

Clearing the Air for 40 Years



OHIO AIR QUALITY DEVELOPMENT AUTHORITY



Clearing the Air for 40 Years



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Clearing the Air for 40 Years

Put on your warm wool coat. Adjust your thermostat. Drive a dent-free car. Breathe in cleaner air. For 40 years, the Ohio Air Quality Development Authority (OAQDA) has impacted these most routine of activities for Ohio citizens.

The dry cleaner that removed the spot from your coat may use environmentally safe equipment financed through OAQDA.

The hail damage repaired on your car may have been completed at an auto body shop assisted by OAQDA to comply with federal clean air standards by providing a better cost equipment loan. The comfort of a warm house may be brought to you by a utility company setting new standards for cleaner energy with help from financing through OAQDA.

The best news is that, according to the Ohio Environmental Protection Agency, Ohio's air has been getting cleaner since 1979, the year when the state's air contaminant data were deemed reliable. When it comes to clean air, "decline" has never looked so good!

- Sulfur dioxide level dropped 76 percent;
- Carbon monoxide level dropped 75 percent;
- Lead levels dropped 95 percent between 1979 and 1998, after which general monitoring for lead was phased out with the advent of lead-free gasoline;
- Nitrogen oxide levels dropped 27 percent;
- Ozone levels (using the eight-hour and one-hour standards, respectively) dropped 18 percent and 22 percent; and,
- Large particulate material dropped 31 percent in the last 20 years, while small particulate material dropped 22 percent over the last 10 years.

Over the years, OAQDA's role grew from its original mission to assist large Ohio industries in controlling air pollution and complying with the Clean Air Act of 1970. The agency took on responsibility for helping small businesses in complying with clean air regulations in 1993. Ohio's clean coal program, the Ohio Coal Development Office, was added to OAQDA in 2003. In 2007, Governor Ted Strickland created the position of Governor's Energy Advisor and placed it at OAQDA. And in 2008, the Authority was tapped to administer Ohio's \$150 million Advanced Energy Job Stimulus Program, giving the agency the ability to become a source of new job development in tomorrow's technologies.

By almost any measure, OAQDA at 40 continues to fulfill its original, primary mission, while meeting newer responsibilities. To date, OAQDA has authorized more than \$7 billion in financing to help large and small Ohio businesses fund air quality improvement projects. Since 2003, OAQDA has awarded 91 grants totaling more than \$46 million in support of clean coal technology research at Ohio universities.

Today, OAQDA supports Ohio's role as a leader in advanced energy research, development and deployment as it has in the past and will for many years to come. The information that follows summarizes OAQDA's accomplishments and contributions as it helps to set the stage for Ohio's energy future.

OAQDA: A Brief History

Formative Years: The 1970s



Amidst the tumult of the late 1960s, the United States experienced a growing consensus on the importance of protecting and preserving our environment. As it has been in so many other instances, Ohio was a vanguard state in converting that nascent consensus into action.

In 1968, the Ohio Water Development Authority (ODWA) was created to address the state's drinking water and wastewater needs. Then, in 1970 – the same year that saw passage by Congress of the landmark Clean Air Act – Sections 3706.01 through 3706.21 were enacted by the Ohio General Assembly to create the Ohio Air Quality Development Authority (OAQDA). It was among the first such state agencies of its kind in the nation.

In general, the mission assigned to OAQDA was to provide Ohio manufacturers with assistance and incentives to initiate projects aimed at air pollution control. Specifically, the enabling legislation called

for OAQDA to:

- Provide for the conservation of air as a natural resource of the state;
- Prevent or abate air pollution;
- Provide for the comfort, health, safety and general welfare of all workers and citizens;
- Create jobs and employment opportunities; and,
- Provide, through the issuance of air quality development revenue bonds, for the acquisition, construction, maintenance, repair and operation of air quality projects.

After OAQDA's creation in June 1970, Governor James A. Rhodes, serving the final year of his second term, selected the first five public-at-large members for the new agency, with terms set to begin on January 5, 1971. By law, the Authority also included two *Ex-officio* members – the directors of the Ohio Departments of Health and Development. (A subsequent 1972 amendment to

the Ohio Revised Code replaced the development director with the director of the newly created Ohio Environmental Protection Agency.)

During its first full year of operation in 1971, OAQDA retained the services of legal counsel and a certified public accounting firm to assist in the establishment of its programs, procedures, financing mechanisms and other start-up activities. OAQDA shared space with the Ohio Water Development Authority in the LeVeque Tower in downtown Columbus. OWDA staff handled all OAQDA duties during that year and into 1972, which would turn out to be a year of milestones for OAQDA.

In February 1972, responding to the Clean Air Act of 1970, the Ohio Air Pollution Control Board enacted its own air emission regulations, bringing new urgency to the work that OAQDA had begun to undertake. That same month, OAQDA financed its first air pollution abatement project – a \$1 million award to Buckeye Steel Castings Company of Columbus for particulate control at its facility. By year's end, three more projects were awarded financing, bringing the year's total to \$5,140,000.

Finally, in August 1972, OAQDA hired an industrial projects manager as its first paid staff member. His name was Robert McConville, and in April 1973, he became the Authority's first executive director.

Two other significant events took place toward the end of this early period that would expand the scope of OAQDA's work into a configuration that remained largely in tact for the next 15 or so years. In November 1974, Ohio voters approved a Constitutional amendment that specifically permitted the financing of pollution abatement

projects by electric utility companies. OAQDA's enabling legislation was amended by the General Assembly to grant this financing authority to the agency.

Then, in 1976, Congress passed the federal Small Business Act and the Small Business Investment Act. Prior to this legislation, OAQDA was limited to assisting only large industrial companies because of the small dollar amounts involved in revenue bond offerings. OAQDA could now begin assisting Ohio's small businesses by "bundling" a number of separate projects into single financing packages.

The first of these small business financings would occur in 1979.

In the late 1970s, OAQDA began to promote itself and its services through public outreach that included meetings with Chamber of Commerce groups, energy and environment trade

associations and public planning organizations around the state. In that spirit, the first issue of a regularly published newsletter for OAQDA appeared in 1979. The newsletter would eventually be named *AirFocu\$* and evolve into its status today as a widely read electronic-only publication.

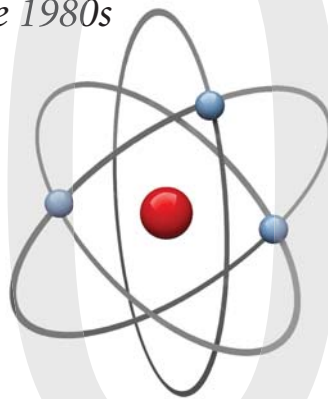
During the same period, OAQDA also began providing small grants to Ohio universities engaged in research projects that sought new methods for burning Ohio coal in a more environmentally friendly manner. For example, a 1979 project at Ohio University was approved by the Authority to identify cleaner coal combustion technology and "methods of obtaining acceptable air quality in Ohio, which will also make best use of Ohio's energy reserves."



OAQDA began funding university clean coal research projects in the 1970s.

OAQDA: A Brief History

Taking Care of Business: The 1980s



The decade of the 1980s saw little change in OAQDA's basic services or activities, although small business financing packages became as routine as larger projects approved for major industrial entities. However, a provision in 1986 federal tax reform legislation limited eligibility for federally tax-exempt bonds – one of the more attractive features of OAQDA financing up to then. Nevertheless, OAQDA retained the ability to issue bonds with reasonable terms for all costs associated with air pollution control and abatement projects.

In November 1985, OAQDA authorized first-ever public financing for the William H. Zimmer power plant in Moscow, Ohio (Clermont County). Subsequent financings in later years have brought total OAQDA support for the plant to \$373 million, making it the project receiving the most financial support from OAQDA in agency history.



William H. Zimmer Power Plant, Moscow, OH

For the first time, in 1988, OAQDA began to make funds available to support “special projects” of a somewhat broader environmental nature. That year, for example, Authority funding assisted in the

execution of Ohio's first statewide radon survey and the Ohio Health Department's evaluation of Ohio public school asbestos removal plans. OAQDA funds also supported the work of Ohio's Acid Rain Task Force and the Governor's Commission on the Storage and Use of Hazardous and Toxic Materials. These projects typically were suggested for consideration by OAQDA's *Ex-officio* representatives from the Ohio Department of Health and Ohio EPA

because of their expertise and familiarity with the impact of air pollution in their respective disciplines.

New Regulations, New Responsibilities: The 1990s



Just as the Clean Air Act of 1970 helped spark the creation of OAQDA, the Clean Air Act Amendments of 1990 would spark changes at the Authority that are still in place today. Those amendments addressed five main areas: air quality standards, motor vehicle emissions and alternative fuels, toxic air pollutants, acid rain and stratospheric ozone depletion. The new regulations brought additional environmental mandates to more types of businesses and to even smaller businesses than ever before.

Recognizing that small businesses might not have the capacity to deal with the new mandates, the law stipulated that each state establish a small business assistance program with three components:

- A compliance advisory panel to involve small business in the development of regulations;

- A technical assistance program; and,
- A small business ombudsman program to advocate for small business and explore ways to assist in financing environmental improvements.

In 1993, the Ohio General Assembly passed legislation to implement these components and placed the Clean Air Ombudsman Program for Small Business within OAQDA. The program's responsibilities were to:

- Promote small business participation in the development of clean air rules;
- Inform small businesses about air pollution requirements and control technology;
- Provide free, confidential assistance on individual source problems and grievances presented by small businesses; and,
- Seek public and private funding sources to assist small businesses in complying with air pollution control laws.

OAQDA: A Brief History

In 1996, OAQDA created the Clean Air Resource Center (CARC). The Center is an independent, non-regulatory one-stop shop for helping small Ohio businesses find solutions in meeting clean air standards.

CARC provides technical assistance to small business owners in understanding and complying with the new rules, offers lower-cost financing of needed air quality facility investments and provides a small grant program to help fund associated costs. Since its inception, CARC has provided assistance to thousands of small businesses across Ohio.

In 1998, OAQDA began reaching out to small businesses working in fields whose daily tasks involved the handling and disposal of materials that were either hazardous or likely to be sources of air pollution. Thus, the Authority began a public outreach campaign to inform dry cleaning and auto repair businesses of the services available to them through CARC. In the years that followed, many of these small businesses around the state have been able to purchase new equipment and other facilities that led to dramatic reductions in their emission of hazardous materials into the environment.



The Clean Air Resource Center, a program of OAQDA, provides one-on-one technical assistance to small businesses like autobody shops and drycleaners for meeting pollution requirements, as well as financing to purchase pollution control or prevention equipment.

Another subtle, but significant, shift in OAQDA activities took place during the 1990s. Although it had the authority to do so from its inception, OAQDA's industrial financing focus tended not to address pollution *prevention*.

Instead, the great majority of funded projects over the first two decades aimed at "end-of-pipe" pollution *control*. Gradually, OAQDA began to target increasing numbers of projects that helped Ohio businesses take steps to prevent pollution from occurring in the first place.

In one more minor "mission shift," OAQDA in 1997 authorized its first-ever financing of an energy efficiency air quality bond to assist Marion Steel in replacing an old electric arc furnace with a new energy efficient system. In the years since, OAQDA has provided similar financing assistance to a number of other organizations, including state agencies and prisons as well as local public sector facilities.

The 1990s also saw OAQDA provide financing assistance to its smallest-ever project in agency history. In 1999, CARC financing of \$13,900 enabled the Scottie McBean's coffee shop in Worthington to install a new afterburner on its coffee roasting machine to help cut air emissions that were annoying its neighbors.

Ohio's Energy Leader: The 2000s

'00s



Without question, OAQDA's environmental stewardship role expanded during the 1990s. But it would have been impossible for anyone to foresee the monumental changes – and elevation of its responsibilities – that the Authority would experience in the first decade of the new century.

In 2003, the Ohio General Assembly transferred the Ohio Coal Development Office (OCDO) from the Ohio Department of Development to OAQDA. By then, OCDO had gained a national reputation as one of the nation's premier state programs engaged in the promotion and development of clean coal technology primarily through the funding of research projects at universities around the state.

This new responsibility augmented OAQDA's long history of supporting the development of new technologies and processes to improve the environment, identify cleaner sources of energy and spur economic development. Since 2003, a total of 91 OCDO grants have been awarded to Ohio universities and other entities totaling \$46,093,935.



Willard & Kelsey, a Perrysburg manufacturer of thin-cell photovoltaic solar panels, was the first company approved for funding from Ohio's Advanced Energy Job Stimulus Program.

In 2005, Ohio leaders decided to compete for the \$1 billion "FutureGen" near-zero-emissions power plant proposed by the U.S. Department of Energy (DOE). OAQDA was tapped to be the lead agency for the Ohio FutureGen Task Force in the state's pursuit of this project. Two potential sites in Meigs and Tuscarawas Counties were identified, and Ohio's proposal was submitted to DOE in the spring of 2006. Although Ohio was not selected as a finalist state, a great deal was learned about the state's potential to serve as a host site for similar future

undertakings. A direct, positive outcome of the process was the drilling in 2007 of Ohio's first deep-geologic test well – a move that has yielded a trove of new data on the state's deep geology.

Then, immediately after taking office in January 2007, Governor Ted Strickland created the office of the Governor's Energy Advisor to serve as the state's leader in the development of new forms of clean, advanced energy. OAQDA's Executive Director Mark R. Shanahan was selected to serve in this newly created advisory role.

OAQDA: A Brief History, *cont.*

Ohio's Energy Leader: The 2000s

In June 2008, Governor Strickland signed into law the bipartisan Job Stimulus package (House Bill 554). This legislation included \$150 million in funding for what would become the Ohio Advanced Energy Job Stimulus Program, to be administered by OAQDA. The program has two components:

- \$66 million for clean coal technology projects administered through the Ohio Coal Development Office; and
- \$84 million for non-coal-related advanced energy projects, to be administered in three annual \$28 million installments.

The Program targets advanced energy projects that are on a fast track toward commercialization, have the potential for short-term job creation and offer the long-term prospect of employing Ohioans in the jobs of the future. It became operational in November 2008 and began accepting project applications in early 2009. As of May 2010, eight

clean coal projects have been approved, along with seven non-coal advanced energy projects. Total funding for all approved projects stood at \$32 million, with 1,663 new jobs created.

OAQDA's growth and evolution during its first 40 years have left the Authority well prepared to meet the challenges and opportunities that lie ahead, including climate change, carbon control and renewable energy. Entering its fifth decade of service to Ohio, OAQDA has emerged as a lead state agency engaged in shaping Ohio's energy, environmental and economic future. As a result, Ohio is better positioned to retain and even strengthen its status as a national leader in these crucial arenas.

OAQDA – In Their Own Words



Gayle Channing Tenenbaum has more than 40 years of experience in all aspects of human services, with a focus on the prevention of child abuse and neglect. She served on the transition teams for Ohio Governor Ted Strickland and President Barack Obama as an advisor on human services and early childhood mental health, respectively. Although primarily known for her human services advocacy and expertise, Tenenbaum also has developed a strong familiarity with environmental and energy issues through her service as an OAQDA member.

Gayle Channing Tenenbaum Chair, OAQDA

Her 26 years of service as a member of OAQDA – including four years in the late 1970s – easily qualifies Gayle Channing Tenenbaum as the agency’s foremost authority on the changes it has undergone.

“Our work today is just so very different from what it was when I was first appointed by Governor Gilligan in 1975. Back then, it was all about authorizing bond issuances for industries and utilities, and there simply wasn’t the variety of work that we’re engaged in today. Now, it’s everything from helping small businesses to clean coal technology research to advanced energy,” Tenenbaum said.

She said that the work of OAQDA during its first decade was mostly about dealing with the air pollution produced by Ohio’s major industries. Authority members actually took field trips around the state to observe factories that had received OAQDA financing to control the pollution they were producing, she observed.

“I thought part of my job was to clean up the drive between Columbus and Cleveland, especially the leg over the I-71 bridges up north that spanned all of the steel mills and factories,” Tenenbaum quipped.

Tenenbaum believes that OAQDA’s motto – “Clean Air and Clean Energy are Good Business” – is even more appropriate today than when it was first crafted in the 1990s. As evidence, she points to the Authority’s new role, since 2008, as the administering agency for Ohio’s \$150 million Advanced Energy Job Stimulus Program.

“I love the work we do to help clean up the environment, but our new focus on advanced energy job creation is just so critical at this juncture because that’s where the jobs of the future are going to be,” Tenenbaum said.

Tenenbaum regards the transfer of Ohio’s coal program to OAQDA in 2003 by the Ohio legislature as a key turning point in the agency’s history. She said that legislators recognized how important coal is to the state’s economy and wanted it to receive more focused attention.

Looking to the future, Tenenbaum said she hopes “we can keep getting better at clean coal technology so Ohio is able to meet the carbon constraints that are likely coming down the road.” She also re-emphasized the important work of OAQDA in supporting Governor Ted Strickland’s advanced and renewable energy initiatives and projects.

“We need to keep ramping up at a rate that will put people back to work and get our economy moving again,” Tenenbaum said.

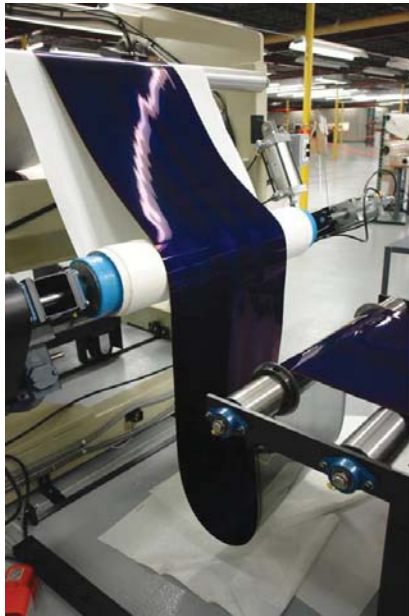
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Powerspan technology is deployed at FirstEnergy's Burger Plant in Shadyside, which was demonstrated in 2005 following financial support for OAQDA.



Jim and Linda Lucas, owners of Highlander Dry Cleaning in Newark, stand near new equipment purchased with financing from OAQDA's CARC. The new machine reduces emissions and helps them comply with clean air mandates.



Coated amorphous silicon solar cell material rolls along the production line at Xunlight Corporation of Toledo. The company received a loan from the Advanced Energy Job Stimulus Program to expand its 2-megawatt production line to a 25-megawatt commercial line.



This humidity and ethylene management equipment utilizing Sorbitech technology for commercial refrigeration systems at Ohio University was constructed with funding from OAQDA as part of a project to improve air quality throughout the institution.



Students in elementary and secondary classrooms around Ohio learn about carbon sequestration with materials created by the Ohio Energy Project through a 2006 grant from OAQDA.



This truck paint spray booth at Midway, Inc. in Monroeville eliminates pollutants from the air and helps the autobody shop comply with federal Clean Air Act standards with financing through OAQDA's Clean Air Resource Center.



A rhinoceros at The Wilds Wildlife sanctuary in Muskingum County stands on a feeding pad constructed of FGD (flue gas desulfurization) byproducts. A grant from the Advanced Energy Job Stimulus Program is funding ongoing research into the use of these byproducts in mine land reclamation.



This drilling rig in Tuscarawas County was constructed with funds from an Ohio Coal Development Office grant in 2007 to The Ohio State University. Researchers there explored the production of hydrogen from coal and a stream of carbon dioxide suitable for underground sequestration.



A truck loaded with "48G" UF6 radioactive waste containment cylinders leaves the Westerman Companies in Bremen. Westerman will use a loan from the Advanced Energy Job Stimulus Program to build a new manufacturing plant to expand its production capability.

The Clean Air Act and OAQDA

If you believe “clean air” became a matter of concern to humankind in the latter part of the 20th century, you would be wrong – by centuries. The first known edict regarding clean air and air pollution was issued in 1306 by King Edward I of England to ban the burning of “sea coal”^{*} in London because of the amount of smoke poured into the air.

Smoke reduction remained a concern in British cities for centuries. In the U.S., the first clean air legislation was approved in 1881 during the Industrial Revolution as local smoke-reduction ordinances in Cincinnati and Chicago. In the early 20th century, the federal Bureau of Mines in the Department of the Interior established an Office of Air Pollution, but it was largely inactive and soon dissolved.

In 1955, Congress approved the nation’s first “clean air” act as the Air Pollution Control Act, primarily to fund research into the scope and sources of air pollution. The Clean Air Act of 1963 and Air Quality Act of 1967 authorized, respectively, a national program to address air pollution and enforcement procedures involving interstate transfer of pollutants.

Amidst growing concern nationwide about the dangers of air pollution, the Clean Air Act of 1970 was approved by Congress, signaling a major shift in the role of the federal government in air pollution control. This Act:

- Authorized the development of comprehensive national and state regulations to limit emissions from stationary (industrial) and mobile sources;
- Established four major regulatory programs affecting stationary sources; and
- Expanded federal enforcement authority, which would be conveyed to the U.S. Environmental Protection Agency after its creation in 1971.

Almost immediately following passage of the Clean Air Act, states around the nation began establishing separate agencies to assist businesses in complying with the new regulations. The Ohio Air Quality

Development Authority, created by the Ohio General Assembly in 1970, was one of the first such agencies in the U.S. Two years later, the Ohio Environmental Protection Agency was established by the legislature to enforce air quality regulations.

The last major piece of federal air pollution legislation was approved by Congress as the 1990 Amendments to the Clean Air Act of 1970. This legislation’s provisions:

- Authorized new regulatory programs to control acid rain and for the issuance of stationary source operating permits;
- Authorized a significant expansion of the program to control air pollution, targeting 189 pollutants deemed as toxic;
- Modified and expanded provisions regarding stratospheric ozone protection;
- Increased enforcement authority; and,
- Expanded research programs.

Although it’s been 20 years since the 1990 amendments, federal regulation of air contaminants is an ongoing process. In 1997, the U.S. EPA strengthened the standard for fine particulate matter, with full compliance by states scheduled to take effect in April 2010. Since 2006, federal standards also were strengthened for carbon monoxide, lead, nitrogen oxide, ozone and sulfur dioxide, with compliance by states scheduled to occur throughout the next decade.

A 1986 revision to the federal tax code removed the tax exemption on pollution control equipment. Because of that change, most of OAQDA’s counterpart agencies in other states are now gone. However, because Ohio law still permits *state* tax exemption for such equipment, OAQDA remains very much alive, well and true to its original mission of helping Ohio businesses to comply with Clean Air Act regulations.

^{*}“Sea coal” referred to coal that was either gathered as fragments washed up along the sea coast of Great Britain or which was gouged out of exposed beds along the shoreline.

OAQDA – In Their Own Words



Clifford R. (Kip) Cloud has devoted his career to the practice of law and public service. Cloud earned his BA in mathematics from Ohio Wesleyan University and his JD from The Ohio State University. A veteran of the U.S. Air Force, Cloud served over the years as Assistant Ohio Attorney General, as legal counsel for the former Ohio Youth Commission and Governor James A. Rhodes, as a member of the Columbus Civil Service Commission and as chair of the Columbus Development Commission. Cloud also served two years as judge of the Franklin County Court of Common Pleas.

Clifford R. (Kip) Cloud OAQDA Member

He has served continuously since 1993 as an OAQDA member. As OAQDA chair from 1997-2007, he enjoys the second-longest tenure in that capacity among all current or former members. His name is Clifford R. (Kip) Cloud, and his long service, coupled with that of Authority Chair Gayle Channing Tenenbaum, gives OAQDA a most experienced, potent duo at its helm.

Like Tenenbaum, Cloud is very aware that OAQDA is a vastly different agency than it was when he was first appointed as a member. And he believes the changes that have occurred stand for something important.

“With all of the new responsibilities we’ve been given, governors and legislators alike have demonstrated a lot of confidence in the agency and the way it’s been managed,” Cloud said. “In addition, the members I’ve served with over the years have been very good stewards and have helped put OAQDA in a position to accept new responsibilities as they come our way.”

For a current example, Cloud expresses satisfaction with the manner in which the Advanced Energy Job Stimulus Program has been managed by OAQDA. In particular, he cites the openness and transparency of the program’s application process, as incorporated into OAQDA’s website as “just about the finest example of which I’m aware of how a government financial stimulus program ought to operate.”

When it comes to assessing the relative success of OAQDA’s financing program for large and small Ohio businesses, Cloud says, “What if OAQDA never existed? Would existing and start-up Ohio businesses still have spent money on equipment and facilities to cut hazardous air emissions and operate in more energy efficient ways? We have no coercive or regulatory power to compel them to do that. Yet, because of how we’ve reached out to and communicated with them over the years, they have voluntarily used our financing programs to facilitate \$7 billion of investments in Ohio for those purposes. The record speaks for itself.”

Cloud also likes the open manner in which OAQDA’s monthly meetings are conducted. He notes that the meetings are especially constructive because OAQDA staff, consultants and interested members of the public are present at each meeting, even at those when new policies are being discussed.

“I think this is one of the reasons OAQDA has done so well and seen its role and responsibilities increase. Our meetings are simply a great way of sharing information, generating and refining ideas and making sure that all of us with a hand in OAQDA operations are on the same page,” Cloud said.

OAQDA – In Their Own Words



Mark Shanahan leverages his deep experience in government and educational pursuits to advance an agenda of energy, environment and jobs for Ohio. Shanahan earned a bachelor of arts in English from Boston College, a master of arts in American Civilization from the University of Pennsylvania, and doctorate in American Studies from Case Western Reserve University. Before serving as OAQDA executive director, Shanahan served as an administrator for the Ohio Bureau of Employment Services, learning first-hand the impact of energy and environmental regulation to jobs. In 2007, Shanahan was named as Energy Advisor to Governor Ted Strickland.

Mark R. Shanahan

OAQDA Executive Director and the Governor's Energy Advisor

Now in his 21st year of service as OAQDA's executive director, Mark Shanahan has been the steady hand at the wheel of a state agency that has steered through major waves of change during the last two decades.

At the time of his appointment in 1989, Shanahan said that OAQDA essentially was the same agency it had been during its first 19 years of operation. The primary focus was offering financing for new air quality facilities to large Ohio industries and utilities, and a steadily increasing capacity to do the same for small businesses. Authority members also began a practice of committing funding for environmental research projects that included subjects such as clean coal research, asbestos removal in public schools and acid rain.

"At the time, the two *ex officio* Authority members from the Ohio Department of Health and EPA were really the ones who decided which research projects OAQDA would fund. A different OAQDA member initiated a project on the subject of scrap tires. To this day, it remains the most requested report ever produced by OAQDA," Shanahan said.

Shanahan said that OAQDA's chief financing focus prior to his appointment was on "end of pipe" pollution *control* as opposed to pollution *prevention*. With concurrence by Authority members, Shanahan directed an expansion of that focus to include projects that sought to reduce hazardous air emissions before they were created.

"The ability to finance pollution prevention projects was there from the beginning," Shanahan said. "But rightfully, in the early years, OAQDA activity was very focused on keeping contaminants from escaping out the top of smokestacks."

Shanahan's tenure has witnessed the legislatively mandated establishment within OAQDA of the Clean Air Resource Center, transfer of Ohio's coal program to OAQDA, Authority leadership in the pursuit of the federal FutureGen project, his own appointment as the Governor's Energy Advisor and administering authority for the \$150 million Ohio Advanced Energy Job Stimulus Program.

"OAQDA remains true to its original core mission, but our role and responsibilities obviously have expanded a great deal in the last 20 years. It's tremendously exciting to have the opportunity to lead Ohio's nationally recognized clean coal technology program, and also to be a driving force in the creation of the 'advanced energy' jobs of the future," Shanahan said.

Shanahan believes that "none of today's environmental and energy challenges will go away. And when you add climate change, likely carbon control and the continued push toward renewables, it's clear that OAQDA will continue to play a vital, and perhaps expanding, role in Ohio's energy future."

OAQDA Milestones

June 1970	OAQDA created by Ohio General Assembly to provide financing assistance for pollution control projects by large Ohio businesses seeking compliance with 1970 Clean Air Act provisions.
January 1971	First OAQDA members are appointed.
1972	First OAQDA financing is approved for Buckeye Steel Castings Co. of Columbus. First OAQDA staff person is hired. Ohio Pollution Control Board adopts stricter state air emission regulations.
1973	OAQDA's first executive director is appointed.
1974	Ohio voters approve Constitutional amendment permitting the financing of pollution abatement projects at electric utilities.
1976	OAQDA gains authority to assist small businesses in pollution abatement projects following passage by Congress of Small Business Assistance Act.
1978	OAQDA co-funds its first university research project.
1979	OAQDA co-funds its first clean coal university research project. First OAQDA financing of small business pollution control project. Precursor of <i>AirFocus</i> newsletter is first published.
1983	Total bond issuances since 1970 top \$1 billion.
1984	Ohio Coal Development Office created by Ohio General Assembly, placed under auspices of Ohio Department of Development.
1985	OAQDA authorized its first financing for the William H. Zimmer power plant in Clermont County; subsequent financings have brought the total approved for the plant to \$373 million, the most for any single project in OAQDA history.
1988	OAQDA begins lending financial support to special projects related to the environment.
1993	Clean Air Ombudsman Program established by Ohio General Assembly within OAQDA to help small businesses comply with Clean Air Act amendments of 1990.

OAQDA Milestones, cont.

1996	Clean Air Resource Center established within OAQDA to further assist small businesses with pollution control projects.
1997	First energy efficiency air quality bond is issued to Marion Steel.
1998	First dry cleaners apply for financing assistance from OAQDA.
1999	First automotive industry businesses apply for OAQDA financing. OAQDA approves its smallest financing project — \$13,900 for project at Scottie McBean’s restaurant in Columbus suburb of Worthington (Franklin County).
2003	Ohio Coal Development Office is transferred by act of Ohio General Assembly from the Ohio Department of Development to OAQDA.
2005	OAQDA assumes leadership of statewide effort to attract federally proposed FutureGen power plant.
2007	OAQDA Executive Director Mark R. Shanahan is named by Governor Ted Strickland as the Governor’s Energy Advisor.
2008	OAQDA is named administering agency for \$150 million Ohio Advanced Energy Job Stimulus Program.
2009	OAQDA authorizes funding for first clean coal and non-coal projects under the stimulus program.
2010	OAQDA has awarded more than \$7 billion in financing for clean air projects since its creation in 1970. Since 2003, when the Ohio Coal Development Office was transferred to OAQDA, the Authority has awarded 91 grants totaling more than \$46 million to help fund clean coal technology research at Ohio universities.

Ohio Milestones

The following achievements in improving Ohio's air in the past 40 years have occurred as the result of the collective and cooperative efforts of various agencies working in collaboration with OAQDA:

- OAQDA, working with other state and federal agencies, has played a key role in reducing air pollution in Ohio, including reductions of sulfur dioxide by 76 percent, carbon monoxide by 75 percent, nitrogen oxide by 27 percent and ozone levels (using the eight- and one- hour standards) dropped 18 percent and 22 percent, respectively.
- Lead levels in Ohio’s air dropped 95 percent between 1979 and 1998, after which general monitoring for lead was phased out with the advent of lead-free gasoline.
- Large particulate material in Ohio’s air was cut 31 percent in the last 20 years.
- Small particulate material in Ohio’s air was cut 22 percent over the last 10 years.

OAQDA – In Their Own Words



Bob Brown has made good use throughout his career of both his agronomy degree from The Ohio State University and the license he received in 1977 as a registered engineer.

Joining OAQDA in 1999, Brown serves today as the Authority's clean coal technology manager. Prior to that, he served as chief technical advisor for 10 years for the Ohio Hazardous Waste Facilities Board.

Previously, during his 10 years with the Ohio Farm Bureau, Brown's service as director of engineering included designing a corn-to-ethanol fermentation and distillation system.

Bob Brown **OCDO Clean Coal Technology Manager**

A registered engineer since 1977, Bob Brown joined the Ohio Coal Development Office (OCDO) in 1999 and has played a key role in helping the state attain a number of clean coal technology milestones in the years since then.

He credits the gradual movement by OCDO toward larger-scale, university-driven clean coal research projects for driving much of the change he has witnessed, particularly in the area of dealing with air pollution produced by Ohio businesses and utilities.

“For years, OCDO was very focused on funding research projects addressing the sulfur dioxide, nitrogen oxide and mercury emissions that were contributing heavily to the air pollution levels in Ohio. Today, the sulfur dioxide challenge is largely solved, and nitrogen oxide and mercury controls and scrubbers are now being installed and making a significant, positive difference. Dealing with these particular pollutants is no longer a *research* issue,” Brown said.

Brown said that, with potential federal carbon constraints now being openly discussed and debated, OCDO has become increasingly focused on projects aimed at managing and controlling carbon dioxide emissions. He singled out the groundbreaking work of Ohio State University Professor Liang-Shih Fan as holding great promise in this area.

“Dr. Fan's cutting-edge work with the ‘chemical looping’ process is truly groundbreaking on a national and even international scale. While his work is still ongoing, it already has demonstrated, on a small scale, the potential to provide a more efficient conversion of coal to energy and power with near-zero emissions,” Brown said.

Brown observed that likely federal regulation of CO₂ could be the most expensive challenge facing the coal industry in its long history, underscoring the urgent need for continued, even expanded, research into carbon management and control.

“One of the best things Ohio's coal program has experienced since I've been here is the continuing rise in the investment ratio for OCDO-supported clean coal technology research. Today, that number has risen to five dollars in investment by other funding sources for every one dollar spent by the coal office. I think this confirms the high quality of projects that OCDO supports,” Brown said.

Prior to joining OCDO, Brown served 10 years on the Ohio Hazardous Waste Facilities Board and, previously, worked for 10 years for the Ohio Farm Bureau.

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