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· August 15-18, 2010 · Dallas, Texas ·
· Dallas Convention Center ·

Case Studies in New Construction: Emerson Global Data Center

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Emerson's Global Data Center

- A Case Study addressing the LEED certification process
- What do building owners and operators need to understand concerning LEED
- Practical strategies for a greener, LEED certified building

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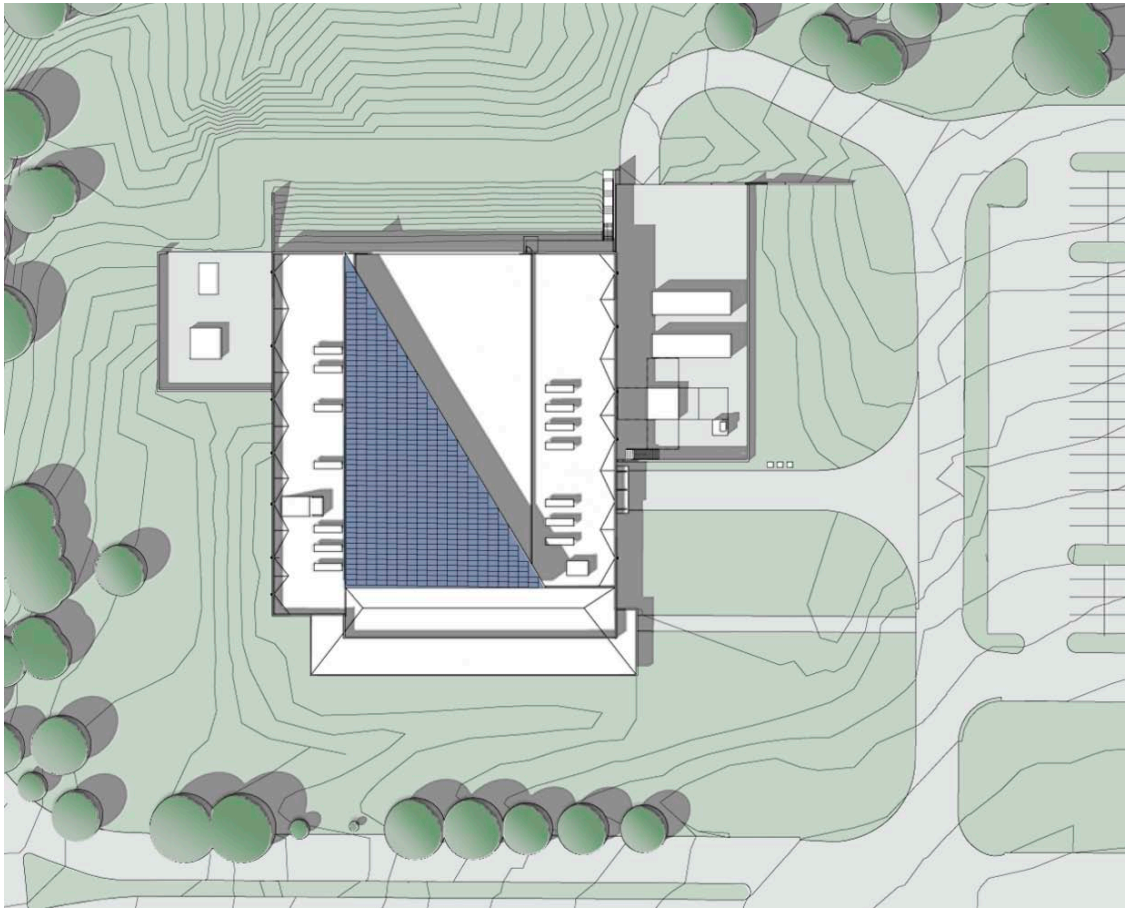
Project Metrics

- St. Louis Missouri
- 35,000 sf Mission Critical Facility
- Primary facility out of 4 Data Centers
- Energy Efficiency and Sustainability identified as project drivers AT CONCEPTION



Working with LEED

- LEED is prescriptive: you are working within LEED's concept of a green building

How we began

- Team built the “scorecard”
- Prioritization: (process) energy efficiency
- Emerson’s own product & “Energy Logic”

Case Study:
5 LEED compliance Strategies

LEED Gold Certification

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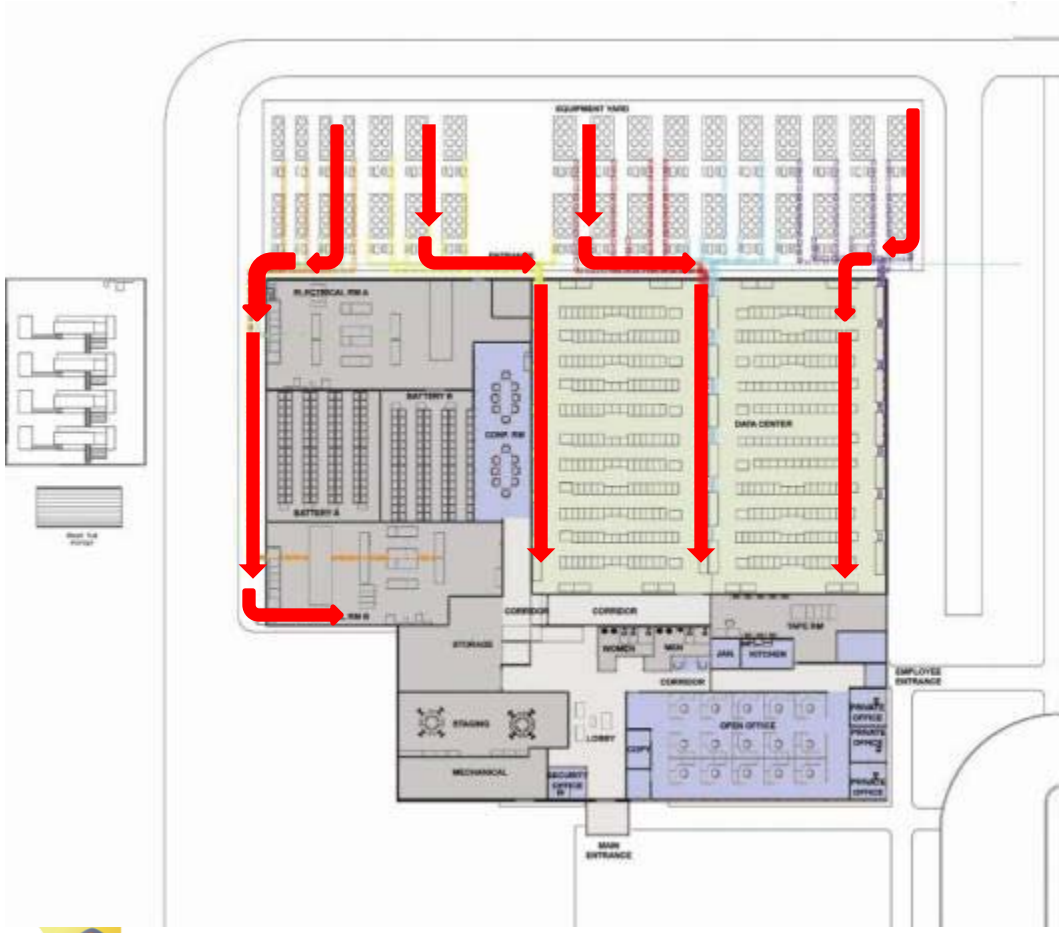
#1 - Sustainable Sites



Technology Consultant Concept:

Single Story facility with ground mounted condensers piped underground to Data Center

17,458 l.f. condenser piping

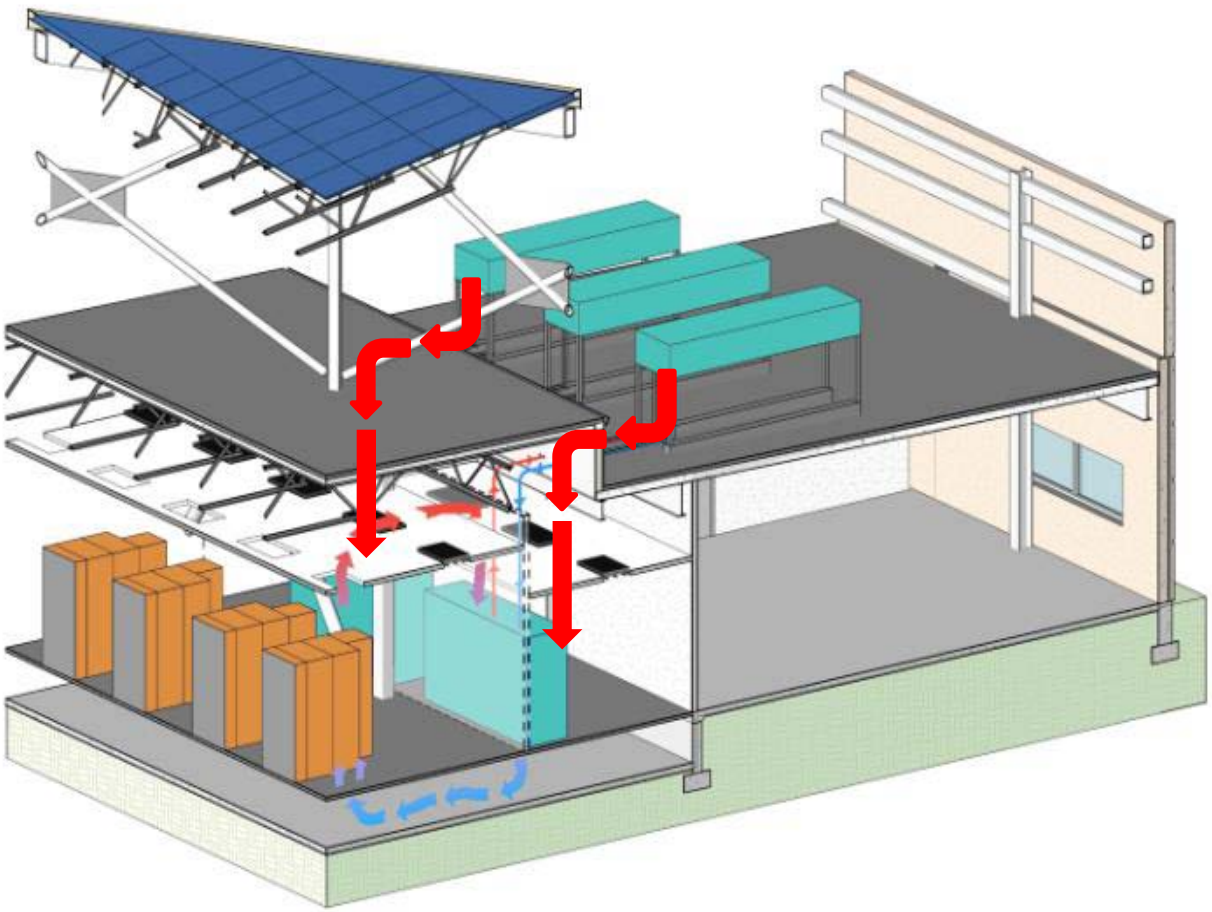
12,000 sf exterior condenser yard

#1 - Sustainable Sites

Sustainable Sites - Maximize open, green space

How does this work with 12,000 sf of noisy, impervious condenser yard?

#1 - Sustainable Sites



Fox Concept:
Move Condensers to the roof

Improved acoustics

Decreases impervious surface, increases green space

75% less condenser piping = less $$$

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#1 - Sustainable Sites

- This idea affected multiple LEED points:
- SS Credit 5.2 – Maximize Open Space
- SS Credit 7.1 – Heat Island Non-Roof
- Innovation & Design Process

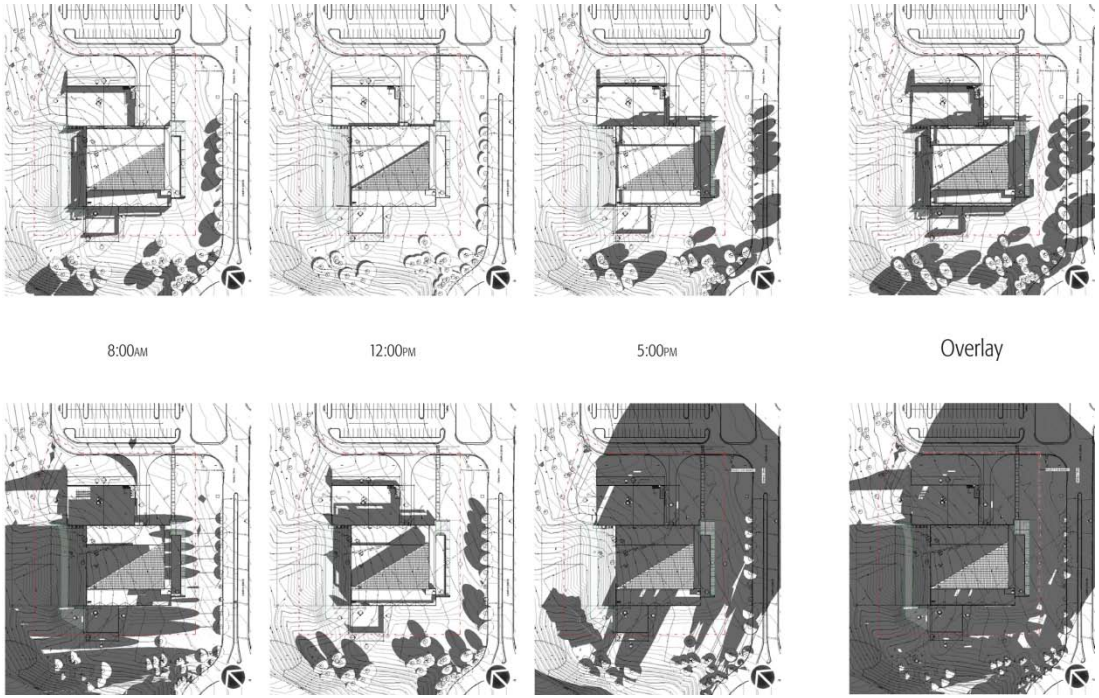
Strategy: use the connected nature of LEED to your advantage

#2 – Renewable Energy

- 100 kW Photovoltaic Array
- 13.6% of day one energy use

#2 – Renewable Energy

- Working with PV –investment/ROI
- Understanding the technical implications



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#2 – Renewable Energy

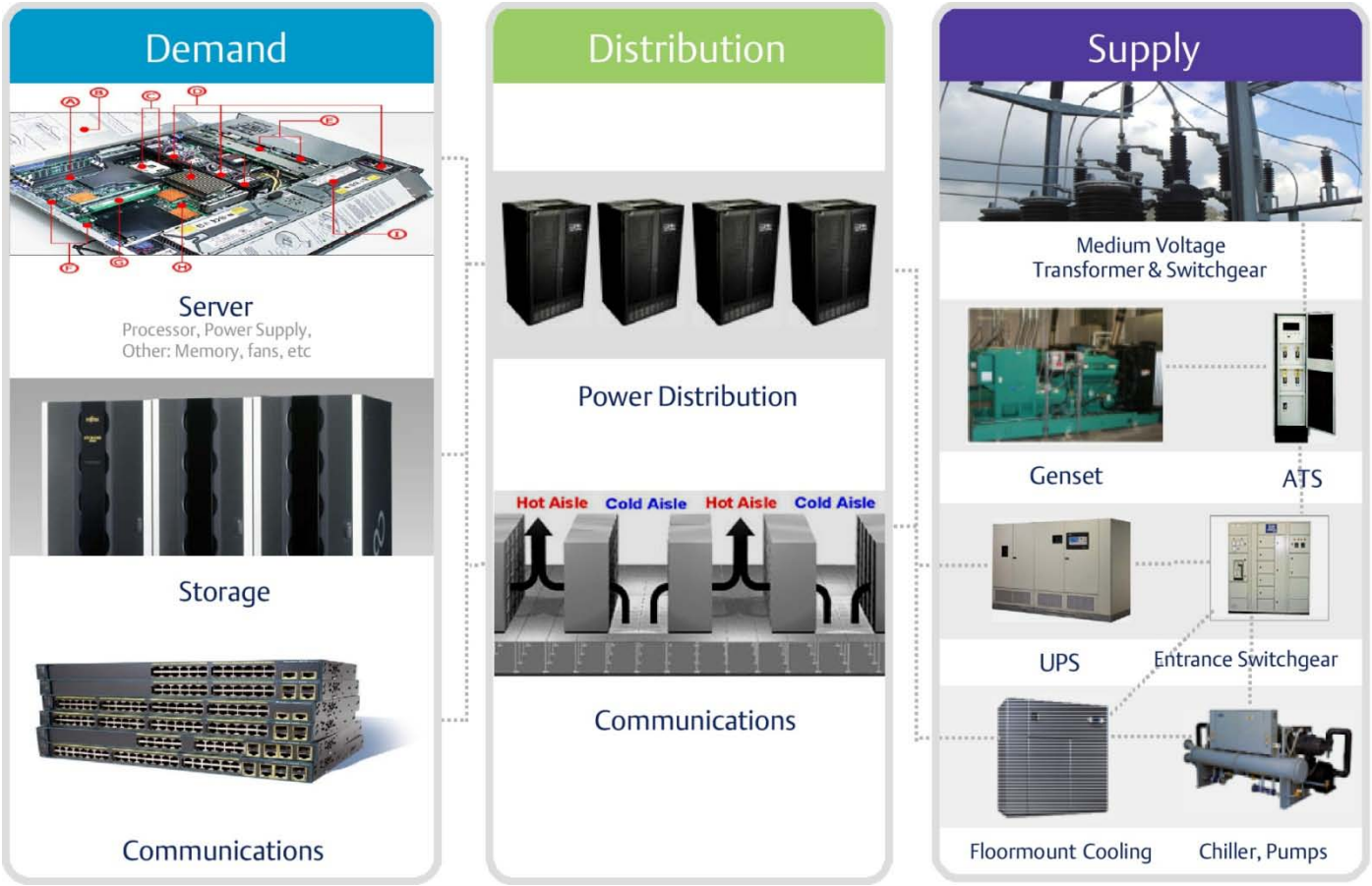
Strategy: message, brand identity with LEED

#3 – Energy Efficiency

- This project was completed under LEED V 2.2 – did not include “Data Centers” as a project type
- Owner’s initiative – pay attention to where the real energy costs occur = ***PROCESS ENERGY SAVINGS***

#3 – Energy Efficiency

- Energy Logic as a design strategy



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#3 – Energy Efficiency

EnergyLogic Steps	Action		Baseline	Proposed	Delta
Step 1	Low Power Processor		*Not quantified*		
Step 2	High Efficiency Power Supplies				
		Server Power	322	322	
		Power Supply Efficiency	0.79	0.91	
		Power Supply Losses	68	29	
		IT Load	390	351	39
Step 3	Power Management Features		*Not Quantified*		
Step 4	Blades	% of Servers on Blades	0%	20%	
		Power savings from using blades		10%	
		IT Load	351	344	7

#3 – Energy Efficiency

EnergyLogic Steps	Action	Baseline	Proposed	Delta
Step 5	Server Virtulization			
	Reduction in IT Equipment		5%	
	IT Load	344	328	16
Step 6	Power Distribution Efficiency			
	Efficiency Impr. 208V --> 240V	0.91	0.915	
	IT Load	328	326	2
Step 7	Cooling Best Practices			
	IT Load	326	326	
	Other Sensible Load %	15%	15%	
	Latent Load %	10%	10%	
	Total Cooling Load	413	413	
	Kw/kW of load			
	Fan Power Consumed	0.136	0.136	
	Compressor Power Consumed	0.276	0.276	
	Humidifier power consumed	0.062	0.062	
	Total Cooling kW/kW of Load	0.474	0.474	
	Cooling Power Consumed	195	195	0

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#3 – Energy Efficiency

EnergyLogic Steps	Action	Baseline	Proposed	Delta
Step 8	Variable Capacity Cooling			
	Kw/kW of load			
	Fan Power Consumed	0.136	0.115	
	Compressor Power Consumed	0.276	0.271	
	Humidifier power consumed	0.062	0.062	
	Total Cooling kW/kW of Load	0.474	0.448	
	Cooling Power Consumed	195	185	11
Step 9	High Density Cooling			
	Kw/kW of load			
	Fan Power Consumed	0.115	0.115	
	Compressor Power Consumed	0.271	0.271	
	Humidifier power consumed	0.062	0.000	
	Total Cooling kW/kW of Load	0.448	0.386	
	Cooling Power Consumed	185	159	26
Step 10	Monitoring & Contol			
	Kw/kW of load			
	Fan Power Consumed	0.115	0.115	
	Compressor Power Consumed	0.271	0.271	
	Humidifier power consumed	0.000	0.000	
	Total Cooling kW/kW of Load	0.386	0.386	
	Cooling Power Consumed	159	159	0

#3 – Energy Efficiency

Total Power Consumption (kW)	Baseline	Proposed	Delta	Savings
Total Cooling Power Draw	234	159	74	32%
IT Load	390.0	326.1	64	16%
PDU Losses	9.7	8.2	2	16%
UPS Losses	38.0	31.8	6	16%
Cooling Power Consumed	233.6	159.3	74	32%
Total Power Consumed	**671.4**	**525.3**	**146**	**22%**

Strategy: Use LEED innovation credits to fit your project's goals

#4 – Measurement and Verification

ASCO PowerQuest

Fat Spaniel

Liebert SiteScan

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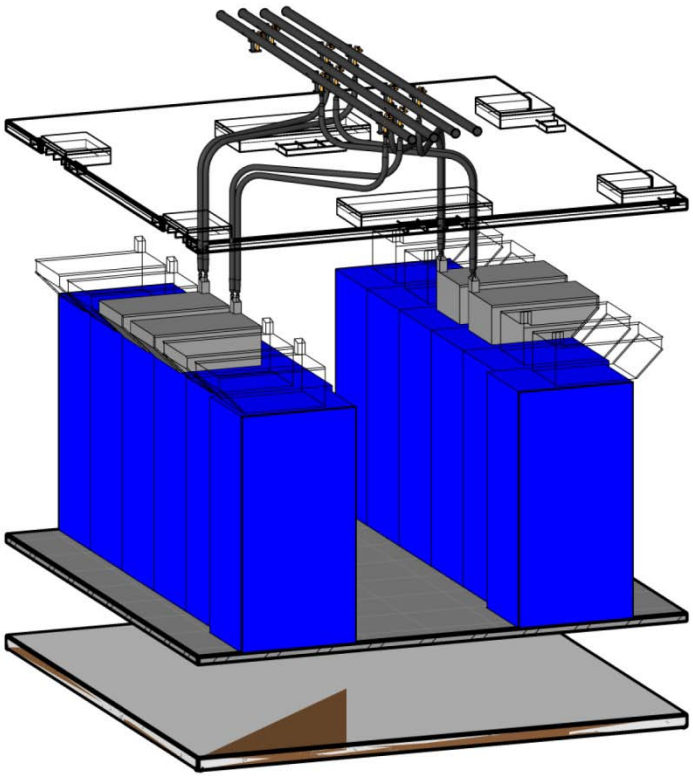

- A Data Center typically needs to drill down for extensive power use /cooling monitoring

Strategy: Understand how LEED points overlap with your project requirements

#5 – Daylight and Views

- Most Data Center staff work in windowless, daylight deprived facilities
- Human error = #1 cause of Data Center downtime
- Access to daylight has been shown to increase staff effectiveness, decrease absenteeism

#5 – Daylight and Views

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#5 – Daylight and Views

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LEED Summary

- ***Become more involved*** in developing the scorecard – LEED as a decision making tool
- ***Set definitive goals for EA Credit 1*** – Optimize Energy Performance!
- Use LEED to ***reinforce your mission***

Questions?

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