Award Selections for Industrial Technologies Program Recovery Act Funding Energy Efficient Information and Communication Technology (ICT)			
Award Winners	**City and State**	**Project Description**	**Total DOE Funding**
IBM T.J. Watson Research Center	**HQs:** Yorktown Heights, NY **Project Location:** Research Triangle Park, NC	**Reducing Data Center Cooling Energy through Software-Based Management Tools.** The project will develop and field test data center and telecommunication facility management tools to reduce power consumption from cooling components. Using real-time temperature, humidity, hot-spot management, air-leakage measurement, and corrosion monitoring, this tool will optimize air conditioning systems and use of outside air in computing facilities. This technology has the potential to save 10% of average data center and telecommunication center energy requirements.	$1,666,550
SeaMicro	Santa Clara, CA	**Reducing Volume-Server Energy Use by Re-Architecting Server Components.** This project will field test re-designed server systems consisting of hundreds of low-power processors. By efficient use of tiny interconnected Central Processing Units (CPUs) within a single server, demonstration of this patented technology is expected to save 75% of the computing energy over conventional servers. The integrated hardware and software design project ensures that the energy consumed within the server is efficiently used regardless of whether the CPUs are hard at work or in "sleep" mode.	$9,300,000
Alcatel-Lucent, Bell Labs	**HQs:** Murray Hill, NJ **Project Location:** Cornelius, NC	**Lower Energy Requirements of Worldwide Network Services.** This project will develop and simulate methods to synchronize telecom network energy demand with real-time network traffic activity.	$300,000
California Institute of Technology	**HQs:** Pasadena, CA **Project Location:** Ithaca, NY	**Power Minimization for Networked Data Centers.** Many large companies use massive arrays of servers across multiple data centers without a global method for managing energy consumption based on customer demand. This study will create algorithms designed to understand the demand for services from server technology and to balance services across servers and data centers according to preferred energy use goals. The so-called "volume servers" targeted in this project are the largest consumers of data center energy, so efficiency gains can yield substantial energy savings.	$300,000
Lineage Power Corporation	**HQs**: Plano, TX **Project Location:** Providence, RI	**Reducing Energy Loss from Power Conversion for Data and Telecommunication Centers.** This project will develop and test a new, more efficient power rectifier - which is responsible for converting Alternating Current (AC) electricity supplied by electricity utilities to the Direct Current (DC) electricity required to run most of the equipment used in data and telecommunication centers. As a rule, energy efficiency is usually greatest in data centers when electricity demand is the highest. This rectifier will operate at high efficiency levels over the entire electricity use range whether demand is at peak or not. Separately, software will also be developed to keep conventional, existing rectifiers operating only during their highest efficiency intervals. To do this it will shut down certain rectifiers that are operating at lower levels so that the remaining rectifiers can operate at peak efficiency. Rectifiers are part of the "Power Supply Chain" and typically lose significant energy to heat loss and represents 25% of energy consumed in a data center.	$2,406,378
BAE Systems	**HQ:** Rockville, MD **Project Location**: Manassas, VA	**Increasing Computing Communications Energy Efficiency through Control of Network Device Energy Consumption.** This concept definition study will develop a model for Real-Time Optimal Control (RTOC) algorithms designed to shift network power consumption up or down based on the need for services within a data or telecommunications center. By utilizing industry-standard protocols, the control algorithms can control the flow of energy based on network traffic and energy management information that will be reported from network devices in network routers and switches and in computing devices such as mainframes and servers.	$222,031

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Power Assure, Inc.	**HQs:** Santa Clara, CA **Project Location:** Palo Alto, CA	**Eliminating Wasted Energy by Automatically Powering Down Servers.** This project will demonstrate software and supporting hardware which is integrated into various data center components to manage the power-state of servers. Currently, servers are always powered on even when not in use. The management software monitors server use and turns servers on and off as needed. This switch from "always on" to "always available" systems could save up to 50% of server energy use in data centers with large server farms.	$5,080,312
Hewlett-Packard Company (HP-01)	**HQs:** Palo Alto, CA **Project Location:** Houston, TX	**Modular Data Center with Integrated Alternating Current (AC), Cooling, and Distributed Energy Systems to Reduce Energy Requirements.** This project will test creating an enclosed row of IT equipment supplied with efficient high voltage AC electrical supply, chilled water cooling components, and a distributed Direct Current (DC) electrical system which can interface with renewable energy sources. Geared towards small-to-medium businesses - the largest segment of the data center market - this technology provides the means to closely monitor and adapt power and cooling within a modular, enclosed area. New technology around power distribution and cooling reduces energy losses and heat generation from converting the electricity between currents. In addition, the ability to connect intermittent renewable energy sources to the data center allows for the broader integration of solar, wind and other renewable energy sources.	$7,432,100
Trustees of Columbia University	**HQs:** New York, NY **Project Locations:** Ithaca, NY Yorktown Heights, NY	**Reduction in Server Power Consumption through Improved CPU Energy Conversion.** This project will develop "on-chip" technology to make power conversions more efficient within servers. By increasing the amount of electricity that is used versus lost in operating the Central Processing Unit (CPU), server energy efficiency can be increased by at least 10%.	$2,800,000
IBM T.J. Watson Research Center (IBM-03)	**HQs:** Yorktown Heights, NY **Project Locations:** Poughkeepsie, NY Research Triangle Park, NC	**Data Center Cooling using a Liquid Metal Thermal Interface.** This project combines advanced metals and liquid cooled heat sinks to carry heat out of the data center to a Dual Enclosure Liquid Cooling (DELC) system. The DELC system will exchange heat from the data center with ambient air. Expelled heat will also be made available for room or water heating elsewhere. The project goal is to reduce cooling energy to 5% of total data center energy (conventional systems often use 25%).	$2,347,801
Federspiel Controls, Inc.	**HQs:** El Cerito, CA **Project Location:** Los Angeles, CA	**Active Management of Cooling Systems to Reduce Energy Consumption for the Data Center Market.** This project will demonstrate cooling control technology integrated with wireless network sensors. Typical data centers use equipment that cannot operate in high temperatures, while data center cooling and computing components use limited efficiency, single-speed fans and do not allow for dynamic shifting of cool air to where it is needed most. This project integrates variable speed fans, adjustable server fan inlets, and wireless temperature sensors to continuously adjust the volume and targets for cooled air according to temperature. This can significantly reduce the cooling infrastructure for data centers, which typically consumes 25% of the electrical energy in a data center.	$584,078

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Yahoo!, Inc.	**HQs:** Sunnyvale, CA **Project Locations:** Lockport, NY	**Next Generation Passive Cooling Design for Data Centers.** This project will design and engineer a key data center for a major internet company. The integrated building design, including the building's shape and orientation and the alignment of the servers within the building, allows the data center to use outside ambient air for cooling 99 percent of the year. The relatively low initial cost to build, compatibility with current server and network models, and efficient use of power and water are all key features that make this data center a highly compatible and replicable design innovation for the data center industry.	$9,921,887
Alcatel-Lucent, Bell Labs (03)	**HQs:** Murray Hill, NJ **Project Location:** Plano, TX	**Advanced Refrigerant-based Cooling Technologies for Information and Communications Infrastructure.** This project will further test and develop advanced heat-sink structures and device-level liquid cooling that dramatically enhance the ability to deal with ever-increasing server heat. The proposed technology is a modular cooling technology that supplies liquid refrigerant to micro-channel heat exchangers that remove heat directly by bringing refrigerant closer to actual heat sources. The work involves optimization of heat exchanger performance, component level cooling, development of a refrigerant handling network, and evaluation of system level performance. By improving the manufacturing process for key components of this system, the project will reduce the cost, measure performance, and increase the commercialization potential of the technology. This system will use 90% less energy compared with conventional systems.	$1,815,277
Edison Materials Technology Center	**HQs:** Dayton, OH **Project Locations:** Menlo Park, CA Mountain View, CA	**Energy Reduction from a Very Dense Liquid Cooled Compute Platform.** This project will result in a prototype ultra high density compute platform with 100% liquid cooling using off-the-shelf commodity components and high volume manufacturing techniques. The system will be powerful enough for High-Performance Computing (HPC) applications and cost effective enough for general enterprise applications. The ability to package highly dense server systems with liquid cooling reduces the floor-space consumed by the server as well as the cooling density per computing operation.	$2,843,985