

Best Practice Guide for Data Centres - a UH Perspective

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Best Practice Guide for Data Centres

Overview

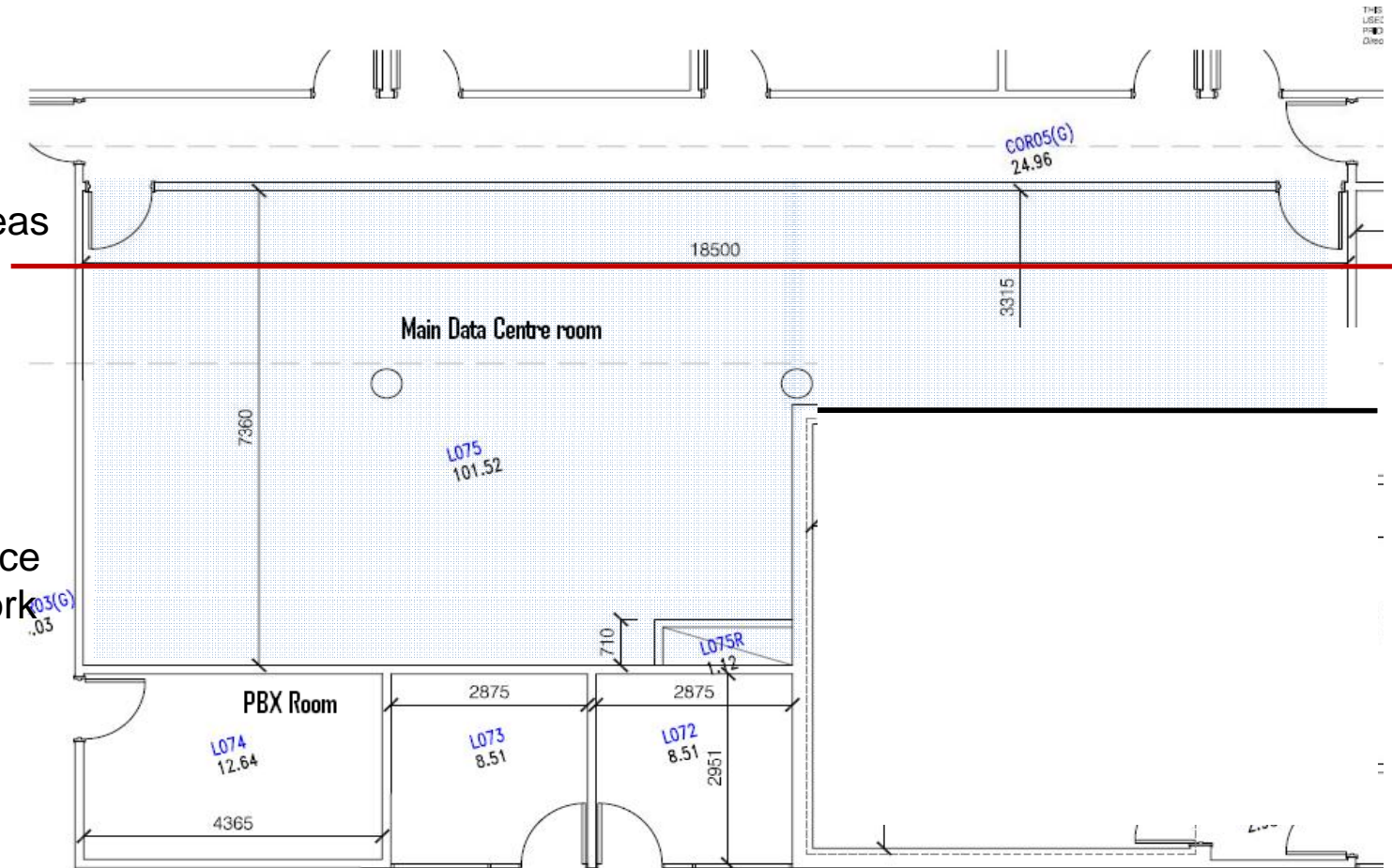
- Constraints and Design
- Breakdown of Typical Energy Requirements
- Best Practices
- Results
- Successful Outcomes

- Q&A

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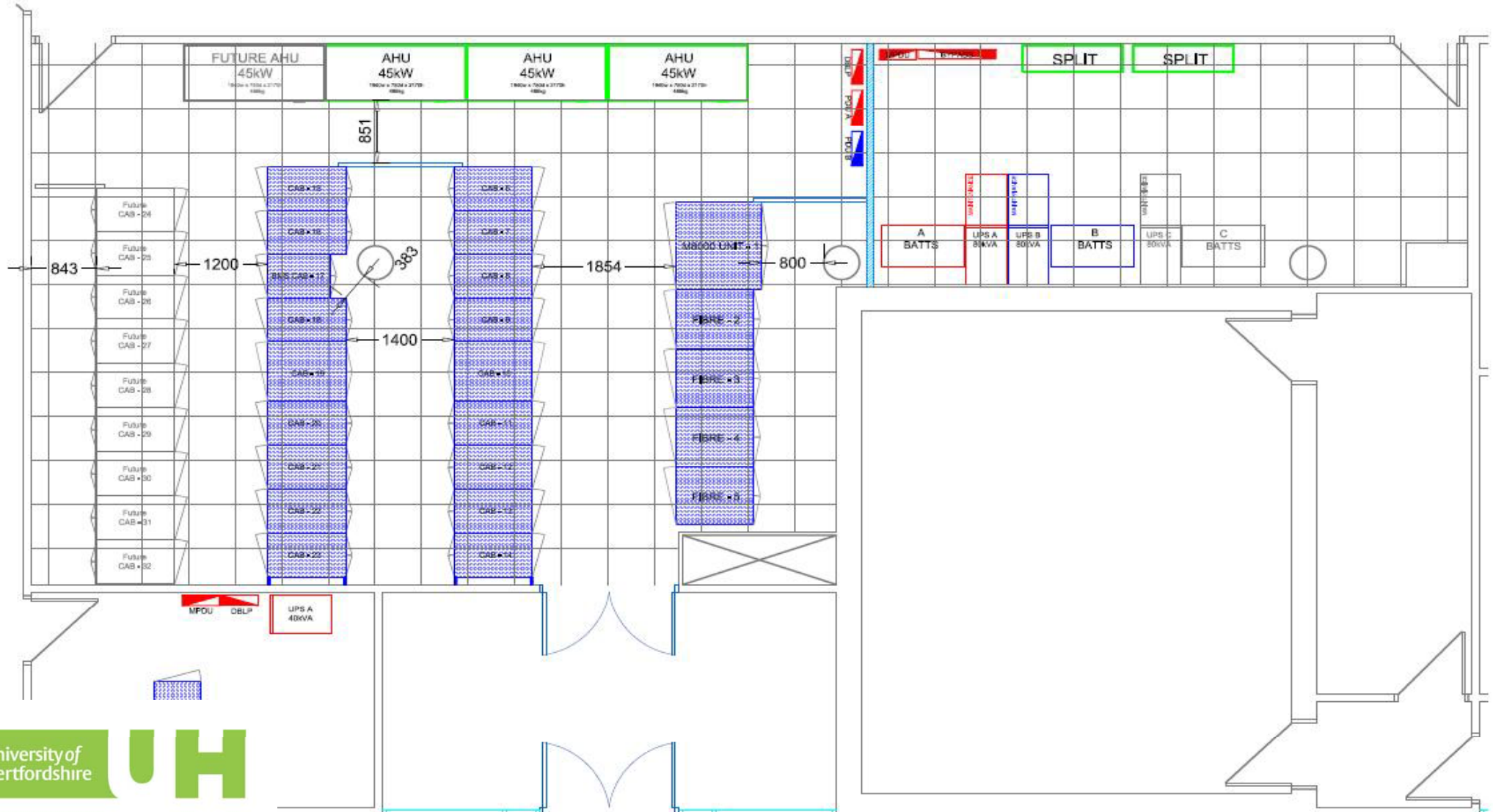
Constraints

- Pillars
- Riser
- Capacity
- Contamination from work areas
- Overhead bulkhead
- Lack of under floor capacity (only 250mm)
- Legacy incorrect (and dangerous) power cabling
- Limited plant space
- Restricted external build space
- “Meet-Me” point for all network cabling
- No external walls



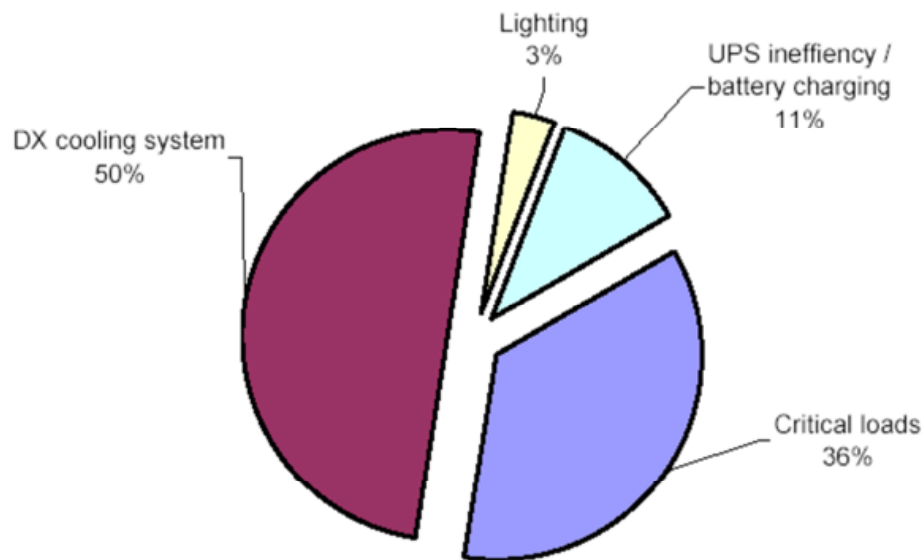
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New Data Centre Design



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Breakdown of Typical Energy Requirements



- ▶ There are other charts which show different splits, but:
 - ▶ The purpose of the data centre is IT, IT and IT
 - ▶ Cooling load is significant and very often bigger than the IT load
 - ▶ UPS losses and battery charging loads are significant
 - ▶ Other loads such as lighting are present

Best Practice Guide for Data Centres

Room Layout

Practice

- Hot Aisle / Cold Aisle
- Containment
- Blanking panels
- No shelf mounted equipment
- Route cables away from fans
- Raised floor
- Tile grommets
- Position of cold aisle relative to CRAH
- Dust mat
- Cable trays

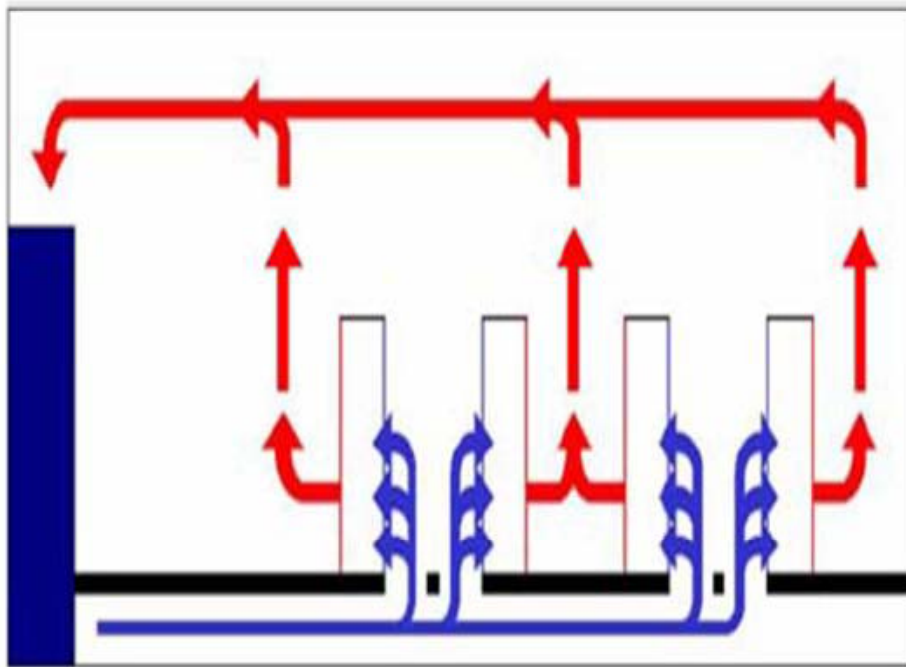
Impact

- Separate hot and cold air streams
- Increase efficiency of CRAH / CRAC
- Reduce / remove “hot spots”
- Improve air circulation / flow
- Prevent fan failure / filter ineffectiveness

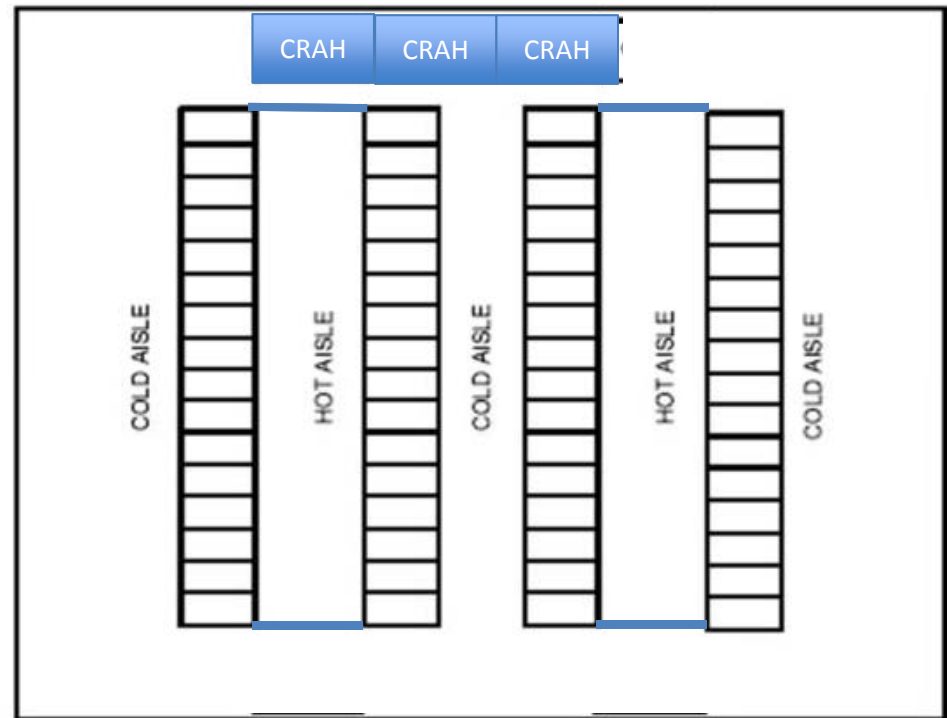
Best Practices

Hot Aisle / Cold Aisle Configurations

Example CLDC Layout



Example dHDC Layout



Best Practices

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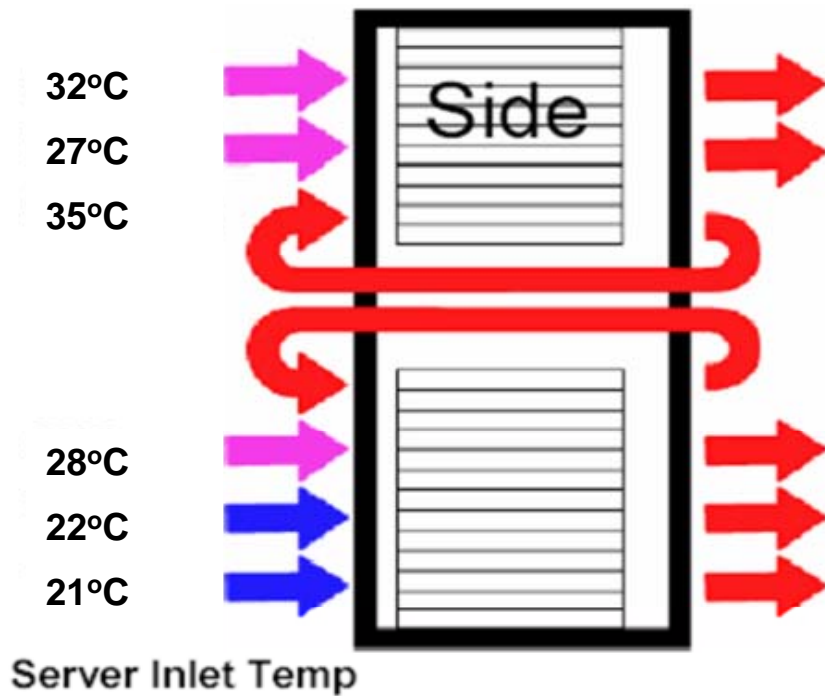
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Best Practices

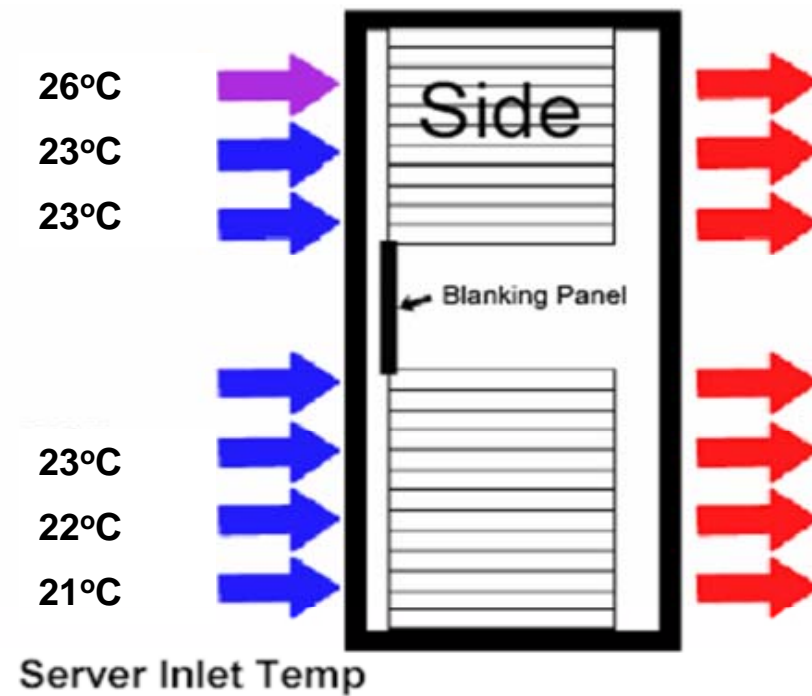
Blanking Panel Effectiveness

- Effect of installation of blanking panel on server air inlet temperature

2A: Without blanking panels



2B: With blanking panels



Best Practices

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Best Practices

Furniture & Fittings

Practices

- T8 Low-energy lighting
- PIR
- Colour of racks
- Provision for additional capacity but don't build it!

Impact

- Reduce lighting requirements
- Reduced facility power cost
- Power and cool only where needed

Best Practices

Electrical configuration

Practices

- Parallel UPSs
 - On-line Interactive
 - Dual Conversion
- Multiple Power Distribution Boards (PDBs)
- Power Factor
- TNSS Filters
- Phase balancing
- Generator

Impact

- Clean mains supply
- Redundancy of supply
- Stability of supply
- Continuity of supply

Best Practices

Cooling Effectiveness

Practices

- “free air”
 - Direct Free Air
 - Indirect Free Air
 - Direct Water Free
 - Indirect Water Free
 - Sorption cooling
(absorption / adsorption)
- Variable speed fans
- Humidifiers
- Waste heat recycling

Impact

- Use ambient air to extract cooling
- Don't dump all waste heat into environment
- Reduced cost of cooling
- Reduced operating cost of LRC

Best Practices

Environment

Practices

- Dust free
- Dry bulb inlet temp of 25-26°C
- Relative humidity of target 50% +/- 20%
- Turn off unused servers / consolidation / virtualisation
- “Lights Out” – lighting only where needed and when needed
- Separate UPS plant area

Impact

- Reduced fan/filter failure
- Reduced cost of facility
- Reduced cost of cooling
- Cooling appropriate to equipment

Best Practices

Four “M”s of Data Centre Management

Practices

- Meter
- Monitor
- Maintain
- Manage

Impact

- Understand your Data Centre “profile”
- Reduced cost of cooling
- Improved reliability of components and infrastructure
- Early and easier diagnosis of issues leading to speedier resolutions

Best Practices

Change Management

- The Data Centre cannot be considered a constant
- Change can wreak untold damage on efficiency and effectiveness
- Plan for change and understand the impact

Data Centre Best Practices

Results

Energy Consumed Per Hour	Before:	After:
Total IT Load	120kW	120kW
Total Facility Load	264kW	146kW
Electricity used per Year	2,312,640KWh	1,282,464kWh
Annual Carbon Footprint	1,394 Tons	773 Tons

Reduction in	CO2 Emissions	Equivalent to
1 Year	621 Tons	117 Fewer Cars
5 Years	3,106 Tons	586 Fewer Cars
10 Years	6,212 Tons	1,172 Fewer Cars

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Successful Outcomes

- Capability of project to act an exemplar to the wider market in relation to the issues of the micro-data centre
 - ✓ Refurbishment not new Build
 - ✓ Re-use of some Equipment
 - ✓ Our savings equate to a 55% reduction in the carbon footprint of the Data Centre
 - ✓ Operational cost savings of £30,000 up to a target of £34,000 per annum
 - ✓ Using a contained Hot Aisle configuration, waste heat is recycled into the building's hot water supply
 - ✓ Our pathfinder project enables others to follow our success and apply the lessons we've learned along the way
 - ✓ The first and only University in Europe to achieve compliance against the EU Code of Conduct for Data Centres
 - ✓ Working with JISC to further EC-wide knowledge-sharing through the e-infranet project
 - ✓ Project Blog still active – disseminating learning post-project (<http://rare-idc.blogs.herts.ac.uk/>)

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Successful Outcomes

- Data Centre Leaders Award Winner 2010
 - ✓ “Innovation in a Micro-Data Centre”

Thank You
Any Questions?