

# Hitachi Eco-friendly Storage Solutions

**Reduce Power, Cooling and Space Costs  
Positive Change for the Environment**

Bratislava, 4. 11. 2009

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## **Hitachi Data Systems**

Wholly owned subsidiary of Hitachi, Ltd. (NYSE:HIT)

- Formed in 1989
- Direct and indirect sales in over 170 countries & regions
- 4,100 employees and expanding

The focal point for Hitachi, Ltd. for storage infrastructure solutions, storage management software, and storage consulting services



One of the worlds largest integrated electronics companies

- Founded in 1910
- 900+ subsidiaries
- 390,000 employees
- Total FY07 sales of \$112.2B

No. 48 on the 2007 FORTUNE Global 500®



# Supporting Environmental Activities

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- Eco-friendly Data Centers
- Corporate Social Responsibility
- Green Supply Chain

## Activities



## Awards



## Global IT concerns

Global energy concerns and environmental protection issues are gaining visibility with data center and IT managers

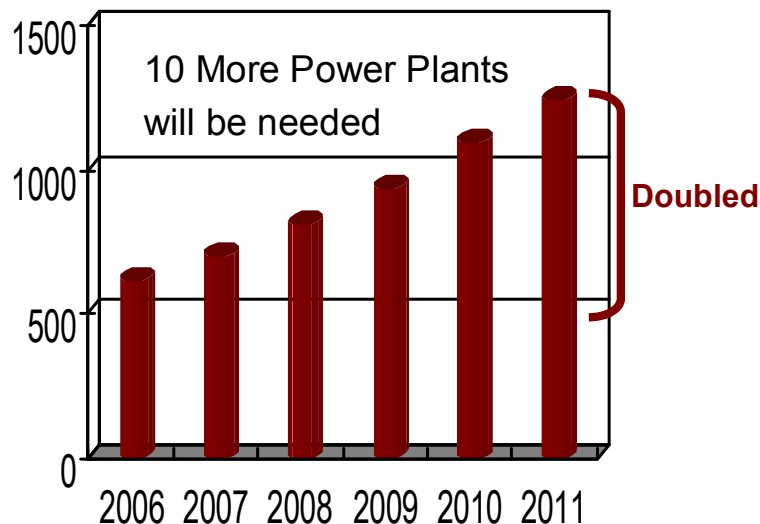
- Power Consumption
- Heat Output
- *Green* Suppliers
- Carbon Emissions
- Rising Energy Costs
- Social Responsibility
- Reliable Sources of Energy
- Cooling Requirements
- Carbon Emissions
- Energy Surcharges



# Power Savings and Heat Management are Growing Concerns in Data Centers

With increasing CPU power and highly integrated servers, IT managers must now consider deployment of equipment and operational practices

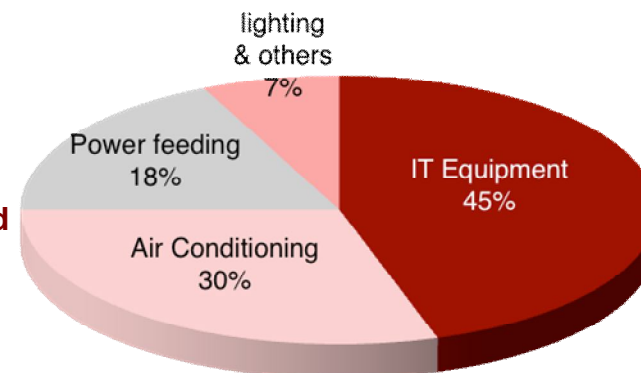
## Total Power Consumption in US Data Centers



(hundred million kWh/Year)

Adapted from EPA ( Environmental Protection Agency ) Aug. 2007

## Data Center Power Consumption



Adapted from JEITA (Japan Electronics and Information Technology Industries Association ), May 2008

# How Hitachi Puts Green IT Initiatives to Use

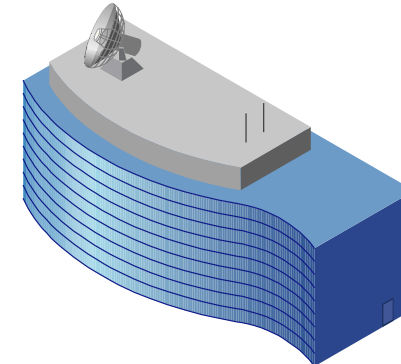
## IT Power Saving Plan

- Development for environmental products
- Goal: reduce CO<sup>2</sup> emissions by 330,000 tons from 2007 to 2012



## Eco-friendly Data Center

Goal: reduce data center power consumption up to 50% from 2007 to 2012



## Power Saving Technologies

### Operational

- Storage efficiency, virtualization, data reduction, system monitoring

### Device

- Cooling, power supplies

### Component

- Low power chips and disk drives



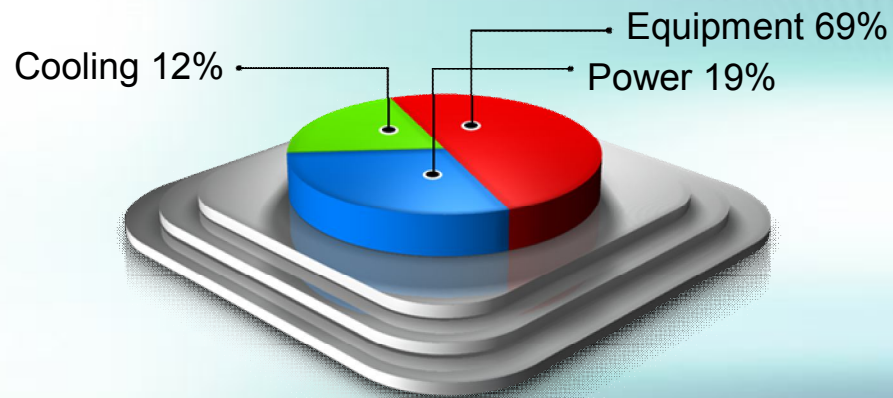
Air-Conditioner



UPS



Transformer



## Data Center Cost

We are hitting the limits  
of power and cooling

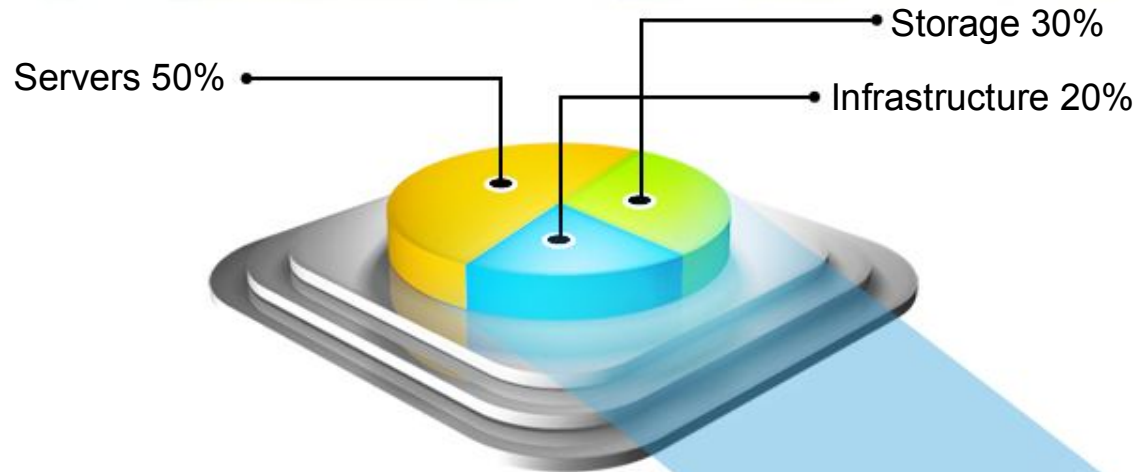
**Now**

Data centers are now rated by  
power and cooling and not floor  
space

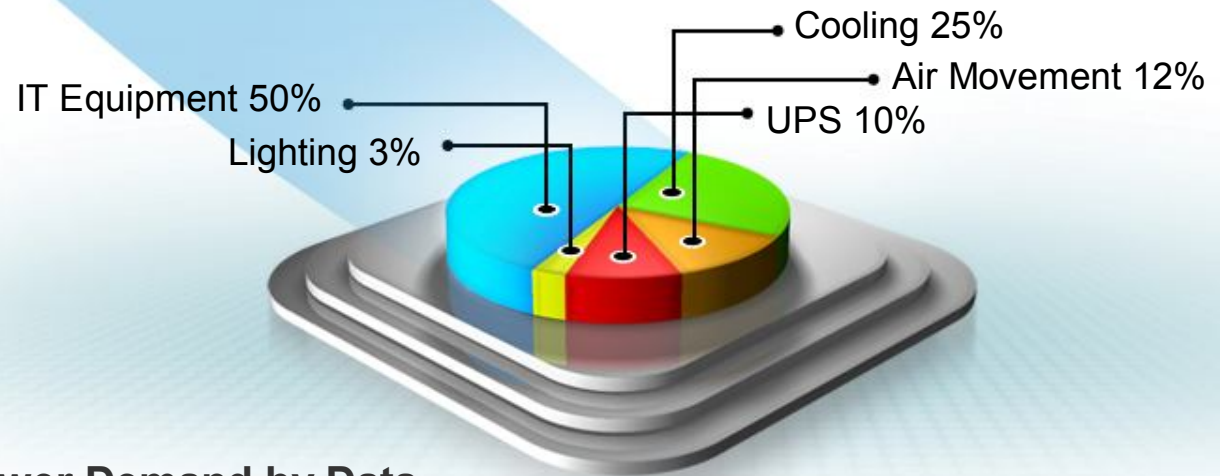
Source: IDC



# Demands On Our Power Sources



**Power Demand by IT Component**



**Power Demand by Data Center Component**

## *Virtualization and Consolidation*

*Reduce TCO and help eliminate data center hot spots*

## *Tiered Storage and Data De-duplication*

*Superior for implementing green data center policies*

## *Dynamic Provisioning including External Virtualized*

*Reduces environmental costs of storage technology*

*Hitachi Data Systems can look at environments in a way that competitors can't by virtue of it's unique ability to segregate the controller apart from the back-end disks; "competitors are stuck looking at environments with the spinners glued on" – Leading Analyst*

# Hitachi Storage Virtualization Is The Key

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Virtualization can help meet the storage requirements of changing workloads and disruptive requirements-critical applications

## Thermal Picture of Data Center Hot Spots

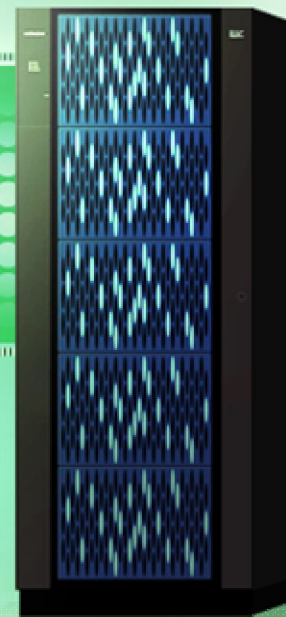


# Advanced Eco-functionality – USP V & USP VM

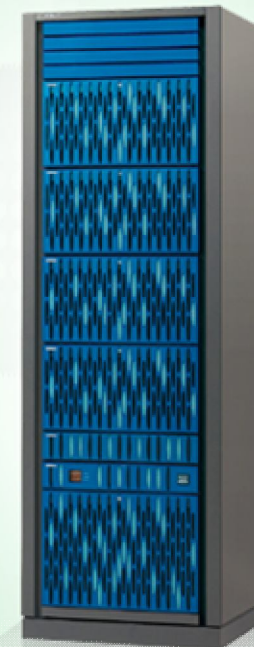
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- Hitachi Dynamic Provisioning
- Large logical storage pools
- Non-Disruptive data migration solution
- Virtual Private Storage Machines (LPARS)
- Green technology & advanced services extended to existing storage assets
- USP V ~ 15% less power consumption

Hitachi Universal  
Storage Platform  
V

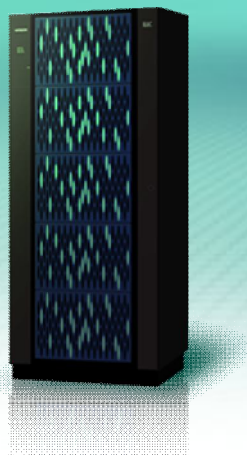


Hitachi Universal  
Storage Platform  
VM





## Management Software



- Common user interface
- Efficient management
- Better resource utilization
- Reduced staff training
- Improved TCO

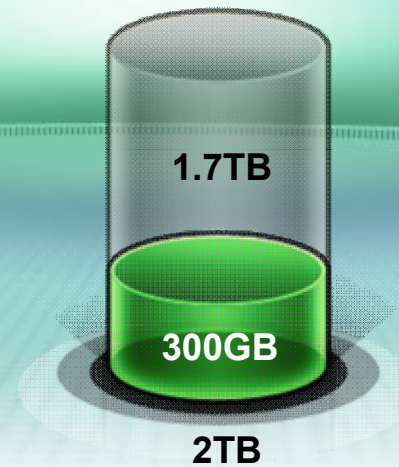


# Hitachi Dynamic Provisioning Internal and External Virtualized Storage

## Thin Provisioning A powerful form of storage virtualization

With Thin Provisioning

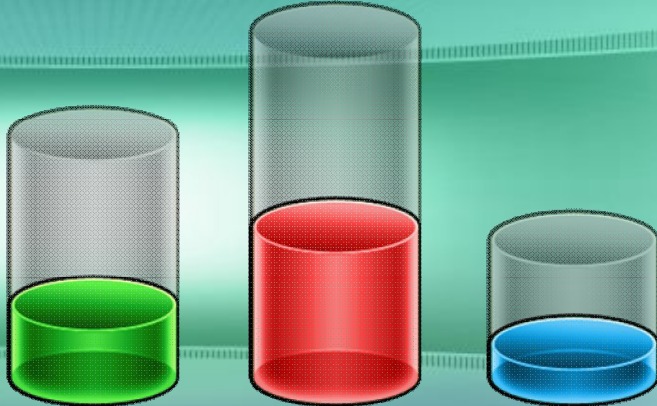
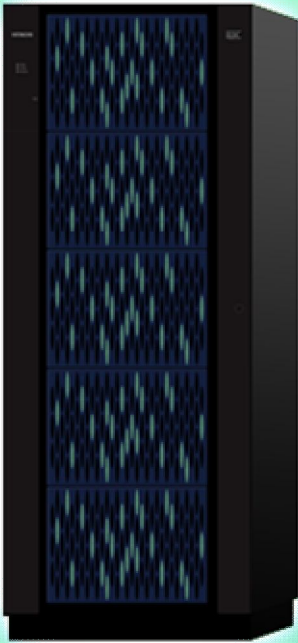
- A 2 TB Volume is Created
- And only 300 GB is consumed and allocated
- The other 1.7 TB is available for other applications



# Hitachi Dynamic Provisioning Increased Utilization

Hitachi USP V

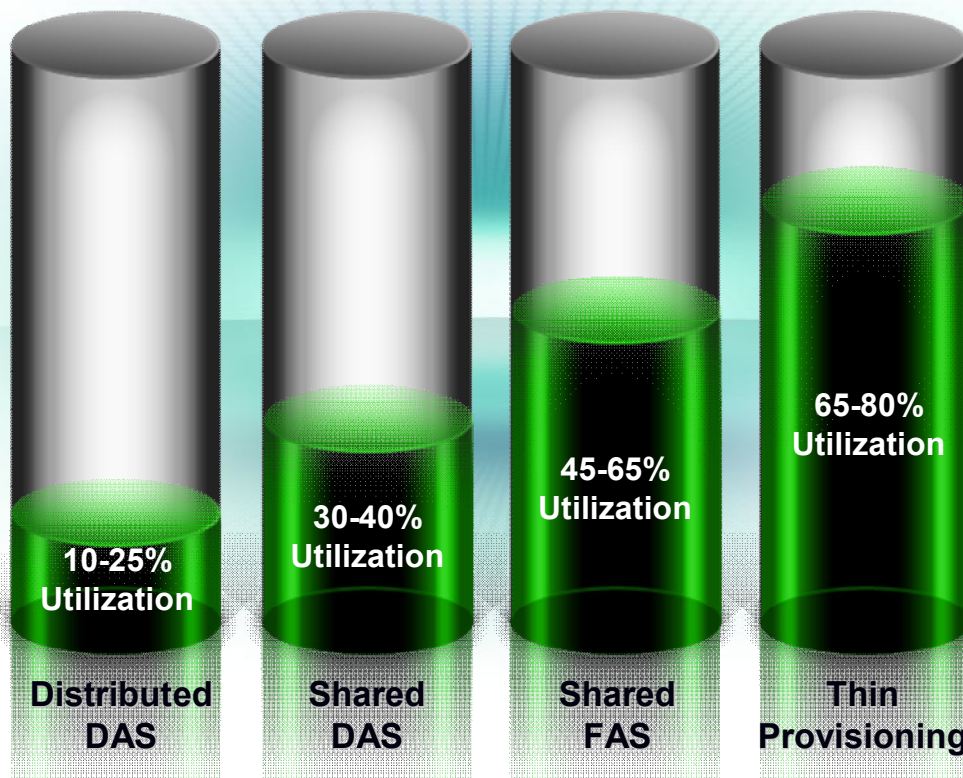
You can create a large number of thin provisioned volumes of all sizes – each drawing from the same pool of capacity



# Key Benefits of Thin Provisioning

"Thin provisioning coupled with virtualized back-end disks improves staff productivity by simplifying storage provisioning and eliminating most tuning activities associated with solving performance problems."

**Gartner**

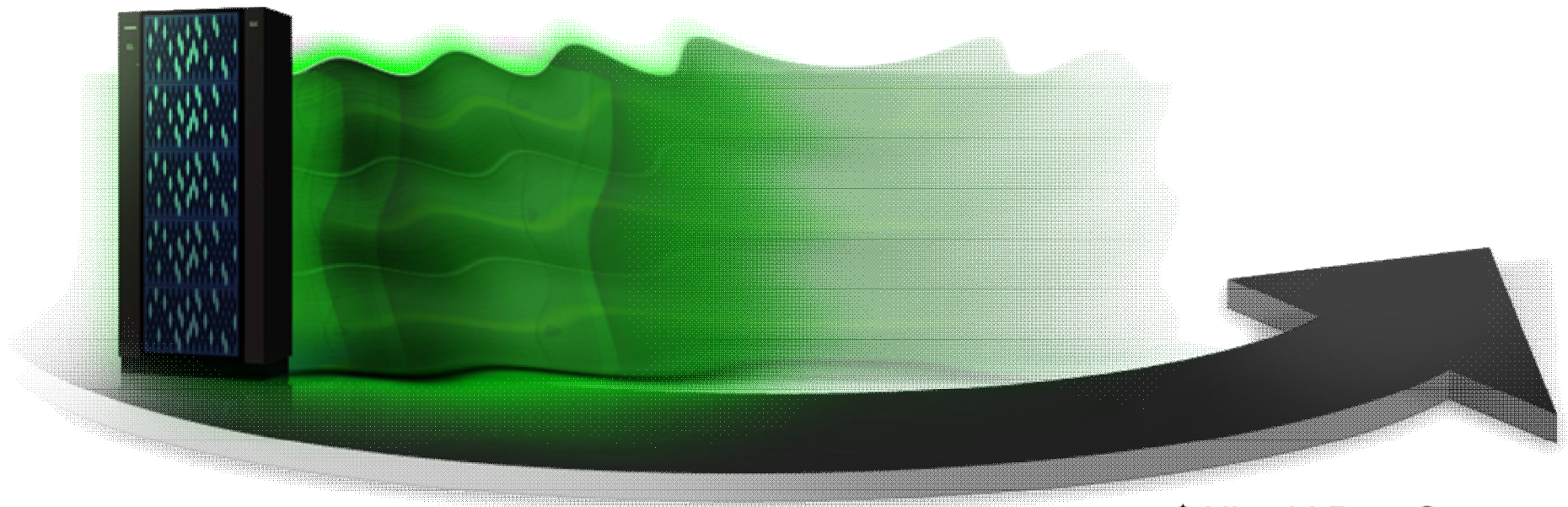




# Storage Economics Services

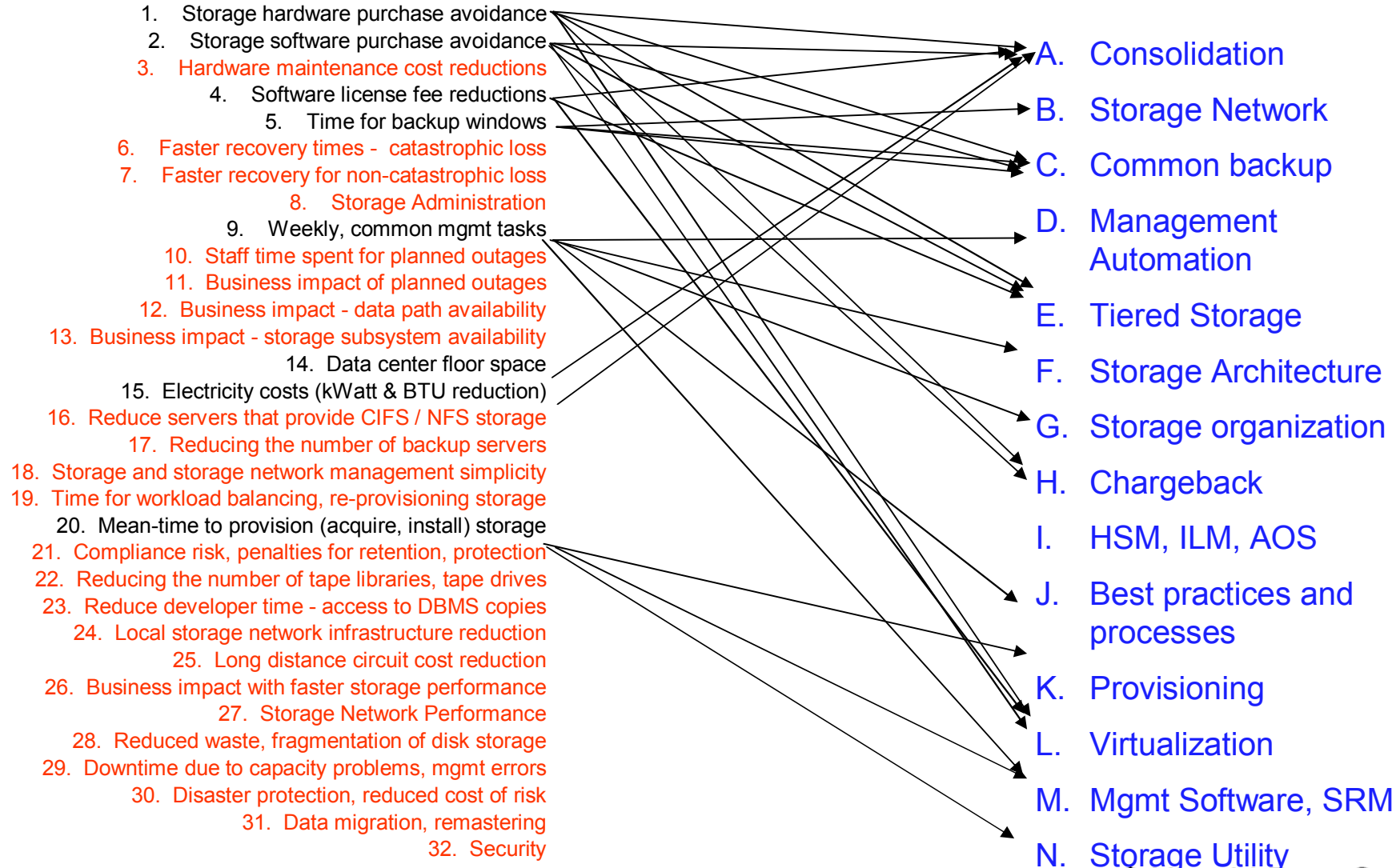
Discover, quantify and justify storage infrastructure investments

- Documented discovery assessment findings
- Options for future design topologies
- Predictive power consumption metrics for each option
- Recommendations and roadmap



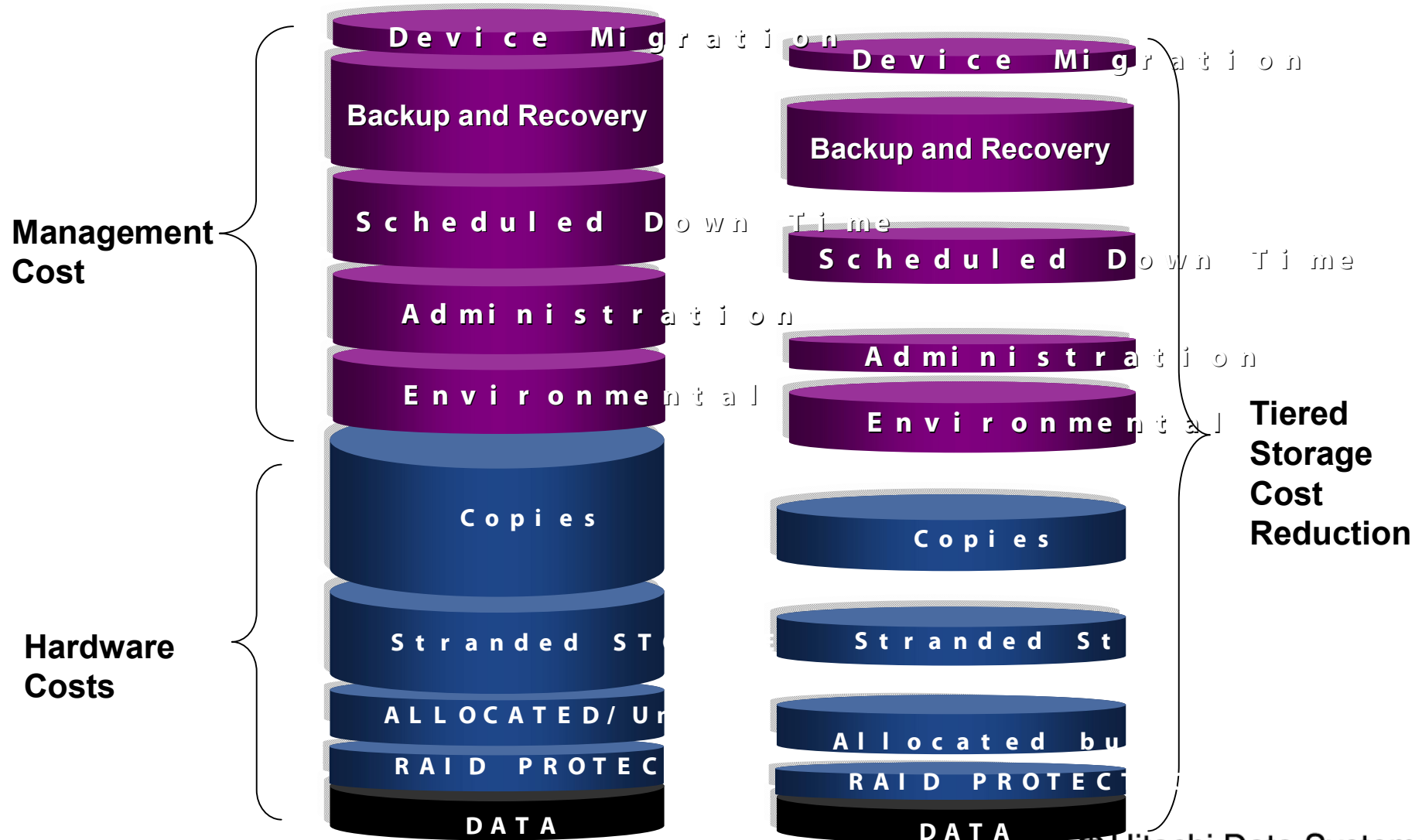
# Storage Economics Services

## What investments to reduce TCO?





# Customer Problems Solved By Tiered Storage



- Increase disk utilization
  - Dynamic provisioning (30-40%, or even > 60%)
- Reduce or eliminate hot spots
  - Load balancing
- Reduce physical resources required
  - Data compression (2:1 or 3:1)
- Eliminate redundant data
  - Data de-duplication (up to 20:1)
- Optimize cost effectiveness and reduce power requirements
  - Tiered storage management
- Reduce data retention costs and power requirements
  - Active archive software
- Decrease power requirement density
  - Spin-down of inactive disks

Unique Heterogeneous  
Virtualization

Dynamic Provisioning  
Including External Virtualized

**HITACHI**

Power Savings Service  
and Dense Power Trays  
for Modular

Super Eco Products

- Power Savings Storage Service for disk drives
  - Integrates with applications that do not regularly read and write data
  - No limit to number of drives spun up and down <sup>1</sup>
  - Backup, archiving, batch reports and unprovisioned storage
  - Backup use case example saves 40% power <sup>2</sup>
- Dense disk trays can lower power and cooling > 20% <sup>3</sup>
- Thin provisioning can improve utilization by ~ 30% and more
- AMS 2000 family certified as Super-eco Product

## Power savings matches energy savings with application usage

<sup>1</sup> Except for first four drives where microcode copies reside

<sup>2</sup> 10TB D2D 6hrs/day, SATA in place of FC

<sup>3</sup> Compared with traditional modular trays. Source: Dave Vellante, CEO ITCentrix

- USP V can support 1,152TB internal SATA storage
- Hitachi Dynamic Provisioning
  - Can improve utilization by ~ 30% and more <sup>1</sup>
  - Zero Page Reclaim – reclaims storage space
- Backup/archiving 10TB data using 1TB drives instead of FC
  - Reduces USP V power consumption ~ 25%
- 5TB of flash drives instead of 73GB 15K rpm FC
  - Reduces USP V power consumption 27%
- Hardware encryption requires virtually no extra power
- USP V and USP VM both certified as Super-eco Products

**Best-in-class scale-up performance without need to scale-out**

<sup>1</sup> Saved United Airlines 50% storage capacity – Also saves power consumption

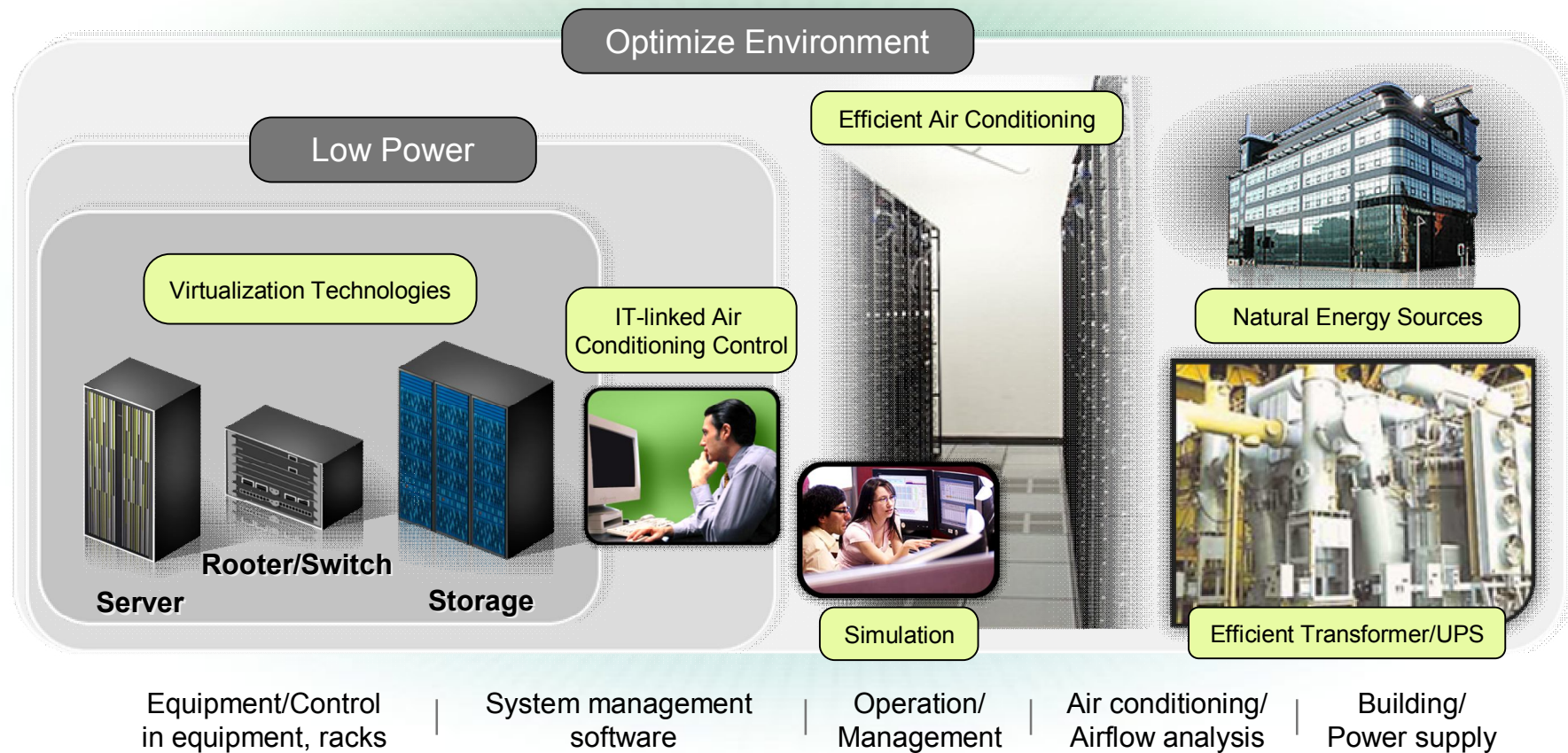


- Best of any vendor IOPS performance per node
  - SPECsfs\_97 benchmark
- Leading 8-way clustering capability – Extreme performance
- Cluster Name Space (Global File system) – Increases utilization
- 4PB capacity access – Highest in industry
- Virtualization with dynamic caching and thin provisioning
  - Increases utilization
- Parallel Network File System – Enhances performance

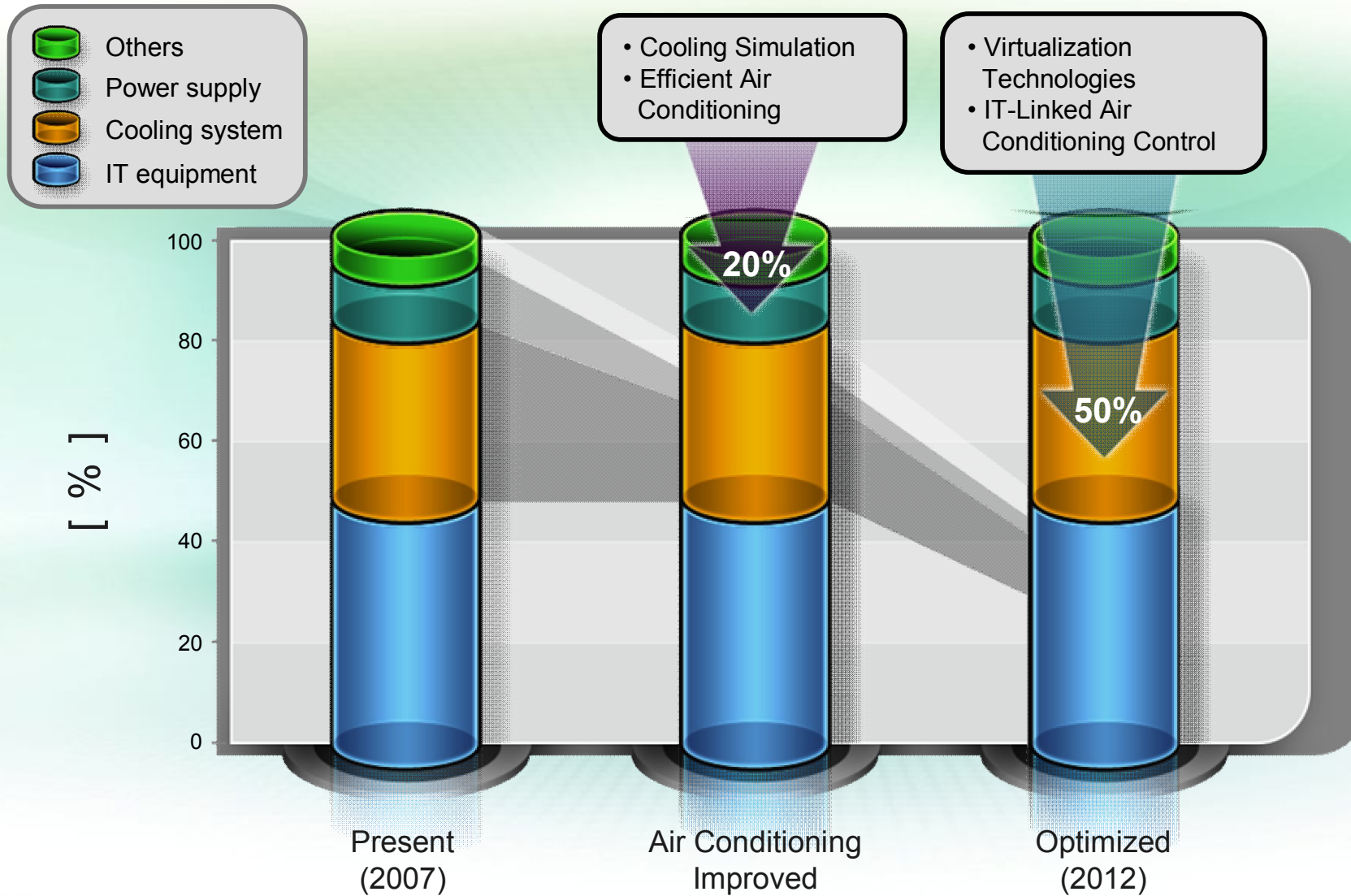
**Industry-leading performance, highest capacity and utilization**

# Eco-friendly Data Center Project

Target 50% data center energy reduction over 5 years



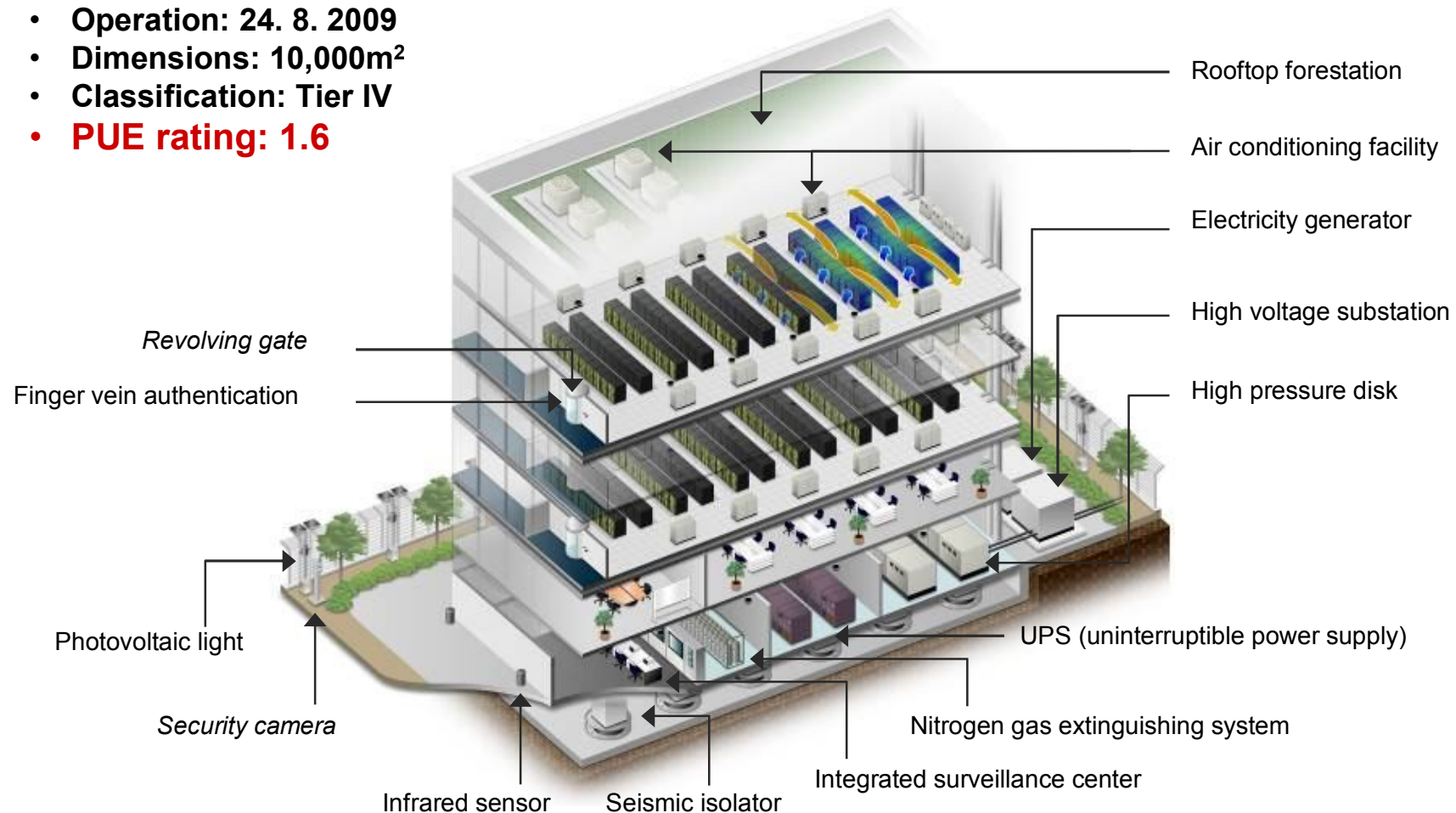
# Eco-friendly Data Center Project Forecast 50% Reduction



# The State of the Art: Yokohama Data Center

## Principles from Eco-friendly Data Center Project and IT Power Saving Plan

- Location: Yokohama, Japan
- Operation: 24. 8. 2009
- Dimensions: 10,000m<sup>2</sup>
- Classification: Tier IV
- **PUE rating: 1.6**



**Power Usage Effectiveness (PUE) is defined as:**

**PUE = Total Facility Power/IT Equipment Power** © Hitachi Data Systems



# Eco-friendly Storage Solutions

- More environmentally friendly data centers
  - Technologies
  - Services
- Reduce power, cooling and facilities costs
- Comply with environmental directives
- Environmentally friendly
  - Design, manufacture and support
  - Entire life cycle, including end of life disposal



*Creating A Better  
World Through Corporate  
Social Responsibility*



**“An eco-friendly  
way to reduce  
your data  
storage costs”**



## Questions/Discussion

**Thank You**