

# FIRE SAFETY IN INDIA

————— A BEYOND CARLTON PERSPECTIVE —————

2026



**ACT BEFORE THE FIRE**

**BEYOND CARLTON**

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ACT BEFORE THE FIRE

# Preface



Fire Safety in India remains an issue that demands sustained attention, collective responsibility, and continuous vigilance. Despite greater awareness and periodic regulatory action, fire incidents across residential, commercial, healthcare, and public spaces continue to result in avoidable loss of life and property. As our cities grow more dense, and infrastructure becomes more complex, the risks evolve – making preparedness, enforcement, and public awareness more critical than ever.

As **BEYOND CARLTON** enters its 16th year, I remain deeply grateful to our Trustees, Executive Team, Partners, Fire Service Professionals, Policymakers, and Community Volunteers who continue to advance the cause of fire safety across the country. What began as a response to tragedy has evolved into a sustained mission: advocating stronger fire safety systems, promoting awareness, and encouraging accountability at every level – from institutions to individual citizens.

This year's report, conceived and authored by Gopal Devanahalli, R.A. Venkitachalam, and Cheryl Rebello, reflects that evolving mission. In addition to our ongoing assessment of the fire safety landscape in India, we have included insights from a survey on citizens' awareness and preparedness. Understanding public perception is essential, because fire safety ultimately begins with individual behaviour, institutional culture, and community readiness.

We have also brought together expert perspectives on modern fire safety challenges in India. Rapid urbanisation, changing building materials, increased energy demands, new technologies, and complex infrastructure create risks that require updated thinking, stronger standards, and more proactive planning. This report also includes reflections from a serving Director General of Police for Fire Services, who offers a valuable operational perspective from the frontline.

A consistent lesson from our work is that regulation alone is not enough. Effective enforcement, thoughtful urban planning, institutional preparedness, technological adoption, and sustained public education must work together. Equally important is building a culture where fire safety is seen not as compliance, but as responsibility.

**BEYOND CARLTON** will continue to play its role as an advocate, knowledge partner, catalyst for dialogue and informed action. Our objective remains simple, but urgent: to help ensure that fire safety becomes embedded in how we plan cities, design buildings, manage institutions, educate citizens, and shape public policy.

I hope this report contributes to stronger ownership by the city's leadership, constructive dialogue, decision-making, and stronger collective action. Preventing fire tragedies requires persistence, collaboration, and commitment – and we remain dedicated to that journey.

**Uday Vijayan**  
Managing Trustee & President  
BEYOND CARLTON  
February 2026



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# Introduction

Fire safety remains a critical yet often under-emphasised component of public safety in India. Despite increasing awareness and regulatory attention in recent years, fire-related incidents continue to result in substantial loss of life, injury, and economic damage. As India's urban landscape evolves – with denser cities, expanding infrastructure, new materials, electrification, and changing patterns of public space usage – the nature of fire risk is also changing. These developments underscore the urgent need for sustained, systemic improvements in fire prevention, preparedness, and emergency response.



This BEYOND CARLTON Perspective on the State of Fire Safety in India (2026) builds on our ongoing commitment to examining fire safety through data, stakeholder engagement, lived experiences, and policy analysis. This year's report expands the conversation by incorporating findings from a nationwide citizen awareness survey, expert perspectives on emerging fire safety challenges in India, and operational insights from senior leadership in the fire services. Together, these perspectives provide a more comprehensive understanding of governance challenges, operational hurdles, and opens the door to strategies that could strengthen institutional preparedness, and public awareness.





## Background of BEYOND CARLTON and its Mission

BEYOND CARLTON is India's first citizen-led fire safety advocacy initiative. It was established following the tragic Carlton Towers fire in Bengaluru on 23 February 2010, which claimed nine lives and left many injured. The organisation emerged from the collective resolve of survivors, families, and concerned citizens determined to ensure that such tragedies lead to systemic change rather than remain isolated incidents.



Since its inception, BEYOND CARLTON has focused on raising fire safety awareness, advocating stronger regulatory frameworks, encouraging enforcement accountability, and fostering collaboration among government agencies, fire services, institutions, industry bodies, and communities. Over the past 16 years, the organisation has contributed to policy dialogue, public awareness campaigns, stakeholder consultations, and knowledge initiatives aimed at embedding a culture of fire safety in India.

## Evolving Fire Safety Risks in India

India's rapid urbanisation and industrial expansion continue to reshape fire risk profiles. The growth of high-rise residential complexes, commercial hubs, healthcare facilities, educational institutions, logistics infrastructure, and public entertainment spaces has increased exposure to fire hazards. At the same time, emerging factors such as electric vehicle ecosystems, battery storage, renewable energy infrastructure, modern construction materials, increased indoor density, and complex building designs present new challenges for fire prevention and response.







## The Need for a Holistic Approach



BEYOND CARLTON's long-term engagement in this domain suggests that improving fire safety requires a multi-dimensional approach combining regulation, enforcement, infrastructure investment, institutional preparedness, technological adoption, and community awareness.

While state-level investments in fire services have improved in certain regions, gaps persist in fire station coverage, trained personnel, modern equipment, inter-agency coordination, and data-driven decision-making. Equally important is public preparedness. Our citizen awareness survey indicates that while general awareness of fire risk exists, practical preparedness – such as knowledge of evacuation protocols, fire extinguisher use, and emergency response behaviour – remains limited.

The report also highlights insights from fire service leadership, including perspectives from a Director General of Fire Services, emphasising operational realities such as response time challenges, urban access constraints, resource limitations, and the need for stronger preventive compliance.

## Key Areas for Action

-  **Decentralising Fire Safety Preparedness:** Empowering communities, institutions, and residential bodies with accessible fire safety tools, structured assessments, regular drills, and clearly defined safety responsibilities.
-  **Integrated Urban Fire Safety Planning:** Encouraging cities to adopt rolling multi-year fire safety blueprints embedded within urban planning frameworks, ensuring adequate fire infrastructure, water access, and emergency response readiness.
-  **Strengthening Compliance and Enforcement:** Enhancing inspection regimes, digitising compliance tracking, increasing transparency, and ensuring meaningful accountability for violations.
-  **Multi-Stakeholder Accountability:** Strengthening collaboration among government agencies, industry, healthcare systems, educational institutions, and community organisations.

-  **Digitisation, Data, and Technology Adoption:** Improving fire incident data systems, predictive analytics, public dashboards, and early warning mechanisms.
-  **Burn Care and Post-Fire Rehabilitation:** Expanding burn care infrastructure, survivor rehabilitation support, and long-term recovery systems, which remain under-resourced in many parts of the country.

## Purpose of this Report

This report seeks to scan the fire safety landscape from a community impact perspective. It aims to contribute to informed dialogue, evidence-based policymaking, and practical action. Fire safety is not solely a regulatory or technical issue – it is a public safety priority that requires sustained commitment from government, industry, institutions, and citizens alike.

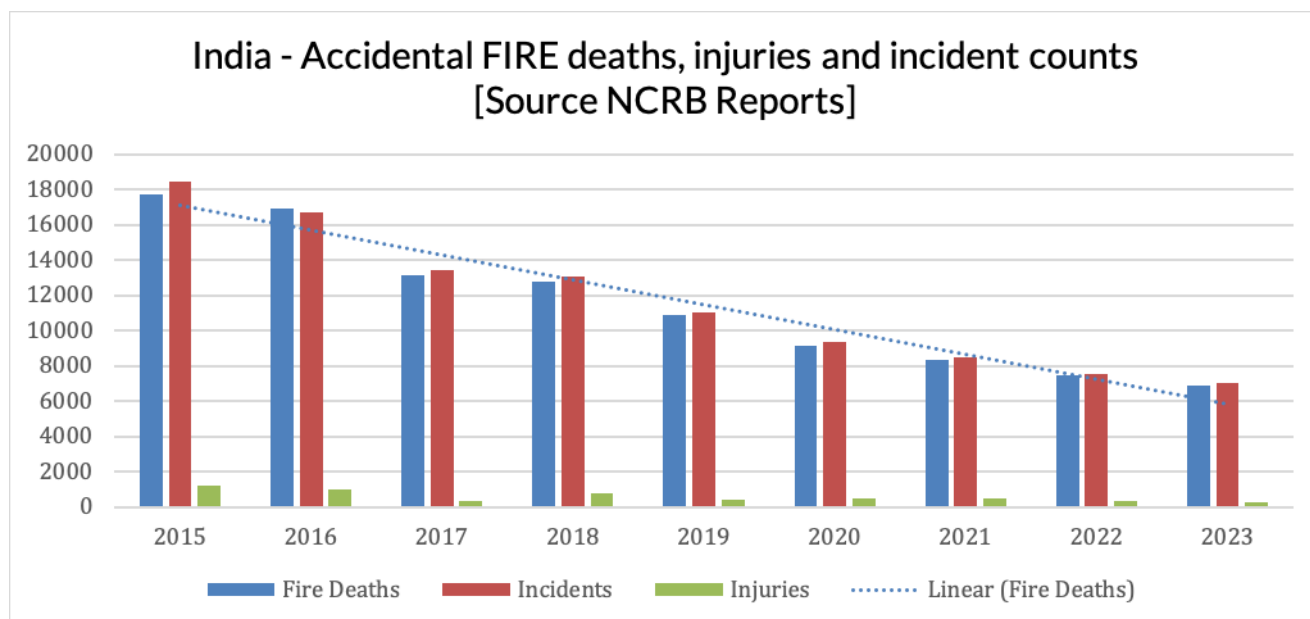
By combining data, expert perspectives, institutional insights, and citizen awareness findings, this report aims to support a stronger national conversation on fire safety and encourage measurable improvements in preparedness, accountability, and resilience across India.

# Fire Safety Statistics


The 2023 NCRB Report has now been made available in mid 2025, and presents an opportunity to see if there any new observations that stick out. This section delves into statistical data on fire incidents, explores regional and sectoral variations, and examines the key causes contributing to fire-related accidents in the country.




## A. The trend of deaths, incidents and injuries



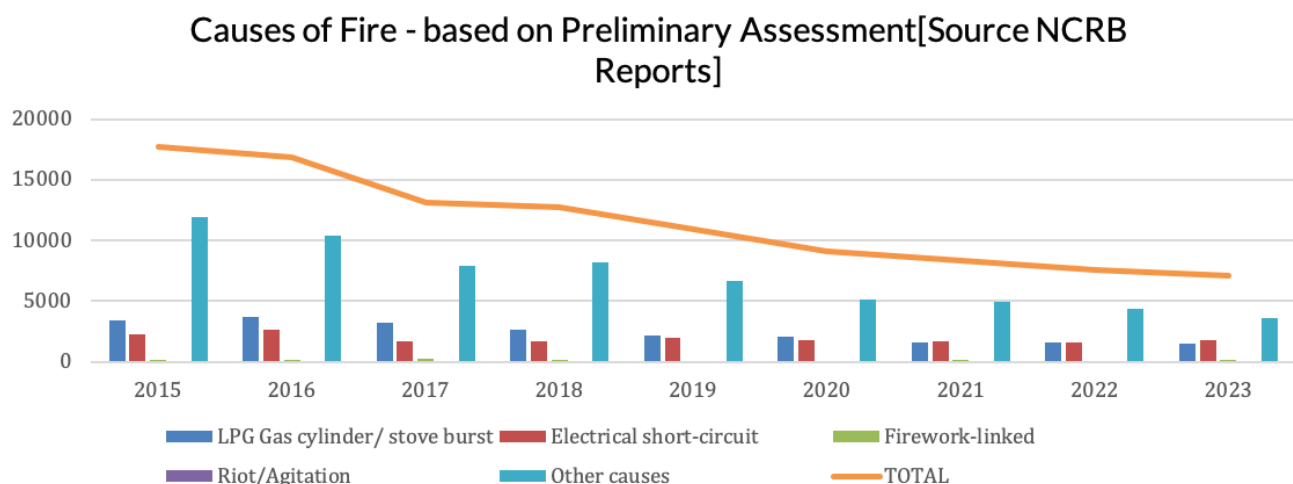
## Comments:

 According to the NCRB report 2023, the number of fire accidents continue to show a decline year-on-year as in previous years. Between 2017 and 2023, the number of deaths due to fire incidents has almost halved. The number of incidents and injury numbers are also declining in a comparable manner.


 As observed in the 2025 report of BEYOND CARLTON, while the trend of Total Deaths and Deaths due to Road Accidents has been on the increase between 2015 and 2023, in the case of Fire Accidents, the death numbers are showing a very significant decline. As stated earlier, while this is good news on the face of it, there is a clear need to double check on the data collection process as well as assumptions made.

## B. The preliminary assessment of the ‘causes of fire’ - indications


	2016	2017	2018	2019	2020	2021	2022	2023
LPG Gas cylinder/ stove burst	3714	3226	2681	2143	2043	1585	1551	1533
Electrical short-circuit	2626	1736	1719	1990	1812	1657	1567	1780
Firework-linked	174	227	185	105	75	148	90	121
Riot/Agitation	1	15	14	5	19	2	7	5
Other causes	10385	7955	8149	6675	5161	4956	4351	3615
TOTAL	16900	13159	12748	10918	9110	8348	7566	7054





## Comments:

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As we know very well, understanding the primary causes of fire accidents is essential for developing targeted prevention strategies. According to NCRB data, the top two causes of fire-related deaths in India continue to be:

  - Cooking Gas related and
  - Electrical short circuit
  
- 

As noted in the 2025 BEYOND CARLTON report, the deaths due to LPG Gas Cylinder continue to be at controlled levels, clearly indicating the correlation with efforts taken by the Gas Distribution Companies. The 1906 initiative seems to be an important contributor and needs closer scrutiny to study the effects on the field.
  
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However, electrical short-circuits as cause of fire are showing increasing trend and remain a major cause, highlighting the need for national-level safety practices and collaboration between fire safety departments and electricity providers.
  
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More than 50 % of the causes continue to be categorized as 'Other Causes'. This points to need for better forensic capabilities in investigating the causes.

## C. Location of incident – what does the available data say?

Location of Incident – Trends observed								
[Source NCRB Reports]								
Place where Fire started	2016	2017	2018	2019	2020	2021	2022	2023
Residential/ dwelling buildings	8478	7614	7208	6329	5248	4240	3979	3738
Commercial buildings	459	382	284	330	163	233	219	241
Factories - Others	168	216	177	177	107	67	88	75
Automobiles	369	277	438	152	326	194	86	146
Govt buildings	41	10	18	54	57	29	38	7
Factory/manufacturing incl combustible materials, crackers etc.	306	72	71	33	13	96	66	104
School buildings	19	3	7	28	5	3	1	5
Trains	6	8	9	7	5	1	1	0
Mines	28	26	14	2	0	7	2	6
Others	7026	4551	4522	3803	3186	3478	2955	2569
Total	16900	13159	12748	10915	9110	8348	7435	6891

## Distribution of deaths location wise in 2023



- Residential/ dwelling buildings
- Others
- Commercial buildings
- Automobiles
- Factory/manufacturing incl combustible materials, crackers etc.
- Factories - Others
- Govt buildings
- Mines
- School buildings
- Trains
- Total

## Comments:



A very significant percentage of fire incidents resulting in loss of life continue to occur in residential buildings, highlighting the need for great vigil and awareness creation.



With increased urbanization, construction of high-rise buildings, increased use of energy and higher population densities, the fire risk can only go up. Our preventive and response measures need to be suitably designed. Residential fire safety measures must be strengthened, including fire alarms, electrical maintenance, and public awareness campaigns.




It is to be highlighted that the automobile-related fires have swung back to much higher levels in 2023. Especially with increased use of Electric Vehicles of different types and all levels, we must prepare for fire risk emanation from EV. The charging and servicing infrastructure need codes and standards compliance and oversight apart from the vehicle and battery designs.




As observed last year, the statistics for Hospital Healthcare entities as well as schools needs separate tracking. India has been witnessing increased occurrence in Hospitals.

## D. Automotive / Vehicle / Train Fires

	Incidents	Injuries	Deaths
Trains	0	0	0
Automobiles - Bus Taxi Auto	41	1	40
Private Vehicles	84	8	62
Goods Carriers	46	1	44

 The NCRB Report provides some data on vehicle-related fires as above.


 With the increasing number of EVs on the road and with battery-related fires appearing in media frequently, it looks like the data capturing mechanisms need to be strengthened to better capture the status on the ground.

## E. States that contribute to the majority of fire-related deaths in India

2023		2021		2019		2018		2017	
Odisha	1032	Odisha	1248	MP	1467	MP	1986	Maharashtra	2230
Maharashtra	697	MP	1178	Maharashtra	1456	Maharashtra	1896	MP	1812
Tamil Nadu	616	Maharashtra	790	Odisha	971	Guj	1194	Guj	1314
MP	597	Chhattisgarh	702	Karnataka	854	Chhattisgarh	976	Kar	1007
Karnataka	466	Tamil Nadu	694	Gujarat	763	Odisha	897	TN	936







## Comments

 There has been a significant reduction in Fire-related deaths in the States of Maharashtra, Madhya Pradesh and Gujarat.

 Odisha has seen a reduction in fire related deaths though it is highest amongst the States.

## Conclusions

While fire-related deaths and incidents have declined as reported, we need to reconfirm the accuracy of data, data classification process and correlate data observed with action taken. Key areas requiring urgent attention include:

-  Strengthening fire forensics to improve cause identification and data accuracy.
-  Understanding Incidents in Critical Buildings – Eg Hospitals, Schools, Public Market areas – very closely and focusing efforts.
-  Enhancing residential fire safety with strict building codes and public awareness programs.
-  Addressing electrical fire hazards through better collaboration with electricity providers.
-  Developing gender-sensitive fire safety strategies targeting household fire prevention.
-  Ensuring safety in emerging areas, such as EV charging stations and high-rise buildings.

A robust fire safety framework, backed by accurate data and proactive policies, is essential to safeguarding lives and property in India's rapidly urbanizing landscape.

# Fire Accidents

## (February 2025 – January 2026)

Examples of fire accidents in the last 12 months which made the news have been listed below.



Date	Location & setting	What happened (short)	Reported casualties
January - 2026	Kolkata, West Bengal – Anandapur warehouse cluster (incl. food brand unit)	Prolonged recovery after a large warehouse fire; no valid fire clearance; DNA matching used to identify remains.	At least 21 dead; dozens initially missing.
December - 2025	Arpora, Goa – Birch by Romeo Lane nightclub	Midnight blaze during a party; early reports: cylinder/pyrotechnics; most deaths by asphyxiation; serious fire-safety lapses and narrow egress.	25 dead, ~50 injured
November - 2025	Bharuch, Gujarat – pharma unit (Saykha GIDC)	Boiler explosion; partial collapse; DoISH probe on licences/safety.	2 dead, ~20 injured
October - 2025	Jaipur, Rajasthan – SMS Hospital Neuro-ICU	Night fire (suspected short-circuit in store); thick smoke impeded evacuation of critical/comatose patients; special inquiry ordered.	≥6 deaths (some early reports up to 9).
October - 2025	Bus - Jaisalmer! Jodhpur (Rajasthan)	AC sleeper bus engulfed minutes after departure; early probe: suspected short-circuit; police said jammed main door trapped passengers; DNA identification undertaken.	~20-21 dead, 15-16 injured
October - 2025	Bus - Hyderabad! Bengaluru (near Kurnool, AP)	Collision with a motorcycle; front-origin fire spread rapidly; survivors reported locked/ jammed door, many broke windows to escape; DNA used for ID.	~19-20 dead, >20 rescued/injured
May - 2025	Hyderabad, Telangana – Gulzar Houz residential-cum-shops	Fire started on ground-floor jewellery/pearl shops; single, narrow staircase and wooden interiors trapped residents; multi-agency probe ordered.	17 dead incl. 8 children
April - 2025	Kolkata, West Bengal – Rituraj Hotel	Fierce hotel fire; defunct alarms, blocked exits and expired fire clearance; owner/manager arrested.	≥14 dead (range 14-15 in early reporting)
April - 2025	Deesa, Banaskantha (Gujarat) – illegal firecracker warehouse	Catastrophic aluminium powder dust explosion; godown flattened; owners arrested.	21 dead, 6 injured

## Observations



### **Asphyxiation and smoke management**

Across enclosed occupancies (hotel in Kolkata, Goa nightclub, Hyderabad old city home), asphyxiation from smoke—rather than burns—drove many fatalities; in Goa, the post mortems explicitly cited inhalation of asphyxiant gases. This underscores the primacy of early detection, compartmentation, smoke extraction, and maintained alarm/sprinkler systems.



### **Exit failure: jammed doors, single staircases, blocked passages**

High casualty counts often correlated with failures in exiting:

- Jaisalmer AC sleeper: main door jammed, bodies recovered in the aisle.
- Hyderabad Gulzar Houz: single, narrow staircase; no alternative escape; parked vehicles blocking access.



### **Electrical faults & legacy wiring**

Multiple incidents list electrical short circuit/overload as the likely ignition: Jaipur SMS ICU, Jaisalmer bus (suspected), and Hyderabad old city structure (ageing wiring, overloaded circuits, AC compressor involvement).



### **Bus safety & standards**

The pattern in AC sleepers remains stark: post impact fires, blocked/jammed exits, and rapid flame spread turn vehicles into “death traps”, prompting renewed enforcement calls.

# FIRE Safety

## Front and Center to Life Safety

By Prashant Kumar Thakur, IPS  
Director General of Fire & Emergency Services, Comman-  
dant General of Home Guards, and DG of Civil Defence,  
Karnataka



In modern day planning and safety thinking, FIRE can no longer be an incidental or subsidiary consideration. It needs to take on a more central dimension, even a more connected one, and bring in a multi-stakeholder, actionable perspective. This will enable governance, and operational solutions that have a wider, yet more focused lens.

Emerging fire risk in urban India is driven not by a single factor, but by the intersection of density, energy use, informality, climate stress, and human behaviour. A multiple stakeholder perspective, therefore, is essential to widen the safety net. Governance also needs to be addressed to distribute and strengthen accountability at multiple levels. Fire safety needs to become central to city planning and administration. It must move from being a departmental responsibility to a core governance function, embedded in how cities are designed, approved, built, and managed.

## Where do the dangers emerge?

Fires today are not only more frequent in certain settings, but also more complex, faster-spreading, and harder to control. Understanding these emerging risks is essential for shaping effective fire prevention and response strategies. The NCRB data consistently over the years points to the fire risk being highest where people live and work.

Residential buildings accounted for over 50 % of fatalities, while Commercial buildings were the second-deadliest site for fire deaths.



**Electrical fires** are now among the leading causes of urban fires in India. Increased appliance use, informal wiring modifications, ageing electrical infrastructure, and the rapid adoption of air-conditioning, rooftop solar, energy storage systems, and electric vehicles have outpaced safety upgrades. Overloaded circuits and incompatible systems introduce new ignition sources that traditional fire safety checks often fail to detect.

A large share of urban India consists of **informal settlements** and ageing buildings never designed for current occupancy or energy demands. Shared walls, combustible construction, unsafe cooking practices, and limited access for fire services allow small fires to escalate rapidly. Retrofitting these areas remains one of the greatest fire safety challenges.

Modern Indian cities **increasingly combine residential, commercial, storage, and parking** uses within the same structure. This mixing of fire loads and occupant profiles creates unpredictable fire behaviour and evacuation challenges. Basements, in particular, pose serious risks due to smoke accumulation, fuel storage, and limited ventilation.

**Rising ambient temperatures** and prolonged heat waves increase the likelihood of electrical faults and material degradation. Climate stress also strains power systems, leading to unsafe temporary connections. Fire risk must now be viewed as part of urban climate resilience, not a standalone hazard.

**Unsafe behaviour**—blocked exits, poor housekeeping, disabled alarms, and lack of evacuation awareness—remains a major contributor to fire fatalities. In many buildings, compliance exists on paper, but operational readiness and occupant behaviour are weak. The absence of a strong fire safety culture magnifies the impact of technical failures.

Fire services in Indian cities face **increasing call volumes, traffic congestion, and complex incidents**. Reliance on response alone is unsustainable. Emerging risks require early detection, risk-based prevention, and community preparedness, reducing dependence on post-incident heroics.

Addressing the above risk scenarios, will require moving beyond traditional firefighting to a preventive, risk-based, and community-centred fire safety system.



### *Embed Fire Risk into City Development Plans*

Currently, fire safety is usually treated as a building-level compliance issue, not a city-level risk. This needs a shift to ensure fire risk is explicitly included in City Master Plans, which will detail plans up to the zone and ward levels. These plans will help map fire risk hotspots (dense housing, high rise buildings, old areas, markets, informal settlements, hazardous industries etc). The plans would include - Fire station locations, Road widths and access routes, Water sources and hydrants, Refuge and evacuation spaces. Ideally, fire safety becomes a spatial planning variable, like transport and drainage.

### *Shift from Fire NOC to Fire Risk Governance*

Presently, fire NOCs are approvals focused on design, not on changing risk. Moving forward, approvals will be better served after completion of a Fire Risk Assessment (FRA), followed by a periodic risk re-certification. This could be done through a risk classification system for buildings, and then prioritise enforcement on high-risk occupancies, and in addition, link occupancy permits to operational fire safety. This enables a continuous vigilance function.

### *Integrate Fire Services into the city planning process, and the urban infrastructure systems*

The city's safety will be better served if we transition the role of the Fire services from responders to risk advisors. Development approvals, infrastructure planning, transport and utility design, and resilience planning should have the active inputs from the fire services. Fire safety has to become part of the core urban infrastructure, not an add-on.

The dependency of fire safety on roads, water, power, and digital systems is well established. Planning actions will need to follow:

- Fire access routes as protected infrastructure
- Dedicated water networks for firefighting
- Smart hydrant mapping
- Backup power for alarms and lifts



## *Broaden the safety ecosystem to formally recognise the role of Communities in Fire Safety Governance*

Fire safety must be seen as citizen facing governance, not only as a set of technical capacity building, and response mechanism. This can be achieved through Ward-level fire safety plans, Resident fire wardens, Building safety committees, Annual evacuation drills, School fire safety education, and so on.

## *Use Data & Technology for Fire Risk Governance*

The need for accurate data is the big shift to prioritise actions for safety. This will ensure Fire safety becomes measurable and visible to administrators. Areas that will prove to be greatly useful include - City fire risk dashboards, GIS-based risk mapping, Integrated emergency command centres etc. These will provide Predictive prevention

- Smarter inspections
- Faster response
- Transparent accountability

## *Finance Fire Safety as Urban Resilience*

Fire safety becomes a planned budget line, not emergency spending. Fire safety must be funded like roads or drainage.

An alignment with these areas could help ensure that Fire safety becomes a planned budget line, not emergency spending.

- Smart Cities Mission
- AMRUT
- 15th Finance Commission grants
- Climate resilience funding
- PPPs and insurance incentives

## *Culture Shift: From Compliance to Safety Outcomes*

The mindset change that needs attention is to create a shift from 'certification' to 'neighbourhood safety'. From "Is the certificate in place?" to "Is this neighbourhood safe in a fire?" This will need to ensure systems are regularly tested, evacuation practice, maintenance of equipment, and learning from fire incidents.



## Strengthening the Operational Perspective

### *Shift from Reactive Response to Risk-Based Prevention*

Fire Risk Mapping is a critical need to review and act on data that uses GIS systems to map --High-risk neighbourhoods, High-rise clusters, Markets and industrial pockets and Informal settlements. This will enable priority inspections and resources based on risk level, not random checks.

### *Mandatory Fire Risk Assessments (FRA)*

A periodic FRA must be seen as essential for - Residential high-rises, Hospitals, malls, schools, Data centres & EV charging hubs. The conventional Fire NOC must be linked with continuous compliance.

### *Integrate Fire Safety into Urban Planning & Building Design*

Fire-safe zoning will become a standard operating procedure to ensure - Fire access roads, Setbacks for engines, and Fire water supply

### *Climate-resilient design*

Design standards must constantly evolve to mandate use of - Heat-resistant materials, Smoke management systems, and Fire-separated basements and EV parking areas.

### *Retrofit old buildings*

The need to secure old buildings is increasing, especially to retrofit to prioritise wiring upgrades, fire escapes, alarm systems, and compartmentation

### *Tackle Electrical & Energy-Related Fire Risks*

The emerging risks of - EV charging stations, Rooftop solar, Data centres, Overloaded grids, Lithium-ion batteries – is intensifying. Swift and deliberate actions are required to create Electrical fire codes for EV & solar, Fire-rated battery storage rooms, conduct Regular electrical audits, and train firefighters for new hazards.



### *Strengthen Fire Service Capacity with Technology*

Smart detection and early warning is key to strengthening the operational focus areas. The use of - IoT smoke & heat sensors in: Markets, Slums, Basements, Public buildings, needs to be mandated. A direct linkage to 112/command centres needs to be integrated.

Smart firefighting tools like Drones for situational awareness, Thermal cameras, GPS-enabled fire engines, AI-based dispatch optimisation must be adopted.

### *Build Community-Based Fire Preparedness*

The widest base of response – in a distributed geographical manner comes from the community. This must be wisely leveraged – through Volunteer fire wardens, Ward-level fire safety plans, Familiarisation with local evacuation routes and Safe Assembly Points.

School and workplace drills must be calendarized, such that a regular cadence and culture of fire safety is built via: Annual evacuation exercises, Fire safety curriculum, and Resident welfare association training. Public awareness quotient needs to increase especially on: Electrical safety, Cooking safety, Festival fire hazards, High-rise evacuation.

### *Focus on Informal & Vulnerable Settlements*

High risk mitigation needs to be addressed in these areas where Congestion, Flammable materials, Unsafe wiring and Narrow lanes. Use of community hydrants, low-cost smoke alarms, safe cooking zones, and building a cadre of local fire safety volunteers is indicated.

### *Improve Governance, Data & Accountability*

It is timely to build a Unified fire safety data system that links - Fire department records, Hospital burn data, and NCRB statistics. This could be published as an annual city fire safety report. Third-party audits are now becoming invaluable as independent fire safety audits for high-risk buildings, and strengthening the impact via public disclosure of compliance status.



## *Prepare for Climate-Driven Fire Risk*

The emerging drivers of risk include, heatwaves, drought, power surges and urban heat islands. These might be defused through use of seasonal fire preparedness plans, heat-fire early warning systems, vegetation management and backup power for alarms and pumps.

## *Build a Culture of Fire Safety*

Celebrating the ecosystem of vigilant systems is key to strengthening the culture of fire safety. This may be done by making fire safety as part of civic identity, dedicating and Annual Fire Safety Week, designing Awards for safe buildings, building transparent Media partnerships, and acknowledging ownership for fire safety from city leaders.

## **In Conclusion**

Emerging fire risks pose an imminent danger to safety in city life, work and mobility. It's clear that FIRE must take a place - front and centre - to a city's life safety index. The mission to drive solutions, is to see the interconnected nature of the problem. Governance, and operational dimensions offer both immediate and medium-long term actions, that will enable a greater assurance of life safety.

It will indeed be a great sense of accomplishment to achieve the vision of a fire-safe city, where every planning decision considers fire risk, every building manages its safety daily, and every community knows how to act before firefighters arrive.

# Fire Safety Awareness

## Survey Insights

*Survey Coordinated by the BEYOND CARLTON Youth Executive Council, and anchored by Tapaswini Varshneya*

A nationwide awareness survey conducted by the BEYOND CARLTON Youth Executive Council revealed important behavioral insights into fire safety perceptions and preparedness.



### Methodology & Scope

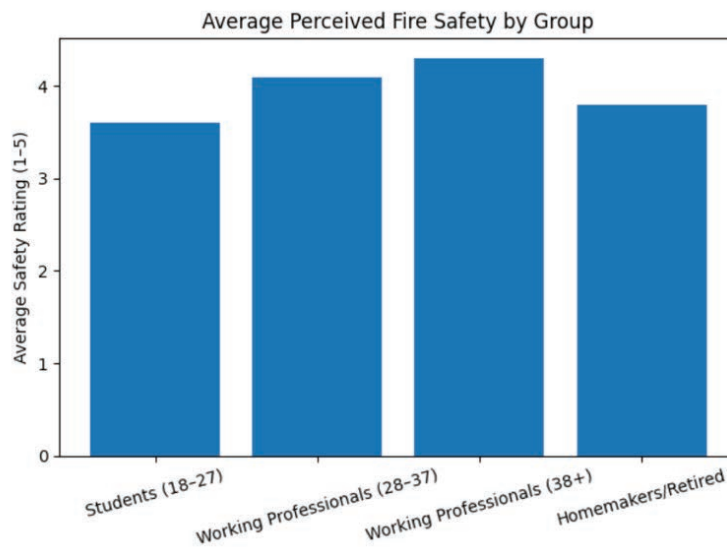
The survey received approximately 200 responses from individuals across multiple Indian cities. The questionnaire covered perceived safety, knowledge of fire safety practices, access to safety infrastructure, emergency response awareness, and lived experiences of fire incidents. While the sample is urban-skewed and not statistically representative of the Indian population, the consistency of responses across demographics allows for identification of strong early trends. This report treats the findings as directional indicators rather than absolute measures.

### Demographic Analysis

Respondents were grouped into four broad categories: students (18–22), young adults and early-career professionals (23–27), working professionals (28–37 and 38+), and homemakers/retired individuals. Students largely reside in hostels, PGs, or rented accommodation, limiting their control over infrastructure. Older working professionals and homeowners reported higher confidence levels, likely linked to perceived control and stability rather than verified preparedness.

## Perceived Safety versus Actual Preparedness

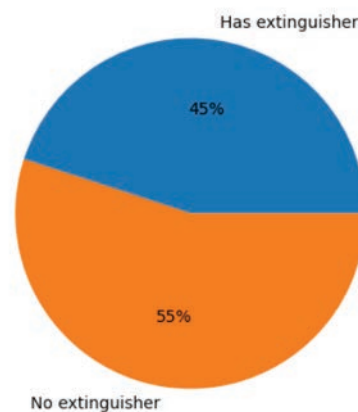
A clear trend emerges where perceived safety increases with age. Working professionals aged 38+ reported the highest safety ratings, while students reported the lowest. However, deeper analysis shows that high perceived safety does not correspond with robust preparedness. Many respondents who rated their safety as ‘high’ lacked basic safeguards such as Fire extinguishers, evacuation plans, or regular drills. This mismatch indicates a systemic issue of false confidence.



## Infrastructure & Equipment Gaps

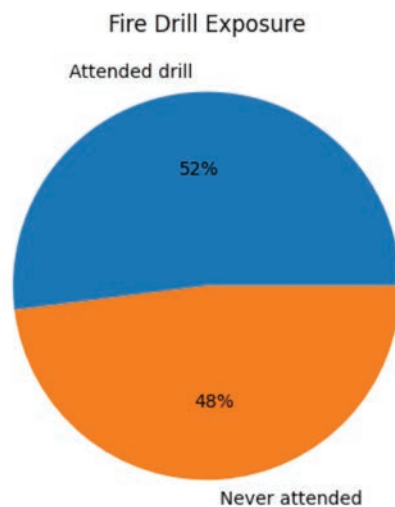
Fire extinguisher availability at home emerged as one of the most critical gaps. Over half of respondents reported not owning a fire extinguisher. Even among those who did, many had never checked expiry dates or were unsure of correct usage. This indicates that awareness campaigns alone are insufficient; barriers such as cost perceptions, lack of guidance, and diffusion of responsibility to landlords or housing societies play a major role.

Fire Extinguisher Availability at Home



## Training, Drills & Behavioural Readiness

Nearly half of respondents have never participated in a fire drill. Where drills were reported, they were overwhelmingly workplace-based, with minimal exposure at the residential or community level. Importantly, several respondents who had attended drills expressed uncertainty about their ability to respond effectively in a real fire. This suggests that drills are either infrequent, overly procedural, or insufficiently contextualised to real-life scenarios.



## Knowledge Gaps & Misconceptions

The survey revealed widespread misconceptions regarding fire behaviour and response. These included incorrect beliefs about the chemistry of fire, inappropriate first-response actions such as opening windows indiscriminately, and confusion around emergency contact numbers. Such misconceptions are particularly dangerous because they coexist with high confidence, increasing the risk of incorrect action during emergencies.

## Age & Profession-Based Risk Patterns

Students and young adults demonstrate lower preparedness but higher willingness to learn and engage. Working professionals show moderate to high confidence but inconsistent follow-through on safety practices. Homemakers and retirees express concern and interest in training but often lack access to structured learning. These patterns suggest the need for differentiated interventions rather than a one-size-fits-all approach.



## Lived Experience and Its Limits

A significant proportion of respondents reported having witnessed a fire incident, ranging from minor kitchen fires to large-scale building fires. However, prior exposure did not reliably translate into improved preparedness. In many cases, effective response depended on the presence of a trained individual rather than collective readiness.

## Implications for Fire Safety Awareness Initiatives

The findings strongly indicate that the impact of Fire Safety Initiatives will be maximised by shifting focus from general awareness to behaviour change and preparedness. Residential spaces must be prioritised, youth must be positioned as safety multipliers, and training must be practical, repetitive, and locally contextual. This approach offers a robust way to prevent tragedies through early, actionable intervention.

## Conclusion

This survey provides a clear early-warning signal: fire safety in India suffers not from lack of concern, but from fragmented responsibility and insufficient preparedness. With targeted, data-led strategies, BEYOND CARLTON is uniquely positioned to bridge this gap and drive meaningful, life-saving change at the community level.

# Modern Fire Safety

## Challenges in India: An Overview

By Dr. Praveen Vijayan  
Assistant Professor, Fire and Combustion Research Center,  
Jain Deemed- to-be University, Bengaluru). Professional  
member, Society of Fire Protection Engineers (SFPE).



In recent years, India has witnessed a disturbing series of fires in buses, high-rise apartments, hospitals, nightclubs, and basement parking areas. These are often described as tragic accidents, but one must ask the uncomfortable question: are these fires becoming more lethal because our buildings, materials, and energy systems have fundamentally changed - while our fire safety thinking has not?

India is getting urbanized at an unprecedented pace. Cities are growing vertically. Our homes are filling up with new materials and new energy sources. Herein, some modern fire safety challenges are presented. Focus is on the interior and exterior of the buildings, vehicles, especially EVs.

### Changing Interiors

The effort here is to examine whether the fire risk of our built environments has gone up or not. Risk, in this context, may be viewed as the product of probability and severity (consequence). That is:

Risk= probability x consequence

Even if ignition frequency remains unchanged, overall risk increases if the severity of fire consequences increases. In buildings, this severity is closely linked to fire load density and to the combustion characteristics of modern materials, particularly their heat release rate and smoke and toxic gas yields. Higher concentrations of such fuels within the same space therefore shift the risk profile primarily by amplifying the consequence term, leading to faster fire growth and earlier loss of tenability.

In our living spaces, we can assess the fire risk by knowing the nature of the articles inside. Recent fire load surveys indicate that combustible content per unit area in modern apartments has roughly doubled in the last 30 years, substantially increasing the potential energy release and severity of fires compared to past decades [1]. It is interesting to see the research insights published by UL research institute in this regard. They conducted a series of fire tests with conventional and modern interiors and found that the time to flashover (sudden transition representing the shift of the room to completely involved in fire), which is a critical fire safety indicator, is considerably less for modern interiors with synthetic material. When fire researchers refer to 'synthetic materials' in modern homes, they mean polyurethane foams in sofas and mattresses, engineered wood products like MDF and plywood bonded with resins, plastic laminates and wall panels, polymer-based textiles, such as polyester curtains and carpets, and the plastic-rich components of modern electronics and batteries. See Fig. 1



Fig.1 (a1) interior furnished with natural material, (b1) interior furnished with synthetic material after 1 minute of ignition, (a2) and (b2) represent the same rooms after 4.5 minutes of ignition (Source: UL FSRI website [2]).

The Fig. 1 illustrates the disastrous effect synthetic materials can bring about. Fig. (b2) represents a flashover. The study shows that the room with synthetic materials goes to flashover in ~ 4 minutes while the room with natural materials takes more than 30 minutes. Flashover is indicative of the worst, and well before flashover evacuation is to be carried out. The evacuation time is much less in case of a room with synthetic material. One can see untenable conditions established in the room within around 2 minutes.

In the Indian interior landscape, the increased use of synthetic material is observed. One may see the new items of furniture in living rooms, bed rooms and notice how the fire load is changing. To put it in perspective of the increase in the use of synthetic materials, this data is pertinent – The PU foam market in India is growing at a CAGR of 6.1% [3], the MDF market is growing at a CAGR of 7.3% [4]. Indian interiors are changing. See Fig. 2.

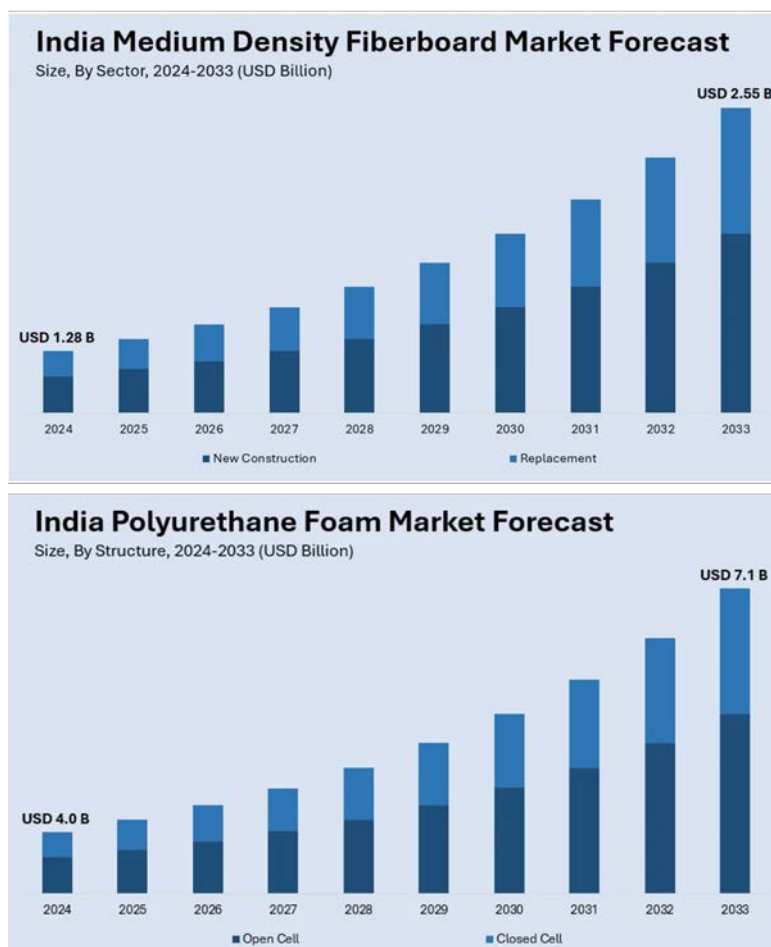


Fig.2 sales forecast of PU foam and MDF given by imarc website (www.imarcgroup.com, [3,4])

One may conclude that the time of fire evacuation is shrinking in Indian interiors even as the synthetic material content increases in Indian structure interiors.

## Changing Exteriors

### *Facades or claddings*

In India, the exterior of buildings is increasingly being transformed by the widespread use of glass façades, aluminium composite panels (ACP), decorative cladding systems, external insulation, and ventilated façade assemblies, particularly in high-rise residential, commercial, and mixed-use buildings [5]. These systems are dear to architects and developers, because they enhance speed of construction, modern appearance, and thermal or weather performance. However, from a fire safety perspective, they also change the way fire can spread, once it breaks out of a window or balcony. If façade systems contain combustible components or non-fire stopped cavities, they can create a continuous external fuel path that allows flames to travel vertically and laterally along the building exterior, bypassing internal compartmentation [6].

Unlike some countries that have introduced strict post-Grenfell (Grenfell tower fire in UK, 2017) restrictions on combustible façade materials, India does not yet have a uniformly enforced, performance-based façade fire testing and approval framework for high-rise buildings. While the National Building Code of India (NBC 2016) recognises the importance of material fire performance, in practice, façade material selection is often driven more by aesthetics, cost, and constructability than by full-scale fire performance of the complete façade system. Aluminium composite panels with different types of cores (including polymer-based cores), external insulation systems, decorative laminates, and polymer-based weatherproofing layers are already present in parts of the Indian building stock, but the actual fire behaviour of these assemblies in the installed condition is rarely evaluated at system level [7].

The Indian urban context introduces additional risk multipliers. High-rise buildings are often closely spaced, increasing the possibility of external fire spread from one building to another. Many façades include openable windows, balconies with combustible contents, air-conditioning outdoor units, and service penetrations, all of which can act as points where an internal fire can break out and impinge directly on the external wall. Once flames reach a façade system that can sustain or transmit fire, multi-floor involvement can occur far faster than what is assumed in conventional fire safety planning, which still largely treats façades as fire-inert boundaries.

## PV Rooftops

The rooftop solar PV systems (solar panels) have become popular in Indian cities, and it has brought with it a new class of fire interaction risks. PV arrays consist of polymer-rich modules, DC cabling, and power electronics that can be ignition sources if electrical faults occur, and the module materials themselves can contribute fuel to a roof fire. International incident data and experimental studies on PV fire behaviour suggest that rooftop PV, while not the most frequent fire source, cannot be ignored in integrated fire safety planning [8]. Moreover, because PV systems can remain electrically live in daylight, they present additional hazards for firefighting access and isolation. At present, Indian fire and electrical codes focus primarily on electrical compliance, leaving fire performance assessment of rooftop PV systems an area where clearer guidelines and integration with building fire safety are yet to pick up momentum. Research data show India should not overlook the increasing risks from the rooftops [8].

## Vehicles: EVs and beyond

India is witnessing a surge in the Electric Vehicle (EV) usage. EV fire management, or rather the battery fire management is a global challenge. The Fire community is perplexed about offering solutions. The data does not suggest that EV fires happen on a greater scale, compared with ICEV (Internal Combustion Engine Vehicles) fires, but the question is about the preparedness.

During a recent electrical safety audit in a residential apartment complex observed by the author in Bengaluru, the following issues were noted regarding EV charging points:

- Individual EV owners had drawn long, improvised power cables to their parking slots.
- Charging points were installed without a clear, standardised fire safety or electrical safety framework.
- There was no shared understanding among residents, facility managers, or even service providers about what constitutes a compliant or safe installation.

Even the electricity supply authority pointed out that parking areas are often technically outside the originally sanctioned electrical distribution zones of the building, creating regulatory ambiguity. But simply disconnecting such points does not solve the underlying issue. If India is seriously envisioning a future with millions of electric vehicles, we must answer the question: how are our apartment buildings and our regulations set up for this transition?

*The Basement Problem: High Consequence, Low Preparedness*

Basements in modern buildings combine several features that make fires in these spaces particularly dangerous. They are typically poorly ventilated, allowing smoke and hot gases to accumulate rapidly, while also being difficult for firefighters to access and operate effectively. Presence of EVs adds more uncertainty in this context. EV fires (Li- ion battery fire) are considered more toxic, primarily due to the release of fluoride compounds and the fire behaviour is unique. The battery fire can produce a jet fire, by which fire propagation may happen faster [9].

See the Fig.3 below.

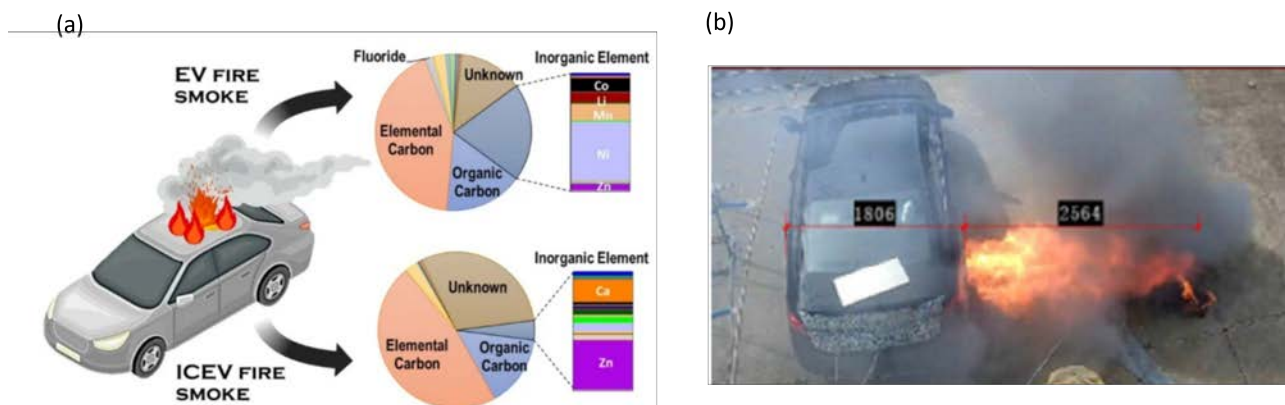


Fig. 3 (a) comparison of the emissions from EVs and ICEVs [10], (b) EV fire extending as a jet fire[9].

Most existing basement designs and fire safety strategies were developed for conventional vehicle fires and were never conceived with battery-dominated fire scenarios in mind, creating a serious and growing gap between design assumptions and present-day risk.

## Summary and Way Forward

It's time to consider urgently, the potential dangers of modern fire risks India. Brief discussions on some of the burning research areas are - how the building interiors and exteriors are changing and how EVs pose greater risk.

Enlisted here are key forward looking perspectives:

### **Material Selection: Treat Fire Load as a Design Variable**

Synthetic-rich interiors are reducing flashover time and available safe egress time, making material selection a critical fire safety decision, rather than merely an aesthetic or cost-driven one. In modern buildings, upholstery, wall and ceiling linings, false ceilings, curtains, carpets, and decorative panels together define the fire load and early fire growth rate of a compartment. Architects and builders must therefore explicitly consider fire load density, heat release rate, smoke production, and toxicity while selecting these materials.

As a general principle, the higher the fire load and faster the fire growth potential, the greater must be the investment in early detection, suppression, and smoke control systems. Particular attention must be paid to escape routes and refuge areas, where combustible linings and furnishings can rapidly compromise tenability. In most fatal fires, casualties occur not because of direct flame contact, but because smoke obscuration and toxic gases incapacitate occupants and prevent escape.

Similarly, façade systems and claddings can enable rapid external fire spread if they contain combustible components or poorly detailed cavities. This risk is now well recognised internationally, and large-scale audits and remediation programs are required for existing buildings with potentially hazardous façade systems [11]. In new construction, façade design must be treated as part of the fire containment strategy, not merely as an architectural skin.

### **Passive Fire Protection: The Backbone of Life Safety**

Passive Fire Protection (PFP) systems — including compartmentation, fire stopping, and fire-rated assemblies — must be treated as core life-safety systems, not as secondary construction details. A robust fire safety strategy cannot rely primarily on active systems, such as sprinklers and detection alone, because these systems can fail, be disabled, or be poorly maintained.

Passive systems buy time, and in fires, time is the most valuable life-saving resource. The primary objective is not to 'fight the fire', but to preserve tenable conditions long enough for safe evacuation. This includes:

- Fire-rated walls and floors to maintain compartmentation
- Fire-rated doors and shutters
- Fire stopping of service penetrations
- Protected shafts and staircases

In many real fires, the failure of fire stopping and compartmentation is what allows smoke to spread building-wide, turning a local fire into a mass-casualty event.

A fire safety rating or public disclosure system, similar to energy star ratings, could significantly improve awareness, market pressure, and accountability in both residential and commercial buildings.

## **Rooftop PV Systems: Integrate Them into Fire Safety Strategy**

International best-practice guidelines, such as those issued by the Italian National Fire Services, make it clear that rooftop PV systems must be treated as fire-relevant building infrastructure, not merely as electrical installations. Key measures include:

- Maintain a minimum 1-meter clearance between PV modules and skylights, domes, or other SHVS (Smoke and Heat Venting Systems) components to prevent fire spread between the building interior and the PV system, and across fire compartments.
- Ensuring compatibility between the fire performance of the roof and the PV modules -either by using fire-rated modules, installing PV only on non-combustible roofs, or providing a fire-resisting layer (e.g., EI 30) beneath the system.
- Providing safe access and adequate structural capacity for maintenance and fire-fighting
- Installing emergency electrical shutdown at the building entry point

At the same time, PV systems must generally be assumed to remain energised during daylight hours, which has important implications for firefighting tactics and safety. Together, these requirements show that PV installations must be fully integrated into the building's fire safety strategy, not treated as add-on equipment [12].

## Regulations and Learning from Fires

The growing presence of EVs, batteries, rooftop PV systems, and dense electrical infrastructure makes regular and mandatory fire safety audits, especially of electrical and energy systems, essential. India also needs institutionalised, technically rigorous fire investigation mechanisms, so that major fires may lead to systematic improvements in codes, standards, and practice, rather than being forgotten once media attention fades.

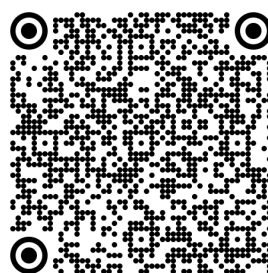
Clear and technically grounded guidelines must also be developed and disseminated by agencies, such as electricity supply companies and local authorities for the safe installation of EV charging points and rooftop PV systems in residential and commercial buildings.

## Education and Capacity Building: The Foundation of Sustainable Safety

Fire safety must be treated as an engineering discipline, not merely as a regulatory formality. Architects, engineers, and planners should work closely with fire safety professionals from the design stage onward, rather than treating fire safety as a late-stage approval requirement. Besides, the investment on fire safety research must be higher.

The deliberate focus here has been on only a few representative emerging risks, but many other equally critical areas remain outside its scope, including fire suppression effectiveness, firefighting strategies, and emergency response capacity. The Indian built environment also faces systemic challenges- including weak enforcement, fragmented regulation, and governance and compliance issues that require serious and sustained attention. Fire safety is still, too often, treated as a secondary concern rather than a fundamental design and operational requirement. The Grenfell Tower disaster is a stark reminder of where this mindset can lead: in that case, decisions which prioritized appearance and marginal cost savings over safety contributed to a catastrophe that claimed 72 lives and left hundreds traumatized for life.

References:



# Conclusion

Sixteen years after the Carlton Towers fire, the central lesson remains unchanged: fires do not become tragedies because of a single failure, but because multiple weaknesses converge – in design, enforcement, preparedness, and behaviour.

This report highlights a paradox. On paper, fire related deaths in India appear to be declining. On the ground, however, fires are increasingly occurring in environments that are harder to escape from, faster to fill with smoke, and more unforgiving of delay or error. Residential buildings, hospitals, buses, nightclubs, and mixed use structures continue to witness high fatality incidents, often marked by blocked exits, electrical failures, combustible interiors, and lack of operational readiness.



India's cities are changing faster than our fire safety mindset.

Synthetic materials, high rise living, electric vehicles, rooftop solar systems, and dense urban infrastructure have dramatically reduced the time available for safe evacuation. In such conditions, reliance on response alone is no longer sufficient. Fire safety must shift decisively toward prevention, early detection, and community preparedness.

The citizen awareness survey reinforces this urgency. It shows that concern about fire safety exists, but responsibility is fragmented. Many individuals assume safety without being prepared, and many buildings meet regulatory requirements without being operationally safe. This gap between compliance and real world readiness is where lives are lost.

True fire safety is not a certificate – it is a condition. It is reflected in how buildings are designed, how electrical systems are maintained, how exits are kept usable, how often people practice evacuation, and how quickly early warning systems function. It is also reflected in how cities plan infrastructure, how data is collected and analysed, and how accountability is enforced after every incident.

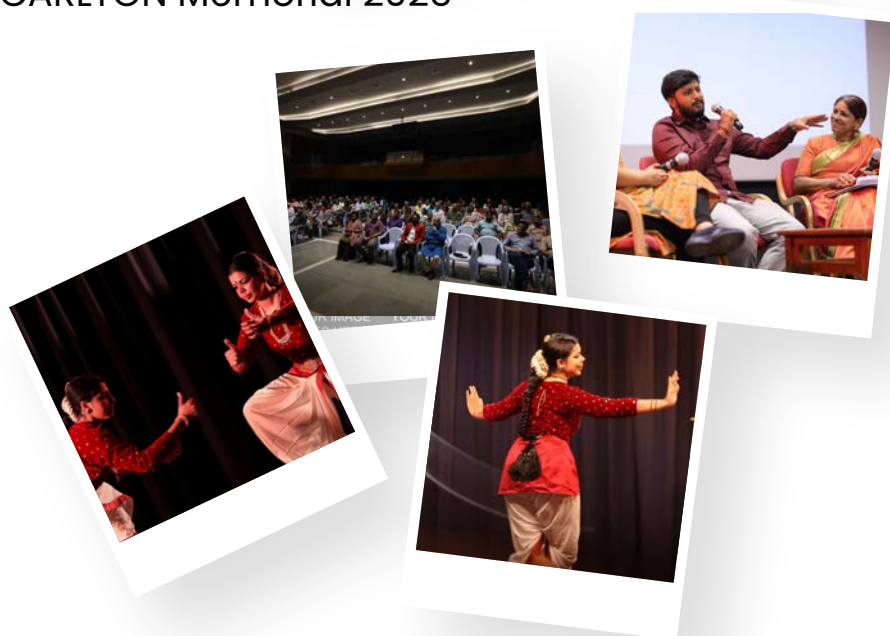
BEYOND CARLTON's role has always been to ensure that fire tragedies lead to learning, not amnesia. This report is not merely a reflection on the past year; it is a reminder that fire safety is an everyday responsibility – of governments, institutions, professionals, and citizens alike.

As India builds her future cities, fire safety must be treated as fundamental to life safety and urban resilience. The cost of inaction is measured not only in statistics, but in lives that could have been saved.

Burn Care, Prevention and Life Safety – In collaboration with Mahabodhi Burns Centre – a CSR Project with TD Power Systems. Influencing the Burn Care Ecosystem.



The BEYOND CARLTON Memorial 2025



Karnataka dedicated February 23rd annually as 'Fire Awareness and Prevention Day'. Initiated in memory of the 2010 Carlton Towers Fire by the State government following advocacy by BEYOND CARLTON.



The 6th Edition of BEYOND CARLTON's #FireSense101 Workshop for Estate Managers – in collaboration with Karnataka State Fire & Emergency Services, and Bangalore Apartments' Federation.



Recognition for the BEYOND CARLTON partnership towards #FireSense101, with Bangalore Apartments' Federation. At the BAF Annual General Body Meeting



#FireReadyBadge101 session at the Kingston High School, Bangalore. 100 students went through the Evacuation Drill, with 30 students from among them being trained as Fire Buddies(ERT) along with Teachers, and members from Security, Maintenance, Housekeeping.



The seventh edition of #FireSense101. Participation of 45 Estate Managers, and Management Committee members of Bangalore Apartments' Federation(BAF).



#FireReadyBadge101 session at the Hyderabad Public School





**ACT BEFORE THE FIRE**



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