ABM Building Value

Improved Air Quality and Reduced Costs: Four Times Bipolar Ionization Was the Answer

Keeping Spaces Healthy with Innovative Technology

CHALLENGE

Concerns over indoor air quality have only increased after the outbreak of COVID-19. Since the cost of providing healthy indoor air was already a key budget item for most, many facility leaders are looking for technologies to help clean air effectively and efficiently for the people sharing spaces in their buildings.

Did You Know?

A 2020 study reported by one company demonstrated a **99.4% reduction of SARS-CoV-2** (COVID-19) at the 30-minute mark using ABM's preferred bipolar ionization solution.[1]

What Bipolar Ionization or Cold Plasma Technology Really Does

The ions generated by the technology attach themselves to particles like SARS-CoV-2 and unwanted gas molecules in the air, leading to multiple helpful effects:

- Ions attach to sub-micron particles, making them filterable or causing them to fall out of the air.[2]
- Ions break down harmful volatile organic compounds (VOCs), rendering them into simpler, harmless compounds like oxygen and water.[2]
- Ions kill or inactivate pathogens such as SARS-CoV-2 by creating oxidative stress that reduces bacterial survival.[3]

Bipolar ionization was a big factor in the air quality and energy solutions for:

- Connellsville Area Schools' Educational Technology Funding Needs
- Turner County Government's Vital Service Infrastructure
- Aiken County Schools' Energy Cost Control Plan
- Irwin County Government's Indoor Air Quality Concerns

"Reducing the need for outdoor air by reducing particles and VOCs in your indoor air saves energy," says Kevin Brown, Director of Technical Solutions at ABM. "But we also don't want sick-building syndrome, which can happen when spaces are completely cut off from outside air. With bipolar ionization we can do a pre-purge and post-purge of the air in a facility, exchange all the air, avoid sick-building syndrome, and then reduce the need for outside air when the energy cost is highest."

1 https://globalplasmasolutions.com/library/news-release/GPS-News-Release-SARS-CoV-2.pdf
2 *A White Paper, An Overview of Needlepoint Bipolar Ionization*, Charlie Waddell, Chief Technology Officer & Founder Member ASHRAE, SSPC 62.1, TRG4-IAQP, TC 2.3 and ICC Global Plasma Solutions, Inc., February 25, 2019
3 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4967512/

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INCREASED FUNDING FOR LEARNING ENVIRONMENTS IN PENNSYLVANIA

For their three-year financial recovery plan, Connellsville aimed higher than a simple downsize. District leaders planned for their consolidated school strategy to improve facilities and provide more opportunities to students. The question was how to fund the technology and infrastructure upgrades they needed, all while facing state and federal cutbacks.

Connellsville Area School District

Bullskin Township Elementary
Springfield Township Elementary
West Crawford Elementary
Dunbar Township Elementary
Connellsville Area Middle School
Connellsville Area High School

A bundled energy savings program was the answer. To enhance their indoor environmental quality, put Smartboards in classrooms, and provide a Chromebook device for every student, the program needed to generate a lot of energy savings.

How Bipolar Ionization Contributed to Millions in Cost Reduction

To generate $26.4 million in guaranteed savings for Connellsville, ABM designed and implemented energy conservation measures. Engineers analyzed each school's assets and airflow. Bipolar ionization boosted the energy savings, making it possible for the school to redirect more savings to its educational technology and learning environment upgrades.

By adding bipolar ionization to heat pumps, roof top units, chilled water air handling units, and more, the cost of keeping spaces ventilated was significantly reduced.

"A project like this provides us the ability to make education upgrades we may not have been able to do otherwise because of a lack of funding. There are a lot of districts that may not be able to take on a project like putting devices in students' hands immediately, but they can do it with the right help."

– Philip Martell
Former Superintendent
Connellsville Area School District

Did You Know?

The CDC recommends schools consider increased circulation of outdoor air to help slow the spread of COVID-19, but only when doing so doesn't increase other risks, like introducing excess asthma triggers from outside.[3] Bipolar or cold plasma ionization reduces particles and VOCs in the air, allowing increased air exchanges in a space with less outside air.

"While there are no singular "silver bullets" for air disinfection, needlepoint bipolar ionization technologies that produce no ozone hold substantial promise for effectively impacting indoor air quality during a time where optimization of strategies is critical."

– ABM's Expert Advisory

Making a Big Project Bigger

The energy savings created by bipolar ionization contributed to an extensive list of energy conversation measures designed and implemented across the district:

- LED lighting upgrades and advanced non-proprietary controls
- New HVAC units, cold plasma ionization, building envelope upgrades, and existing HVAC unit rejuvenation
- Water conservation measures
- High-efficiency boilers and pumps

Educational technology and learning environment upgrades funded by energy savings included:

- Smartboards for classrooms
- Building wide Wi-Fi and VOIP upgrades for seven schools and the Career and Technology Center
- Security cameras
- A Chromebook for every student

THEN AND NOW: AIR QUALITY AND ENERGY SAVINGS

As providers of vital services, county facilities wanted to eliminate wasted expenses and invest in improved security, communications reliability, and their infrastructure. Fire stations, elections department offices, the courthouse and jail, EMS and Georgia Defense Force facilities needed upgrades.

That was before the COVID-19 outbreak. Now that the county is responsible for maintaining so many shared spaces for residents and county employees, the additional benefits to their air quality and occupant health are even more appealing.

3 https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html

A Solution Then: Upgrades Without Upfront Costs

To achieve proper, healthier levels of ventilation, air exchange with outside air is required. A system that brings in a lot of outside air has to do more work, though, especially if that outside air is too humid, too hot, or laden with unwanted particles.

Cold plasma ionization (or bipolar ionization) may help a facility provide healthier air without having to bring in excessive amounts of outside air, adding more and more energy costs and stress on the system for more and more dehumidifying and filtering. For a rural county in southern Georgia with multiple buildings to keep healthy and efficient, reducing that reliance on excessive outside air brought down energy costs.

Those larger energy savings helped Turner County invest in energy conservation measures with slower payback and redirect funds to needs like:

- Upgraded fiber optic communication lines for the Emergency Response Center
- Renovated kitchen for the Turner County Jail
- Constructed a 2,800-square-foot addition to the Turner County Annex to help consolidate county services

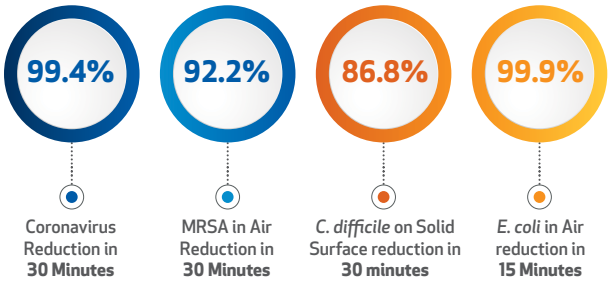
A Solution Now: Cleaner Air in the Era of COVID-19

With upgrades in place and already reducing energy and operational costs, Turner County is enjoying an additional benefit of their project: technology capable of reducing the count of active bacteria and viruses in their indoor air.

Turner County Facilities Included:

Courthouse, Jail, and Courthouse Annex
Georgia Defense Force and Extension/Agricultural Center
Elections and Road Departments
Fire Stations Amboy, Bethel, Coverdale, Dakota, Harmony, and Inaha

Bipolar ionization inactivates pathogens with microbicidal effects on bacteria and viruses. One industry leader reports independent laboratory tests of that microbicidal effect[4]:



How a County Saves More Than $7.2 Million

Generating that savings required a carefully engineered, custom deployment of energy conservation measures for 16 county facilities, including six fire stations:

- LED lighting retrofit
- HVAC replacements and retrofits
- Energy management control systems
- Solar fields at four elementary schools and three middle schools, including Jackson STEM Middle School
- Water conservation measures
- Building envelope sealing, including windows, doors, and a roof replacement for the County Annex
- Improved outdoor air intake management through cold plasma technology

"As a banker and county commissioner, for me everything we do is about the return on our investment for our community's needs and wellbeing. Thanks to ABM, not only did they help us upgrade and improve our infrastructure by reducing our operating expenses they also helped improve the air quality of our building by installing global plasma technology. And as everyone knows during this pandemic, there is nothing more important than the health of our employees and the community we serve."

- Sam McCard
Turner County Commissioner

4 https://www.hsph.harvard.edu/news/press-releases/green-office-environments-linked-with-higher-cognitive-function-scores/

CUTTING RUNAWAY COSTS IN SOUTH CAROLINA

In the way of Aiken County School's maximum energy savings stood the HVAC of their two highest energy-using schools. ABM experts analyzed the assets and controls to help them reduce that energy use.

How Cold Plasma Made a New Solution Possible

ABM discovered the existing outside air dampers in one school were open nearly 75% of the time. The brand-new building didn't need new HVAC, it needed its current assets expertly adjusted to improve outcomes.

Cold plasma ionization helped the systems at Levealle McCambell Middle School provide proper ventilation while reducing energy cost by $25,000 a year. At the largest energy-using school in the district, Mossy Creek Elementary, solving similar over-ventilation with improved controls and bipolar ionization saved over $30,000 a year.

Did You Know?

Aiken County Schools

Levealle McCampbell Middle School
Mossy Creek Elementary School

Reducing volatile organic compounds (VOCs) and increasing ventilation has been shown to improve cognitive test scores. For instance, in a 2015 study, lower VOC concentrations and enhanced ventilation over the course of the day improved test scores in adults by 61%.[5] Bipolar ionization technology creates ions that break down compounds in the air, such as VOCs.

"Before the COVID-19 outbreak, bipolar ionization was a go-to energy savings generator with a fantastic extra benefit of better air quality. Now that ventilation has risen to be a key health issue for many facilities, we're excited to bring an air cleaning technology that also saves energy to our clients."

– Kevin Brown
Director of Technical Solutions at ABM

Helping a District Save $70 Million

The projected savings of $70 million during the 20-year life of the project was created by facility improvements and new systems at multiple facilities. ABM helped the school update infrastructure and meet sustainability goals without upfront costs.

- LED lighting retrofit
- HVAC replacements and retrofits with state-of-the-art control systems
- Building automation controls with remote monitoring capability
- Water conservation measures
- Improvements to ventilation and outside air intake, including bipolar ionization and building envelope sealing.

IMPROVED INDOOR AIR QUALITY IN GEORGIA

Irwin County's problem was different. Some buildings featured smaller, residential-style air conditioning equipment, with no capability to ventilate with outside air. Some older courtroom facilities suffered from mustiness and odors. Options for improving air quality were limited.

How Cold Plasma Made a Courtroom More Comfortable

Buildings with residential-style air conditioning used the technology to improve air quality in their facilities despite their inability to draw in outside air. ABM's project reduced odors in the aging courtrooms, significantly improving indoor air quality while still achieving a small bonus to energy savings by lowering outside air setpoints.

Irwin County

Irwin County Courthouse
EMS Building Health Department
Senior Citizens Center
Library

5 https://www.hsph.harvard.edu/news/press-releases/green-office-environments-linked-with-higher-cognitive-function-scores/

Better Air and 32% Less Energy Use

Upgrades cut the energy cost of the courtroom facility from $1.01 per square foot down to $0.68 per square foot, with spending reduction accomplished through conservation measures:

- LED lighting retrofit
- HVAC replacements for 36 units
- New boiler
- Building envelope improvements
- Bipolar ionization/cold plasma technology for outside air reduction
- Energy management system (HVAC controls)

"Our historic courthouse is the centerpiece of our county and has withstood many years of changes – even today's unique challenges. Thanks to ABM's bundled energy solutions and technological expertise, we've been able to make major upgrades and improvements to our lighting, mechanical, building envelope, and air quality. And we all know how important indoor air quality is during these times."

– Joey Whitley
Chairman, Irwin County

BENEFITS

ABM uses ionization technology in our HVAC and energy projects for multiple positive impacts, including:

- Energy savings using improved indoor air quality, per ASHRAE 62.1, by providing healthier ventilation with a reduced reliance on outside air
- Disinfection and pathogen reduction from the microbicidal effects of ions on viruses and bacteria
- Reduction of VOCs and unwanted gases from indoor air, including odor reduction
- Improved filtration of unwanted particles, including asthma triggers
- Eliminating biofilms and other buildups on coils of HVAC equipment , contributing to energy and maintenance savings

Take the next step towards healthier, safer air quality for your occupants. Schedule your Healthy Building Risk Assessment today.

Visit EnhancedFacility.com or call 866.624.1520 to learn more.

About ABM

ABM (NYSE: ABM) is a leading provider of facility services in the United States and various international locations. ABM's comprehensive capabilities include janitorial, electrical & lighting, energy solutions, facilities engineering, HVAC & mechanical, landscape & turf, mission critical solutions and parking, provided through stand-alone or integrated solutions. ABM provides custom facility solutions in urban, suburban and rural areas to properties of all sizes - from schools and commercial buildings to hospitals, data centers, manufacturing plants and airports. ABM Industries Incorporated, which operates through its subsidiaries, was founded in 1909. For more information, visit ABM.com.

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