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1:45pm -3:15pm**

Responsible Use of SF₆ – Challenges and Options

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The electric energy demand is growing fast and this means electric energy is getting more and more important for us. A long term power supply concept is needed to guarantee the reliable supply of electrical energy for future generations. Environmentally accepted solutions will be a key issue and the economic and reliable supply of electricity will be required by public and policy.

Today's high-performance gas insulated switchgear offers high switching capabilities and low environmental impact. Minimized transmission losses and high gas tightness are features of state-of-the-art equipment using sulfur hexafluoride (SF₆). SF₆ has become an indispensable component in high voltage switchgear used as an insulating and arc quenching gas. With the properties of SF₆, the high performances of small size and high switching capability can be reached. The use of SF₆ provides high performing switchgear equipment which would not be available without SF₆. The very high insulating capability makes the equipment compact, and the very high arc quenching capability of SF₆ allows very high rated and short circuit currents.

Gas insulated high voltage switchgear has been proven for high gas tightness since its introduction more than 40 years ago. The high quality of the sealing system and the gas compartment housings offers gas tightness values much better than the IEC requirements of less than 0.5 % per year per gas compartment. Long time measurements show that equipment of GIS got leakage rates of <0.1%/year/gas compartment, which means that no gas refill is required for the expected long lifetime and, furthermore, the environmental impact is very low.

The compact design reduces the amount of required SF₆ gas to a minimum and requires little space for the installation.

The modular design of the switchgear permits flexible adaptation to any single line configuration and problem-free extensions, which, in the end, reduces the amount of SF₆-gas and possible emission.

Beside the quality of the design, manufacturing and installation on site, an important impact on the reduction of SF₆ released to the atmosphere is coming from the SF₆ gas handling. This includes the SF₆-handling process and the service equipment, like maintenance units or gas quality measurement instruments.

First fillings or the refilling after maintenance are possible sources of SF₆ released to the atmosphere. Reports including from CIGRÉ have been published on how to handle SF₆ to assure

a minimum of SF₆ releases to the atmosphere. In addition, a newly published CIGRE "SF₆-tightness guide" is available, giving advice how to keep the high voltage switchgear gas-tight for the whole lifetime.

SF₆ is a greenhouse gas, which deserves careful and responsible treatment in its whole life especially as it does not age. Therefore, a lot of improvements on the equipment and handling have been made to reduce significantly the SF₆ emission. The paper will describe technical design features of GIS and measures to reduce SF₆-emissions coming from handling the gas.

SF₆-emission is the sum of SF₆-leakage of the equipment itself and SF₆-handling losses.

In addition to international technical standards, regulation implemented on SF₆ will be mentioned and how they are adopted for practical use.

The tutorial gives a complete overview of challenges and options regarding the use of SF₆ to find the perfect solution for the functionality of the gas insulated high voltage switchgear and the involved environmental aspects.

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