AEEGTA Discussion

OPTIMIZING DATA CENTRE COOLING

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DISCUSSION

- Introductions
- Background on data centres
- What improvements can be made to reduce energy use
- Case study example sites

It’s no secret that data centers are large consumers of energy, accounting for 2% of total worldwide energy use. Using PUE as a measure, data centers have become much more energy conscious, largely due to the increased energy efficiency of IT equipment. Improvements in cooling systems have also been significant but unlike IT equipment that has the option of being refreshed every 3-5 years, cooling systems have a life of 15-20 years. So what can be done to improve cooling energy efficiency in legacy data centers within a reasonable payback period?

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TYPES OF DATA CENTRES

Enterprise **data centers -** built, owned, and operated by companies; optimized for their end users- (banks, social media, telecom, private enterprise, etc)

Managed services **data centers -** managed by a third party (or a managed services provider) on behalf of a company; company leases the equipment and infrastructure instead of buying it (Aptum, OnX, Pathway)

Colocation **data centers** **-** a company rents space within a data center owned by others and located off company premises. The colocation data center hosts the infrastructure: building, cooling, bandwidth, security, etc., while the company provides and manages the components, including servers, storage, and firewalls (Equinix, Rogers, Cologix, Cyxtera)

Cloud **data centers -** off-premises form of data center where data and applications are hosted by a cloud services provider (Amazon Web Services (AWS), Microsoft (Azure), or IBM Cloud

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COMMON FEATURES

1. Air is the heat extraction medium
2. Energy metering is not common in legacy sites
3. Companies focus on IT technology
4. Cooling takes a back seat – can account for 50% of energy cost
5. Cooling systems typically have 20 year life
6. Social media and cloud providers leading in energy efficiency measures

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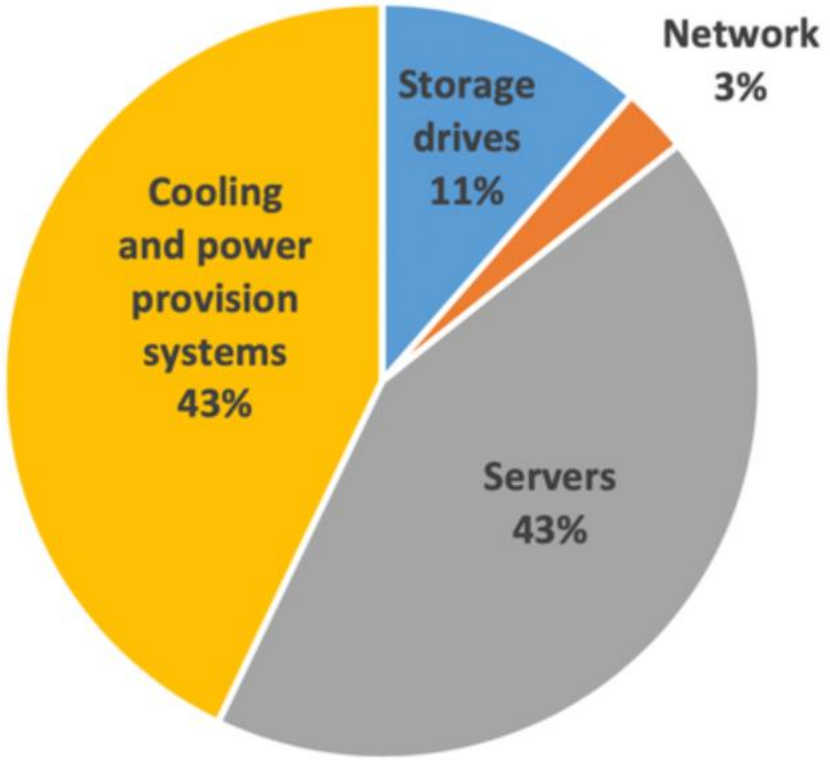
DATA CENTRE POWER PROFILE



Power Draw	kW
Total kW	1,000
Servers	430
Cooling & power systems	430
Storage Drives	110
Networking	30

Power Usage Effectiveness $= \boldsymbol{Total\ kW / IT kW}$

PUE	1.75

For every 1.0 kW related to IT equipment, 0.75 is being used for cooling, power systems, etc.

A good PUE is between 1.1 & 1.5

https://energyinnovation.org/2020/03/17/how-much-energy-do-data-centers-really-use/

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WHY HASN'T COOLING BEEN OPTIMIZED?

The facility should be cold!

What's a set point?

Significant IT growth is coming.

We've always done it this way!

Our cooling vendor deals with this.

Cooling doesn't cost that much!

Unnecessary cooling can cost $000's each year.

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COOLING OPTIMIZATION

- Equates to using the least amount of cooling capacity and energy to create optimal thermal conditions for the IT equipment.
- Requires a Whole system approach to addressing cooling issues
- Each data center requires a customized solution

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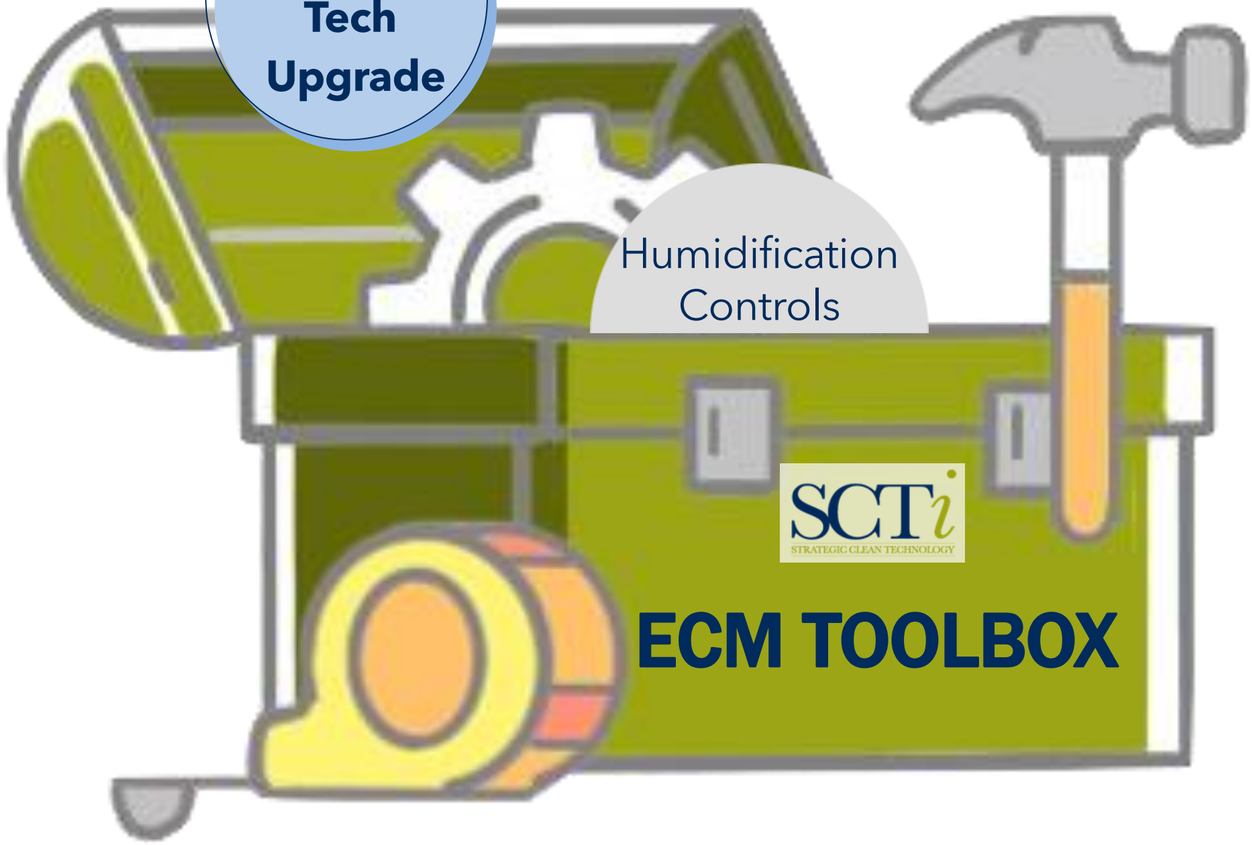
ENERGY CONSERVATION MEASURES

Operational Settings

VFDs

Airflow Management

Cooling Tech Upgrade



CRAC Sequencing

Humidification Controls

Networking Cooling Systems

Calibration and Measurement

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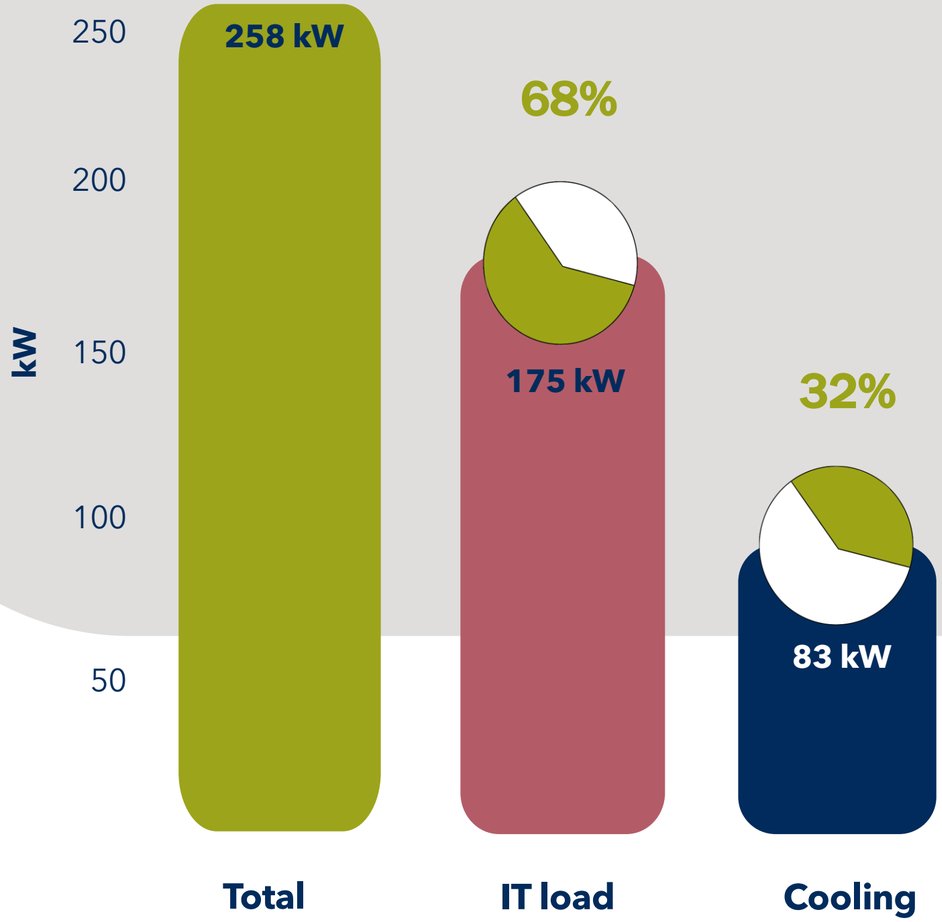
DATA CENTER CASE STUDY

BASELINE

1.48
pPUE

4,200 sq.ft. with 120 racks

Power Distribution



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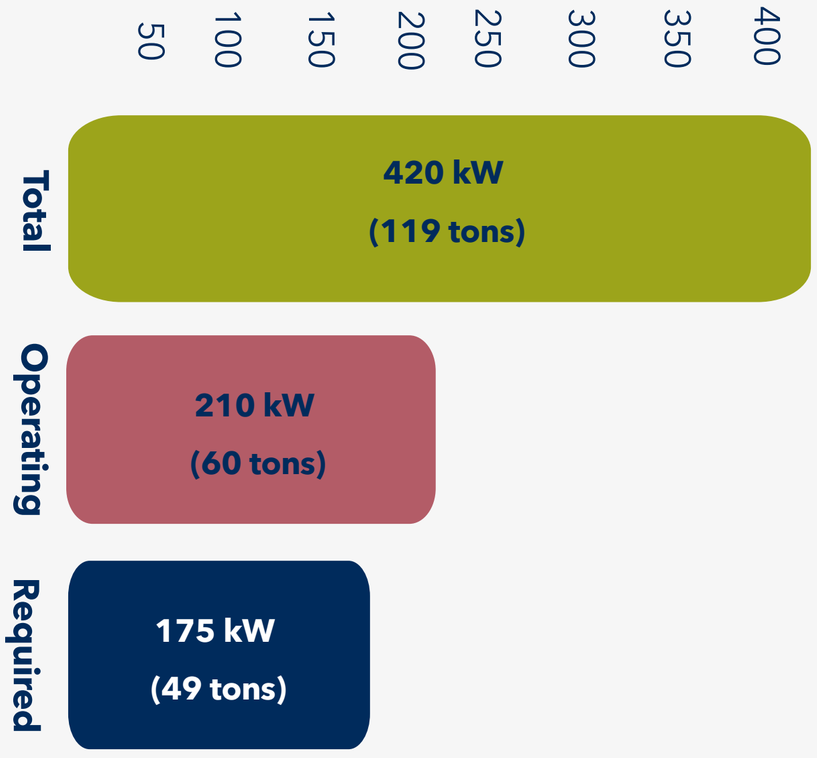
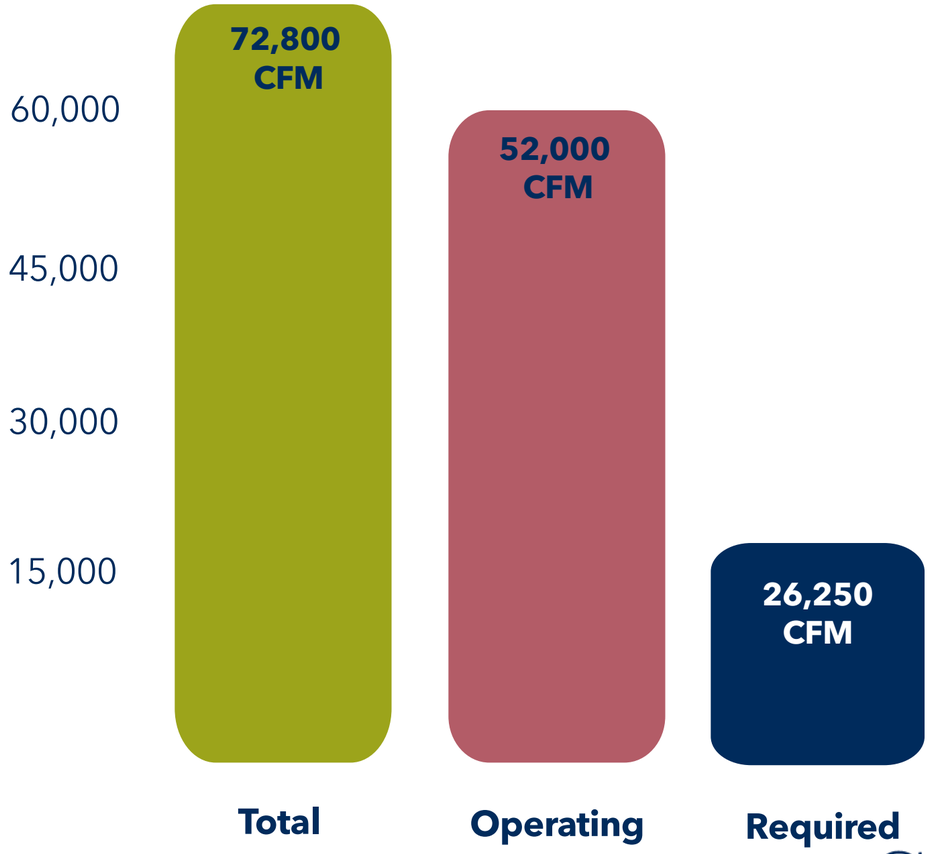
BASELINE

Cooling Capacity (kW)



Airflow (CFM)



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COOLING OPTIMIZATION PROGRAM

Airflow Management

Technology Upgrade

Networking Cooling Systems

CRAC Sequencing

Operational Settings

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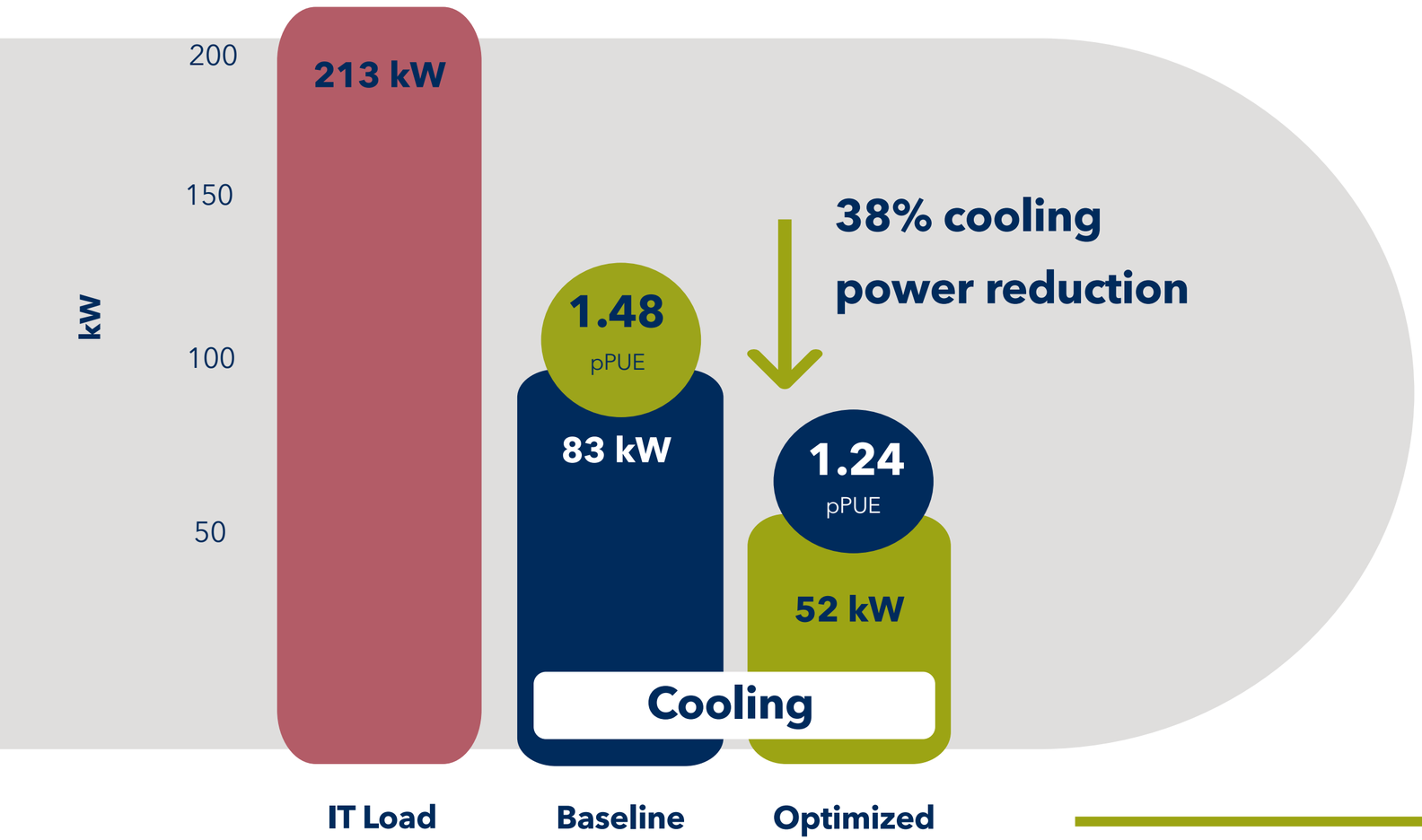
Power Use



DATA CENTER-
OPEX PERFORMANCE

276,648 kWh

Cooling Energy **Reduction**

$38,731

Annual Cooling Energy Cost **Reduction**

$27,665

in energy incentives

SUMMARY

COOLING OPTIMIZATION SUMMARY

Cost effective improvements can be made to legacy data centres to make them more energy efficient and reduce carbon footprint

7,843,801 kWh
Cooling energy reduction.

$1,098,132
Cooling energy cost reduction.

$795,698
Energy incentive payments

36%
Average reduction in cooling energy costs.

3300 Kg
Refrigerant removed.

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QUESTIONS?

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