

## Electrical Safety : A Vital Component of India's Sustainable Urbanization

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India is on a path towards sustainable urbanization, but it faces a critical challenge in ensuring electrical safety. As the country aspires to become a developed nation by 2047, its infrastructure will play a pivotal role in achieving this objective. According to a report by United Nations, the urban population in India is projected to nearly double from 461 million in 2018 to 877 million by 2050. To meet its developmental goals, India is undergoing rapid urbanization, accompanied by a surge in the use of electrical appliances in households.

Electrical safety is a critical feature of any building, especially high-risk buildings which include high-rise constructions, hospitals, educational institutions, and public buildings such as metro stations, airports, and malls among others in densely populated urban areas as accidental fires in buildings pose a big threat and continue to haunt occupants. The Central Electricity Authority (CEA) reported a total of 10,022 electrical accidents in India during 2019-2020. CEA data further suggest that 35% of accidents were reported due to the addition of loads in old buildings with existing electrical infrastructure, especially old wiring not capable of handling extra load resulting in overloading and short circuits due to excess heating while 25% accidents were reported due to electrical design, especially inadequate wires and cables sizing, circuit planning and protection devices

coordination. The remaining 40% is contributed by poor workmanship and maintenance issues in buildings.

Split Incentive is a major cause for saving costs in electrical installations in buildings. The split incentive here arises from the misplacement of incentives between the builder selecting the equipment or technologies for fire & electrical safety and the occupants who stay in a safe building. Using inferior quality electrical material, wrong selection & under-sizing of wires and cables at the time of construction is a major issue that leads to fire due to electrical hazards resulting in loss of life & property and also affects the sustenance of buildings and their long-term performance. Despite this having an impact on safety of the building, little attention has been drawn on how to resolve it and current policy interventions have made relatively little progress towards providing effective solutions.

To mitigate these risks, it is crucial to establish and enforce stringent safety standards. The Indian government introduced the National Building Code (NBC) in 2016, which outlines guidelines for fire safety in the construction and maintenance of structures. While state governments were encouraged to incorporate the NBC into their local building bylaws, the adoption of these guidelines has been partial. Similarly, the National Electrical Code (NEC) 2023 provides

guidelines for regulating electrical installations across the country, but compliance with these guidelines remains voluntary rather than mandatory.

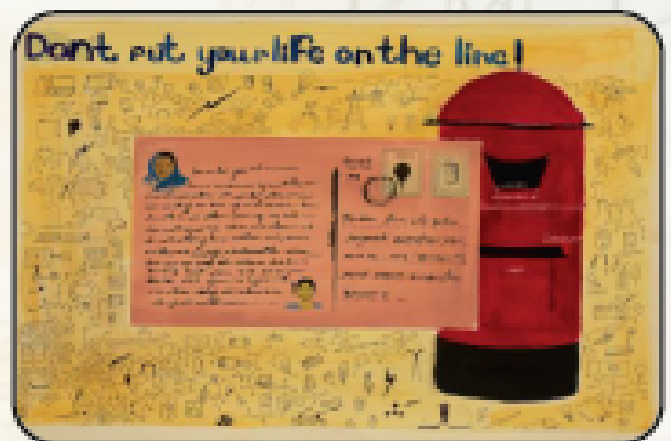
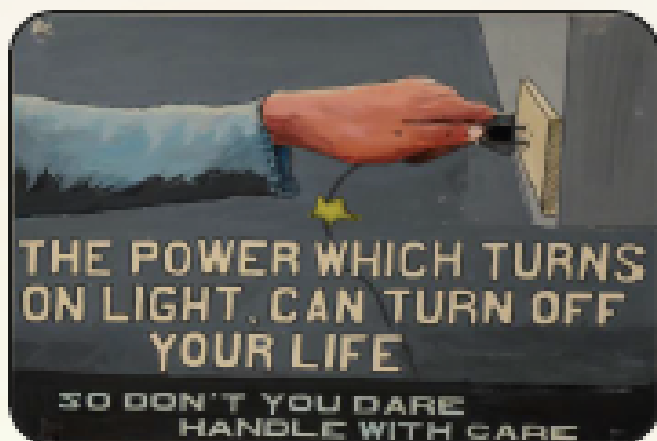
In most buildings, electrical mishaps are caused by the wrong selection of wires and cables. According to a cable performance study conducted by International Copper Association (ICA)- India on 5-to-30-year-old buildings, aluminium cables in comparison to copper cables were found to have issues such as overheating, oxidization, hot spots, termination clearance, expansion and contraction cycle, etc. highlighting a risk associated with short circuits and thereby, electrical accidents.

For this reason, the National Building Code of India states that 'Aluminium conductor cables in size less than 16 mm<sup>2</sup> causes termination problems leading to heating at the terminals and enhance the possibilities of fire. For conductor sizes less than or equal to 16 mm<sup>2</sup>, only copper conductor should be used.' Copper conductor finds larger favour in electrical installation standards of various developed nations. Singapore Electricity (Electrical Installations) Regulations specify 'The conductor shall be of copper when the cable is to be used in an installation whether wholly or partially for domestic purposes.' Similarly, the Qatar Electricity wiring code and Abu Dhabi Electricity wiring

regulations mandate only copper cables inside the buildings.

Wire and cable represent a smaller percentage of the total construction cost of a building i.e., on average 1.1% for commercial buildings and 1.6% for most residential buildings. Though using 100% copper cables in the building will add a marginal additional average cost of 0.5% for commercial buildings and 0.6% for residential buildings, it gives a significant perceived benefit of safety and reliability to consumers in the long run over other materials.

Considering the rapid vertical expansion of cities in India, it is imperative to prioritize electrical safety in urban development. This involves strict adherence to electrical safety standards & codes, by ensuring improved electrical design considering future requirements, the right selection and sizing of cables & other electrical equipment, electrical installation by an authorized person, and electrical inspection at the planning, construction, and completion stage before issuing OC / CC. By implementing robust electrical safety measures, India can enhance the well-being of its urban residents, minimize the risk of fire accidents, and accelerate its progress towards sustainable urbanization.



Painting Competition in B.K. College of Art & Craft, Bhubaneswar - 2022