

- fossil energy
- environmental
- energy efficiency
- other

ADVANCED TURBINE SYSTEMS: THE GE H-CLASS

States Impacted:

Massachusetts, Michigan,
New Jersey, New York, Ohio,
South Carolina, Tennessee,
Virginia

Benefit Areas:

Environment, Energy Security,
Technology Leadership,
Lower Cost of Electricity

Participants:

GE Power Systems,
GE Corporate Research &
Development, GE Aircraft
Engines Division, GE Turbine
Plant, Howmet, PCC Airfoils,
Oak Ridge National
Laboratory, South Carolina
Institute for Energy Studies

FETC Contact:

Abbie Layne**
ATS Product Manager
Office: (304) 285-4965
E-Mail: alayne@fetc.doe.gov

MAIL ADDRESS:

* U.S. Department of Energy
P.O. Box 10940
626 Cochran Mill Road
Pittsburgh, PA 15236-0940

**U.S. Department of Energy
P.O. Box 880
3610 Collins Ferry Road
Morgantown, WV 26507-0880

WEBSITE:

www.fetc.doe.gov

Description

As part of an eight-year partnership between the Department of Energy and General Electric Company (GE), the successful development of H-class ATS gas turbine continues. This advanced engine is expected to achieve greater than 60-percent efficiency operating in the combined-cycle mode, while maintaining single-digit nitrogen-oxides emission levels. At the heart of the GE concept is steam cooling of the first two power turbine stages. Innovative steam cooling allows the turbine to operate at inlet temperatures of 2,600 °F, which is 200 °F higher than the now-commercial F-class. A higher inlet temperature equates to higher efficiency. This versatile technology serves as the foundation for the power modules of the Vision 21 energy plants, and will be integrated into coal-gas fired systems.

Goals

ATS utility turbine systems will offer: (1) ultra-high efficiency -- 60 percent lower heating value basis; (2) environmental superiority in terms of reduced nitrogen oxides, carbon dioxide, carbon monoxide, and unburned hydrocarbons; and (3) a 10-percent lower cost of electricity.

Tangible Benefits

National: ATS development in the H-class program yields many side benefits, including U.S. capability to manufacture thin-walled, complex, single-crystal castings for advanced gas turbines. ATS technology advancements are also being used in the manufacture of other turbine engines to produce some of the cleanest, most efficient, and economically viable power systems available today. The national benefits are numerous since these systems are being built by U.S. manufacturers, and are utilizing domestic fuel.

Regional: The southeastern U.S. is recognized globally for its advanced turbine manufacturing capabilities. The GE ATS machine is manufactured and tested at GE's Turbine Plant in Greenville, South Carolina. In addition, GE, along with Howmet and PCC Airfoils (all developers and manufacturers of advanced turbine blades) have established manufacturing facilities in the region. Oak Ridge National Laboratory also manages a large materials development program in support of ATS. Additionally, the Advanced Gas Turbine Systems Research (AGTSR) program, directed by South Carolina Institute for Energy Studies (SCIES) at Clemson University, coordinates university applied research in combustion, aerodynamics, materials, and heat transfer.

The northeast is also sharing in the benefits of the successful ATS program. As part of an agreement between GE and Sithe Energies, an 800-megawatt natural gas fueled power system featuring GE's H-system™ has been purchased for \$400 million. Plans are to install two of the new turbines at Sithe's Heritage Station at Scriba, NY, where the company already operates a 1,040 megawatt Independence Station. Construction will begin following the State of New York environmental permitting process; as many as 1,000 new construction jobs are anticipated.