Environmental Impact of Precipitator Energy Savings

We all benefit from the net reduction in pollution created by the use of our Precipitator Optimization System.

By Michael Neundorfer, President
Neundorfer, Incorporated

Electrostatic precipitators use electric energy to charge and collect airborne particles, including fly ash and chemicals that are environmentally undesirable. While the precipitator power used is relatively low, its powering contributes to the use of fuels that cause air pollution. By optimizing precipitator power needs to match varying generating load, precipitator fuel consumption is reduced. The result is a reduction in air pollution and fuel consumption. The fuel saved offers an economic benefit to the operator, and the pollution reduction benefits our shared environment.

Industries traditionally have operated their precipitators continuously at full power. Many of Neundorfer's customers now use Precipitator Optimization System (POS), to automatically match the amount of precipitator power used to their process needs. Neundorfer's POS includes voltage and rapper controls and monitoring devices, as well as software providing optimization algorithms.

Precipitator Optimization System software includes convenience features permitting the centralization of precipitator monitoring and control functions as well as the optimization feature. About two-thirds of POS users have not implemented optimization at the time of this report.

They use POS as a convenient, centralized method for controlling and monitoring precipitator functions.

There are several issues to consider when assessing the impact of precipitator energy optimization on the environment.

The issues include:
Does reduced power operation increase particulate emission? If so, by how much? How much pollution is avoided because the precipitator energy is not used? How much fuel can be conserved?

By avoiding energy use, the economic and environmental costs of producing it are avoided.

Opacity levels indicate air pollution and relate to precipitator collection efficiency. In some installations, the question of particulate emission under reduced precipitator power is easily answered because reducing precipitator power also reduces opacity. Generally, reduced mass emission results in reduced opacity. Too much precipitator power creates a condition defined as back corona, which actually impedes collection. In installations where back corona is not a significant performance factor, effects of precipitator power optimization on emission are less obvious.

Precipitator energy optimization may encounter some short times of suboptimal performance, but the pollution avoided and energy saved create a net effect on the environment that is overwhelmingly positive.

In a recent survey of Neundorfer customers who use the Precipitator Optimization System software, it was found that users adjust the software for low opacity and aggressive particulate collection. They save power because:

1) The precipitator is oversized for the application *(see figure 1; power input vs. efficiency curve)*, or
2) The precipitator is effectively oversized during periods of low process demand or low load.

The survey documented a total of 87,214 MWH/yr. of energy savings using Neundorfer Precipitator Optimization System Software. These POS users avoided the economic and environmental cost of:

- **The purchase and transport of 34,685 tons/yr. coal**
- **The disposal of 2976.2 tons/yr. of ash**
- **The emission of 14.9 tons/yr of fly ash**
- **The emission of 1,186 tons/yr. of Sulfur Dioxide (non scrubbed)**
- **The emission of 88,828 tons/yr. of Carbon Dioxide**
- **The emission of 261 tons/yr. Nitrous Oxide (based on allowable rate)**
- **The contribution of uncalculated thermal pollution**

These values are based on the following assumptions:
12,532 BTU/lb. coal with 10.78% ash and 1.71% sulfur, generation in a unit with 3,413 BTU/kw heat rate and 20% excess air, precipitator collection is 99.5% efficient.

Neundorfer Precipitator Optimization System Software is designed to reduce power when it is not needed for good performance and increase power in anticipation of more difficult process demands. However, there may be some short time periods of process transition when collection may be less than optimal. Precipitator performance with or without automatic power optimization is site specific. More testing will help to establish standards.

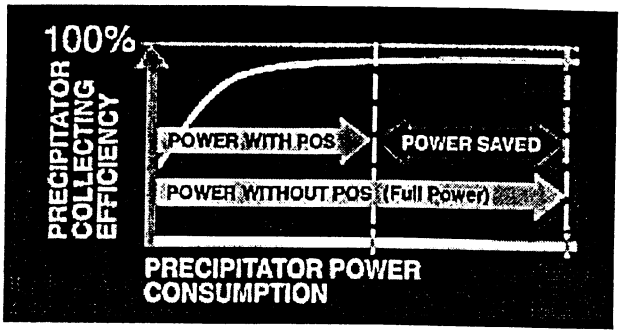

Figure 1

At least one user is currently performing mass emission tests at various loads with and without energy optimization. Quantitative results were not available at this writing. Without a doubt, this precipitator power saved is power that need not be generated. It is fuel that need not be burned. It is sulfur dioxide, nitrous oxide, carbon dioxide, carbon monoxide and particulate not emitted. It is ash, which need not be disposed of, and it is thermal pollution, which does not occur.

I am pleased that our company has created a reliable, easy to use software tool and supporting equipment that helps customers reduce pollution and conserve resources. The necessary hardware and software can be purchased and installed for a cost often lower than one year's energy savings.

Precipitator energy optimization may encounter some short times of suboptimal performance, but the pollution avoided and energy saved create a net effect on the environment that is overwhelmingly positive.

We all benefit from the net reduction in pollution created by the use of our Precipitator Optimization System.