

## Sustainable Development of HV Substation in Urban Areas Considering Environmental Aspects

**Authors :** Mahdi Naeemi Nooghabi, Mohammad Tofiqu Arif

**Abstract :** Gas Insulated Switchgears by using an insulation material named SF<sub>6</sub> (Sulphur Hexafluoride) and its significant dielectric properties have been the only choice in urban areas and other polluted industries. However, the initial investment of GIS is more than conventional AIS substation, its total life cycle costs caused to reach huge amounts of electrical market share. SF<sub>6</sub> environmental impacts on global warming, atmosphere depletion, and decomposing to toxic gases in high temperature situation, and highest rate in Global Warming Potential (GWP) with 23900 times of CO<sub>2</sub>e and a 3200-year period lifetime was the only undeniable concern of GIS substation. Efforts of international environmental institute and their politic supports have been able to lead SF<sub>6</sub> emission reduction legislation. This research targeted to find an appropriate alternative for GIS substations to meet all advantages in land occupation area and to improve SF<sub>6</sub> environmental impacts due to its leakage and emission. An innovative new conceptual design named Multi-Storey prepared a new AIS design similar in land occupation, extremely low Sf<sub>6</sub> emission, and maximum greenhouse gas emission reduction. Surprisingly, by considering economic benefits due to carbon price saving, it can earn more than \$675 million during the 30-year life cycle by replacing of just 25% of total annual worldly additional GIS switchgears.

**Keywords :** AIS substation, GIS substation, SF<sub>6</sub>, greenhouse gas, global warming potential, carbon price, emission

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