newman

Plant Fibre Technology Ltd

www.plantfibretechnology.com

gary@plantfibretechnology.com