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# Striking off risks

Experts say an alarming 90% of buildings in Malaysia are not complying with the official guide on lightning protection system and the Energy Commission is determined to address this issue.

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# Taking bolts too lightly

Houses and high-rise buildings still using flawed lightning protection systems

By GRACE CHEN  
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DESPITE living in a country with thunderstorms aplenty and high incidence of lightning strikes, public awareness of lightning protection is surprisingly little and general preparedness is low.

Lightning strikes kill more than a hundred people and injure many more every year.

Not only does it put lives and properties at risk, it can also result in losses and additional operational costs for businesses that may run into millions of ringgit.

In 2004, a lightning bolt shot down a chunk of concrete from the top of a block of apartments in Desa Mentari, Petaling Jaya. Debris rained down on a car parked below but residents managed to run for shelter.

Last July, water supply was cut off for half a million people in Terengganu after lightning damaged a main switch at a water treatment plant in Air Kepong.

In November, lightning was also suspected to have caused a double circuit at the 275kV Kemena-Selangau line to trip, bringing about two power outages within nine hours in Sarawak.

The most recent case saw motorists from Damansara heading towards Klang and Subang Jaya stuck in a frustrating 45-minute crawl after lightning crashed SmartTag readers at the Damansara Toll Plaza, forcing PLUS Highway staff to manually scan cards with hand-held devices.

Another concern is the widespread use of early streamer emission (ESE) rods, which are seen on many rooftops despite being declared a public safety risk in 2005 by the International Conference on Lightning Protection.

This has prompted the Energy Commission (EC) to conduct studies in Sabah and peninsular Malaysia to determine how many buildings are not following the MS IEC 62305 standards for lightning protection.

EC electrical safety regulation

## Interesting facts about lightning

- Studies of lightning hits on buildings started in 1990.
- Klang Valley was chosen as a study location for its high density of lightning flashes.
- An average bolt of negative lightning can generate enough power for 16,000 concert loudspeakers at one time.

director Mohd Elmi Anas said the exercise was initiated after technical experts expressed alarm that 90% of buildings, including those belonging to government agencies, had not conformed to specifications.

This was in spite of the fact that a circular on lightning protection standards was issued in 2011 – the same year that three wards at Hospital Putrajaya caught fire after a lightning strike.

“Eighty per cent of buildings in the Klang Valley have physical scars caused by lightning strikes,” said lightning research and development consultant Hartono Zainal Abidin, who has 35 years of experience in the field.

Studies showed that buildings with these rods had been struck and damaged by lightning bolts, proving their ineffectiveness.

Another obvious flaw seen on most houses and high-rise buildings is the sight of a single lightning rod protruding from the highest point.

This was generally believed to be able to offer umbrella protection for the entire structure, which Hartono said was not true.

The “Guide On Lightning Protection System For Buildings” published by the EC states that the correct method is to have lightning rods placed at corners and outer ridges of a rooftop.

Positioning of the rods also depends on building size, structure and the presence of rooftop equipment such as staircases, antennas and ventilation units.

The guideline lists four other major components to be looked



Sometimes, lightning damages corners and pointed features of buildings as seen in this photo.

into. This includes network conductors to carry the lightning current safely towards ground.

As a general rule, each down conductor must end in an earthing electrode which can consist of conductors (at least three) in a crow’s foot layout buried at least 0.5m deep.

It also asks for surge protection devices to be placed at main and distribution switchboards.

The EC study, expected to be completed by the end of this year, is viewed as an important step towards enhancing safety measures as lightning strikes have been known to cause property damage running up to millions, not to mention production downtime and expensive repairs.

“Voltage surge from a lightning strike can cause short circuits resulting in premature failure or total loss in equipment linked to plumbing, air conditioners, heaters, ventilation and wiring,” said Tenaga Nasional Bhd (TNB) research power quality and energy efficiency specialist Mohamed Fuad Faisal.

Even if power surges caused by lightning are not severe enough to crash an electronic device immediately, rapid overheating fol-

lowed by gradual cooling in the wiring or circuit can result in a condition known as “electronic rust.”

Known as the “silent killer” of electronic devices, it can cause enough damage to bring down entire sections of a power grid over time.

Between 2014 and 2016, TNB received 21 complaints of electronic rust caused by voltage surges.

Mohd Elmi advises owners of buildings completed before 2007 to redo their lightning protection system (LPS) assessment.

Though EC has not carried out any enforcement, under Section 50e of the Electricity Supply Act 2015, building owners found guilty of not following Malaysian standards are liable to a maximum fine of RM200,000 or two years’ jail.

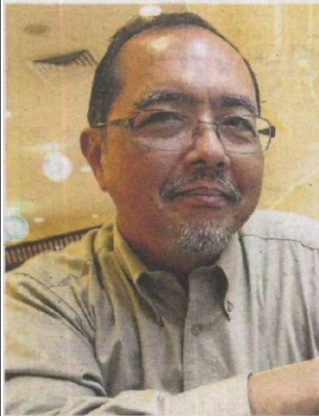
Malaysian Electrical and Electronics Association council member Lim Kim Ten said the EC study would have far-reaching consequences for building owners as they would have to bear the costs of changing their LPS if found to be non-compliant with the MSC IEC standard.

“The concept is like buying

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Lightning strike crashed SmartTag readers at Damansara toll plaza, forcing the highway concessionaire to scan cards manually. — filepic



Hartono says 80% of buildings in the Klang Valley have physical scars caused by lightning strikes.

insurance. You may not use it but you must buy it.

"Ideally, building owners should be given a grace period or have a limitation be put on the law applying to structures built after a certain year," he said.

But Lim stressed that in view of the frequency of lightning occurrences in Malaysia, there must be more awareness among



Mohd Elmi urges owners of buildings completed before 2007 to redo their LPS assessment.

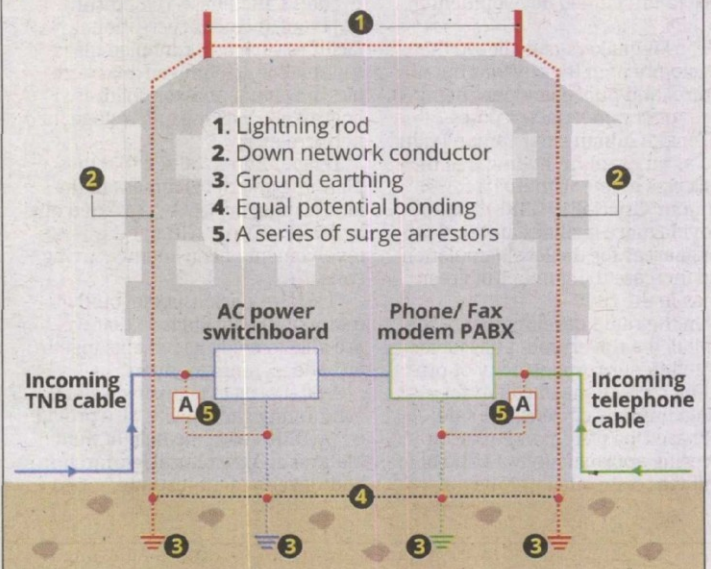
building owners.

"In countries such as Japan, South Korea and China, an LPS system adds more value to a building," he said.

Building owners are advised to deal only with LPS vendors that are certified by the EC.

For checking purposes, they can call up the regional offices that will have a list of approved companies in their registry.

## The five components of lightning protection for high-rise buildings



Source: Lightning Research Sdn Bhd and Energy Commission

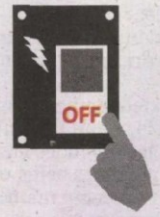
## Lightning safety guides



> **Seek shelter** upon sighting dark clouds.



> **Do not shower.** Lightning can travel through plumbing.



> **Switch off** electricity main switches.



> **Never** use an umbrella during a thunderstorm.



> **Avoid** open spaces, trees and poles.

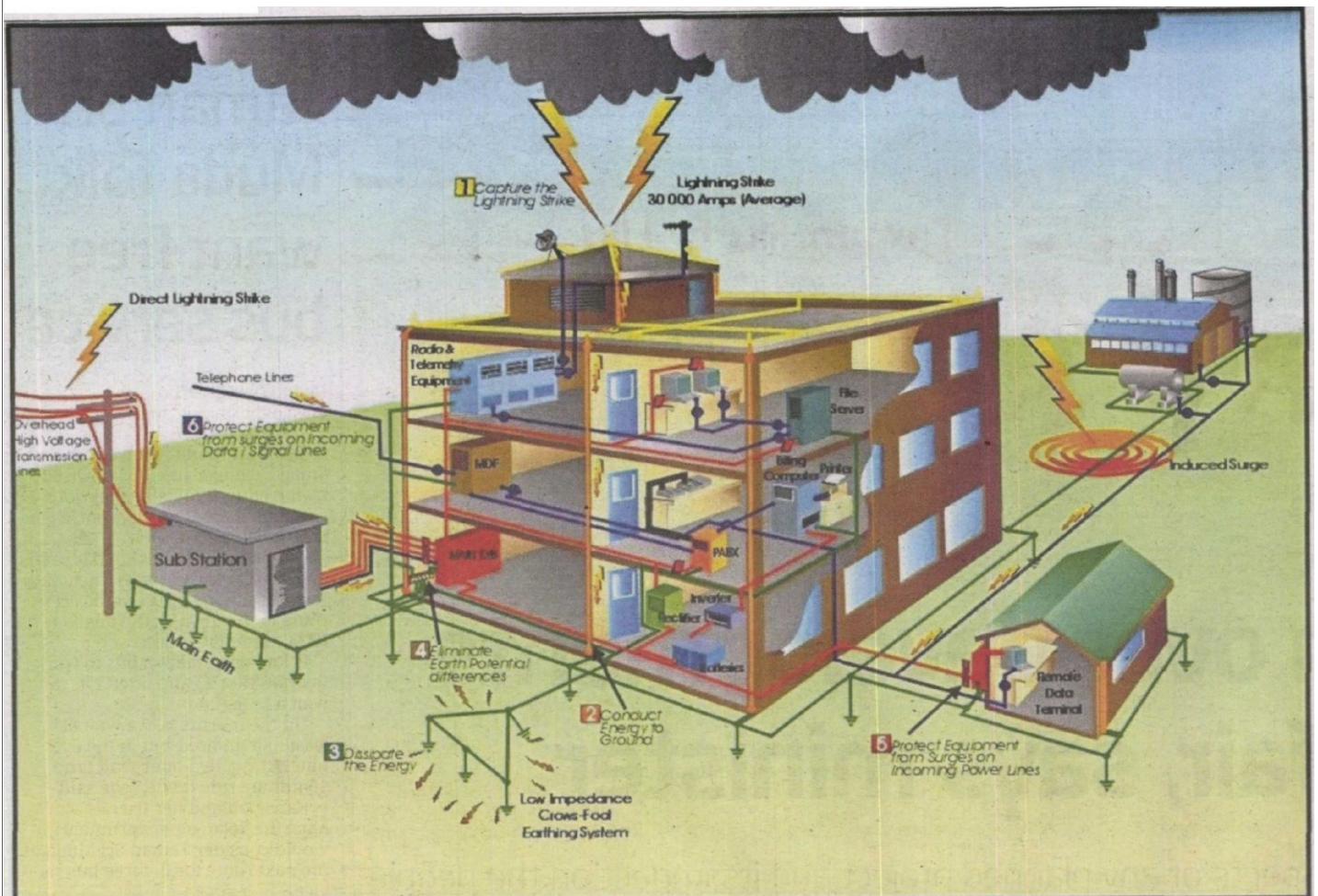


> If caught outside in a thunderstorm, **squat and close ears.** Don't lie down.

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In 2004, debris fell from the roof top of a Desa Mentari apartment block after it was struck by lightning. Luckily, a car was the only casualty. — filepic



Methodology of lightning protection as illustrated by TNB.