



CLEAN AIR & CLEAN ENERGY ARE GOOD BUSINESS

# Air Focus

Issue Fall 2005

News you can use from the Ohio Air Quality Development Authority

## OAQDA Awards Numerous Grants for Clean Coal Research and Development

At its June and July meetings, the Ohio Air Quality Development Authority approved more than \$7 million in grants for 24 clean coal technology and research projects statewide.

"All of these projects reinforce Ohio's commitment to finding new ways to enhance the use of Ohio coal, in an environmentally friendly manner, as a principal energy source. The grants support a wide range of projects involving state-of-the-art technologies, cutting edge science, and/or university-based research. These funds are truly an investment in Ohio's future," said Mark R. Shanahan, executive director of OAQDA.

Eight clean-coal technology projects were awarded OAQDA grants at the June Authority meeting, including:

**Energy Industries of Ohio** - \$2 million to fund research and development of ultrasupercritical (USC) materials that can enable boilers and steam turbines to use oxygen rather than air for combustion.

**FirstEnergy Corp.** - \$1 million to supplement the current 50-megawatt commercial demonstration unit at the Burger station.

**The Ohio State University Research Foundation/Ohio Agriculture Research and Development Center** - \$170,362 for field trials to examine the feasibility of using power plant by-products (calcium sulfite and sulfate) on Ohio croplands to increase crop yield and promote increased drainage.

**The Babcock & Wilcox Co.** — \$484,382 for Phase 1 of a project to convert one of the

City of Hamilton's boilers to oxygen, rather than air, combustion.

**The Ohio State University Research Foundation and Department of Civil & Environmental Engineering & Geodetic Science** — \$248,719 to help fund ongoing research into potential uses and markets for Ohio's coal combustion products, as well as technology transfer opportunities.

**Battelle** — \$750,000 for Phase 2 of the Midwest Regional Carbon Sequestration Partnership, which seeks to identify the most logical options for carbon sequestration in both geologic and terrestrial applications.

**Ohio Energy Project** — \$5,000 for the Project to expand its programming to help students better understand and appreciate the importance of coal as an energy source.

Fifteen clean-coal research projects at six Ohio universities were awarded nearly \$1.3 million in grants for the 2005-2006 academic year by OAQDA at its July meeting, including:

The University of Cincinnati:

- \$79,972 to study the use of absorbents and adsorbents as a means to more cost-effectively capture both oxidized and elemental mercury from flue gas
- \$80,000 to study the use of advanced ceramic materials as protective coatings in boilers for improved corrosion resistance, conductivity, and mechanical strength and for more efficient power generation
- \$65,233 to develop membranes that can be used in coal gasification plants to

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## Open House Spotlights New Multi-Pollutant Control Technology

New multi-pollutant control technology developed by Powerspan Corp. was on display in a Commercial Demonstration Open House at FirstEnergy Corp's R.E. Burger Plant in Shadyside, Ohio on Wednesday, September 28. All of the program participants agreed that the demonstration project has been a significant success.

Powerspan's Electro-Catalytic Oxidation (ECO) technology provides for high removal of sulfur dioxide, nitrogen oxides, fine particulate matter, and mercury from the flue gas of coal-fired power plants. Of equal importance, the ECO process also yields a highly marketable ammonium sulfate fertilizer co-product, currently being sold in the fertilizer market.

The ECO unit at the Burger Plant was built in 2003 and has undergone an extensive and successful testing period. OCDO and OAQDA have contributed \$5.5 million to the project, in addition to the investments made by Powerspan and FirstEnergy. The commercial demonstration is

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# Air Waves

## States Now Monitoring Fine Particle Pollutants in the Air

By Mark R. Shanahan, Executive Director, OAQDA



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and nitrogen oxides.”

Fine particles of 2.5 micrometers or less in diameter are viewed as posing the most serious risks to human health. Such particles measure just one-thirtieth the diameter of a human hair and can get deep into the lungs or even the bloodstream. At greatest risk are people with heart or lung disease, asthmatics, older adults, and children.

Unlike ozone pollution, fine particles do not need sunlight to form. And fine particle pollution can occur at any time during the year, as evidenced by alerts issued in early February 2005 for major Midwest cities that included Cincinnati and Columbus.

I mention all of this because OAQDA deals with a number of businesses and other entities that already are dealing with ozone pollution-related issues. Affected businesses simply need to be aware of their own

If you live in or near an Ohio county designated as “non-attainment” for fine particle pollution, you may well be aware of periodic alerts that are issued when such pollutants rise to what are deemed unhealthy levels. These alerts typically are issued by area regional planning commissions.

Briefly, “fine particle pollution” is defined by the United States Environmental Protection Agency as “a mixture of microscopic solids and liquid droplets suspended in air. Fine particles can be emitted directly (such as smoke from a fire) or formed in the atmosphere from power plant, industrial, and mobile source emissions of gases such as sulfur dioxide

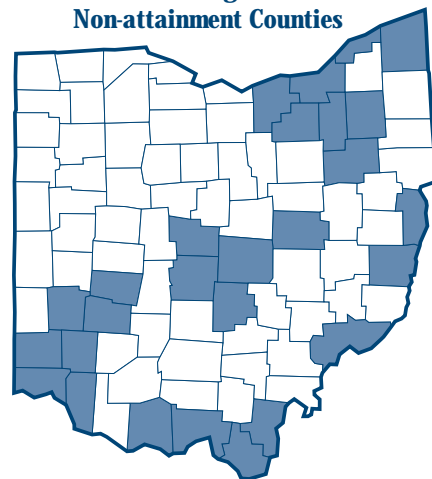
sources – stationary, mobile, and area – that may be emitting fine particles into the air.

U.S. EPA concern about fine particle pollution has increased in recent years, prompting the agency to move forward with plans to curb such pollution across the country. Currently, 27 Ohio counties have been designated as “non-attainment” for fine particle pollution. In some cases, only part of the county received the designation (P). The entire list includes: Adams (P), Ashtabula (P), Belmont, Butler, Clark, Clermont, Coshocton (P), Cuyahoga, Delaware, Fairfield, Franklin, Gallia (P), Greene, Hamilton, Jefferson, Lake, Lawrence, Licking, Loraine, Medina, Montgomery, Portage, Scioto, Stark, Summit, Warren, and Washington.

States such as Ohio with designated non-attainment counties are required to submit plans to the U.S. EPA that outline how they will meet the fine particle pollution standards. Such states are further required to meet those standards and attain clean air as soon as possible, but no later than 2010.

Ohio business owners who have questions about particulate pollution, or who may need help with compliance issues, are encouraged to contact OAQDA for assistance.

Ohio Designated Non-attainment Counties



## OAQDA Approves its Largest-ever Financing Project

At its September 2005 meeting, OAQDA approved the issuance of refunding bonds requested by FirstEnergy Corp. of up to \$697,565,000 for the refinancing of outstanding debt issuances for air quality facilities at various electricity-generating plants around Ohio. The approved amount is the largest, single project financing in OAQDA history.

Of the total amount, \$578,765,000 was approved by OAQDA for the transfer to FirstEnergy Generation Corporation of air quality facility assets at the following Ohio power plants: Ashtabula A

and Ashtabula C in Ashtabula, Avon Lake and Edgewater in Lorain County, Eastlake in Lake County, Acme and Bayshore in Lucas County, Niles in Trumbull County, W. H. Sammis in Jefferson County, and R. E. Burger in Belmont County. These facilities were assisted previously by 12 bond issuances on behalf of Cleveland Electric Illuminating, Ohio Edison, Toledo Edison, and Penn Power.

The remaining \$118,800,000 will accomplish the transfer to FirstEnergy Nuclear Generation Corporation of air quality facility assets at the Perry Nuclear Power Plant in Lake County. These assets were assisted previously through all or part of 10 bond issuances on behalf of Cleveland Electric Illuminating, Toledo Edison, and Ohio Edison.

## FutureGen Update

The Ohio Air Quality Development Authority is continuing to monitor and guide Ohio's progress as we prepare to compete for the U.S. Department of Energy's proposed FutureGen project. FutureGen will be the nation's first near-zero-pollution power plant. It will use coal as its fuel; it will also produce hydrogen for use as a fuel and test the ability to store large amounts of carbon dioxide deep underground, rather than emitting it into the air. It is anticipated that the formal Request for Proposal (RFP) will be issued later this year.

"Ohio is uniquely positioned as a candidate for the FutureGen project, due to our

experience and reputation as a national leader in energy production and clean-coal technology," said Mark R. Shanahan, executive director of OAQDA.

"The future of energy technology will rely on knowledge and infrastructure that we already have in place in Ohio—using coal in innovative and cleaner ways, improving air quality through the sequestration of carbon dioxide, enhancing oil production with carbon dioxide injection, and developing hydrogen as a fuel. These are the premises of the FutureGen project," he explained.

OAQDA is leading the statewide task force created to prepare Ohio's response. Some 20 other states have expressed interest in this \$1 billion project. OAQDA is working

with community leaders in the several Ohio counties that have the potential to provide the site for the FutureGen facility.

Informational meetings were conducted over the past several months for elected officials and community leaders representing the interested counties in preparation for the RFP. These forums provided information about job creation and other economic issues, geological and environmental impacts, and procedural issues for the local communities. The attendees included state legislators, city and county government representatives, and private sector interested parties.

As the process moves forward, we will keep you updated on our progress.

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convert coal to hydrogen, a clean fuel source

- \$80,000 to develop low-cost, inorganic membranes for use in high-temperature hydrogen separation from "syngas" (a gas produced in coal gasification consisting primarily of carbon monoxide and hydrogen)

The Ohio State University:

- \$79,977 to develop innovative chemical catalysts that may help reduce costs for the production of hydrogen in the high-temperature "water gas shift" reaction process for generating electric power
- \$79,893 to demonstrate the effectiveness of "chemical looping combustion" as a more efficient means to produce hydrogen from Ohio coal, for use as a chemical feedstock or for power production with near-zero emissions of pollutants into the air
- \$79,977 to address critical issues such as sulfur poisoning in the application of solid oxide fuel cell technology to large-scale, coal powered systems

- \$79,893 to demonstrate a two-step process for producing hydrogen from syngas and also a carbon dioxide stream suitable for underground sequestration

Ohio University:

- \$79,963 to further refine a patented process for reducing the cost of capturing fine particulate emissions produced in the burning of coal
- \$60,000 to demonstrate a new method for reducing costs associated with particulate capture in hot gas systems such as coal gasification
- \$80,000 to develop new material that can address the problem of sulfur poisoning of fuel cells using coal-derived syngas as a fuel source

The University of Dayton Research Institute:

- \$80,000 to study the chemical transformation of mercury in coal combustion systems aimed at bringing about enhanced mercury-emission control
- \$79,867 to study the properties of fly ash as they might pertain to improved mercury-emission control

The University of Akron:

- \$80,000 to further study the use of coal as a feedstock for fuel cells, which deliver near-zero emissions of pollutants into the air

Case Western Reserve University:

- \$79,955 to advance understanding of potential chemical reactions when carbon dioxide is sequestered in the Rose Run geologic formation in eastern Ohio

These universities and projects represent the work of the Ohio Coal Research Consortium, which was established by the Ohio Coal Development Office in 1989 to better coordinate university research and development work and to foster awareness and collaborations among Ohio universities.

OAQDA separately, at its July meeting, approved \$204,532 in funding for the second stage of a research project at Ohio University involving development of a sieving electrostatic precipitator that has the potential to greatly reduce the cost and area now required for particulate collection systems at power plants and other industrial sources. The technology also enables the removal of unburned carbon from fly ash, allowing the fly ash to be reused in other applications. The first stage of this project was also supported through the OCRC.



**The average American consumer is responsible for the use of 3.8 tons of coal every year.**

Source: Ohio Coal Association

# AirFocus

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expected to continue through 2006, and possibly into 2007.

Building on the success of the Burger Plant demonstration project, FirstEnergy announced on September 22 that it would install an ECO system on the 215-megawatt Unit 4 of its Bay Shore generating station in Oregon, Ohio at a cost of \$100 million. Design engineering for the Bay Shore ECO system will commence in early 2006 and will include a fertilizer processing plant.

Additionally, during the September 28 Open House, FirstEnergy and Powerspan announced plans to pilot-test a promising carbon dioxide removal technology beginning late next year at the Burger Plant in Shadyside. The CO2 capture process will be integrated with the existing ECO technology. The announcement follows a May 2004 agreement between Powerspan and the U. S. Department of Energy that established a cooperative research and development effort aimed at developing a cost-effective CO2 removal process for coal-based power plants.

## About the Ohio Air Quality Development Authority

The Ohio Air Quality Development Authority (OAQDA) is a non-regulatory government agency created in 1970 to help Ohio business comply with clean air regulations. OAQDA provides financial help to hundreds of large and small businesses in Ohio, and has awarded more than \$4 billion in bonds to finance air quality projects. Its small business program, the Clean Air Resource Center, also offers one-on-one technical assistance, confidential compliance assessment and grants to help defray the costs of financing for small businesses. With the addition of the Ohio Coal Development Office in 2003, OAQDA also oversees the State of Ohio's coal research, development and technology deployment efforts, one of the nation's largest state programs of its type. For additional information about OAQDA and its services, visit [www.ohioairquality.org](http://www.ohioairquality.org).

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