Data Center Predictive Modeling

How to minimize TCO through system level optimization

Jim Rodriguez – GM Americas
What’s happening out there?...

- Increasingly dynamic environment
- Interdependency accelerates complexity
- Spiraling energy costs
- Regulatory compliance and governance
- CFO telling me cloud computing means zero capex and flexible right-sized opex
What are others are saying?....

“Energy costs are the fastest-rising cost element in the data center portfolio, and yet data center managers are still not paying sufficient attention to the process of measuring, monitoring and modeling energy use in data centers.”

Rakesh Kumar, research vice president at Gartner.

“The lifecycles of data centers are getting shorter and shorter. The needs of today’s data centers are much more complex than they were twenty five or even five years ago.”

Lisa Richarde - Data Center Journal
Data Center Predictive Modelling – A Solution?

• Modeling is not new!

• Modeling can help when things get complex

• Modeling can help create detailed future energy and data costs

• Modeling can provide advanced energy-planning and accounting capabilities

• Enable thousands of man-hour analyses to be run in minutes

• Avoid disruption of business operations
How does it work?
Simulation Modeling
PUE is not a single number for a data center
Financial outputs
An example simulation model

Base Scenario

• 3.5 MW design IT capacity
• 2N+1 Infrastructure
• Running at 90% of rated capacity
• Using the old ASHRAE spec (45-55% RH)
• Poor airflow management
• No power management
• No virtualization
An example simulation model

Base Scenario

• Located in Europe
• Chilled water / Dry cooler design
• Power cost of $0.08/kWh rising to $0.10/kWh
• Carbon intensity of 0.573kg / kWh
Scenario 1 – Implement Best Practice

- Airflow management (aisle containment)
- Variable Frequency Drives in the CRAC units
- New ASHRAE spec
- Enable power management on servers
Scenario 2 – Implement Economizer

• Airflow management (aisle containment)
• Variable Speed Drives in the CRAC units
• New ASHRAE spec
• Enable power management on servers

• Implement an indirect waterside economizer
# Results Comparison

## 4-Year Cost / Energy / Carbon Analysis

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Energy (GWh)</th>
<th>Carbon (Tons)</th>
<th>Energy Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>231</td>
<td>122,000</td>
<td>$43.4m</td>
</tr>
<tr>
<td>Implement Best Practices</td>
<td>168</td>
<td>89,000</td>
<td>$31.6m</td>
</tr>
<tr>
<td>Add Economizer</td>
<td>147</td>
<td>78,000</td>
<td>$30.2m</td>
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<tr>
<td>Savings</td>
<td>84</td>
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<td>$12.7m</td>
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</tbody>
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Thank you

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