Save Energy, Lower Costs: ENERGY STAR Data Center Products and Resources

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The Primary Priorities of Data Center Operators

- Uptime and reliability
- Security
- Performance
- Lower energy use

ENERGY STAR Products for Data Centers

Why ENERGY STAR Certified Data Center Equipment?

- **Improve uptime and reliability** with efficient equipment and systems less likely to overheat, break down, or require high maintenance
- **Heighten digital security** with up-to-date equipment much less prone to technical failures
- **Save energy** and use those savings on other building functions
- **Lower costs** by reducing energy use, software licensing and optimizing performance

ENERGY STAR Data Center Equipment

- Although data center infrastructure has raised data center efficiency to new heights, **IT equipment** accounts for **nearly two-thirds of energy consumption** at data centers

- ENERGY STAR certified products include:

Enterprise Servers

Uninterruptible Power Supplies

Data Center Storage

Large Network Equipment

https://www.energystar.gov/products/data_center_equipment

Computer Servers

- **Every 3 – 5 years** - when servers are replaced
- **30% less energy** – used by ENERGY STAR certified enterprise servers compared to standard models*
- **Power management settings** – key energy savings
- **How to purchase:** Filter on ENERGY STAR Product Finder for attributes including:
  - Form factor (e.g. rack-mount, blade)
  - Number of Processor Sockets
  - Installed Memory and Storage
  - Operating system supported

*When power management is enabled

Uninterruptable Power Supplies (UPS)

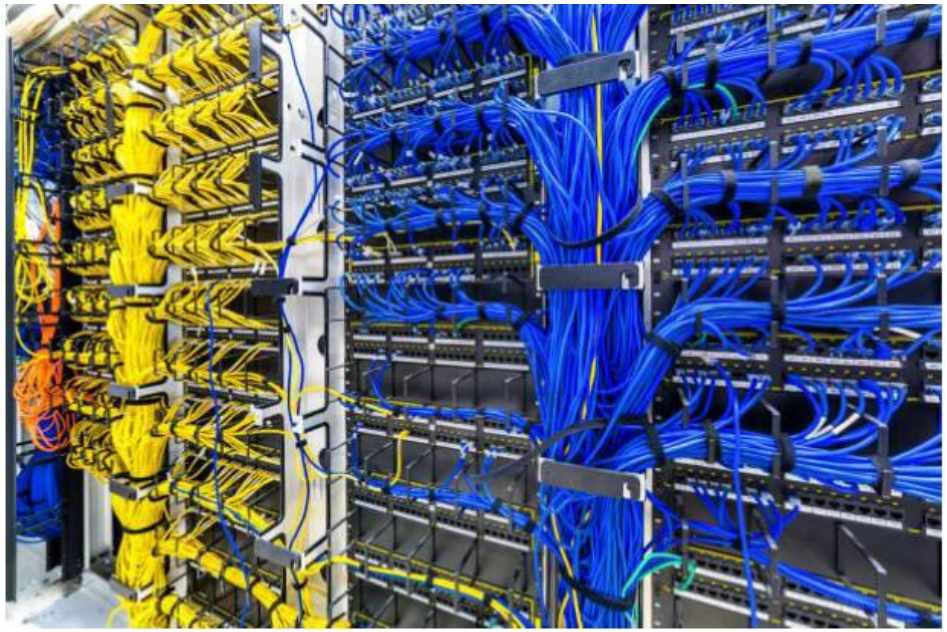
- **Protect essential equipment** from power outages with UPS Battery Backup
- **52% energy savings** compared to conventional UPS batter backups

Data Center Storage

- **Capacity Optimization Methods (COMS)** are techniques that reduce storage devices needed for a given capacity.
  - Thin Provisioning
  - Data Deduplication
  - Compression
  - Delta Snapshots
- **Component Efficiency** requirements for power supplies and more efficient types of storage devices for given workloads

Large Network Equipment

- **Driving less energy use per port** in data center switches and routers
- **Providing real measured data** on product throughput and performance which often differs from manufacturer claims



5 Simple Ways to Save Energy

Data Center Measure
Raise the temperature!
Virtualize servers
Identify and remove unused servers
Replace standard fans with variable speed fans
Institute ENERGY STAR purchasing policy

1. Raise the Temperature

- Generally, most modern IT equipment can tolerate higher operating temperatures
- **Every 1°F increase** in temperature can **save 4% to 5%** in energy costs.
- ASHRAE expanded **recommended temperature range 64.4°F - 80.6°F**
- Case Study: **BNY Mellon**'s ENERGY STAR certified data center
  - **"Supply Air"** (from cooling unit) temperature: from **70°F to 81°F degrees**
  - **Chilled water** temperature: from **44°F to 47°F** so energy use and cost to cool water dropped

2. Virtualize Computer Servers

- You can run a number of “virtual servers” on one physical host server
  - Fewer physical servers to power and cool
- Case study: A university that **virtualized 35 servers, saved $280,000+** over 3 years
- Only 54% of small data centers use virtual servers
- Rebates: Some utility companies offer rebates to help offset the costs of virtualization projects.
  - Please see the ENERGY STAR Utility Guide for Designing Incentive Programs Focused on Data Center Efficiency Measures

3. Remove "Comatose" Servers

- Why?
  - Surveys: 30% of servers do no useful work but consume energy 24/7
  - Uptime Institute: **Decommissioning 1 server can save $2,000**
    - $500 in energy
    - $500 in operating system licenses
    - $1,500 in hardware maintenance
- How?
  - Take inventory
  - Leverage Data Center Infrastructure Management (DCIM) systems
  - Look at connectivity to servers

4. Upgrade to Variable Speed Fans (or BLDC)

- Variable speed fans optimize data center cooling and save energy
- **Reduce Fan Speed = Save Big**
  - Reducing fan speed by one-half will reduce energy consumed by one-eighth
  - Two CRAC units running at half speed use one fourth the fan energy of one CRAC unit running full speed
- Computer room air conditioning (CRAC) unit fans account for 5% to 10% of a data center's total energy use
- Case Study: eBay's investment in variable speed fan retrofits had a 1.6-year payback
- Newer brushless DC fans (BLDC) can save even more energy as they are inherently more efficient

5. Institute ENERGY STAR Purchasing Policy

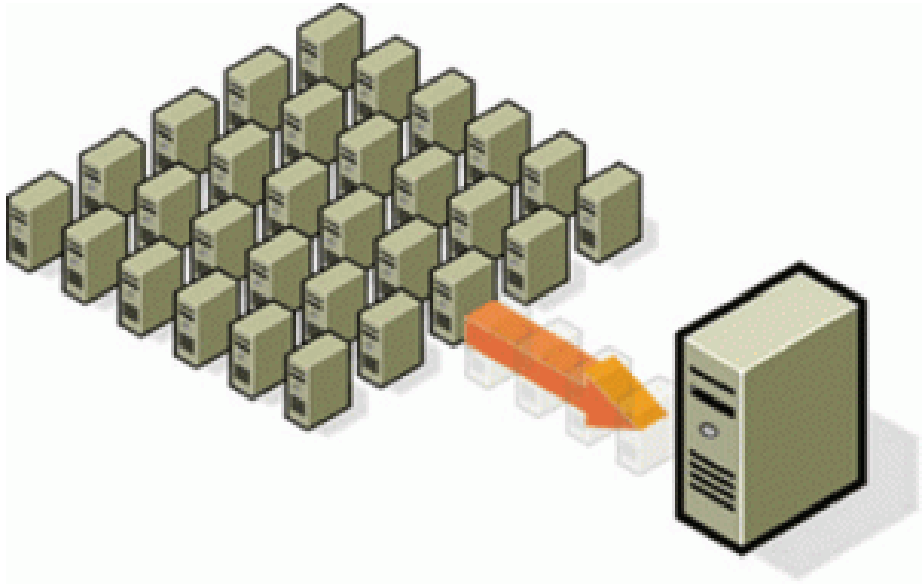
- Always purchase ENERGY STAR certified servers, data storage, networking, and uninterruptable power supplies when possible
- Third party certification process ensures highest standards
- Work with your purchasing department if you have one
    - Product Purchasing & Procurement template | ENERGY STAR

16 More Ways to Cut Energy Waste

5 Energy Efficiency Categories

Category 1: Information Technology

- Consolidate lightly-used servers
- Implement efficient data storage measures
- Utilize built-in server power



Category 2: Power Infrastructure

- Reduce energy losses from power distribution units (PDUs)
- Reduce energy losses from UPS systems

Category 3: Air Flow Management

- Manage airflow for cooling efficiency
- Move to a hot aisle/cold aisle layout
- Utilize containment/enclosures

Category 4: HVAC

- Consider a water-side economizer
- Install in-rack or in-row cooling
- Make humidification adjustments
- Use an air-side economizer
- Use sensors and controls to match cooling capacity & airflow with IT loads

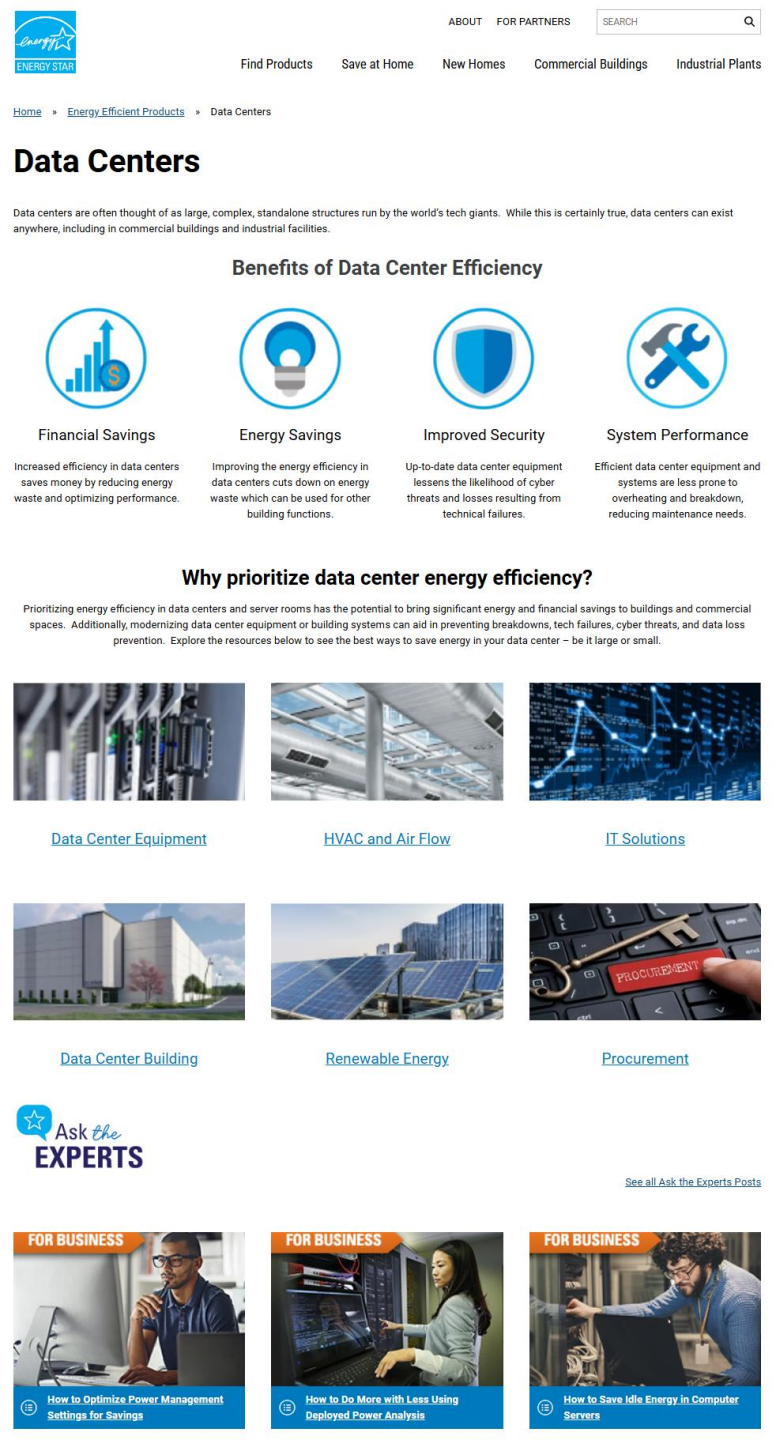
Category 5: Others

- Benchmark your data center's energy efficiency
- Select a sustainable colocation facility
- Provide energy-efficiency awareness training

ENERGY STAR

Resources

Guides, Tools, Tips and Insights



ENERGY STAR Resources

- Data Centers for Utilities
- IT Solutions and Power Infrastructure
- The Energy Cost of Cryptocurrency
- The Hidden Savings Opportunity of Embedded Data Centers
- Top Saving Energy Tips for Co-Location Data Center

Buy ENERGY STAR IT Hardware

Data center products that earn the ENERGY STAR label are designed to do more with less. An ENERGY STAR certified server, with power management enabled, uses on average almost **40% less energy** than a non-certified product. With increases in productivity this could result in savings of over **$8500 per unneeded server**. ENERGY STAR certification is also available for data storage and uninterruptible power supplies (UPS) to further extend your savings.

Maximize Temperature and Humidity Set Points

Did you know there is an optimum temperature and humidity set point for efficiency? Going below that level requires more energy from the HVAC equipment, while exceeding that point puts more onus on your IT equipment, likely reducing its longevity. Work with your equipment manufacturer to determine the optimum temperature set point so that your HVAC and IT Equipment are working optimally. ASHRAE and IT equipment manufacturers have updated their recommendation to allow safely running your IT equipment up to **80- 81°F and 50% humidity** without product longevity or uptime concerns.

Mind the Gaps!

When installing your equipment, pay attention to airflow management. This is critical for colocation energy efficiency. Proper airflow management can save up to **15% in energy use** alone. Look to get blanking panels, floor tiles, gap fillers, and server ducting to help you reduce the cooling needs of the facility and your equipment. If you have questions, contact your data center manager to help you improve your airflow management.

Keep Things Free and Clear

Just as with adding blanking panels, etc. to manage airflow, it is important to ensure that your **network cables** and rack layout are set up correctly to allow the correct airflow. Setting up your cables correctly will reduce the stress on IT equipment and ensure that debris and inhibited air flow does not reduce the lifespan of your hardware, while also helping with the efficiency of the data center.

Above: (Left) Example of bad cabling in a data center, (Right) an example of good cabling.

Separate Hot and Cold

Hot aisle/cold aisle data center layouts are one of the most proven ways to save energy in the data center. Visit energystar.gov to find out more on how to best set up your data center in a hot aisle/cold aisle alignment.

EPA United States Environmental Protection Agency

ENERGY STAR® is the simple choice for energy efficiency. For more than 20 years, EPA's ENERGY STAR program has been America's resource for saving energy and protecting the environment. Join the millions making a difference at energystar.gov.

Ask the Experts Series

- How to Optimize Power Management Settings for Savings
- How to Do More With Less Using Deployed Power Analysis
- How to Save Idle Energy in Computer Servers
- Is Energy Efficiency in Data Centers Still Important?
- How to Balance Ambient Data Center Setpoints with IT equipment Energy Use?
- How to Go Green with Your Code?
- How to Make the IT Case for Energy Efficiency?
- How to Measure Server Efficiency with SERT?