Green IT and Green DC

Alex SL Tay
Regional Service Product Line Manager
Site & Facilities Services, IBM ASEAN
What our clients are telling us

- “We are running out of space in our data center”
- “We have environmental concerns with our data center (e.g., power, HVAC, etc.)”
- “We are relocating or consolidating multiple environments”
- “We need to optimize our environment or reduce our cost structure”
- “We have too many people that are needed to monitor and control our systems”
- “How can we consolidate our mainframe, distributed and/or network operations to gain increased efficiencies?”
- "How do we reduce costs in delivering IT services while maintaining the appropriate level of performance and quality?"
- "We have grown through internal consolidations and/or external mergers; how do we enable a true shared services environment to realize the anticipated synergies?"
- "What is the best way to implement a cost allocation (charge back) system that is equitable for the business units and fiscally responsible within IT?"
Green is the New Business Barometer

**Financial**
- Cost savings from more efficient energy use
- ROI on IT more than 3 years old is less than 2 years
- Every $1 saved on energy, drives another $6 - $8 operational savings

**Operational**
- More computing performance per kilowatt
- Extend the life of IT equipment
- Results in a shared, flexible infrastructure

**Social / Regulatory**
- Verifiable energy conservation
- Achieve energy use reduction and address climate challenges
- Improves customer’s image of your company
Establish a holistic green agenda focusing on 7 areas

- Diagnose
- Facilities
- Compute Resources
- Virtualization
- Active Energy Management
- Cooling Innovations
- Responsible Disposal
Extend the life with improved data center energy efficiency

Address both the IT and physical infrastructure uses of energy

Optimize IT Infrastructure

Active Energy Management

Optimize Data Center Infrastructure

Power and cooling systems perform more efficiently at higher loads.

Typical Power Efficiency curve:

- Power Efficiency
- Load

Graph shows that power efficiency increases as load increases up to a certain point, after which it plateaus or slightly decreases.
Extend the life of your data center facility infrastructure

**major US Utility saved 40% a year with a Data center energy efficiency assessment**

### Solution
- Comprehensive, fact-based analysis
- Evaluate cooling, electrical and building systems
- Provide baseline MPG for data center energy efficiency
- Deliver roadmap of cost justified recommendations

### Benefits
- 40% annual savings on actions with < 2 year payback
- Spend $14K to save $100K per year

### Improvements | Cost ($K) | Payback
--- | --- | ---
Reduce recirculation & bypass of cooling air | < 5 | < 1 year
Increase CRAC air discharge temperature | < 5 | < 1 year
Adjust indoor temperature & relative humidity | < 3 | < 1 year
Turn off CRAC’s where no IT equipment load | < 1 | immediate
Improve UPS efficiency | 40-140 | 1-2 years
Consider transferring IT loads to two PDUs | Varies | varies
Implement occupancy sensor light controls | < 5 | 1.5 years
Variable speed fans | 200 | 6 years
Variable speed scroll compressors | 300 | 18 years
Total | 60 - 700 | 1 To 18 years
Thermal Analysis using Mobile Measuring Tool

- Accelerated measurement method for comprehensive thermal profiling of Data Center
- Perforated tile layout may be optimized

Ideal starting point in a dynamic datacenter
Scalable Modular Data Center (SMDC)

Benefits

- Quick to deploy (8 – 12 weeks)
- Lower implementation costs (up to 20% lower)
- Lower operating costs (up to 40% lower)
- Energy efficient
- Scalable to easily meet the needs of today and tomorrow
- Space saving (up to 40% less space)
- Modular design for quick easy maintenance and growth
- No raised floor required
  - Flexible installations
  - High density zones
- High density computing environment support
  - Up to 30kW per rack and higher
  - Preconfigured IBM BladeCenter solutions
- SMDC helps clients in their quest to become more “Green”
Implement high density zones using different revolutionary concepts e.g. cold aisle containment, supplementary cooling solution
A hot aisle containment option can be utilized to prevent hot exhaust air from mixing with the cooled supply air thereby increasing cooling capacity and efficiency.

**Figure 6** - InfraStruXure HD – APC Symmetra UPS, PDU, NetShelter SX Racks, and InRow RC Cooling Units

**Hot aisle containment options**

*(Ceiling, door and frame enclosure assemblies)*
Introduce innovative cooling capability

How does RDHx work?

Today, up to 20kW Rack Density with chilled water solution:

- Cold Air enters the front
- Hot Air enters the RDHx
- 100% of Heat is transferred via the chilled water circulating in the Secondary Loop serving the RDHx
- Reduces or eliminates the need for other cooling solutions

Above 20kW Rack Density:

- Heat above 20kW is discharged into the data center to be cooled by other cooling systems

ASHRAE recommends

- Server inlet temperature to be maintained between 18°C - 27°C
- Server manufacturers recommend:
  - For normal servers - 160CFM/kW
  - For blade servers - 80-100CFM/kW
- Rack density to be based on IT kW
- Footprint per rack is 3.0 m² per rack, including support equipment
Rear Door Heat Exchanger System Concept

**Raised floor white space**

Rear Door Heat Exchanger (RDHx)

**High density racks**

- 20KW
- 20KW
- 20KW

Utility space

Cooling Distribution Unit (CDU) 120KW

- -> 150-200 PSI
- -> 7 degree Celsius
- -> High water volume

External Chiller System

- -> 13-20 PSI
- -> 2 degree above dew point (e.g. 18 degree Celsius)
- -> Max 5 gal water
Cisco EnergyWise Converges IT and Facility Networks

Tenant Services and Technologies
IP Based
- High-Speed Internet
- Wireless
- VPN
- IP Telephony
- Audio & Video Conferencing
- Visitor Management
- Interactive Media
- Digital Signage

Building Services and Technologies
Non-IP
- Lighting
- Elevators
- 24/7 Monitoring
- HVAC Sensors
- Fire
- Video Surveillance
- Access
- Energy

The Network Is the Platform
Reducing Bank Branch Carbon Footprint

- Operation 9 to 5
- Power off phones after hours and power on phones next day
- Legacy phone and switch
Reducing Headquarters Peak Power Usage

- EnergyWise controls laptops, phones, and building cooling
- Peak power reached – smooth and time shift power use

EnergyWise Management Monitors Power

Peak Power Alert

Policy Added and Distributed to Network

Identify Eligible Phones, Laptops, Building HVAC

- Laptop to battery power
- Eligible phones to night sleep mode
- Building temperature increased

Micro-Gen
Optimizing Hotel Power Usage

- Room setting customized for frequent guest

- EnergyWise Notified Guest Arrives
- Policy Added and Distributed to Network
- Identify Room Phones, AP, Building HVAC, Lights
- Room Power Up
  - Phones power up
  - Wireless coverage assured
  - Room temperature set
  - Lights on
Cisco EnergyWise – The Impact

**Watts Savings**

\[15.4\text{W} \times 5,000 \text{ off hrs} \times (5,000 \text{ IP phones} + 500 \text{ APs}) = 423,500\text{kW savings per year}\]

**Cost Savings**

\[15.4\text{W} \times 5,000 \text{ off hrs} \times \$.12/\text{kWhr} \times (5,000 \text{ IP phones} + 500 \text{ APs}) = $50,820 \text{savings per year}\]

**GhG Savings**

\[\text{kW savings per year} \times 0.15 \text{ kgCO2e/kWh} \times \text{EBF1} = 194,024 \text{ trees saved per year}\]

\[12,498 \text{ mid-size automobile annual emissions removed}\]

Based on 5000 color IP phones, 5K employees, 10 employees/AP,
1 kgCO2e reductions = 3.0542986425334 trees (Environmental Benefit factor 1 = EBF1),
1 kgCO2e reductions = remove 0.1967435549525 mid-size automobile (Environmental Benefit factor 2 = EBF2)
EnergyWise Summary

Converged IT and Buildings Centralized Policies

Environmental Benefits Power Optimization

Lower Operating Costs
The Time is Right for a Dynamic Infrastructure

- Enables visibility, control, and automation across all business and IT assets
- Transforms assets into higher value services
- Highly optimized to achieve more with less
- Addresses the information challenge
- Leverages flexible sourcing like clouds
- Manages and mitigates risks

...delivers superior business and IT services with agility and speed
Summary

- Green IT and Green DC help companies save money and save the environment
- Solutions exist today in at least 7 areas for going green
  - Cisco EnergyWise is an innovative solution to reduce energy consumption
  - Optimize power efficiency through technology and virtualization
  - Optimize cooling efficiency to reduce energy cost
  - Use supplementary cooling solution to support high density computing
- IBM can help you improve energy efficiency