

J. EDWARD CICHANOWICZ

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INDEPENDENT POWER SYSTEMS CONSULTANT

J.E. CICHANOWICZ, INC.
(July 1993-present)

J. Edward (Ed) Cichanowicz provides consulting services addressing the design and application of environmental control technologies for fossil fuel power stations. This service requires analysis of control technology fundamentals, capital and operating cost, applicability to a given site, and operating risk. The control technologies include burners and catalytic reactors for low emissions of nitrogen oxides (NO_x), desulfurization processes for sulfur dioxide (SO₂), sorbents and additives for control of mercury (Hg), and carbon capture systems for carbon dioxide (CO₂)

Mr. Cichanowicz's services can be categorized as follows:

Strategic Planning, Implementation, and Development of Generating Plant and Environmental Technologies

Mr. Cichanowicz has developed investment plans addressing thermal efficiency improvements and retrofit of environmental technologies for coal- and natural-gas fired generating stations. Domestic clients include industry consortia such as the Utility Air Regulatory Group, Edison Electric Institute, American Public Power Association, and the National Rural Electric Co-operative Association. Individual utilities include Detroit Edison, Duke Power Company, Exelon Power, FirstEnergy Corporation, Luminant, New York State Electric & Gas Corporation, Public Service Electric & Gas Corporation, Southern Company, Tennessee Valley Authority, We Energies, and several rural co-operatives. International clients include the Italian utility ENEL for whom the cost, thermal performance, and CO₂ "footprint" of combustion turbines operating in simple and combined cycle was evaluated, and the Israel Electric Corporation whom engaged Mr. Cichanowicz regarding handling and firing blends of natural gas and hydrogen fuel.

J. EDWARD CICHANOWICZ

Expert Testimony

Mr. Cichanowicz has prepared expert reports or testified on behalf of owners of fossil generating plants and process suppliers in more than a dozen public trials, arbitrations, mediations, or public utility commission hearings.

He has twice testified to United States House of Representatives committees regarding coal-fired power plant environmental control technology. In October of 2011 he addressed *Factors Affecting the Timeline for Retrofit of Environmental Control Technologies to Coal-fired Power Stations* to the Subcommittee on Energy and Environment Committee on Science, Space and Technology. In November 2013 he described *Factors Affecting the Commercial Feasibility of Carbon Capture and Sequestration Technologies for Coal-fired Power Stations* to the Subcommittee on Energy and Power Committee on Energy and Commerce.

An international assignment required an expert report and presentation to the Public Utility Authority of Israel regarding the environmental control technology capabilities and cost as applied to coal-fired power stations operated by Israel Electric Corporation.

TECHNICAL PROJECT MANAGER

ELECTRIC POWER RESEARCH INSTITUTE
(1978-1993)

Duties at EPRI focused on managing research projects to develop and commercialize environmental control technologies and improve plant performance. Projects addressed advanced technologies to control NO_x, SO₂, and particulate matter emissions. A key focus of his duties was managing the design, operation, and testing of six pilot plants treating coal-generated combustion products to develop and assess advanced environmental control technologies.

Work to enhance power plant thermal and environmental performance using integrated design concepts in 1988 received the National Academy of Environmental Engineers *Excellence in Environmental Engineering* award.

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RESEARCH ENGINEER

ENERGY & ENVIRONMENTAL RESEARCH CORPORATION
(1975-1978)

Key responsibilities addressed developing burner design and fuel processing for advanced combustion systems, focusing on control of emissions of NO_x and particulate matter for coal and fuel oil, under sponsorship of the U.S. Environmental Protection Agency, the Department of Energy, oil refiners, and industrial fuel consumers. This work included responsibilities as an on-site test engineer for experimental coal and fuel-oil fired combustors for power plant and industrial boiler application.

FURTHER BACKGROUND INFORMATION

Mr. Cichanowicz has been awarded several patents in NO_x and environmental control technology and improved heat capture in boilers. He has authored or co-authored over 100 technical papers and briefing documents. He is a member of the American Society of Mechanical Engineers and the Air & Waste Management Association.

EDUCATION

Clarkson University (Potsdam, NY): BS in Mechanical Engineering, 1972

University of California at Berkeley: MS in Mechanical Engineering & Thermal Sciences, 1975

SUMMARY OF EXPERIENCE
 ARBITRATION, MEDIATION, AND JUDICIAL ACTIONS
 2010-2025

J. Edward Cichanowicz
 Saratoga, CA

Year(s)/Client/Representation	Issue
<u>2021-2024</u> Babcock & Wilcox Power Generation Group/ Quinn Emanuel Urquhart & Sullivan, LLP	Steam Boiler Design/US District Court, Middle District of Pennsylvania
<u>2017-2018</u> Illinois Power Resources, LLC/Schiff-Hardin	Coal Power Plant Startup Emissions Performance/US District Court, Central District of Illinois
<u>2018-2019</u> Colloid Environmental Technologies Company, LLC/Cravath, Swaine, and More, LLP	Patent dispute/arbitration
<u>2016-2017</u> First Energy Corporation/Quinn Emanuel Urquhart & Sullivan, LLP	Mercury Control Technology Feasibility/arbitration
<u>2016</u> Rolls Royce/Vorys, Sater, Seymour, and Peas, LLP	Gas turbine environmental control design (arbitration)
<u>2011-2013</u> Kansas City Power & Light/Schiff-Hardin	Power plant environmental control design (mediation)
<u>2009-2010</u> Luminant Power/Sussman Godfrey LLP	Power plant environmental control performance, cost (Luminant vs. Alcoa, jury trial)

J. Edward Cichanowicz

Select List of Recent Presentations, Publications, Design Guidelines

Carbon Capture, Utilization, and Storage (CCUS) and Hydrogen: The Potential to Contribute to Low Greenhouse Gas Power Generation in the United States, EM: The Magazine for Environmental Managers, April 2024.

Evaluation of Reference CO₂ Emission Rates and Heat Rate Improvements Options in Compliance with the Affordable Clean Energy Rule, MEGA Symposium: Navigating the Emerging Energy Environment, November, 2020.

2021 Status of Carbon Capture Utilization and Sequestration for Application to Natural Gas-Fired Combined Cycle and Coal-Fired Power Generation, December 2021, for release by the Edison Electric Institute et. al.

Mercury Emissions Rate: The Evolution of Control Technology Effectiveness, Power Plant Pollutant Control and Carbon Management Symposium, August 2018.

Current Capital Cost and Cost-Effectiveness of Electric Utility Coal-fired Power Plant Emissions Control Technologies, Prepared for the Utility Air Regulatory Group, December 2017.

The First Year of Mercury Hg Emissions Rate: Control Technology Effectiveness, Energy, Utility, & Environment Conference, February, 8-10, 2017, San Diego, CA.

The First Reporting Quarters of Mercury Emissions Rate: Effectiveness of Control Technology Categories, Power Plant Pollutant Control and Carbon Management Symposium, August 2016.

Catalytic Environmental Controls Best Practices Operating and Maintenance Guideline for Gas Turbines and Combined Cycles Operating in a Power Generation Environment, EPRI, Product Number 3002006041, November 2015.

Reliability Assessment and Life Cycle Best Practices Manual for Catalytic Systems Supporting Gas Turbine Combined Cycle Generators Operating in an Oil & Gas Environment, EPRI, August 2015.

Procurement Guidelines for Catalytic Environmental Controls for Simple and Combined Cycle Gas Turbines, EPRI Product Number 3002003869, November 2014.

Factors Affecting the Commercial Feasibility of Carbon Capture and Sequestration Technologies for Coal-fired Power Stations, Testimony before the Subcommittee on Energy and Power, Committee on Energy and Commerce, United States House of Representatives, November 14, 2013.

Emissions Controls for Natural Gas-fired Combustion Turbines: Present and Future Trends, Workshop on Air Quality Impacts of Natural Gas Combustion for Electricity Generation, Palo Alto, CA, August 2013.

Current Capital Cost and Cost-Effectiveness of Power Plant Emissions Control Technologies, Prepared for the Utility Air Regulatory Group, July 2013.

Factors Affecting the Timeline for Retrofit of Environmental Control Technologies to Coal-Fired Power Stations, Testimony before the Subcommittee on Energy and Environment, Committee on Science, Space and Technology, United States House of Representatives, October 4, 2011.

Gas Turbine/Combined Cycle Post-Combustion Emission Control Best Practices Guideline: Selective Catalytic Reduction and CO Emission Control Technologies, EPRI Product 1022096, November 2011.

Operation and Maintenance Guidelines for Selective Catalytic Reduction Systems: 2010 Update, EPRI Product Number 1019707, November 2010.

Current Capital Cost And Cost-Effectiveness Of Power Plant Emissions Control Technologies, Prepared for the Utility Air Regulatory Group, January 2010.

PAC Characterization Tests for Coal-Fired Utility Applications, Proceedings of the 2008 Combined Power Plant Air Pollutant Control Symposium, Baltimore, MD, August 2008.

Estimating Total Sulfuric Acid Emissions from Stationary Power Plants, EPRI Product 1016384, November 2008.

The First 100 GW of SCR in the U.S. – What Have We Learned? Proceedings of the 2006 Combined Power Plant Air Pollutant Control Symposium, Baltimore, MD, August 2006.