ENHANCING THE VALUE OF SCHOOL PROJECTS WITH ENERGY STAR QUALIFIED PRODUCTS

Incorporating ENERGY STAR qualified products into American Recovery and Reinvestment Act (ARRA)-funded school projects can help maximize energy savings and environmental benefits.

- ENERGY STAR offers clearly defined energy performance specifications for more than 60 product categories. Recognized by more than 75 percent of the population, ENERGY STAR can be used to easily communicate energy efficiency expectations among project teams and suppliers.
- A vast network of ENERGY STAR partners including manufacturers and suppliers can be leveraged to help move projects forward. Engaging these partners helps reinforce that energy efficiency is an important and integral product feature and can help build a green work force for the long term.

This project brief focuses on opportunities for incorporating ENERGY STAR products in school new construction and major renovation projects. Resources for developing full-scale energy efficiency programs in response to ARRA are available at *epa.gov/cleanenergy/energy-programs/state-and-local/recovery.html*.

ENERGY STAR PRODUCTS FOR SCHOOLS

The nation's K-12 school districts spend more than $6 billion annually on energy—more than is spent on computers and textbooks combined. As much as 30 percent of a district's total energy is used inefficiently or unnecessarily[1].

Ensuring that ENERGY STAR qualified products are planned for and properly used in new construction and major renovation projects is an important part of achieving energy performance in schools[2]. Some of the best opportunities for savings can be found in cafeterias, work stations and data centers. ENERGY STAR labeled products of greatest relevance include:

- *ENERGY STAR Qualified Commercial Food Service Equipment*
- *ENERGY STAR Qualified Vending Machines*
- *ENERGY STAR Qualified Computers and Monitors*
- *ENERGY STAR Qualified Servers*

Schools spend more on energy than any other expense except personnel.

[1] Source: US EPA ENERGY STAR Program, *energystar.gov/ia/business/challenge/learn_more/Schools.pdf*.

[2] EPA's recommended approach to whole building energy performance improvement can be found at *energystar.gov/schools*

PROCURING ENERGY STAR PRODUCTS AND RELATED SERVICES

The following broad steps are useful to consider when procuring ENERGY STAR products and related services. More detailed information on product benefits, selection considerations, and key market actors involved in sales and installation are provided by product category in subsequent sections.

- **Procurement**. Specify ENERGY STAR in the procurement language: "[Target product] must be ENERGY STAR qualified as of [insert date]." Samples of more detailed procurement language, as well as key product criteria and qualifying product lists by product category can be found at *energystar.gov/purchasing*. Make sure there are no "or equal" clauses that would open the door for a contractor to install a non-ENERGY STAR product. Also, it is advisable to check for applicable building codes and state product efficiency standards in your area.
- **Financial incentives**. Contact your local utility or energy efficiency program sponsor to see if they offer related financial incentives. Visit *energystar.gov/DIME* for more information on utility-funded energy efficiency programs. When available, rebates are typically offered in the following ranges:
  - Commercial Food Service Equipment – Rebates vary widely depending on the equipment cost and potential for energy savings. As of May 2009, incentives range from $50-$1,000. A searchable tool for commercial food service incentives is available at *energystar.gov/CFSrebate_locator*.
  - Servers – Some utilities offer incentives for decommissioning servers or custom incentives for server virtualization and decommissioning. PG&E, for example, offers a per-unit incentive of $150 to $300 to remove servers from service with total incentives capped at 50 percent of project cost[3].
  - Other ENERGY STAR qualified products may be supported through custom incentives. Check with your local utility to learn about custom incentive programs for commercial customers.
- **Recycling**. Properly recycle old equipment to ensure that inefficient products don't end up in the landfill or get installed elsewhere. Utilities and municipal government agencies can be a good source of information on recycling and proper disposal of used equipment. Links to recycling/remanufacturing options are available at *epa.gov/waste/conserve/materials/ecycling/donate.htm#local*. The following non governmental source may also be useful *earth911.com*.

Change the World, Start with ENERGY STAR

Change the World, Start with ENERGY STAR is a national campaign that encourages all Americans to pledge to take small, individual steps to reduce their energy consumption and related greenhouse gas emissions. Schools can sign up to be pledge drivers to encourage individuals to take the ENERGY STAR pledge. The pledge includes everyday actions, such as changing a light to one that has earned the ENERGY STAR label, enabling computers to power down when not in use, and properly programming thermostats.

The campaign can make students and employees more aware of energy use, and motivate them to take actions that not only save energy at school but also at home and throughout the community.

EPA provides a wide array of support for the campaign including online tools, graphics, and Public Relations resources. Visit *energystar.gov/nationalcampaigns* and click on "Change the World, Start with ENERGY STAR" to learn more about support for campaign participants and how to enroll in the campaign.

[3] Source: PG&E "High Tech Energy Efficiency Incentives" available at *pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/hteeincentives.shtml*

- **Education**. Provide education on the benefits and proper use of ENERGY STAR products. In particular:
  - Enable the energy efficiency setting on computers and monitors in order to realize full energy savings potential. State and local governments can participate in the Low Carbon IT Campaign, which is a nationwide effort to assist and recognize organizations for reducing IT-related energy consumption and related pollution. For more information on the Campaign, visit *energystar.gov/lowcarbonit*. More details are provided in the *"ENERGY STAR Qualified Computers and Monitors"* section below
  - Involve employees and students in efforts to save energy and protect the environment by participating in the Change the World, Start with ENERGY STAR campaign. See text box on page 2 for details.
  - Help students understand the environmental benefits of school improvements by incorporating energy efficiency education in the classroom. Resources are available at *energystar.gov/kids*.

ESTIMATING PROJECT SAVINGS AND ENVIRONMENTAL BENEFITS

While the individual benefits of ENERGY STAR products vary by product category, savings can really add up. For example, for every 20 vending machines replaced with models that meet the ENERGY STAR specification, a state or local government can save more than $3,000 annually and $44,000 over the life of the machines. That is equivalent to keeping more than 655,000 pounds of greenhouse gas emissions out of the atmosphere[4].

To estimate savings from installing ENERGY STAR products, take advantage of calculators available at *energystar.gov/purchasing* for most product categories. The calculators allow users to customize utility rates and input number of products and other relevant parameters to generate estimates of lifecycle energy and cost savings, simple payback, and air pollution reduction benefits.

The following chart provides national average estimates of energy and dollar savings on a per product basis.

ENERGY STAR Qualified Product	Annual Energy Savings per Product	Annual Dollar Savings per Product
Commercial Food Service Equipment	1,100-6,600 kWh/year and/or 15-50 MBtu/year[a]	$110-975/year
Vending Machines	1,500 kWh/year	$150/year
Computers and Monitors	30-190 kWh/year[b]	$3-20/year
Servers	800 kWh/yr[c]	$80/year

Source: ENERGY STAR Products Factoid Work Book. April 2009 (unless otherwise noted)

[a] NOTE: Commercial Food Service equipment includes commercial grade refrigerators, freezers, hot food holding cabinets, fryers, steamers, ice machines, griddles, ovens, and dishwashers. The savings range reflects the large variance in base energy use of these different pieces of equipment. KWh savings are logged from equipment that is either solely operated using electricity, or a combination of gas and electric. MBtu savings reflect gas used in the operation of gas fryers, ovens, steamers, dishwashers, and griddles. For additional savings information on griddles and ovens see, the EPA News Release, "EPA Announces new ENERGY STAR specifications for Energy Efficient Commercial Griddles and Ovens," May 2009.

[b] NOTE: The range presented is based on a weighted average of turn-off rates and represents savings from purchasing a desktop computer and monitor depending on whether power management is enables. Increased savings can be realized if not already enabling power management or turning off computers at night.

[c] Source: Savings spreadsheet for EPA News Release, "EPA Announces ENERGY STAR Label for Computer Servers," May 18, 2009

[4] Source: 2009 ENERGY STAR Products Factoid Workbook.

ENERGY STAR QUALIFIED COMMERCIAL FOOD SERVICE EQUIPMENT

ENERGY STAR qualified Commercial Food Service (CFS) equipment uses less energy to store, cook, and keep food hot saving money without sacrificing equipment performance. Outfitting an entire kitchen with a suite of ENERGY STAR qualified CFS equipment could save operators about 300 MBtu/year, or more than $3,100/year[5].

Selection considerations: Currently, eight categories of CFS equipment are eligible to earn the ENERGY STAR label: fryers, steam cookers, hot food holding cabinets, refrigerators/freezers, dishwashers, ice machines, convection ovens, and griddles. Cafeterias will at least use fryers, refrigerators, freezers, dishwashers, griddles, and ice machines. Smaller kitchens, possibly outside the main cafeteria, might only require a refrigerator, freezer, hot food holding cabinet and oven. Qualified product lists are available on each of the specific product pages at *energystar.gov/cfs*.

It is best to address the energy efficiency of the kitchen as a whole; visit *fishnick.com/design/eek* for suggestions. It is important to note that in some states building codes specify that CFS equipment must be ENERGY STAR (e.g., California Title 24). Check the building code specification in your state to help guide the procurement process more efficiently.

Working with key CFS market actors: Engaging the following market actors as soon as possible can help ensure projects run smoothly.

- **Dealers**: Dealers primarily sell to individual organizations and restaurants, but will often sell equipment to public facilities and schools. Before committing to a dealer, check that they carry and can deliver ENERGY STAR CFS qualified equipment within your project timeframe.
- **Manufacturers and Reps**: CFS equipment manufacturers generally sell through product reps, although manufacturers may also sell directly to large end users like school districts. To ensure ENERGY STAR equipment is purchased, it is best to check with local procurement officers to find out if they buy equipment through a manufacturer's rep and that they sell ENERGY STAR qualified equipment. Visit *energystar.gov/partnersearch* and select "Product Manufacturer" to identify ENERGY STAR partners by product category.
- **Design Consultants**: Design consultants assist in the planning and design of new or renovated commercial kitchens. Design consultants usually design what their customers ask for, so it is important to request energy-efficient designs as soon as the design process is initiated. Once the design is finalized and construction begins, it is very difficult to change the equipment out for ENERGY STAR versions.

ENERGY STAR QUALIFIED VENDING MACHINES

ENERGY STAR qualified new and rebuilt refrigerated beverage vending machines can save building and business owners more than 1,500 kWh/year per unit, or $200 annually on utility bills if the onboard low power modes are activated[6]. ENERGY STAR qualified vending machines incorporate high efficiency components such as compressors, fan motors, and lighting systems and use close to 50 percent less energy than conventional models[7].

Selection considerations: Most facilities have a multi-year contract with an operator service. Encouraging facility operators to request ENERGY STAR vending machines in their next request for proposals (RFP) will help ensure the energy savings and also promote the need for energy-efficient machines to the operator.

Brand new ENERGY STAR qualified vending machines are not the only option – refurbishing extends machine life and avoids the cost of safe disposal of inefficient machines. If a facility is in the middle of a vending contract, an operator could refurbish their current fleet of vending machines to meet ENERGY STAR performance specifications.

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5 Source: 2009 ENERGY STAR Products Factoid Workbook.

6 Source: 2009 ENERGY STAR Products Factoid Workbook.

7 Source: 2009 ENERGY STAR Products Factoid Workbook.

Working with vending machine market actors: Below are some specific tips on how to work with the various markets actors for vending machines.

- **Operating service companies**: Facilities work through operating companies when ordering vending machines. Generally the operator owns the vending machines, so it is important to find an operator that owns ENERGY STAR qualified units or is willing to refurbish existing machines to meet ENERGY STAR specifications.
- **National Automatic Merchandising Association (NAMA)**: NAMA is the national trade association for the food and refreshment vending industries. NAMA can help facilities find a vending service operator in their area through *vending.org/about/contact2.php*. NAMA can also help locate operators that carry ENERGY STAR models.

ENERGY STAR QUALIFIED COMPUTERS AND MONITORS

For every 100 computers a school replaces with computers that meet the new ENERGY STAR specification, it can save more than $6,500 annually (95,000 pounds of greenhouse gas emissions) if power management features are enabled and computers are turned off at night[8].

ENERGY STAR qualified computer monitors, desktop and notebook (laptop) computers, integrated computer systems, desktop-derived servers and workstations are designed to save energy in three distinct operating modes: standby, active, and sleep modes, ensuring energy savings when computers are performing a range of tasks or idle.

Selection and operational considerations: For longer lead projects, a new ENERGY STAR specification for monitors will become effective October 30, 2009, and a new specification for ENERGY STAR professional displays will be effective January 1, 2010. On average, ENERGY STAR qualified products covered under these new specification will be 20 percent more energy efficient than conventional options[9].

Ensuring monitors and computers go into a low-power "sleep mode" after a period of inactivity can save a significant amount of energy and money. There are many ways to activate sleep features across entire networks of computers. EPA recommends setting computers to enter standby after 30-60 minutes of inactivity; monitors should enter sleep mode after 5-20 minutes of inactivity.

ENERGY STAR Low Carbon IT Campaign

After selecting the appropriate ENERGY STAR qualified computers and monitors, joining the ENERGY STAR Low Carbon IT Campaign can help schools save even more energy, and receive recognition for their efforts. The Low Carbon IT Campaign is a nationwide effort to assist and recognize organizations for reducing the energy consumed by their computers and monitors. For more information on the Campaign, visit *energystar.gov/lowcarbonit*.

Participants in the Low Carbon IT Campaign benefit from:

- Free technical expertise
- An estimate of the building's energy and carbon savings
- A certificate of recognition from EPA
- National recognition from EPA for top performers
- Template materials for publicizing efforts

(*energystar.gov/index.cfm?c=power_mgt.pr_power_mgt_low_carbon_participants_toolkit*)

To join the Low Carbon IT Campaign, a school or government agency pledges to activate power management features on their monitors and computers to save energy. An online pledge form located at *energystar.gov/index.cfm?fuseaction=lowcarbon.showPledge* is available for enrollment and can help estimate related energy savings and environmental benefits.

[8] Source: 2009 ENERGY STAR Products Factoid Workbook.

[9] Source: EPA News Release, "EPA Issues New Requirements for ENERGY STAR Computer Monitors, Picture Frames," March 30, 2009

Tools for activating these features and for educating employees about the benefits of maintaining these settings are available at *energystar.gov/powermanagement*. Participating in the ENERGY STAR Low Carbon IT campaign (see text box on previous page) can be a powerful way to achieve power management goals and gain recognition for your project.

Working with key market actors: Managing energy efficiency in IT applications requires comprehensive energy management, communication, and team building across IT, facilities management, and procurement officials. Advance coordination with the following market actors helps to ensure that the most appropriate ENERGY STAR computers and monitors are selected.

- **IT management**: Since IT management teams are responsible for computer operation and maintenance they understand the needs of the facility and can help make purchasing decisions and ensure equipment is configured properly during installation. IT managers can perform the following important functions:
  - Adjust the power management setting so that it is suitable to the work environment. Managers can refer to the owners' manual, call the manufacturer's help line, or visit *energystar.gov/lowcarbonit* to learn about public domain/operating system solutions, as well as commercially available software.
  - If the building operates on a local area network (LAN), ensure that the power management features on the computers are compatible with the existing network system.
- **Procurement management**: Establishing formal guidelines to institutionalize ENERGY STAR as a purchasing requirement can ensure energy efficiency requirements are maintained over the long term. Sample procurement language, key product criteria and qualifying product lists by product category can be found at *energystar.gov/purchasing*.
- **Vendors**: When vendors provide new and repaired computers, monitors, and integrated computer-monitor systems that are ENERGY STAR qualified, they can also add a valuable service by ensuring that the products are configured properly for automatic energy-saving features.

ENERGY STAR QUALIFIED SERVERS

Computer servers are computers that provide services and manage network resources for client devices (e.g., desktop computers, notebook computers and wireless devices.). Computer servers are typically used in datacenters and office environments. If all servers sold in the United States met the ENERGY STAR specification, energy cost savings would grow to $800 million per year and prevent greenhouse gas emissions equivalent to those from over one million vehicles[10].

On average, ENERGY STAR computer servers are about 30 percent more efficient than standard servers and offer the following features and benefits[11]:

- Efficient power supplies that generate less waste heat, thereby reducing the need for excess air conditioning in the facilities where they are housed.
- Improved power quality that provides building-wide efficiency benefits.
- Capabilities to measure real time power use, processor utilization, and air temperature, which improves manageability and lowers total cost of ownership.
- Advanced power management features to save energy across various operating states.
- A Power and Performance Data Sheet with standardized information on energy performance, features, and other capabilities.

Depending on size, government agencies or school districts may have a dedicated datacenter for centrally locating mission-critical IT equipment including server and data storage equipment, or may use an off site co-location center to house their IT equipment. Within individual buildings, it is also common to have servers—often housed in server closets—for managing internal networks and for connecting to any centralized information management systems.

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[10] Source: EPA News Release, "EPA Announces ENERGY STAR Label for Computer Servers," May 18, 2009

[11] Source: EPA News Release, "EPA Announces ENERGY STAR Label for Computer Servers," May 18, 2009

Selection and operational considerations: Consider the following when purchasing and installing servers.

- Consider replacing servers older than three years with new ENERGY STAR servers; enable power management features in servers to reduce power consumption during periods of non-use.
- Determine computing capacity needs before purchasing. Whether procuring servers for a new facility or replacing older servers, it is important to match servers to intended work load. A typical server sold today has several times the computing capacity of a server sold just three years ago. Through smart deployment of ENERGY STAR servers, facilities may be able to service the same workload with fewer servers.
- Develop a strategy for virtualizing servers. Virtualization is a method for enabling a single server to perform the work of many. For example, a server can be physically portioned into multiple "virtual servers" that run independently and can independently be rebooted[12]. It is not uncommon for a virtualized server to be able to displace the need for 10 or more servers, offering significant additional energy savings[13].
- Effectively manage air flow in spaces where multiple servers are installed. For example, avoid exhausting hot air into the cool air intake of another server. Other best practices for setting up an energy-efficient server closet or data center are available from Lawrence Berkeley National Laboratory at *hightech.lbl.gov/datacenters-bpg.html*.
- Eliminate and recycle servers that are on but not running necessary applications. Up to 30 percent of the servers deployed today are "comatose servers"—servers that remain on despite not running any necessary applications.[14] When disposing older servers, check to see if there are recycling or remanufacturing options in your area. For a partial listing visit *epa.gov/waste/conserve/materials/ecycling/donate.htm#local*.

While ENERGY STAR servers offer substantial standalone benefits, there is significant opportunity to reduce energy use by strategically managing IT equipment, datacenters and facilities as an integrated system. To learn more about government-sponsored efforts and emerging best practices visit *energystar.gov/datacenters*.

Working with key market actors: Managing energy efficiency in IT applications requires comprehensive energy management, communication, and team building across IT, facilities management, and procurement officials. Advanced coordination with the following market actors can help ensure servers are properly specified and installed.

- **Office equipment manufacturers and value added resellers (VARs)**: Working closely with manufacturers and VARs will help make sure the most efficient equipment is purchased and helps implement the best practices during deployment to maximize energy savings. Server deployment, including the physical installation and software configuration of the server, is critical to the overall efficiency of the system and presents numerous opportunities for additional savings. For example, additional savings can be achieved through software (e.g., advanced power management and virtualization), or through effectively managing cooling and airflow (e.g., avoid exhausting hot air into the cool air intake of another server).
- **IT management**: IT management teams are responsible for keeping track of server operation and maintenance. They must understand the data needs of the organization supported by the data center and make recommendations on configurations, new server purchases, or levels of redundancy to maintain effective data storage and security. IT equipment generates significant heat and thus requires cooling in order to maintain temperature equilibrium and avoid hardware failure.
- **Facilities management**: Facilities management teams are typically in charge of managing the heating, cooling, ventilation, and energy use of buildings and/or multi-building organizations. This group is responsible for managing the environmental conditions under which IT equipment is active and can provide insight on the best placement of ventilation and cooling equipment to efficiently maintain the correct temperature for IT equipment.

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[12] Source: *comandsolutions.com/resources/glossary.html*

[13] Source: Based on estimates from the following sources: David Rogers, BC Hydro Power Smart Forum. November 17, 2008 *wwe12.bchydro.com/awards/wp-content/uploads/2008/11/Server%20Virtualization.pdf* and Server Virtualization Low Hanging Fruit and Sour Grapes. Source URL (retrieved on 2009-05-11 11:50): *nemertes.com/articles/server_virtualization_low_hanging_fruit_and_sour_grapes*

[14] Source: Brill, Kenneth G., Uptime Institute, Data Center Dirty Secrets. Forbes.com, June 30, 2008.

ENERGY STAR AND OTHER RESOURCES:

Resource	Web or Info Link	How to Use
Manufacturer List	*energystar.gov/partnersearch*	Provides a searchable list of ENERGY STAR manufacturing partners by product category.
Change the World, Start with ENERGY STAR	*energystar.gov/changetheworld* *energystar.gov/index.cfm?fuseaction=join_change_the_world.showSuccess*	Provides information and tools for participating in the national Change the World, Start with ENERGY STAR campaign.
Energy Efficiency Curriculum	*energystar.gov/kids*	Provides interactive web tools for students to learn about energy efficiency and links to lesson plans for teachers and parents.
Low Carbon IT Campaign	*energystar.gov/lowcarbonit*	Provides tools for enabling power management features in computers and monitors and information on how to get involved in the national Low Carbon IT Campaign.
ENERGY STAR Commercial Food Service	*energystar.gov/cfs*	Provides information on commercial food service product features and benefits.
ENERGY STAR Vending Machines	*energystar.gov/vending*	Provides information on vending machine features and benefits.
Energy Efficiency Programs and Incentives (DIME)	*energystar.gov/dime*	Provides a searchable database of utility-funded energy efficiency programs and related financial incentives.
Procurement Language	*energystar.gov/purchasing*	Provides tools to help evaluate, identify, and procure ENERGY STAR qualified products.
Data Centers	*energystar.gov/datacenters*	Provides information on datacenter energy use and emerging best practices for improving energy efficiency.
Schools	*energystar.gov/schools*	Provides information on best practice approaches for measuring, improving, and monitoring building performance in schools.