DRAFT

Rampressor Shock Wave Compressor
(Ramgen Power Systems, RPS)

FACT SHEET

I. PROJECT PARTICIPANTS

A. Prime Participant: Ramgen Power Systems, Inc (RPS)
B. Sub-Award Participants: Global Power Services (GPS), General Applied Science Lab (GASL), Dynamic Engineering Incorporated (DEI), Methane Power Generation (MPG), Techland, Inc., Boeing Technology Services (BTS), CD Adapco Group, ASE Technologies (ASE).

II. PROJECT DESCRIPTION

A. Objective(s): Based on aerospace ramjet technology, Ramgen Power Systems is developing a novel more cost effective and more efficient compressor concept (the Rampressor) for support of coal fueled gasification stationary power applications and for replacement of the compressor component in gas turbines.

B. Background/Relevancy:

Background: Initially, Ramgen had a ramjet engine concept that promised to uniquely apply well-established ramjet engine technology used in the aerospace industry for the generation of electric power. However, through guidance of the DOE/NETL, the concept underwent a rigorous design review leading to the technical direction that Ramgen should focus on the compression component and thus the Rampressor product evolved. The results of the review determined that the conceptual design of a Ramgen (ramjet) engine was valid, but a different approach should be used for development. The conceptual design had integrated compression, combustion and propulsion on a single rotating disk. Heeding design review input, Ramgen decided to decouple compression, combustion and propulsion, and reduce the scale of the engine to 400kW. Subsequently, this decoupling led to recognition that the compression aspect was at the center of Ramgen's ram jet shock wave theoretical basis and commitment to a compressor only product, the Rampressor.

The rotating disk in the Rampressor unit now performs the compression function. Importantly, the compression is accomplished with super-sonic inlet technology by employing air velocities beyond the speed of sound that uses shock waves to efficiently compress the air.

In comparison to existing compressors, the Rampressor is designed to cost less to build and to operate more economically. In addition, the simplicity of the Rampressor engine is projected to result in high reliability and availability.

C. Period of Performance: September 29, 2000 through March 2005. A proposal for multi-year extension will be considered.

D. Project Summary:

III. PROJECT COSTS

A. DOE Costs: 14,397,574
B. Prime Contractor Cost Sharing: $3,180,267
C. Partner Cost Sharing, If Applicable: NA

IV. MAJOR ACCOMPLISHMENTS SINCE THE BEGINNING BEGINING OF THE PROJECT

- A 2.8 MW ramjet engine conceptual design was completed (April 2002)
- The 2.8 MW design was based on extensive testing of a first ever 10 MW Ramgen ramjet engine (2001 through 2002).
- Tests conducted showed that emission levels dropped below 10 ppmv NOx, CO and unburned hydrocarbon.
- Means to dramatically downsize to a 400 kW engine size evolved from a successful external design review.
- Rampressor rig tests showed the rotor produced compressed air near the target design point and efficiency estimates are on track to achieving new industry standards (November 2003).
- A strategic decision was made in February 2004 to focus Ramgen on development of the Rampressor product.
- Ramgen calculations indicate that a 10:1 pressure ratio Rampressor compressor, conventional burner and standard non-air cooled turbine could achieve near 40% cycle efficiency if the system were recuperated.
- Completed the Rampressor Turbine Design Report topical report (June 2004)

V. MAJOR ACCOMPLISHMENTS ACCOMLISHMENTS PLANNED DURING THE NEXT 6 MONTHS

- Complete preliminary design of the 2nd Rampressor for higher performance: pressure ratio, efficiency and speed.

VI. MAJOR ACCOMPLISHMENTS PLANNED IN OUTYEARS (6 -18 MONTHS)

- Complete final design of the 2nd Rampressor and build-test same.

VI. ISSUES

Ramgen must raise private sector financial support.

VII. ATTACHMENT (NONE)