



Intel Corporation's High Density Data Center *An Operational Review*

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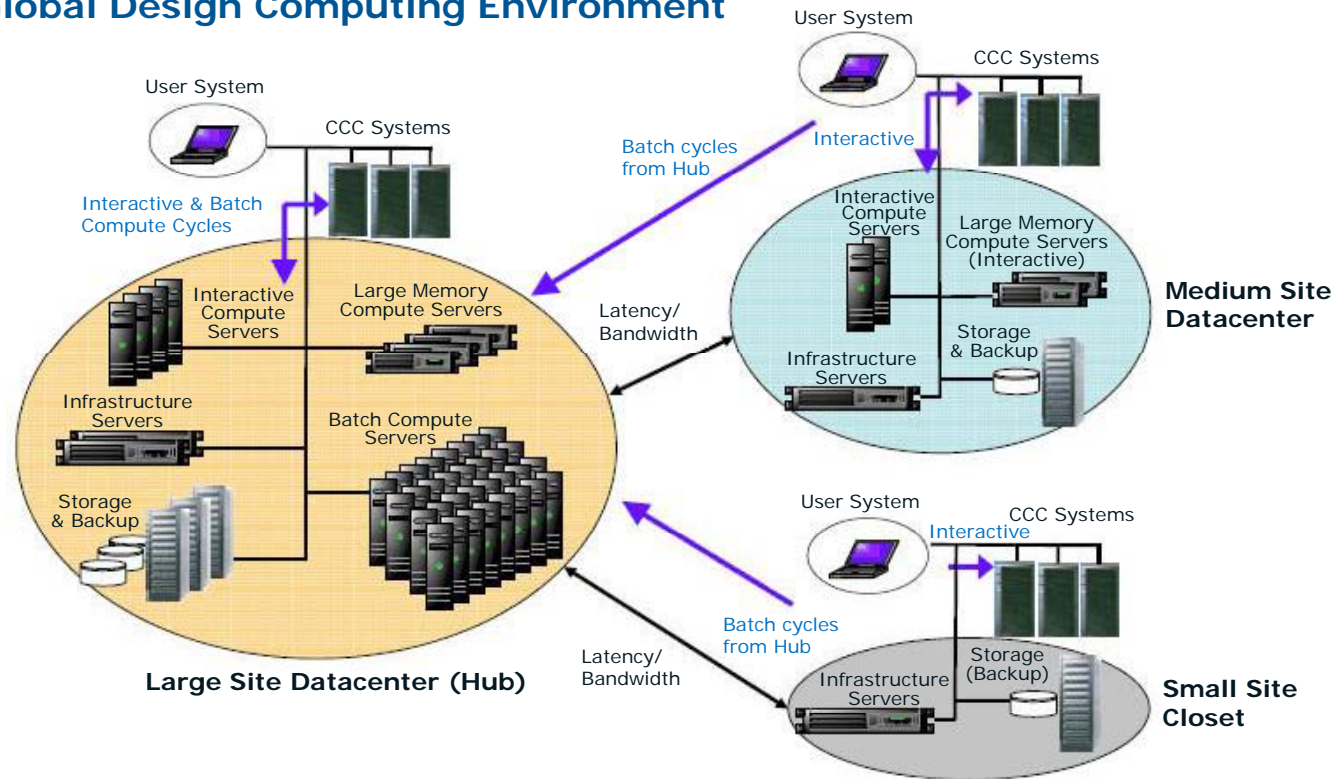


JFS1 High Density Data Center



HPC for Silicon Design

Global Design Computing Environment

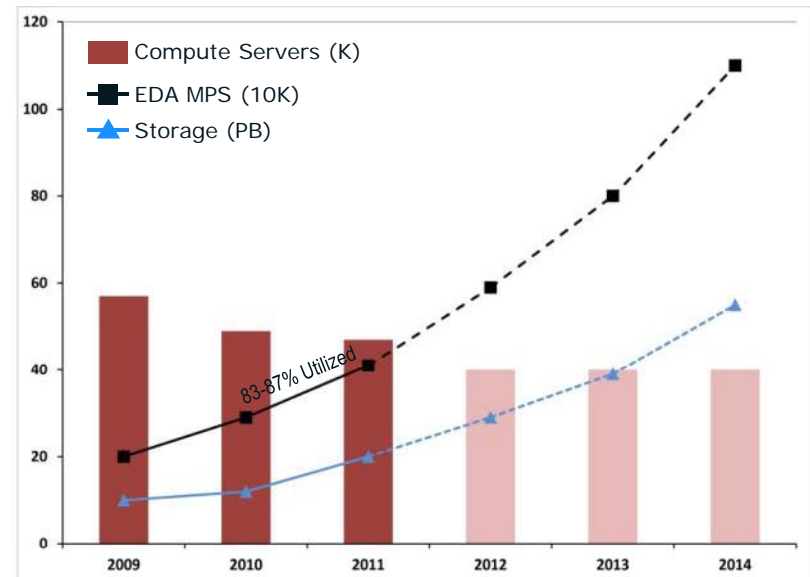


HPC for Silicon Design

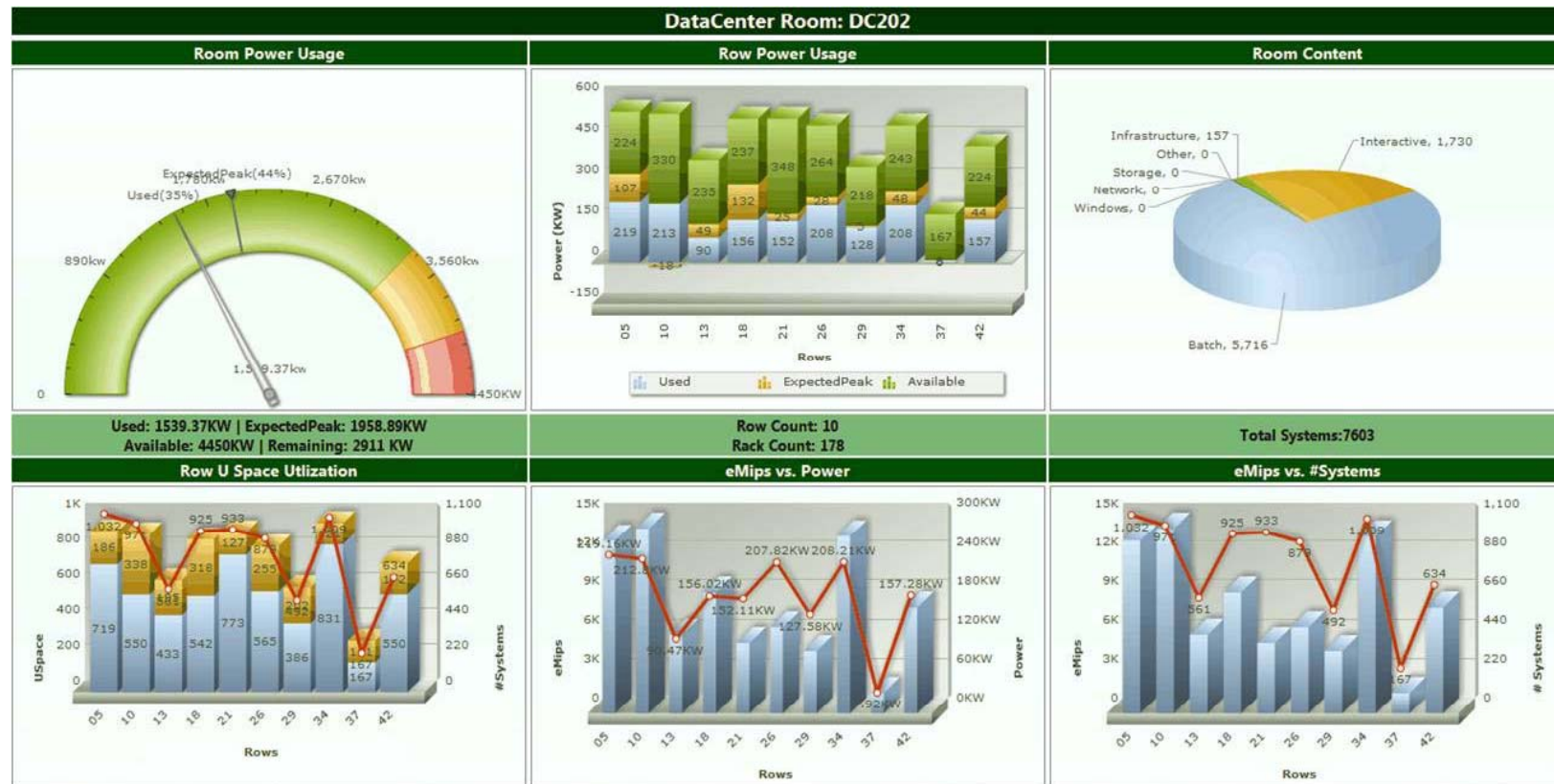
Growth of Design	2006	2012
EDA-MIPS	75,392	533,554
Linux Compute Servers	62,137	38,927
Number of Cores	132,282	451,990
Compute Batch Utilization	~58%	~86%
This is growth specific to Intel silicon design engineering environment and does not include overall corporate IT demand.		

Intel Design Computing Capacity

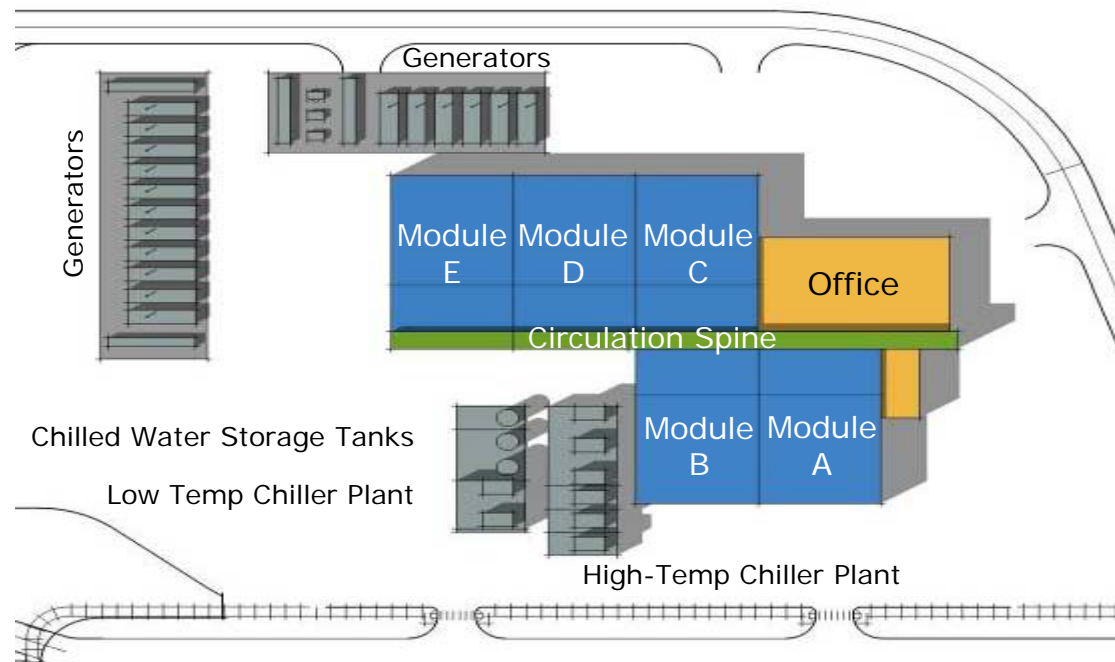
Silicon Design Compute and Storage Demand vs. Utilization



Data Center Compute Dashboard



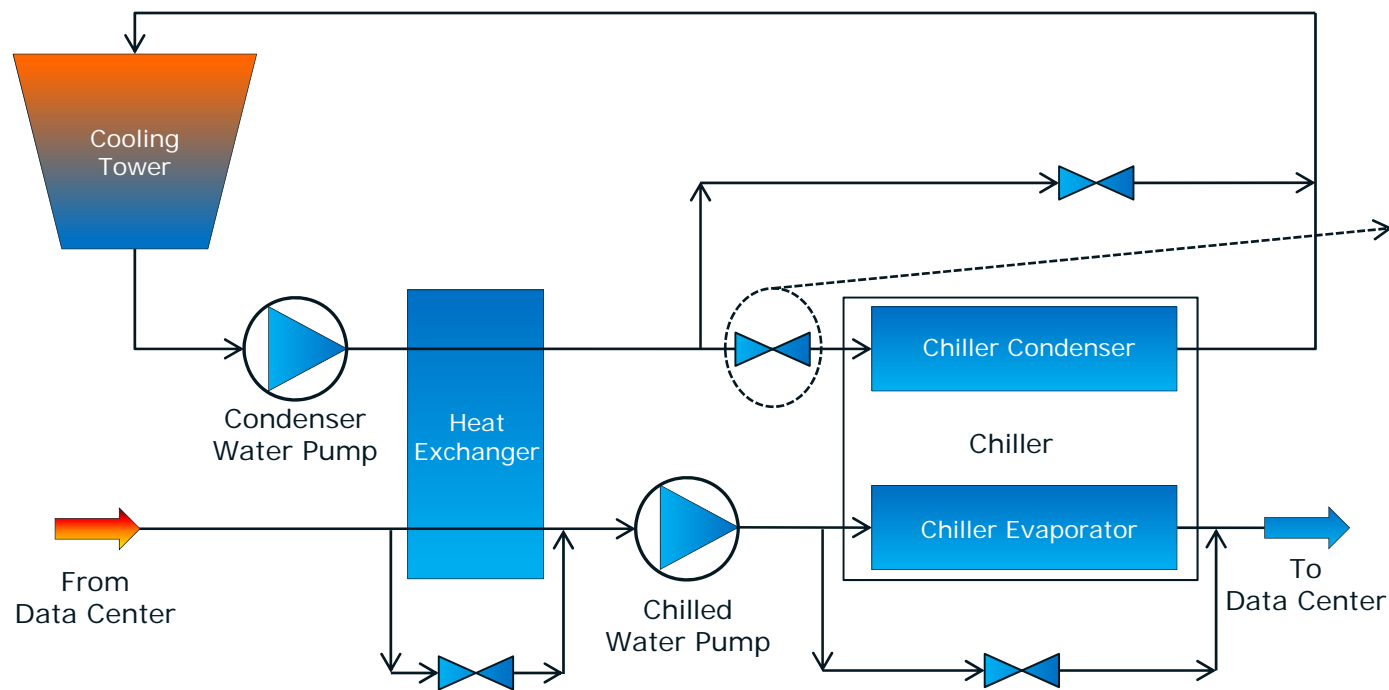
Site and Facility Configuration



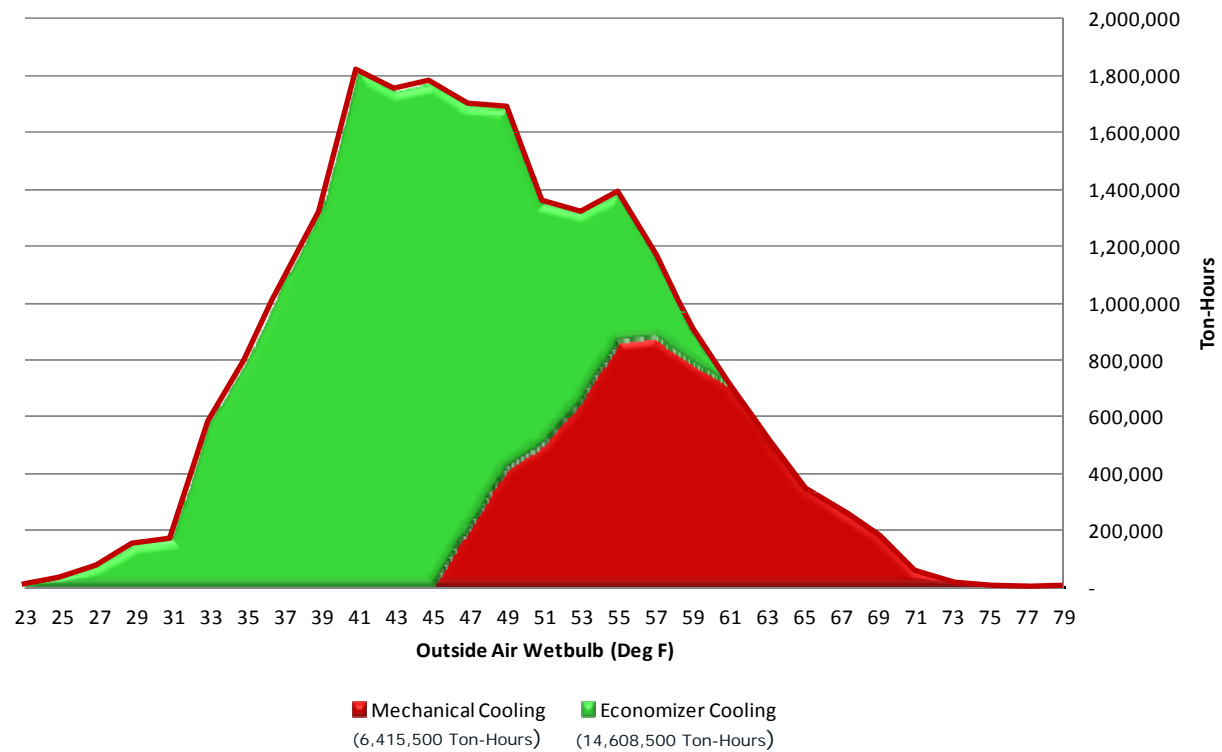
Chilled Water Plant



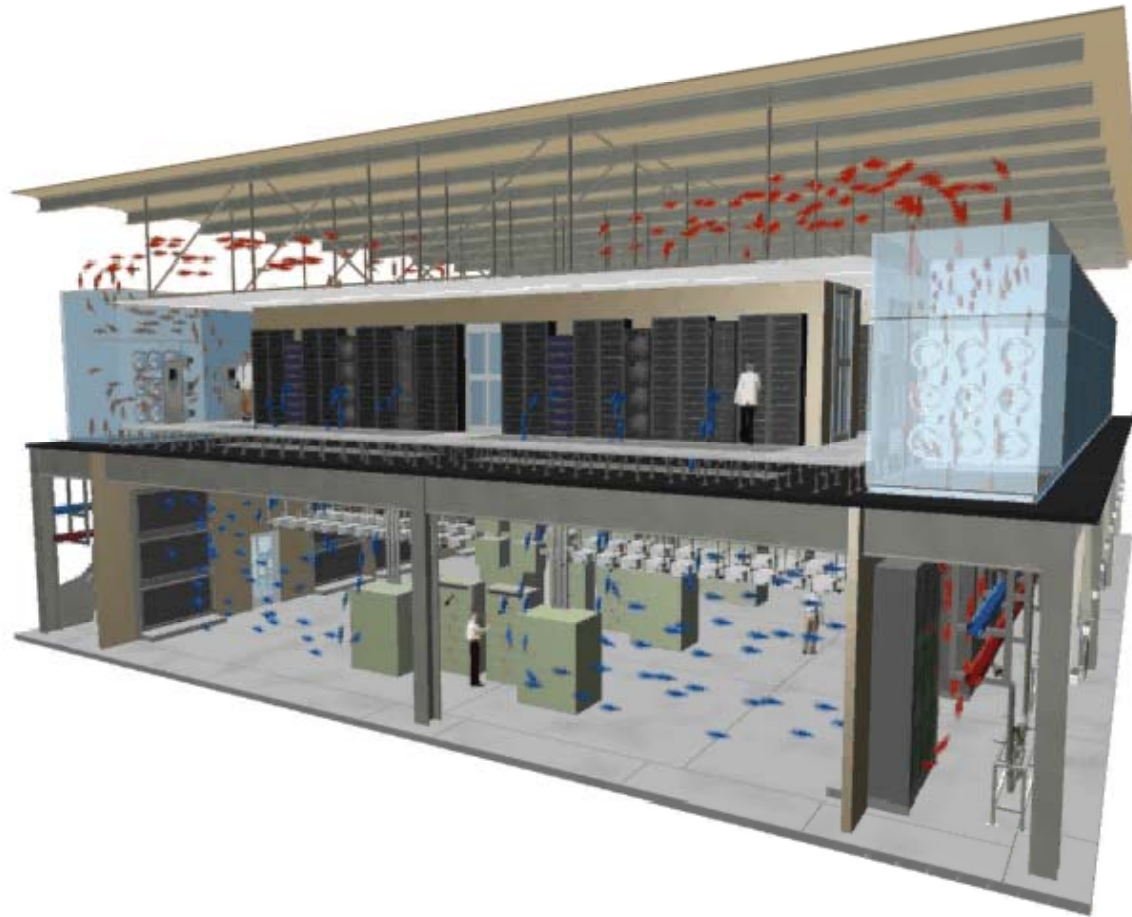
Waterside Economizer



Chilled Water Plant Economization



Data Center Modules



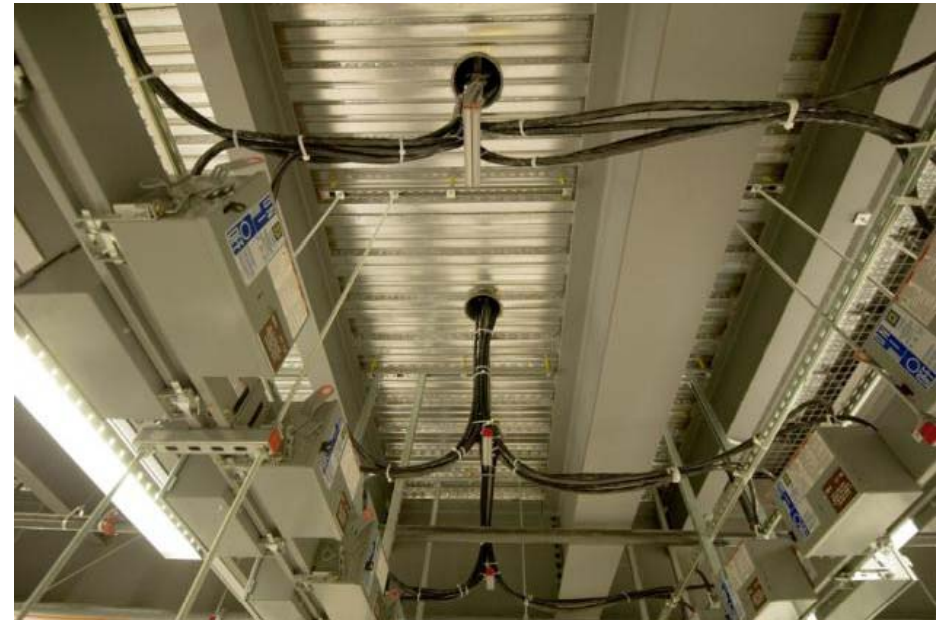
Recirculation Air Handlers



Cooling Coils & Filtration



Electrical Distribution



Air Pathway to IT space



Hot Aisle Isolation



Cold Aisle



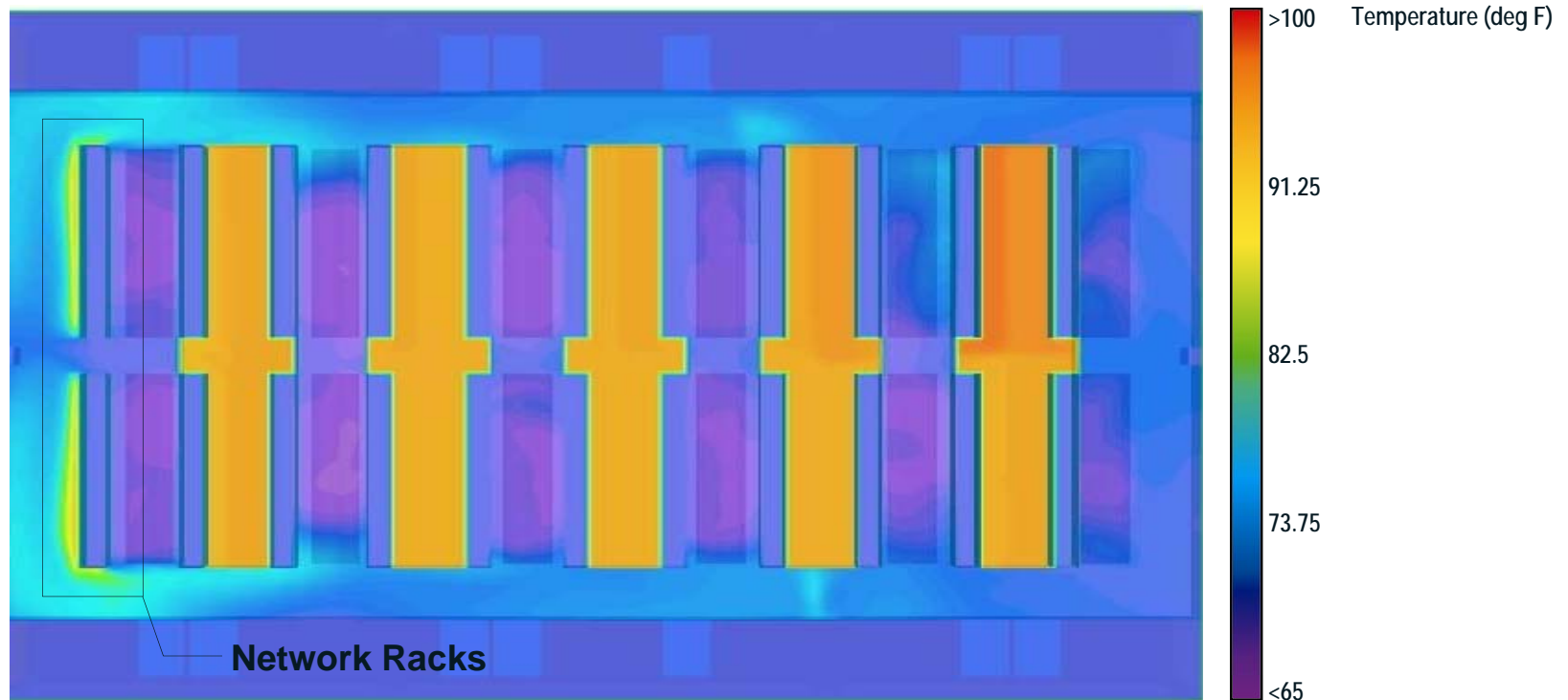
Hot Aisle



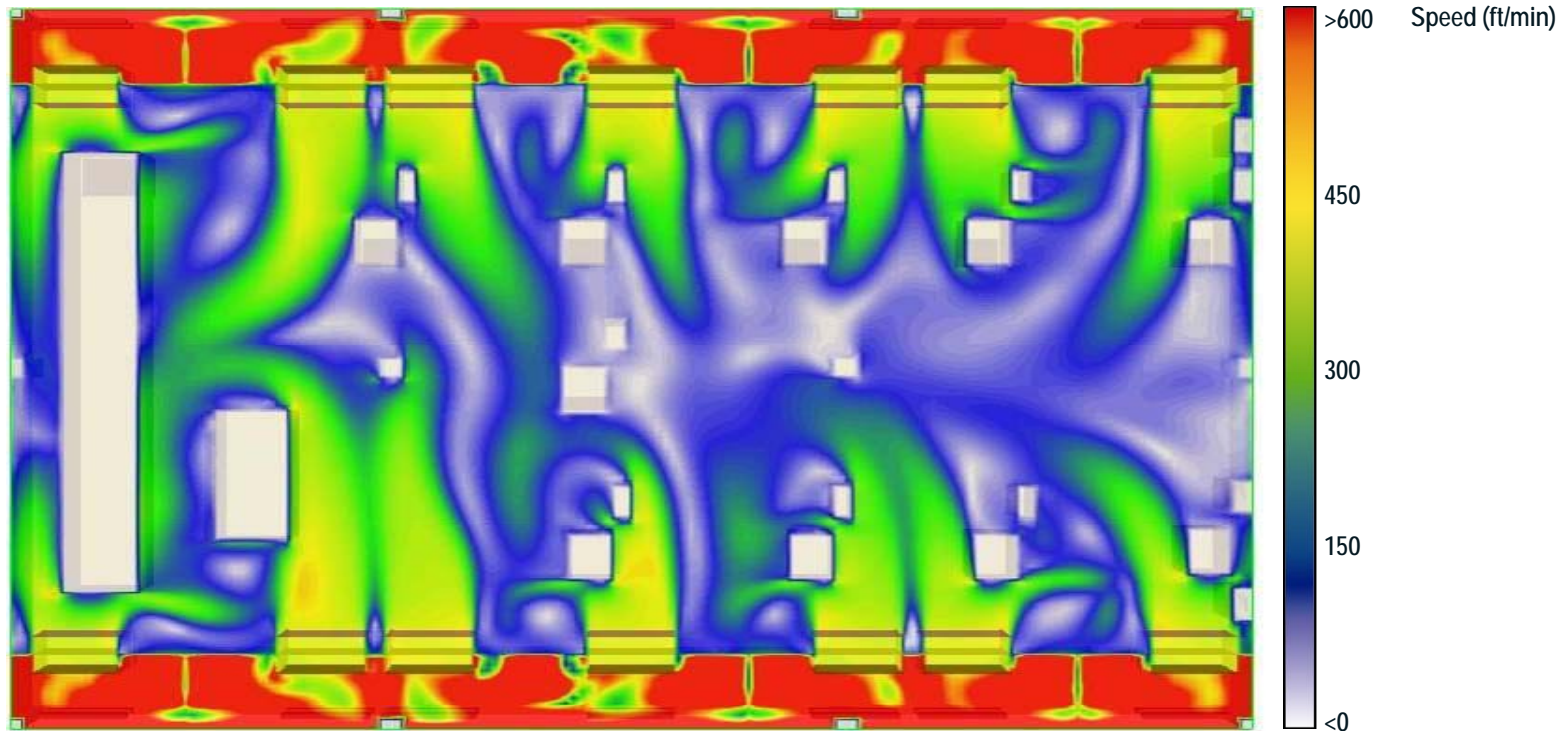
Non-Isolated Low Power IT



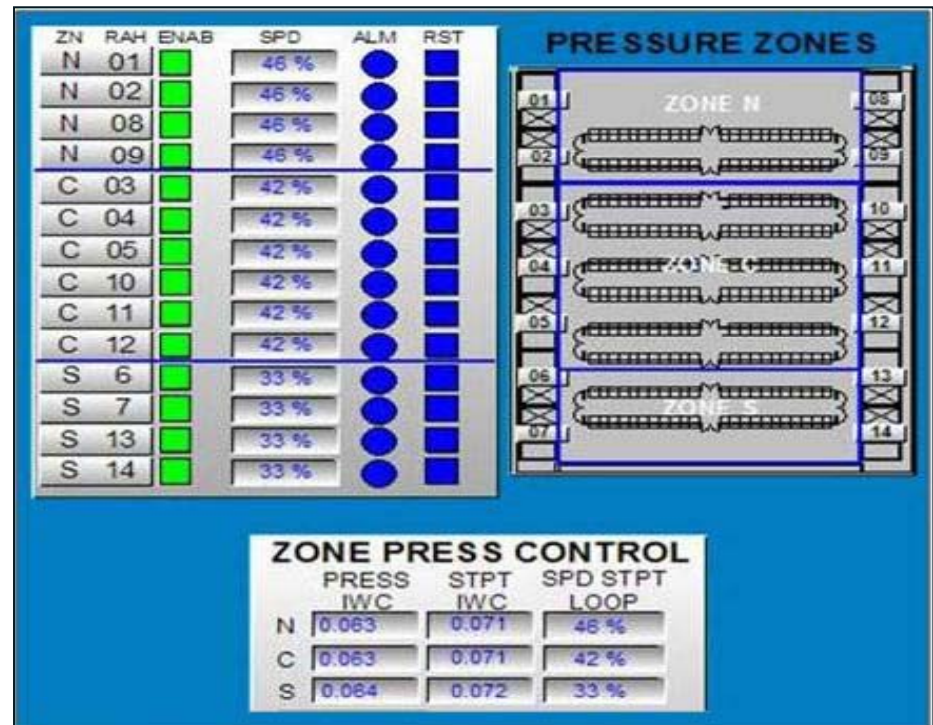
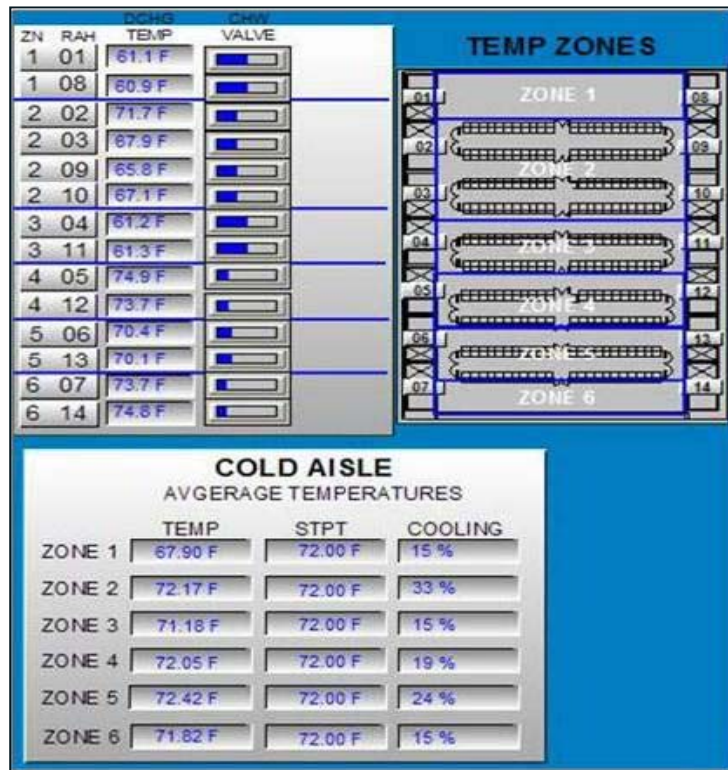
Airflow Model – White Space



Airflow Model – Utility Level



Temperature & Pressure Control Zones



Cascading Energy Efficiency

- Hot aisle containment
- Increased supply air temperature
- High temperature chilled water system
- Variable speed infrastructure fans
- Infrastructure fan output tracks IT airflow demand
- Water side economizer
- Variable speed chilled water pumps
- Variable speed cooling tower fans
- Adiabatic humidification



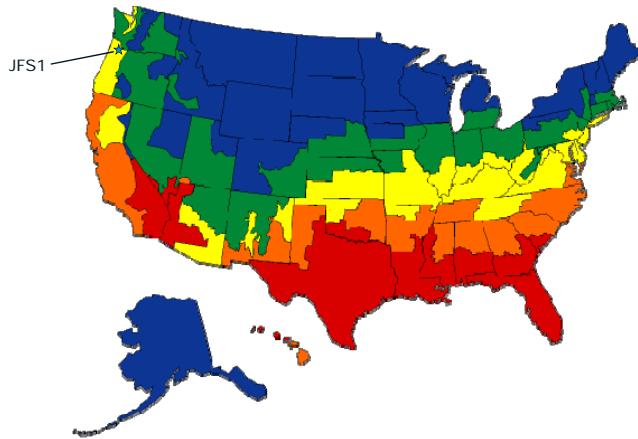
Energy Efficiency - PUE

Operational PUE Range*

1.35 without economizer

1.21 With 100% Free Cooling

* Calculated



Source: US Energy Information Administration, <http://www.eia.gov/consumption/commercial/census-maps.cfm>

Current PUE*

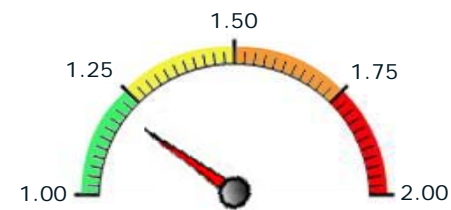
Total Load 6,217 kW

IT Load 5,114 kW

Facility Load 1,103 kW

Current PUE 1.22

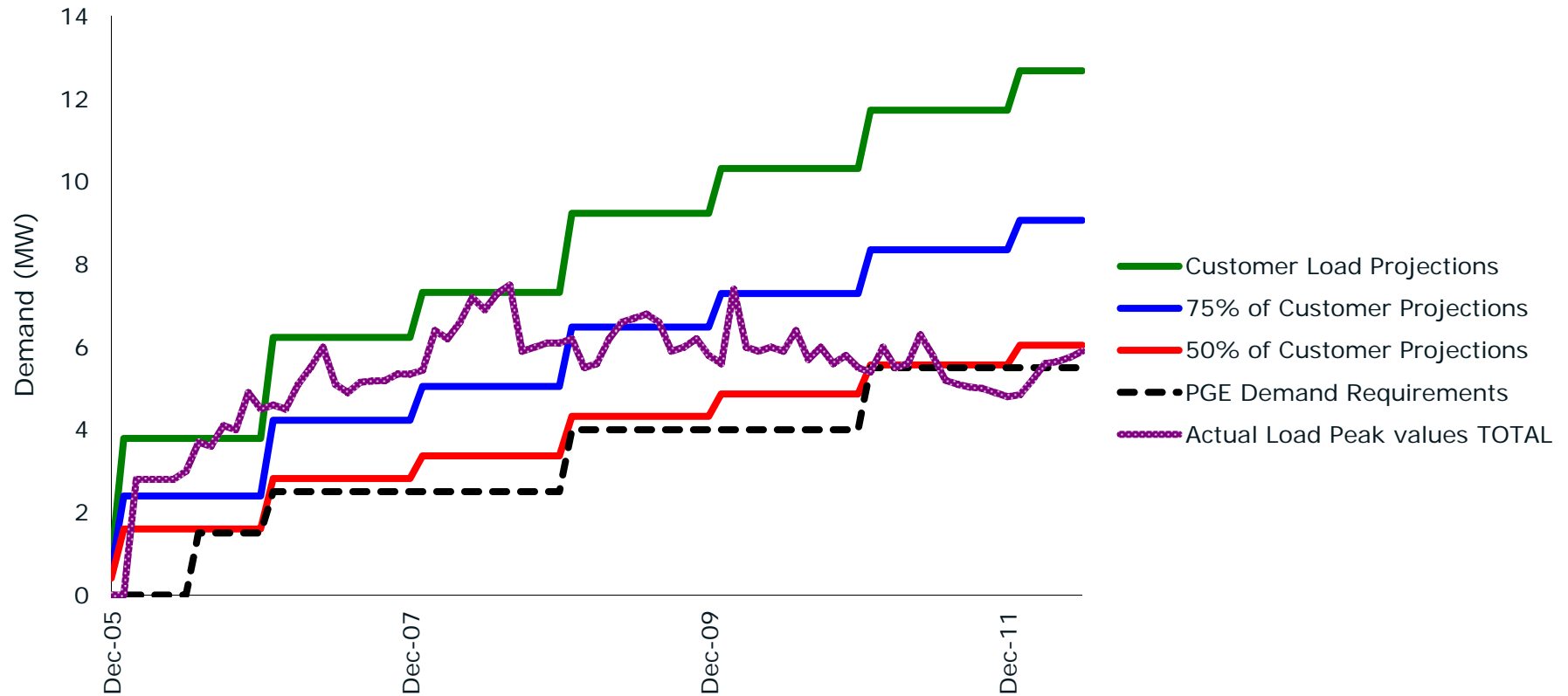
Current DCIE 0.812



* April 12, 2013

Current PUE

JFS1 Power Demand Forecast





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Thank You

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