



Center for Energy-Smart
Electronic Systems

A National Science Foundation Industry/University Cooperative Research Center

The Value of ES2

Data centers are a high growth and energy-intensive sector of the U.S. economy. Over the past six years, data center energy use is estimated to have nearly doubled. Based upon recent estimates, if data center energy demand continues to grow at the current rate, the nation will need to build approximately two 500 MW power plants per year to meet this added demand (U.S. EPA, 2007). Data centers are also an enormous producer of greenhouse gas, producing about 40 million metric tons of greenhouse gas in 2006 (US EPA, 2007). In addition, CO₂ emission by data centers worldwide was 80 million tons in 2007 and is projected to become 340 million tons in 2020 (Gartner, 2007). The goal of the Center for Energy-Smart Electronic Systems (ES2) is to improve the energy efficiency and productivity of the country's data centers by 20-35%, which translates to one to two less power plants every three years while still meeting data center growth demand. This achievement is equivalent to the complete elimination of the greenhouse gas emission from ~1.5-2.7 million cars or ~1-1.7 million homes in the US annually (U.S. EPA, 2011).

The Industry/University Cooperative Research Center (I/UCRC) for ES2 leverages money from the National Science Foundation with membership money from industry to fund this research. Collaborative efforts among four university partners, along with at least 16 industrial members, bring together computer scientists, and mechanical and electrical engineers, and link the fields of information technology, dynamic systems control, electronic systems and electronic cooling for a holistic approach to the development and design of energy-efficient electronic systems.

