Naval Facilities Engineering Command

ACTIVITY NAME

Innovation: Improving Energy and Water Efficiency

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BLUF

- **Decades of Energy Emphasis: Laws; EO's; Regulations; Goals etc with dramatic increase in last 8 yrs.**
- **In 2009, NAVFAC SE CIBL developed a "Sustainability" evaluation factor for Design-Build projects, which makes energy efficiency part of the competitive process. Contractors responded with energy efficient systems which are far above "Code Minimums".**
- **CNRSE/NAVFAC buys many items not through DB, but through defined requirements using prescriptive specifications, "Code Minimums".**
- **"Code minimums" are describe in the current Tri-Service Unified Facility Criteria (UFC) and Tri-Service Unified Facility Guide Specifications (UFGS). Slow to react to industry.**
- **NAVFAC SE CIBL issued guidance to its facility designers which sets new standards that are higher than the UFCs for certain bldg envelope, mechanical, and lighting systems.**

Total Ownership Cost

LCCA Comparison – Three Chillers (50,000 SF Building)

	"Code Minimum" Air-Cooled, Scroll, Multi-Compressor Chiller (12.5 yr life)	"High Efficiency" Air-Cooled, Constant Speed, Rotary Screw Chiller (25 yr life)	"Super High Efficiency" Air-Cooled, Variable Speed, Magnetically Levitated Centrifugal Chiller (25 yr life)
First Cost	$62,500	$75,000	$125,000
Maintenance & Replacement Annualized Cost	$6,299	$400	$200
Annual Energy Bill	$71,800	$67,190	$47,170
25 yr Present Value	$1,409,094	$1,251,945	**$949,854**

Opportunities

- Incorporate <u>focused</u> energy and water efficiency strategies that exceed code minimums in:
  - New Construction Contracts
  - Renovation / Repair Contracts
  - Facility Support Contracts
  - Tenant Specified Equipment / Systems
- Influence those who "define the requirements"
- Issue technical guidance to designers, energy managers, and tenants
- Result: Lower Facility Total Ownership Cost

Mechanical Strategies

- **HVAC Systems (new construction and change outs)**
  - Developed HVAC system selection guidelines
  - Use “Super” high efficiency low maintenance chillers
  - Use NEMA premium efficiency motors
  - Use Dedicated Outdoor Air Systems w/energy recovery
  - Develop specifications for the above requirements
- **Water Heaters**
  - Use Air Source Vapor Compression type water heaters
  - Integrate solar & increase solar fraction of domestic hot water capacity from 30% to 50%
- **Water Conservation & Solar**
  - Use Low or ultra-low water-usage fixtures
  - Consider rainwater storage/distribution at isolated facilities
  - Use Evacuated Tube Solar Collectors (collects 80% of solar energy) vs flat panel (collects 20% of solar energy)

Architectural Strategies

- **Air Barriers**
  - Require air barriers in all new construction
  - Include building air leakage test protocol
  - Developed air barrier guide specification

- **Insulation**
  - Increase insulation values in walls and roofs

- **Glazing Assemblies**
  - Increase Solar Heat Gain Coefficients and U-Factors to comply with ASHRAE 90.1-2010 (vice 2007 edition)
  - Require thermal breaks and low-emissivity glazing
  - Require air-tightness of glazing materials to meet ASHRAE 90.1-2010 requirements (vice 2007 edition)

Lighting Strategies

- **Interior Lighting and Controls**
  - For new construction, require Extended-Life small diameter T5 fluorescent lamps for general lighting (36K hrs vs 25K hrs greater life than standard T8 fluorescent lamps)
  - Use Induction Lamps for 24/7 lighting and hard to maintain lighting (100K hrs vs 25K hrs)
  - Use Extended-Life fluorescent lamps when relamping existing (36K hrs vs 25K hrs)
  - Use Dimming ballasts and mult-layered control system to modulate illuminance in spaces with day lighting

- **Exterior Lighting and Controls**
  - For new construction, require pole-mounted LED luminaires with multi-layered controls for area lighting and parking