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Energy Efficiency Considerations for HPC Procurements

CORAL-2 Facility Integration and Energy Efficiency

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Sample Vendor Analysis – Need to Normalize and Scale Systems by Category to Evaluate Energy Efficiency Between Systems

	Vendor 1 Normalized	Vendor 1 40MW	Vendor 2 Normalized	Vendor 2 40MW	Vendor 3 Normalized	Vendor 3 40MW
Compute racks	87	137	128	210	138	198
Compute ft2	2784	4576	4000	6562	6000	8000
Electrical (compute only)	26.15 MW	38 MW	24.7 MW	39 MW	25.9 MW	37.2 MW
Electrical (208V components)	2.05 MW	2.05 MW	0.94 MW	0.94 MW	2.69 MW	2.69 MW
Mechanical (compute only	7606 tons	11500 tons	7500 tons	11500 tons	7918 tons	11500 tons

Some data has to be calculated to draw comparisons

Energy Efficiency Considerations and Questions

- CAPEX and OPEX must be compared amongst all vendors
- Select evaluation metrics - PUE <1.1
- Compare/contrast the capabilities of the power/cooling monitoring systems
- Minimize lower voltage loads to reduce transformer losses
  - Most racks are distributed at 480V but still have some 208V ancillary racks to consider
- Liquid cooling requirements should focus on ASHRAE W3 water at a minimum
- Minimize air cooling requirements
    - Ancillary racks may require W2 water for rear door heat exchangers
- How accurate is the envelope for temperature and flow to a Cooling Distribution Unit (CDU) if vendor is using CDUs? Will it be constant or variable flow?
- Evaluate not only the worst case temperature/flow or power consumption projections
  - Consider idle, normal and peak

Key Drivers for Energy Efficiencies in HPC Procurements

- Develop a facility sustainability plan to understand how new systems impact facility operations
  - Know in advance your evaluation metrics. Is it PUE < 1.1? Is it W3 water?
- Facility requirements grow with each generation of HPC - limitations and expectations should be included in the scope of work
- Include options in the procurement documents to ensure that energy savings can be implemented
- When evaluating, normalize and scale all proposals to a common performance
- Evaluate CAPEX and OPEX for all options
- Once selection is made, continue to work with vendor to drive energy efficiencies
  - Continue to ask questions and push for the most energy efficient solution
  - Design of vendor's system will evolve from contract selection to approximately 1 year prior to delivery which could be a 2 or 3 year period.

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