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2005 Energy

Federal Energy Management Program

2005 Energy

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The Solutions Network

Applying Best Facilities Management Practices

Keith McClanahan
Facility Issues
(928) 213-9767
keithmcc@facilityissues.com

Background

Keith McClanahan -

- BS in Engineering from Arizona State
- Registered Professional Engineer
- Real Property Administrator
- Founder of Facility Issues

Background

- 34 Years of Facility Experience - All Areas
- 18 Years for Salt River Project (SRP)
- Publishes the Newsletter "*Facility Issues*"
- Facility Benchmarking for 14 Years

Finding Best Practices

So How Do We Find Best Practices???

Benchmarking !!!

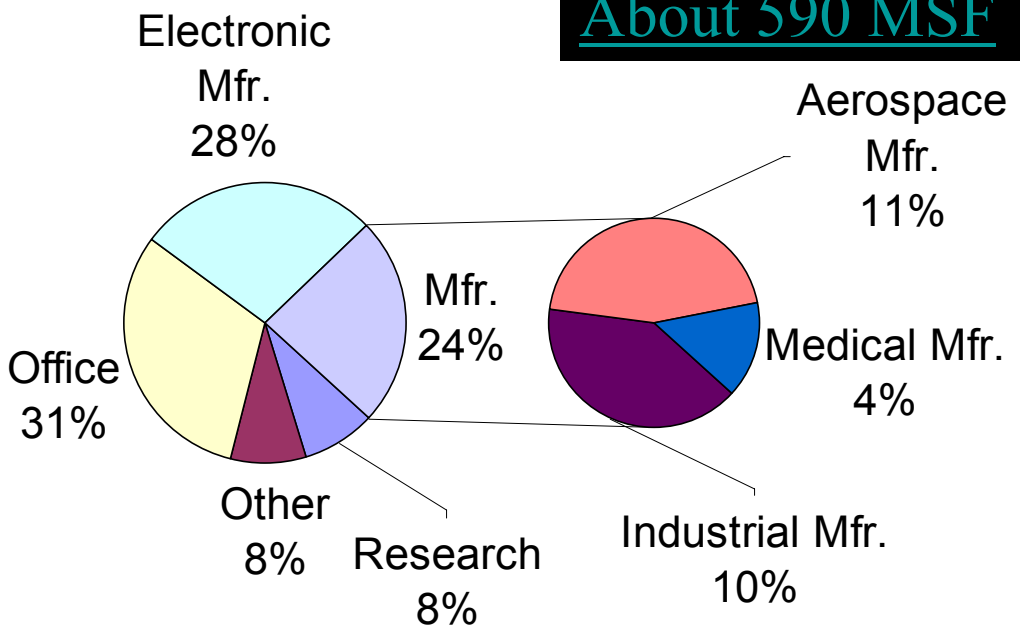
Benchmarking Groups Include…

- Boeing
- IFMA's Utility Council
- Facility Managers Roundtable
- Nuclear Generating Stations
- Regional Bell Operating Companies
- Washington Group
- National Laboratories
- Research Facilities Benchmarking Group
- California County Facility Managers
- Chicago Regional Group

Who Benchmarks with Facility Issues….

Participants By Industry Type

For 2005:
About 590 MSF



Benchmarking - What Is It?

Bench . mark . ing: The search for industry best practices that lead to superior performance

(The Boeing Company)

What Is Benchmarking

- A Comparison of Key Metrics
- A Type of Professional Development
- An Advanced Learning Process

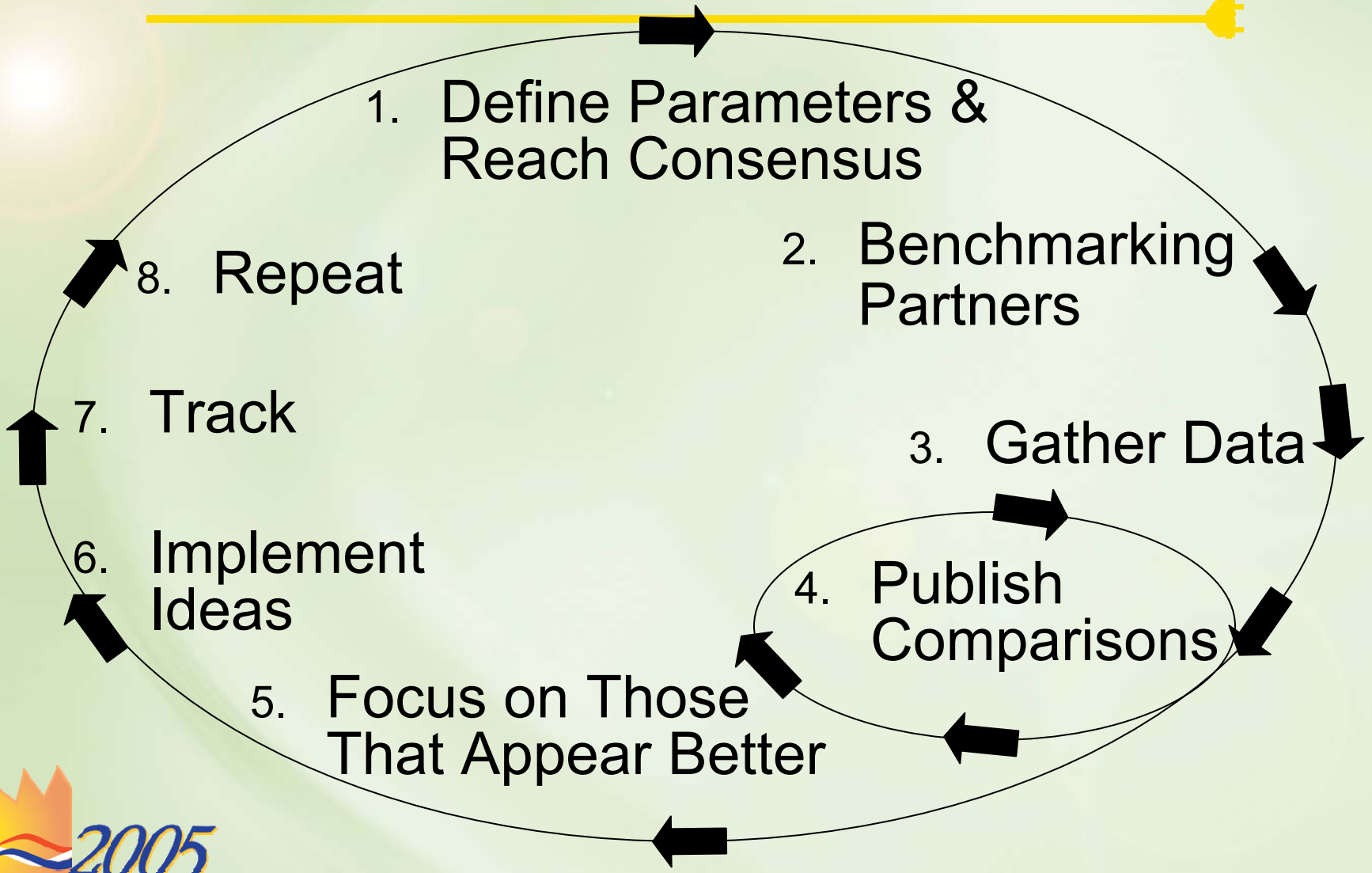
Benchmarking Benefits for the Facilities Management Organization…

- Improved Efficiency
- Proactive - Not Reactive
- Improved Knowledge About Your Functions
- Improved Employee Satisfaction
- Outsourcing Approached Objectively

Benchmarking Benefits for Yourself…

- Know What and How to Change
- Better Prepared for Change
- Builds Confidence and Self Esteem
- Overcome Tendency to Defend Your Way or Costs

Benchmarking Process:



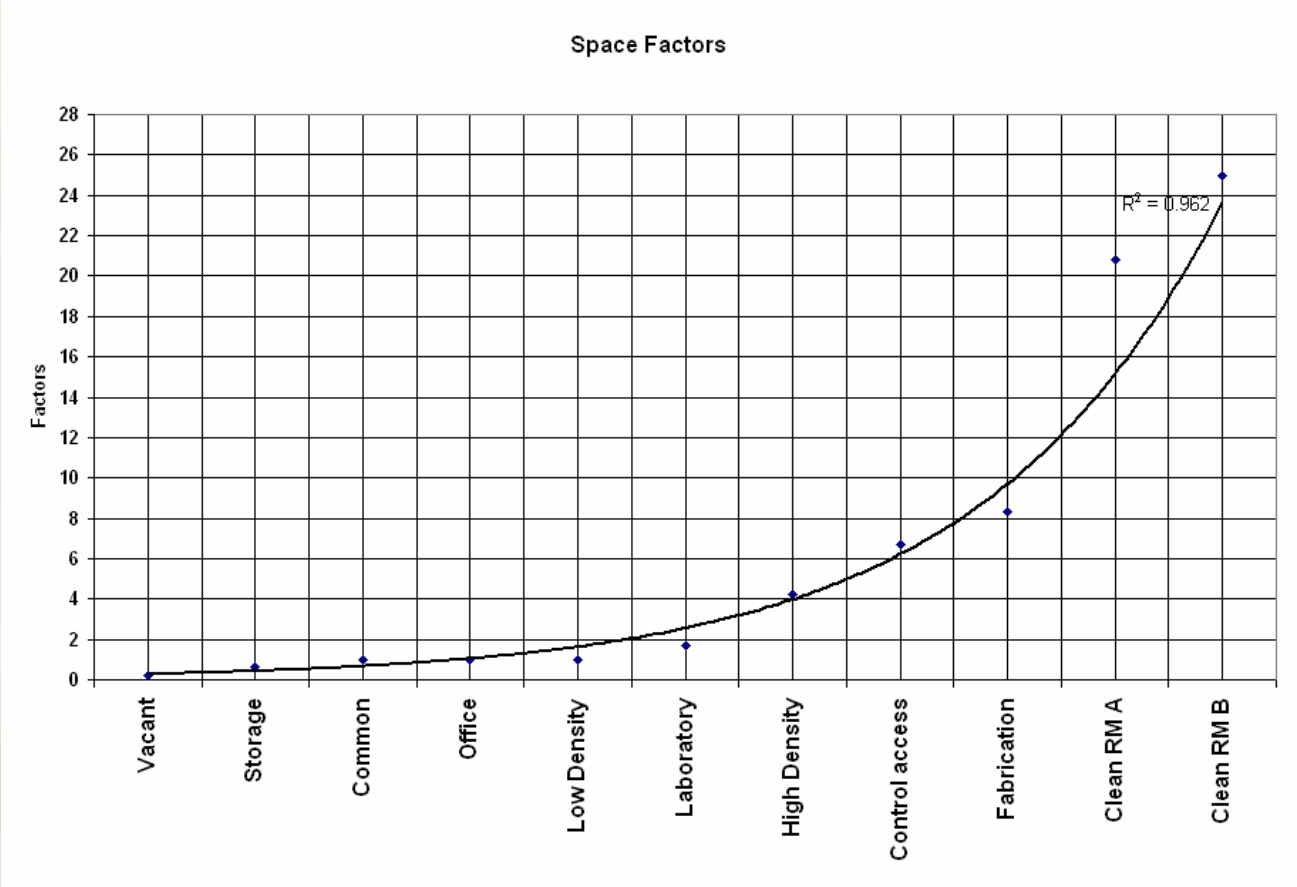
What We Benchmark Annually….

- Space
- **Utilities**
- **Maintenance**
- Custodial
- Parking and Paving
- Grounds,
- Project Costs / Engineering
- Environmental Health and Safety (EHS)
- Security
- Fixed Costs
- Customer Service Survey

Benchmark Survey Questions... Space

Types of Space	Square Feet Thousands (000)	Operating Hours
A17. Vacant & Storage (TSF = 0.60): Used for storage or storage related activities. Low utility requirements, and very low occupancy. Examples: Stores, shipping, receiving, chemical storage, enclosed docks, storage closets, and materials stores. (000)		
A18. Common (TSF = 1.00): Area used by all building occupants, or for building equipment and structure. The net usable (occupiable) area is gross square feet minus common area. Examples: Rest rooms, stairs, elevators, major aisles, vestibules, lobbies, pay phones, security centers, vending areas, teller machines, passageways, exterior/ interior walls, mechanical /electrical rooms, central plant, and janitor rooms. (000)		
A19. Office (TSF = 1.00): Areas used for offices. Can be open landscape, modular cubicles, or private offices. (000)		
A20. Support spaces (TSF = 1.00): File rooms, conference rooms, classrooms, training rooms, libraries, PC bullpens, kitchens, cafeterias, day care centers, fitness centers, auditoriums, copier rooms, mail rooms, locker rooms, health/nurses station. (000)		
A21. High Bay Work Area (TSF = 1.00): Large open area, high bay, low density, no unusual utility loads, basic shell configuration, air conditioned. Examples: Aircraft Hangar, Auto Repair Shop, and Maintenance Shop. (000)		
A22. Laboratory/Assembly Space (TSF = 1.50): Areas with work stations and/or multiple pieces of equipment for R&D, or repair. Higher power and utility requirements than offices. Typically can operate 24 hours/day. Examples: aircraft assembly lines, chemical labs, wet labs, SEM labs, systems training rooms, electronic labs, software labs, hospital patient rooms, chemical processing, machine equipment, and call centers. (000)		
A23. Assembly and Testing (TSF = 4.00): Areas for product assembly or testing. High density of work stations and related production equipment. Medium utility requirements, additional air conditioning capacity to meet higher heat load requirements, and high lighting requirements. Examples: Test, inspection, and circuit card assembly. (000)		

Benchmark Survey Questions... Space



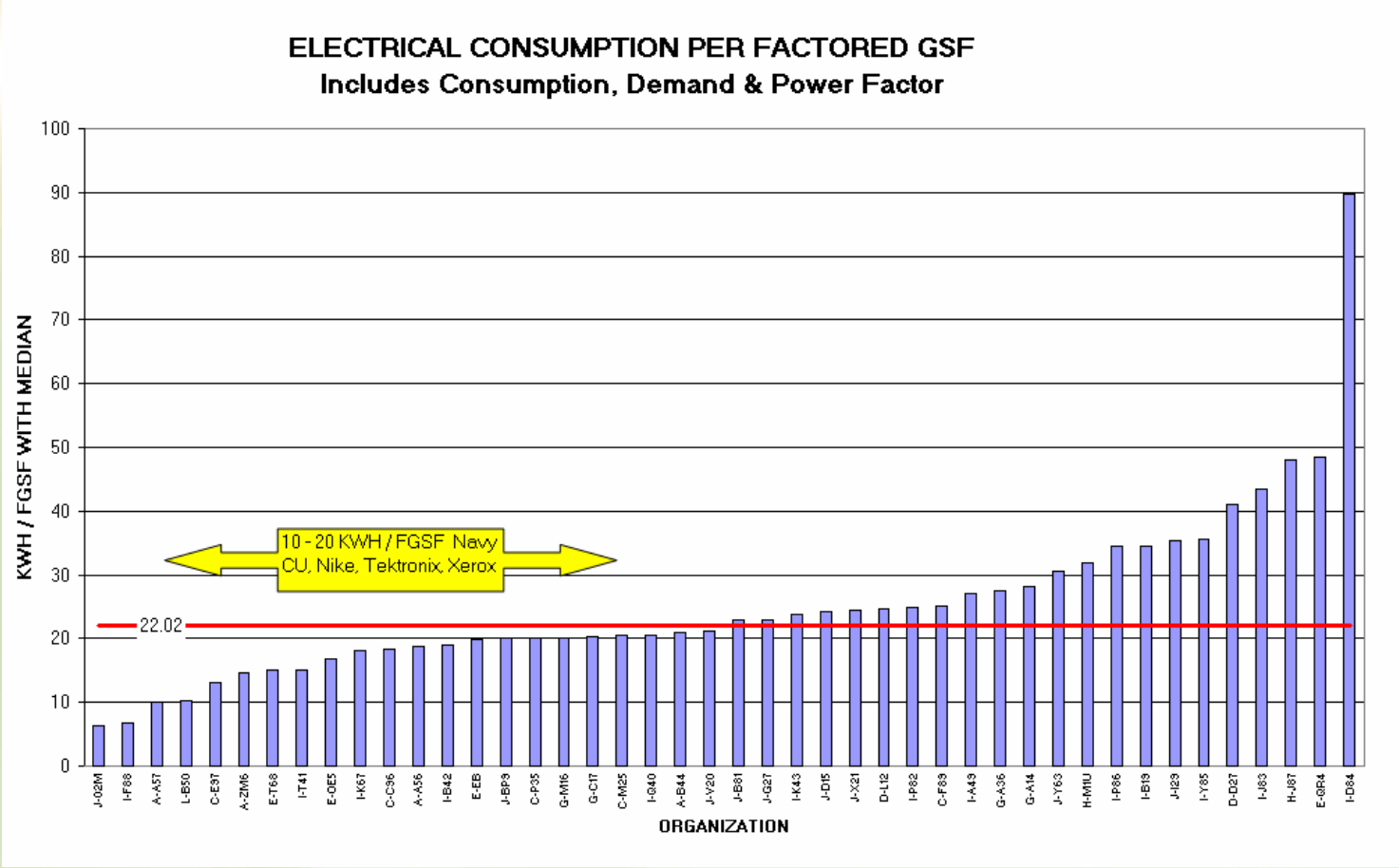
Benchmark Survey Questions... Utilities

Section B. Utilities		
Report total utility costs and quantities including production and process consumption.		
	Internal Costs ($000)	Contractual Costs ($000)
B1. Annual cost of electricity including any penalties imposed by your utility company. ($000).		
B2. Annual cost of water ($000). If you can not separate your water and sewer costs include the total cost for these services here.		
B3. Annual sewer costs ($000).		
B4. Annual cost of fuels such as: natural gas, propane, fuel oil etc. ($000)		
B5. Other utility costs such as purchased steam or fuel oil. ($000) If you enter a value here please describe the basis in question B6.		
B6. Other utility costs description...		
Function	**Internal Costs ($000)**	**Contractual Costs ($000)**
B7. Energy management costs ($000). Energy management functions include buyers, contract negotiators, energy management systems and support, etc. Use your best estimate where the same system provides support for energy management and operations / maintenance. Do not include building energy management systems in this section.		
B8. Annual consumption of electricity (KWH 000).		
B9. Annual BTUs (000,000) of fuel consumed in question B4 and B5 (do not include electrical BTUs).		
B10. What percentage of your facility is refrigerated air conditioned? (Express as a percent)		
B11. What percentage of gross square feet is heated? (Express as a percent)		

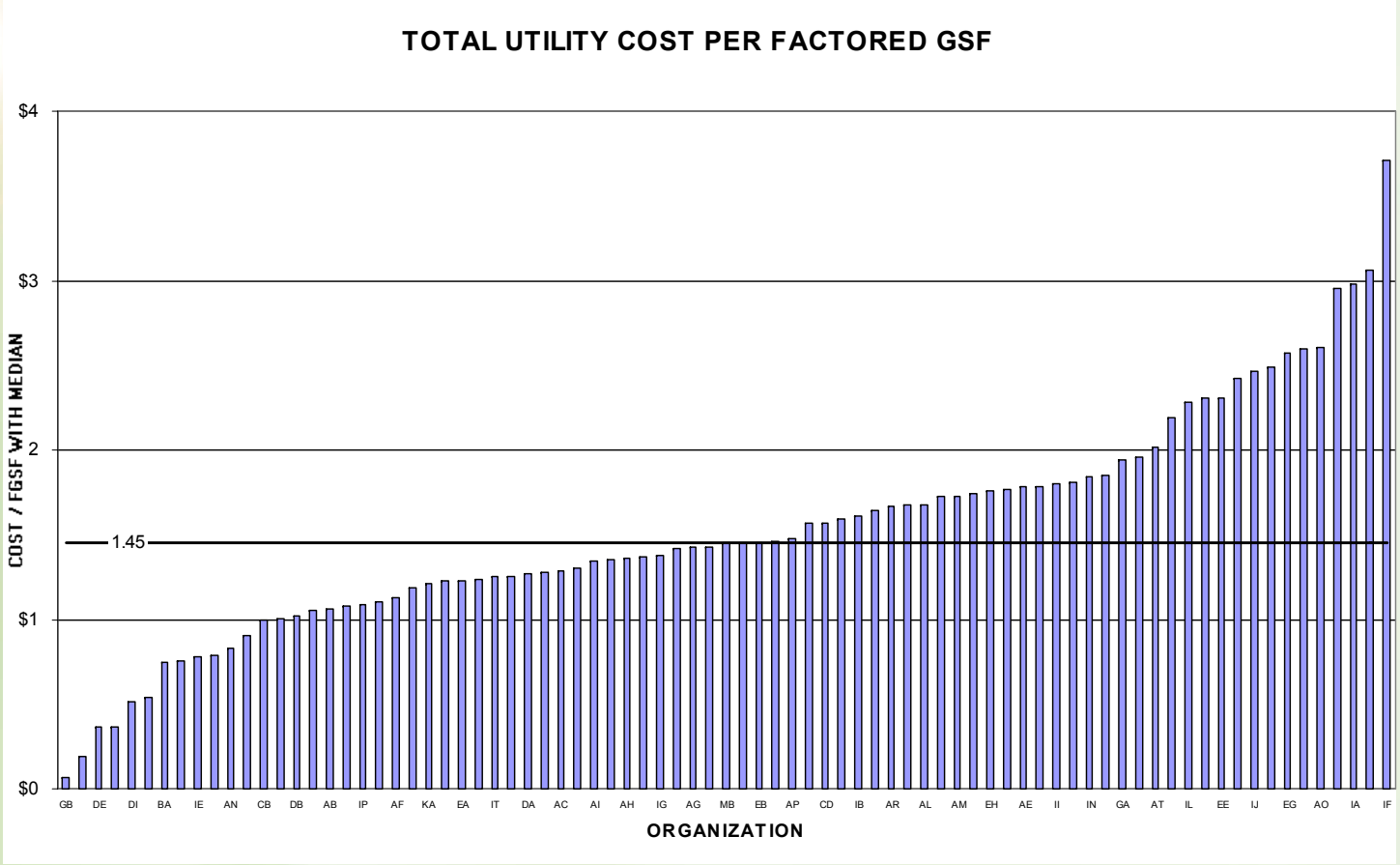
Benchmark Survey Questions-Maintenance

Section D. Building Maintenance				
Building Maintenance is the preventive and remedial upkeep of building components i.e., maintenance work done as a normal part of building maintenance operations.				
	Standard Costs		**Exceptional Costs**	
Craft	Costs ($000)	al Costs ($000)	Internal Costs	Contractual Costs
HVAC	$	$	$	$
Electrical	$	$	$	$
Plumbing	$	$	$	$
Energy Management Systems	$	$	$	$
Mechanical	$	$	$	$
Waste Water Treatment	$	$	$	$
Reverse Osmosis De-Ionized (RODI) Water	$	$	$	$
Elevators	$	$	$	$
Carpentry	$	$	$	$
Painting	$	$	$	$
Roofing	$	$	$	$
Flooring	$	$	$	$
General Labor	$	$	$	$
Miscellaneous	$	$	$	$
Maintenance Support assistance from Plant Engineering	$	$	$	$
Supervision & Management	$	$	$	$
Clerical	$	$	$	$
Building Operators	$	$	$	$
Trouble Call Dispatcher and Equipment	$	$	$	$
Work Order Administration	$	$	$	$
Vehicles - Operation and Maintenance - to support building maintenance only	$	$	$	$
Parts Ordering/Buyer	$	$	$	$
D1. Total maintenance costs ($000):				

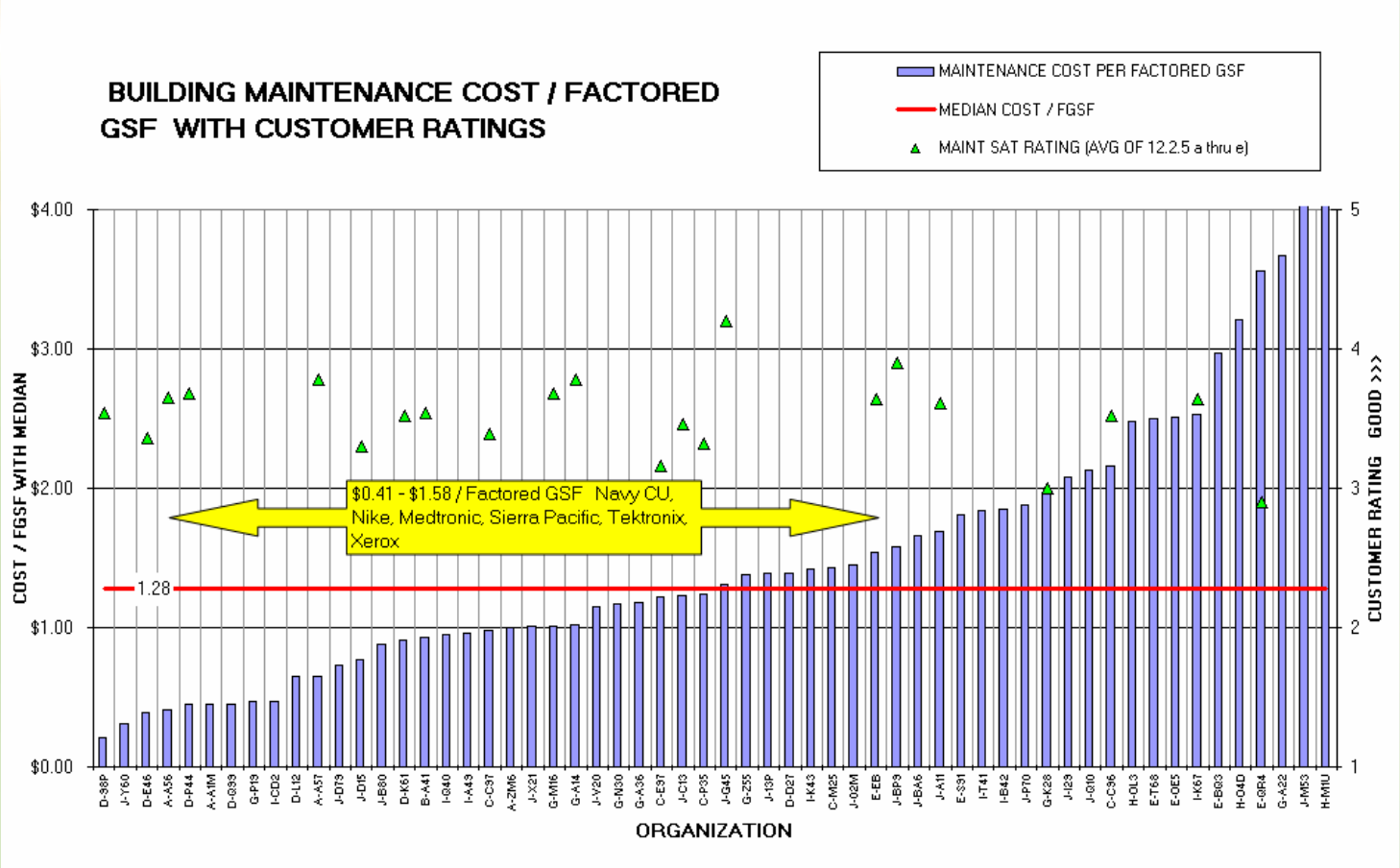
Benchmarking Comparisons



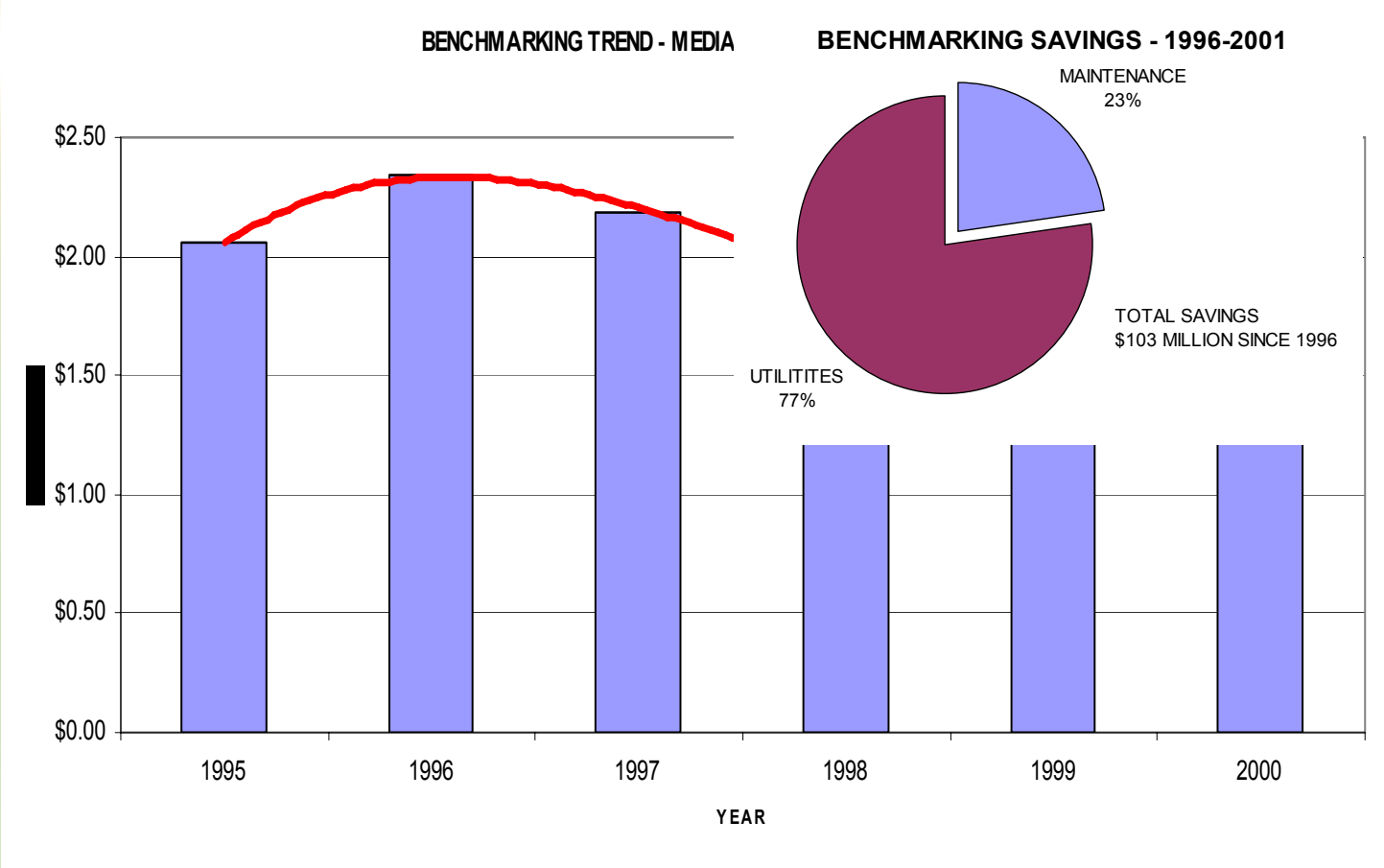
Benchmarking - Comparisons



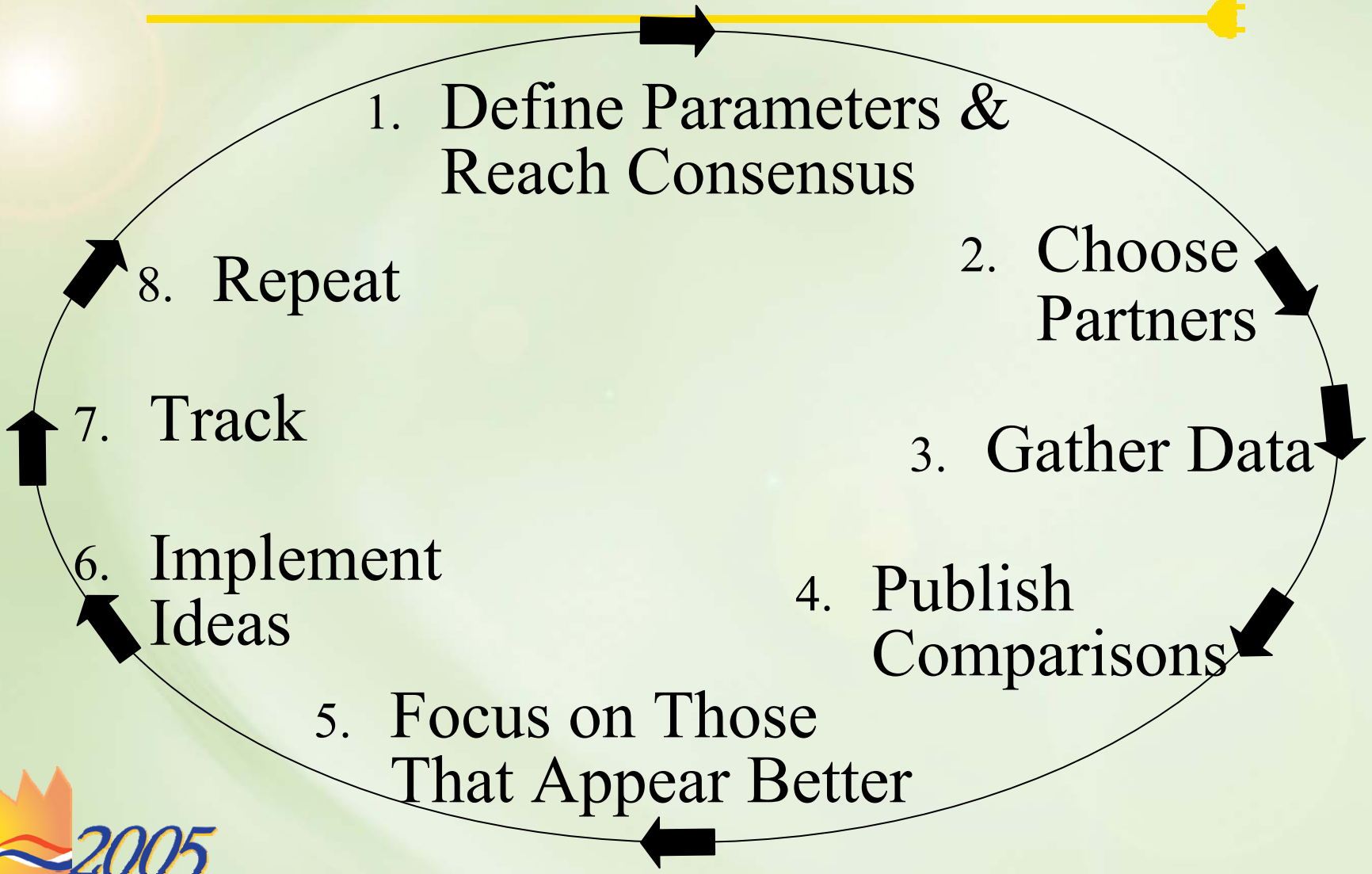
Benchmarking Comparisons



Benchmarking - Savings



Benchmarking Process:



Site Visits - Understanding the Numbers

Meet to review benchmarked information and understand the organization

Indirect Lighting

Energy efficient / minimize glare

Indirect Lighting

Indirect lighting / exposed concrete ceiling

Indirect Lighting

Light diffusers

Indirect Lighting

No task lighting

Original Fixture Mock-up

Original T-8 fixture with 10’ spacing.
Note dark spots between fixtures.

Before and After

Remodeling project in process

Lighting Energy Savings

Savings from 3 Direct/Indirect Lighting Projects

Total number of fixtures: 928

Estimated energy use before: 420,000 kWh

Estimated energy use after: 268,000 kWh

Energy savings: 152,000 kWh

Energy cost savings: $9,930 per year

Total incentive amount: $99,300

Lighting Changes

- Low watt bulbs
- High Efficiency Electronic ballasts
- Computer driven Micro-lite System
- Motion detectors

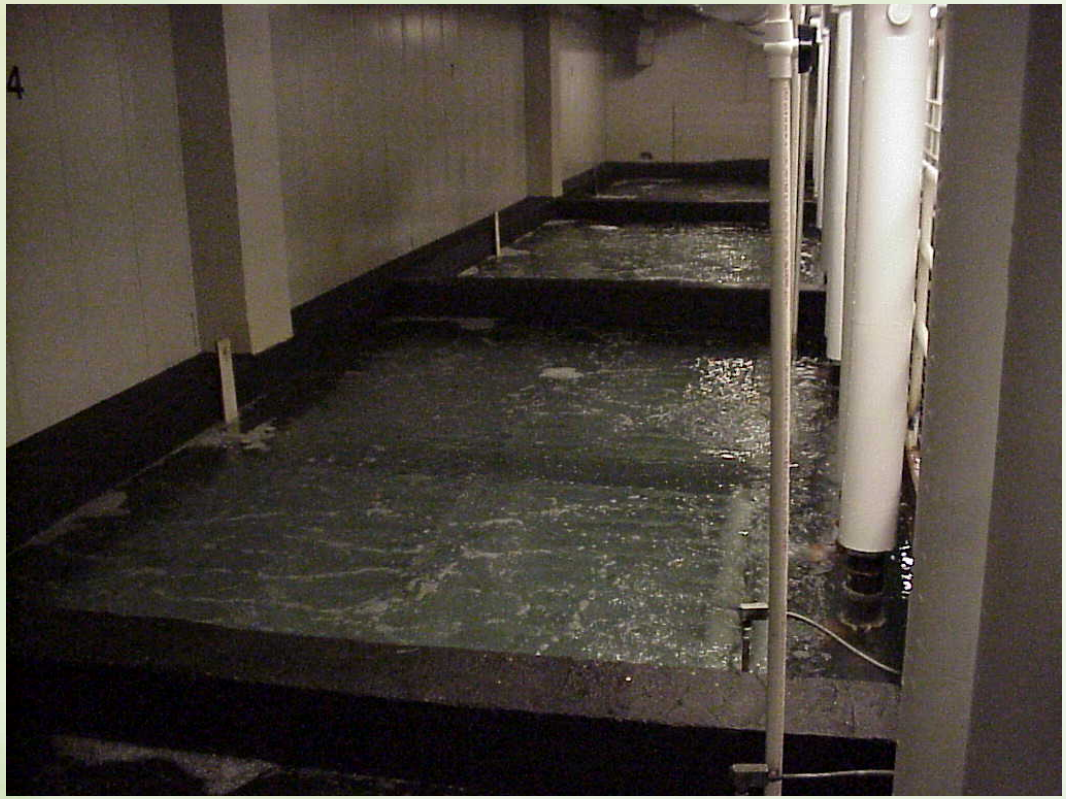
Daylighting / Dimmable Ballasts

Extensive Use of Motion Sensors

Energy Efficient Lighting

LED Exit Signage …

Ice Pits



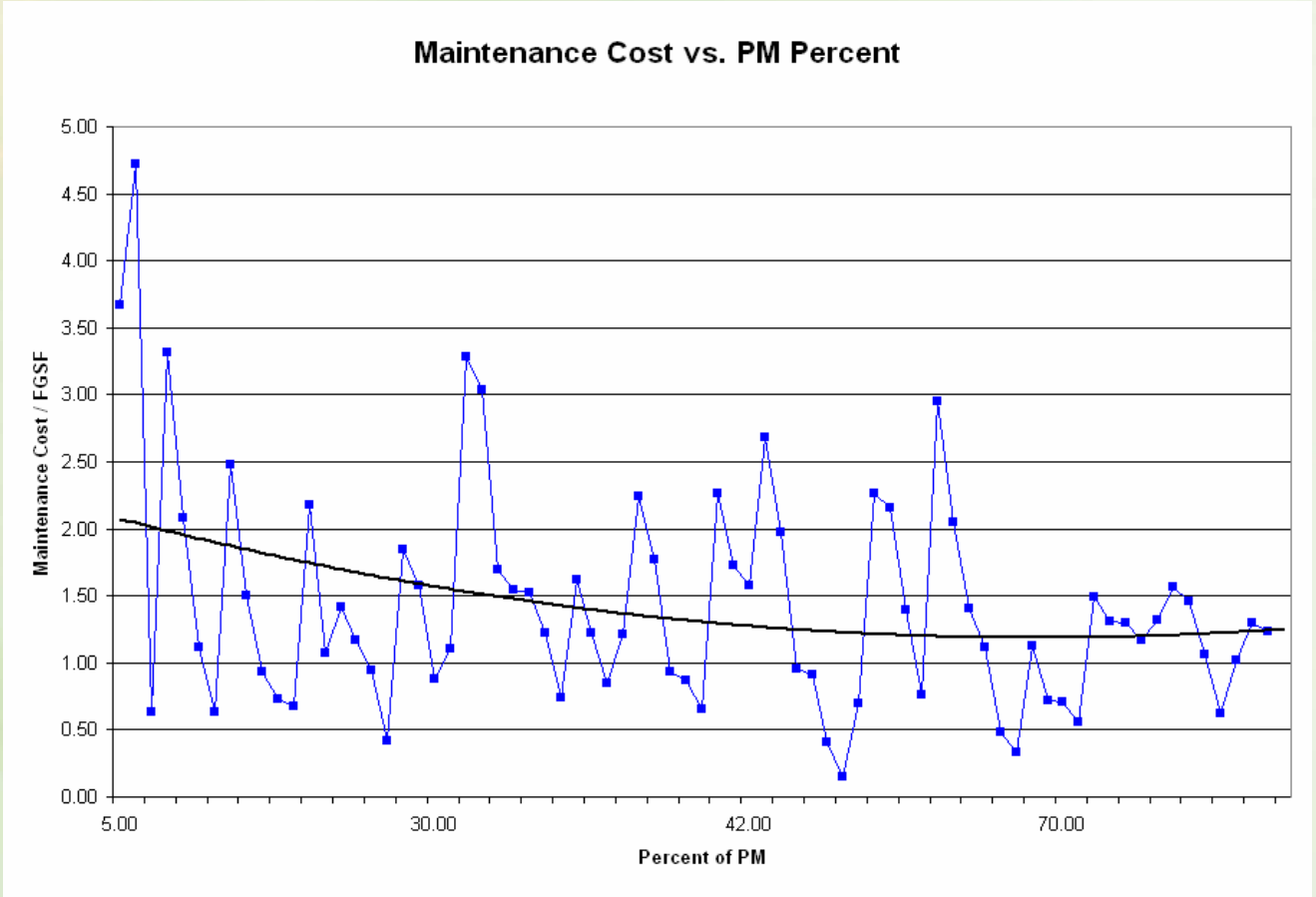
Maximum Benefit from Ice Storage

Reduced Utility Costs Using Off Peak Rates...

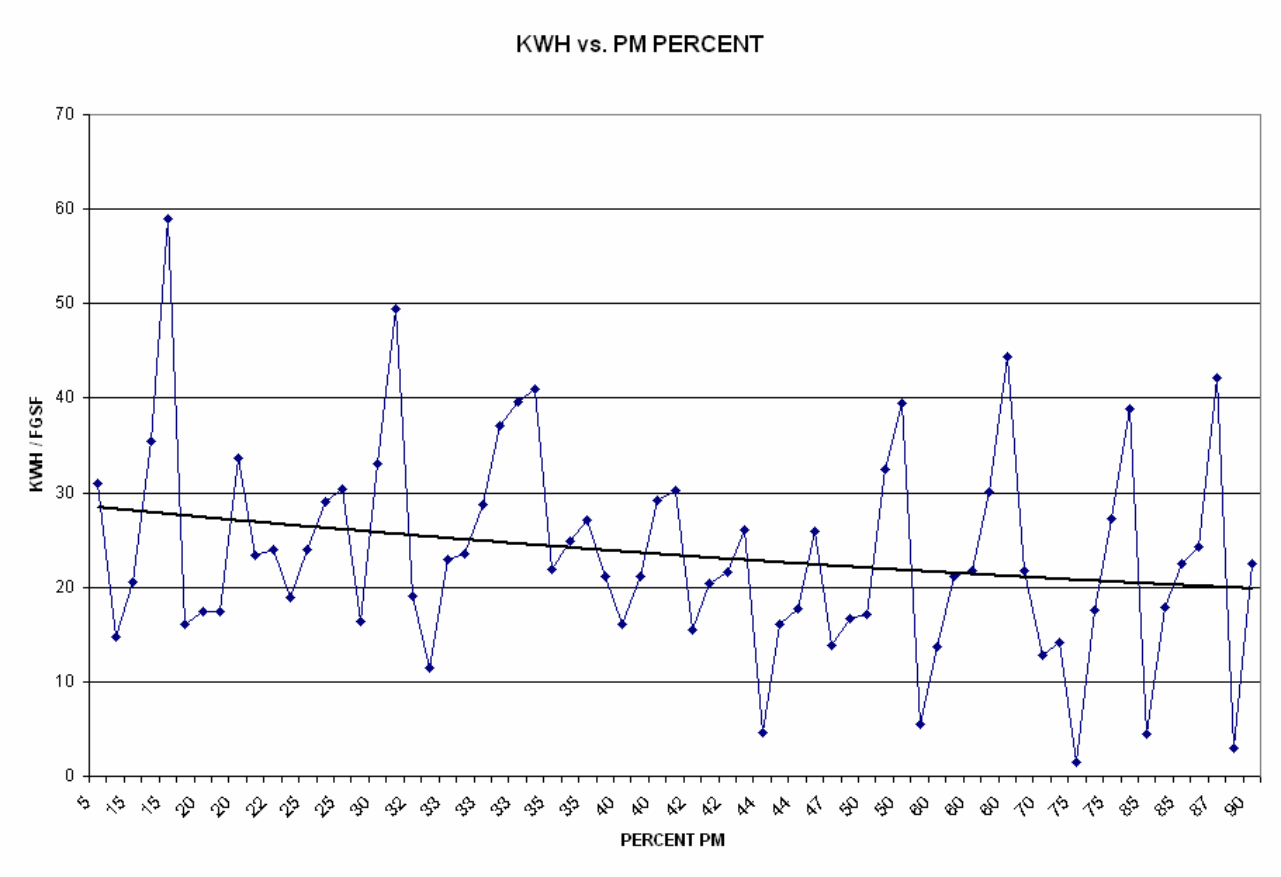
Thermal Storage

Reduced Utility Costs Using Off Peak Rates...

PM Program Impacts Costs



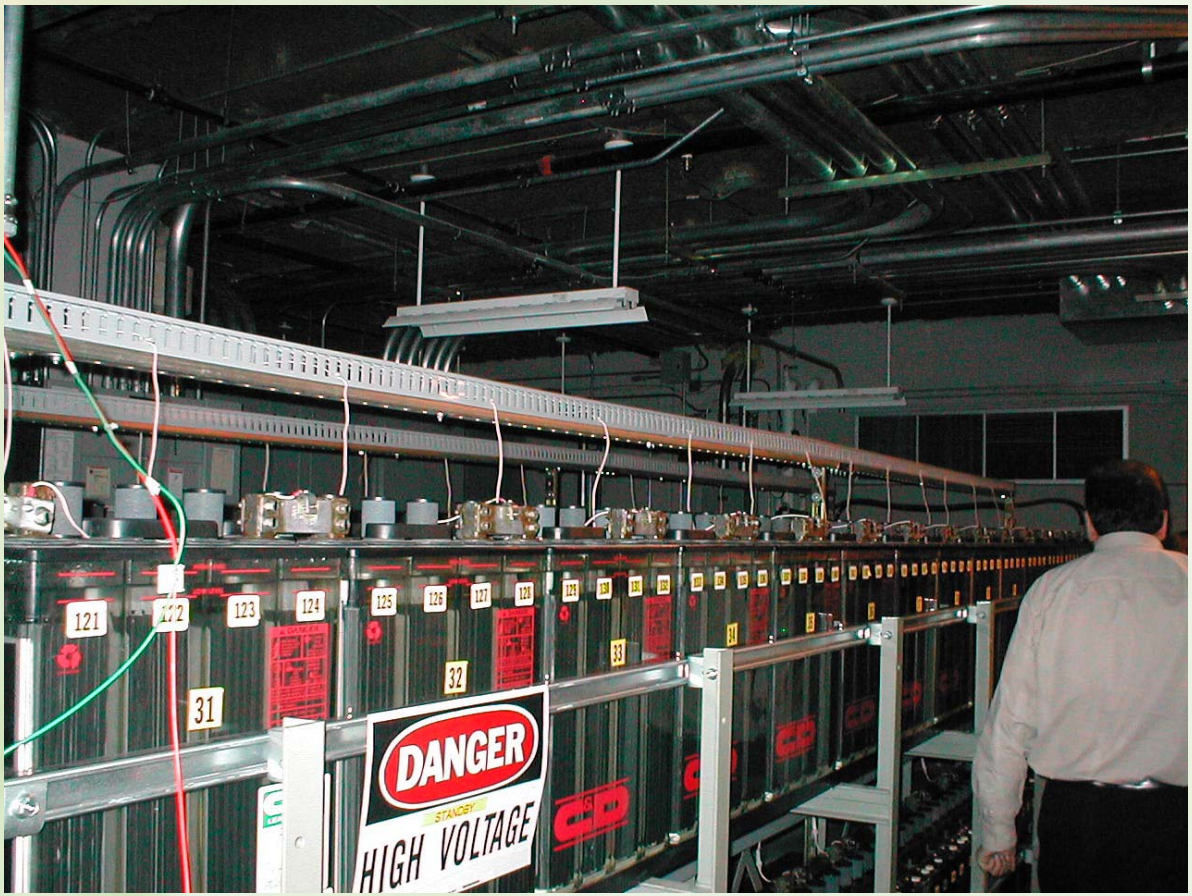
PM Program Impacts Energy Usage



PM Program

60 % - 80% PM

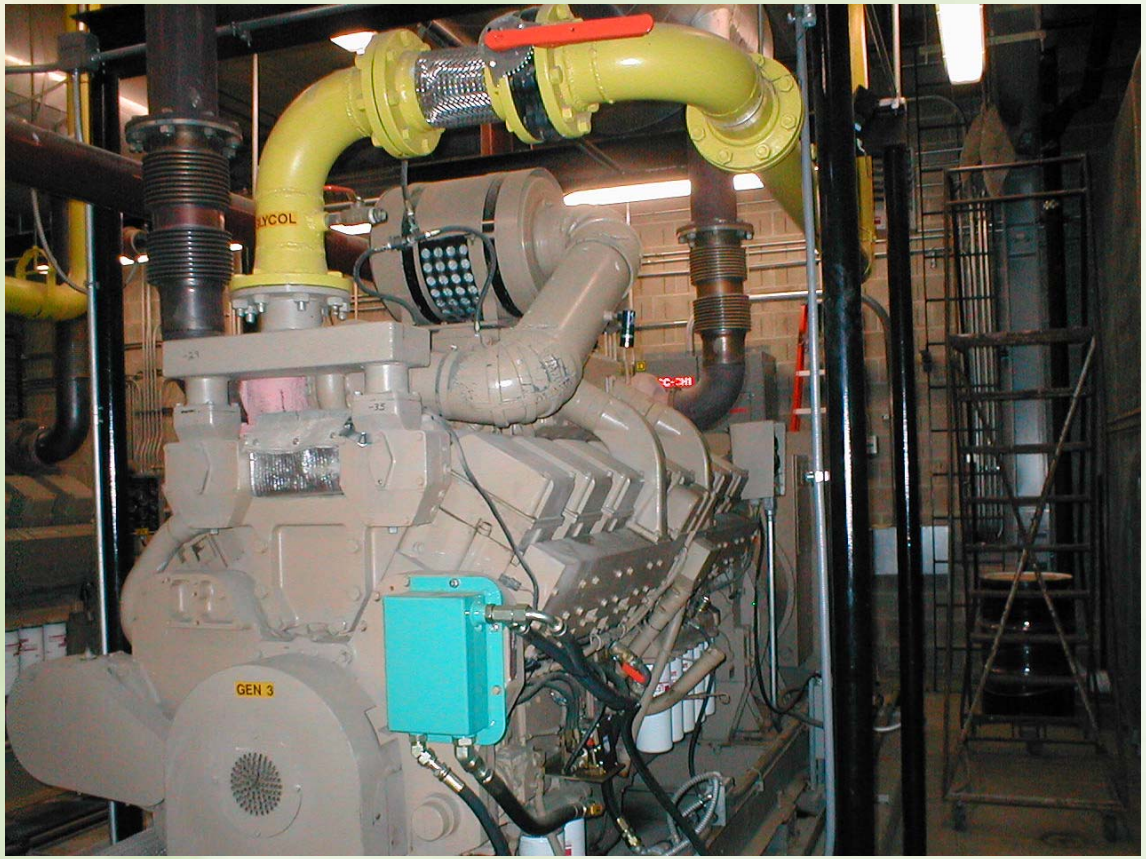
PM Program



Clean, Well Maintained, Mechanical Areas

Keith McClanahan, Facility Issues **August 17, 2005**

PM Program

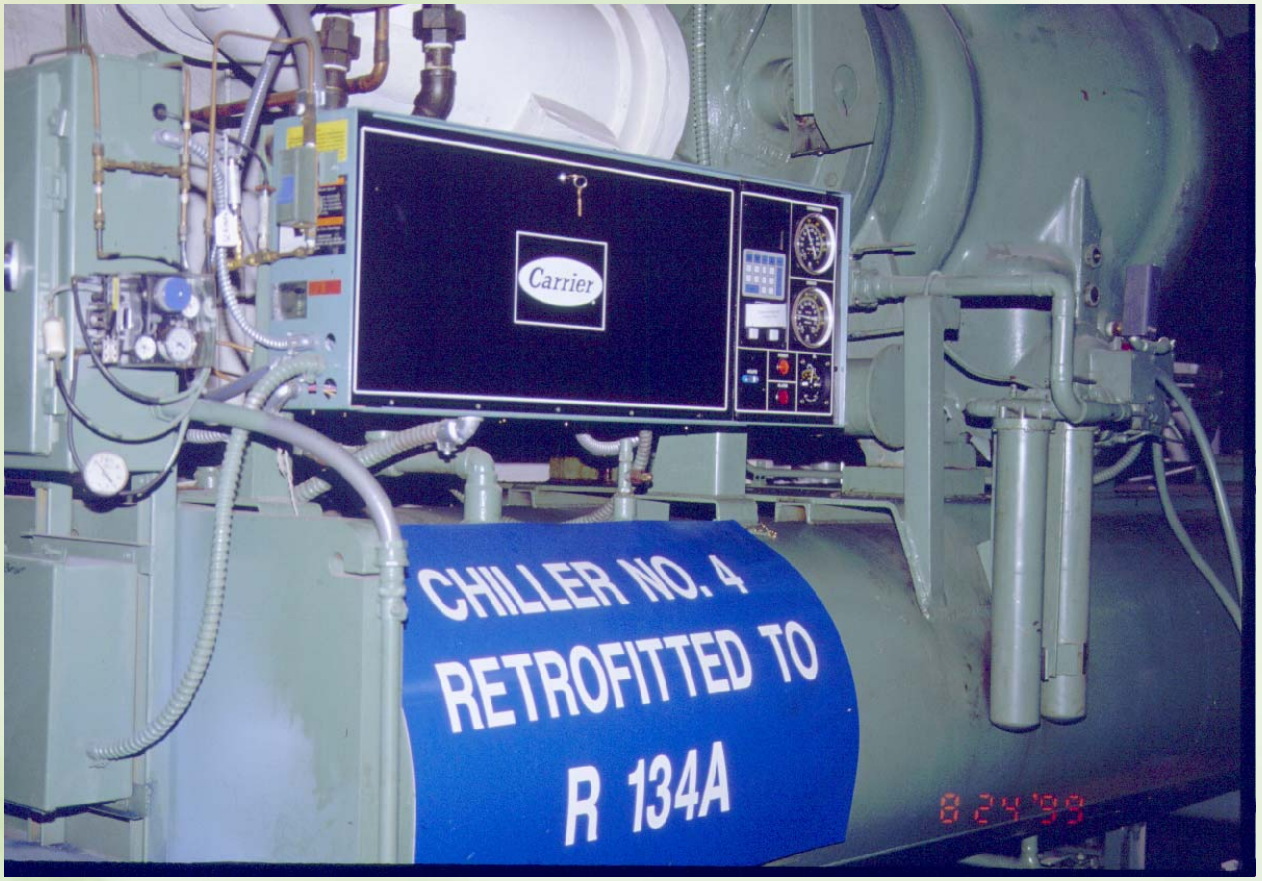


Clean, Well Maintained, Mechanical Areas

PM Program

Clean, Well Maintained, Mechanical Areas

PM Program – Chiller Maintenance



PM Program – Boiler Maintenance

PM Program – Filter Changes

Replaced HVAC Control System

Locate Occupants Away From Windows

Locate Occupants Away From Windows

Lighting Control Strategy

- Floor lighting control sheds lights off at 18:30
  - Lights have local switches on each floor to turn lights on after 18:30
  - Controller sweeps lights off every hour
- Lighting controller can be programmed for events or after hour meetings
- Perimeter lights have dimming controls that measure and adjust for outside lights

Soft Start Controls

HVAC Control Strategy

- Air handling units set up on enthalpy control
- AHU's minimum outside air percentage is based on CO2 set point of 1100 ppm
- AHU's discharge air temperature is reset off outside temperature
- AHU's discharge static pressure is set back after hours
- VAV's are set back at 18:00 to range 4.5 degrees from temperature set point. Normal hours range is 1 degree
- VAV's are set to the occupied mode in 15 minute increments (3 floors maximum at a time)

Communications Strategy

Communications Strategy

Overall Energy Management Strategy…

- Support “Sustainable Facilities”
- Reduce “Carbon Footprint” by x percent per year
- Use “Green” power – more expensive but funding with energy savings in second year
- All “Energy Star” compliant
- Occupancy sensors throughout
- VAV boxes tied to occupancy sensors
- VFD’s on all motors greater than 2 hp

Successful Benchmarking....

- Identifies Under / Over Performance
- Basis for Goal Setting
- Creates an Acceptance for Change
- Identifies Improved Work Processes
- Improved Understanding of Organization
- Better Prepared for Outsourcers
- Auditors Focus on Other Departments

More Information....

- *Facility Issues* (newsletter)
- Website: http://www.FacilityIssues.com

Thank You