28th January 2026

Professor Jim Glockling
Visiting Professor University of Central Lancashire

EUROPEAN FIRE SPRINKLER NETWORK

Mass Timber: Unthinkable without……..

Resilience measures to court insurance and protect investment

Glockling consulting

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Presenter: Dr Jim Glockling

Credentials:

FORMERLY

- Degree Chemical Engineering
- PhD Nuclear Engineering
- Post Doc. Watermist Modelling
- Forensic Fire Investigator Burgoynes
- Associate Director Loss Prevention Council LPC
- Associate Director Building Research Establishment BRE
- Technical Director FPA & RISCAuthority

NOW

- Visiting Professor University of Central Lancashire
- Principle Engineer BMT (Naval Engineering)
- Co-author of the ASBP Mass Timber Insurance playbook

SPECIALISM

- Resilience (Insurance Property Protection, Business Resilience, Military)

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Talk pre-qualifications

- No presumption that timber buildings should be any less safe for occupants than any other form of construction
- 'Compliance' with life-safety codes is increasingly meaningless to investors and insurers – it is viewed as a baseline given
- In the UK, the total divorce of life-safety and property protection means the obligatory objective is to essentially achieve **evacuation before collapse** of the building – possibly of limited relevance to insurers and investors when constructing out of fire resilient materials, but little or no meaning when building out of combustible materials
- FRS have no obligation to save property
- The need for reduced carbon construction is obvious to all
- We need biophilic materials in construction
- This talk is given wearing a Property Protection hat only

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Agenda

01	Insuring large and complex buildings
02	Why fire & water present challenges
03	A suite of 'enabling' solutions
04	Adapting protection to be better, and lower carbon
05	Some outstanding unknowns & Next Steps

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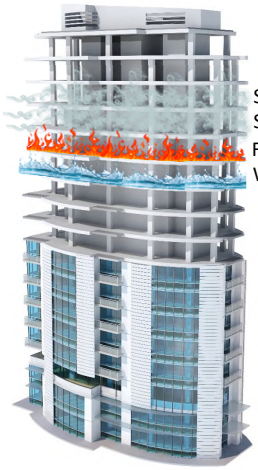
Fire Insurance - Estimated Maximum Loss



Insurance: Estimated Maximum Loss ~ 4 floors of 17

Model Assumptions:

- Fire does not spread between floors (predicated on the use of concrete?)
- Fire does not spread through voids, ducts, and seams (NC voids and seams / building designs with less voids)
- Fire cannot spread externally over the building (NC cladding & insulation)
- Building remains stable for Fire Service intervention (NC structure)
- Fire services have the resources they need and believe they will be safe enough in conducting their duties (Access, water, risk of entanglement)
- Damage to 'structure' is limited (NC structure)
- Fire will not spread to other buildings (Radiative emission & NC cladding)
- Consequential damage will be limited (NC & water insensitive materials)
- A good passive environment for sprinkler systems to work within

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Insurance - Estimated Maximum Loss

And now?:

- Floor slabs might now timber (Vertical compartmentation)
- Exposed combustible materials will increase fuel load and surfaces may respond very differently to modern threats such as lithium-ion battery charging (Increased fire load, reduced passive capability, increased emission to adjacent buildings, ability of biophilic materials to SMOULDER)
- Voids might now be extensive, combustible, and capable of spreading fire out of reach of suppression systems and the fire service (Fire spread in voids, smouldering – all directions)
- The structure itself may be consumed in a fire and Firefighters may have to remove structure to access burning structure (FRS safety / risk of collapse / cost of repair)
- Ceiling mounted services may become detached in fire (FRS risk of entanglement)
- Water sensitivity of biophilic materials means potential for higher consequential damage (Water damage to structure, and finishes)
- Combustible cladding, biophilic insulation & Green Walls (External fire spread, fire ingress, and spread to adjacent buildings)
- FRS may have to stay on-site for days damping down (Hidden smouldering)

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The big IF……

IF fire gets out of the room of origin into a combustible void or a seam to smoulder

- Out of the reach of fire suppression
- Out of the reach of fire hoses
- And demand destructive intervention to access the fire seat

No one can now say how the fire event will end

Only boots on the ground (or high up) can perform this task, and the FRS are under no obligation to do this, and there are many safety reasons why they should not.

The only insurance option is to ascribe an EML of 100%

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Water exposure - Sources

It is likely that it is the control of water exposure that will ultimately determine the success or failure of biophilic construction methods, rather than fire.

1. Construction Phase: Weather & on-site EoW
   a. Transportation weather protection
   b. On-site Storage
   c. Construction weather protection
   d. Construction site controls on EoW
   e. Encapsulated water in pre-made modules
2. Occupational Phase: Atmospheric control
   a. Air humidity
   b. Timber moisture content
3. Occupational Phase: Adverse events
   a. Escape of water from domestic systems (heating & ventilation)
   b. Fire Suppression water release accidental & in anger
   c. Water ingress through building's envelope
   d. Flood

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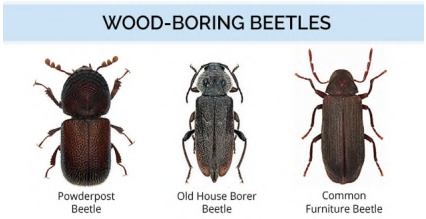
When wood gets wet

- Loss of aesthetic
- Change in dimensional proportions
  - Shrinking & cracking
  - Warping, bowing, and cupping
  - Fastner and adhesive failure
  - Delamination
- Mechanical properties change
- It becomes food:
  - Rot – Fungi, Mould, & Bacteria
  - Infestation – Termites, furniture, deathwatch, and house longhorn beetles

And all of this can happen very quickly!



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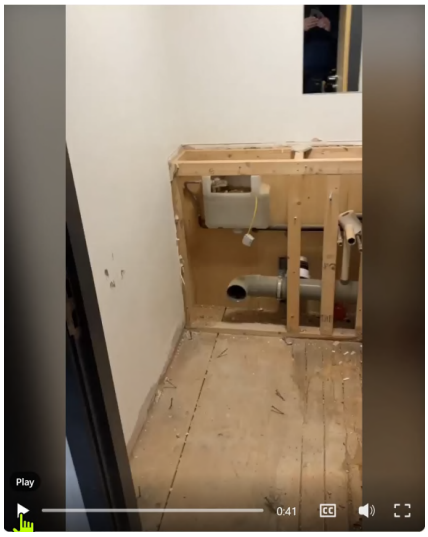
Water damage from ‘normal’ bathroom exposures



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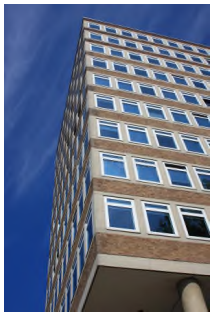

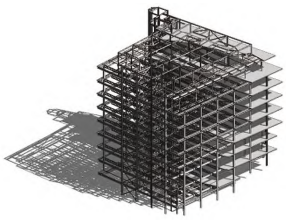

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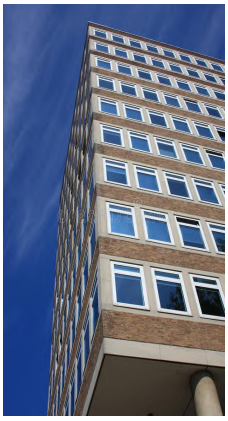
Trusted and good technical understanding
= choice, excess capacity, and competition



BROKER

RSA 100% C
100% Allianz
QBE 100%
100% ZURICH
100% AVIVA
100% AXA

Munich RE
Swiss Re

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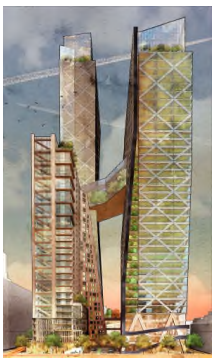
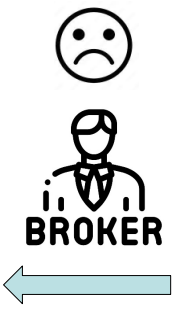
A lack of trust / technical concern
= a lack of available insurance capacity





RSA 20%
20% Allianz
QBE 20%
20% ZURICH
AVIVA 10%
10% AXA

Munich RE
Swiss Re

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Mass Timber Insurance Playbook

- The definitive guide on the resilience challenges of mass timber buildings
- Endorsed by the Association of British Insurers
- Now released in the US
- Accepts the challenges (rather than denies them) and provides a framework for addressing them.
- Addresses resilience to:
  - Fire
  - Escape of Water
  - Flood

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Significant Mass Timber Buildings – Unthinkable without? ……

Measures that enable the insurer to assign an EML other than 100%

1. Pre-agreed insurance arrangements on Damage assessment & repair
2. Fire Sprinklers (with suitably adapted installation rules)
3. Water & Moisture Detection and Control Systems
4. Hybridisation with low carbon concrete
5. Non-combustible cladding materials
6. Control of combustible voids
7. Specific measures to support Fire Service Effectiveness
8. Additional research:
   - Fixings into timber ceilings
   - Improving Sprinkler performance and reducing the carbon footprint of suppression systems

Would like these measures to be viewed as 'enabling' greater use of timber.

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1. Agreements on repair at point of insurance purchase

- Estimation of repair costs of novel and 'low pedigree' building methods can be very difficult – lack of data
- Recovering new-for-old might be:
  - Impossible
  - Impossibly expensive
- Options could be negotiated whereby repairs are:
  - Functionally & cosmetically identical but what lies beneath might be different (structural steel)
  - Functionally & cosmetically changed – i.e. where difficult to recover surface finishes are covered, or slight geometrical change to accommodate steel bracing

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2. Fire Sprinklers

Fire Sprinklers must act in time to prevent fire getting in to hidden spaces and hold the fire until FRS may intervene.

- Selection of sprinkler head type, water provision, response time, depth of installation, and head spacings
  - Wall wetting
  - Ceiling Wetting
- Installation of pipework
  - Rules for firestopping through combustible walls
  - Select pipe to reduce likelihood of leaks
  - Routing guidance
  - Areas of protection
- Management of dropped water to reduce consequential damage
  - See water & moisture management
- Ignore
  - Self-extinguishment by design
  - Watermist*

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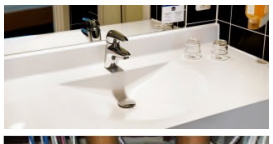

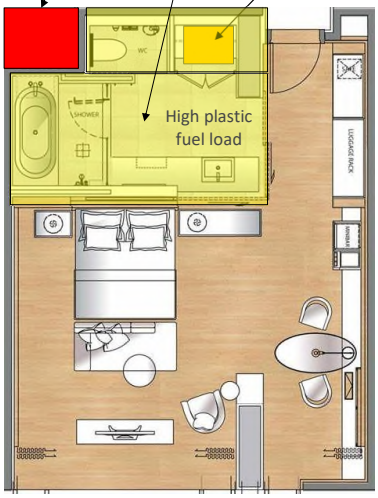

Bathrooms historically considered inert – but might need reclassifying

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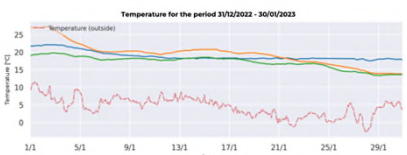
3. Water & moisture detection

Primary objective:

- Water MUST be detected and acted upon whilst the damage is only aesthetic
- Structural damage from an unaddressed leak may occur in as short a time as 2 months



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4. Hybridisation timber and LC Concrete

Location of all plant and electrical intakes in concrete core, and vertical routing of services – this:

- Replaces significant concrete usage with timber
- Reduces combustible void challenges
- Improves building stability
- Supports firefighting activities

Locating all bathrooms and kitchens within a concrete core of a massive timber building – this:

- Replaces significant concrete usage with timber
- Reduces the potential for escape of water damage
- Supports built in drain-to-safe features

CLT panel waterproofing membrane – this:

- Reduces the potential for water damage during delivery and construction before weather proofed.

Alternating CLT floors in concrete or steel framed buildings – this:

- Reduces concrete usage
- Preserves a higher level of (insurance relevant) compartmentation
- Improves building stability under fire
- Supports firefighting activities

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5. Non-combustible cladding

Routes for mass fire spread – a key issue for insurance that could cause EML to be exceeded:

- Through the occupied spaces
- Over the external surface of the building
- Through voids

1. Occupied spaces – normally well catered for by building codes and passive FP requirement
2. Over the external surfaces of buildings – combustible cladding can transport fire into every compartment via windows and vents which will defeat all forms of protection.
3. Through voids – see next slide

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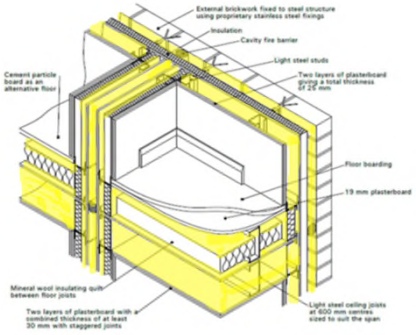
6. Control of combustible voids

- International Building code (IBC) forbids combustible voids. If any exists they must be:
  - Filled with non-combustible insulation material, or
  - Lined with fire resisting board
  - Sprinkler protected



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7. Support for firefighters

If Firefighters are referenced in the building's safety case it must be done with their approval. To this end, just like designers need to attract the insurance the building needs, it is vital they design to attract the level of FRS intervention required.

- Are they well enough resourced?
- Do they have the right equipment?
- Do they have the risk appetite?

- Fire will be more prevalent
- Fires will be larger
- Less of the building will remain
- Fire will be harder to tackle
- Fires will be more dangerous to tackle
- Fire 'events' may last many days
- Fires may be more 'legally' challenging
- Other NetZero factors may compound the situation
- Perceptions of FRS success may have to change

https://www.linkedin.com/pulse/building-designers-expectations-fire-service-you-expect-glockling-anete

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8a. Fixings into timber ceilings

"*Reduction of load capacity of fixings into a timber soffit during and after fire*", Dale Kinnersley, Richard T Hull, James L D Glockling, Stuart Campbell

- A startling loss of strength of timber fixings under fire conditions
- Bigger, not always better (they transport more heat to the threads around which charring occurs)
- Premature loss of strength in fire poses risk of crush and entanglement from M&E systems to:
  - Evacuees
  - Firefighters
- A significant potential barrier to fire service effectiveness
- Reduced firefighter support has consequences for insurability

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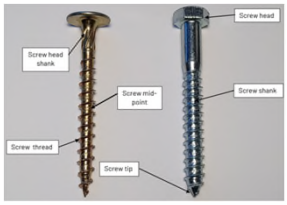
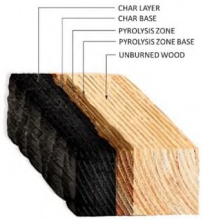
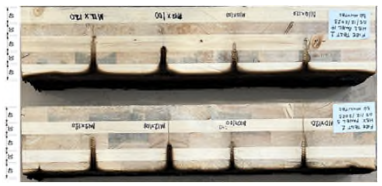
8b. Failure mechanism & misunderstandings

1. Timber in fire often described in terms of 'char-formation rate' for the purposes of assessing structural strength
2. How much char is enough to reduce the load bearing capability of 100 cm coach screw to zero?
3. ANSWER – Just the thread pitch ~ 1.5-2.0mm





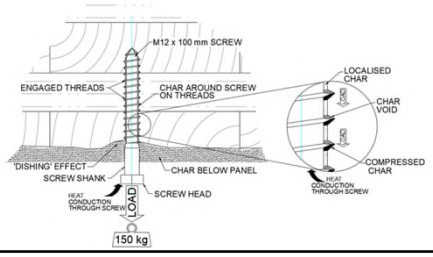


Reduction of load capacity of screw fixings into a timber soffit during and after fire.

Dale Kinnersley[a*], T Richard Hull[b], James L D Glockling[a], Stuart Campbell[a]

[a]Fire Protection Association, London Road, Moreton in Marsh, Gloucestershire, GL56 0RH, UK, dkinnersley@thefpa.co.uk, stuart.c.campbell@outlook.com

[b]Centre for Fire and Hazard Science, University of Central Lancashire, Preston, PR1 2HE, UK,



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Fire sprinklers - adaptations

Investigation of sprinkler distribution patterns for fire protection of exposed timber

Dale Kinnersley[a,b], T.Richard Hull[b], James L D Glockling[b], Stuart Campbell[a]

[a]Fire Protection Association, London Road, Moreton in Marsh, Gloucestershire, GL56 0RH, UK,

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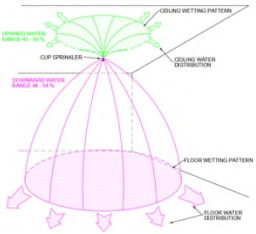
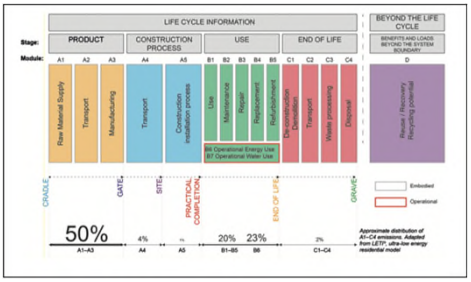
[b]Centre for Fire and Hazard Science, University of Central Lancashire, Preston, PR12HE, UK,

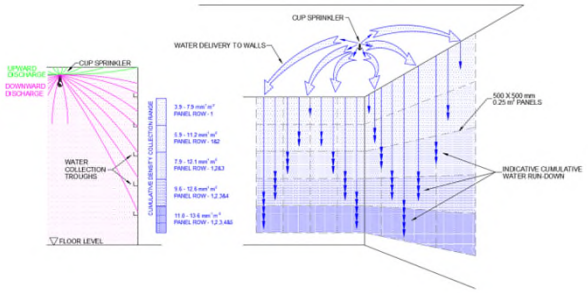
TRHull@uclan.ac.uk, Jim@glockling.co.uk

Highlights:

- Some sprinkler head designs are better than others for combined exposed timber and contents protection.
- Sprinkler head spacing is critical to ensure wall and ceiling surface coverage for combustible surfaces minimise thermal response time.







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Architects, Designers & Engineers

The solution to many of the challenges demands:

- An understanding of the insurer perspective (EML)
- Improved understanding of the important perils (fire, water, infestation, and rot)
- An openness to use a combination of ‘best athlete’ materials and systems to create buildings that are BOTH sustainable and resilient (insurable)
- A need to understand, that in this day and age, insurance and investment must be ‘courted’ through good design that seeks to achieve more than just ‘evacuation before collapse’
- And the same applies to Fire Service Intervention

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Designers must be able to answer:

- '*What stops the fire*?'
- '*What detects the water?'*

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