BRE Global Protecting People, Property and the Planet

Where are green building schemes heading in the future ?

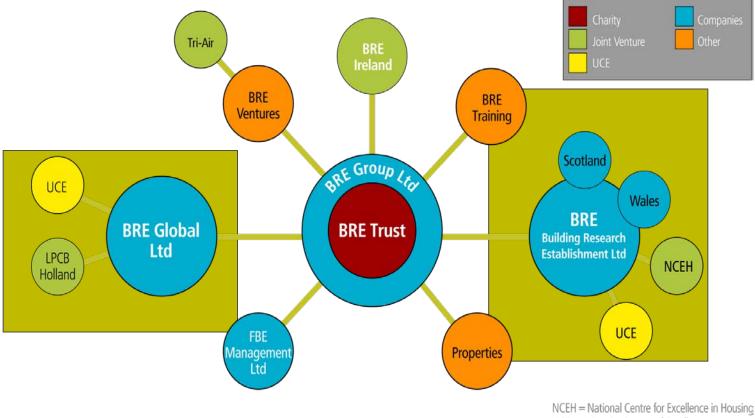
Debbie Smith BRE Global 8<sup>th</sup> November 2012

Symposium – FIRE Safety Design and Sustainable Buildings: Challenges and Opportunities

Part of the BRE Trust



### The BRE Group- the multi-disciplinary team for "Public Safety"



UCE = University Centres of Excellence

### **BRE Trust**

A charity whose objectives are 'through research and education, to advance knowledge, innovation and communication in all matters concerning the built environment for public benefit'.

### Purpose

- to hold '*in trust*' the ownership of BRE Group of trading companies;
- to support their continuing development as a national asset;
- to receive profits from the BRE Group of companies (and any income from third parties); and
- to spend it 'for the public good', in line with its charitable objects.

### What does the Trust spend its income on?

- Research funded more than 145 research projects.
- University Centres of Excellence:
  - Edinburgh University (Fire Safety Engineering),
  - Strathclyde University (Energy Utilisation modelling),
  - Bath (Innovative Construction Materials)
  - Cardiff University -Welsh School of Architecture (Sustainable Building Design),
  - Cardiff University School of Engineering (Building Systems and Informatics).
- 30 PhD students currently





## BREEAM®

- 1980's, concerns about the quality of the built environment and a desire to make better environments in buildings for people to live and work in.
- BRE's Environmental Assessment Method BREEAM was launched in1990 following extensive research and consultations.
- Celebrated 21st birthday last year



## BREEAM®

- Today BREEAM is a family of products linked to life cycle stages of buildings – Residential and Commercial
  - Planning BREEAM Communities
  - Design BREEAM New build
  - During occupation BREEAM in Use\*
  - Refurbishment BREEAM Refurbishment

\*Includes fire safety management, maintenance credits



### Functionally based regulations

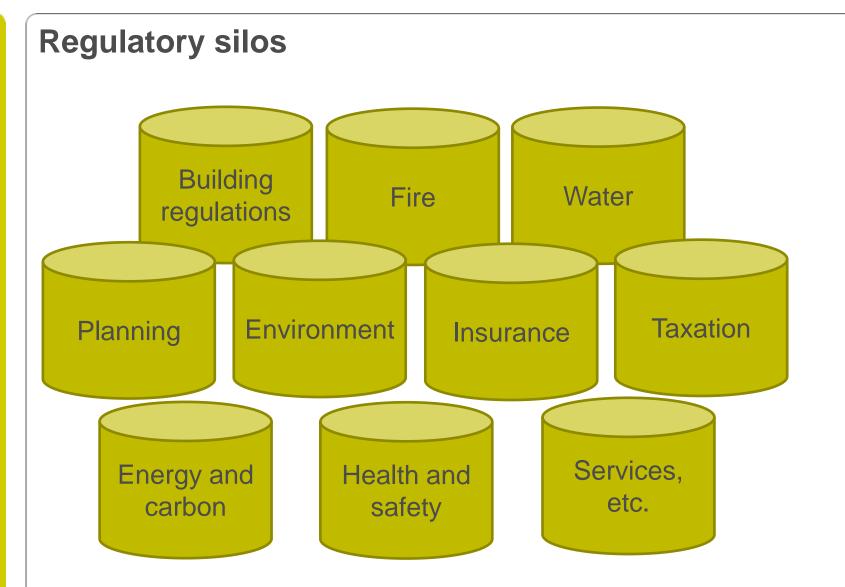
Compliance - demonstrated using BS, EN, ISO standards and Approved Documents

BREEAM and LPCB go beyond compliance standards

Feedback

More sustainable built environment







### We have to consider issues hollistically; Conflicts between sustainability, security and fire





# Sustainable Urban Drainage Systems – easy to contaminate water table with fire fighting water run off – bunding is not the answer!





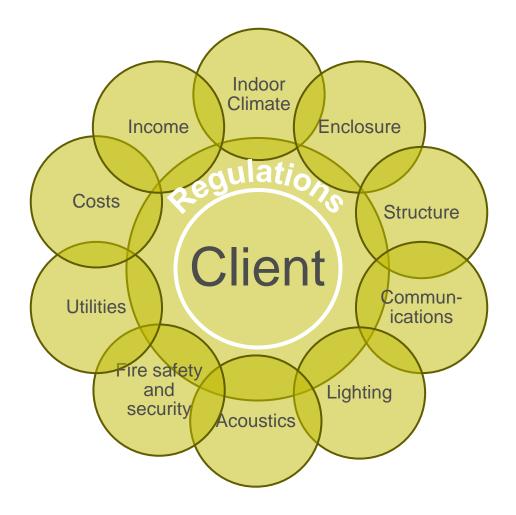
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### **Green wall – substrate ?!**



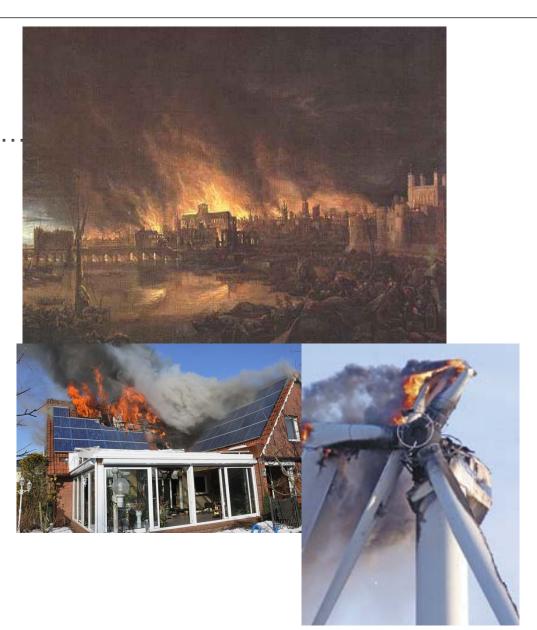


The challenge - meeting the client's business needs at the same time as delivering the performance required of the building......



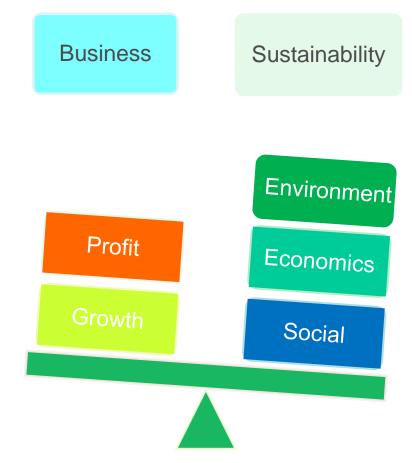


### Getting it wrong .....

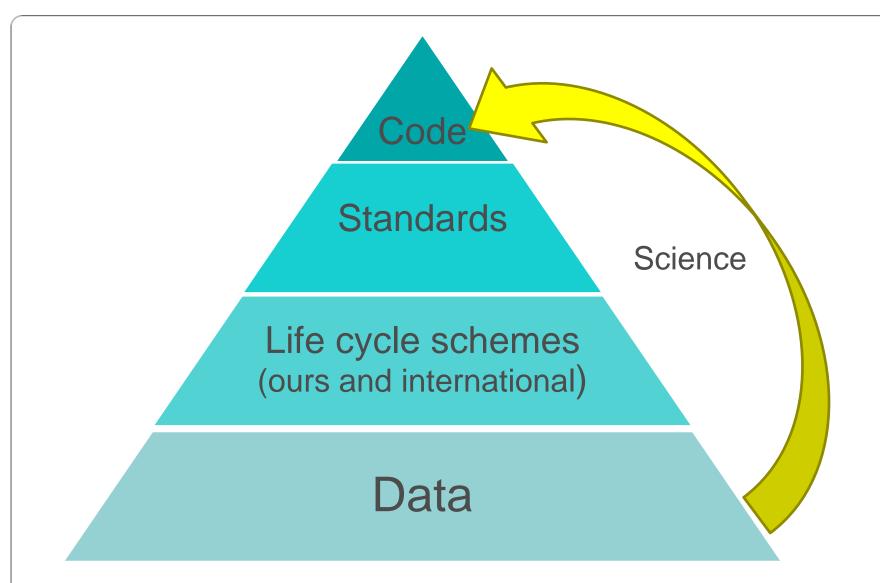




## Sustainability is not just about environmental assessment !







### New European Standards EN 15643 series

Sustainability of construction works — Sustainability assessment of buildings

- Part 1: General framework
- Part 2: Framework for the assessment of environmental performance
- Part 3: Framework for the assessment of social performance
- Part 4: Framework for the assessment of economic performance
- Future developments of BREEAM will comply with these documents



### Some sustainability drivers and issues

- Increased use of recycled materials (e.g. mobile phone cases, tyres, pallets, bottles)
- Construction site waste reduction leading to development of innovative construction methods/techniques – Modern Methods of Construction (MMC)



- Increased thicknesses of insulation to improve energy efficiency
- Increased airtightness of buildings
- Separation of buildings
- Performance of new laminated glazing products (impact and security resistance compared with fire performance)

### Sustainability continued

### The impact of fires on the environment

- Generation of carbon dioxide, toxic species
- Pollution of water courses
- Business interruption
- Property damageSocietal local community
- Economic benefits/costs
- Technically robust data required to support the development of new generation "green schemes" such as **BREEAM**



### **Example: Cost – benefit analysis – life safety**

PROPERTY TYPE: House, multiple occupancy - traditional HMO			
	0/0/000	uncertainty	net effect
	average	uncertainty	net ellect
Capital Cost of System (per unit)	£585	£287	0.46
Water connection charge (per unit)	£203	£34	0.05
Capital Recovery Factor	0.045	0.002	0.05
Annual Cost of Loan	£35.07	0.002	0.00
Annual Inspection Cost	£18	£1	0.04
Total Annual Cost	£52.67	~.	0.01
Deaths per Million Units	26	5	0.17
Sprinkler Effectiveness Factor	1.00	0.00	0.00
Deaths saved per Million Units	26		
Monetary Value per Death Saved	£1,685,000	£84,250	0.04
Monetary Benefit per Single Unit	£44.14		
Injuries per Million Units	795	90	0.06
Sprinkler Effectiveness Factor	0.67	0.11	0.08
Injuries saved per Million Units	529		
Monetary Value per Injury Saved	£50,446	£2,522	0.03
Monetary Benefit per Single Unit	£26.71		
Fires per Million Units	3606	383	0.06
Sprinkler Effectiveness Factor	0.93	0.02	0.01
Unsprinklered property damage	£8,813	£441	0.03
Reduced property damage per fire	£8,227		
Monetary Benefit per Single Unit	£29.67		
Total Monetary Benefit per unit	£100.51		
Benefit : Cost ratio	1.91	+/-	0.52
Confidence Level (ratio > 1)	96%		
Monte Carlo results			
Benefit : Cost ratio	1.96	+/-	0.49
Confidence Level (ratio > 1)	99%		0110

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### **Common mode of failure**

### - Cavity fires

- Common to all Modern construction methods
- Occurs in combustible cavities
- Cavity barriers and compartmentation not adequate



### How can these problems be solved ?

Assess fire performance of systems not materials

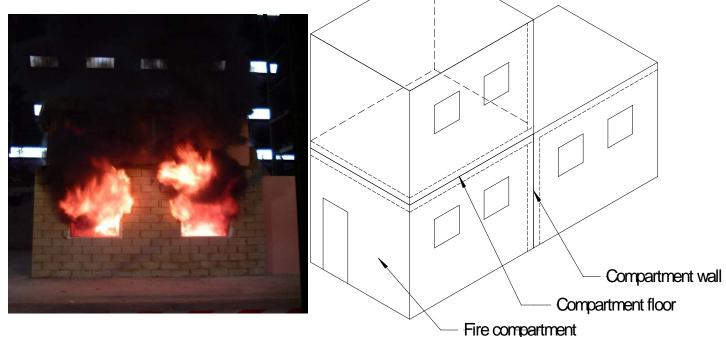
### - Deals with

- Importance of workmanship issues
- Importance of detailing
- Cavity barriers and fire stopping
- Impact of thermal insulation requirements (creation of unstopped cavities)
- Alternative load carrying mechanisms and alternative modes of failure



## LPS 1501 - Standard for fire performance assessment of MMC

 Assessment for fire performance against LPS 1501





## External thermally insulated cladding systems BS 8414 parts 1 and 2 published 2002





### Lack of data

- Full circle
- Construction Industry (of which fire community is a part) lack collaboration
- Common terminology but different definitions
  - "Houses in multiple occupation"
  - Very limited data in public domain
  - Incompatibilities diminish its usefulness
- Need to adopt consistent language and definitions
- Will enable us to assess costs and benefits, risks of injury and death, environmental and social impacts of fires



### Summary – where we are heading

- 1. Considering and managing risks holistically
- 2. Sustainability driving innovation in construction and modern methods of construction.
- 3. Can create issues with fire performance but these are all technically and economically solvable.
- 4. Key Stakeholders need to commit and act in partnership to get fire protection measures that will address the risks.
- 5. Developing more robust data open to scrutiny and peer review to better quantify costs, benefits, risks of injury and death and environmental and social impacts of fires.
- 6. Developing new methodologies for benchmarking materials (responsible sourcing, embodied energy), products and systems within the sustainability framework for societal and economic impacts as well as environment.



### Thank you for listening

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