SF_6 Emission Reduction Partnership for Electric Power Systems

Electric Power Systems—SF_6 Project Profiles

SF_6 Mitigation Project:

Substation Decommissioning Project: SF_6 Recovery and Reclamation

SF_6 Partner:

Duquesne Light Company

Partner Bio:

Duquesne Light Company serves more than half a million customers in southwestern Pennsylvania with a network comprised of more than 300 major substations, 103,000 transformers, and more than 670 transmission miles.

Project Background/Objective

The Carson Substation was originally built about 25 years ago to provide power primarily to two very large arc furnaces that were operated by a local steel production facility in Pittsburgh. After nearly three years, the steel company ceased operation and closed the facility. The equipment at the Carson Substation was used only sparingly since the steel company closed. Attempts were made to have the transformers serve as standard 345-138KV autotransformers; however, because they were originally purchased with a lower than normal impedance, they were not sufficient for operation on Duquesne Light's system. Consequently, the transformers and the gas insulated bus that supplied them with power were deemed obsolete. Duquesne Light decided to make better use of the space by installing a new, more applicable transformer. In 2004, having considered the environmental impact of the idle equipment containing SF_6 gas, Duquesne Light developed plans to decommission the substation, which included proper SF_6 gas recovery and reclamation methods.

This project is one example of many being executed by SF_6 Partners. Other SF_6 Partners are urged to share their stories; please submit your request to the EPA Program Manager. Contact information can be found on the program's Web site at:

www.epa.gov/electricpower-sf6

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Quick Facts

Scope	• 2 dual pressure circuit breakers each filled with 1,600 pounds (liquid weight) of SF_6 (based on nameplate capacity) • 1 gas filled bus with an estimated 8,711 pounds of SF_6 (based on gas density) • Equipment idle for more than 25 years
Vendors	• Airgas (and their contract vendor, Xenon Specialty Gas)
Total Nameplate Capacity	• Approximately 12,000 pounds (i.e., sum of the breakers (3,200 lbs) and gas bus (8,711 lbs))
Project Duration	• One week in February, 2005
Conditions	• Work performed during relatively cold weather, average air temperature of approximately 20 degrees Fahrenheit.
Gas Recovery Process:	• Gas removal contractor used gas carts to recover and transfer SF_6 gas from the substation into 106 recovery cylinders for shipment. Recovery pulled the system into a 24" Hg vacuum and the breakers were subsequently re-pressurized with nitrogen.
Gas and Equipment Disposal	• Recovered SF_6 reclaimed to ASTM D2472 standards at a facility in Tennessee. Reclaimed SF_6 sold to Airgas and their contract vendor for their own use. • Retired equipment scrapped; scrap metal sold
Project Costs	• Project cost offset by a credit for each pound of gas recovered and reentered into supply chain. • Final cost for the SF_6 gas removal was $48,000
Cost Savings/ Benefits	• No immediate cost savings associated with this project; however, an environmentally conscious method for dismantling SF_6 containing equipment prevents significant SF_6 emissions. • Space made available for new transformer to be installed that is more applicable to Duquesne Light's current customer base.

Environmental/Climate Benefits

Proper recovery methods removed the entire quantity of SF_6 remaining in equipment. Approximately 7,300 pounds of SF_6 were removed that would have otherwise been lost to the atmosphere had Duquesne Light not chosen to invest resources to decommission the substation in an environmentally responsible manner. This quantity is equivalent to close to 80,000 metric tons of carbon dioxide ($MTCO_2$), and in terms of climate protection is the same as preserving 650 acres of forest from deforestation, not driving 17,000 passenger cars for one year, or reducing electricity use by 50 percent for one year for 5,000 households.

Important Project Tips

- Be involved in the daily operation of the gas recovery work in order to have a good working knowledge of the exact procedures.
- Make a pre-recovery inspection of all pressure gauges and identify a specific vacuum level as a cutoff point to ensure that adequate vacuums are pulled and all gas is recovered.

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