

UNLOCK YOUR HIDDEN DATA CENTER



FOR INTERNAL AND EXTERNAL USE

IT EXECs ARE PREPARING FOR SIGNIFICANT DATA CENTER CHANGE

- 52% are willing to pay 5% to 10% more for green products
- 51% are willing to trade 5 to 10 percent of server performance for lower carbon emissions
- 42% say their companies don't monitor IT-related energy spending
- 12% say energy efficiency is a critical issue when buying IT equipment following reliability (63%), price (32%) and after-sales support (30%)



UNLOCK YOUR HIDDEN DATA CENTER WITH DELL

1. ENERGY SMART SERVERS
2. VIRTUALIZATION
3. DELL-LIEBERT XD ENERGY SMART SOLUTION
4. ENERGY SMART DATA CENTER ASSESSMENT & VIRTUALIZATION SERVICES



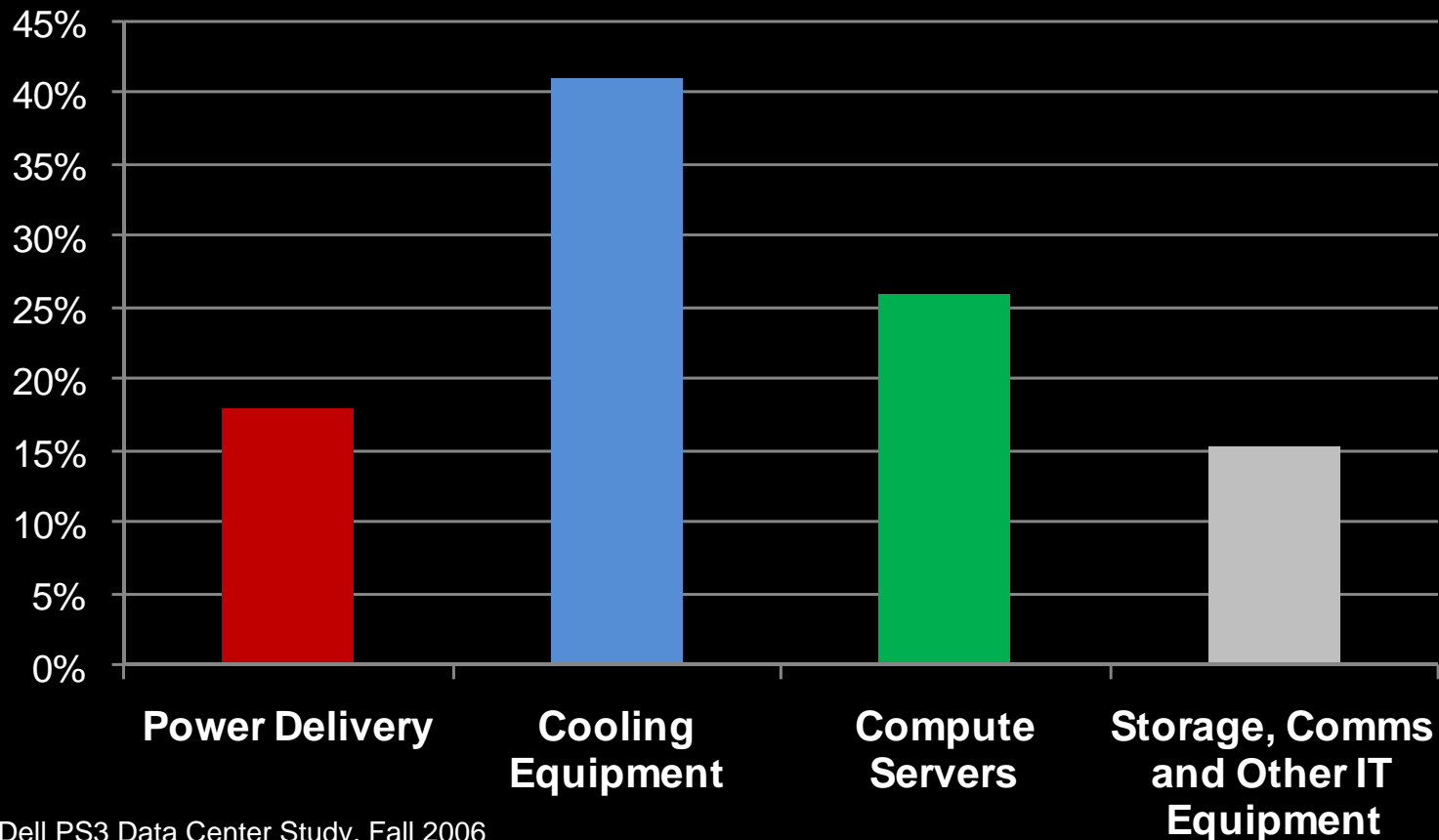
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IN TYPICAL DATA CENTERS, COMPUTE SERVERS ACCOUNT FOR LESS THAN 30% OF ENERGY CONSUMPTION

Share of Datacenter Energy Use

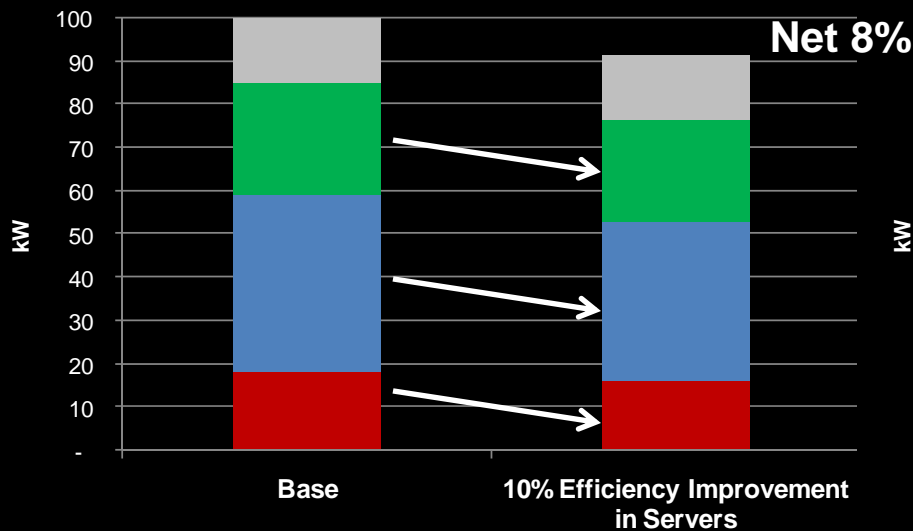


Source: Dell PS3 Data Center Study, Fall 2006

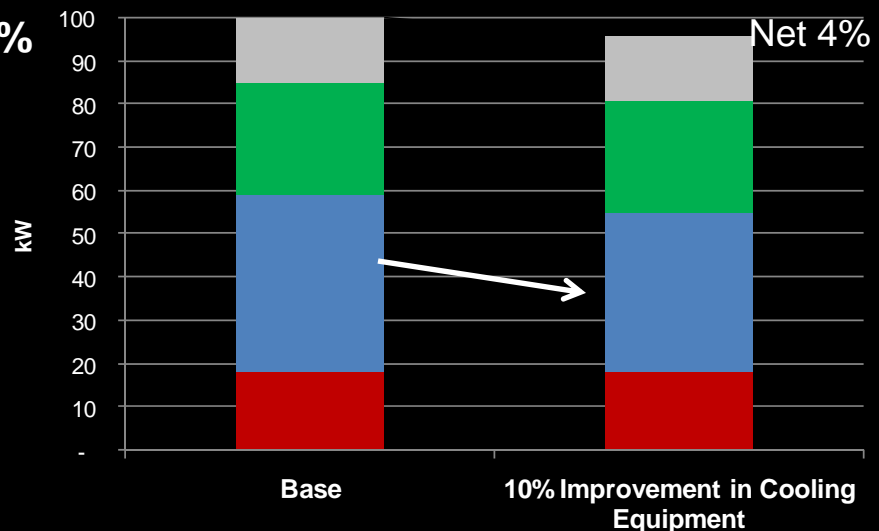


SERVER EFFICIENCY DRIVES IMPROVEMENT AT THE DATA CENTER LEVEL

Impact of Server Efficiencies on Overall Datacenter Energy Consumption



Impact of Cooling Equipment Efficiencies on Overall Datacenter Energy Consumption



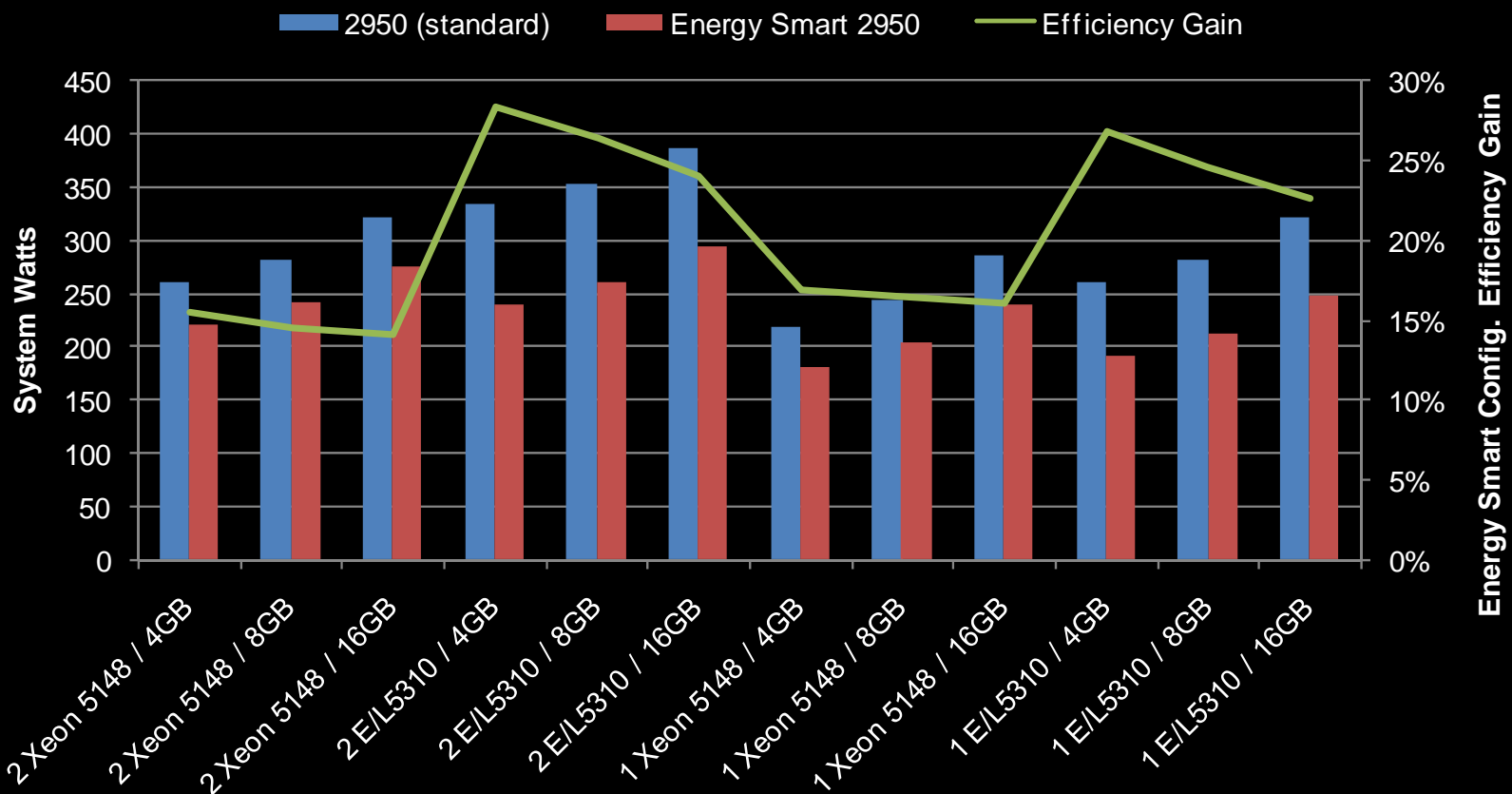
- Storage, Comms and Other IT Equipment
- Compute Servers
- Cooling Equipment
- Power Delivery

Source: Dell PS3 Data Center Study, Fall 2006



POWEREDGE ENERGY SMART 2950s ARE UP TO 28% MORE EFFICIENT

**Power Comparison:
PowerEdge 2950 vs. PowerEdge Energy Smart 2950**



Source: Dell Data Center Capacity Planner 2.0



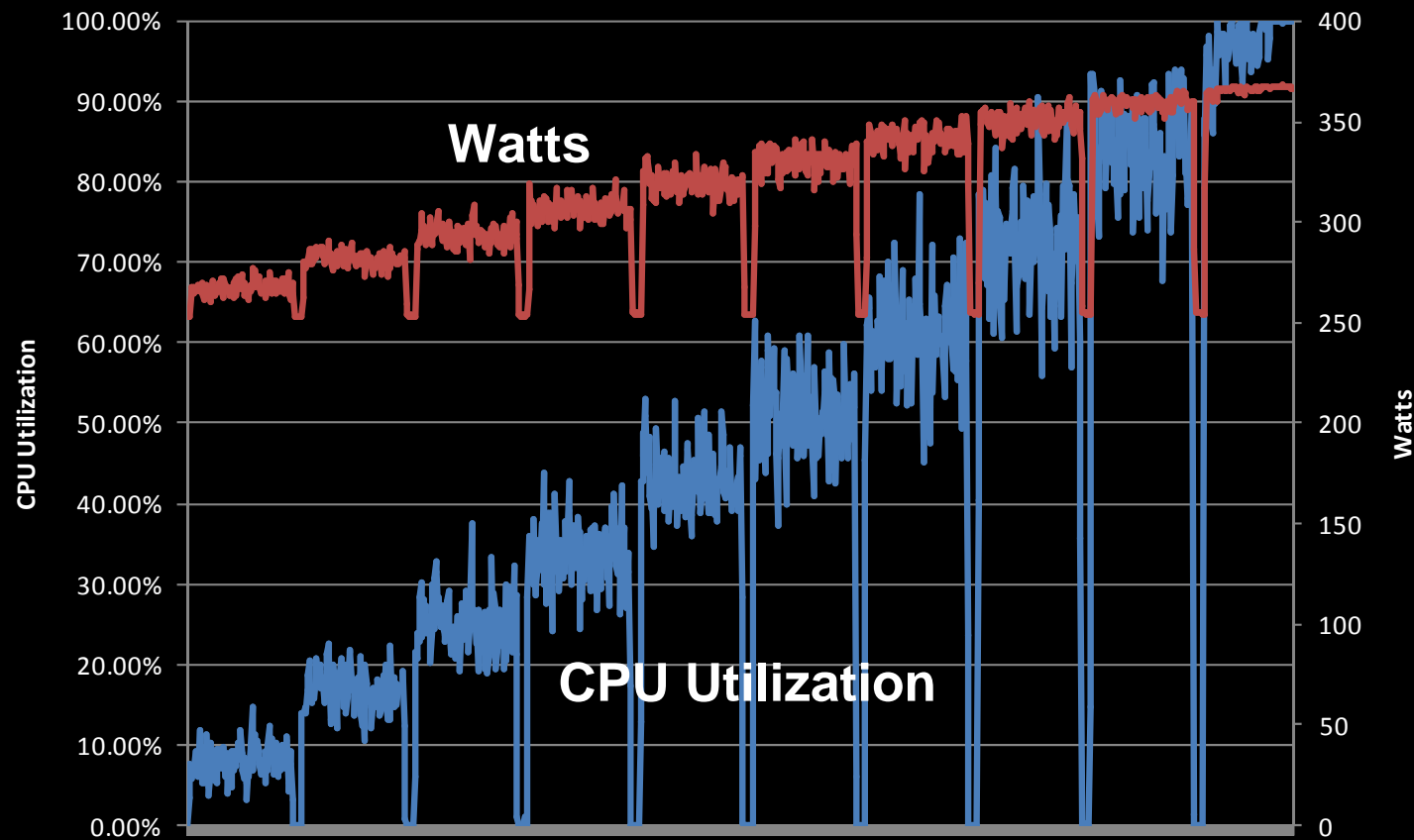
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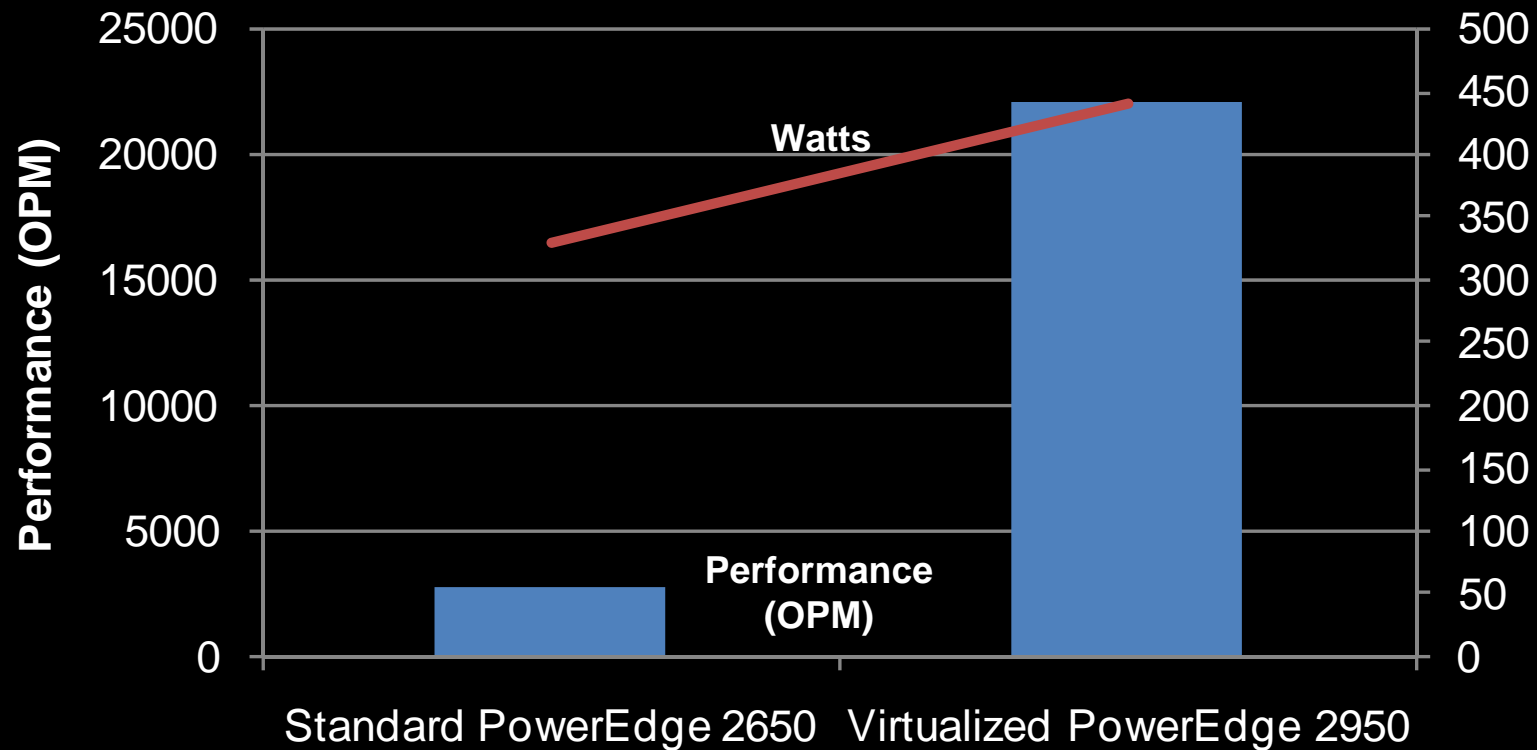
LOW SERVER UTILIZATION RATES WASTE ENERGY

Dell PowerEdge 2950 Utilization vs. Power Draw



VIRTUALIZATION ENABLES INCREASED SERVER UTILIZATION

Dell PowerEdge 2650 vs. 2950: Performance & Power Draw



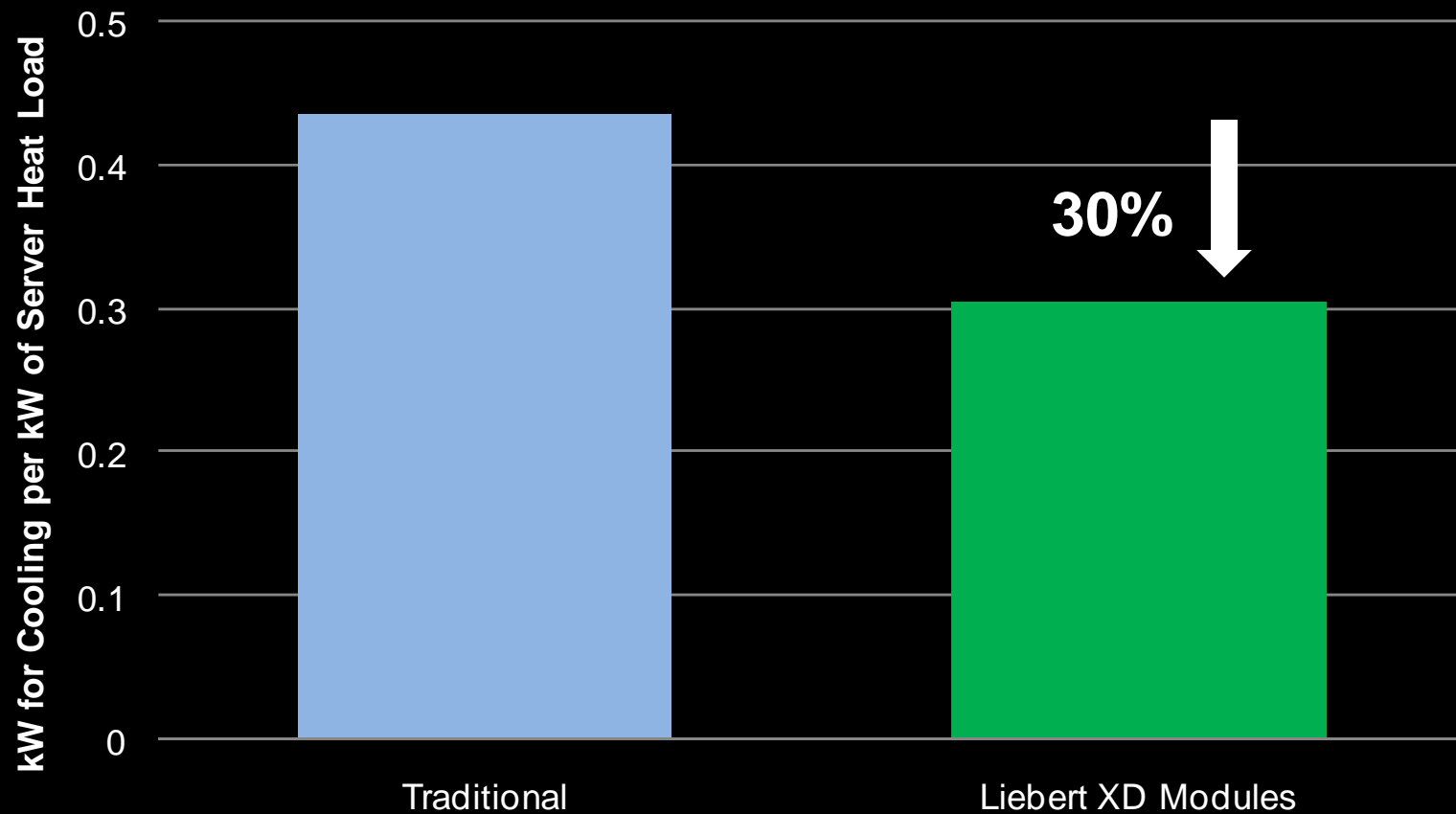
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LIEBERT XD SOLUTIONS: UP TO 30% MORE EFFICIENT THAN TRADITIONAL PERIMETER COOLING

Cooling Effectiveness of Traditional Perimeter Cooling vs. Liebert XD Cooling



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DELL SERVICES FIND YOUR UNIQUE COMBINATION

- ENERGY SMART DATA CENTER ASSESSMENT SERVICES
 - Evaluate your facility for improvement opportunities, including best practices implementation
 - Develop short and long term designs to meet your business needs
 - Implement design to deliver results
- VIRTUALIZATION SERVICES
 - Identify the virtualization opportunities for your data center
 - Implement to capture the value

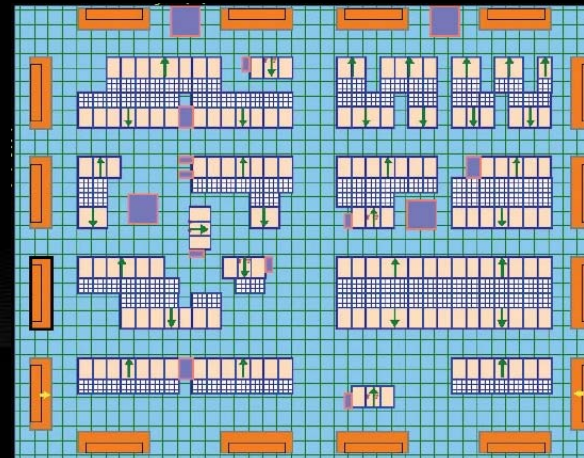
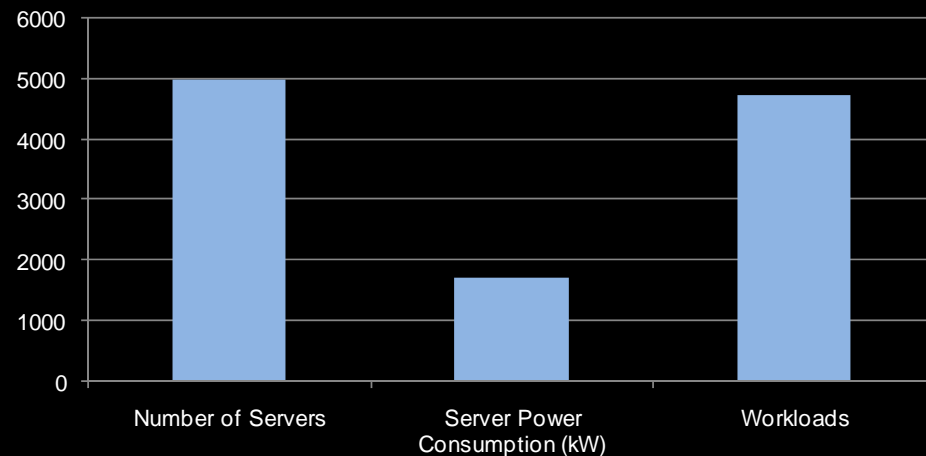


UNLOCK YOUR HIDDEN DATA CENTER: AN ILLUSTRATION

BASELINE

- ASSUMPTIONS:
- TYPICAL LARGE DATA CENTER
- 5000 SERVERS
 - ~29 servers / rack
 - 10% 5+ years old
 - 70% 2-5 years old
 - 20% <2 years old
- WORKLOADS = 4750
- PUE = 2.23
- Cooling vs. IT Power draw: 92.6 to 100 watt ratio

Unlocking the Hidden Data Center: Baseline Servers, Power Consumption and Workloads



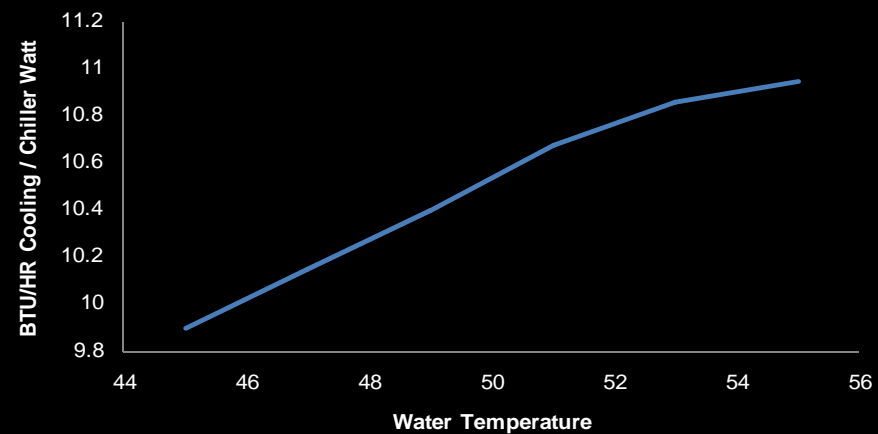
Source: Based on Dell PS3 Data Center Study, Fall 2006



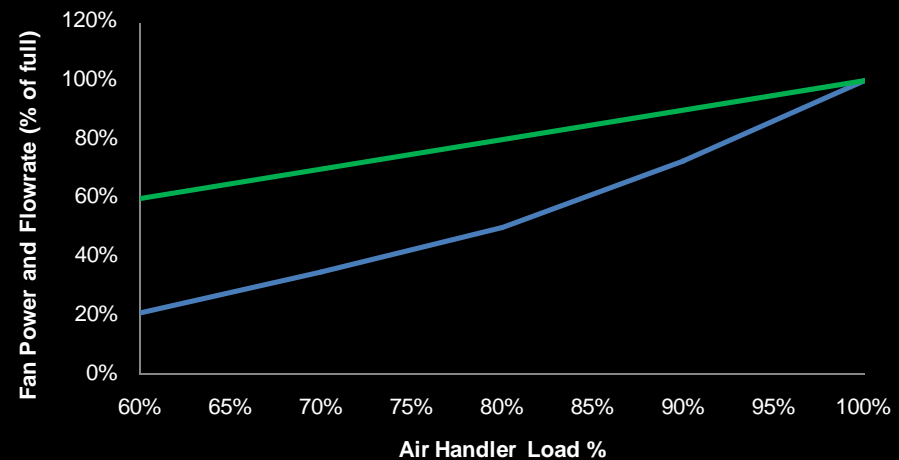
BEST PRACTICE: RAISING DATA CENTER SET POINT LEADS TO GREATER EFFICIENCY

1. Chiller cooling efficiency improves with increased water temperature
2. Increased water temperature enables an increase in temperature of the air handler coil
3. Incorporating Variable Frequency Drive blowers into air handlers enables greater efficiency

Air Cooled Chiller Efficiency



Fan Power at Partial Load



UNLOCK YOUR HIDDEN DATA CENTER: AN ILLUSTRATION

OPTIMIZED DATA CENTER TEMPERATURE

Data center temperature raised 5 degrees

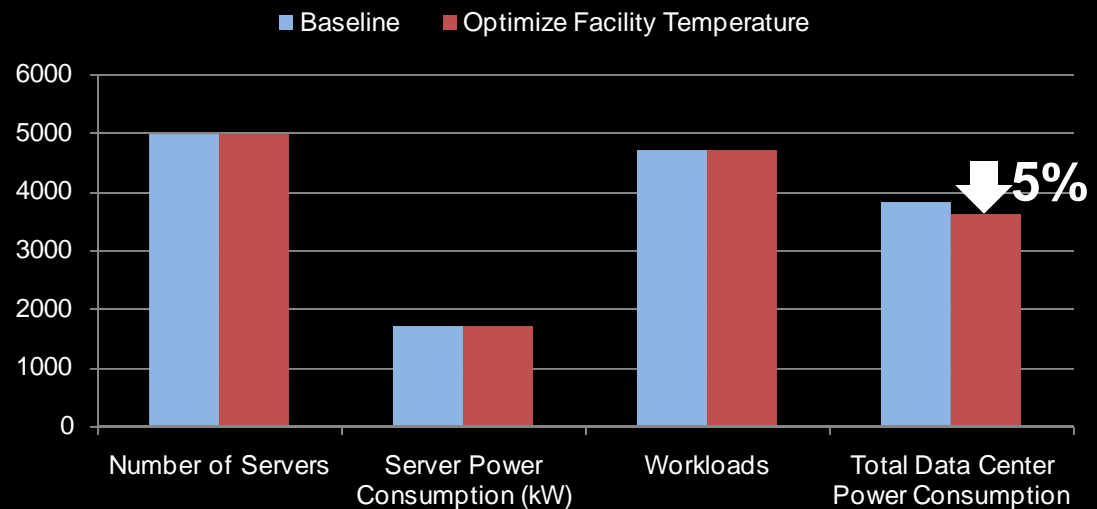
No change in servers, server power or workloads

5% reduction in Total Data Center Power Consumption

Cooling vs. IT Power draw: 80.5 to 100 watt ratio (13% improvement)

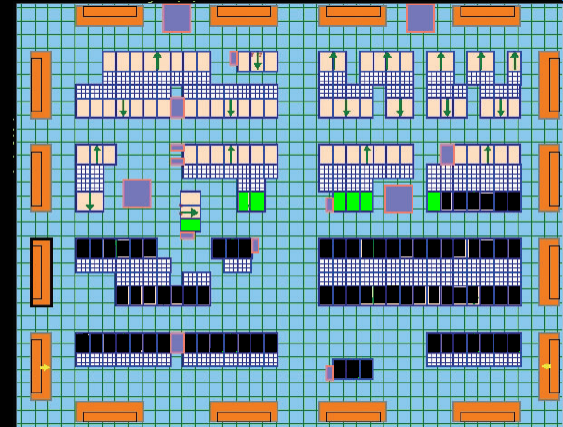
Improvement at overall data center: PUE drops from 2.23 to 2.12

Unlocking the Hidden Data Center: Servers, Power Consumption and Workloads w/ Optimized Facility Temperature



SERVER OPTIMIZATION RECOMMENDATIONS

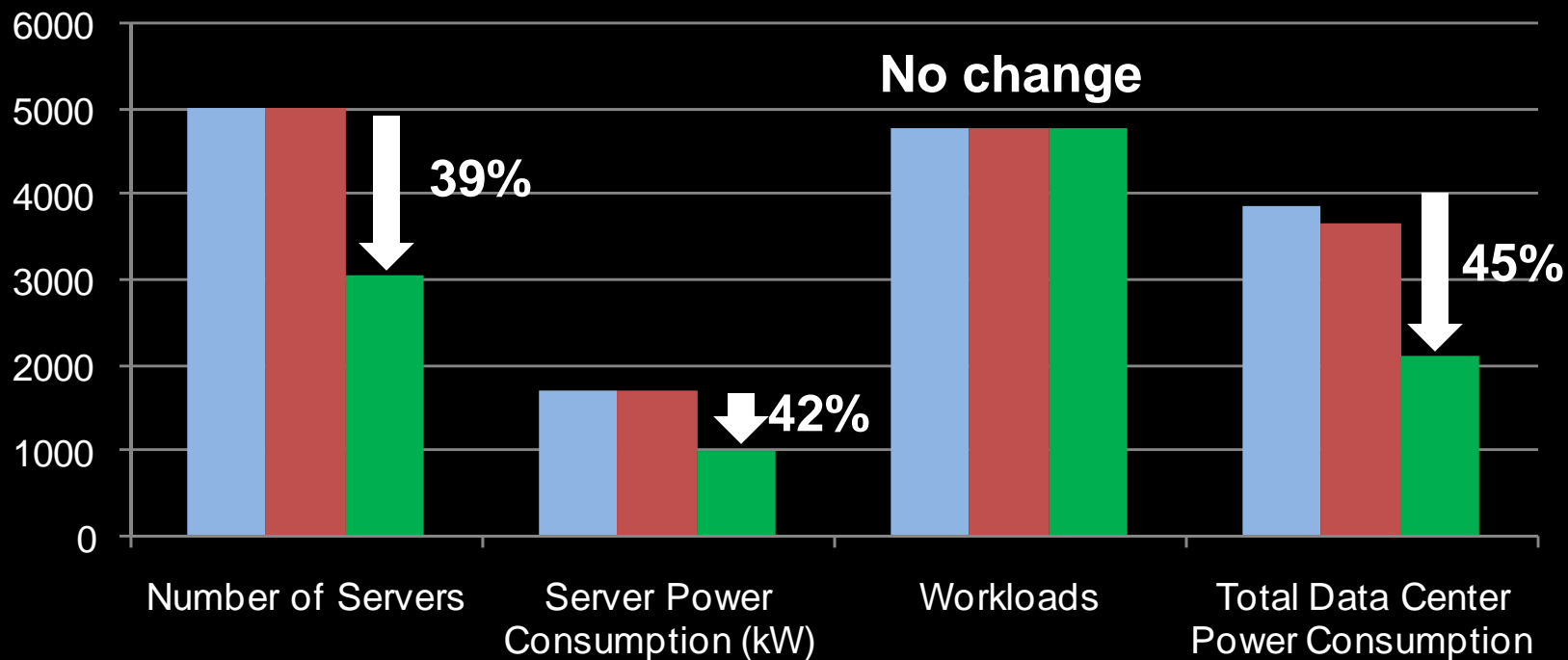
- CONSOLIDATE
- 5+ YEAR OLD:
 - Remove 50%
 - Refresh 25% with Energy Smart servers
 - Leave 25% as is
- 2-5 YEAR OLD:
 - Refresh / consolidate 20%, 75% of new servers are Energy Smart
- VIRTUALIZE
- 2-5 YEAR OLD:
 - Refresh 40% with virtualized systems
- <2 YEAR OLD:
 - Refresh with 32% virtualized systems



REDUCE DATA CENTER POWER CONSUMPTION UP TO 45% WITH NO PERFORMANCE CHANGE

Unlocking the Hidden Data Center: Comparison of Servers, Power Consumption and Workloads

■ Baseline ■ Optimize Facility Temperature ■ Optimize Servers



UNLOCK YOUR HIDDEN DATA CENTER: AN ILLUSTRATION UTILIZE FREED CAPACITY

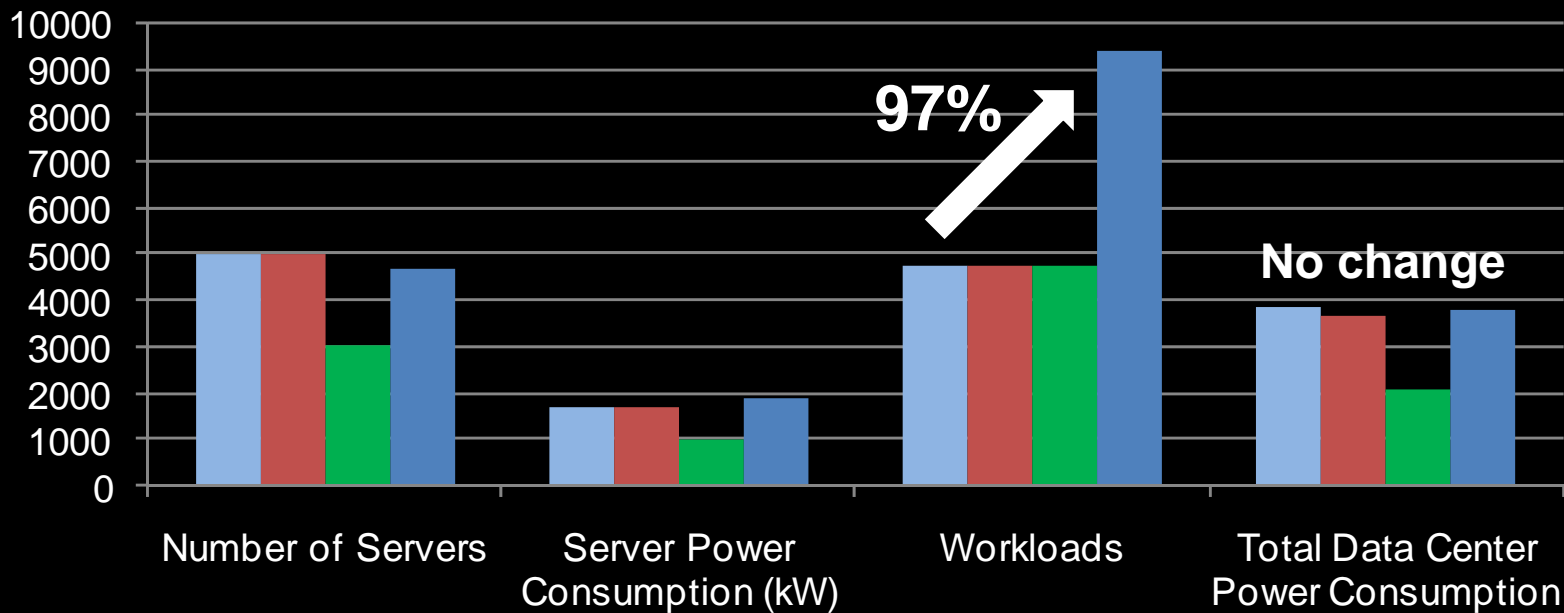
- ASSUMPTIONS
- ADVANCED COOLING:
 - Liebert XD or APC Hot Aisle Containment
 - 240 volt power distribution
- NEW SERVERS:
 - Energy Smart (13%), Blade (47%), and standard servers (40%) installed
 - 40% virtualized



UNLOCK YOUR HIDDEN DATA CENTER: INCREASE PERFORMANCE UP TO 97%

Unlocking the Hidden Data Center: Comparison of Servers, Power Consumption and Workloads

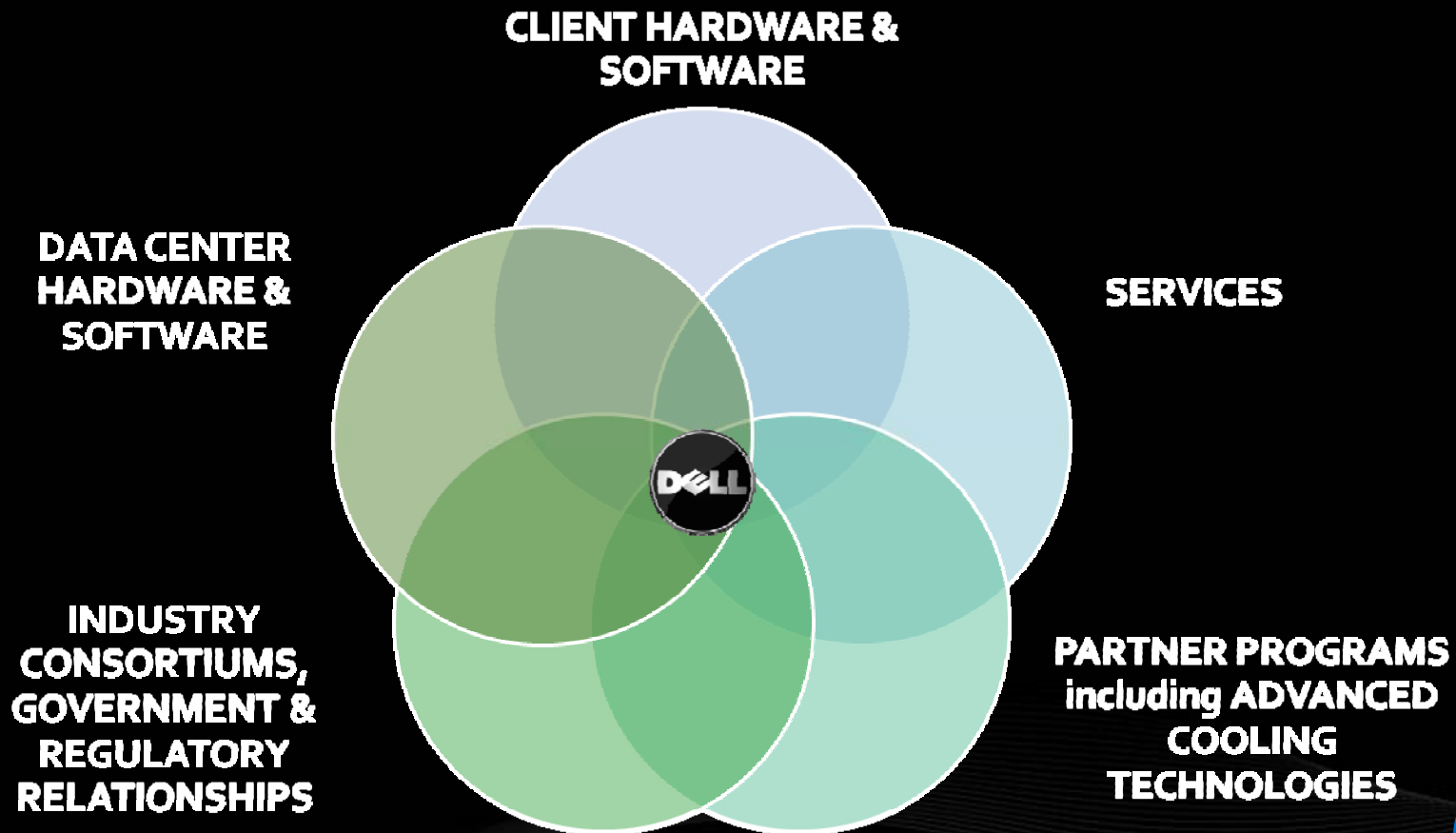
- Baseline *PUE = 2.23*
- Optimize Facility Temperature *PUE = 2.12*
- Optimize Servers *PUE = 2.12*
- Fill "Hidden Data Center" *PUE = 2.02*



Cooling vs. IT Power draw: 73.8 to 100 watt ratio (8% improvement)



DELL OFFERS A COMPLETE PORTFOLIO OF POWER & COOLING SOLUTIONS FROM THE DESKTOP TO THE DATA CENTER



MORE TO COME . . .

- VIRTUALIZATION OPTIMIZED SERVERS
- POWEREDGE BLADE SERVERS
- OPENMANAGE



SIMPLIFY IT WITH DELL POWER & COOLING SOLUTIONS

GET IT
FASTER

RUN IT
BETTER

GROW IT
SMARTER

- **REALIZE RESULTS TODAY**
- **SAVE TIME, ENERGY, MONEY, SPACE**
- **MAKE THE MOST OF CURRENT INVESTMENTS**
- **PREPARE FOR FUTURE BUSINESS NEEDS**

