CASE STUDY:

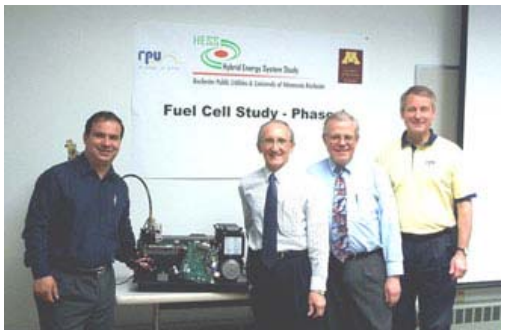
Rochester Hybrid Energy System Study (HESS)

The Rochester Public Utilities (RPU) and the University of Minnesota Rochester teamed up in March 2003 to work on a Hybrid Energy System project utilizing a combination of various power sources, such as fuel cells, to provide a more efficient power system for residential and business customers.

The HESS project is divided into three phases: Phase I, a commercially available 1.2 kW Proton Exchange Membrane (PEM) fuel cell system, manufactured by Nexa, will be evaluated; Phase II, the a symbiotic combinational arrangement between PEM fuel cell and a geothermal heating system will be assessed by fuel cell and geothermal manufacturers; Phase III, the optimal cost/efficient mix of energy supplied by the hybrid: the electric grid, the geothermal system and the PEM fuel cell, will be examined.

The RPU is funding the project (a budget of $322,000) and the University received an additional $59,000 grant to conduct the first phase of the study, which was completed January 2004.

The two fuel cells used in the first phase of HESS each produce enough electricity every hour to run 12, 100-watt light bulbs. They are approximately the size of a carry-on airline bag. Fuel cells use hydrogen (or hydrogen-rich fuel) and oxygen to create electricity by an electrochemical process. If pure hydrogen is used as a fuel, fuel cells emit only heat and water as a byproduct.



The HESS research team is (l. to r.) Sophronis Mantoles, a graduate student in engineering; Dr. Jim Licari and Dr. Hal Ottesen of the University of Minnesota; and Jim Walters, RPU's manager of marketing and external services. (photo courtesy of RPU)

The HESS team members hope that they will be able to use the heat and water byproducts of the fuel cell in a geothermal system. According to Dr. Licari of the University, the efficiency of a fuel cell is 35-40%. By utilizing the byproduct they hope to increase the efficiency to 80%.

The completion of all three phases is scheduled for December of 2005.

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