

Session 3. Energy supply for mission critical facilities: tiered requirements and capabilities of supporting energy systems – Panel Discussion:

Leader: Dr. Alexander Zhivov, ERDC

Mike Savena, NAVFAC

Tarone Watley, AFCEC

Avinash Srivastava and Calum Thompson, AECOM

Panel

- **Alexander Zhivov** – Senior Research Engineer, US Army Engineer Research and Development Center
- **Michael Savena** - Utility Operations Supervisor for Naval Facilities Engineering Command (NAVFAC) Headquarters;
- **Tarone Watley** - the Air Force Energy Surety Subject Matter Expert positioned in the Engineering Division of the Air Force Civil Engineer Center
- **Avinash Srivastava** - Principal and Director of Urban Analytics at Design + Planning + Economics at AECOM
- **Calum Thompson** - Lead of the High Performance Communities team at AECOM

Examples of Mission Critical Operations



Da Vinci Robotic Surgery. One of main reasons of malfunction is when power supply voltage is out of range.

Walk in Cooler. To prevent food spoilage, the refrigerator temperature shall be at 40 °F or below and the freezer is at 0 °F or below. The refrigerator will keep *food safe for up to 4 hours*. A full freezer will hold the temperature for approximately 48 hours (24 hours if it is half full).



Gym converted into a temporary shelter. Energy is required for a limited lighting. The space needs to be heated or cooled with a humidity control in some climates.



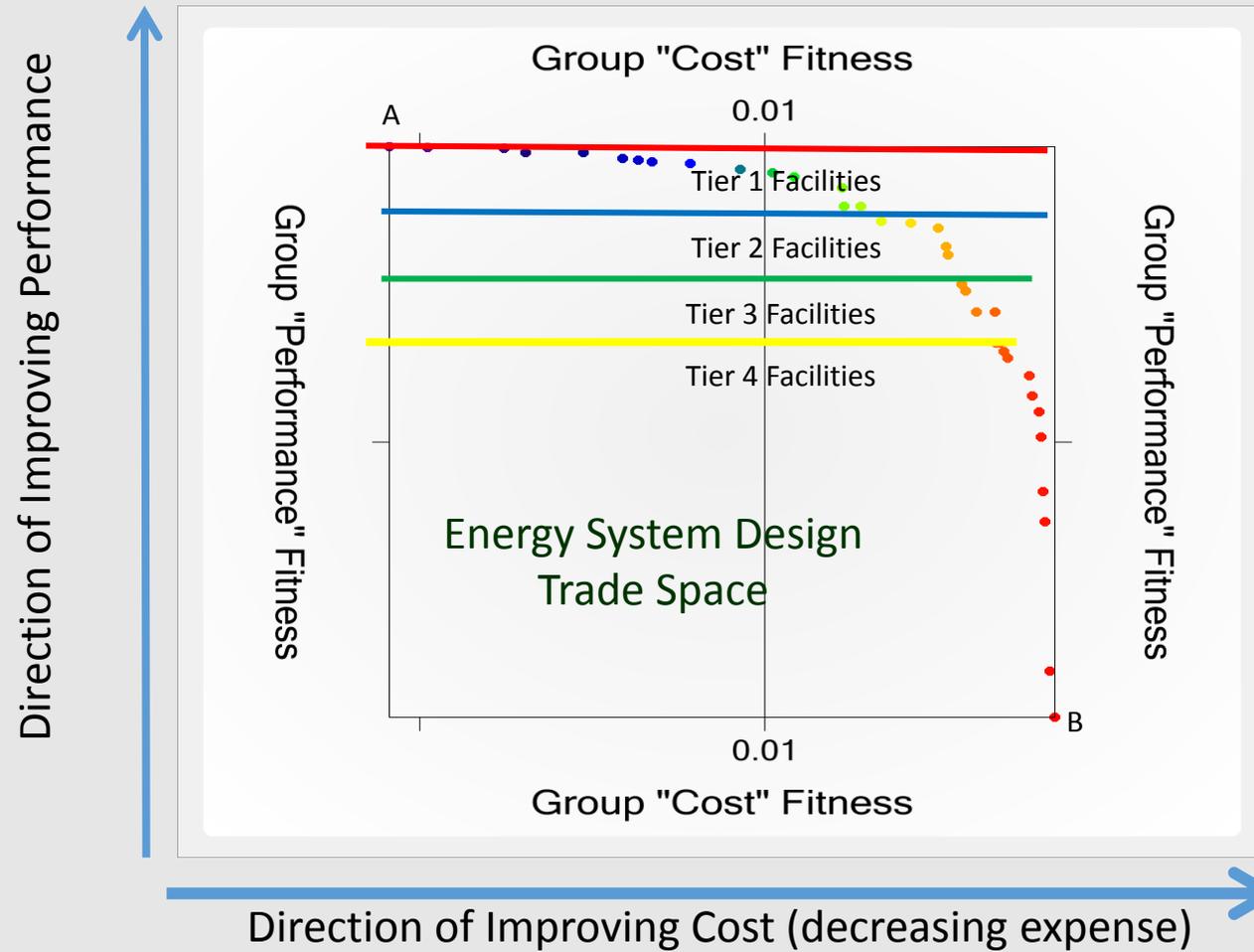
Computers. Sudden loss of power and power surges can cause damage to computers.



Water supply system



Matching Facility Tier with System Performance Requirements



Energy Use in the Building

- Plug/process loads: average and peak loads, power quality requirements
- Lighting: total, emergency and for mission critical operations
- Heating: total load and for mission critical operations with adjusted range of temperatures; allowable time with no heating (climate, time of the year and building shell type)
- Cooling: total load and for mission critical operations with adjusted range of temperatures; allowable time with no cooling (climate, time of the year and building shell type)
- Other utilities: loads

Concept of building ER metrics into contracts?

Availability Failure Penalty Table											
Based on Critical Loads Sheet and Cost Schedule/Estimates											
Allowable Down Time		None		60 Seconds		10 Minutes		20 Minutes		30 Minutes (in Priority Order)	
Mission/Building/Equipment Affected		Emergency equipment (exit signs, egress illumination, etc.) Elevator car lights Emergency voice / alarm communication systems Critical exhaust fans		Fire command center lighting Electrically powered fire pumps Ventilation and automatic fire detection equipment for pressurized stairwells		Critical buildings 1 & 2		Security Command Center Laboratory freezers Emergency operation center Data Center Auxiliary Computer Systems All other functions, including water pumps for heating/cooling		Building N Child Care Center All Remaining Buildings	
Actual Down Time	30 Seconds	\$ 250.00	25%								
	60 Seconds	\$ 500.00	50%	\$ 250.00	25%						
	5 Minutes	\$ 750.00	75%	\$ 500.00	50%						
	10 Minutes	\$ 1,000.00	100%	\$ 750.00	75%	\$ 250.00	25%				
	15 Minutes	\$ 1,250.00	125%	\$ 1,000.00	100%	\$ 500.00	50%				
	20 Minutes	\$ 1,500.00	150%	\$ 1,250.00	125%	\$ 750.00	75%	\$ 250.00	25%		
	25 Minutes	\$ 1,750.00	175%	\$ 1,500.00	150%	\$ 1,000.00	100%	\$ 500.00	50%		
	30 Minutes	\$ 2,000.00	200%	\$ 1,750.00	175%	\$ 1,250.00	125%	\$ 750.00	75%	\$ 250.00	25%
	35 Minutes	\$ 2,250.00	225%	\$ 2,000.00	200%	\$ 1,500.00	150%	\$ 1,000.00	100%	\$ 500.00	50%
	40 Minutes	\$ 2,500.00	250%	\$ 2,250.00	225%	\$ 1,750.00	175%	\$ 1,250.00	125%	\$ 750.00	75%
	45 Minutes	\$ 2,750.00	275%	\$ 2,500.00	250%	\$ 2,000.00	200%	\$ 1,500.00	150%	\$ 1,000.00	100%
	50 Minutes	\$ 3,000.00	300%	\$ 2,750.00	275%	\$ 2,250.00	225%	\$ 1,750.00	175%	\$ 1,250.00	125%
	55 Minutes	\$ 3,250.00	325%	\$ 3,000.00	300%	\$ 2,500.00	250%	\$ 2,000.00	200%	\$ 1,500.00	150%
	60 Minutes	\$ 3,500.00	350%	\$ 3,250.00	325%	\$ 2,750.00	275%	\$ 2,250.00	225%	\$ 1,750.00	175%
	65 Minutes	\$ 3,750.00	375%	\$ 3,500.00	350%	\$ 3,000.00	300%	\$ 2,500.00	250%	\$ 2,000.00	200%
70 Minutes	\$ 4,000.00	400%	\$ 3,750.00	375%	\$ 3,250.00	325%	\$ 2,750.00	275%	\$ 2,250.00	225%	