NSIN: OPTIMIZE DATA CENTER COOLING

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Problem Statement

Leverage industry standards and best practices to optimize the cooling efficiency of Space Force Data Centers

Target Goal

40% Energy Savings

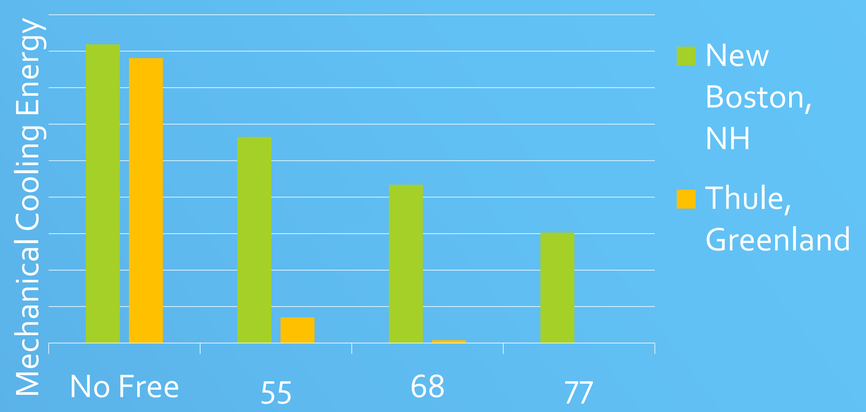
Introduction

Outdated practices overcool modern IT equipment and incur **excessive energy costs.**

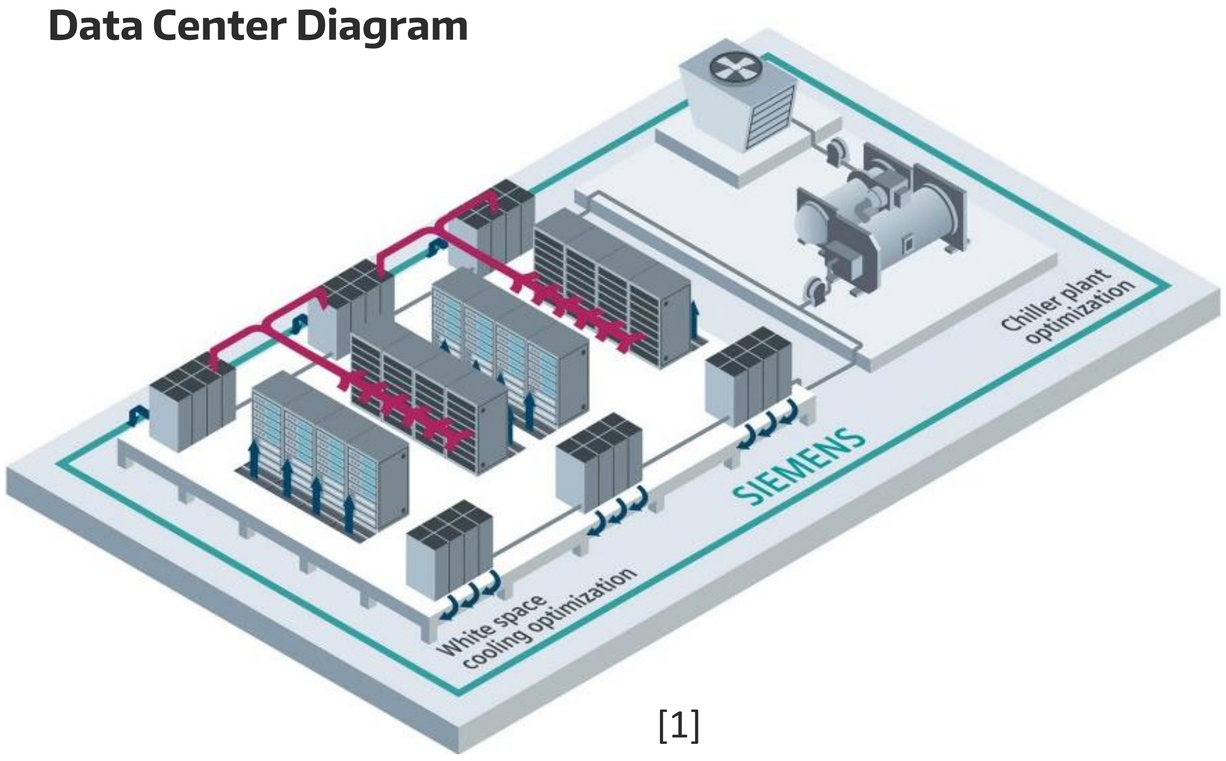
Our team is delivering a **predictive tool** for estimating the **cost savings** of modernizing older data centers using **industry best practices.**

These results were produced through a culmination of in-depth **literature review** and consultations with **industry experts.**

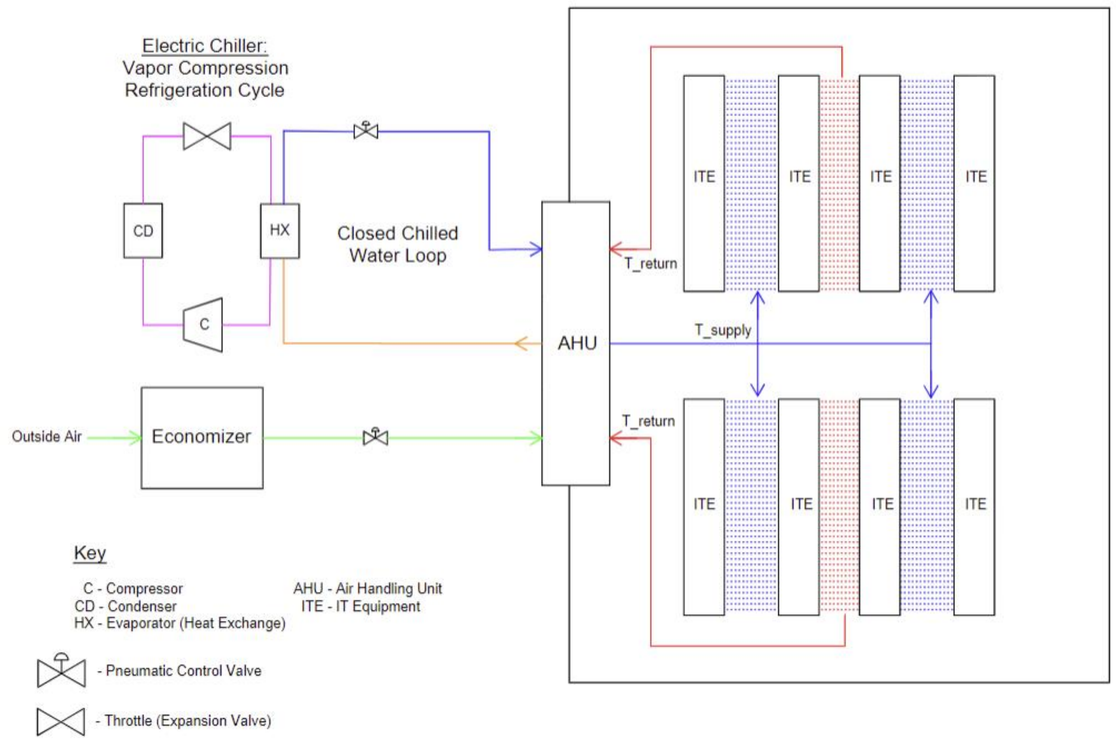
Relative Energy Savings



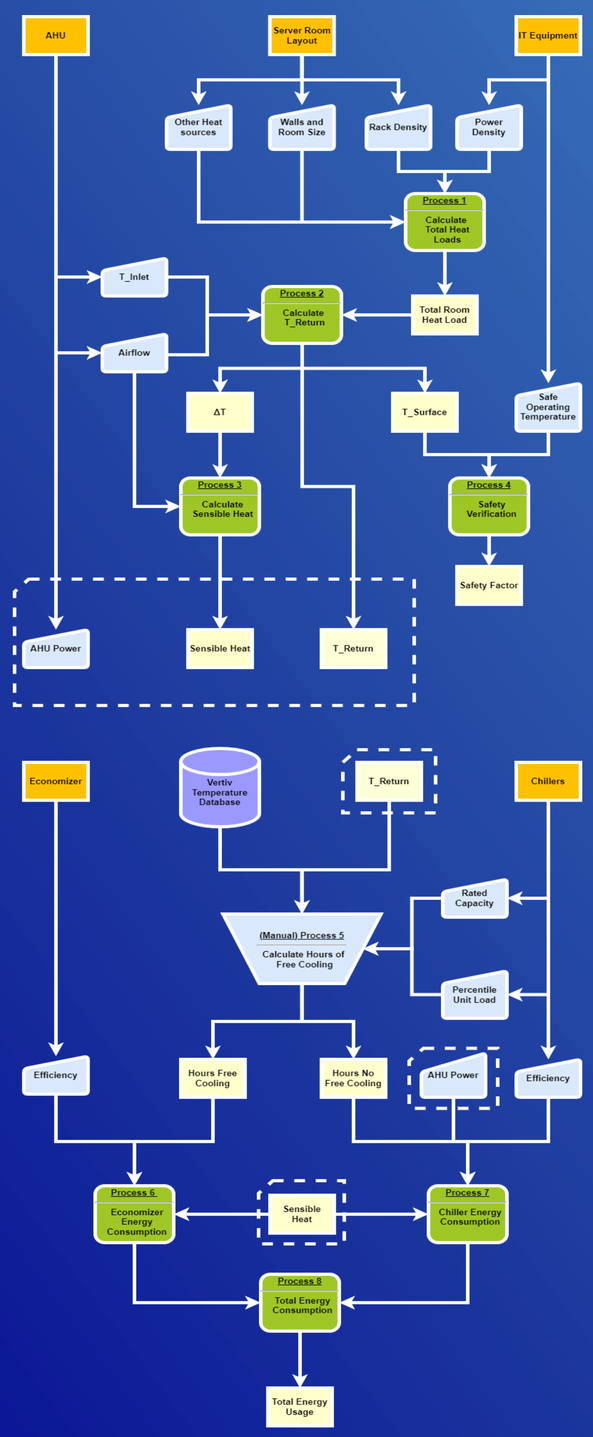
Data Center Diagram



[1]



Predictive Tool Calculation Logic



Air Inlet Temp

"If you walk into the room and feel cold, you're doing it wrong"

–Eric Beam, UW Data Center Strategy and Operations

- Easiest and most direct way to save energy in Data Centers
- Greatest justification: increase the hours of economizer use per year
- Additionally: increase Chiller temperature setpoint allowing about 1% energy savings per degree temperature rise [2]

Assumptions

- Full capacity operations
- IT power capacity = heat generated
- ASHRAE/IECC minimum compliance
- Negligible heat load from AHU
- Negligible heat envelope load
- No windows
- Non-inhabited space
- No partial Economization

Free Cooling

- Definition: Using cold outside air to cool your data center instead of, or in combination with a mechanical system
- Most potential for energy savings in cold climates
- In locations such as Greenland, can use free cooling 100% of the time
- Higher air inlet temp, increased hours for free cooling available

Verification Validation

- Our team used equipment and set point values given to us by the UW Data Center to validate our predictive tool calculations.
- Return air temperature calculation accurate to 1%
- Through this test, we believe our tool is an accurate way to estimate the cooling costs & validates that increasing the temperature by 10° F proves no risk to the life of the equipment and can provide 32% Energy Savings.

Conclusion

- **30-85%** cooling energy savings potential depending on location

Acknowledgements
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Reference List