IESF
SOCIÉTÉ DES INGÉNIEURS ET SCIENTIFIQUES DE FRANCE

Newsletter

British Section
www.iesf.co.uk

Issue 44: November 2026

"The Grenfell Tower Fire: Key Outcomes from the Inquiry and Further Changes on the Horizon". Lecture by Professor José Torero, University College London

The British Section of the IESF organised this prestigious lecture and jointly hosted the event with the ICE Safety Risk Advisory Group. Professor Torero reminded a large audience of over 300 construction and fire engineers in the ICE Telford Lecture Theatre about the systemic failures that were the root cause of the Grenfell Tower fire disaster. The lecture was a very honest and forthright tour de force and a sobering reminder of what went wrong. It is hoped that the many important messages conveyed by Professor Torero during his presentation have been appropriately captured in this report.



Professor José Torero. Image: Ray Jefferson

Think beyond the role of the cladding!

When we see the images of the Grenfell Tower burning, understandably the first thing that comes to mind is the issue with the combustible cladding. Professor Torero emphasised that the cladding is one part of an incredibly complex problem that needs understanding. We should open our minds and think beyond the cladding as a culprit of this event. Not to do so would create a significant disservice to the victims by oversimplifying the problem, which is much more complex than the choice of building materials.

The objective of the Public Inquiry was to try to understand not only what happened but also why in an endeavour to ensure that such incidents are never repeated. However, since the Grenfell Tower incident, there have been similar disasters in Valencia and Hong Kong that claimed many lives. Clearly, the reality is that such events are still happening and are still threatening the lives of many people.

Stage I of the Public Inquiry was concerned with what happened and took one year to complete. The events were analysed, explained and fundamentally understood. Stage II of the Inquiry commenced in 2018 and attempted to explain why it happened and this proved to be a much more complex problem, taking six years to complete. Within this period Dame Judith Hackett published her report on a review of the Building Regulations in which she described the construction industry as "a race to the bottom". There was an across the board misuse of Building Regulations, but she was unable to explain why.

Circumstances of the fire

The fire started soon after midnight in the small kitchen of flat 16 on the fourth floor. Although the fire was a moderate size on a scale routinely tackled by the fire service, flames vented from the kitchen window and the fire found its way into the cavity of the new cladding that had been fitted to the external façade of the building, comprising polythene core aluminium composite panels and combustible insulation. The combustion properties of polyethylene, the core in the aluminium composite panels, have been known since the 1930's. Polyethylene is easy to ignite, it spreads flame easily, it has a high heat of combustion and as it burns it melts and sheds burning droplets that can spawn secondary fires. All the knowledge necessary to predict the way in which the fire spread both vertically and laterally at Grenfell through the agency of the polyethylene core of the aluminium composite panels existed. The fire fighters attended to fight a one compartment fire but were completely overwhelmed by the developing external fire.

How the fire safety design of the building was flawed

Professor Torero reminded us that the building should have been designed to adequately contain such a small fire. What followed was the failure of all fire safety provisions, including the fire service. Safety critical systems must always have redundancies and all of the knowledge necessary to define this existed. However, as soon as the fire breached the compartment there were no response mechanisms in place. Professor Torero posed the question - how could this be possible?

Small footprint, high-rise residential buildings, such as Grenfell, are among the simplest buildings to design from the fire safety perspective. A properly designed building with fire resisting compartmentation enables the fire service to rely on the" stay-put" strategy, which was a robust and commonly used approach to life safety that had a recognized track record. However, external fire spread, by definition, challenges that strategy. There have been many precedents of external fires with serious consequences and so by the time of the Grenfell Tower fire, we should have been prepared.

The engineering objective for the fire safety of the building was a one-unit fire,



4.43 a.m. Image: Natalie Oxford, Wikimedia Commons CC BY 4.0

achieved by having a one-unit fire detection system, four levels of compartmentation redundancy, a safe route for egress and no external fire spread. Fundamentally, the fire service was not recognized as a redundancy to the building safety and instead they were thought of as coming to fight the fire and save the day, irrespective of the size and type of the fire. When confronted by the developing external fire they continued to try to fight it instead of moving into a rescue mission. The failure to achieve '*no external fire spread*' in the fire safety objective led to a '*single point failure mode*', bypassing all levels of redundancy. Furthermore, a conflict was

introduced by giving the Fire Service priority over the stairs which became filled with smoke and the stay-put strategy could not be reversed. This placed enormous pressure on senior fire service personnel who were faced with making the unfair decision of taking occupants from a very risky environment in their own units to the equally risky environment of a staircase filled with smoke.



6 a.m. Image: Natalie Oxford, Wikimedia Commons CC BY 4.0

In what can be viewed as a classic example of the Swiss cheese model, Professor Torero summarized the position as follows. "*Everything that happened was foreseeable, the knowledge to prevent the outcome existed and, for a building of that nature,* ***all those inolved in the design, construction and management of the building should have had that knowledge and ought to have exercised that knowledge in the design, construction and maintenance of the building***". So why was this knowledge not exercised?

The role of deregulation

In his review of important factors that contributed to the Grenfell Tower tragedy, Professor Torero started by examining the Building Act of 1984, which created a functional requirements system relying on performance-based design with guidance and which diminished the hierarchy of prescriptive solutions with rules used hitherto. The solution to the design of a safe building relied, therefore, on a combination of functional requirements and guidance without rules. It became necessary for the professionals to demonstrate that the design of a building meets the safety objective. The functional requirements system allows the professionals to define objectives that meet the tests of '*appropriate*', *adequate*' and '*sufficient*' and then do their analysis in an explicit way to demonstrate that their unique solution to their specific problem meets the requirements of the objectives. For example, Requirement B4.(1) of Approved Document B to Building Regulations 2010 states "*The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building*". What does *adequate* mean in a building with a 'stay-put' fire safety strategy? Does it mean no fire spread – who decides?

The role of professionals and issues around competency

The functional requirements system fails to define professional boundaries. It is up to the professionals to define the objectives and the fire safety strategy, but Professor Torero questioned where does the fire engineer start and finish,

when do the structural engineer and façade designer become involved and when does the architect become involved and take over the whole design? All professionals involved must understand each other and be able to speak the same language. Similarly, responsibility is also undefined because each project sets its own structure of responsibility and decides who does what.

The Building Regulations in terms of functional requirements place an enormous weight on professional competency. The recommendations of the Finniston report in 1979 to set up a new statutory Engineering Authority to protect the title and function of an engineer was opposed by the professional institutions to retain independence through self-regulation of membership, overseen by the Engineering Council. In the case of Grenfell there was an enormous presumption of competency, which was a product of a system that relies heavily on professional competency. The functional requirements framework evolved from the Building Act 1984 where functional requirements were supported by guidance set out in approved document B. The main inconsistency was the failure to establish a competency framework. There were no formal requirements about who could do fire safety engineering, there was no professional monopoly.

In the absence of a formal framework of competency, 30 years of deregulation by incompetence led to a systemic devaluing of knowledge and competency and over emphasis of nonprofessional relationships. An approvals system was constructed by means of which there was involuntary collusion between firefighters, authorities and engineers. Industry educated itself to take full advantage of the incompetence and poor regulatory framework. Professional organisations served as an enabler to perpetuate nonprofessional relationships. Competence became *"the one who can get my building approved"*. There had developed a widespread misconception that job title, in itself, denoted competency and Professor Torero expressed the view that this has not been sufficiently highlighted during University undergraduate teaching.

A fire event well understood left major questions on the competency of all those who played a part in the design, building and management of Grenfell Tower, including those who developed the legislation, performance tests and practice protocols, that allowed Grenfell to happen particularly on those who anointed those experts. The outcome was a total loss of trust in the fire engineering profession. Everyone is so incompetent that you can do what do you want. This amounts to deregulation by incompetence.

Professions have attempted to define competency for centuries. You are not competent; you are deemed competent by those who participate in a subject. Professional competency must be regulated when the subject is one deemed complex and important to society. It is necessary to create a structure to regulate competency.

The way forward – the path towards recovery of trust

Professor Torero reminded us that much has been said about carrying out an appropriate fire risk assessment with proper objectives and an appropriate method. The government wants to use the PAS 9980:2026 to deliver an appropriate risk assessment, but this is very similar to PAS 79 that existed before and as a result it failed badly because it did not identify the most obvious of problems, the creation

of a single point failure mode. For a stay put strategy, then "*adequate*" in requirement B4.(1) of Approved Document B to the Building Regulations dealing with external fire spread means "No", and this should have been known. The fire detection system was not designed to inform the occupants of an alternative approach to fire safety and fire-fighting protocols, equipment and staff were defined for a one-unit fire.

For the first time we are facing the possibility of having an engineering discipline in the United Kingdom which is protected in name and function. The Government has acted and constituted a Fire Engineers Advisory Panel which issued an Authoritative Statement - "*the establishment of fire engineering as a regulated profession, to be regulated in both title and function to restore trust*". This means that the activities of the fire engineer can only be performed by an individual who is registered and has met specific requirements. Fire engineers will hold formal responsibility for the development and stewardship of the fire safety strategy as a core function, with clear duties that are defined in regulation. This augurs well for the future in which fire engineering is a regulated, accountable profession operating within a system that places the safety and wellbeing of all people at its core. In delivering the fire safety strategy, the role of the fire engineer is one of providing the link between multiple disciplines to ensure that design decisions come together to form a coherent and effective fire safety solution for a building and its occupants. The Government's Policy Paper setting out the next steps on the reform of the fire engineering profession illustrates its commitment to implementing both the recommendations of the Grenfell Tower Inquiry Phase 2 report and the advice of the Fire Engineers Advisory panel. This marks the beginning of a partnership between government, industry, regulators, and higher education to build a profession equipped for the future.

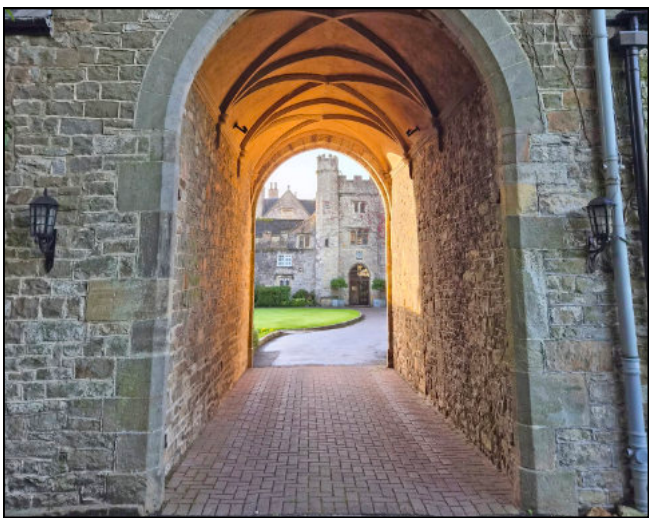
Chris Foster

The President's Day in Bristol

At the end of September, 2026 President John Beck led a party of enthusiastic members on a *voyage* to Bristol to view some engineering masterpieces. Our voyage began with dinner and an overnight stay at the St Pierre Hotel, Chepstow, set in 400 acres of parkland across the Severn Bridge from Bristol itself. The St Pierre estate dates back to Norman times and incorporates a small 11th century private church and 14th century gatehouse.



The St Pierre Hotel. Images: Ray Jefferson





Looking north west towards the Clifton Suspension Bridge. Image: Chris Foster

The Clifton Suspension Bridge

The Avon Gorge at Clifton is not symmetrical; the eastern side at Clifton has a vertical rock face whereas the western side, towards Leigh Woods, has a 45° slope. The 23 year old Brunel's winning design addressed the asymmetry by building out an abutment on the west side to reduce the overall span and give balance to the bridge.There was no government funding of infrastructure projects in the 19th century with the Clifton Bridge Company having to raise money from shareholders. Funding was finite and in the 12 years after winning the competition, Brunel built the masonry abutments, towers and bridge approaches, but ran out of money for the suspension chains and deck. The abutments and towers remained as an embarrassing half



The maintenance access platform under the suspension bridge. Image: Chris Foster



Inside one of the vaults. Image: Norman Train



President John Beck leads the way. Image: Chris Foster

built project for almost two decades. It was the HS2 of its age.

Brunel is a paradox in that his overall design vision was always bold and visionary, whereas his construction was solid and conservative. The Leigh Woods abutment contains vaults like cavernous cathedrals which are stacked two high towards the base of the gorge. There are 12 vaults within the abutment forming a solid plinth for the bridge towers. The vaults are constructed in red sandstone whereas the towers are in grey Pennant sandstone. The vault walls are over 1m thick with an arched roof constructed in dressed blocks set in lime mortar. The towers piers either side of the bridge deck continue down as solid supports within the abutment vaults. Further vaults to the outside support the pedestrian walkways and give lateral stability to the base of the tower. Over the years water has percolated the abutments dissolving the calcium carbonate in the lime mortar and producing spaghetti like stalactites up to 7m long to form from the arched roof.

When Brunel died, it was his fellow engineers, Hawkshaw and Barlow, both ICE Presidents, who took the white elephant forward to a completed project. It was the manic expansion of the London railways in the second half of the 19th century that was the catalyst for the completion of the Clifton suspension bridge. Brunel's original Hungerford Suspension Bridge across the River Thames was for pedestrians. This was demolished in 1860 to make way for Hawkshaw railway bridge between Waterloo and Charing Cross. Hawkshaw salvaged the chains and saddles, recognising that these could be reused at Clifton and in the next 4 years along with



Members of the group inside one of the vaults. Image: Chris Foster

Barlow he reinvigorated the funding and completed the bridge. Tension assemblies are only as good as the weakest connection and with the greater span and increase in loads from pedestrians to vehicles, Hawkshaw used three chains at Clifton rather than the double chains on the Hungerford.

Maintenance was not a priority to the Victorian engineers. Brunel sealed the vaulted Leigh Wood abutment without access. With the demise of the original bridge company, records were lost and it was only in the 21st century that an doorway was stitch drilled through the abutment outer wall to gain access to the vaults themselves. This was the first time that the vaults had been seen in 150 years and were in sound condition, as a testament to the care with which Brunel had taken in their construction.

Norman Train

Lunch was enjoyed at the Hotel Du Vin, Avon Gorge, after which we were privileged to receive a presentation from Tristan Ralph, the Clifton Bridgemaster.
We were soon off again however, this time to visit the SS Great Britain at Bristol Dockyards Museum.

The SS Great Britain - Impressions

There is much information about the Great Britain available on the internet, so this description is reflecting what we actually saw on our visit.
As soon as it comes into view, the ship immediately catches the eye with its beautifully painted stern end, bearing gold painted decoration as well as the ship's name and home port of Bristol.
The first thing one notices is that it appears to be floating in the dock, as there is a horizontal glass screen filling the gap around the ship at the level that the sea water would have been. This is not there just for effect, as below the screen is a closed space in which two very large de-humidifiers maintain the space beneath at 20% relative humidity to minimise deterioration of the wrought-iron hull. An air-lock allows visitors to first walk around



Looking along the deck of the SS Great Britain.
Image: Ray Jefferson

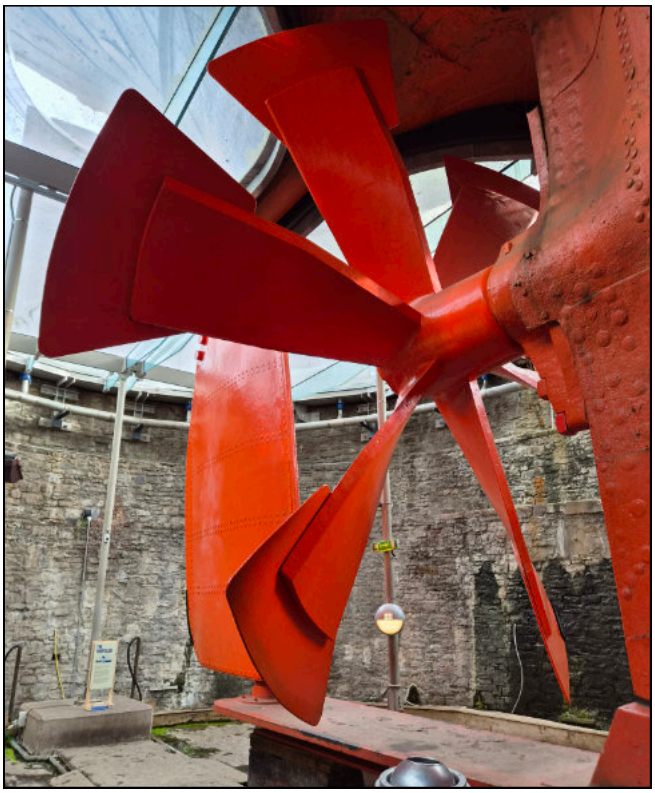
the base of the dry dock and see the outside of the hull and the large red-painted propellor and rudder.
Climbing up a staircase and through the airlock then allows one to access the open main deck (completely replaced a few years ago) which certainly gives a good impression of size. One of the first things in view is a cow in a stall – on the voyages to Australia it was normal to take livestock (a cow, 36 sheep, 140 pigs, 96 goats and 1,114 chickens, ducks, geese and turkeys) for use in the ship's catering!
Towards the rear of the vessel stands in open air the steersman's wheel (helm),



The Voyagers together under the gold encrusted stern of the SS Great Britain. Image: Chris Foster



The first class dining room. Image: Chris Foster



The use of a screw propeller on the SS Great Britain was a significant innovation for an ocean-going vessel. Image: Ray Jefferson

along with a binnacle containing the compass.

Below the top deck are two decks for accommodation of the crew and passengers, all of which have been most effectively installed in what arrived from the Falklands as a bare shell of a ship. Areas are set aside for the dining rooms, promenade spaces, galley, services such as the doctor and hairdresser, etc. All of the large spaces appear quite airy, with overhead windows letting in daylight, but not the weather. In particular, the large and spacious First-Class Dining Room was a very elegant affair, with crockery, silver cutlery, and napkins to match.

A number of cabins may be seen, and a number have been given mannequins to



SS Great Britain. Image: Ray Jefferson

show how passengers would have lived – parents, babies and children in 'family cabins', ill patients in a 'sickbay' cabin, and so on. One thing that was immediately apparent was how narrow the berths were – even in first class.

Those in lower-class accommodation had somewhat smaller spaces, and in fact the 4th-class passengers had to endure open bunks, three high in the sides of an open area! Similarly, lower-class eating was at long 'shelves' along the side of the area, with limited spaces - some having to wait until others had finished eating. Some of those in the lower-class cabins were able to provide services such as barbering, or doing work as seamstresses, for the First-Class passengers.

In midships, the boiler and engine areas could be seen – the boiler produced steam at 10 psi was supplied to the main steam engine arranged rather like an upside-down V-four, driving a crankshaft attached to a large pulley of about 16ft diameter, turning at about 18rpm, connected by a wide belt to a smaller pulley on the main propeller shaft which gave around 54 rpm for the actual propulsion. The replica cylinders were based on the originals, and had an 82-inch diameter and a stroke of 72 inches!

For both the engineers, and their partners, this was a most interesting visit!

Chris Lumb

"Driving Ahead - The Future of the Car."
Lecture by Terry Spall Bsc, MSc, CEng, FIMechE, FREng

The Future of the Car: Electric, Autonomous — and Airborne?

Few technologies are changing as rapidly as the motor car. In a lively and thought-provoking lecture, Terry Spall, Past President of the Institution of Mechanical Engineers, looked beyond today's electric-vehicle debate to ask what personal transport might actually look like in 2030 — and 2050.

The speed of the electric revolution is striking. In 2011, British buyers had a



Terry Spall

choice of just two fully electric models. Today there are hundreds. Range has risen dramatically, battery performance has improved and costs have tumbled: battery prices, once above $1,000 per kWh, have fallen to around a tenth of that. Electric cars are moving rapidly from novelty to mainstream.

But Spall's central message was more complicated than simply "electric is good". An EV may produce no exhaust emissions, but manufacturing its battery requires substantial quantities of lithium, nickel, cobalt, graphite and other critical minerals. Extracting and processing these can carry a considerable environmental price. Rare-earth production can generate contaminated water, toxic waste and radioactive residues, while cobalt mining in the Democratic Republic of Congo raises serious ethical concerns.

Much of the processing is undertaken in China, which has built a commanding position in the supply chain for batteries and critical minerals. The uncomfortable question is therefore whether the developed world is partly exporting the



An MG4 Electric Vehicle.
Image: Corvettec6r/Wikimedia Commons CC BY 4.0

environmental consequences of its green transition elsewhere.

There is also a question of sheer availability. Electrifying a global fleet heading towards two billion vehicles will require extraordinary quantities of minerals. Known reserves may prove inadequate, while developing a newly



Lithium brine evaporating ponds. Image: ChatGPT

discovered mineral resource into a producing mine can take many years.

The ocean floor contains enormous quantities of valuable minerals, but exploiting them could create another environmental dilemma.



A Waymo taxi.
Image: Aamy Dugiere / Unsplash

Technology may, however, provide part of the answer. Sodium-ion batteries are particularly promising. Sodium is extraordinarily abundant and potentially cheaper than lithium, while sodium batteries can operate well at low temperatures and present a lower fire risk. Solid-state batteries promise another leap forward, potentially providing much greater energy density and ranges approaching 500 miles.

Hydrogen, by contrast, looks unlikely to become a mainstream fuel for cars: producing, compressing and distributing it is inefficient and the refuelling infrastructure remains tiny.

Perhaps the most intriguing change, though, concerns not what powers cars but who — or what — drives them. Autonomous taxis are already operating commercially in parts of the United States, while increasingly sophisticated systems are appearing on conventional cars. Spall envisages robotaxis becoming commonplace, potentially challenging the assumption that everyone needs to own a car. That could have a profound social benefit. Fully autonomous vehicles might eventually preserve personal mobility for people who can no longer drive through age or disability.

And after autonomous cars? Look upwards. Hundreds of companies are developing electric vertical-take-off-and-landing aircraft — effectively airborne taxis. Some are already flying.

Spall's conclusion was that by 2050 the "car" may bear surprisingly little resemblance to today's machine: predominantly electric, increasingly



A possible flying car. Image: ChatGPT

autonomous, perhaps shared rather than owned — and, occasionally, not on the road at all.

Matthew Symes

Member News

Welcome to a new member

Dr Robert Pierce

RIP

Humphrey Pocock died in October 2026 shortly before his 90th birthday.. A member of the IESF ski group, Humphrey helped organise overseas tours, including the British Section's voyage to Nantes in 2011.

Maureen Lloyd died in October 2026. Maureen was the wife of our 2002 President, David Lloyd.