

Agricultural Uses of Gypsum and Other Products from Flue Gas Desulfurization (FGD) Systems



Many crops can benefit from the addition of gypsum to the soil

FGD gypsum is a valuable commodity that is widely used as a source material to manufacture products for building construction applications—primarily wallboard, and to a lesser extent cement and concrete. The quantity of FGD gypsum is expected to increase substantially over the next ten to twenty years as more power plants install wet scrubbers in response to the Clean Air Interstate Rule and other clean air initiatives. Supply is expected to exceed demand for traditional manufacturing uses on a local basis within the next few years. Agricultural applications offer an alternative beneficial use with potential for consuming high volumes of FGD gypsum.

Several research projects have shown the value of FGD products for specific soil and crop types. However, there has not been a coordinated effort to obtain data that demonstrates, in a scientifically accepted manner, the potential benefits of using FGD products for a broader range of soil and crop types. In addition, environmental data associated with different application rates has not been systematically collected. As a result, the acceptance of FGD gypsum by the regulatory and agricultural communities has been limited.

This project will establish a network of field sites to conduct research on agricultural uses of FGD gypsum and other FGD products. A common set of research

- Demonstration of the agronomic value and environmental acceptability of FGD products in each participant's geographic area
- Development of the agricultural market for high volumes of FGD gypsum to complement the wallboard market
- Direct interaction with a wide range of interested parties--researchers, utilities, marketers, regulators, and agricultural specialists

protocols will be established that ensures valid comparisons can be made between untreated and treated plots at an individual site, as well as between sites in different geographic areas.

Drivers and Trends: Expanding Markets

In 2005, U.S. utilities produced 10.9 million metric tons of FGD gypsum, of which 77% was recycled, primarily in wallboard production. Only about 3% was used for agricultural applications. Increased production of FGD gypsum will exceed wallboard demand in many areas, resulting in disposal of this high-value product unless alternative uses are well established. For an individual power plant, disposal of 200,000 tons of FGD gypsum at \$20/ton represents an annual cost of \$4 million; selling it at \$5/ton represents an annual profit of \$1 million.

Project Design and Execution

The Ohio State University (OSU) will coordinate the development of a network of field sites and will establish protocols for setting up test plots and collecting samples. Treatments will be arranged in a randomized complete block design with four replications. OSU will be responsible for all sample analysis at their central lab facility. In addition, they will be responsible for

maintaining, evaluating, and reporting all data. Project direction will be provided by a steering committee comprised of representatives from OSU, EPRI, U.S. EPA, USDA, network participants, and the agricultural industry.

Crop yields and quality will be measured to evaluate the effectiveness of the FGD product application. Extensive environmental testing will also be performed, including soil composition before and after treatments, soil water quality, and plant uptake. To address unique concerns with respect to mercury, mercury emissions from the surface of the treated and untreated plots will also be measured.

Deliverables

The following deliverables will be produced during this project.

- **On-site Research.** Site-specific research activities and reports. Network members are on the project steering committee.
- **Database.** All of the data collected will be maintained in a central database. Network members will have access to data via an OSU website.
- **Website.** OSU will maintain a website throughout the project to disseminate information to network members in a timely manner, supplemented by webcasts and conference calls.
- **Progress Reports.** Annual reports will detail progress and significant results. A comprehensive final report will detail all aspects and results from the project.
- **Specialty Reports.** Various reports on special interest topics (e.g., sulfur deficiency in soils, mined vs. natural gypsum) will be prepared throughout the project at the direction of the steering committee.
- **Workshops.** One workshop will be held each year to discuss project progress and technical topics.

Price of Project

There are three levels of participation. A minimum of two years participation is required. Companies that fund any Environment or Generation program can use Tailored Collaboration (TC) funds for up to half their contribution. Funding for this project is leveraged with additional funding from the Department of Energy and EPRI.

- **Network Member, Level 1.** Research is performed at member approved site, with local soils, FGD material, and crops. OSU performs all research activities, including site set-up and sampling. Member receives a site-specific report, is on the project steering committee, and has access to all deliverables listed above. The annual cost is \$35,000 per site.
- **Network Member, Level 2.** Research is performed at member site, with local soils, FGD material, and crops. Network member performs on-site research activities (set-up, sampling) per OSU protocols and sends samples to OSU for analysis. Member receives a site-specific report, is on the project steering committee, and has access to all deliverables listed above. The annual cost is \$15,000 per site.
- **Participant.** Participant will receive progress reports and specialty reports, and will have access to the website and the annual workshops. The annual cost is \$10,000. This cost will be waived for funders of EPRI Programs 49 (Groundwater Protection and Coal Combustion Products Management) or 78 (Coal Combustion Product Use)

Project Status and Schedule

The project is scheduled to begin in January 2007 and continue for a minimum of two years.

Who Should Join

This project will benefit power producers that expect to generate increasing amounts of FGD products. The results will also be of value to companies that market gypsum and FGD products to agriculture.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

Technical Contact

Ken Ladwig at 262.754.2744 (keladwig@epri.com).

Electric Power Research Institute

3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com