Grenfell Tower – One Year On

Following the awful Grenfell Tower fire in west London on 14th June 2017, the UK government have been working closely with industry experts to review the Building Regulations and the design, construction, and management of high-risk buildings.

This presentation will give a summary of the findings from the investigation and the many industry workshops held to uncover the causes of how the Grenfell Tower fire spread. What actions have the UK authorities taken alongside industry stakeholders to try and prevent future tragedies.

Secondly, the presentation will give an update on the ongoing work on the international movement to develop consistent fire safety standards globally for high-risk buildings.

Gary Strong, a Chartered Building Surveyor, Chartered Arbitrator, Chartered Loss Adjuster and Chartered Building Engineer, and practised as a surveyor, building engineer, expert witness and arbitrator for 38 years. Highlights of a successful career are the landmark House of Lords case of Delaware Mansions (Flecksun Ltd) –v- City of Westminster and the Heathrow Tunnel collapse project.

Has spent most of his career investigating fires and rebuilding post-fire, incorporating latest best practice. Is particularly experienced in managing buildings in use, and upgrading/refurbishing to modern codes. Currently responsible for developing standards and guidance for RICS professionals globally in 137 countries and is RICS media spokesman on technical surveying subjects. He has appeared on many international tv channels inc BBC One Show, BBC radio and is a regular contributor to various journals and as a presenter at conferences.

Currently consultant to BBC, and the Financial Ombudsman Service (FOS), and post Grenfell Tower is leading the RICS fire advisory group advising government and is a member of the UK Construction Industry Council Expert Panel.

Gary is Chair of the CTBUH Fire & Facades Working Group, and is leading the work on developing a global UN-backed coalition of professional bodies who aim to achieve International Fire Safety Standards particularly for high rise, high risk buildings.

Learning Objectives

1. *Learn about the Grenfell fire*
2. *Learn what has happened since the fire*
3. *Learn about the International Fire Safety Standards (IFSS) Coalition, a UN-backed initiative.*

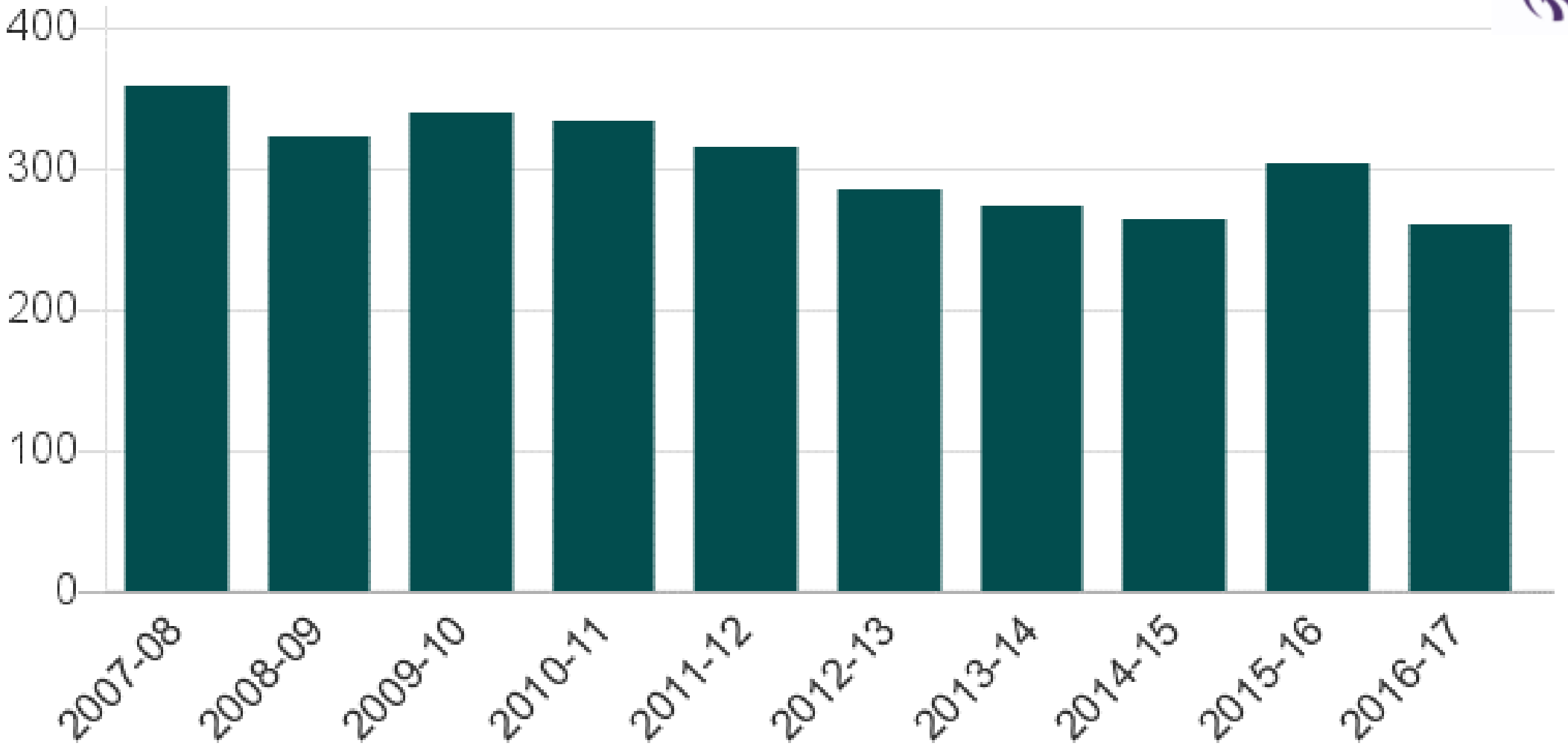
“With the exception of language, it would not be an exaggeration to characterise global fire safety standards as the most urgent outstanding issue in the pursuit of the public interest in global safety and performance comparability.”

Gary Strong BSc (Hons) FRICS FCIArb CBuildE CABE FCILA FUEDI-ELAE
Global Building Standards Director, RICS

Chair – CTBUH Fire & Facades Group

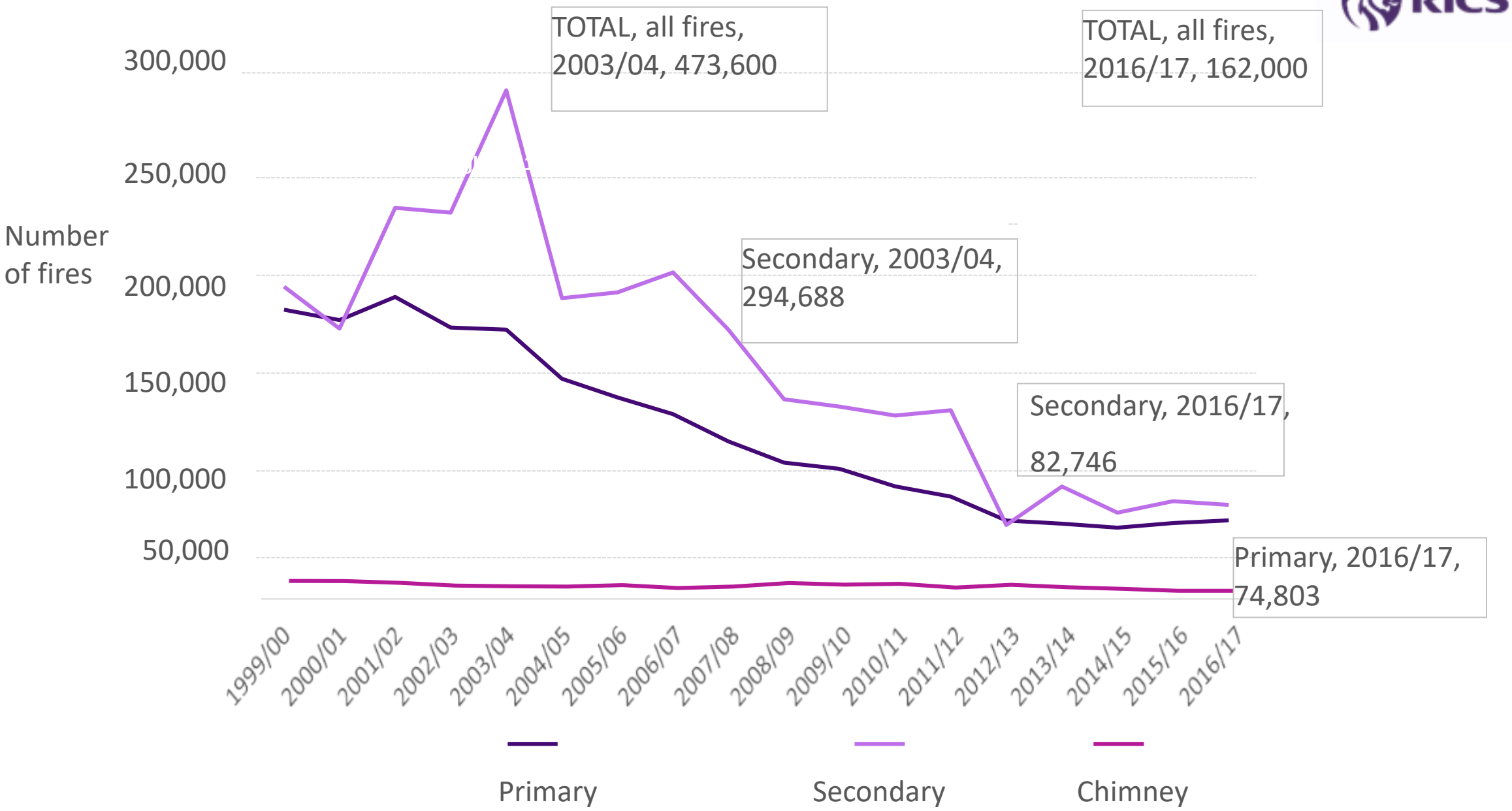
Chair – International Fire Safety Standards Coalition

Fire-related fatalities in England



Source: Home Office

Trends in fires, England, 1999/00 to 2016/17



Grenfell Tower update

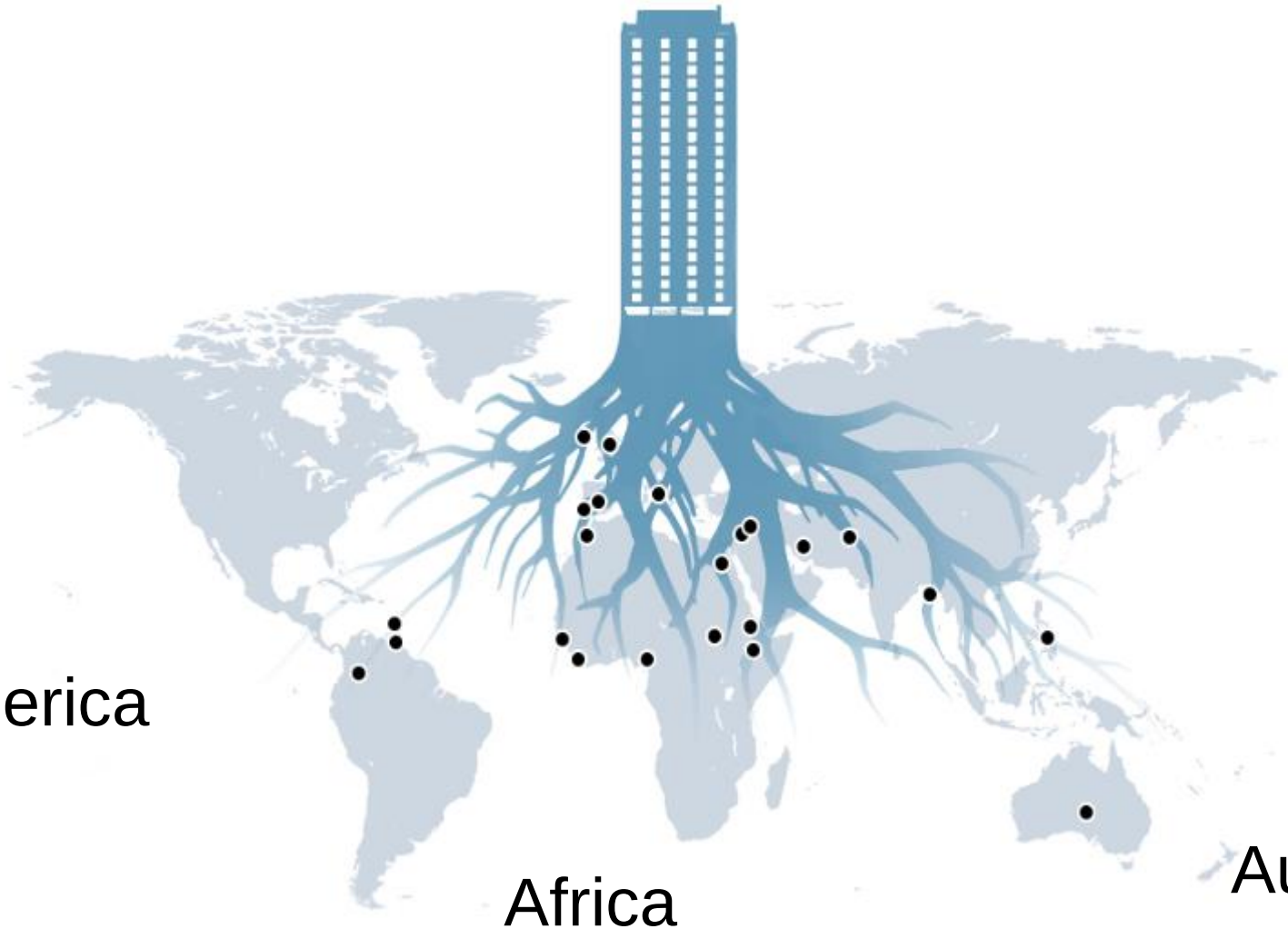
- First 999 call at 12.57am June 14th 2017 from flat 16 on 4th floor
- ACM cladding & insulation caused rapid fire spread
- Window filler insulation boards accentuated fire
- Windows were open causing leapfrogging
- Electrical surges history
- Single staircase 24 storey building
- 293 residents
- Some fire doors open, missing closers

Grenfell Tower update

- Stay Put policy
- No sprinklers
- Toxic smoke in stairwell
- No working residents fire alarm
- Fire doors failed tests, closers missing
- Firefighters inside not aware of cladding fire externally
- Stay Put policy reversed at 2.47am
- 72 final death toll, carbon monoxide main cause of death
- 441 other buildings as at 30th Nov 2018

The Roots of Grenfell

bbc.co.uk



Middle East

Europe

India &
Bangladesh

South America

Africa

Australia

Grenfell Tower update

Independent Expert Advisory Panel
IRG – Industry Response Group
Public Inquiry
Dame Judith Hackitt Building Regulations and Fire Safety Review
Criminal investigation
7 large scale BS8414 tests
Guidance issued to building owners by MHCLG continuing
Building Safety Programme
Building Solutions Programme

Grenfell Tower update

- Initial focus on ACM
- Clear that little understanding of building regs requirements
- Ban on ‘combustible’ cladding wef 21/12/18 in England
- Scotland changes Feb 2021

Hotel building - Rostov-on-Don, Russia

Grenfell tower, London

Shanghai, China

Baku, Azerbaijan

Address Downtown hotel, UAE

Lacrosse tower fire, Melbourne

(kate.nguyen@unimelb.edu.au)

Building	Location	Year	Description	Damage
Grenfell Tower	London, UK	2017	External cladding which consisted of ACM panels with PE core	72 dead 70+ injured
The Address Downtown Dubai (302m tall)	Dubai, UAE	2016	An electrical short circuit on a spotlight was the cause	16 minor injuries
Marina Torch (352m)	Dubai, UAE	2015 & 2017	Fire initiated in the 52nd floor and spread quickly due to high winds, combustible cladding	No injuries
Tamweel Tower (160m tall)	Dubai, UAE	2012	Vertical bands of exterior cladding from ground to roof level ACM panels with PE core	Repair works have begun after 3 years
Saif Belhasa Building (13 stories)	Dubai, UAE	2012	Cladding consisted of ACM panels with PE core	9 flats destroyed 2 injured Debris damaged 5 vehicles
16 Storey apartment building	Baku, Azerbaijan	2015	Rapid fire spread along the cladding. Combustible panels according to reports.	17 dead 60 injured
Lacrosse Building	Melbourne, Australia	2014	External wall cladding and aided by combustible material located within the wall structure quickly spread to the top of the building	No injuries
18 storey building	Roubaix, France	2012	Highly flammable outer cladding	1 dead 1 injured
28 storey building	Shanghai, China	2010	Polyurethane insulation to external walls	53 dead 90 injured
Monte Carlo Hotel (32 stories)	Las Vegas, US	2008	Exterior insulation and finish system which consists of a layer of expanded polystyrene foam adhered to gypsum sheathing	13 minor injuries

Cladding system tests	Result
Test 1 **cladding system formed using ACM panels with an unmodified polyethylene core (PE) and a rigid polyisocyanurate foam (PIR) insulation**	Failed
Test 2 **cladding system formed using ACM panels with unmodified polyethylene core (PE) (Cat 3 in screening tests) and stone wool insulation**	Failed
Test 3 **cladding system formed using ACM panels with a fire-retardant polyethylene core (FR) and a PIR foam insulation**	Failed
Test 7 **cladding system formed using ACM panels with fire-retardant polyethylene filler (Cat 2 in screening tests) with phenolic foam insulation**	Failed
Test 4 **cladding system formed using ACM panels with a fire-retardant (FR) core and stone wool insulation**	Passed
Test 5 **cladding system formed using ACM panels with a limited combustibility filler (A2) with PIR foam insulation**	Passed
Test 6 **cladding system formed using ACM panels with a limited combustibility filler (Cat 1 in screening tests) and mineral (or stone) wool insulation**	Passed

Combustibility

(kate.nguyen@unimelb.edu.au)

National Construction Code (NCC)	International Building Code (IBC)	Building regulations (ADB)
1) $t_t \leq 5$ s 2) $\Delta T_{furnace} \leq 50^\circ$ C 3) $\Delta T_{specimen} \leq 50^\circ$ C	1) If the weight loss of specimen ≤ 50% I. $\Delta T_{furnace\ \&\ specimen} \leq 30^\circ$ C II. No flaming from the specimen after the first 30 seconds 2) If the weight loss > 50% I. $t_t = 0$ s II. $\Delta T_{furnace\ \&\ specimen} = 0$	Non-combustible 1) $t_t \leq 5$ s 2) $\Delta m \leq 50\%$ 3) $\Delta T_{furnace\ \&\ specimen} \leq 30^\circ$ C Limited combustibility 1) $t_t \leq 20$ s 2) $\Delta m \leq 50\%$ 3) $\Delta T_{furnace\ \&\ specimen} \leq 50^\circ$ C
Mat. 1 ✓	✗	✗
Mat. 2 ✗	✓	✗ (Limited combustibility)
AS 1530.1	ASTM E136 or ISO 1182	BS EN ISO 1182 and/or BS EN ISO 1716 (and EN) 13823

Assembly Test Comparison

Test	Test Dimension	Fire Source	Peak Heat Flux to Panels*	Primary Criteria (Failure Evaluation)
NFPA 285	17.5 feet tall, 13.3 feet wide	Two gas burners (HRR = 1.3 MW)	40 kW/m2	**Temperature via thermocouple measurement (10 ft elevation, 1000°F)**
BS-8414	32 feet tall, 9 feet wide, with a 5 foot wide wing Wall	Wood crib (HRR = 3±0.5 MW)	75 kW/m2	**Temperature via thermocouple measurement (16.4 ft elevation, 1110°F above ambient)**
FM 16-ft PPT	**16 feet tall, 3.5 feet wide**	**One gas burner (HRR = 360 kW)**	**100 kW/m2**	**Peak HRR > 1100 kW**

MHCLG cladding categorisation

1. ACM cladding with A2 filler (**category 1**) can be safe on buildings over 18m with foam insulation or stone wool insulation – really ?

2. ACM cladding with fire retardant polyethylene filler (**category 2**):

- presents a notable fire hazard on buildings over 18m when used with *rigid polymeric foam insulation* based on the evidence currently available.
- can be safe on buildings over 18m if used with *non-combustible insulation (e.g. stone wool)*

- ACM cladding with unmodified polyethylene filler (**category 3**) presents a significant fire hazard on buildings over 18m with *any* form of insulation.

Non ACM cladding is also an issue

Innovation will pose challenges

Electrical issues

21st October 2017

Residents evacuated in Walpole Road and Hamilton Road, Bournemouth on Friday after power surge sparks five fires

http://www.bournemouthecho.co.uk/news/15610931.Hundreds_of_people_sti

ll_without_electricity_after_power_surge_causes_house_fires/

Sprinklers

In Wales, sprinklers are now mandatory for ALL residential new buildings – and in Scotland above 18m (changing in Feb 2021) - but not in England, or Northern Ireland.

Recommended in AD B above 30m but NOT mandatory.

NOT retrospective.

Procurement

1. Hyde launches £2.4bn fire safety procurement framework
News12/07/18
A major London housing association has launched a £2.4bn fire safety procurement framework.

2. ‘value engineering’ = cost savings

Fire door issues

Fire door manufacturer withdraws products from sale following post-Grenfell tests

News 19/07/18

Procurement

London association to remove non-ACM laminate cladding after failed test

News11/07/18

A large London housing association is working to strip cladding from a tower block of a kind recently revealed never to have passed a large-scale test.

Media – every day

Housing associations face being stuck with dangerous cladding on leased blocks

Grenfell Inquiry day 22: description of hectic scenes within control room

Hyde launches £2.4bn fire safety procurement framework

Grenfell Inquiry day 21: account from 'nerve centre' of fire brigade response

Control room technology caused Grenfell response difficulties, inquiry hears

London association to remove non-ACM laminate cladding after failed test

FPA to launch alternative cladding testing regime

Widely used combustible cladding has never passed large-scale test

Grenfell Inquiry day 20: firefighter describes 'huge volume' of calls from trapped residents

Britain flouting human rights over ACM

Dame Judith Hackitt final report Building a Safer Future

1. Roles and responsibilities for building safety are unclear;
2. Regulations and guidance are "ambiguous and inconsistent" and are "misunderstood and misinterpreted";
3. The process that drives compliance with the regulations are "weak and complex with poor record keeping and change control in too many cases";
4. Competence (of people in the system) is "patchy";
5. Product testing, labelling and marketing is “opaque and insufficient”;
6. Residents' voices go unheard

Dame Judith Hackitt final report Building a Safer Future

53 principal recommendations:

- a stronger and tougher regulatory framework for higher risk residential buildings (HRRBs) that are 10 storeys
- a Joint Competent Authority (JCA) comprising fire and rescue authorities, Local Authority Building Standards and HSE to oversee better management of safety risks (through safety cases) across their entire life cycle
- introduction of a safety case approach & permissions
- clear responsibilities to actively manage on-going safety during occupation

Dame Judith Hackitt final report Building a Safer Future

- mandatory incident reporting
- key roles & responsibilities
- overhaul of guidance
- digital records – inc BIM
- stronger enforcement & criminal sanctions
- effective leadership & competence for key roles
- stronger testing, labelling & traceability of products
- empowering residents' voices

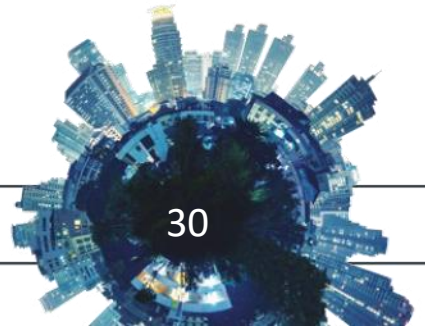
CDM – Construction Design & Management Regulations

Client
Principal Designer
Principal Contractor
Health & Safety File
Notification to HSE
Criminal prosecutions

Insurance issues

Buildings insurance

PI insurance



Benefits to business of standards

From investors to the public, they offer significant benefits to different stakeholders:

Professional advisors

enhance performance and reputation 1

Investors

comparability of sound investments on a like for like basis 2

Multinationals

better understanding of property portfolio 3

Developers

ability to attract new clients from all markets/regions 4

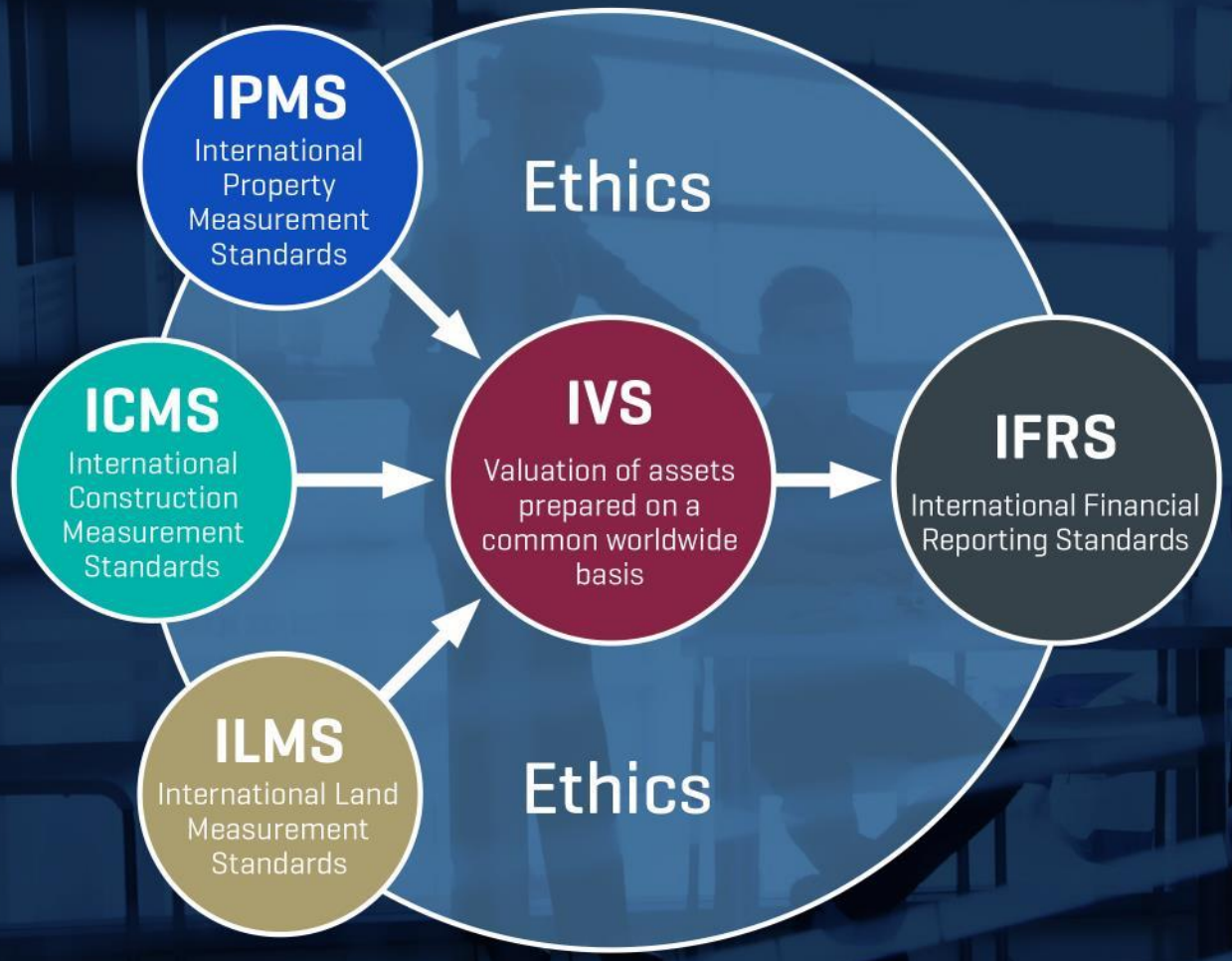
Governments

political, market transparency and investment potential 5

Public

confidence in governments and buildings 6

International standards – working together



Valuation

- Based on open market value
- Use best comparables available
- Public sentiment is against dangerous buildings
- Global investors very aware of this as a global issue
- Local investors very aware
- Banks very aware of inconsistencies
- So **no investment and inability to raise finance**

IFSS - International Fire Safety Standards

Why is there a need for IFSS?

Property of all types is built and managed differently around the world, which leads to:

- Difficulty in providing consistent and transparent information from one market to the next
- Inconsistency further undermining existing international standards such as IFRS and IVS
- A degree of uncertainty in property markets
- Uncertainty for international financial investors
- Uncertainty by the public leading to political instability

Fire Safety in Buildings

Fire safety in buildings has two arenas:

- Design and construction – providing the fire safety infrastructure
- Building in use – using and maintaining the fire safety infrastructure

Design and Construction – Providing the fire safety infrastructure

Fire safety design needs to address:

- Holistically the whole building, not just cladding, on a fire engineered approach
- Fire prevention and arson resistance
- Fire detection and alarm
- Means of escape/evacuation
- Structural fire resilience
- Fire growth control incl fire suppression
- Fire fighting facilities
- Fire engineers input
- Supervision of construction
- Competency

Building In Use – Using and maintaining the fire safety infrastructure

- Fire risk assessment
- Building management
  - Regular inspection, reporting & testing
  - Maintenance
- Training
- Existing buildings – incremental improvements
- Competency

What are International Fire Safety Standards (IFSS)?

IFSS will offer a global solution to:

- Address current inconsistencies in the way property is designed, built and managed for fire safety
- Ensure different types of property including offices, residential, retail and industrial are safe for users
- Ensure confidence in property investment

IFSS will be implemented by all coalition organisations, through their members.

Consistency

- Consistent standards enable governments & clients to accurately quantify risks and other sustainability measures.
- Enable governments to reassure the public and investors

Transparency

- Improved confidence in national market for foreign direct investment at all stages of the property lifecycle.

Comparability

- Removes need for multiple differing standards within countries (such as the UK), and allows for better foreign direct investment assessment.

Future proof

- Utilising international best practice early as the world moves to this set of standards, as it has done with IFRS and other international standards.

Why not ISO ?

- Takes too long and costs too much
- ISO set up for products not professional behaviour
- IP owned by ISO and cost (of downloading) is a barrier
- Any one country can veto a standard
- IFSS Coalition members develop the standards and ensure it’s adoption

IFSS – Team approach

- **These issues need a team approach**
- **Fire engineers are key to the solutions**
- **Opportunity to build a global fire engineering profession is huge, particularly in high risk buildings**
- **Professional bodies must collaborate**


RICS
C·A·S·L·E
cabe
chartered association of building engineers
CEBC
RIBA
CELEBRATING 100 YEARS
1918
2018
CIOB
ICC
INTERNATIONAL CODE COUNCIL
THE WORLD BANK
IBRD • IDA
SGSA
Sports Grounds Safety Authority
ASSOCIATION FOR PROJECT SAFETY
ENGINEERS AUSTRALIA
AEEBC
Singapore Institute of Building Limited
FIG
NFPA
CIAT
United Nations
Get involved –
gstrong@rics.org
NHBC
LABC
Council on Tall Buildings and Urban Habitat
API
AUSTRALIAN PROPERTY INSTITUTE
bca
rics.org/standards

Professional standards are

Good for business
Good for govts
Good for the public

rics.org/standards