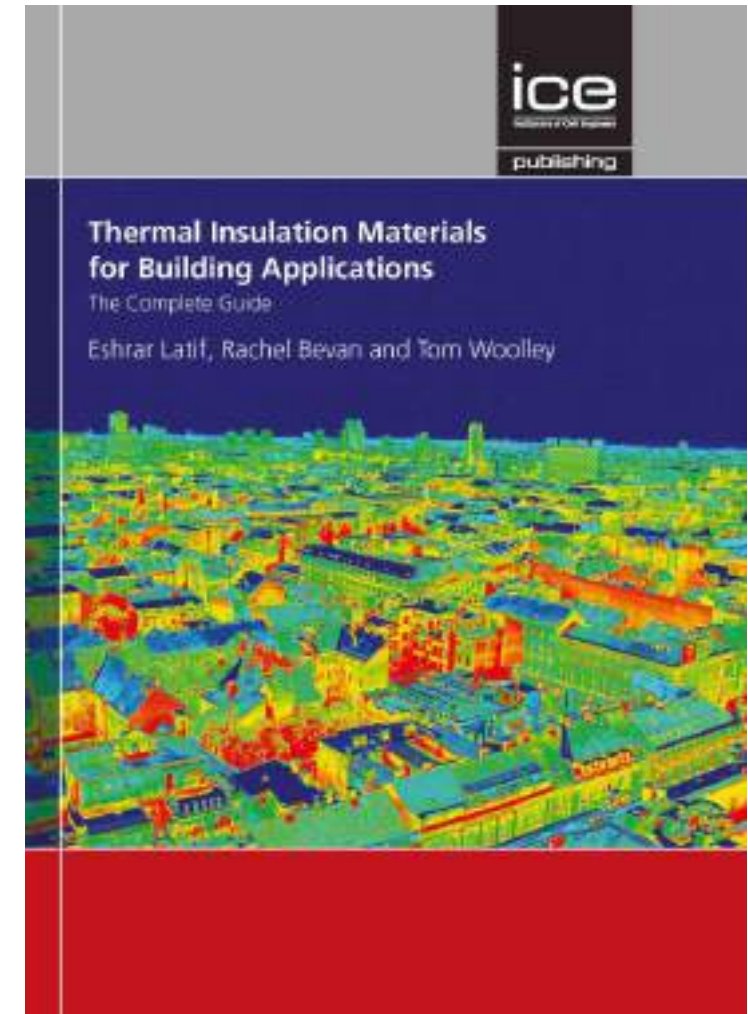


Reducing Energy Use in Housing: Insulation and Retrofit Problems in Wales and the UK

Tom Woolley, Rachel Bevan, Eshrar Latif

Cynhadledd ymchwil tai Cymru 2020 | Wales Housing Research Conference 2020 Thursday, 9 January 2020



Why is it important to understand insulation materials?
How do you choose insulation materials – what criteria?
Aesthetics, Cost, Construction, Environment???

- There is general agreement that existing and new build houses should achieve higher standards of energy efficiency.
- **Is all insulation the same?** There has been an assumption that all insulation materials are much the same and that, providing that thermal performance figures are satisfactory, any material can be used in any form of construction.
- **Insulation the elephant in the room.** Recent reports on climate action, zero energy and retrofitting amazingly barely mention insulation
- **Performance Gap.** Evidence shows, however, that inappropriate insulation and installation measures can lead to many unintended consequences and a gap between predicted and actual performance.
- **Retrofit disasters?** Far from reducing fuel poverty and carbon emissions, mould and damp can occur, aggravating health problems, which has been confirmed by academic research.
- **Fire Risks.** Flammable insulation materials are still widely used
- **Health Problems.** Sealing up increasingly airtight buildings with non-breathable, flammable and even hazardous synthetic materials can cause damage to building fabric and occupant health. The importance of indoor air quality and ventilation is often overlooked
- **Negative environmental impacts of insulation?** Furthermore the embodied energy and pollution involved in the production of many commonly produced insulation materials can be bad for the environment
- **Our book on insulation materials** tries to help people understand the differences between different kinds of insulation and indicates natural environmentally friendly alternatives

Insulation is central to keeping houses warm and to reducing CO2 emissions
 But how much thought is given to which insulation to use?
 Insulation is often ignored in climate and energy policies

REDUCE YOUR ENERGY BILLS £

WWW.WARMWALES.ORG.UK

Let's face it the cold weather is never far away, so now is a good time to take a look at your house and ask if some extra insulation might help keep the heat in and the energy bills down?

WHAT HAVE YOU GOT UP TOP?

Insulating your loft, attic or flat roof is a simple and effective way to reduce heat loss and your bills. Loft insulation is effective for at least 40 years and should pay for itself many times over with savings of up to £225 per year*

WHAT'S ESCAPING THROUGH YOUR WALLS?

A third of all the heat lost in an uninsulated home escapes through the walls. Heat will always flow from a warm area to a cold one so the colder it is outside, the faster heat from will escape. cavity wall insulation can save up to £225 per year*

HOW SOLID ARE YOU?

Insulating your solid walls could cut your heating costs considerably as they let through twice as much heat as cavity walls. Insulating solid walls could save up to £425 per year*

PLUG THOSE GAPS

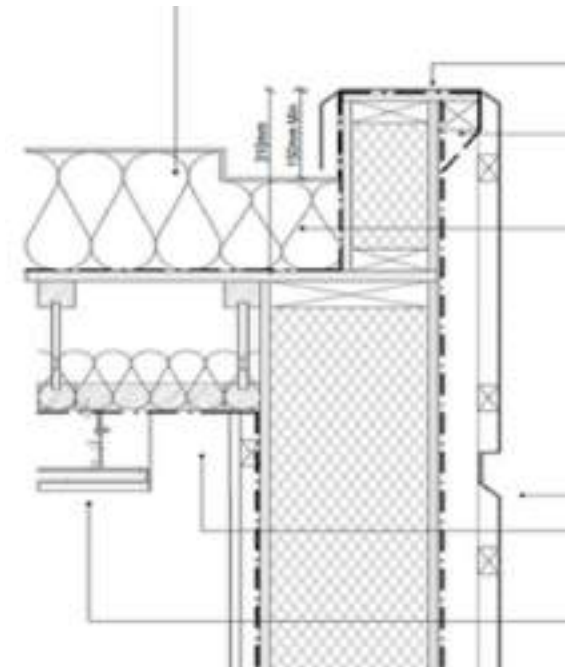
Draught-proofing is a cheap and effective way to save energy and money. A draught will let in cold air and waste heat, so block up unwanted gaps and save your warm air. It could add up to a £25 per year* saving.

LOCK UP YOUR PIPES

Where to start? Lagging your water tanks, wrapping those pipes and insulating with foil behind your radiators, it will reduce the heat lost and keep your water hot whilst saving you money and £20 per year*

*Estimated savings are taken from <http://www.energy.gov/wales/energy/wales/warm-wales>

WARM WALES
CHANGING STRATEGIES



CarbonBrief
CLASH OF SCIENCE

SCIENCE ENERGY POLICY

UK POLICY | 21 February 2015 | 001

UK homes 'shockingly unprepared' for climate change, says CCC

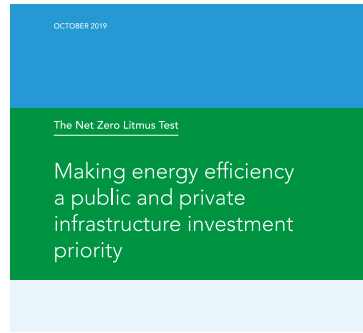
f t p in

Here are ten recent reports on housing, energy zero carbon and retrofit. In over 600 pages insulation is only mentioned 50 times and then only in a very vague and general way



The Green Construction Board

48 pages 2019.
insulation only 8 refs



Net Zero Litmus Test 2019. 48 pages.
Only mentions insulation 3 times



Zero Carbon Manchester 2017 26 pages
insulation mentioned only once



Zero Carbon Hub. 2014 44 pages
Insulation only mentioned twice



AFFORDABLE WARMTH, CLEAN GROWTH
Action Plan for a comprehensive Buildings Energy Infrastructure Programme
September 2017



Energy Efficiency Infrastructure Group 2017 88 pages

Only mentions insulation and then only in passing 9 times



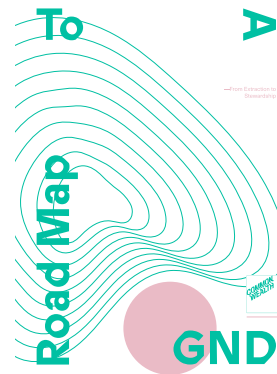
2019 22 pages

Insulation only mentioned 10 times but only in passing



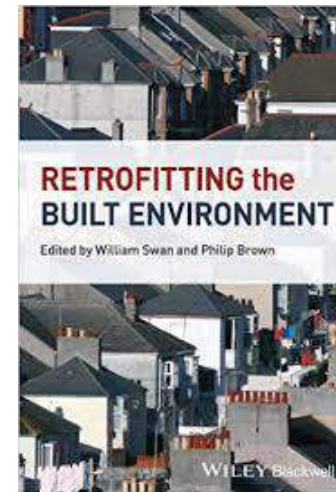
32 pages

2018
Only 6 references to insulation



Green New Deal. 2018?

37 pages with 8 insulation refs but mostly repetition



234 pages published 2013
Only 5 pages refer to insulation materials



2019 Only mentions insulation twice

This is the worst (2019)
UK GBC ..insulation not
mentioned at all



Net Zero Carbon Buildings: A Framework Definition

APRIL 2019

Advancing Net Zero Programme Partners

Lead Partner:



Programme Partners:



House of Commons
Business, Energy and Industrial
Strategy Committee

Energy efficiency: building towards net zero

Twenty-First Report of Session
2017–19

*Report, together with formal minutes relating
to the report*

*Ordered by the House of Commons
to be printed 9 July 2019*

HC 1730
Published on 12 July 2019
by authority of the House of Commons

These are the
best documents
as they do
recognise the
importance of
insulation and go
into some detail

Each Home Counts

An Independent Review of Consumer Advice, Protection,
Standards and Enforcement for Energy Efficiency and
Renewable Energy



Dr Peter Bonfield, OBE, FREng



Department for
Business, Energy
& Industrial Strategy

Department for
Communities and
Local Government

December 2016

How can you discuss retrofit and decarbonisation without discussing how to insulate homes safely and effectively?

National Assembly for Wales
Climate Change, Environment and Rural Affairs Committee

Low Carbon Housing: the Challenge

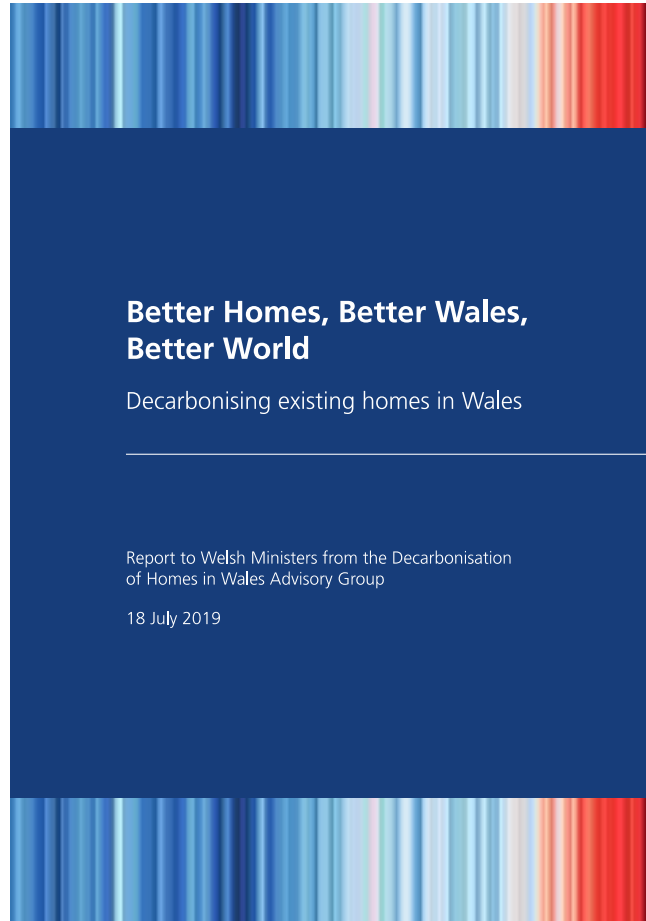
August 2018



www.assembly.wales

44 pages

Insulation only
mentioned 5 times



Better Homes, Better Wales, Better World

Decarbonising existing homes in Wales

Report to Welsh Ministers from the Decarbonisation
of Homes in Wales Advisory Group

18 July 2019

2019

66 pages

Insulation only mention once
(though with twice in
references)

Community
Housing
Cymru
In-depth Briefings



Better Homes, Better Wales, Better World

**Impact of the recommendations on
residential retrofit**

18th July 2019

Climate change has become an increasingly urgent priority for both politicians and the public across the world, and the Welsh Government were one of the first to declare a climate emergency in April 2019. The Environment (Wales) Act 2016 set a target of reducing carbon emissions by at least 80% from their pre-1990 levels by 2050; this was superseded in June 2019 by the Welsh Government's decision to adopt the upgraded reduction target of 95% recommended by the UK Committee on Climate Change (UKCCC) and set out an ambition to achieve net zero carbon by 2050.

CHC's 2017 Housing Horizons vision imagined a Wales where good housing is a basic right for all, and housing associations (HAs) share Welsh Government's ambition to decarbonise homes. The quality of social housing has been significantly improved during the current Welsh Housing Quality Standard (WHQS) programme, which is due to conclude in December 2020.

1

Insulation not mentioned once

Insulation and retrofit problems

49. Over the years, householders have experienced energy saving interventions, such as damp proofing and solid wall insulation, which have not delivered the benefits that were promised. This has eroded householders' confidence in such activities. Mark Harris from the Homebuilders' Federation gave the Committee an example of the historical problems:

"I was working at Bridgend council delivering Arbed schemes, and we were merrily cladding buildings and filling cavities full of insulation. Five years later, we've got companies setting up now to take cladding off and to take insulation out because we've realised that, actually, either it wasn't the right thing to do or the skill set that delivered it wasn't properly skilled and it was done in a rush."⁴⁷

The Welsh Low Carbon housing report does mention problems from Mark Harris

Standards of installation

From BEIS

80. If the housing stock is to be decarbonised, almost every home will need some energy efficiency improvements. Yet scams and poor standards of workmanship have blighted confidence in energy efficiency installations.¹⁹⁶ Issues such as damp from poor installations, hard sell approaches, and scams related to the Green Deal have "exacerbated" the problem.¹⁹⁷ If there is limited trust in energy efficiency schemes, there will be limited progress in housing decarbonisation and fuel poverty alleviation.

RETROFIT PROBLEMS

HOME » FINANCE » PERSONAL FINANCE » ENERGY BILLS

Green Deal nightmares: 'British Gas botched our insulation – then offered £50 Nando's meal'

Non-existent cashback and dodgy works have left these householders out of pocket. We share their stories below



Heidi and Jonathan McInally-Henry say Green Deal works carried out on their home have left it barely habitable

The great cavity wall calamity: 1.5 million homes are blighted by damp after cowboy builders cash in on a Government insulation drive

- Millions of homeowners persuaded to sign up to scheme with promise of cheaper bills by call-centre staff and salesman trying to meet targets
- The Government scheme was meant to make homes energy efficient
- But experts claim homes were not suitable for cavity wall insulation
- Victims left with houses riddled with damp and mould from botched fittings

By [BEN ELLERY FOR THE MAIL ON SUNDAY](#)

PUBLISHED: 22:48, 21 January 2017 | UPDATED: 01:19, 22 January 2017



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BBC Radio 4 – Cavity Wall Insulation

By [RISY](#) | [CFL Home](#) | [Comments are closed](#) | [9 November 2015](#) | [♥ 0](#)

BBC Radio 4 have reported the issues many people are suffering from caused by Cavity Wall Insulation. The report illustrates what can go wrong when Cavity wall insulation is installed incorrectly.

Listen to the recording below



One of the best documented disasters Fishwick in Preston



FISHWICK Community Energy Savings Programme (CESP)



PASSIVE HOUSE?



Disastrous Preston retrofit scheme remains unresolved

A disastrous failed energy efficiency retrofit scheme under a government energy saving scheme has affected up to 100 houses in Preston with water penetration, mould and noise.

Four years on from the launch of the scheme, residents are still suffering from the effects of the scheme. The scheme was intended to improve energy efficiency and reduce carbon emissions. However, the scheme has resulted in water penetration, mould and noise.

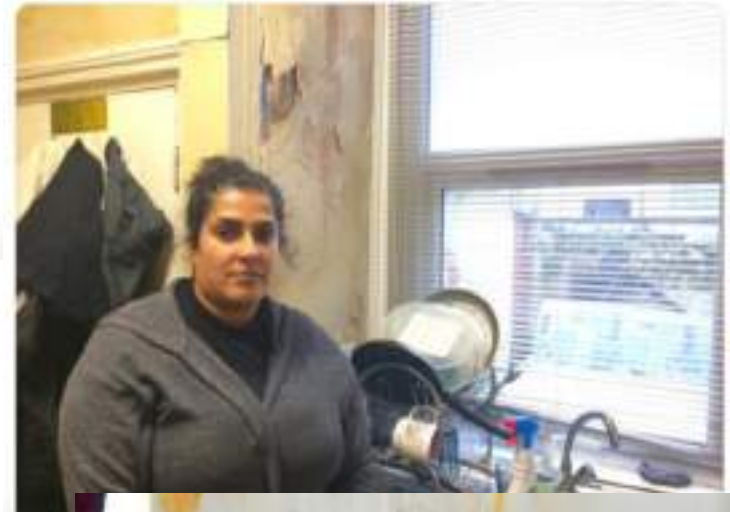
The scheme was intended to improve energy efficiency and reduce carbon emissions. However, the scheme has resulted in water penetration, mould and noise.

zoe conway @zoeconway1
 This is Virginia Gill's bedroom wall. She lives in Fishwick, Preston where a home insulation scheme has gone terribly wrong. She doesn't know who to turn to for help. Listen to her story at 0730 @BBCr4today #r4today



zoe conway @zoeconway1
 Following

This is Afshar Hussain. She has mushrooms growing in her kitchen. When it rains, water pours into her home. She lives in Fishwick, Preston where a home insulation scheme has gone horribly wrong. Hear her story at 0730 @BBCr4today #r4today





60mm Phenolic boards

90mm grey Neopor boards

Deterioration Since October 2015

Another picture of Porch Interior – showing water ingress. Taken Mar. 2016



Now on to the exterior – below taken 14th Feb. 2016, note poor finish to silicone and messy fin to the topcoat which is spread over UPVC trim. Hardly done with great care.



Deterioration Since October 2015



Porch - Taken Dec. 2018 EWI identifying the dry bond allowing water ingress and a large growth

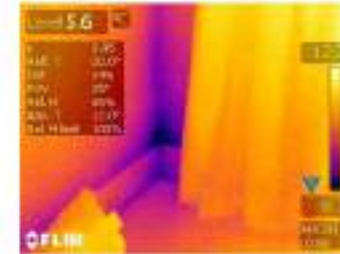


Carmarthenshire

Mould and damp: Retrofit disasters case studies. Many are in Wales



Colin King BRE. Has done a lot of excellent work to draw attention to unintended consequences of retrofit
I have borrowed these from one of his presentations

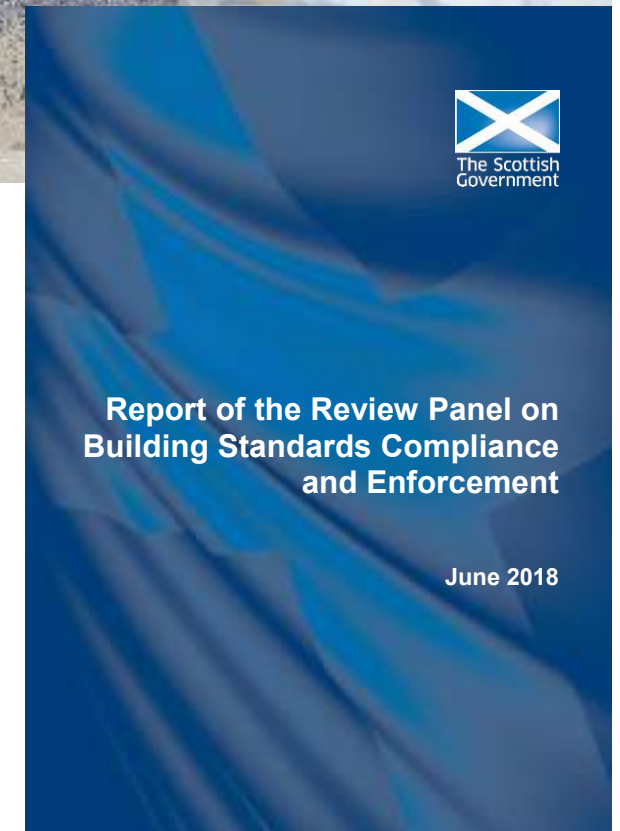


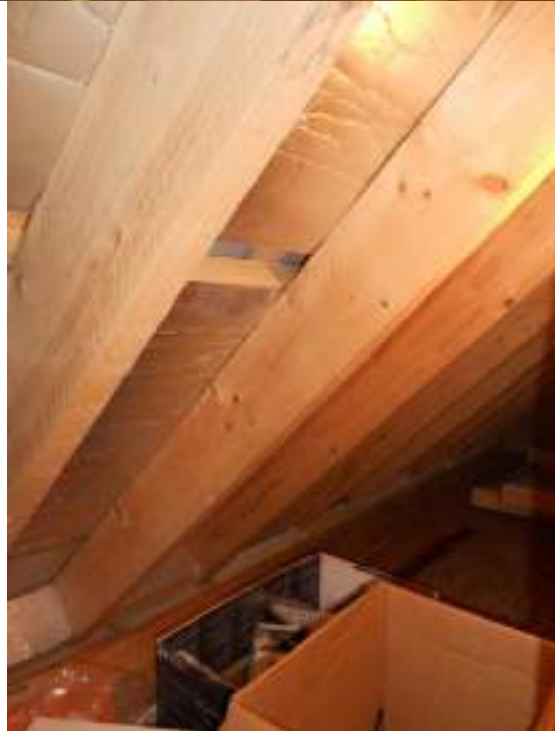
bre



Poor installation of insulation is common in building construction leading to massive performance gaps.

Actual performance has been shown to be as much as 70% less than predicted SAP





Here are examples of how plastic foam insulation can shrink though often this can be unseen

Building company sues firms over allegedly defective insulation boards which 'caused floors to sink'

04/12/2017 - 10:42:07



By Ann O'Loughlin

A building company has sued for more than €2m damages over allegedly defective insulation boards which, it claims, caused floors in houses built by it to sink.

Tallaght-based Kelland Homes says extensive remedial works were required to about 58 houses at a development at Elder Heath, Kiltipper, Tallaght, because the insulation boards shrank, causing floors in the houses to sink.

It says it has suffered a loss of some €2m as a result of the remedial works and having to pay compensation to, and provide alternative accommodation for, affected homeowners.

It claims the boards were used in construction of houses at Elder Heath in 2015 and 2016 and were used under ground floor slabs.

THE IRISH TIMES

Thu, Dec 7, 2017

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Kelland Homes sues over allegedly defective insulation boards

Builder claims €2m damages over shrinkage that caused floors in 58 homes to sink

© Mon, Dec 4, 2017, 16:11

Mary Carolan

FIRE AND FLAMMABILITY

We're two years on from Grenfell, so why do these fires keep happening?

Luke Barratt

It's not just unsuitable cladding - a host of other safety issues are not being addressed by authorities and building owners



Images from after the fire show that much of the cladding on the top two floors has been burned away or has fallen off. Firefighters tackle Friday's blaze at The Cube in Bolton. Photograph: Peter Byrne/PA

Barking, Crewe, Clapton, Worcester Park and now Bolton: 2019 has seen at least five major fires in blocks of flats. The latest blaze hit the Cube, a student

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IN ASSOCIATION WITH **BUSINESS-LIVE.CO.UK**
WIN A TRIP TO BARCELONA

Bolton Cube student block fire: Everything we know so far

At least 40 fire engines and 200 fire-fighters battled the blaze throughout the night

A burning issue

If test shows potential risks with PIR sandwich panels

A series of studies indicates that PIR sandwich panels may not be a fire or a greater concern than other fire cladding materials

PIR sandwich panels are widely used in building cladding and are a key component of the fire safety strategy for many high-rise buildings. However, a series of studies have shown that PIR sandwich panels may not be as safe as previously thought. A series of studies have shown that PIR sandwich panels may not be as safe as previously thought. A series of studies have shown that PIR sandwich panels may not be as safe as previously thought.

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NEWS

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Wales Wales Politics Wales Business North West North East Mid South West

Cardiff flats fire safety funding offer 'insulting'

By Paul Martin
BBC Wales Live

18 October 2019



Residents 'safe' after Cardiff high-rise flats fire



The catalogue of failures that make this huge Cardiff apartment complex a 'major concern' fire risk

Two reports identified a series of fire safety issues across the whole development with more than 450 flats

Clapton flats fire: Woman rescued during 'suspicious' blaze

2 hours ago



Witness described seeing a large window on the top floor "explode" sending debris to the ground



ITV REPORT 9 September 2019 at 11:15am

Worcester Park fire: 'It's gone' - fire rips through block of flats

A four-storey residential block has been destroyed after a fire ripped through the building in the early hours of Monday.



FIRE WARNING Persimmon and Bellway new-build homes 'are fire risk', BBC Watchdog investigation finds

House builders are required to make sure the homes they sell meet fire safety standards

By Alice Graham, Digital Consumer Reporter
1 May 2019, 0:01 | Updated 1 May 2019, 8:37



HUNDREDS of new homes constructed by Persimmon and Bellway Homes have been built with "potentially dangerous fire safety issues", an investigation by BBC Watchdog Live has found.

The Persimmon properties were sold with missing or incorrectly installed fire barriers, designed to prevent the spread of fire, according to a new episode airing on BBC One tonight.



'New-build homes not fire safe', BBC investigation finds

1 May 2019



Houses developed by Persimmon Homes and Bellway Homes have potentially dangerous fire safety issues, BBC Watchdog Live has found.

Bad indoor air quality can be another consequence of airtight insulated houses



Health Effects of Modern Airtight Construction

HEMAC Multidisciplinary Network

Ventilation and Indoor Air Quality in New Homes

Dispatches · Posted Apr 06, 2017 · Add new comment

New build homes face emerging ventilation crisis

Despite increasing standards of [insulation](#) and [airtightness](#), housing developers face few requirements to provide better ventilation and indoor air quality for new home buyers — beyond knocking extra holes in walls. But as reports of condensation and mould affecting new housing developments continue to surface in both the UK and Ireland, and research indicates many new homes may have poor indoor air quality, are developers finally waking up to the need for properly engineered ventilation systems?

September 2019
Aecom Limited

Ministry of Housing, Communities and Local Government

Ian Mawditt has shown that pollutants from plastic foam *external insulation* exceeded safe limits inside his house when the MVHR system is turned off

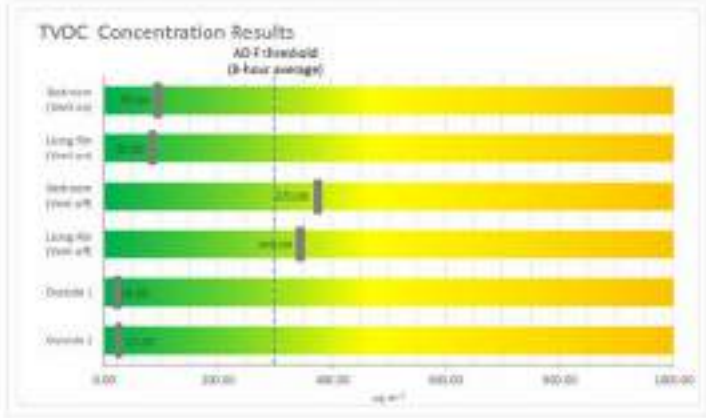


While it is frequently claimed that improved energy efficiency leads to better health, the evidence of this is questionable whereas studies have shown increased health problems

AUTHOR ADDRESS: IAN MAWDITT

Indoor Air Quality: VOCs

Posted on March 13, 2016 by Ian Mawditt



- RECEN
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Environment International 75 (2015) 234–244



Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint



Higher energy efficient homes are associated with increased risk of doctor diagnosed asthma in a UK subpopulation

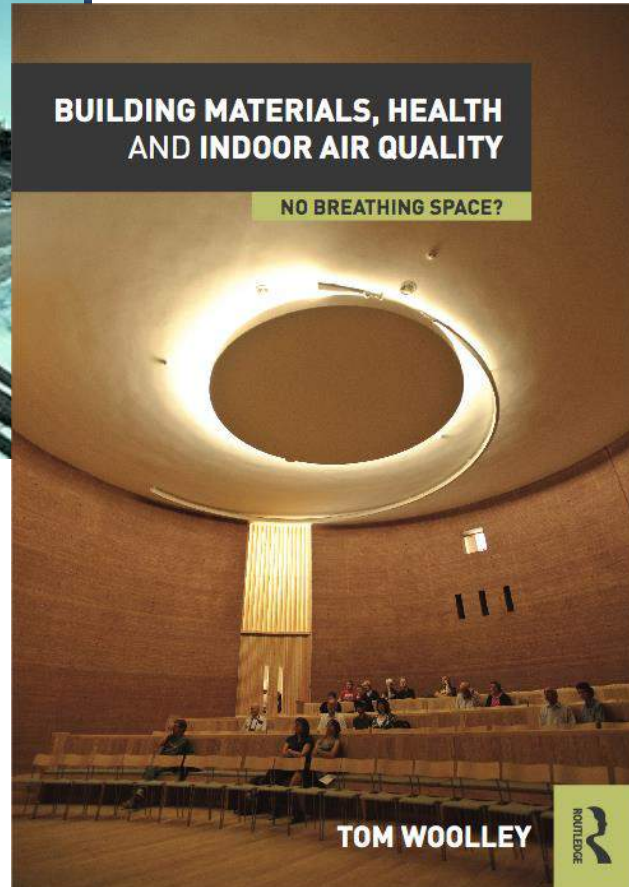
Richard A. Sharpe ^a, Christopher R. Thornton ^b, Vasilis Nikolaou ^c, Nicholas J. Osborne ^{a,d,*}

^a European Centre for Environment and Human Health, University of Exeter Medical School, Knowledge Spa, Royal Cornwall Hospital, Truro, Cornwall TR1 3HD United Kingdom
^b College of Life and Environmental Sciences, University of Exeter, Stocker Road, Exeter EX4 4QD, United Kingdom
^c University of Exeter Medical School, The Veysey Building, Salmon Pool Lane, Exeter EX2 4SG, United Kingdom
^d Department of Paediatrics, University of Melbourne, Flemington Road, Parkville, Melbourne, Australia





Many insulation materials are made from hazardous chemicals



Chapter 1: Introduction

Chapter 2: Volatile Organic Compound Emissions

Chapter 3: Emissions from materials – Why do we need to use hazardous chemicals?

Chapter 4: Cancer, Carcinogens and Building Materials

Chapter 5: Other Hazards and Radiation

Chapter 6: Hazardous Materials to be avoided and why

Chapter 7: Mould, Damp, Fuel Poverty and Breathability

Chapter 8: Ventilation and a critique of Passiv Haus

Chapter 9: Dealing with problems in existing buildings

Chapter 10: Healthy Building Theories

Chapter 11: How to building Healthier Buildings

Chapter 12: Policy Issues for Healthy Buildings –
Appendix A: Carcinogenic Chemicals
Appendix B: Useful Organisations



Polyurethane insulation and household products – A systematic review of their impact on indoor environmental quality

Dzhordzhio Naldzhiev^{a,b,*}, Dejan Mumovic^a, Matija Strlic^b

^a Institute for Environmental Design and Engineering (IEDE), University College London (UCL), UK

^b Institute for Sustainable Heritage (ISH), University College London (UCL), UK

ARTICLE INFO

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Exposure
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Air quality
Volatile organic compound
Polyurethane

ABSTRACT

We systematically review the impact of polyurethane insulation and polyurethane household products on the indoor environmental quality of buildings. The review breaks down polyurethane products into constituent compounds (isocyanate, polyol, flame retardant, blowing agent and catalyst) as well as secondary emissions, and discusses their implications on human health. Concentrations of compounds emitted from insulation, and household materials, measured in laboratory experiments and case studies are presented in the context of the built environment.

We outline that isocyanate exposure over the current legal limits could take place during spray foam insulation application in the absence of personal protection equipment. The study reports that flame retardants are not chemically bound to polyurethane products and they are found in measurable concentrations in indoor environments. Additionally, we provide evidence that catalysts are responsible for at least some negative impact on perceived indoor air quality. More data is required to determine the long-term emissions from spray foam products and the ventilation strategies required to balance energy savings, thermal comfort and good indoor air quality. However, it is not yet possible to determine whether potential health impacts could result from exposure to a single compound or a combination of compounds from spray foam products. We present a risk matrix for polyurethane compounds and propose that flame retardants, by-products, and residual compounds are particularly important for indoor air quality. We conclude by suggesting a framework for further research.

1. Introduction

In the UK, 19% of the total CO₂ emissions can be attributed to buildings [1], therefore the energy performance of buildings is a critical factor for reducing carbon emissions. Studies have shown that increasing or adding insulation within the thermal envelope of a building reduces the heating demand of the property by 20–60% [2], while also increasing thermal comfort [3].

Isocyanate based rigid board insulation (PUR/PIR) and spray polyurethane foam (SPF) insulation products have topped the \$1bn mark in sales in 2015 [134]. The long term thermal benefits [4] and energy efficiency improvement from SPF have been demonstrated for retrofits [5], and in comparison to conventional insulation products [6]. Meanwhile, the total environmental quality of buildings is still a subject of continuing research [7]. While polyurethane (PU) materials are commonly found indoors in clothing, appliances (fridges and freezers), composite wood, floorings, furnishing, car seats, insulation and

packaging materials [8], there is little information on their impact on indoor air quality. In an effort to address the impact of the building sector on CO₂ emissions, “green buildings” with lower air-permeability for improved energy performance, grow in popularity. The issue of indoor air quality to promote better health and well-being for building occupants [9] must, however, be considered alongside energy efficiency.

Isocyanate based insulation products are typically produced by mixing two liquids: an A-side component (isocyanate: MDI, pMDI or TDI) and a B-side component (polyol, fire retardant, catalyst, blowing agents and surfactants). These insulating materials could either be produced in factories (PUR/PIR rigid boards/sheets/panels) or applied in-situ (SPF insulation). To understand the implications of these products on indoor air quality, each of their constituent compounds should be considered. The main chemical bond of the insulation is between the isocyanate and the polyol, which form the urethane link, whilst other compounds enhance the reaction process (catalyst, blowing agents) or

Hazardous emissions from PUR and PIR insulations Isocyanates, polyols, flame retardants, blowing agents and catalysts, by products Carcinogens and products causing respiratory problems

Research demonstrates that in isolation each group could impact human health, with some carrying higher risks compared to others [13, 14].

During the production, and lifecycle, of PU products various organic compounds can be released from the foams into the indoor environment. Scarce data is available covering these emissions and to address the knowledge gap, a compilation of small studies was published by ASTM to provide further insight [15], followed by the ASTM D8142-17 standard for measuring SPF chemical emissions. This collection of reports provides data in relation to SPF emissions and their implications on indoor environmental quality (IEQ). Polyurethane products are found abundantly in modern indoor environments [8], however their cumulative volatile and semi-volatile organic (VOCs, SVOCs) long-term emissions and implications on human health are still largely unknown

* Corresponding author. Institute for Environmental Design and Engineering (IEDE), University College London (UCL), UK.
E-mail address: dzhordzhio.naldzhiev.16@ucl.ac.uk (D. Naldzhiev).



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What's Happening from Environmental Building News
EPA Takes Action on Spray-Foam Health Risks

By Peter Yost

The U.S. Environmental Protection Agency (EPA) has released a new action plan for chemicals used in spray polyurethane foam (SPF) insulation. Isocyanates, such as MDI (methylene diisocyanate), are highly reactive chemicals that can cause skin, eye, and lung irritation, asthma, and chemical sensitization when absorbed through the skin or inhaled.

When SPF is applied on a job site, both the ingredients and the byproducts of the process (which include potentially toxic solvents) that require protective measures for workers as well as any occupants. This is not news: worker protection protocols and quality assurance programs for SPF installation were developed by the SPF industry decades ago. Why the fuss now?

"There has been an increase in recent years in promoting the use of foams and sealants by do-it-yourself energy-conscious homeowners, and many



isocyanates can be off-gassed polyurethane foam (SPF) insulation is among the SPF industry products under scrutiny by EPA and others.

“Isocyanates are highly reactive chemicals
That can cause skin, eye and lung irritation,
asthma and chemical sensitization”
US Environmental Protection Agency



Polystyrene insulation creates a massive waste problem

Non-aluminium cladding to be stripped from high rises after test failure

NEWS: 15/01/18 7:30 AM BY FATHANIEL BARRETT

Non-aluminium cladding which had previously been considered safe will be stripped from an east London high rise after experts warned the system may not resist the spread of flames.



Shortage of hazardous isocyanates
 Has caused problems for the companies making foam insulation



Estimated impact to Ercros of banning the use of mercury technology and Covestro plant shutdown from December 2017

Estimated impact to Ercros of banning the use of mercury technology and Covestro plant shutdown from December 2017



CONTAMINATED SLUDGE CLEANUP BEGINS ON SPAIN'S EBRO RIVER TO REVERSE TOXIC LEGACY



Elimination of chemical pollution in Flix Reservoir



Project management for the elimination of chemical pollution



Builders face insulation 'headache' amid key chemical shortage



Kingspan and Quinn exposed to insulation ingredient shortage

Insulation group 'confident' issue won't have material effect on its business



Kingspan and Quinn Industrial Holdings have told customers they could only supply them with a fraction of their average weekly purchases of insulation materials of this product range for a period. Photograph: Chris Kelly/REUTERS

Kingspan and Quinn Industrial Holdings Ltd have been forced to temporarily curtail the supply of some insulation ranges as the European provider of a key ingredient has run short of stocks.

Pre-mixed Polyols with contaminants, CFS etc?
CFC emissions have been tracked to China

BLOWING IT:

Illegal Production and Use of Banned CFC-11 in China's Foam Blowing Industry

July 2018

Web Site: December 22, 2018

Blast at China's Wanhua kills four

Accident at world's largest producer of key polyurethane material adds to deadly year for China's chemical industry

By Jean-Francois Tremblay

0 photos



Wanhua Chemical's main production base in Yantai, China.

Illegal CFC-11 production: response to China embassy letter

17th August, 2018

China has identified illegal use and production of CFC-11 in a series of actions undertaken in response to our report [Blowing it](#), which recently revealed that companies making polyurethane foams in China continued to use the banned ozone depleting substance.



In a [letter](#) to the Guardian, which reported on our findings, a spokesperson from the Chinese embassy stated that an investigation of the 19 PU foam enterprises had been undertaken. Although no CFC use was found in 12 enterprises, CFC-11 was detected in one enterprise and six remain under further investigation. In addition, authorities uncovered two enterprises producing CFC-11 and CFC-12. According to the letter, "The seized CFCs and raw materials have been confiscated and sealed up, and the local police have filed charges against the enterprises and are hunting down the suspects in the cases".



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2017.08 GUTEX Thermofib e Data Sheet

GUTEX Thermofib e Technical Data	
Package (mm)	800 x 400 x 200
Weight per package	15.50
Bales/package per pallet	21
Weight per pallet (kg)	330
Bales in density (kg/m ³)	26.30
uncompressed	29.45
Vapour diffusion factor (g)	12
λ (DIN EN ISO 10456) (W/mK)	0.08
λ (DIN EN ISO 10456) (W/mK)	0.10
Fire Reaction Euro Class (per DIN EN 13501)	E
European Union	
Nominal thermal conductivity (λ ₀) (W/mK)	0.079

Information regarding the product is available at [www.gutex.com](#)

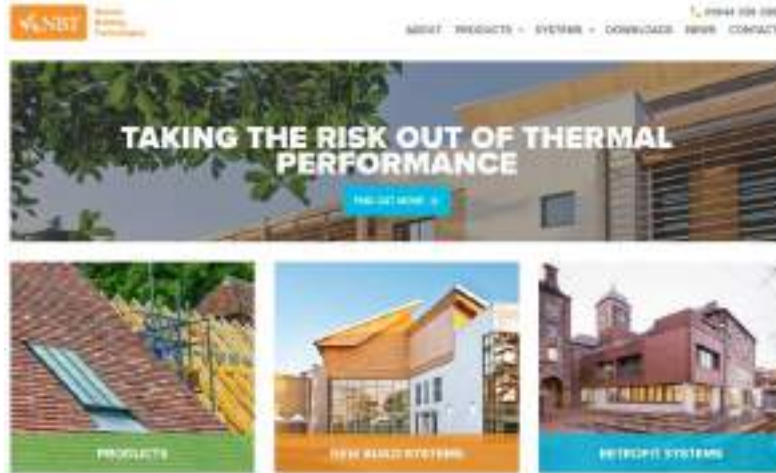
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GUTEX Holzwerkstoffwerk, Gutenberg S.D. 7081 Weiskirchen, Phone: +49 6371 6100-0, Fax: +49 6371 6100-10, Email: info@gutex.com, www.gutex.com



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Hempcrete has good insulation and thermal mass

Harrison Spinks Triples Hemp Production with New Machinery

By RedTara on December 3, 2018



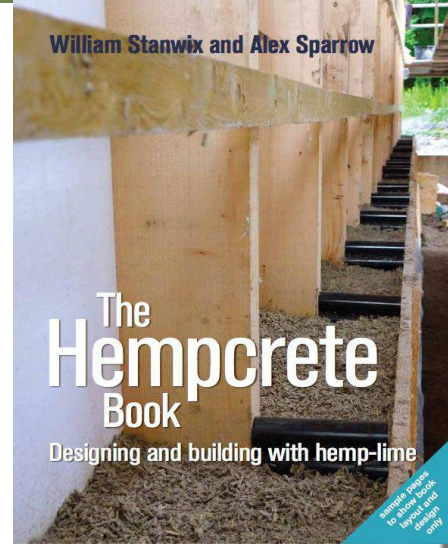
Luxury bed maker Harrison Spinks, based in Leeds, England, has increased its hemp processing abilities with new machinery.

The equipment investment follows a 30% increase in hemp orders over the past year, the company said in a news release.

The new streamlined process will boost the company's weekly output from 3 tons to 9 tons. Hemp is one of the natural mattress fillings grown on Harrison Spinks' 300-acre farm in Yorkshire, England.

The company said it designs, builds and installs its own machinery. For its hemp production, a new bale opener has been installed to help complete a formerly manual process, and a new high-tech machine tears and clean the bales. Also, a new step cleaner shakes the hemp and ensures any foreign materials are effectively removed.

As the most vertically integrated and sustainable bed



Thank you

- Tom Woolley : tom.woolley@btconnect.com
- Rachel Bevan: bevanarchitects@btconnect.com
- Eshrar Latif: LatifE@cardiff.ac.uk