

DISCUSSION PAPER

FIRE REGULATIONS AND URBAN HOUSING

A COMPARATIVE ANALYSIS

FIRE REGULATIONS AND URBAN HOUSING

A COMPARATIVE ANALYSIS

DISCUSSION PAPER

Centre for Public Policy Research
September 2026

Anu Maria Francis, Assistant Manager (Research and Project Management), CPPR
Dr D Dhanuraj, Chairman, CPPR

Layout & Design by
Sruthi.k

Published in September 2026

All rights reserved with:
Centre for Public Policy Research (CPPR)
First Floor, Mandoli House, New Link Road
Elamkulam, Kochi, Kerala, India-682020
www.cppr.in | E-mail: research@cppr.in

Distributed by Centre for Public Policy Research, Kochi

Copyright © Centre for Public Policy Research, Kochi

All rights reserved. This publication, or any part thereof, shall not be reproduced in any form whatsoever without permission in writing from the publisher. Views expressed by the authors are personal and need not reflect or represent the views of the Centre for Public Policy Research.

TABLE OF CONTENTS

1. Introduction - Context..	1
2. Methodology.....	2
3. What does the regulation say?.....	2
4. How do fire regulations interact with affordable housing?.....	5
4.1 Why do rules exist?.....	5
4.2 Regulatory approaches to fire safety.....	6
4.3 The economic cost of fire regulations.....	8
4.4 How fire regulations shape the housing stock.....	9
5. State-level variations in laws – Kerala, Tamil Nadu and Andhra Pradesh.....	11
5.1 Applicability of fire regulations in residential buildings.....	11
5.2 Threshold effects on building design.....	12
5.3 Specified capacity versus realised safety.....	12
6. International comparison.....	13
7. Institutional capacity of fire department in Kerala, Andhra Pradesh and Tamil Nadu....	14
7.1 Governance and funding of fire services.....	14
7.2 Equipment and modernisation gaps.....	16
7.3 Stations, personnel and response times.....	17
7.4 Capacity as the precondition for reform.....	18
8. Role of the private sector in fire safety.....	18
9. Key regulatory issues.....	20
10. Policy recommendations.....	22
11. Conclusion	25

LIST OF ABBREVIATIONS

ABCB	Australian Building Codes Board
AICTE	All India Council for Technical Education
ALARP	As Low As Reasonably Practicable
BIS	Bureau of Indian Standards
CAG	Comptroller and Auditor General of India
DGFSCDHG	Directorate General Fire Services, Civil Defence and Home Guards
DLUHC	Department for Levelling Up, Housing and Communities (UK)
FAR	Floor Area Ratio
FSI	Floor Space Index
G+4	Ground plus four floors
GeM	Government e-Marketplace
GIDM	Gujarat Institute of Disaster Management
G.O.Ms.	Government Order (Manuscript Series)
HSE	Health and Safety Executive (UK)
IBC	International Building Code (US)
IS	Indian Standard
KFRS	Kerala Fire and Rescue Services
KMBR	Kerala Municipality Building Rules
MBIE	Ministry of Business, Innovation and Employment (New Zealand)
MHA	Ministry of Home Affairs
NBC	National Building Code of India

NBCS	National Building Construction Standards
NCC	National Construction Code (Australia)
NCRB	National Crime Records Bureau
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Fund
NFPA	National Fire Protection Association (US)
NOC	No Objection Certificate
OECD	Organisation for Economic Co-operation and Development
PNV	Present Net Value
PPP	Public–Private Partnership
PTI	Press Trust of India
SCCR	Societal Capacity to Commit Resources
SCDF	Singapore Civil Defence Force
SFAC	Standing Fire Advisory Council
SP	Special Publication (BIS)
TCPD	Town and Country Planning Department, Kerala
TNCDBR	Tamil Nadu Combined Development and Building Rules
UK	United Kingdom
US	United States

1. Introduction - Context

India's urban population has increased, and cities such as Mumbai, Delhi, Bengaluru, Chennai and Hyderabad are now among the country's largest urban agglomerations by population. But, the Economic Survey 2025-26 argues that India's urban infrastructure development in terms of transport, housing, water, sanitation and governance capacity has not matched the scale and pace of urbanisation (Government of India, 2026). As per the 2011 Census, over 70 percent of the urban population was living in Class I cities, and 42.3 percent of the urban population was concentrated in 52 metropolitan cities with a population of more than one million (Government of India, 2026). These figures point to a need for more housing in, and around, well-established cities.

The urban population in India faces a shortage of about 9.4 million units of affordable housing, a figure projected to reach about 30 million units by 2030. The report identifies high land costs, inadequate urban infrastructure and cumbersome approval processes as some of the constraints affecting the expansion of affordable housing supply (Knight Frank India and NAREDCO, 2025).

With populations increasing, especially in cities where space is limited, a vertical approach has been common. However, high-rise buildings may pose particular difficulties for fire rescue and evacuation, particularly regarding access, evacuation and firefighting at higher elevations (Zhang et al., 2020). As the demand for vertical housing increases, so the need for specialised firefighting equipment, emergency access and technically capable fire-response systems grows.

Fire-safety standards are essential to protect occupants and prevent loss of life. Simultaneously, the building regulations need to be examined for their efficiency, execution and economic viability. The relevant policy question is therefore whether the regulatory architecture, while ensuring adequate fire-safety outcomes, creates an enabling environment for affordable housing by keeping compliance costs proportionate. The National Disaster Management Authority (NDMA, 2012) has emphasised the need to enhance the fire-safety preparedness, prevention, mitigation and response capacity in India.

Three developments make a review of fire-safety regulation timely. First, the standards themselves are changing. NBCS 2026 has raised the high-rise threshold from 15 m to 24 m, and Andhra Pradesh has already moved to 24 m, while Kerala still triggers the full fire regime at 15 m. States must now decide whether and how to adopt the new standard, and that decision should rest on evidence. Second, fire norms are not neutral to housing supply. Crossing a height threshold adds large fixed costs: water storage, pumps, a second staircase, fire lifts and non-saleable circulation space. These costs shape how tall buildings are, how many units a plot yields and what each unit costs. Third, prescriptive norms have not reliably delivered safety on the ground, as buildings with lapsed certificates and non-functional systems show. A regime that raises the cost of formal housing without assuring safety after occupation serves neither affordability nor safety.

In India, fire-safety norms are largely prescriptive, with mandatory requirements for individual elements such as fire stairs, firefighting systems, water storage, and other life-safety measures. But these requirements are effective only if well designed, maintained, inspected, and enforced and if

there is institutional capacity within the fire services. Therefore, the paper looks into the fire-safety regulations in India with special reference to Kerala, Andhra Pradesh and Tamil Nadu and analyses their implications on urban housing affordability and supply.

2. Methodology

This paper adopts a comparative legal and regulatory analysis of the fire-safety provisions governing residential buildings in Kerala, Tamil Nadu and Andhra Pradesh. It examines the text, structure and implementation of the relevant instruments: the National Building Code of India 2016 and the National Building Construction Standards 2026 (Part F), state building rules, and state fire-service legislation. Where relevant, it benchmarks these against the building codes of the United States, the United Kingdom, Singapore and Japan. The analysis draws on the institutional perspective that legal rules shape economic outcomes by structuring the conditions under which economic activity takes place (Pistor 2019). The paper therefore gives particular attention to how fire-safety thresholds affect development capacity, land intensity and the cost of urban housing. The analysis draws on secondary data on fire incidents and fire-service capacity from the National Crime Records Bureau, CAG audit reports and state government sources.

The documentary analysis is complemented by semi-structured interviews with builders and developers, government and planning officials, architects, fire-safety consultants and other professionals involved in the planning, approval and construction of urban housing. The interviews were used to understand how regulatory requirements are interpreted and implemented in practice, the practical and financial constraints they create, and how multiple requirements combine at the project level. The study does not estimate a statistically causal effect of any individual regulation on housing prices or supply. It aims to identify and document the regulatory mechanisms that plausibly constrain affordable housing production and to establish that regulation is a material and structured component of the housing-supply problem rather than its sole or quantitatively dominant cause. Regulatory reform is accordingly proposed as one part of a broader affordable-housing strategy that must also address land markets, infrastructure, finance, construction costs and household purchasing capacity.

3. What Does The Regulation Say?

The fire safety norms in India are governed by Part 4, "Fire and Life Safety", of the National Building Code of India (NBC), first published by the Bureau of Indian Standards (BIS) in 1970 and subsequently revised in 1983, 2005 and 2016. In 2026, BIS replaced the NBC with the National Building Construction Standards (NBCS 2026), under which fire safety is now dealt with in Part F, "Fire and Life Safety" (BIS 2026, SP 7:2026).

NBCS 2026 has clearly stated that the Code is voluntary and non-binding and takes effect only when state governments adopt it into their building rules. It acts as the central standard and provides guidelines regarding general construction requirements, maintenance, exit routes and fire safety of buildings. States adopt these standards in their respective state-specific rules.

Table 1 discusses the active and passive fire protection measures in the NBCS 2026. The code defines a “high-rise building” as any building with a height of 24 m or more. This is an important change from NBC 2016, which defined high-rise buildings as those 15 m or more in height. The change will affect compliance requirements in states that adopt the NBCS 2026 definition

The fire norms are automatically applicable for the high-rise buildings, with some state-level exceptions. The buildings are further classified based on their usage, such as Group A – that includes any building in which sleeping accommodation is provided for normal residential purposes with or without cooking or dining facilities or both. “Residential buildings” thus include lodging, private independent houses, dorms, apartments/flats, hotels, etc.

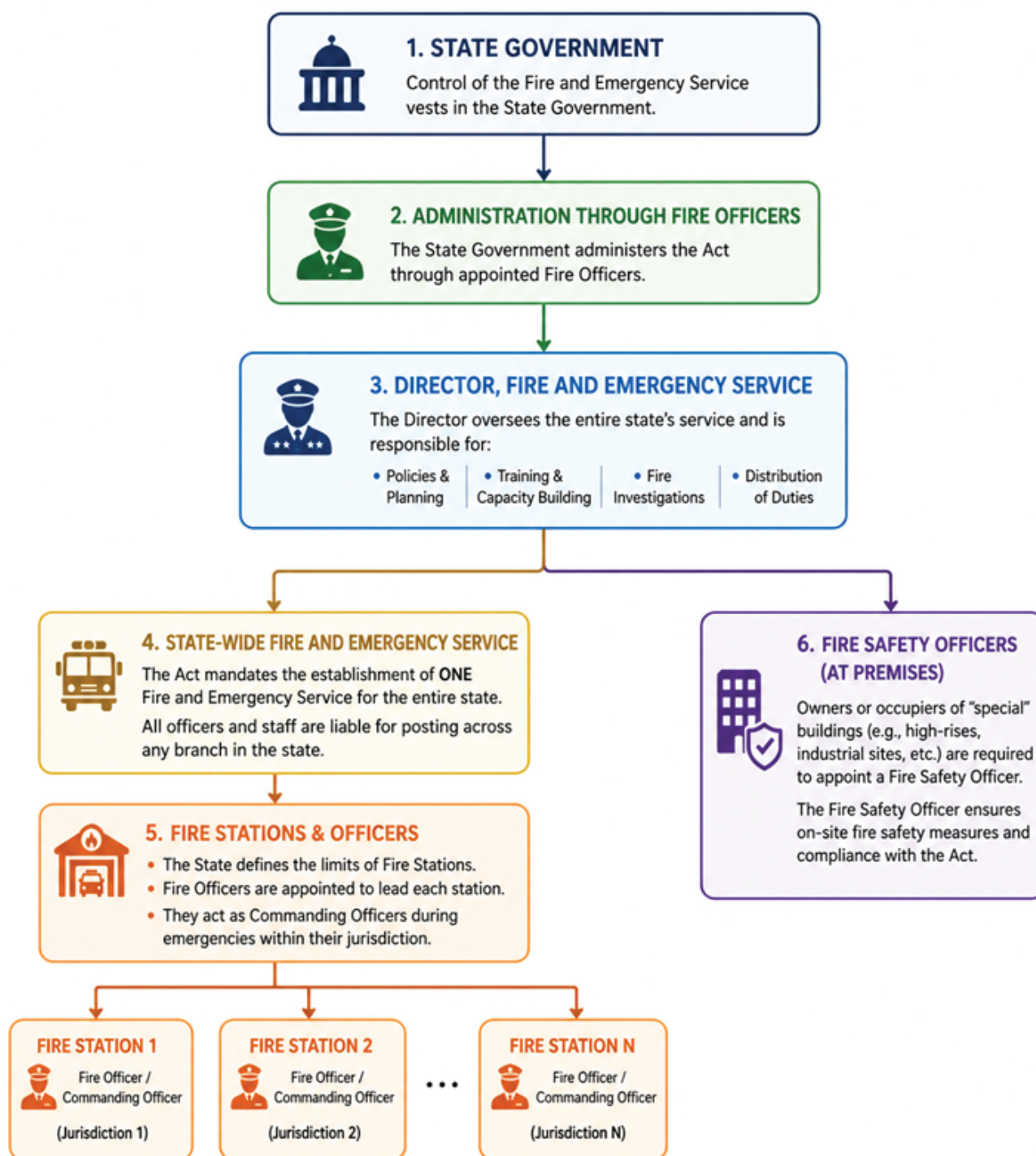
Table 1. NBCS 2026 Firefighting Installation Requirements for Apartment Houses (A-III)

Building height / floor area	Protection category	Fire extinguisher	First-aid hose reel	Down-comer	Wet riser	Yard hydrant	Automatic wet sprinkler	Automatic detection and alarm	Public address / voice evacuation
24–60 m; or below 24 m with 501–1,000 m ² on a floor	HL-2	Required	Required	Required	Not required	Not required	Not required	Not required	Not required
Below 24 m with 1,001 m ² and above on a floor	HL-3	Required	Required	Not required	Required	Required	Not required	Required	Required
Above 60 m	CL-4	Required	Required	Not required	Required	Required	Required	Required	Required

Source: NBCS 2026, Part F, Table 7A, apartment houses (A-III).

Apart from the NBC, the central government brought out a Model Fire Act in 2019 for the states. The Model Maintenance of Fire and Emergency Service for the State (2019) is designed to create a comprehensive framework for fire protection, life safety and other emergency services. The Act proposes to establish an institutional structure at the state level, as depicted in Figure 1.

Figure 1: Institutional Architecture prescribed under Model Fire Act 2019¹



Source: Developed by Author using AI Tools

¹ Flowchart image developed using AI

The Act provides significant authority to fire personnel to ensure effective emergency response and prevention.

1. **Emergency Powers:** During a fire or rescue, personnel can close streets, break into or pull down premises to gain access, and utilise any available water source (public or private).
2. **Enforcement of Order:** Members of the service have the power to disperse assemblies obstructing operations and can arrest individuals who wilfully hinder their work.
3. **Administrative Powers:** The Director has the power to seal buildings or premises deemed dangerous to life or property and can requisition equipment or property from other authorities or individuals for emergency use.
4. **Inspection:** Fire officers may enter and inspect buildings (with three hours' notice) to check for safety violations or enter immediately if a fire is suspected or an industry is in operation.

The Act mandates a “Fire Safety Certificate” under Section 24 in accordance with the state building rules and NBC for all multi-storeyed buildings above the high-rise threshold. Section 47 suggests that a fire tax be levied on land and buildings in the form of a surcharge on the building tax. This fire tax, as per the Model Act, will form part of the “Fire Prevention and Life Safety Fund” constituted under Section 51. The fund shall be utilised for community preparedness, training and procurement of firefighting equipment, etc., as decided by the state governments via rules. The Act also includes a detailed section on penalties for violations of various provisions. Despite the directions from the NDMA and central government, many states have not adopted the principles in the Model Act of 2019 and still follow the older fire Acts (Times of India 2022). The state's fire services are governed by state-level legislations. **In most states, NBC 2016 standards are adapted in the state rules.**

4. How Do Fire Regulations Interact With Affordable Housing?

4.1 Why do rules exist?

The Accidental Deaths and Suicides in India 2024 by the National Crime Record Bureau reports a total of 5,971 cases of fire accidents in 2024, showing a decrease of 15.4% as compared to 2023 (7,054 cases). It involved the death of 5888 persons. The place of occurrence-wise analysis of fire accidents revealed that 60.4% of total deaths (3,555 out of 5,888) were reported in residential/dwelling buildings during 2024. In the state-wise data, Tamil Nadu is one of the states with 81.9 percent of deaths caused by fire in residential or dwelling buildings. The above-mentioned data clearly states the need for regulations for ensuring the safety of residents in case of a fire accident. However, the question to be enquired is how are the rules implemented or enforced?

The NCRB data show that most fire deaths occur in homes, but not which homes. The category “residential/dwelling buildings” covers everything from century-old tenements to new apartment towers. It cannot tell us whether deaths occur in the buildings the high-rise regime regulates or in the far larger stock of low-rise, older, mixed-use and informal buildings below the thresholds. The evidence points to the latter: fire risk in low- and middle-income countries is strongly associated with informal and substandard housing (Twigg et al. 2017; Rush et al. 2020).

The Gulzar Houz fire in Hyderabad in May 2025, which killed 17 members of one family, including eight children, illustrates this. It occurred in a century-old, ground-plus-two building with shops below and homes above, whose only escape route was a single narrow staircase (News On AIR 2025; PTI 2025). None of the costly high-rise installations would have applied to it. What was missing were low-cost measures: a second exit, smoke detection and electrical safety.

If risk is concentrated in such buildings, a regime that places its costliest requirements on new formal buildings just above 15 m is regulating the wrong margin. It raises the cost of the safest new supply while leaving the most dangerous existing stock largely untouched. The case for revisiting fire regulation is not that safety matters less, but that regulatory effort does not match the distribution of risk. Even within the regulated stock, failures are often failures of maintenance and enforcement rather than of specification.

The fire at Atlantis Society, an 11-storey residential building in Rajkot, Gujarat, in March 2025 illustrates the consequences of lax compliance with fire-safety requirements. The fire broke out in the sixth-floor lobby, killing three visitors and injuring another person. The building had reportedly operated for nearly a decade without renewal of its Fire Safety Certificate, while its installed fire-riser system was non-functional because the motor required to pump water through the system was absent. The incident demonstrates that the effectiveness of fire-safety regulations depend not only on their incorporation into building approvals but also on their continued maintenance and enforcement after occupation (Dabhi 2025).

The laxity in compliance with fire safety norms could be due to either expensive regulations or weak enforcement resulting from poor institutional capacity. Costly regulations push informality. Agarwala and Mimani (2026) explicitly find that excessive regulatory costs and weak enforcement capacity are associated with unauthorised or illegal buildings and argue that non-compliance creates safety and hazard risks.

Therefore, fire-safety regulation should be proportionate to the risk involved. Regulatory requirements should increase with factors such as building height, occupant load, occupant vulnerability, floor area, fire load, evacuation complexity and accessibility for emergency services, rather than imposing uniformly stringent requirements across buildings with substantially different risk profiles. Where regulatory requirements impose substantial fixed costs irrespective of the level of risk, they can disproportionately increase the cost of smaller and lower-income housing (Patel, Byahut, and Bhatha 2018). The resulting increase in the cost of formal construction may create incentives for developers and households to circumvent regulations or remain outside the formal system. The relevant policy question is not whether fire-safety regulation should be stringent or relaxed, but whether the regulatory burden is calibrated to the risk being regulated and whether compliance is realistically achievable.

4.2 Regulatory approaches to fire safety

The international fire-safety literature on regulations broadly identifies three regulatory approaches: prescriptive, performance-based and hybrid (Meacham and Custer 1995; Hadjisophocleous, Benichou and Tamim 1998).

Prescriptive regulation specifies how a building must be made safe. It sets fixed design requirements, such as the number and width of staircases, maximum travel distances, fire-resistance ratings, tank volumes and the height at which sprinklers become mandatory. Its advantages are clarity, predictability and ease of enforcement: a fire officer can verify compliance against a checklist without specialised engineering expertise. Its weaknesses are rigidity and a poor link to actual risk. Because requirements are uniform, they can over-regulate low-risk buildings, under-regulate unusual ones, and discourage innovative design (Hadjisophocleous, Benichou and Tamim 1998). India's NBC 2016 Part 4 is a largely prescriptive code.

Performance-based regulation specifies safety objectives and permits designers to demonstrate compliance through alternative engineering solutions. Codes set objectives, such as allowing all occupants to evacuate before conditions become untenable, and the designer demonstrates compliance through fire engineering analysis, fire and smoke modelling, and evacuation simulation (Meacham and Custer 1995). This permits trade-offs, such as better compartmentation in place of a refuge floor, and allows new research and technologies to be incorporated as they develop. It also depends heavily on competent fire engineers, effective regulatory oversight and regulators capable of assessing complex analyses. Where such expertise is limited, greater discretion in performance-based design can create challenges for effective regulatory scrutiny (Spinardi, Bisby and Torero 2017). The UK experience illustrates the risk. Following the Grenfell Tower fire in London in 2017, the independent Hackitt Review found that the building-safety system was overly complex, lacked clarity regarding responsibilities, and was subject to inadequate regulatory oversight and enforcement. It recommended a less prescriptive, outcomes-based framework with clearer responsibilities, stronger accountability, and more robust regulatory oversight (Hackitt 2018).

Hybrid regulation is a combination of the two. For standard buildings there is a prescriptive “deemed-to-satisfy” route and for non-standard designs there is a performance-based alternative, provided the alternative is equivalent in terms of safety. The National Construction Code (NCC) in Australia provides compliance through either a Deemed-to-Satisfy Solution or a Performance Solution (ABCB 2022). The Building Code of New Zealand sets performance objectives that can be met by using Acceptable Solutions, Verification Methods or alternative designs (MBIE 2023)². For buildings that cannot meet the prescriptive provisions, Singapore’s Fire Code also allows performance-based fire engineering. Most small and routine projects are done the prescriptive way. Complex buildings are done the engineered way. For countries with poor regulatory capacity, a hybrid model is often recommended, as this concentrates scarce reviewing capacity where it matters most.

Choosing between these approaches is increasingly framed as an economic question as well as an engineering one: which regulatory design delivers a given level of safety at the lowest total cost to society?

² For example, under New Zealand's fire-safety framework, C/AS1 and C/AS2 provide prescribed Acceptable Solutions for specified categories of buildings, while C/VM2 provides a performance-based pathway using fire-engineering design, particularly for complex or unusual buildings. An Alternative Solution may depart from these recognised pathways where the applicant can otherwise demonstrate compliance with the Building Code. C/VM2 provides a performance-based framework for demonstrating compliance with fire-safety clauses C1-C6 through fire-engineering design. It is particularly intended for complex or unusual buildings where a prescriptive solution may not be appropriate.

4.3 The economic cost of fire regulations

The fire regulations primarily involve four types of costs.

1. Capital cost for installing the active fire protection systems inside the buildings as mandated by regulations. For example sprinklers, wet risers, pumps, static water tanks, fire lifts, alarms, etc. This cost is borne by the builders or developers and shifted to home buyers.
2. Space cost for allocating spaces for fire protection activities in case of fire accidents such as a fire staircase, fire lobbies, refuge areas, 6 m+ fire tender driveway, and turning space. Etc. These are included in the calculation of FSI and are not a saleable area for the developer. However, the cost is finally borne by the home buyer.
3. Administrative process cost for getting approvals and sanctions from the Fire Department. The rules require inspections at pre- and post-construction stages before occupancy of the building. Despite being an online service in many states, the lack of institutional capacity delays the process of approvals, thus incurring costs on the developer, mostly affecting the interest rates on loans or credits availed. (Stakeholder Interviews)
4. Recurring cost for maintenance of the active and passive fire protection systems installed in the residential buildings. This is borne by the residents for the lifetime of the building as monthly or yearly maintenance costs.

The above-mentioned costs involved in fire regulations could disincentivise builders from constructing high-rise buildings as per state regulations that often act as the trigger for fire compliances.

The justification of these costs depends on the safety benefit they provide, an issue increasingly addressed by explicit economic analysis in the fire-safety literature. Van Coile et al. (2023) propose a reference methodology for cost–benefit analysis based on Present Net Value (PNV) that balances the cost of fire-protection measures against the losses they are expected to avoid during the lifetime of the building. They show that PNV is the only proper basis for comparison of design alternatives. For the case of regulation, the PNV approach chooses the design that minimises the total lifetime cost to society, including construction, maintenance and expected fire losses. Gernay et al. (2023) apply this to case studies and find that sprinklers in a single-family home and a residential timber building save about \$1.06 for every dollar spent, a just-above-break-even return that is sensitive to the pricing of indirect losses and the value of statistical life.

A related approach tests if the safety expenditure is in line with the ALARP principle, which states that risks should be reduced ‘as low as reasonably practicable’ (HSE 2001; Van Coile, Jomaas and Bisby 2019). The so-called judgement value or J-value (Thomas, Stupples and Alghaffar, 2006) adapted to fire safety by Hopkin, Spearpoint and Van Coile (2018) compares the cost of a safety measure with the Societal Capacity to Commit Resources (SCCR). The SCCR is the amount society can afford to spend to increase life expectancy without reducing overall welfare. If the J-value is lower than one, it means that the measure is cost-effective. If it is higher than one, it means that the measure costs more than the societal benefit. Each additional unit of risk reduction costs more than the previous unit, so that safety investment has diminishing marginal returns and beyond a certain point additional mandates have costs that exceed the welfare they protect.

Maintenance costs are often decisive in this calculation. Butry, Brown and Fuller (2007) estimate net benefits of \$2,919 to \$4,166 per home for multipurpose network sprinklers systems in the United States. These systems are cost-effective largely because they are integrated with the domestic plumbing and require no separate professional maintenance. Hopkin et al. (2019), applying the J-value to existing residential sprinkler studies, find that sprinklers are generally cost-effective only where installation and maintenance costs can be shared across several dwellings, as in apartment blocks. Adding a recurring professional maintenance charge can push the J-value well above one, making the same measure socially unjustifiable. The implication for regulation is that prescriptive rules mandating high-maintenance systems can reduce net social welfare by imposing recurring costs that outweigh the safety gains, and that these burdens fall on residents for the life of the building.

No comparable cost–benefit assessment has been undertaken for the fire-safety provisions of the NBC or the state building rules examined in this paper. The thresholds and installations they mandate have therefore not been tested against the costs they impose on housing. As Section 4.4 discusses, those costs shape not only the price of individual units but also the height and form of what gets built.

4.4 How fire regulations shape the housing stock

Fire-safety regulations affect not only the cost of each dwelling but also how much housing is built and in what form. They work through four connected mechanisms.

Cost per unit: Once a residential building crosses the high-rise threshold, it must install a full suite of active fire-protection systems. These include static water storage, pump rooms, wet risers, sprinklers, alarm systems and fire lifts, along with structural changes such as slabs designed to carry fire-tender loads. These are largely fixed costs that do not shrink with the size or price of the units. Developers pass them on to buyers. Residents then carry the recurring cost of maintaining the systems for the life of the building. Fixed costs weigh most heavily on smaller and lower-priced units, so the burden falls hardest on the affordable segment.

Loss of saleable area: Fire regulations also take up space. Fire staircases, fire lobbies, refuge areas, pump rooms and the driveway and turning space for fire tenders are not saleable. Yet they use up built-up area and site area that could otherwise have gone to dwellings. The developer recovers this by raising the price of the remaining units.

The height threshold as a design ceiling: Compliance costs rise sharply, not gradually, once a building crosses the high-rise threshold. Developers therefore have a strong incentive to stay just below it. In Kerala, where the threshold is 15 m, stakeholders describe a de facto ceiling of about 14.9 m, visible across the skylines of Kochi and Thiruvananthapuram. Where this height limit binds before the plot's permissible Floor Area Ratio (FAR) is fully used, part of the plot's legal development potential is simply left unbuilt. The land then carries fewer dwellings, so land cost per unit rises. Demand that cannot be met through vertical growth spreads outward to the urban periphery. This raises the cost of providing roads, water and sewerage, and pushes households further from jobs.

Informality: When compliance costs are high relative to project size, some developers and households avoid them by building without approvals, misdeclaring heights or occupancy, or skipping certification after occupation. Agarwalla and Mimani (2026) find that excessive regulatory costs combined with weak enforcement are associated with unauthorised construction. Patel, Byahut and Bhatha (2018) show how building regulations in Ahmedabad push lower-income housing out of the formal market. The result is the opposite of what the regulation intends: buildings that carry fire risk but fall outside the regulatory system altogether.

Box 1: An illustration of the height threshold (illustrative figures) ³

Take a 20-cent (about 810 sq m) residential plot in Kochi with four dwelling units per floor.

- At G+4 (about 14.9 m), the building stays below the high-rise threshold and yields 20 units.
- At G+6 (about 21 m), still below the NBCS 2026 threshold of 24 m, the same plot yields 28 units.
- Spread across 28 units instead of 20, land cost per unit falls by roughly 29 percent.

Under the current Kerala rules, however, going to G+6 triggers the full high-rise regime. This means a static water tank of about 75,000 litres, a pump room, wet risers, a second staircase and the associated loss of saleable area. A developer will build taller only if the saving in land cost per unit exceeds these added costs. Stakeholder interviews suggest that on many mid-sized plots it does not, so the G+4 option is chosen and eight potential dwellings are never built. Under a 24 m threshold, as adopted in Andhra Pradesh and NBCS 2026, the G+6 option would remain outside the high-rise category.

Taken together, these mechanisms mean fire-safety regulation is a material part of the housing-supply problem. It is not the sole cause, but it is one whose costs have never been weighed against the safety benefits they deliver. Section 5 shows how these effects differ across Kerala, Tamil Nadu and Andhra Pradesh because their thresholds differ.

³ Figures are illustrative. Unit counts assume uniform floor plates and do not account for setback and coverage limits.

5. State-Level Variations In Laws – Kerala, Tamil Nadu And Andhra Pradesh

5.1 Applicability of fire regulations in residential buildings

As discussed, fire norms and compliances under the state building rules and fire rules are applicable for high-rise buildings.

Kerala: As per the Kerala Municipal Building Rules (KMBR), a high-rise building in Kerala is a building which is 16 m or more in height or more than 4 floors, excluding the basement floors. The Fire NOC, however, identifies the 15 m as the height threshold in compliance with NBC 2016, Chapter 4, while the 16 m threshold is a definition of a high-rise building under Rule 80 of KMBR.

The 2025 amendment to the building rules of Kerala has brought in a separate trigger for fire safety approval. Under the amended Table A to Rule 5, a NOC from the Director of Fire and Rescue Services or an authorised officer is required for buildings proposed in specified occupancies including Group A1 and A2 where the building is over 1,000 sq m in built-up area or over 15 m in height. The amended Kerala framework also provides for a differentiated approval approach for smaller buildings in the low-risk category. The low risk category will include Group A1 residential buildings with a built-up area of less than 300 sq m and not more than two storeys, subject to conditions specified in the rules. This implies that smaller residential constructions undergo a slightly less burdensome regulatory process while larger or taller buildings go through a more rigorous review for fire safety.

Tamil Nadu: Rule 64 of the TNCDBR 2019 lays down fire protection measures for high-rise buildings of 18.30 m and above in Tamil Nadu. Fire protection and extinguishing systems shall be designed to meet accepted standards and the NBC 2016. The building plan for high-rise buildings shall also show fire appliance access, alternative staircases, fire lifts, smoke-stop lobbies where applicable, refuge areas, fire-alarm systems, static water storage and pump rooms, fire-service inlets, sprinklers, wet risers, hose reels and other fixed fire-protection installations. Fire-safety compliance is to be confirmed at the completion stage as per the rules. Thus, 18.30 m is an important regulatory threshold for the application of the high-rise fire-safety regime in Tamil Nadu.

Andhra Pradesh: According to the original AP Building Rules 2017, a high-rise building in Andhra Pradesh means a building with a height of 18 m or more and a prior Fire NOC was required for high-rise buildings. This provision has, however, been amended since via G.O.Ms. No. 273 dated 19.12.2025 with 'high-rise building' as 24 m and above.

Thus, building height has regulatory consequences that go beyond the building envelope. If a certain height or area threshold is exceeded, further requirements may be triggered in relation to fire-safety approval, means of escape, vertical circulation and active and passive fire-protection systems. These requirements may also affect site planning and space allocation for access, circulation, fire-safety infrastructure and open areas. It can also affect the buildable footprint, usable floor area, number of dwelling units and the overall feasibility of higher density development. The regulation thus has an impact on the affordability of the housing units.

5.2 Threshold effects on building design

The height at which the high-rise fire regime applies varies considerably across the three states. It is 15 m in Kerala, 18.3 m in Tamil Nadu and 24 m in Andhra Pradesh. The 9 m gap between Kerala and Andhra Pradesh corresponds to roughly three storeys. A developer building the same affordable housing typology in the two states therefore faces materially different fire-safety obligations. This is so even though there is no evidence that the underlying fire risk, or the capacity of the fire services to respond, differs to the same degree.

The difference is clearest in the mid-rise band. In Tamil Nadu, a residential project at 18.3 m is treated as a high-rise building requiring a full Fire NOC, sprinklers and dual fire staircases. The same project at 23 m in Andhra Pradesh would be classified as an ordinary mid-rise building and attract substantially lower obligations. In Kerala, the same project would have crossed the threshold three storeys earlier. As Section 4.4 shows, a lower threshold acts as a design ceiling. Kerala's 15 m trigger therefore constrains density in precisely the G+5 to G+7 segment where vertical development on mid-sized plots can do most for affordability.

The available data on Kerala's apartment stock are limited and dated. An apartment survey by the Town and Country Planning Department in 2011 recorded 121 of 554 apartment buildings, about 22 percent, as having fewer than four floors (TCPD 2011). The survey shows that low-rise apartments form a substantial part of the stock.

Andhra Pradesh's 2025 amendment, which raised the high-rise threshold from 18 m to 24 m, moves a significant range of G+5 to G+7 buildings out of the high-rise category and is likely to lower compliance costs for such projects. The change should not, however, be read as reducing the underlying fire risk. The NBCS 2026 has since adopted the same 24 m definition, signalling a broader shift in approach. It still requires a minimum set of prescriptive fire-protection measures in buildings below 24 m (Table 1). The relevant comparison across states is therefore not only where the threshold lies but also what protection applies on either side of it.

5.3 Specified capacity versus realised safety

- 1) A recurring feature of the regulatory regimes examined is that they govern specified capacity rather than realised safety. Compared with NBC 2016, which prescribed static firefighting water-storage capacities largely by occupancy and building height, NBCS 2026 retains requirements for static firefighting water storage but shifts the basis for determining water demand towards protection-level and hazard-based calculations. Tables 7A–7J assign protection levels according to occupancy, area and height, while Tables 7K and 7M provide the corresponding bases for calculating firefighting water demand, pump capacity and duration.
 - Andhra Pradesh tackles this at the building level. Rule 41 of the AP Building Rules, 2017 mandates replenishment at 1,000 litres per minute from the town main or an alternate source and permits feeding the domestic sump only through the overflow of the fire tank so that the fire reserve cannot be depleted for household use.

- Tamil Nadu does it at an institutional level. Section 19 of the Tamil Nadu Fire and Rescue Services Act, 2025, states that the Director or Fire and Rescue Services Officer shall take reasonable measures to ensure that there is an adequate supply of water in the event of a fire. Section 20 empowers the Director or Fire and Rescue Services Officer to enter into agreements with approved agencies to meet the water-supply demand and emergent needs. Generally, these provisions are reflected in Sections 17 and 18 of the Revised Model Fire Service Bill, 2019, providing for a duty to secure an adequate water supply and a power to enter into agreements to meet water-supply demand and emergent needs, respectively.
 - In this respect, the Kerala framework is less specific. The Kerala Fire Force Act, 1962 authorises the Government to make provision for an adequate supply of water and empowers the Director, with prior sanction of the Government, to enter into arrangements with the water-supply authority for the supply of adequate water in case of fire (ss.9(b), 11). However, unlike the Tamil Nadu Fire and Rescue Services Act, 2025, it does not lay down an express statutory duty on the fire-service authorities to ensure adequate availability of water or provide for a similar mechanism for contracting with approved agencies to meet emergent demand for water. More operational powers under Section 10(1)(d) are triggered only on the occurrence of the fire accident.
- 2) Under NBCS 2026, apartments with balconies are exempt from refuge-area requirements up to 60 m, whereas buildings without balconies must provide refuge areas above 24 m. A saleable design feature can thus stand in for a non-saleable, collectively accessible safety space, although the code does not establish that the two offer equivalent protection, particularly for elderly or mobility-impaired residents. These examples suggest that the effectiveness of fire-safety regulation depends not only on the stringency of its prescriptions but also on mechanisms that sustain performance over time. Such mechanisms include replenishment requirements, maintenance obligations and coordination between fire services and water-supply agencies, and they can strengthen safety at comparatively modest cost.

6. International Comparison

Most building codes define a high-rise building by a minimum height, based on the reach of firefighting equipment in use, but the threshold varies by jurisdiction. In the United States, a high-rise building is defined as any building with any occupied floor more than 75 ft (23 m) above the lowest level of fire department vehicle access (IBC 2021, §202; NFPA 101, §3.3.36.7). The high-rise provisions are associated with the habitable height of 24 m and above in Singapore (SCDF Fire Code 2023). In Japan, buildings higher than 31 m must have an emergency lift (Building Standard Act, (Japan 1950, Art. 34(2)). In the UK, a ‘higher-risk building’ is a building of at least 18 m or seven storeys (Building Safety Act 2022, s. 65). Crossing these thresholds usually triggers more stringent fire safety provisions such as a second staircase, fire lifts, risers and smoke control systems. There are three reasons for this increased protection. The taller the building, the longer it takes to evacuate. Vertical shafts allow fires and smoke to spread faster. The taller the building, the more people it contains.

Against these benchmarks, India's definition under NBC 2016 is notably stricter, although it varies among states. Crossing 15 m triggers the full suite of high-rise fire protection: a second staircase, a firefighting shaft, a fire lift, wet risers and a fire NOC. India may therefore be characterised as following a "precautionary regulatory approach", in which additional design requirements compensate for uncertainty about emergency response capability. Singapore permits a single staircase up to 60 m, provided there is a ventilated smoke-free lobby. It also relies on dry risers charged by the fire service, requiring on-site wet risers only above 60 m. The United Kingdom and the United States prescribe no refuge floors at all and rely instead on compartmentation and sprinklers. India, by contrast, mandates fixed on-site water storage volumes that rise with height and requires refuge floors from 24 m in buildings without balconies. NBCS 2026 raises the high-rise threshold to 24 m, permits a single external ventilated staircase up to that height, and calculates firefighting water supply by hazard level rather than fixed volumes. This brings India broadly in line with comparable jurisdictions, although, being voluntary, the revised standards take effect only where states adopt them.

7. Institutional Capacity Of Fire Department In Kerala, Andhra Pradesh And Tamil Nadu

7.1 Governance and funding of fire services

Fire services is a State subject under Schedule VII and is listed as a municipal function in the Twelfth Schedule of the Constitution under Article 243W, alongside urban planning and the regulation of land use and building construction. Primary responsibility for organising, funding and equipping fire services therefore rests with state governments. Most states operate a state fire service, typically under the Home or Police department. In a few states, including Maharashtra, Gujarat, Chhattisgarh, Punjab and Madhya Pradesh (excluding Indore), fire services are run by municipal corporations and other urban local bodies (DGFSCDHG, n.d.). Kerala, Tamil Nadu and Andhra Pradesh all operate state-level fire services, each under its own legislation, organisational structure and funding arrangements.

The Government of India, through the Directorate General Fire Service, Civil Defence & Home Guards, Ministry of Home Affairs, plays an advisory role by issuing technical advisories, model guidelines and promoting best practices for strengthening fire prevention and fire safety across the country. The Standing Fire Advisory Council (SFAC), constituted by the Ministry of Home Affairs in 1956, advises states on fire-service standards and policy. The National Disaster Management Authority (NDMA) Guidelines on Scaling, Type of Equipment and Training of Fire Services set national benchmarks for fire-service capacity. NDMA has directed states to enact fire legislation mandating fire clearance for specified buildings, to extend fire stations down to the block and panchayat level, and to build training and water-reserve infrastructure. To address capacity gaps, the Union Government launched the Scheme for Expansion and Modernisation of Fire Services in the States in July 2023. The scheme has a central outlay of ₹5,000 crore under the National Disaster Response Fund, following a recommendation of the Fifteenth Finance Commission, and most of it is earmarked for modernisation and expansion. A further ₹500 crore within the outlay is reserved to reward states that undertake legal and infrastructure reforms. As of Feb 2026, a total of Rs.1798.20 crore has been allocated to different states under the Scheme for Expansion and Modernisation of Fire Services (Ministry of Home Affairs 2026).

Table 2 : Fund Allocation under Scheme for Expansion and Modernisation of Fire Services

State	Approved outlay	Central assistance	State share	Central funds released
Kerala	₹162.25 cr	₹121.07 cr	₹41.18 cr	₹36.32 cr
Tamil Nadu	₹373.27 cr	₹279.95 cr	₹93.32 cr	₹195.97 cr
Andhra Pradesh	₹252.86 cr	₹189.65 cr	₹63.21 cr	₹132.76 cr
Haryana	₹117.19 cr	₹87.47 cr	₹29.72 cr	₹26.24 cr

Source : Lok Sabha Unstarred Question No. 610, 3 February 2026

Table 2 also shows how far modernisation funds have actually reached each state. By February 2026, Tamil Nadu and Andhra Pradesh had each received about 70 percent of their approved central assistance. Kerala had received only 30 percent (₹36.32 crore of ₹121.07 crore). Under the scheme, funds are released in instalments, and every release after the first is linked to deliverables and utilisation certificates (MHA 2023). The figures therefore suggest that Kerala had not yet qualified for its second instalment. The scheme was framed for the Fifteenth Finance Commission award period ending in 2025–26, with no spill-over of committed liabilities beyond it (MHA 2023). Unless the period has been extended, Kerala risks leaving most of its central modernisation allocation unused.

The fire safety norms are normally drafted keeping in mind the existing fire safety equipment and fire tenders' capacity that the states have. Standard fire tenders in India typically measure around 8.5 to 9.5 metres in length, 2.5 metres in width, and roughly 3.2 metres in height. Hence, road widths and setbacks are mandated for these standard fire tenders to enter the premises in case there is a fire accident.

7.2 Equipment and modernisation gaps

Fire-safety norms assume that the fire service can reach, supply and rescue at the heights the rules permit. All firefighting appliances must conform to BIS standards, such as IS 950:2012 for water tenders and IS 12117 for foam tenders (DGFSCDHG 2012). The gaps lie less in standards than in what equipment is available, how old it is, and whether it can be operated and maintained.

Reach versus approved heights: For vertical housing, the decisive question is whether the fire service can reach the upper floors of the buildings it approves. Above the reach of ground ladders, rescue and external firefighting depend on aerial ladder platforms and hydraulic platforms. The consequences of a mismatch are visible elsewhere. Faridabad, Haryana's most populous city, was reported to have no hydraulic platform despite more than 200 high-rise residential and commercial buildings. This left its fire department unable to deal with fires above about 12 m (The Tribune, 2022). In Kerala, this capacity has lagged far behind the high-rise stock. As of August 2026, the state's firefighters had waited about a decade for aerial ladder platforms (The New Indian Express 2026). The procurement forms part of a wider modernisation push. The state has spent over ₹600 crore on fire services over nine years, including ₹72.5 crore in 2023, ₹51.5 crore in 2024 and ₹60 crore in 2025. Planned purchases include drones and robotic firefighting vehicles alongside aerial ladder platforms and tower monitors for high-rise emergencies (Deshabhimani 2025).

Specialised equipment: The indicative equipment list under the MHA modernisation scheme is effectively an official statement of what a modern urban fire service should hold. It includes hydraulic platforms, turntable ladders, mist-based motorcycle units for congested lanes, rescue tenders, robots and drones (MHA 2023).

Import dependence and maintenance: India does not manufacture complete high-reach aerial appliances. Indian firms mainly build chassis and bodies, while aerial superstructures come from foreign manufacturers such as Bronto Skylift (Finland), Magirus (Germany) and Rosenbauer (Austria). Some domestic assembly exists: Bronto platforms up to 42 m have been assembled in India from imported kits since 2013 (Brijbasi n.d.). Higher reach still depends on imports.

Import dependence raises not only purchase costs but also the cost and time of upkeep. Spare parts, specialist technicians and recertification come from abroad. A platform out of service for repairs can leave a city with no high-rise rescue capacity at all. Mumbai, Pune, Telangana and, more recently, Delhi have imported such equipment as they relaxed FSI and height norms (Gadkari 2024; Mishra 2026).

Training: Modern firefighting equipment requires corresponding investment in specialised training and operational capability. While Tamil Nadu institutionalises refresher training for departmental personnel to keep pace with modern firefighting techniques, Kerala has expanded its training and modernisation infrastructure to include equipment such as drones, breathing apparatus, rope-rescue systems and advanced rescue equipment. Kerala's first 60-metre aerial ladder platform is another reminder of the need to link capital investment in specialist equipment with training for operators, maintenance capability and recurrent competency assessment (GoK, 2025). The scheme allocates 5 per cent of funds for strengthening of state training centres (MHA 2023).

Procurement delays: Tamil Nadu Fire and Rescue Services' CAG compliance audit report 2022-23 said Rs 4.73 crore earmarked for 11 water tenders in 2019-20 lapsed due to escalation in cost between sanction and tender. The aerial ladder trucks ordered in the same time frame had not been delivered as of December 2022. This is also made worse by a longstanding dearth of stations, owing to poor inter-departmental co-ordination between Revenue and the Tamil Nadu Police Housing Corporation. Hence, procurement is getting delayed due to bureaucratic hurdles (Comptroller and Auditor General of India 2023).

The scheme requires procurement through competitive bidding under state rules or the Government e-Marketplace (GeM) (MHA 2023). For specialised imported appliances with few qualified suppliers, this can lengthen timelines further.

7.3 Stations, personnel and response times

NDMA's 2012 guidelines estimated, on the basis of SFAC norms, national deficits of 97.54 percent in fire stations, 80.04 percent in firefighting and rescue vehicles, and 96.28 percent in fire personnel (NDMA 2012). These figures are now more than a decade old. A later fire hazard and risk analysis coordinated by the DGFSCDHG estimated somewhat smaller but still large deficits: about 65 percent in fire stations, 83 percent in vehicles and 92 percent in personnel (DGFSCDHG n.d.). Rajya Sabha data from 2019 showed 3,377 fire stations in the country against a requirement of 8,559 (FactChecker 2019). Table 3 sets out the current capacity of the three states.

Table 3 : Institutional Capacity of Kerala, Tamil Nadu, Andhra Pradesh

Metric	Kerala	Tamil Nadu	Andhra Pradesh
Number of fire stations	129	331	188
Actual staff (executive + ministerial)	5,100	7,300	Data not Available
Total vehicles & appliances	685	775	500
Vehicle data year	2023	2025	2025
Metric	Kerala	Tamil Nadu	Andhra Pradesh
Staff per station	39.5	22.1	Data not available
Vehicles per station	5.3	2.3	2.7
State population (mn, 2025 est.)	35.7	76.6	53.9
Stations per million population	3.61	4.32	3.49
Staff per million population	143	95	n/a

Data compiled by author, table created using AI: Source – Government Websites as updated on 30 April 2026.

SFAC sets response-time benchmarks of 3 minutes for high-hazard and densely built urban areas and 5 minutes for other urban areas. Station counts alone do not show whether these benchmarks are met in congested city traffic. Therefore, investing in this fire safety equipment at the municipal level is crucial to encourage the relaxation of high-rise definition, FSI and other norms for vertical housing that would improve the affordability of housing.

7.4 Capacity as the precondition for reform

The precautionary character of India's fire norms is, in part, a substitute for capacity. Low height thresholds, on-site water storage, refuge floors and access rules sized for fire tenders all compensate for fire services that may not be able to reach, supply or rescue at height. This explains both why the norms are costly and why they have been difficult to relax.

Modernisation is therefore not a separate agenda from regulatory reform; it is its precondition. Raising height thresholds without raising capacity would shift risk onto residents. Equally, investment in aerial reach, specialised equipment and trained crews creates the conditions under which height thresholds, FSI and access norms can be safely rationalised. Andhra Pradesh's move to a 24 m threshold, and the relaxations in Mumbai, Pune and Telangana, need to be matched by such investment (Section 7.2).

For Kerala, the immediate steps are within reach. It can complete the long-delayed aerial ladder procurement, and it can clear the utilisation conditions needed to draw its remaining central modernisation funds (Section 7.1). Together, these would allow the state to adopt the NBCS 2026 threshold on a sound footing (Recommendation 1).

8. Role Of The Private Sector In Fire Safety

While private firefighting is not the dominant model of fire-service provision, private participation in fire protection takes several forms. Fire equipment, detection systems, suppression technologies and related services are predominantly supplied by private firms, while their design and installation are governed by standards such as those issued by the Bureau of Indian Standards (BIS), National Fire Protection Association (NFPA) and other standard-setting and regulatory bodies. With respect to fire protection services during a fire accident there are few models of private or contracted firefighting services in several jurisdictions.

The United States provides an example of **subscription-based private fire protection**. Rural Metro Fire was established by Louis Witzeman in 1948 after he witnessed a house fire outside municipal boundaries where the local fire department hardly reached. The company subsequently operated in Scottsdale and other communities and pioneered a model in which residents and property owners in areas without municipal fire protection could purchase fire protection through membership. Rural Metro continues to provide subscription-based fire protection in unincorporated communities in Arizona, Oregon and Tennessee. Its current membership arrangements provide fire suppression and emergency response to subscribers, while non-members may be charged for responses.

A second model involves the ***contractual provision of fire services to local governments***. Denmark provides an established example through Falck, a private company that has historically provided firefighting services to municipalities under contractual arrangements. Falck's 2015 annual report recorded contracts with 63 of Denmark's 98 municipalities, while academic research on the Danish system describes municipal firefighting as being provided through agreements between Falck and individual municipalities. In this model, the public authority retains responsibility for ensuring fire protection, while operational provision is contracted to a private organisation. This differs from the subscription model because access to emergency services is not dependent on individual households purchasing membership.

A third form of private provision is linked to insurance. In parts of the United States, insurance companies have provided or funded private firefighting services for policyholders, particularly in areas exposed to severe wildfire risk. These services generally supplement rather than replace public fire services and raise questions concerning access, coordination and the allocation of emergency resources.

The historical experience of the United Kingdom illustrates some of the challenges associated with fragmented private provision. Before 1866, London's firefighting arrangements were substantially organised through fire insurance companies. Insurance companies maintained brigades and used fire marks to identify insured properties. The Metropolitan Fire Brigade was established as a public service on 1 January 1866 following the Metropolitan Fire Brigade Act 1865. The transition reflected, among other factors, the difficulty of sustaining an insurance-based system as London's fire risks and urban scale increased.

India already contains elements of private and contracted fire-service provision, although these are generally facility-based or involve outsourcing rather than full privatisation of municipal fire services. The Gujarat Institute of Disaster Management identifies fire brigades maintained by private factories as a distinct segment of the country's fire-service system. Such establishments maintain their own personnel and equipment and may participate in mutual-aid arrangements under district disaster-management plans (GIDM 2021).

There is also evidence of outsourcing within municipal fire services. The Municipal Corporation of Rohtak's official expenditure records list "Outsourcing Fire Staff" as a separate expenditure category, including ₹1.68 crore in 2019–20 (Municipal Corporation of Rohtak 2020). In 2026, the Municipal Council of Nangal in Punjab issued a tender for the supply of firemen and drivers for its fire brigade through outsourcing, with an estimated value of ₹38.73 lakh (Municipal Council Nangal 2026). These examples do not constitute full privatisation of fire services, but they demonstrate that India already uses contractual and privately supplied inputs within publicly administered fire-service systems.

The experience of private provision therefore suggests that privatisation need not be understood as a single institutional model. It can range from facility-level private fire brigades and outsourced personnel to municipal contracting and subscription-based community protection. Each model creates different questions concerning universal access, accountability, command and coordina-

tion, financing and emergency response. Guardiano (1992), writing from a US policy perspective, cites estimates of potential cost savings from private provision ranging from 10 to 50 percent, principally through lower establishment and operating costs.

Such estimates, however, derive from contexts with established contracting frameworks and mature regulatory oversight and cannot be adopted directly in India. In the Indian context, private participation so far has been limited to facility-based brigades and the outsourcing of personnel within publicly administered services. The relevant policy question is therefore not whether to privatise fire services, but how private providers can be accredited, overseen and held accountable so that they complement public capacity without compromising universal access or unified command during emergencies.

9. Key Regulatory Issues

The preceding analysis points to six interrelated issues in India's fire safety regulatory framework.

Prescriptive regulation in a context of rapid urbanisation

India's fire safety regime relies mainly on prescriptive norms, codified in the National Building Code and replicated, with variations, in state building rules. Prescriptive standards offer clarity and are easy to administer. However, they apply uniform requirements regardless of a building's actual risk profile. As urbanisation intensifies and the demand for affordable housing grows, it is reasonable to ask whether this approach imposes compliance costs that are out of step with the safety benefits it delivers. Several jurisdictions, notably the United Kingdom, Singapore and Australia, permit performance-based alternatives. Under these, compliance is shown through engineered solutions that meet defined safety objectives rather than adherence to fixed specifications. The question for India is whether a comparable shift, or a hybrid model, could secure equivalent or better safety outcomes while easing the cost burden on housing supply.

Proportionality of high-rise thresholds

The classification of a building as "high-rise" triggers a substantially higher tier of mandatory fire protection measures. These thresholds differ across states, which raises the question of whether they rest on a coherent assessment of risk. A proportionate threshold would reflect empirically relevant factors, such as the operational reach of firefighting equipment, evacuation times and occupancy characteristics. Where thresholds are set administratively instead, they may create sharp regulatory discontinuities. Such "cliff effects" can lead developers to restrict buildings to just below the trigger height, which results in the underuse of urban land and constrains density. The design of these thresholds therefore warrants scrutiny against the principle of proportionality.

Specified capacity versus realised safety

The regulatory regimes examined govern what a building must contain at the time of approval far more closely than whether those systems remain functional over the building's life. Provisions to ensure that firewater reserves stay full, that installed systems are maintained, and that fire services can draw on an adequate water supply during an emergency are uneven across states. Andhra

Pradesh protects the fire reserve at the building level. Tamil Nadu places an express statutory duty on its fire service to secure water supply. Kerala's Fire Force Act, 1962 contains neither provision in comparable form. Similarly, the substitution of private balconies for collective refuge areas under NBCS 2026 has not been shown to provide equivalent protection, particularly for elderly or mobility-impaired residents. The Rajkot incident shows the consequence of this gap: a building with installed but non-functional systems, operating for years without a valid Fire Safety Certificate.

Institutional capacity of state fire services

Regulatory standards are effective only to the extent that the state can enforce them and respond when they fail. A critical question is whether the state fire services are adequately equipped to respond to fire incidents within reasonable time frames, given the built environment they are expected to protect. The relevant measures are station density, staffing, specialised equipment such as aerial ladders, and response times compared with the benchmarks of the Standing Fire Advisory Council. Of particular concern is any mismatch between the building heights the state approves and the operational capability of its fire services.

Absence of evidence on costs and benefits

The fire safety provisions of the NBC and the state building rules have not been subjected to any systematic assessment of their costs and benefits. The thresholds, installations and space requirements they mandate impose capital, spatial, administrative and recurring costs on housing. Yet there is no evidence on whether the safety gains justify these costs or on whether alternative measures could achieve the same level of safety at a lower cost. The international literature offers established methods for such assessment, including present net value analysis and the J-value approach. Without such evidence, regulatory standards are more likely to reflect precaution and convention than a calibrated judgement of risk. This makes it difficult either to defend the existing norms or to reform them on a principled basis.

The role of private agencies

Given the constraints on public capacity, it is worth examining whether private agencies could legitimately complement state fire protection services. Potential roles include accredited third-party auditing and certification, estate-level or industrial fire brigades, and inspection regimes linked to insurance. Each could extend the reach of oversight without a proportionate expansion of public expenditure. However, private participation also raises concerns about conflicts of interest, the quality of certification, and the allocation of liability. Any expanded role for private agencies would therefore need to sit within a robust framework of accreditation, audit and accountability.

Together, these issues frame the policy recommendations that follow. They suggest that reform must address not only the content of fire safety norms but also the institutional arrangements through which those norms are enforced.

10. Policy Recommendations

1. Raise the high-rise height threshold

The present 15 m trigger imposes high fixed compliance costs on buildings that present relatively modest evacuation challenges. As Sections 4.4 and 5.2 show, it creates an artificial design ceiling and encourages horizontal urban expansion instead of compact development. Any revision should, however, be linked to fire-service capacity. A state or city should adopt the higher threshold only where its fire service has verified reach, equipment and response times for buildings of that height (Section 7).

2. Adopt a hybrid fire safety regulatory framework

Rather than relying on completely prescriptive regulations for fire safety, the states should gradually adopt a hybrid regulatory framework that combines prescriptive minimum standards with performance-based alternative compliance pathways. While Part 4 of NBC is largely prescriptive, it recognises fire engineering analysis in specific contexts and increasingly refers to internationally accepted standards. The developers must be provided an alternative regulatory pathway to demonstrate superior or equivalent fire safety mechanisms through certified fire engineering analysis for projects employing innovative fire safety systems. For example, buildings incorporating enhanced compartmentation, automatic sprinkler systems, smoke extraction systems, higher fire-resistance ratings, and advanced evacuation modelling could be permitted to satisfy fire safety objectives without necessarily complying with every prescriptive requirement relating to dual staircases, refuge floors, or other design features, subject to independent third-party certification and approval by the competent authority. Globally, countries such as Australia, New Zealand, Singapore, and the United Kingdom employ dual compliance pathways. Such an approach is particularly suitable for India, where institutional capacity for reviewing sophisticated fire engineering designs remains uneven across states.

A phased hybrid model would encourage innovation without imposing the institutional risks associated with a complete transition to performance-based regulation. The performance-based regulatory approach improves the regulatory environment by establishing clear code objectives and safety criteria, leaving the means of achievement the same to the builder with the support of a fire engineer or any relevant certified authority. Another advantage of a performance-based regulatory system is the possibility of incorporation and use of the latest building and fire research, data and models (Hadjisophocleous, Benichou, and Tamim 1998). The approach helps in ensuring a permitted regulatory trade-off for the builders, such as having enhanced compartmentation instead of mandatory refuge floors and advanced smoke control systems instead of additional staircases.

However, a performance-based regulatory framework must be supported by competent fire engineers, robust review mechanisms, adequate regulatory capacity and quality assurance (Lange et al. 2021). Thus, a phased approach would be suitable in the Indian context.

Since NBCS 2026 has provisions on a performative approach and being a model code, the state governments can take a hybrid approach by incorporating performative standards into their state-level regulations.

3. Adopt risk-proportionate fire protection standards

The comparative study of the three states shows that fire water tank capacities are still set according to NBC 2016, without modification. Those standards prescribe fixed static storage volumes that rise with building height. They take no account of expected firefighting duration, occupant load, the reliability of municipal water supply or residual water pressure. This uniform approach raises construction costs, which are passed on in the final price of apartments.

NBCS 2026 moves away from this model. It calculates firefighting water supply by hazard level rather than by fixed volumes (BIS 2026), so the national standard now supports a risk-based approach. States should adopt this method in their building rules instead of retaining the NBC 2016 tables. In line with international practice in countries such as the United States and Japan, they should also recognise municipal water as part of the firefighting supply where urban water systems meet specified reliability standards. On-site storage requirements could then be reduced accordingly, with safeguards such as Andhra Pradesh's Rule 41 ensuring that the remaining fire reserve cannot be drawn down for domestic use.

4. Allow third-party fire engineering certification:

Accredited private fire engineers should be allowed to perform an assessment of the apartments and certify compliance with the fire safety standards before applying the fire NoC. The governmental fire institutions must focus on enforcement, auditing of safety engineers, emergency fire response and high-risk inspections. The independent certification can result in decreasing approval delays and lower transaction costs and allow the existing institutional capacity and public resources with the State Fire Force to focus more on oversight and enforcement. This approach rests on the regulatory principle of separating service delivery from regulatory oversight, functions that are at present vested in the same institution (OECD 2012).

However, the challenge is India has very limited formal higher education capacity in fire engineering. There are only a few (approximately 5–8) institutions offering AICTE-recognised undergraduate engineering programmes in Fire Engineering or Safety and Fire Engineering, with numerous private institutes offering diploma and certificate programmes of varying quality. An official recognition and accreditation of fire safety engineering professionals could result in private and public higher educational institutions investing in related courses, thus opening opportunities for Indian youth.

5. Strengthening the state fire services capacity

With the increasing urbanisation and resulting housing deficits in the cities, vertical development of cities would be inevitable. Along with rationalising the existing fire regulations and NBC 2016 Code Chapter 4, the state fire services must invest in strengthening the human resources as well as the equipment capacity for combating fire accidents. Specialised machinery required for combating fire accidents in super-tall residential buildings must be acquired along with personnel training. The investments are to be made in aerial ladder platforms and specialised rescue equipment such as

the Fire Brigade Bullet for firefighting during heavy traffic and access to narrow lanes, Bronto Sky-lifts and snorkel fire trucks for high-rise buildings, and thermal imaging technology. Considering the lack of sufficient fire stations and personnel capacity as per SFAC norms, states must be incentivised to invest in additional fire stations and personnel training and capacity. Funding for state investments in the fire force capacity could be mobilised through the proposed Fire Tax under the Model Fire Act 2019.

6. Encourage private participation in fire safety services

Many fire protection failures arise not from inadequate regulations but from poor maintenance of installed systems and weak post-occupancy compliance. Accredited private agencies can improve the quality and frequency of inspections, reduce administrative burdens on fire departments, and foster competition and innovation in fire safety services. International experience suggests that public-private partnerships in preventive fire safety can improve service delivery while allowing public fire services to focus on emergency response, enforcement, and high-risk inspections (Guardiano 1992; Spinardi 2019; OECD 2012). Private participation must be encouraged in areas such as fire system design and installation, periodic maintenance, third-party inspections, fire safety audits, evacuation planning, occupant training and certification of fire protection systems. Government agencies should limit their role to setting standards, accrediting service providers, conducting random audits and enforcing compliance.

State fire services should explore public-private partnership (PPP) models for procuring and operating specialised firefighting resources, particularly high-value equipment such as aerial ladder platforms, hydraulic rescue tools, robotic firefighting systems, thermal imaging equipment, and hazardous material response units. Under such arrangements, the private sector may provide equipment, maintenance, technical expertise, operator training and human resources for operating the equipment, while operational command during emergencies remains with the state fire service (World Bank, 2017). This approach can reduce capital expenditure, improve access to advanced technologies, and enable faster modernisation without compromising public accountability.

7. Institutionalise regulatory impact assessment for fire safety norms

Any revision of the fire safety provisions in state building rules, including the adoption of NBCS 2026, should be preceded by a regulatory impact assessment. The assessment should estimate the costs each provision imposes on housing, covering capital, space, administrative and recurring costs, against the expected reduction in fire losses. Established methods such as present net value analysis (Van Coile et al. 2023) and the J-value approach (Hopkin, Spearpoint and Van Coile 2018) provide a basis for such evaluation. The BIS, the state fire services and the state housing departments could jointly commission pilot assessments of high-cost provisions such as static water storage volumes, refuge floors and second staircases in mid-rise residential buildings. Requiring such assessment would anchor future thresholds in evidence rather than precaution and would give both regulators and developers a transparent basis for reform. This is consistent with the OECD's recommendation that regulatory proposals be assessed for their costs, benefits and alternatives before adoption (OECD 2012).

8. Strengthen post-occupancy compliance

States should shift regulatory attention from approval-stage compliance to the ongoing performance of fire safety systems. This would involve the following measures:

- mandatory periodic renewal of the Fire Safety Certificate, supported by accredited third-party inspection of installed systems;
- building-level safeguards for fire water reserves, along the lines of Rule 41 of the Andhra Pradesh Building Rules, so that the fire reserve cannot be drawn down for domestic use;
- graded penalties for non-functional systems and lapsed certificates.

Kerala in particular should amend the Kerala Fire Force Act, 1962, drawing on the Model Fire Act 2019 and the Tamil Nadu Fire and Rescue Services Act, 2025. The amendment should place an express statutory duty on the fire service to secure an adequate water supply for firefighting. It should also empower the service to contract approved agencies for emergency water supply and to inspect and seal non-compliant buildings.

11. Conclusion

India's fire safety regulations were developed in response to historical institutional constraints and limited firefighting capacity. However, rapid urbanisation, changing construction technologies, and increasing demand for affordable housing require a transition towards a more risk-proportionate regulatory framework. Such a framework should preserve life safety while allowing greater flexibility, encouraging innovation, strengthening institutional capacity, and reducing unnecessary compliance costs.

With the changing urban environment, the existing laws and regulations, including NBC, must undergo regulatory assessments to ensure that laws are rationalised and provide incentives for better growth and investments in the housing sector. India regulates fire safety through highly prescriptive rules rather than proportionate, risk-based regulation. The affordability of housing, especially in cities, is dependent on the ease of building high-rise buildings or vertical development. This approach helps in effective utilisation of existing scarce land resources. The horizontal development of cities requires more investments in municipal infrastructure such as sewerage, transportation, etc. in outer cities and results in increasing land cost, thereby pushing people away from urban city centres. Hence, the laws must respond to the increasing urbanisation by rationalising the FSI limits and fire safety norms. Road-width and setback requirements for taller buildings are framed around the dimensions of standard fire tenders rather than occupant load, evacuation time or the protection a building provides (Section 7.1). Hence, a comprehensive revision of existing regulations is required for improving the affordability of the housing sector.

Reforming fire safety regulation should therefore be viewed not as deregulation but as an effort to improve both safety outcomes and housing affordability through evidence-based regulation.

References

- ABCB (Australian Building Codes Board). 2022. National Construction Code 2022. Canberra: Australian Building Codes Board.
- Agarwalla, Astha, and Komal Mimani. 2026. "Building Regulations, Enforcement, and Real Estate Developer Behavior in Developing Countries." *Journal of Housing Research*. <https://doi.org/10.1080/10527001.2026.2629699>.
- Andhra Pradesh, Government of. 2026. Amendments to the Andhra Pradesh Building Rules, 2017. G.O.Ms.-No. 161, Municipal Administration and Urban Development Department. Amaravati: Government of Andhra Pradesh.
- Brijbasi. n.d. "Aerial Ladder Platform." <https://brijbasi.in/aerial-ladder-platform/>.
- Bureau of Indian Standards. 2016. National Building Code of India 2016. Vol. 1, Part 4, Fire and Life Safety. SP 7:2016. New Delhi: Bureau of Indian Standards.
- Bureau of Indian Standards. 2026. National Building Construction Standards 2026. Part F, Fire and Life Safety. SP 7:2026. New Delhi: Bureau of Indian Standards.
- Butry, David T., M. Hayden Brown, and Sieglinde K. Fuller. 2007. Benefit–Cost Analysis of Residential Fire Sprinkler Systems. NISTIR 7451. Gaithersburg, MD: National Institute of Standards and Technology.
- Comptroller and Auditor General of India. 2023. Report No. 5 of 2023: Compliance Audit for the Year Ended March 2022. New Delhi: Government of India.
- Constitution of India. 1992. Article 243W and Twelfth Schedule, inserted by the Constitution (Seventy-fourth Amendment) Act, 1992.
- Dabhi, Brendan. 2025. "Gujarat: How a Lobby Fire in Rajkot Building Killed 3 Non-Residents." *The Indian Express*, March 16, 2025. <https://indianexpress.com/article/cities/ahmedabad/gujarat-how-a-lobby-fire-in-rajkot-building-killed-3-non-residents-9888065/>.
- Department for Levelling Up, Housing and Communities. 2024. Approved Document B: Fire Safety. Vol. 1, Dwellings. 2019 edition incorporating 2020, 2022 and 2024 amendments. London: DLUHC.
- Deshabhimani. 2025. "Kerala Fire and Rescue Services to Upgrade Disaster Response with Drones and Robotic Equipment." <https://www.deshabhimani.com/deshabhimani-english/-kerala-news/kerala-fire-rescue-upgrade-drones-robotic-equipment-14680>.
- Directorate General Fire Services, Civil Defence and Home Guards. 2012. General Specification and Approximate Cost of Firefighting & Rescue Vehicles and Specialized Equipment. New Delhi: Ministry of Home Affairs, Government of India.
- Directorate General Fire Services, Civil Defence and Home Guards. n.d. Fire-Risk and Hazard Analysis in the Country: Phase 4 Study (Gujarat State). New Delhi: Ministry of Home Affairs. <https://dgfscdhg.gov.in/sites/default/files/Gujarat.pdf>.
- Falck. 2016. Annual Report 2015. Copenhagen: Falck A/S.
- FactChecker. 2019. "India's Fire Preparedness: A FactCheck." <https://www.factchecker.in/indias-fire-preparedness-a-factcheck>.

- Gadkari, Siddharth. 2024. "Pune Civic Body to Acquire Five New Firefighting Vehicles for High-Rises." *Hindu-
stan Times*, October 1, 2024.
- Gernay, Thomas, Shuna Ni, David Unobe, Andrea Lucherini, Ranjit Kumar Chaudhary, and Ruben Van Coile. 2023. "Cost–Benefit Analysis of Fire Protection in Buildings: Application of a Present Net Value Approach." *Fire Technology*. <https://doi.org/10.1007/s10694-023-01419-2>.
- Government of India. 2026. *Economic Survey 2025–26*. New Delhi: Ministry of Finance.
- Government of Kerala. 2025. G.O.(Rt) No. 874/2025/HOME: Fire & Rescue Services – Purchase of Aerial Ladder Platform – Sanction Accorded. Home Department, Government of Kerala, March 18, 2025.
- Guardiano, John R., David Haarmeyer, and Robert W. Poole Jr. 1992. *Fire Protection Privatization: A Cost-Ef-
fective Approach to Public Safety*. Policy Study No. 152. Los Angeles: Reason Foundation. [https://rea-
son.org/policy-study/fire-protection-privatization/](https://rea-
son.org/policy-study/fire-protection-privatization/).
- GIDM (Gujarat Institute of Disaster Management). 2021. *Basic Course in Fire Prevention, Life Safety and Fire
Protection Measures: Fire Safety Officer – General (FSO-G) Handbook*. Gandhinagar: GIDM. <https://gidm.gujarat.gov.in/sites/default/files/FSO-G-Handbook-2021.pdf>.
- Hackitt, Judith. 2018. *Building a Safer Future: Independent Review of Building Regulations and Fire Safety:
Final Report*. Cm 9607. London: HMSO.
- Hadjisophocleous, George V., Nouredine Benichou, and A. S. Tamim. 1998. "Literature Review of Perfor-
mance-Based Fire Codes and Design Environment." *Journal of Fire Protection Engineering* 9 (1): 12–40.
- Health and Safety Executive (HSE). 2001. *Reducing Risks, Protecting People: HSE's Decision-Making
Process*. Sudbury: HSE Books.
- Hopkin, Danny, Michael Spearpoint, Matthew Arnott, and Ruben Van Coile. 2019. "Cost-Benefit Analysis of
Residential Sprinklers – Application of a Judgement Value Method." *Fire Safety Journal* 106: 61–71. [https://-
doi.org/10.1016/j.firesaf.2019.04.003](https://-
doi.org/10.1016/j.firesaf.2019.04.003).
- Hopkin, Danny, Michael Spearpoint, and Ruben Van Coile. 2018. "The J-Value and Its Role in Evaluating
Investments in Fire Safety Schemes." *Fire Technology* 54: 1547–1564. [https://-
doi.org/10.1007/s10694-018-0752-9](https://-
doi.org/10.1007/s10694-018-0752-9).
- International Code Council. 2020. *2021 International Building Code*. Country Club Hills, IL: International Code
Council.
- Japan. 1950. *Building Standards Act. Act No. 201 of 1950, as amended by Act No. 43 of 2020*. Tentative
English translation. Japanese Law Translation, Ministry of Justice. [https://www.japaneselawtranslation.go.-
jp/en/laws/view/4024/en](https://www.japaneselawtranslation.go.-
jp/en/laws/view/4024/en).
- Knight Frank India and NAREDCO. 2025. *India Affordable Housing 2025: Tackling Urban Housing Deficit
through Supply-Side Reforms*. Mumbai: Knight Frank India. [https://content.knightfrank.com/re-
search/3035/documents/en/india-affordable-housing-2025-12385.pdf](https://content.knightfrank.com/re-
search/3035/documents/en/india-affordable-housing-2025-12385.pdf).
- Lange, David, Jose L. Torero, et al. 2021. "A Competency Framework for Fire Safety Engineering." *Fire
Safety Journal*.

- MBIE (Ministry of Business, Innovation and Employment). 2023. New Zealand Building Code Handbook. Wellington: MBIE.
- Meacham, Brian J., and Richard L. P. Custer. 1995. "Performance-Based Fire Safety Engineering: An Introduction of Basic Concepts." *Journal of Fire Protection Engineering* 7 (2): 35–54.
- Ministry of Home Affairs. 2023. Scheme for Expansion and Modernization of Fire Services in the States. No. I-45011/9/2020-Ad(CD). New Delhi: MHA. https://www.mha.gov.in/sites/default/files/2023-07/FireServicesinStates_10072023.pdf.
- Ministry of Home Affairs. 2026. Modernization of Fire Services: Lok Sabha Unstarred Question No. 610, Answered 3 February 2026. Government of India. <https://www.mha.gov.in/MHA1/Par2017/pdfs/par2026-pdfs/LS03022026/610.pdf>.
- Mishra, Alok K. N. 2026. "Fire Service Budget." *The Times of India*, March 24, 2026.
- Municipal Corporation of Rohtak. 2020. Budget 2020–21.
- Municipal Council Nangal. 2026. Supply of Firemen and Drivers for Fire Brigade of MC Nangal for Six Months as per DC Rate through Outsourcing. Government of Punjab e-Procurement.
- National Crime Records Bureau. 2025. Accidental Deaths & Suicides in India 2024. Chapter 1, "Accidents in India." New Delhi: Ministry of Home Affairs, Government of India. <https://www.ncrb.gov.in/uploads/files/6AD-SI-2024Chapter-1AccidentalDeaths.pdf>.
- National Disaster Management Authority. 2012. National Disaster Management Guidelines: Scaling, Type of Equipment and Training of Fire Services. New Delhi: Government of India.
- National Fire Protection Association. 2024b. NFPA 101: Life Safety Code. Quincy, MA: NFPA.
- New Indian Express. 2026. "Firefighters' Decade-Long Wait for Aerial Ladder Platforms to End Soon." August 24, 2026. <https://www.newindianexpress.com/states/kerala/2026/Aug/24/-firefighters-decade-long-wait-for-aerial-ladder-platforms-to-end-soon>.
- News On AIR. 2025. "Hyderabad Fire Near Charminar Claims 17 Family Members, Including 8 Children." *Prasar Bharati*, May 18, 2025. <https://www.newsonair.gov.in/hyderabad-fire-near-charminar-claims-17-family-members-including-8-children/>.
- Organisation for Economic Co-operation and Development. 2012. Recommendation of the Council on Regulatory Policy and Governance. Paris: OECD Publishing.
- Patel, Bimal, Sweta Byahut, and Brijesh Bhatha. 2018. "Building Regulations Are a Barrier to Affordable Housing in Indian Cities: The Case of Ahmedabad." *Journal of Housing and the Built Environment* 33 (1): 175–195. <https://doi.org/10.1007/s10901-017-9552-7>.
- Pistor, Katharina. 2019. *The Code of Capital: How the Law Creates Wealth and Inequality*. Princeton, NJ: Princeton University Press.
- Press Trust of India. 2025. "Multi-Disciplinary Team to Submit Report on Hyderabad Fire Accident." *The Tribune*, May 19, 2025. <https://www.tribuneindia.com/news/india/multi-disciplinary-team-to-submit-report-on-hyderabad-fire-accident>.

- MBIE (Ministry of Business, Innovation and Employment). 2023. New Zealand Building Code Handbook. Wellington: MBIE.
- Meacham, Brian J., and Richard L. P. Custer. 1995. "Performance-Based Fire Safety Engineering: An Introduction of Basic Concepts." *Journal of Fire Protection Engineering* 7 (2): 35–54.
- Ministry of Home Affairs. 2023. Scheme for Expansion and Modernization of Fire Services in the States. No. I-45011/9/2020-Ad(CD). New Delhi: MHA. https://www.mha.gov.in/sites/default/files/2023-07/FireServicesinStates_10072023.pdf.
- Ministry of Home Affairs. 2026. Modernization of Fire Services: Lok Sabha Unstarred Question No. 610, Answered 3 February 2026. Government of India. <https://www.mha.gov.in/MHA1/Par2017/pdfs/par2026-pdfs/LS03022026/610.pdf>.
- Mishra, Alok K. N. 2026. "Fire Service Budget." *The Times of India*, March 24, 2026.
- Municipal Corporation of Rohtak. 2020. Budget 2020–21.
- Municipal Council Nangal. 2026. Supply of Firemen and Drivers for Fire Brigade of MC Nangal for Six Months as per DC Rate through Outsourcing. Government of Punjab e-Procurement.
- National Crime Records Bureau. 2025. Accidental Deaths & Suicides in India 2024. Chapter 1, "Accidents in India." New Delhi: Ministry of Home Affairs, Government of India. <https://www.ncrb.gov.in/uploads/files/6AD-SI-2024Chapter-1AccidentalDeaths.pdf>.
- National Disaster Management Authority. 2012. National Disaster Management Guidelines: Scaling, Type of Equipment and Training of Fire Services. New Delhi: Government of India.
- National Fire Protection Association. 2024b. NFPA 101: Life Safety Code. Quincy, MA: NFPA.
- New Indian Express. 2026. "Firefighters' Decade-Long Wait for Aerial Ladder Platforms to End Soon." August 24, 2026. <https://www.newindianexpress.com/states/kerala/2026/Aug/24/-firefighters-decade-long-wait-for-aerial-ladder-platforms-to-end-soon>.
- News On AIR. 2025. "Hyderabad Fire Near Charminar Claims 17 Family Members, Including 8 Children." *Prasar Bharati*, May 18, 2025. <https://www.newsonair.gov.in/hyderabad-fire-near-charminar-claims-17-family-members-including-8-children/>.
- Organisation for Economic Co-operation and Development. 2012. Recommendation of the Council on Regulatory Policy and Governance. Paris: OECD Publishing.
- Patel, Bimal, Sweta Byahut, and Brijesh Bhatha. 2018. "Building Regulations Are a Barrier to Affordable Housing in Indian Cities: The Case of Ahmedabad." *Journal of Housing and the Built Environment* 33 (1): 175–195. <https://doi.org/10.1007/s10901-017-9552-7>.
- Pistor, Katharina. 2019. *The Code of Capital: How the Law Creates Wealth and Inequality*. Princeton, NJ: Princeton University Press.
- Press Trust of India. 2025. "Multi-Disciplinary Team to Submit Report on Hyderabad Fire Accident." *The Tribune*, May 19, 2025. <https://www.tribuneindia.com/news/india/multi-disciplinary-team-to-submit-report-on-hyderabad-fire-accident>.

- Rush, David, Greg Bankoff, Sarah-Jane Cooper-Knock, et al. 2020. "Fire Risk Reduction on the Margins of an Urbanizing World." *Disaster Prevention and Management* 29 (5).
- Singapore Civil Defence Force. 2023. *Code of Practice for Fire Precautions in Buildings 2023*. Singapore: SCDF.
- Spinardi, Graham. 2019. "Performance-Based Design, Expertise Asymmetry, and Professionalism: Fire Safety Regulation in the Neoliberal Era." *Regulation & Governance* 13 (4): 520–539. <https://doi.org/10.1111/rego.12251>.
- Spinardi, Graham, Luke Bisby, and Jose Torero. 2017. "A Review of Sociological Issues in Fire Safety Regulation." *Fire Technology* 53 (3): 1011–1037.
- TCPD (Department of Town and Country Planning, Kerala). 2011. *Apartment Survey 2011*. Thiruvananthapuram: Government of Kerala. <https://townplanning.kerala.gov.in/>.
- Telangana Today. 2025. "Hyderabad: Fire at Gulzar Houz Turns Fatal for 17, Including 8 Children." May 18, 2025. <https://telanganatoday.com/death-toll-raises-upto-17-in-gulzar-houz-fire-accident>.
- Thomas, P. J., D. W. Stupples, and M. A. Alghaffar. 2006. "The Extent of Regulatory Consensus on Health and Safety Expenditure. Part 1: Development of the J-Value Technique and Evaluation of Regulators' Recommendations." *Process Safety and Environmental Protection* 84 (5): 329–336.
- Tribune. 2022. "Six Years On, Faridabad Fire Dept Has No Hydraulic Platform." <https://www.tribuneindia.com/news/haryana/six-years-on-faridabad-fire-dept-has-no-hydraulic-platform-444739>.
- Twigg, John, Nicola Christie, James Haworth, Emmanuel Osuteye, and Artemis Skarlatidou. 2017. "Improved Methods for Fire Risk Assessment in Low-Income and Informal Settlements." *International Journal of Environmental Research and Public Health* 14 (2): 139. <https://doi.org/10.3390/ijerph14020139>.
- United Kingdom. 2022. *Building Safety Act 2022*. c. 30. London: The Stationery Office.
- Van Coile, Ruben, Grunde Jomaas, and Luke Bisby. 2019. "Defining ALARP for Fire Safety Engineering Design via the Life Quality Index." *Fire Safety Journal* 107: 1–14.
- Van Coile, Ruben, Andrea Lucherini, Ranjit Kumar Chaudhary, Shuna Ni, David Unobe, and Thomas Gernay. 2023. "Cost-Benefit Analysis in Fire Safety Engineering: State-of-the-Art and Reference Methodology." *Safety Science* 168: 106326. <https://doi.org/10.1016/j.ssci.2023.106326>.
- World Bank. 2017. *Benchmarking Public Procurement 2017: Assessing Public Procurement Systems in 180 Economies*. Washington, DC: World Bank.
- Zhang, Xiaoxiang, Jing Yao, Katarzyna Sila-Nowicka, and Yuhao Jin. 2020. "Urban Fire Dynamics and Its Association with Urban Growth: Evidence from Nanjing, China." *ISPRS International Journal of Geo-Information* 9 (4): 218.



097457 09174



cppr@cppr.in



www.cppr.in



**First Floor, Mandoli House,
New Link Rd, opp. Metro Pillar 821,
Kochi, Kerala 682020, India**