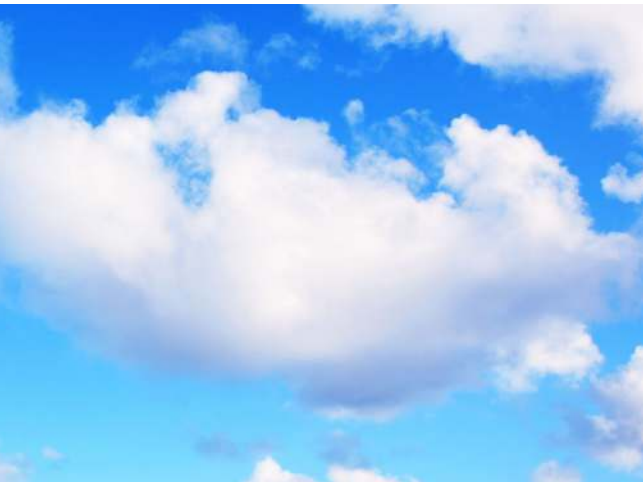


AECOM

AIR QUALITY SERVICES to the Power Industry

Statement of Qualifications







A modern society depends on reliable, safe electric power at reasonable costs. Power and transmission providers face ever-increasing environmental challenges in their efforts to meet demand.

For almost 50 years, AECOM has offered leading-edge consulting and engineering services to help electric utilities successfully address their most difficult environmental challenges.

We help the industry obtain regulatory and public approval for major projects at coal, integrated gasification combined cycle, natural gas, solar, wind, oil, hydroelectric, cogeneration, renewable biomass, geothermal, and nuclear power stations. Air quality services can be a critical component to environmental review and permitting of capital power projects.

For existing operations, we help the industry understand and respond to an evolving

regulatory framework, support facility expansions and modifications, design and implement air emissions controls, provide monitoring and measurement support, and help facilities maintain compliance with environmental requirements. Air quality regulations continue to evolve with a trend towards more stringent requirements — we can help you keep your strategy and compliance programs current.



Services

AECOM provides full air quality services directly to the power industry and as part of multi-media environmental projects and integrated offerings with our engineering groups:

- Air permitting strategy, advocacy and applications
- Air quality regulatory compliance strategies and compliance support
- Emissions inventories and reporting
- Source testing and monitoring systems
- Air quality modeling and risk assessment
- Air pollution control evaluation, design, and implementation
- Greenhouse gas emissions strategy support
- Siting and fatal flaw analyses
- Noise and odor evaluations
- Environmental information management systems
- Training on air quality regulatory programs

Support to Power Industry Groups

- For the Electric Power Supply Association, we served as exclusive technical environmental counsel.
- For the Electric Power Research Institute, we have been a contractor on health risk, regional haze, vapor intrusion, model validation, technology development and acid rain issues.
- For the Utility Air Regulatory Group, we have been a contractor on modeling guidelines and ambient air quality standards.
- For the Utility Solid Waste Activities Group, we provide toxicology and risk assessment review consulting service.

Representative Recent Projects

Air Permitting Strategy, Advocacy and Applications

For a California power company, AECOM successfully provided comprehensive permitting services for a proposed hybrid (gas-solar) power plant. The innovative design proposed to thermally integrate 570 megawatts (MW) of clean-burning natural-gas combined-cycle technology with 50 MW of solar parabolic trough mirrors on a 333-acre site. AECOM supported the air permitting processes, which consisted of obtaining a Prevention of Significant Deterioration (PSD) permit from the U.S. Environmental Protection Agency (EPA) Region 9, as well as a local non-attainment New Source Review permit from the local air quality management district. Significant challenges faced in the permitting of this facility included 1) obtaining sufficient offsets/emissions reduction credits; 2) addressing the new one-hour NO₂ NAAQS and 3) evaluating new GHG BACT requirements.

AECOM provides an Arizona utility company with AQ support for a variety of projects. In relation to the Environmental Impact Statement for the lease renewal of a power plant, AECOM provided air quality impact analyses and ozone modeling. In addition to this work, AECOM assisted with analysis and implementation of the Best Available Retrofit Technology requirements under the Regional Haze regulations. We provided analyses and support for negotiation with EPA on these requirements. We assisted with the permitting

of a new auxiliary boiler needed in order make the required emissions reductions, under the Navajo Tribal new source review program. We are currently preparing a PSD application for the client for the installation of SCR systems on the two remaining coal-fired boilers.

AECOM assisted a private Midwestern university with developing federal Boiler MACT and NAAQS compliance programs, as well as guiding the University through conversion of its cogeneration facility away from coal firing. The Boiler MACT and NAAQS programs focused on table-top evaluation of existing control systems, including suggestions for alternatives; design and implementation of an on-site stack-testing study to empirically evaluate the systems and trial new fuels and sorbents; assisting the University with air emissions permitting of the selected design options; and development of fuel testing, performance testing, and continuous parameter monitoring documentation.

AECOM developed the PSD air permit application and negotiated permit conditions for a 64-MW simple-cycle combustion turbine for a generating station in New Jersey. AECOM developed the PSD air permit application (Title V significant modification) and dispersion modeling analysis, including modeling protocol, emissions netting analysis, and monitoring waiver request. Since the client was considering two turbine models, the project included analyses and separate application development (per NJDEP request) for both



a Rolls Royce Trent 60 turbine and a General Electric LM6000 turbine, and the air permitting was finalized with the selected Trent 60 model. The permit was approved with a high annual capacity factor (8760 hr/yr operation), natural gas firing as primary fuel, and up to 1,440 hr/yr of ultra-low sulfur distillate firing. At the request of the NJDEP, AECOM developed an analysis of simple-cycle versus combined-cycle performance in support of the state-of-the-art emissions control analysis (justification for use of simple-cycle gas turbine generator with greater than 10 percent annual capacity factor). AECOM negotiated the monitoring, recordkeeping, and reporting requirements for the combined PSD permit and Title V significant modification.



Air Quality Regulatory Compliance Strategies and Compliance Support

For a utility company that serves the Northeastern US, AECOM provided regulatory compliance and support for the 2015 phase of the EMIS build-out. Areas and media managed in the EMIS are: Regulatory Tasking, Air Compliance and Reporting, GHG MR&R Reporting, Water Compliance and Reporting; Laboratory Sample Analysis Data Validation System; Waste Metrics; EPCRA Tier II; and

EPCRA TRI. AECOM delivered system design and configuration tasks, developed content and business logic, and provided training and deployment support as needed for all modules. AECOM created integrations, including transformation logic, between multiple business systems such as CEMS databases, serving as data feeds to the EMIS thereby eliminating over 90% of manual entry. AECOM invented business intelligence systems supporting reporting of enterprise metrics meeting client policies and goals, for example tasks completed on time, compliance status for permit limits, and waste reduction. The Air Compliance & Reporting module processes ~50,000 records/day and successfully supports the transformation and reduction of this large dataset to support both state specific air emissions reporting requirements and TRI reporting.

Source Testing and Monitoring Systems

Since 1993, AECOM has been providing a Nevada power company with ambient air and meteorological monitoring, auditing, and reporting services at four of their electrical generating facilities. These monitoring programs are designed to meet Title V operating permit requirements as well as to collect representative ambient air quality data and model-ready meteorological data to support PSD permit applications for future new generation or major modifications to existing plants. Monitoring stations are equipped with various combinations of continuous NO_x , SO_2 , CO , O_3 , PM_{10} and $\text{PM}_{2.5}$ monitors, as well as instrumented meteorological towers with multiple levels of instrumentation and SODARs.

AECOM was subcontracted to conduct mercury (Hg) testing at a coal-fired power

station. Mercury sampling was performed to demonstrate compliance and low emitting electrical generating unit (EGU) low emitting electrical (LEE) status with the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coal and Oil Fired Electric Utility Steam Generating Units (EGUs). This "Utility NESHAP" is published as 40 CFR 63, Subpart UUUUU and was promulgated on February 16, 2012, with an effective date of April 16, 2013, and a compliance date of April 16, 2015 (3 years after the effective date).

Air Quality Modeling and Risk Assessment

To respond to the need to account for emissions variability in addressing probabilistic 1-hour ambient air quality standards for SO_2 and NO_2 , AECOM developed a statistical technique with EPRI funding, the Emissions Variability Processor (EMVAP), which can account for emissions variability in dispersion modeling. The use of EMVAP can aid our clients in that the occurrence of occasional high emission cases due to startup, shutdown, and malfunctions that are infrequent (and do not threaten compliance with the probabilistic ambient standards) can be explicitly accommodated with the use of EMVAP.

AECOM was hired by a northern utility company to assist with the permitting of a power station in northern Virginia that is a 3-on-1 combined cycle natural gas-fired power plant. The unique location and timing of this power plant (within 10-km of Shenandoah National Park) presented some unusual modeling challenges. The proximity to Shenandoah, created the need for a high-level visible plume study using the PLUVUE model. Combined with the visible plume impacts, the nitrogen

deposition impacts were also highly scrutinized by the Federal Land Manager. AECOM was able to assist at a high level in negotiations between the client and the FLM that resulted in the FLM not issuing an adverse impact finding for the project. As for the timing, the project was also being permitted in the midst of newly promulgated National Ambient Air Quality Standards (NAAQS) for NO_2 . Showing compliance with these standards at the time was a challenge because the EPA had not issued any guidance on how to perform the modeling and the approved model, AERMOD, had not yet been equipped with the appropriate tools to handle the statistical nature of the new NAAQS. AECOM had to develop a standalone post-processor that would calculate the new form of the NAAQS and also incorporate a source culpability function as the modeling inventory was so large (extending into the Washington DC area). The modeling and post-processor development was ultimately approved by Virginia DEQ and EPA. This analysis combined with the FLM's no adverse impact finding helped pave the way for the client to receive a PSD permit to construct and operate the station.

Air Pollution Control

AECOM brings clean air solutions to power plants. We provide our clients with proprietary SO_2 , SO_3 , and mercury control technologies as well as technology neutral solutions for all regulated pollutants. AECOM has provided engineering, procurement, construction, and start-up services since the early 1970s and we have extensive retrofit and upgrade experience: 52,000 MW SO_2 control; 23,000 MW NO_x control; 16,000 MW of SO_3 control; and 20,000 MW of low NO_x burners, particulate matter, halogens, and

mercury control. We have conducted mercury control projects ranging from bench-scale fundamental investigations to pilot- and full-scale demonstration programs carried out at more than 65 power plants. We also support technology development and economic analysis programs for EPRI, DOE, and various utilities. AECOM has expertise in all regulated pollutants and all major technologies, including carbon dioxide control and sequestration evaluations.

Siting and Fatal Flaw Analyses

AECOM was hired to perform a wind assessment study to determine the feasibility of producing wind energy within an area of North and South Dakota. Three sites were reviewed for potential development and assessed using the WindFarm software package. AECOM used interpolated mesoscale meteorological (MM5) data to determine the hourly wind speed and direction in each area and compare it to a nearby observation tower. The wind data, topography, and surface roughness were used in WindFarm along with a wind turbine model and hub height to calculate the net energy yield. The turbine layout was optimized to reduce wake losses to maximize energy output of the wind farm.

AECOM is working with a confidential power client to develop an expedited approach to power plant siting. This expedited approach integrates AECOM's extensive air emission source modeling and permitting capabilities with our water, land use, and GIS capabilities to rapidly and cost-effectively determine the optimal site location(s) for a proposed power plant. This siting study approach will save thousands of dollars and substantial time when siting a new power plant.





About AECOM

AECOM is built to deliver a better world. We design, build, finance and operate critical infrastructure assets for governments, businesses and organizations. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM had revenue of approximately \$20.2 billion during fiscal year 2018.

See how we deliver what others can only imagine at aecom.com and [@AECOM](https://twitter.com/AECOM).

CONTACTS

Bart Eklund

Practice Director, Air Quality
512.419.5436
bart.eklund@aecom.com

Mark Rokoff

Market Sector Director, Power
216.622.2429
mark.rokoff@aecom.com

aecom.com

