

# Reduce SF<sub>6</sub> emissions —and save money



## A utility/EPA partnership program promises multiple benefits

Imagine an environmental program that is entirely voluntary (at least for the moment) and has: (1) relatively simple, straightforward reporting requirements that are not overly burdensome; (2) the potential to save—rather than cost—money; and (3) a potential benefit for the environment, with attendant public relations advantages for the utility.

Impossible? Not according to the utilities that are participating in the US Environmental Protection Agency's (EPA) SF<sub>6</sub> Emissions Reduction Partnership for Electric Power Systems. Officially launched in April 1999, the program now has 56 participating utilities—including some of the largest in the country: Pacific Gas & Electric Co, San Francisco, Calif; Southern Company, Atlanta, Ga; Florida Power & Light Co, Juno Beach, Fla; Wisconsin

Electric Power Co, Milwaukee, Wis; and Cinergy Corp, Cincinnati, Ohio. Dozens of smaller public utilities are also involved.

"We love the fact that the program is voluntary. It enables us to build a relationship with the EPA, plus work toward doing something positive for the environment," says Tammy Jett, senior environmental scientist, Cinergy Corp. "[The program] really has taken something we wanted to do anyway, and given us a structure to get it done. It also puts us in a position where we don't put it off—it is that little push we need to get it done."

What Cinergy and other utilities have tried to accomplish since the cost of SF<sub>6</sub> gas skyrocketed (from about \$3/lb in 1995 to as high as \$30 in recent months) is reduce emissions from leaky SF<sub>6</sub> transmission equip-

ment, says James D (Dave) McCreary, senior engineer, American Electric Power Co, Columbus, Ohio, another major participating utility.

SF<sub>6</sub> (sulfur hexafluoride, for those not familiar with transmission-side equipment), is a gaseous dielectric used in large circuit breakers, gas-insulated substations, and switchgear. This equipment is used extensively in transmission systems, but rarely on the distribution side. SF<sub>6</sub> has many benefits for transmission equipment: high dielectric strength, potent arc quenching properties, and low chemical reactivity at temperatures below 200C. It is nonflammable at temperatures below 500C, nontoxic to humans, and easily liquefied at room temperature. And, the gas has carbon-reducing and self-healing properties.

Because SF<sub>6</sub> is such a useful gas, it

has been very popular in the manufacture of high-voltage switches and other equipment. Its arc-reducing ability allows equipment to be built much more compactly, allowing for easier storage and installation.

Scientists believe that SF<sub>6</sub> is a "highly potent greenhouse gas." According to EPA, over a 100-yr period, SF<sub>6</sub> is 23,900 times more effective at trapping infrared radiation in the atmosphere than an equivalent amount of CO<sub>2</sub>. "SF<sub>6</sub> also is a very stable chemical with an atmospheric lifetime of 3200 years," the EPA reports on its Web page devoted to the partnership ([www.epa.gov/highgwpl/sf6/partnership\\_overview.html](http://www.epa.gov/highgwpl/sf6/partnership_overview.html)).

For once, environmental concerns and economic drivers seem to have coincided, rather than clashed. When EPA asked utilities to join the voluntary reduction program, they responded favorably.

"The partnership encourages utilities to better manage SF<sub>6</sub>, get a better handle on what is in their system, and find cost-effective means to reduce loss," says Eric Dolin, program manager, EPA Climate Protection Div, and manager of the partnership.

In July, EPA invited more than 1000 utilities to join the 56 who have already signed up. To join the partnership, utilities must approve a memorandum of understanding (MOU) that outlines the duties of both sides. For utilities, these responsibilities include:

- Seeking technically and environmentally feasible actions to reduce SF<sub>6</sub> emissions.
- Appointing a single representative to work with EPA.
- Where possible, estimating SF<sub>6</sub> emissions during one of the years between 1990 and 1998 and choosing the year for which the most accurate information is available. (This year's numbers will be the utility's benchmark for emissions reduction efforts.)
- Submitting an annual progress report yearly between Jan 1 and Mar 31.

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■ Providing to EPA, in the first report, the total estimated nameplate capacity of SF<sub>6</sub> in pounds for its equipment in service.

■ Taking emissions inventory annually and reporting those in a standard protocol provided by the EPA.

■ Developing and distributing a company-wide policy for the handling of SF<sub>6</sub>.

■ Implementing handling policies within one year.

■ Within 18 months of signing the MOU, establishing and submitting an emissions reduction goal, using the utility's starting year as the base.

■ Sharing information on successful emissions reduction strategies with EPA and other utilities.

In return, the EPA will track the reports, provide information to the utilities, and hold an annual conference for participants. The first such conference is scheduled for Nov 2-3 in San Diego.

A utility can withdraw from the partnership with 30 days' notice, with "no penalties or continuing obligations," according to the MOU.

The first set of annual reports is being collected and collated this summer. EPA plans to compile and pub-

## OPERATIONS

lish the early reports prior to the November SF<sub>6</sub> conference.

"Among partners who submitted data for 1999, the amount of SF<sub>6</sub> in their systems and the amount that made it into the atmosphere varies significantly," Dolin says. "Percentage-wise, leak rates range from zero, for some utilities that just don't have any leaks, to 40% for some—and everything in between. This tells us that there is a lot of room for improvement, especially since many of the leakage rates were between 5 and 15%."

"This is the first time we have had any solid numbers ourselves," says Jett. "From our initial calculations, we figure we were paying about \$385,000/yr for gas we were emitting into the air. Some we won't be able to stop, but our goal is not to get rid of all of that at once. We are looking to reduce our emissions by 20% [from our 1999 levels] prior to the year 2009."

In AEP's case, there wasn't as far to go, says McCreary. "Basically, we're one of the lower ranking utilities on leakage. We're at about the 5% rate right now. We have a base year of 1996 when we were around 10% leakage, so

we've already reduced the rate by 50%. The two most effective things we did to reduce SF<sub>6</sub> leakage was replace older, leaky equipment with newer equipment, and use the new laser imaging cameras. That is a good method for finding leaks." McCreary says AEP expects to save about \$70,000/yr by reducing SF<sub>6</sub>, after joining the EPA partnership.

The laser-imaging camera mentioned by McCreary was developed by Electric Power Research Institute, Palo Alto, Calif, to help locate SF<sub>6</sub> leaks. Leaks are sometimes hard to pinpoint, even though equipment gauges show when gas is escaping. "SF<sub>6</sub> absorbs radiated energy and it appears as black smoke on the new video camera," McCreary says. "This makes it possible to pinpoint very small leaks." Because the cameras are quite expensive (in the \$100,000 range), McCreary leases them from other utilities or companies that provide them.

Cinergy doesn't use the camera, Jett says, because it's relatively easy to determine which devices are leaking and the company decided to replace the equipment with the highest emis-

sions first, rather than trying to find the tiny leaks in old equipment.

"The way we pinpoint bad equipment is by tracking how much SF<sub>6</sub> we have been adding to it," she says. "Our crews are on a schedule. They go out every Friday to replace the gas that has leaked. That's another way we can save money with this program, by not spending so much on crews to go out and replace gas."

If a utility is losing \$70,000 to \$500,000 of expensive gas annually, it doesn't take much of a push to get it to stop. That's why the EPA had little difficulty in signing up the first 50 or so utilities. With representatives of those companies saying the program is not onerous, the reporting fairly simple, and the cost saving real, it seems likely many more will be joining as EPA begins to push the program nationwide prior to the November conference.

And, it even makes global-warming proponents happy—not an easy task these days. ■ —Warren Causey

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