

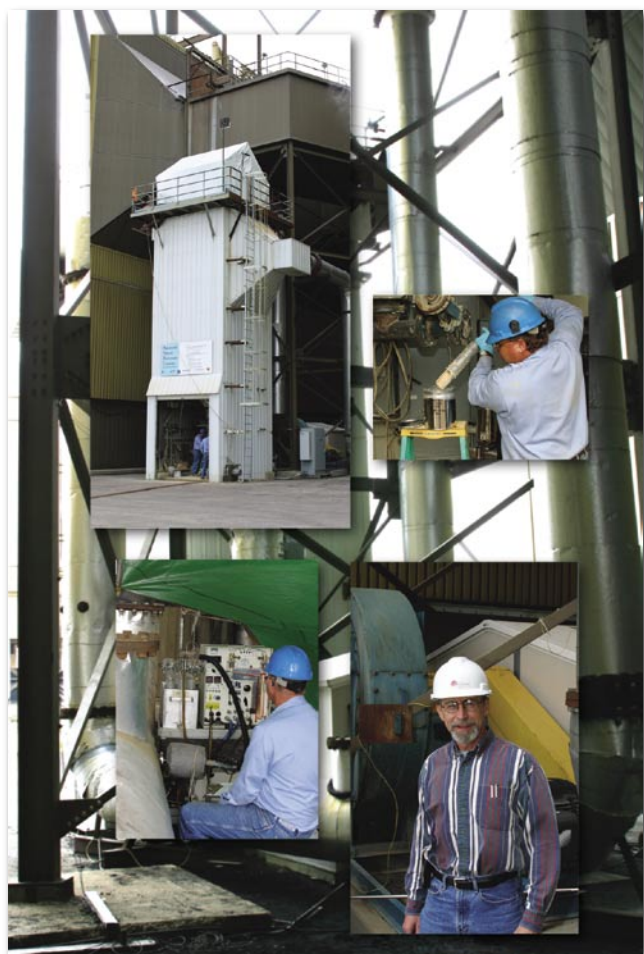


# ADVANCED HYBRID™ Technology

*Development, Demonstration, and Commercialization*

## What is the ADVANCED HYBRID™ Filter?

The ADVANCED HYBRID™ Filter (formerly the advanced hybrid particulate collector) is a pollution control technology that removes microscopic particles (fine particulate) from exhaust gases of coal-fired power plants, incinerators, and cement production facilities. Fine particulate emissions contribute to visibility-reducing haze and have been linked to human health problems. The ADVANCED HYBRID™ technology is a novel concept that combines key characteristics of conventional fine-particle control technology in a new way leading to a more effective and lower-cost option for fine-particle control.



*Global Reach: Control of fine particles from industrial plants worldwide represents a \$5 billion market annually. Invented by EERC Senior Research Manager Stan Miller and licensed to W.L. Gore & Associates, Inc., the ADVANCED HYBRID™ Filter removes these particles so efficiently that the air leaving the device is actually cleaner than the air entering the plant, with respect to fine particulate.*

## What is the EERC's role in ADVANCED HYBRID™ development?

The Energy & Environmental Research Center (EERC) has been active in research on fine-particle emissions for over 20 years. In 1995, the EERC was awarded a competitive grant by the U.S. Department of Energy and W.L. Gore & Associates, Inc., to develop a concept invented by EERC engineer Stan Miller to combine the strengths of conventional fine-particle control technologies to achieve extremely high levels of fine-particle control. Since 1995, the EERC has worked on understanding and further development of this technology at the laboratory-, pilot-, and full-scale level. Currently, a field demonstration unit is scheduled to be on-line at the Big Stone Plant in Milbank, South Dakota, on October 25, 2002. To date, total contract value to the EERC for ADVANCED HYBRID™ development is \$4,347,930.

## Who owns the ADVANCED HYBRID™ technology?

The EERC formed the Energy & Environmental Research Center Foundation in 1992 to facilitate the commercialization of EERC-developed technologies. This 501(c)(3) corporation has title to the technology. U.S., Korean, and European patents have been granted for this technology. Patents have been applied for in Canada, China, Japan, and India. Based on continuing work to enhance the ADVANCED HYBRID™ technology, a second patent has been granted in the United States, and applications have been submitted to the countries noted above.

This technology has been licensed to Gore exclusively for selected countries and applications. Gore has sublicensed this technology to the Swiss company, ELEX, for applications in the energy and mineral-processing industries in Europe, India, and China. ELEX has been given the right to install an ADVANCED HYBRID™ unit on the Otter Tail Power Company Big Stone Plant in Milbank, South Dakota.

Two additional sublicensees have been named for the U.S. market. Proceadair will cover the mineral-processing industry and Southern Environmental, Inc., will be responsible for the electric utility industry.

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## How good is the technology?

Removal efficiencies for fine particles of over 99.99% have been achieved by the ADVANCED HYBRID™ technology both at the demonstration facilities of the EERC and the field demonstration unit at the coal-fired power plant at Milbank, South Dakota. That means the air leaving the fine-particle control device is cleaner than the air entering the power plant, with respect to fine particulate. Amazingly, the cost of this technology is less than the cost of conventional, less effective options currently used for fine-particle control. Based on these results, the ADVANCED HYBRID™ technology is the best and least expensive option for controlling fine-particle emissions.

## What is the market for the ADVANCED HYBRID™ technology?

Control of fine particles from industrial plants represents a very large market worldwide. Currently, the size of this market is estimated at \$5 billion annually. Stricter future regulations of fine-particle emissions in the United States could open an even larger market in the future for the ADVANCED HYBRID™ technology.

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