



Datuk Ir. Ahmad Fauzi Bin Hassan
Chief Executive Officer,
Energy Commission, Malaysia.

Datuk Ir. Ahmad Fauzi bin Hassan is the Chief Executive Officer of the Energy Commission of Malaysia since April 2010. Prior to this position, he has held several positions in the Energy Commission, namely as Chief Operating Officer, Deputy Chief Executive Officer and Director of Gas Regulation. Before joining the Energy Commission, he has also served in the Department of Electricity and Gas Supply and the Department of Occupational Safety and Health. He is a professional engineer with over 36 years of regulatory experience, including in the areas of technical, economic and safety regulation and development of the electricity and gas supply industries. He is also actively involved with industry stakeholders in the development and implementation of energy policies, plans and standards as well as in awareness programmes at the national and international levels. He is a Member of the Atomic Energy Licensing Board of Malaysia and President of the National Committee of the International Electrotechnical Commission. Datuk Ir. Ahmad Fauzi received his Bachelor's Degree in Mechanical Engineering from the University of Manchester Institute of Science and Technology (UMIST), United Kingdom, and his Master's Degree from the University of Michigan, United States of America.

Protection Against LIGHTNING

by Puji Zainha

Malaysia has one of the highest lightning ground flash densities in the world. Because of this, installing an effective lightning protection system for buildings should be one of our top priorities.

THE frequency of lightning strikes in Malaysia is one of the world's highest. According to the US-based geo-science news and information online magazine geology.com, which reproduced the National Aeronautics and Space Administration (NASA) World Lightning Map, more lightning occurs near the equator than at the poles. NASA also said that approximately 70% of lightning occurs on land in the tropics where the majority of thunderstorms happen.

Six areas identified by NASA as experiencing an unusual amount of lightning are the Democratic Republic of Congo in Central Africa, North-western South America, the Himalayan Forelands, Central Florida, the Pampas of Argentina and Indonesia. However, according to The Star/Asia News Network report dated 3 March, 2010, an American scientist and chairman of the US National Lightning Safety Institute (NSLI), Richard Kithil Jr, said Malaysia is the country with the second highest number of lightning strikes in the world.

The Energy Commission headquarters located at Precinct 2, Putrajaya.



What is certain is that our location near the equator makes it prone to thunderstorms and lightning. Unfortunately, many Malaysians are still oblivious to the dangers of lightning strikes. While this is a cause for concern, the country does have a framework in place with respect to protection against lightning.

Jurutera spoke to the Chief Executive Officer of the Energy Commission of Malaysia, Datuk Ir. Ahmad Fauzi bin Hasan, who shared at length the country's regulatory framework to mitigate the risks associated with lightning strikes.

The Energy Commission (EC) is the statutory body regulating the energy sector particularly the electricity supply and piped gas supply industries in Peninsular Malaysia and Sabah. Sarawak does not come under the purview of the EC, as the state has its own regulatory body for electricity and gas supply.

REGULATING ELECTRICITY SUPPLY

Datuk Ir. Fauzi says: "Malaysia has the mechanism and framework for buildings to be installed with lightning protection system. All buildings should have the system installed."

He adds that the installation of such systems in buildings in the country is at a reasonable level and that the country has consultants and engineers for the design of buildings in terms of protection against lightning.

He says in regulating the electricity supply industry, the EC ensures that transmission lines are equipped with lightning arresters. "This is very much regulated by us. Because of this, there haven't been many incidents resulting in the failure of the power system due to lightning strikes, especially in the peninsula. We are reaching a level of control with regards to lightning causing electricity surges in voltage level."

Datuk Ir. Fauzi notes that industry players, including those in information technology, electronics and manufacturing, are not pleased when power quality-related incidents happen. "These power quality surges may be due to lightning. There is no interruption of supply permanently but surges are still a concern," he says, reiterating that the EC is now going to a higher level to mitigate power quality issues further so that high-tech industries can be set up in the country.

He adds: "The situation in Peninsular Malaysia is good. Sabah is not there yet in terms of lightning protection systems. The state is still experiencing lightning surges, with localised interruptions in supply."

LIGHTNING INCIDENTS

The increase in the number of accidents at electrical installations in the country is a concern. This year alone, 24 accidents have been reported so far. Fourteen of these involved deaths due to electrocution.

"This figure is quite high for just the first part of the year. There were 64 accidents in the whole of last year. If possible, we don't want more than 50 accidents this year. We'd like the figure to be even much lower. Getting zero

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accident rate may not be possible but we are gearing up to reduce and even eliminate incidents involving electricity. We are always continuing to look at ways to improve the standard of safety in the supply and use of electricity," he says.

As for lightning incidents, on and off, the media has reported cases of lightning strikes that has caused damage to buildings. One such high profile case was the Putrajaya Hospital incident in 2009. A fire broke out at the orthopaedic ward after the hospital was struck by lightning. The staff managed to evacuate all 14 patients in the ward before the ceiling collapsed. Although no one died in the incident, it triggered a public outcry over the safety protection of the country's buildings against lightning.

Several schools and commercial buildings had also been damaged by lightning in the past, causing anxiety among the public on the effectiveness of lightning protection systems.

LIGHTNING PROTECTION ENFORCEMENT

Datuk Ir. Fauzi says there have been disputes on the effectiveness and acceptability of conventional and non-conventional lightning protection systems, adding that such disputes have been raised, not only in Malaysia but also at international levels.

"We are definitely concerned over the issue of lightning protection, which has not been fully addressed, even internationally, to such an extent that safety in the electrical system is compromised. One way to address this is to make lightning protection more effective," he says. "The matter was brought up to the Cabinet and, in 2010, the Ministry of Science, Technology and Innovation (MOSTI) met with the relevant agencies, including the EC to look at ways to resolve the issue."

In Malaysia, says Datuk Ir. Fauzi, it has been a normal practice that the installation of lightning protection systems on buildings are based mainly on the expertise of mechanical and electrical consultants with respect to design and installation requirements if there are no specifications provided by the implementing agencies. In fact, up till last year, there was no specific directive issued by relevant authorities here with regards to lightning

protection system designs or installation.

As such, he says, the EC, which is responsible for regulating the energy industry, initiated measures last year to address the issue in line with Section 47 of Electricity Supply Act 1990 (Act 447). Section 47 has a provision on Precautions Against Atmospheric Electricity, which states:

“Any department of the Federal Government or any State Government or any other consumer taking or using electricity from any installation shall, if the Commission so requires, provide such means for obviating any risk of damage to such installation by atmospheric electricity as may be directed by the Commission or as may be prescribed by regulations under this Act”.

With this provision in the Act, the EC has been entrusted with looking into means of reducing the risks associated with lightning strikes. This is in line with the functions of the EC, which is governed by the Energy Commission Act 2001, and the subsequent amendments and regulations pertaining to four key areas, namely Economic Regulation, Technical Regulation, Safety Regulation and Customer Protection.

LIGHTNING PROTECTION SYSTEM STANDARDS

One of the regulatory means towards achieving the objective of reducing risks associated with lightning strikes, is to ensure that parties involved in building development and construction, adhere to the necessary technical standards on lightning protection.

Datuk Ir. Fauzi says MOSTI came into the picture to develop a Malaysian Standard (MS) for lightning protection based on the International Electrotechnical Commission (IEC) new lightning protection standard, IEC 62305. In 2007, MOSTI endorsed the IEC 62305 as the new Malaysian standard, MS IEC 62305.

“We’ve had that standard in place as far back as 2007 for use as the basis for the design and installation of lightning protection systems. We issued a circular in 2011 with the instruction for all to comply with MS IEC 62305 with effect from 1 September, 2011,” he says.

Before the circular was issued, the EC consulted with relevant agencies and institutions, such as the Public Works Department (PWD), the Ministry of Urban Wellbeing, Housing and Local Government, SIRIM, Centre of Excellence on Lightning Protection (CELP) of Universiti Putra Malaysia (UPM) and MOSTI to get feedback on the suitability of and the need for mandating the standard.

In fact, the first Malaysian lightning protection standard, the MS 939 (which was based on the British Standard, BS

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6651), was developed as far back as 1984. It was used until 2001, when MOSTI endorsed the IEC 61024 lightning protection standard as the new MS IEC 61024.

Meanwhile, the use of some means of ionisation to induce the formation of streamers to intercept lightning strikes, such as the Early Streamer Emission or ESE lightning protection system, became popular around the world and in

Malaysia. However, in 2005, the International Conference on Lightning Protection (ICLP), a scientific body that specialises in lightning and lightning protection, issued a global warning about the dangers of using the ESE system and other non-conventional lightning protection technologies.

In the interest of public safety, that same year, The Association of Consulting Engineers Malaysia (ACEM) issued an advisory to its members against the use of the ESE and other non-conventional lightning rods.

In 2006, the IEC published the new lightning protection standard, IEC 62305, and instructed all members to revoke any lightning protection standard that did not comply with the new standard, within three years (i.e. by 2009). In line with this, MOSTI endorsed the IEC 62305 in 2007 as Malaysia’s new lightning protection standard (known as MS IEC 62305).

The standard has four parts and provides comprehensive guidelines for the design and installation of lightning protection systems for various types of structures, from domestic houses to large building complexes. The guidelines cover the aspects of protecting buildings and equipment from lightning hazards due to both direct and indirect strikes.

GUIDELINES TO STANDARDS

Datuk Ir. Fauzi says: “MS IEC 62305 is very detailed and comprehensive, in terms of technical requirements. Not all can comprehend and put in practice the requirements. It covers a lot with regard to levels of risk assessments such as the need to calculate the risk levels, for example financial loss and the loss of lives, which are not easy to define.

“We need specialists to decipher these. That’s why we came out and published a book on guidelines to the MS IEC 62305 in 2014. These guidelines are meant to help consultants, owners of buildings and the public such as contractors, who are not specialists in lightning protection system, to understand the MS IEC 62305. You will still need to have a certain level of technical knowledge to understand it but reading the guidelines is a good start to understand the standard.



Guidelines published by the Energy Commission: Guide on Lightning Protection System for Buildings (right) and Guide for Safe Work Procedures for Electrical Work.

"UPM's Centre of Excellence on Lightning Protection was again roped in to prepare the guidelines for us. There were many other parties involved too. Both professional and non-professional bodies, industry players and consumers were called in to contribute towards the guidelines. Subsequently the guidelines were published and disseminated to all concerned."

ENHANCING AWARENESS

Last November, the EC organised a symposium on Protection Against Lightning, in collaboration with IEM. "Hopefully it has helped raise awareness among those concerned, to put in place an efficient and effective lightning protection system in the country," says Datuk Ir. Fauzi.

"To improve the country's lightning protection practices, we need to start enforcing provisions of Section 47 of Act 447 on Precautions Against Atmospheric Electricity. For that, we have issued directives on the standards for the relevant parties to follow. We hope consultants, engineers, architects, developers and building owners will abide by our directives and adopt MS EC 62305 for the design and installation of lightning protection systems. They must comply with the standards. How else will we improve? There's a lot more to be done. We will continue enhancing awareness among all relevant stakeholders."

He said engineers play a big role as they are very much the decision makers in the design and development of buildings here.

"They can work with developers, building owners and consumer groups to create a better understanding of lightning protection systems and to try and improve the level of effectiveness of the system for the country. They can also work with local authorities and government agencies to make it a standard requirement to have a proper lightning protection system installed."

CRUCIAL COLLABORATIONS

According to Datuk Ir. Fauzi, the EC also approached the Ministry of Urban Wellbeing, Housing and Local Government to incorporate the MS requirements in the bylaws that come under the purview of local authorities. "Some have already included in their building bylaws, the provision for the MS as a basis for developing and installing lightning protection systems. Of course, this depends on the various states to adopt the bylaw for their own requirements and to compel the industry and all concerned to abide by this. You need to apply the carrot-and-stick approach; while trying to promote the awareness programme on the standard and getting them to adopt it voluntarily, you also must apply the 'stick' to make them comply," he says.

The EC, says Datuk Ir. Fauzi, will address the lightning protection system issue as much as it can, based on the relevant provision of Act 447. "Everything to do with building construction, not just lightning protection system, is a big challenge because you have many aspects to consider, especially when it comes to optimising cost. The other aspect is the aesthetic requirement, as you wouldn't want the installation to mar the appearance of a building. There are also many other factors, including energy efficiency, safety and maintainability. People in the business know the various factors... architects, engineers (mechanical, electrical and civil)... there are many parties involved. All must work together and collaborate to get the improvements done," he says.

KEEPING TRACK

While acknowledging that the implementation of lightning protection in the country is at a reasonable level, Datuk Ir. Fauzi says a study has not been carried out to compare this with that in other countries. "We will try to carry out a survey to determine our status in terms of lightning protection system effectiveness. We will only know how much we need to improve if we do the survey."

Since Malaysia records high occurrences of thunderstorms and lightning strikes, we need to be active in keeping track with the development in lightning protection systems. When it comes to the ESE lightning protection system, MS EC 62305 is neutral.

Datuk Ir. Fauzi says: "This does not mean you cannot use ESE or the rod system. If you comply with the MS and position the terminal as required by the standard, it should be fine. That is the international standard at the moment. There's on-going debate in the world about ESE. There are many parties doing research on ESE. There are even court cases related to the standard in the US, for example. We should learn from all these developments and follow only the good practices. How will we know whether the practices are good or not? We follow the internationally accepted standards. That's why we came out with MS EC 62305 in the first place."

REACHING OUT

The EC also has the monumental task of reaching out to industry players and some 8.2 million customers of TNB. Datuk Ir. Fauzi reaffirms the EC's commitment to continue with its outreach programmes. "We've just launched a programme this year through the media (newspapers and radio) to reach out to and advise the people on electrical safety."

He suggests that IEM and the EC should work together to increase awareness of and to promote good practices in the effort to improve safety performance in the energy sector.

He says: "We have a good scheme under the law to control good practices for electrical installations. We have the provision for competent persons in many categories, such as engineers, supervisors, chargemen, wiremen and cable jointers. In terms of regulating knowledge and skills of industry players who work with electrical systems, we have the framework of certification by the EC."

The EC licenses all organisations, including big licensees such as TNB and local distributors, which want to supply electricity. The EC also registers electrical contractors as well as certain categories of electrical installations, for example 11 kV installations and those with standby generator sets.

Datuk Ir. Fauzi says: "Those who install and operate these must register with us so that we can monitor their safety management practices. We also regulate the importation, manufacturing, advertising or sale of electrical equipment for household use. The products must have our approval and SIRIM-ST certification label before they can be sold to the public. We have quite a rigorous regime to ensure that the supply and use of electricity is done in a safe manner through our legal framework. Engineers are required, in the scheme of things, to ensure that safe infrastructure and equipment are installed, operated and maintained effectively in this country."

TRAINING AND DEVELOPMENT

For human capital development in the electrical sector, the EC has accredited more than 100 training institutions to conduct electrical competency programmes. These are mostly government institutes or are supported by the government, such as Institut Kemahiran Mara and Institut Latihan Perindustrian. These institutions conduct training for chargemen, wiremen and other technical positions in the field. The training is hands-on, with full-time and part-time programmes available.

Datuk Ir. Fauzi says that as a professional body for engineers, IEM can help the EC in educating and disseminating good practices on lightning protection. "Come and talk to us if IEM wants to conduct training in this area. We can collaborate through training programmes for electrical systems," he says.

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"IEM can offer programmes to instill competency that complies with our legal requirements. If we can do this, it will be very good for the country as I feel that the implementation of electrical installation safety standards needs to be improved further. The cost factor is a big challenge in improving compliance to the standards."

SAFETY AND COMPLIANCE CONCERNS

There is also a guideline to another relevant standard, i.e. MS IEC 60364 pertaining to electrical installation of buildings. The EC has also issued guidelines to this standard. According to Datuk Ir. Fauzi, this must be complied by those who design and install electrical systems in buildings.

"These guidelines were developed in-house to explain the standards. We worked with industry associations such as The Electrical And Electronic Association of Malaysia (TEEAM) and other relevant parties to get their input when developing the guidelines and to help us disseminate information on the standards," he says.

"We have organised roadshows to explain the guidelines on both MS IEC 62305 and MS IEC 60364, so developers and other related industry players should already be aware of the guidelines by now. Hence, if they still do not follow the guidelines, we will have to take the necessary follow-up actions."

Datuk Ir. Fauzi says IEM members, in particular, should be well-versed in both systems – electrical installation of buildings and lightning protection.

"Electrical safety is a specialised area involving high risks, so you are required to be competent. When it comes to installation, operation, maintenance and repair, you need competency certificates. At present, engineers designing electrical installations are not required to register with the EC but if, in the future, engineers do not incorporate the safety standards in their designs and we find buildings with sub-standard protection systems, we may need to do something," says Datuk Ir. Fauzi.

"We may be compelled to pursue more effective measures, such as requiring electrical engineering consultants to be registered with the EC. This issue has been long debated. We hope we can all work together and contribute to upgrading the professionalism of engineers in this country." ■