



Talk on SF₆ Gas Management and Handling for High Voltage Switchgear, Controlgear and Assemblies
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On 24th February, the IEM Electrical Engineering Technical Division (EETD) has successfully organised the second Saturday talk of the year 2018 on “SF₆ Gas Management and Handling for High Voltage Switchgear, Controlgear and Assemblies” at Wisma Chin Fung Kee, Wisma IEM. The speaker was Mr. Sethuraman Muthukaruppan from TNB Grid Division. The talk was attended by 51 participants.

Mr. Sethuramana divided his talk into four main topics. He started off by presenting on the effects of SF₆ on the environment. A quick revisit on the definition of greenhouse gas (GHG) was first done. Then, he introduced the Global Warming Potential (GWP) term which is a measure of how much a given mass of GHG contributes to the greenhouse effect relative to carbon dioxide (CO₂). SF₆ was shown to have exhibited 22,200 GWP. Mr. Sethu then briefly highlighted Kyoto Protocol, COP15, 1997 SF₆ Voluntary Commitment and 2005 SF₆ Voluntary Commitment before zooming into how European Union regulates SF₆.

The second topic was centred around the characteristics of SF₆. It is colourless, odourless, inert, non-toxic, not flammable, not corrosive and possesses excellent arc-quenching and insulation properties. This explains why SF₆ is such a good choice for arc-quenching and insulation applications in high voltage switchgears. However, one has to take note that SF₆ may react with the electrodes or the surface of the materials in a gas filled electric equipment during arc-quenching resulting in production of metal fluorides and sulphur dioxide gas (SO₂). For such occurrence, he recommended that the fluorides powder to be cleaned with dry vacuum cleaner whereas the gaseous decomposition products to be cleaned with filters in the gas compartment together with dry filters in the service cart. He then shared on the specifications of new SF₆ based on IEC 60376 and specifications of reuse SF₆ based on IEC 60480. Following up with the latter, Mr. Sethu presented on 3 scenarios pertaining to the concept of reusing SF₆. They are direct reuse on site, regeneration and disposal of SF₆.

In the third topic, the speaker talks about how to zeroing down SF₆ emission. The first step has to be measuring the gas quality with gas analyser. This is crucial to monitor the gas quality and also to aid in deciding whether the recovered gas is suitable to be reused on site or to be regenerated or to be disposed. Practically, one would measure the dew point and gas pressure. There is a strong need to monitor usage of the said gas based on environmental and economical aspect on top of the technical aspect. Disposal of SF₆ can only be done via incineration.

Due to the high GWP of SF₆, alternatives to the said gas have been explored and researched. In his last topic, Mr. Sethu introduced a potential alternative known as g3 which stands for green gas for grid. This alternative mixes Novec 4710 with carbon dioxide to produce the g3 gas which only has GWP of 400 in addition to possessing other strengths of SF₆ such as non-flammable, high chemical and thermal stability and excellent dielectric performance. Most importantly, the handling procedure is similar to that of SF₆ which means that the migration from the former to the latter gas is actually much more viable. As of April 2017, revision of IEC 62271-1 has started introducing the distinction of parts in oxidising gas and non-oxidising gas to replace the former air and SF₆ categories.

Figures below depict the participation rate as well as the presentation of a token of appreciation from EETD to the speaker.



EETD committee presenting a token of appreciation to the speaker