



**Energy Project Update
for
Rebuild Hawaii
Consortium**

21 FEB 2007



Energy Project Drivers



Energy Policy Act of 2005

- Baseline changed from FY85 to FY03
- Energy reduction goal (MBTU/KSF) = 2% per year from FY06 to FY15
- Agency may retain utility \$ saved only to fund energy/water & renewable energy projects
- Advanced metering w/hourly readings by 1 Oct 2012
- Procurement of energy-efficient products
- Extends ESPC authority to 2016
- Design buildings for energy consumption 30% below that allowed by ASHRAE Standard 90.1 of 2004

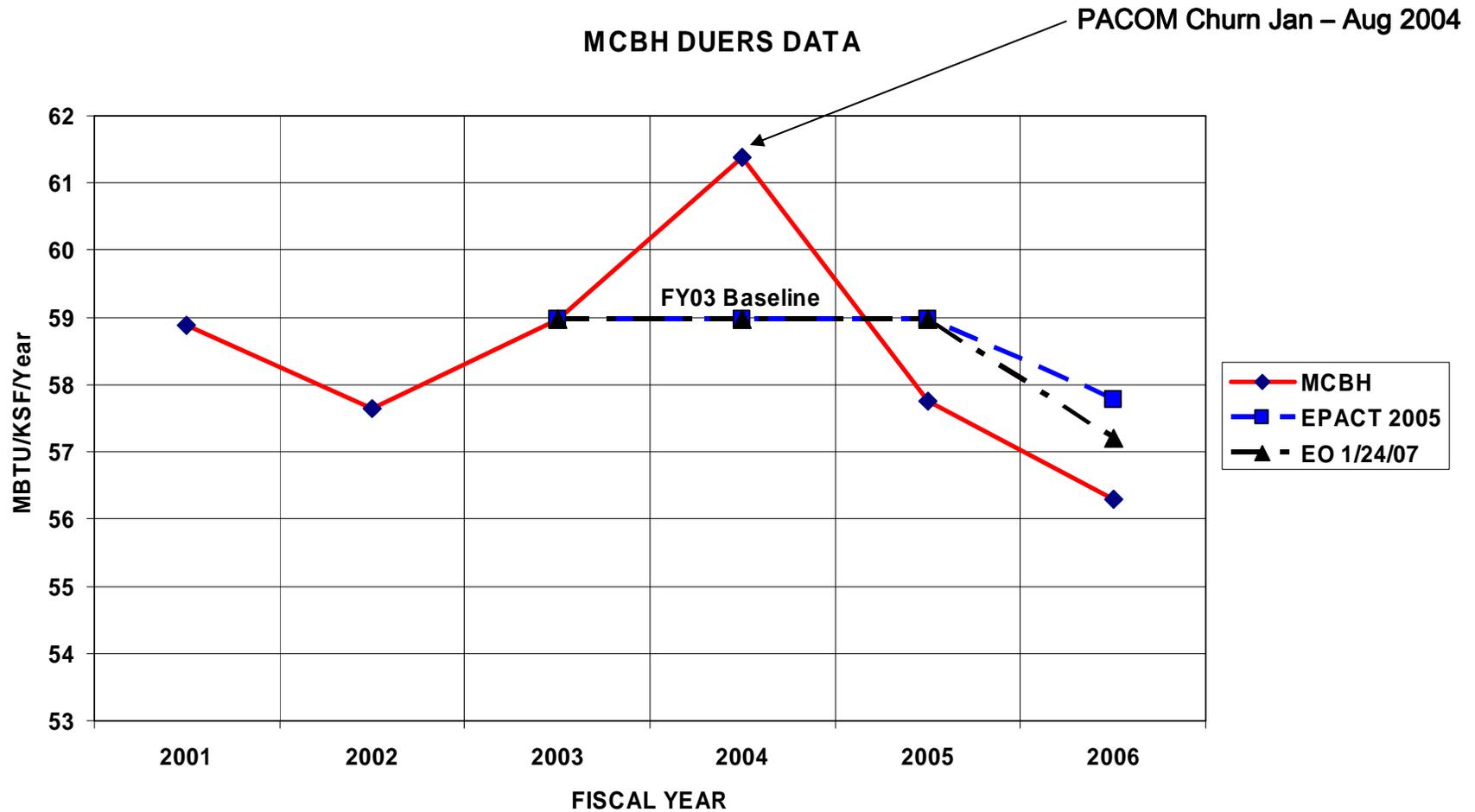


New Executive Order of 24 Jan 2007

- Energy reduction goal (MBTU/KSF/Yr) increased to 3% per year from FY06 to FY15
- Added greenhouse gas emissions reduction goal of 3% per year from FY06 to FY15
- Requires half of mandated renewable energy use to come from new (>1/1/1999) sources and onsite energy generation
- Added water use reduction goal of 2%/year, 2007 - 2015
- Requires sustainable construction and major renovation of 15% of building inventory by 2015
- Requires motor vehicle fleet petroleum use reduction of 2%/year, and increase of non-petroleum use of 10%/year 2005 – 2015, and use of plug-in hybrid (PIH) vehicles

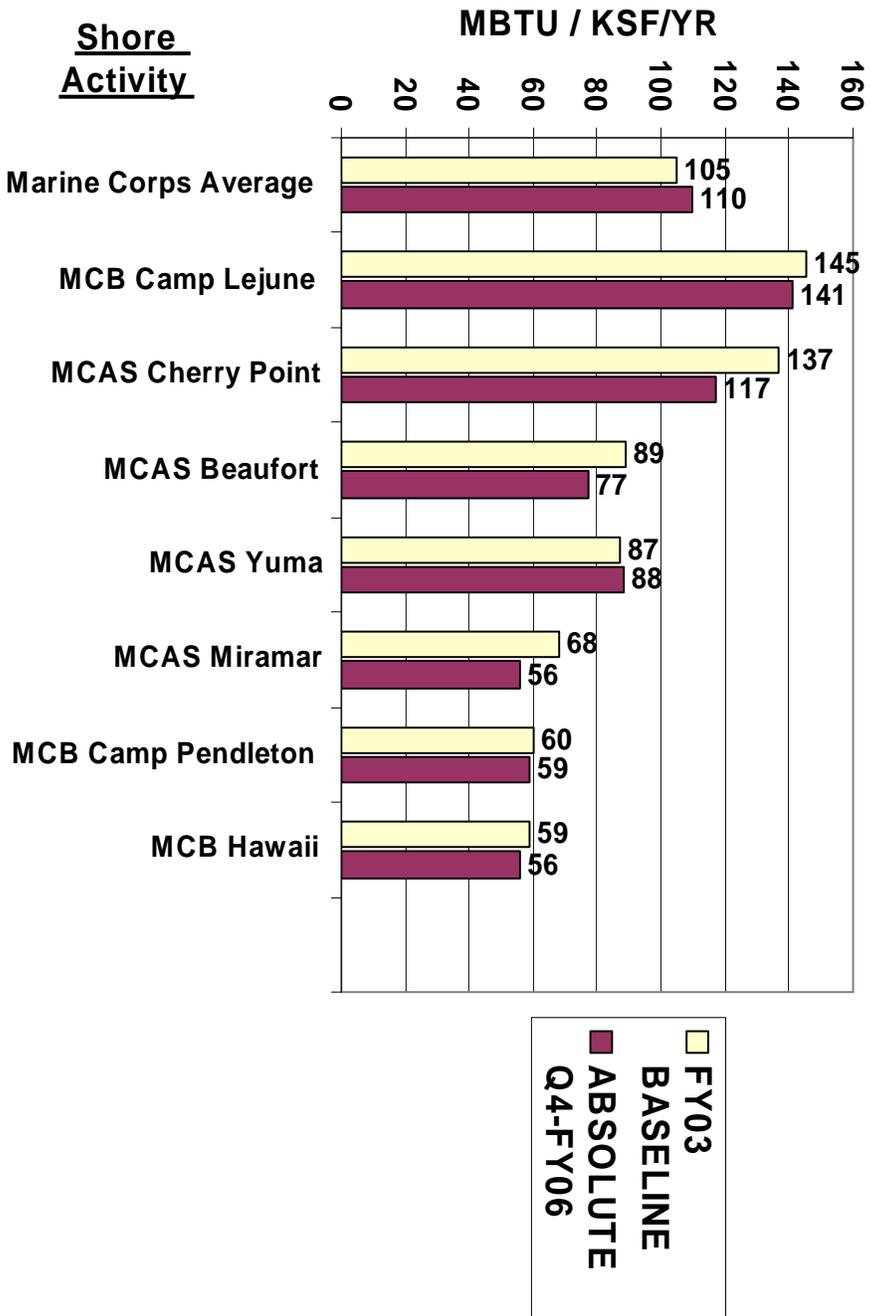


MCBH DUERS Performance





USMC DUERS Comparison

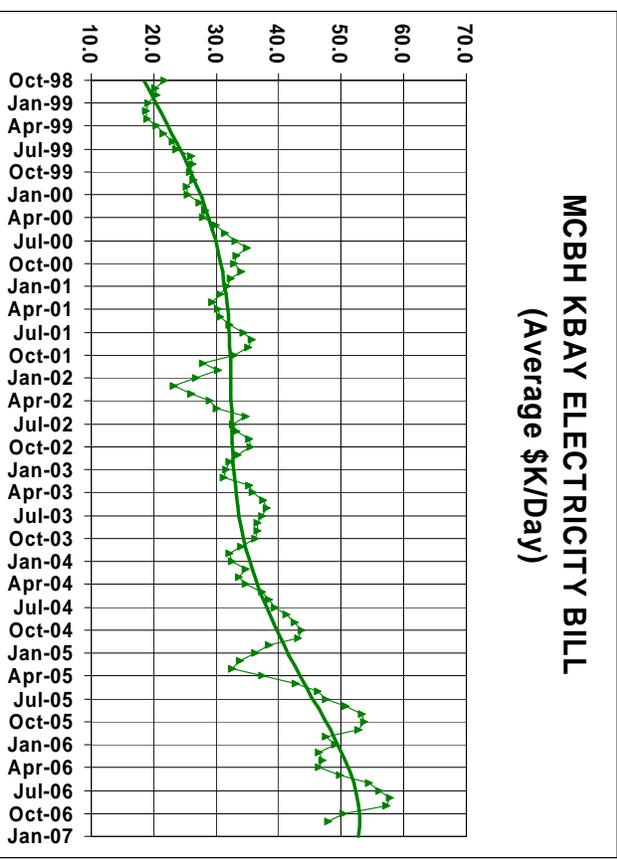
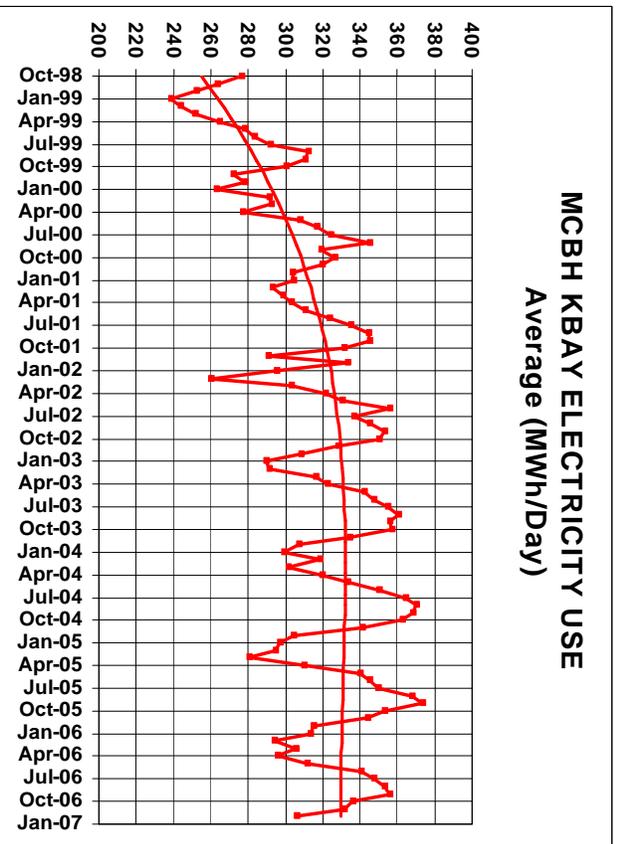




Average Electricity Use/Cost

330MWh/Day

\$55K/Day

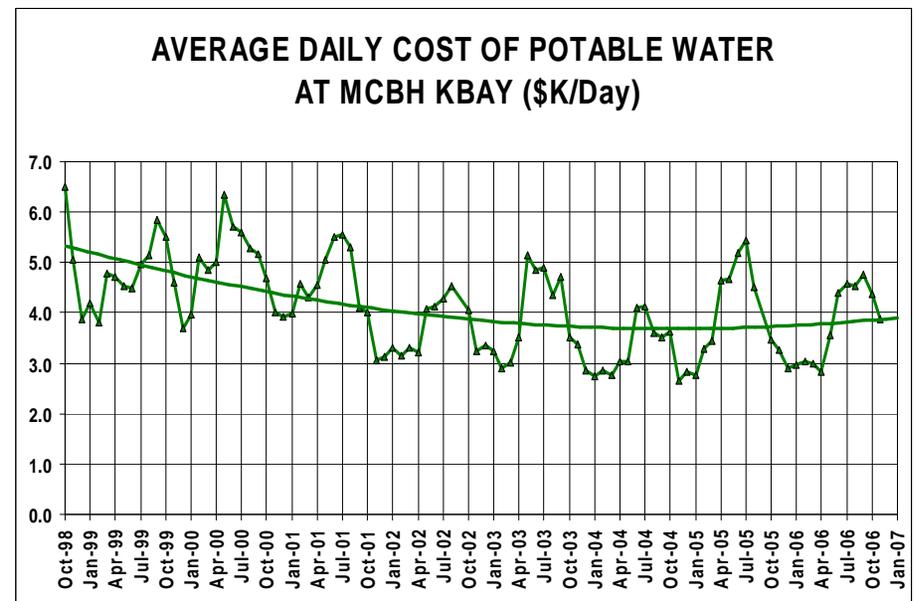
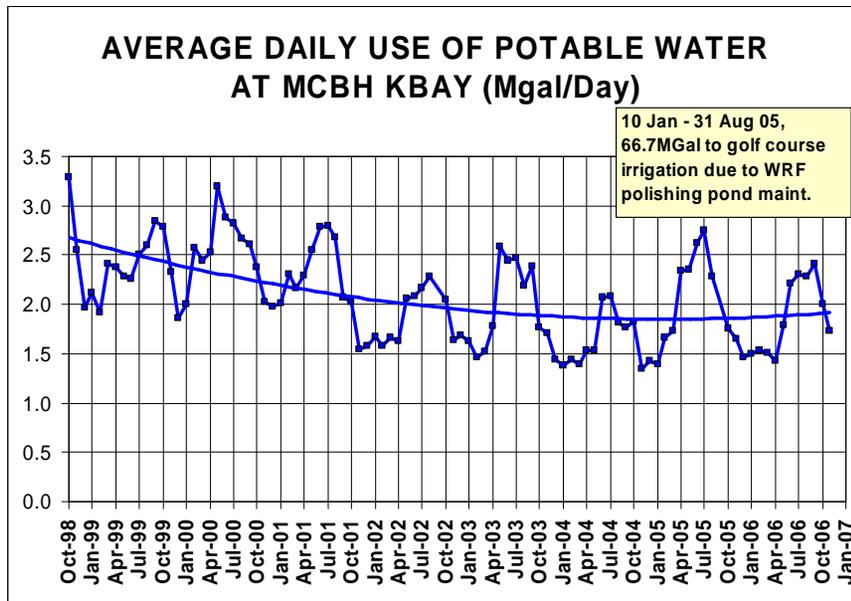




Average Water Use/Cost

1.8MGal/Day

\$3.9K/Day





Application of New Technologies and Techniques at MCBH



New Construction

- **P-749 BEQ Replacement Project (FACD Jan 07)**
 - **Design/Construct to LEED Silver Criteria & 30% better than ASHRAE 90.1 of 2004**
 - **Building Systems Commissioning**
 - **Building Systems Automation**
 - **High Efficiency Lighting, Daylighting, Controls**
 - **High Efficiency A/C & Dedicated Outdoor Air Sys**
 - **Occupancy Sensor Controls**
 - **Hot Water from Reclaimed Waste Heat**
 - **Building-Integrated PV Renewable Energy**
 - **Low-Maintenance Materials & Equipment**



P-749 BEQ Construction & Demolition Site



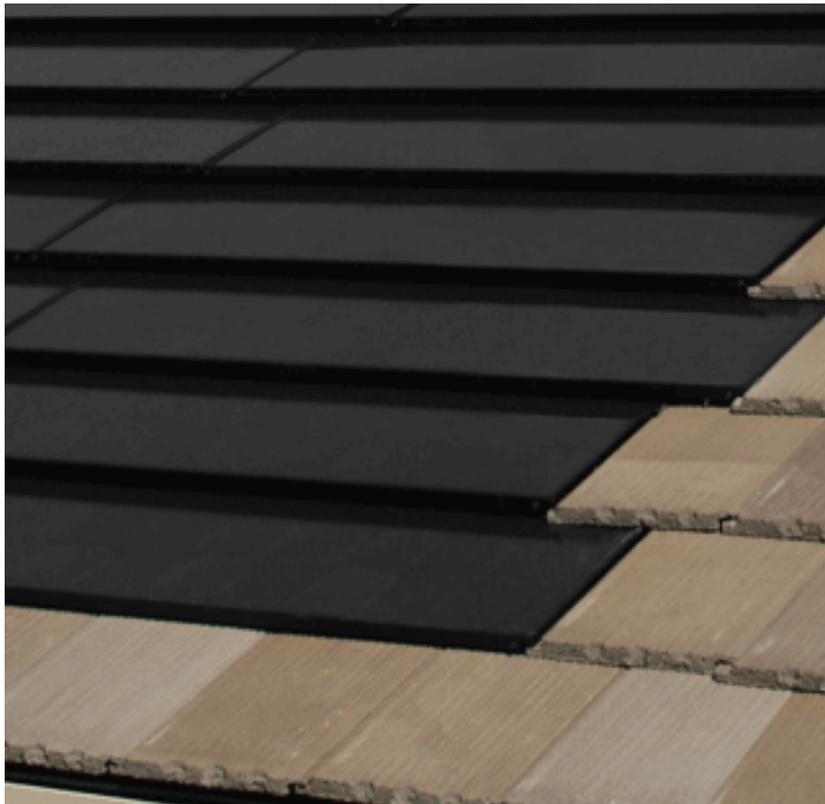


P-749 BEQ Design & Construction





P-749 BEQ Design & Construction



- Recyclable, Polymeric Synthetic Slate Roofing Tiles (Carlisle EcoStar)
- PowerLight Photovoltaic Sun Tiles, 15KW, 3,600SF/Building
- Class A Fire Rating
- 110MPH Wind-Rated
- Web-Based Performance Monitoring



New Energy Savings Performance Contract (ESPC)

- **Delivery Order #1** (Revised Initial Proposal rcvd 1/15/07)
 - **Lighting Retrofits**
 - **Daylighting Skylights / Controls**
 - **Plumbing Fixture Retrofits**
 - **A/C System Improvements / Controls**
- **Delivery Order #2** (Initial Proposal started, due in 2/28/07)
 - **Building Integrated Photovoltaics**
 - **Covered Parking Photovoltaics**
 - **Free Standing Photovoltaic Arrays**
 - **Wind Turbines**
 - **Small-Scale Hydro-Electric, using Water Reservoirs**



New Energy Savings Performance Contract (ESPC)

Daylighting with Integrated Skylights
and Lighting Controls



Building-Integrated Photovoltaic Roofing



Photovoltaic Solar Panel Covered Parking



Energy Improvement Projects

Program	Proj. No.	Project	Cost	SIR	Payback
ECIP			MCON \$		
FY07	HI0755R	Skylights & Lighting Upgrades - Various Warehouses and Workshops	\$677,000	2.23	6.4 yrs
FY08	HI0754R	Solar Hot Water Systems, Bldg 386 & 503 and Lighting Upgrades, Bldg 375	\$443,000	1.32	10.7 yrs
Unprog	HI0863R	Street and Parking Lot Lighting Retrofit	\$526,000	1.31	8.3 yrs
Unprog	P-835	1.5 MW Grid-Interactive Photovoltaic Array	\$8,095,000	0.86	15.7 yrs
EIP			FSRM \$		
Pending Validation	HI0836R	Daylighting and Lighting Retrofit, Bldg 3013	\$165,000	1.3	9 yrs
Pending Validation	HI0837R	Daylighting and Lighting Retrofit, Bldg 3014	\$118,000	1.33	8.8 yrs
Pending Validation	HI0839R	Daylighting and Lighting Retrofit, Bldg 6030	\$143,000	1.32	8.8 yrs



Technology Evaluation Projects Underway



- Cut-Off Metal Halide Street Lights (9)
 - 70W replaces 100 ~ 250W HPS
 - Cost $\$240 \times 9 = \$2,160$
 - Savings $\$325/\text{yr}$
 - Payback 6.6 years
 - Good photometrics



- Cut-Off LED Street Lights (2)
 - 20W replaced 175W MV
 - Cost $\$795 \times 2 = \$1,590$
 - Savings $\$217/\text{yr}$
 - Payback 7.3 years
 - Poor photometrics



Technology Evaluation Projects Underway



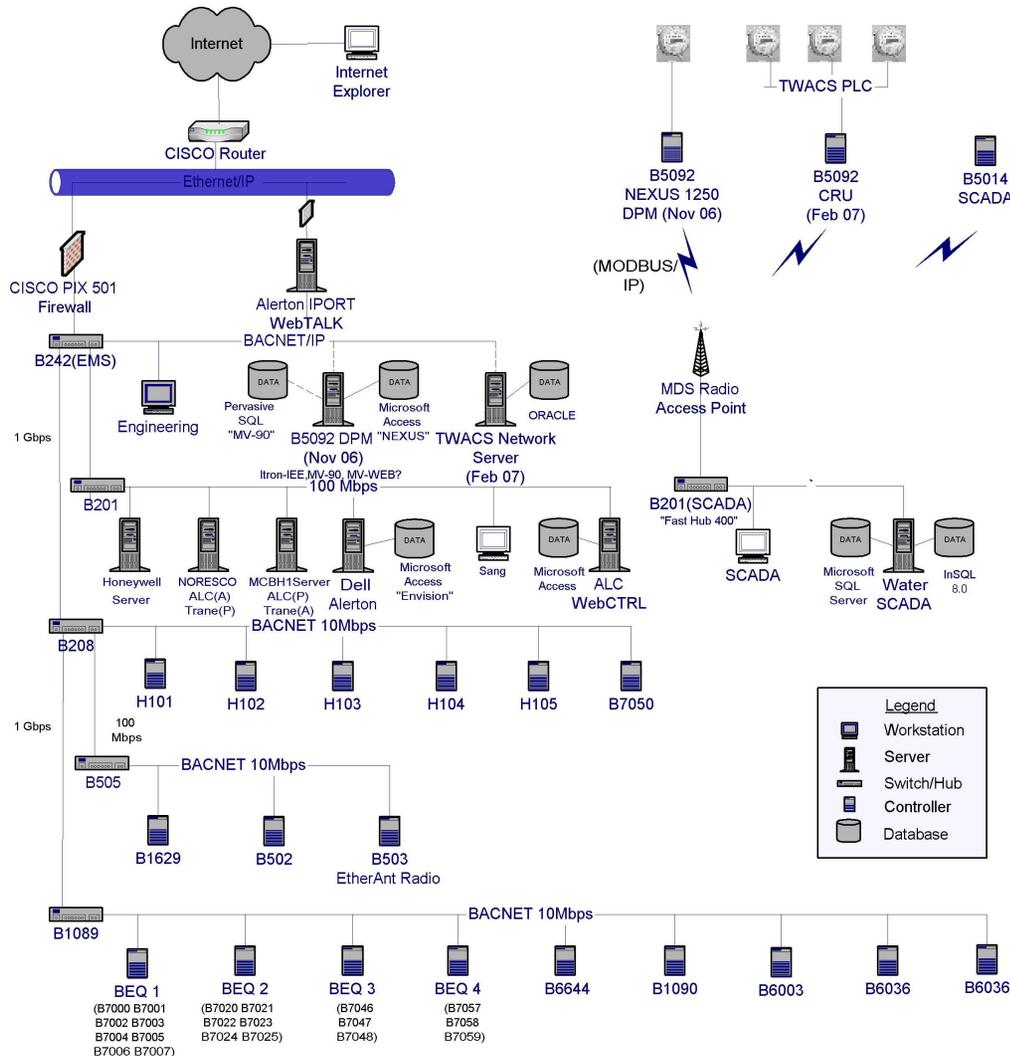
- Cut-Off LED Parking Lot Lights (2)
 - 20W replaced 100W HPS
 - Cost $\$795 \times 2 = \$1,590$
 - Savings $\$112/\text{yr}$
 - Payback 14.2 years
 - Narrow photometrics



- “Ice Bear” A/C Thermal Storage
 - Retrofitted to 5 Ton, 18 SEER, DX Split System
 - Cost $\$7,000$
 - Savings $\$759/\text{yr demand} + \$192/\text{yr KWh}$
 - Payback 7.4 years
 - Performance problems



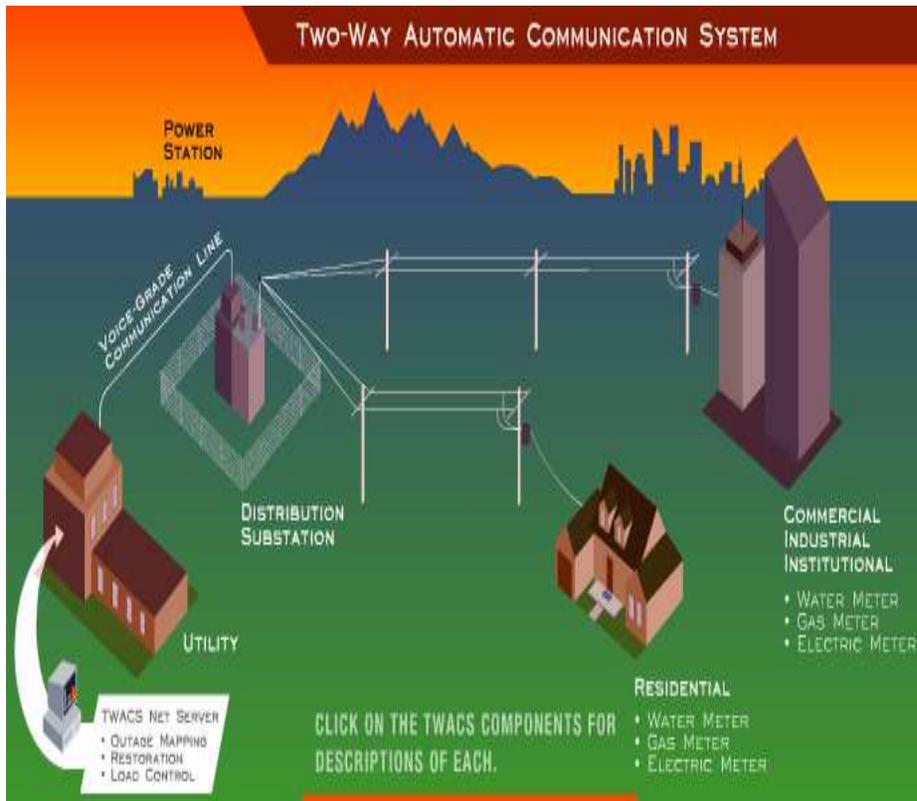
Energy Management System (EMS)



- Central Monitoring & Control of Bldg Systems
- 38 LAN-Connected Bldgs
- 18 Phone/Modem-Connected Bldgs, to be LAN-Connected
- Included in New Facility Construction
- Web Access if LAN-Connected
- Will be Integrated with AMR, SCADA, Maximo, and GIS
- KBay only now, Cp Smith in Future



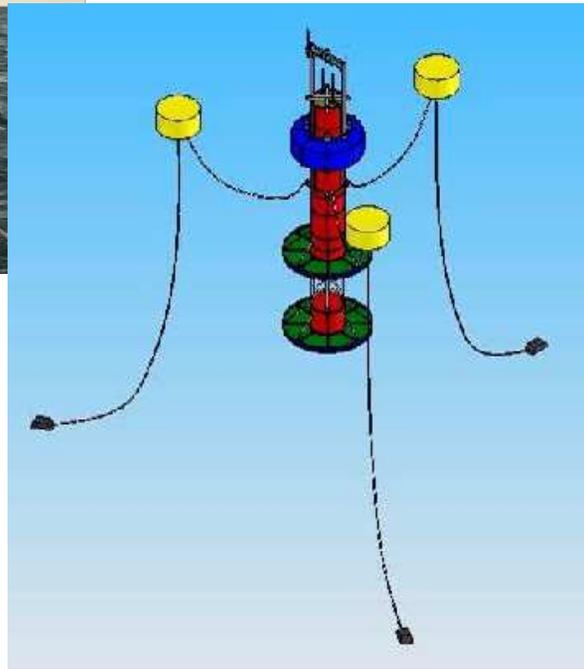
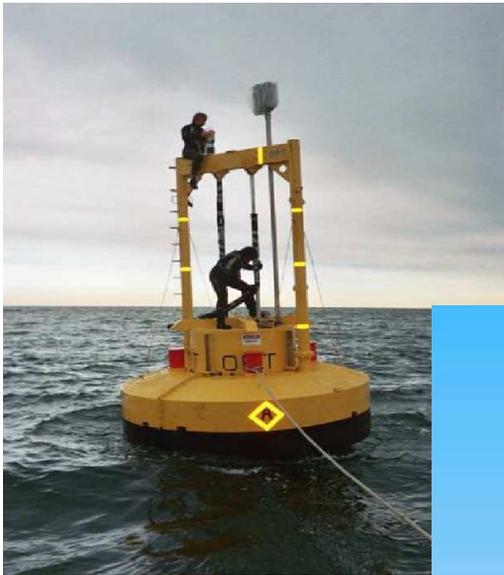
Real-Time, Remote Metering (AMR)



- Two-Way Power Line Communications
- Central Computer Reads Meters Every 15 Minutes
- Net Server & Comm Link being installed now, w/41 KWh meters for 2,366 Family Housing Units and non-housing buildings on housing circuits
- Phase 2: 36 KWh meters on 46 MCCS Bldgs & 63 KWh meters on 63 other reimbursable bldgs.
- Phase 3: 130 KWh meters on 332 non-reimbursable bldgs. & all water meters
- Phase 4: Remote Load Control on Select Facilities, & additional tenant meters, as required



Wave Energy Technology (WET) Project, Buoy #2 of 6



- ONR-Sponsored R&D
- 40KW Maximum Output
- Weighs ~22 Tons
- Site is ~1Mile NE of Taxiway "A"
- Connection to KBay Electrical Distribution System, via undersea & above ground cable & control room in underground shelter #614
- Assembly at MCBH, March 2007
- Offshore buoy installation April 2007



**The MCBH Energy Program
Continues Forward, Learning and
Implementing New Technologies,
Training, and Techniques**