Emerson estimates their potential sales for each new coal-fired power plant as follows:

Integrating digital bus-based technology into the design of a wet scrubber can reduce total project cost by approximately $3.9 million, according to Emerson Power and Water. This represents a five percent savings in total construction costs compared with the same project implemented using a traditional hardwired I/O approach.

Emerson Process Management has installed its SmartProcess® Fleet Emissions Optimizer module to optimize SO_2 emissions at three Xcel Energy Denver-area power generation facilities. Emerson supplies pH control instrumentation to cope with the abrasive and scaling tendencies of FGD slurries.

Emerson System Optimizes Emissions at Multiple FGDs in Fleet Emerson Process Management announced that Xcel Energy has installed its SmartProcess® Fleet Emissions Optimizer module to optimize SO_2 emissions at three Denver-area power generation facilities. This announcement comes just one year after Emerson introduced this software, which uses computer models and artificial intelligence to improve environmental compliance and cost efficiency over a fleet of generating units. The module, which began running in September 2003, is to be used in conjunction with Xcel Energy's voluntary Metro Emissions Reduction Program (MERP) for the metropolitan Denver area. Through the installation of additional emission controls at three Xcel Energy power plants (Arapahoe, Valmont and Cherokee stations), Xcel Energy seeks to optimize the SO_2 emission rate so that the total amount of SO_2 produced by these units does not exceed the yearly cap (10,500 tons of SO_2 per year), and ensure that the flue gas is scrubbed in the most cost-effective manner. The SmartProcess® Fleet Emissions Optimizer module was designed to determine the optimum SO_2 emission rate for the FGD (Flue Gas Desulfurization) systems at these generating facilities.

"Environmental performance is extremely important to Xcel Energy," said Alan Davidson, manager of capital projects for the Energy Supply business unit at Xcel Energy. "We are currently gathering data through this system and hope to soon use it to control our scrubbers. The software is a decision-support tool that weighs a number of interrelated variables to determine the emission rate set points for the scrubber units so that we meet our MERP SO_2 goal as efficiently as possible," Davidson said.

The optimization software is further enhanced by the SmartProcess Fleet Emissions Optimizer Portal, which provides a single window into the plants, enabling plant personnel to remotely view the output of the SO_2 optimization program, plant process graphics and other relevant information. The portal also allows what-if analysis through the browser to determine the cause and effect of tweaking the variables.

"Via secure Internet access, designated personnel can see into the plants and monitor the program on a real-time basis," said Davidson. "This valuable tool helps our personnel to keep close tabs on SO_2 compliance – even when they are off site."

Xcel Energy operates three facilities with coal-fired units in the metropolitan Denver area: Arapahoe Station, a two-unit, 156 MW, steam-electric generating station; Cherokee Station, a

four-unit, 717 MW, steam-electric generating station; and Valmont Station, which has one 199 MW steam-electric generating unit. The plants are located several miles apart, however, each is connected to the corporate network, making it possible to gather data from each plant and deliver it to a central location. The optimization software receives all of the primary process data from each of the plant's control systems. The software also evaluates a number of related factors, including data collected from the Continuous Emission Monitoring (CEM) system located at each plant; the load/outage schedule; coal train and load forecast data; as well as dry reagent, water and waste disposal costs associated with the two types of FGD systems used by the units – Dry Sodium Injection (DSI) and Lime Spray Dryers (LSD). Based on this information, the optimization software sends FGD system setpoints from the central computer to each of the plant's control systems. The actual amount of SO_2 being emitted from each plant and the predicted yearly SO_2 amount are constantly updated so that the software can calculate the difference between the two and make the necessary adjustments. The software responds dynamically to plant operating conditions. For example, if a scrubber goes offline, the software weighs the overall load against the target compliance and costs to determine whether it is necessary to run gas units – and for how long – until the scrubbers go back online.

"The decision support offered by the module provides the information necessary to ensure we meet the objectives of the MERP," said Davidson. When modifications have to be made, there are many combinations of actions that can eliminate the error. However, some combinations are better than others, according to Jeff Williams, director, SmartProcess Advanced Control Solutions, Power & Water Solutions industry center of Emerson Process Management.

"Some FGD systems are more efficient than others, while others cost less to operate although they are not as efficient," he explained. "The goal is to find the solution that satisfies SO_2 requirements at minimum cost." Based on the early indications of the success of this program, Williams believes it will be adopted by others in the power industry looking for ways to cost effectively manage fleet-wide emissions reductions. He explains that the Fleet Emissions Optimizer offers a competitive advantage to power generators because it can impact the bottom line in a number of ways.

"The ability to assure environmental compliance by automating a process previously done manually and increase equipment efficiency and lifespan makes a compelling case for adopting a fleet-wide approach," said Williams.

Emerson Digital Bus-Based Technology Reduces FGD Costs Integrating digital bus-based technology into the design of a wet scrubber can reduce total project cost by approximately $3.9 million, according to Emerson Power & Water. This represents a five percent savings in total construction costs compared with the same project implemented using a traditional hardwired I/O approach.

A study, "Economic Impact of Digital Bus Technology on Wet Scrubber Construction," conducted by JDI Contracts Inc., identified and compared typical construction costs in several categories: engineering, construction, startup, system selection and overheads. Costs were evaluated for two different approaches - traditional and digital bus-based. For each approach, the study examined instrumentation & control system implementation for an $82.5 million wet FGD

installation at a 660-MW power plant. According to the study, utilization of bus-based I/O technology can reduce the project cost by roughly $3.9 million, or nearly five percent. The across-the-board savings include a $664,667 reduction in engineering expenses, a $1.4 million decrease in labor and material (construction) costs, a $133,322 cut in checkout and startup expenditures, and a $260,024 reduction in costs associated with system selection. Furthermore, implementation of the bus-based approach resulted in the reduction of terminated points from 2678 to 1616. Despite the reduction in terminated points, the bus-based approach provides many times the data available through traditional hardwired implementation.

Product	**Revenue $ millions**
Measurement	1
Valves	2-4
Control systems	2-4
Asset Optimization	0.5-1
Analytical	0.5
Factory automation	1-2
Services	2-3