Western Power Grid Peak Demand and Energy Reduction Program Army

Steven A. Parker, P.E., C.E.M., Program Manager
steven.parker@pnl.gov
Battelle—Pacific Northwest Division
Richland, WA

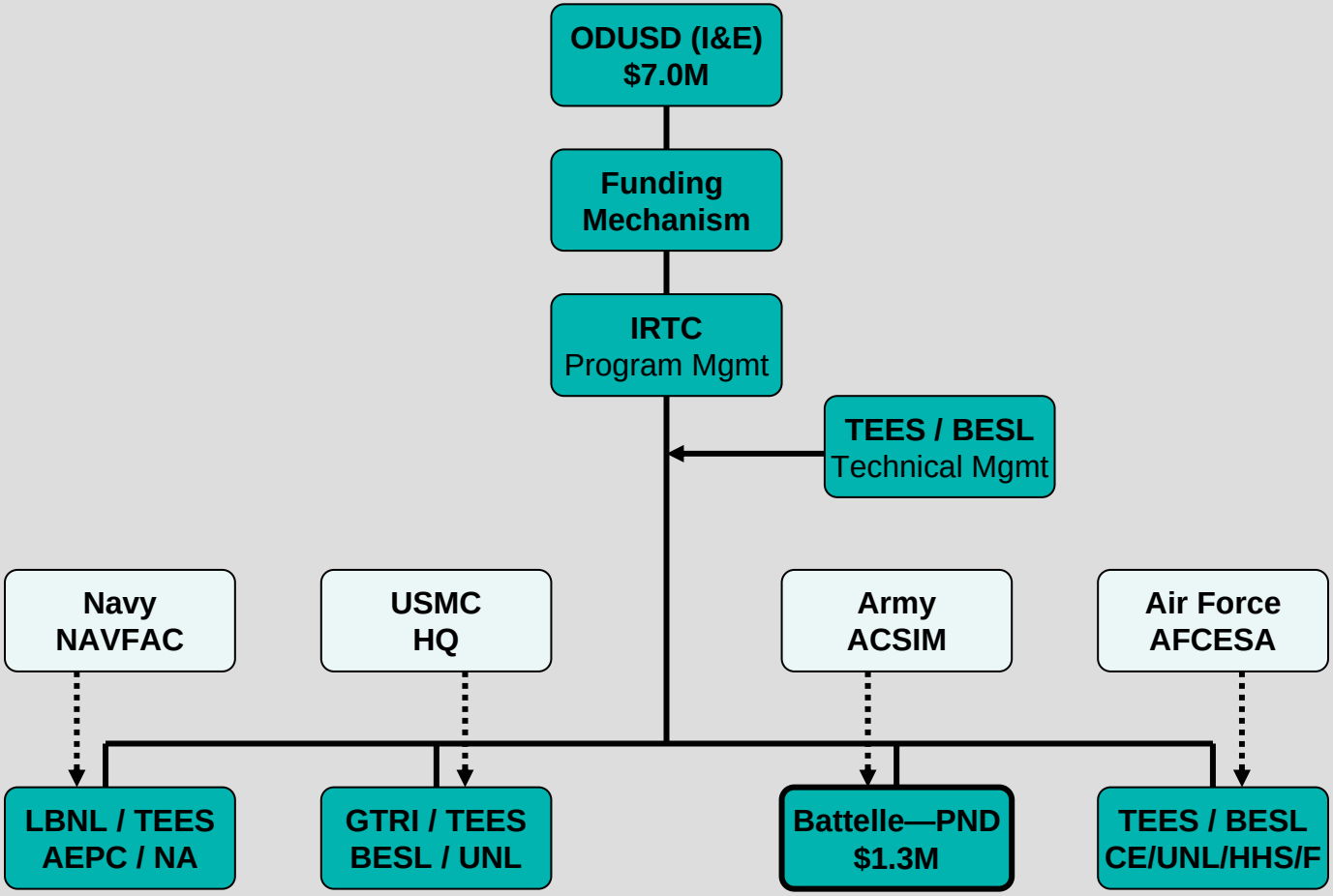
The Department of Defense

- The Need
  - Meet energy and greenhouse gas reduction goals set by Congressional legislation and Executive Order
- The Problem
  - Federal government's energy bill totals almost $8 billion per year
  - DoD owns over 2 billion gross square foot of facilities (does not include leased space)
  - DoD facilities account for over $2 billion per year in energy costs
  - The mission of the DoD does not include saving energy
- The Opportunity
  - The California energy crisis, which expanded throughout the West, increasing both gas and electricity prices
  - Congress appropriated $7 million for the purpose of identifying peak demand and energy reduction projects at DoD facilities
  - Western Power Grid Peak Demand and Energy Reduction Program was created

The Program

- The objective is to provide technical services to military installations to identify specific projects at specific installations that are cost effective and would make the greatest impact in terms of reducing energy consumption and demand
- Managed from the Office of the Deputy Under Secretary of Defense (ODUSD) for Installations and Environment (I&E)
- The program is divided into four components, one for each Service branch: Army, Air Force, Navy and Marine Corps
- Office of the Assistant Chief of Staff for Installation Management (ACSIM) operates as the COTR for service delivery to the Army
- Battelle—Pacific Northwest Division operates as the lead subcontractor for service delivery to the Army. [*Battelle also operates the Pacific Northwest National Laboratory for the U.S. Department of Energy*]

The Program



Acronyms defined on later slide

The Approach

- Phase I—Develop Initial Scope and Services
  - Scope of services defined
  - ACSIM selected seven Army installations
- Phase II—Delivery of Services
  - Initial site assessment
    - General reconnaissance of installations during initial site visit
    - Preliminary energy assessment using general FEDS (Facility Energy Decision System) assumptions
  - Specialty service—FEDS
    - Detailed site assessments using FEDS with collected data
    - Specific retrofit projects identified in final report
  - Specialty service—HVAC re-tuning
    - HVAC re-tuning using ALERT, WBD, and other tools
    - Some improvements made while on site, additional opportunities identified in the final report

The Services

- Initial Site Assessment
  - Site orientation and collection of relevant site energy and facility data
  - “Walk-through” audit using FEDS and basic assumptions
  - Initial assessment report summarizes potential energy-saving retrofit opportunities and preliminary results
  - Screening for specialty services and other energy-efficiency project opportunities, including reconnaissance for FEDS assessment and HVAC re-tuning services
  - Recommend additional projects to be evaluated

The Services, continued

- Specialty Service—FEDS Assessment
  - Collect detailed building and equipment data
  - Use FEDS software for assessment of retrofit energy-saving measures
  - Manually evaluate additional energy-saving projects (if identified and within project scope and budget)
  - Deliver final report to Army site and headquarters (ACSIM), including MILCON request forms (DD 1391) for specific projects
  - Recommend additional energy-saving projects, which should be evaluated at each installation
  - Deliver FEDS database to site for future assessments

Preliminary Results
from Initial Assessment Reports

Installations	Buildings (Qty)	Total Area (gsf)	Savings (10^9 Btu/yr)	Savings ($M/yr)	Investment ($M)	Payback (yr)
Fort Carson, CO	773	8,666,234	95.3	1.7	8.6	5
Fort Drum, NY	1,348	7,348,358	103.0	1.5	7.2	5
Fort Huachuca, AZ	713	5,475,392	65.4	1.1	4.7	4
Fort Shafter, HI	156	1,661,399	6.8	0.1	0.9	6
Parks RFTA, CA	72	964,963	3.6	0.3	1.5	5
Presidio of Monterey, CA	120	1,786,140	16.7	0.2	0.8	4
Schofield Barracks, HI	631	6,897,047	43.8	1.2	2.0	2
Sierra Army Depot, CA	721	4,572,231	19.0	0.7	5.3	7
Total	**4,534**	**37,371,764**	**353.6**	**6.9**	**30.9**	**4**

The Services, continued

- Specialty Service—HVAC Re-tuning
  - Target limited number of HVAC systems
  - Perform condition assessment and re-tuning to improve operating performance
  - Inspect equipment condition and identify maintenance needs
  - Test equipment using new tools and technology (automated diagnostics)
  - Examine, evaluate and adjust controls
  - Check and correct schedules
  - Assess efficiency improvement

Preliminary Results
from HVAC Re-Tuning Analysis

- Inspected and adjusted 44 air-handler units and 19 roof-top air-conditioning units
- Adjusted program controls and set-points
- Found most air-handling units, dampers, and economizers needing repair
- Found many controls not well utilized
  - e.g., fans set for 24/7 without need; multiple pumps running to serve a small load
  - PX HVAC controls on 24/7 reset to 14 hrs “on.” Results $11,800/yr reduction in fan energy.
  - Barracks AHU dampers repaired. Results $1,200/yr reduction in HVAC energy
- Adapted re-tuning checklists to the scheduled maintenance program

Thank you

Any Questions?

Additional Information Slides

FEDS
Facility Energy Decision Screening

- Software Tool Developed by PNNL for DOE
- Technology and Fuel-Neutral Assessment
  - Evaluation of hundreds of potential energy-efficiency measures
  - Also determines emission reduction associated with retrofit projects
- Life-Cycle Cost Optimization
  - Selects energy measures to minimize total life-cycle costs
  - Simulation takes into account interactive and synergistic affects between technologies and between buildings
  - Also takes into account weather, occupancy patterns, building-use types, construction types, and facility age
- Proxy Approach to Energy Auditing
  - Applicable for single building but excellent for campus-type environments, especially where multiple buildings have similar characteristics and equipment
- Alternative Financing Analysis
  - Software can optimize for appropriated funds or alternative financing
  - Delivers the information necessary for writing project funding proposals [automatically develops MILCON forms (DD 1391) for ECIP applications]

FEDS Limitations

- While FEDS does evaluate over 100 energy measures, it is limited to those energy measures within its database. There are many additional energy-saving opportunities and technologies available today.
- FEDS evaluates retrofits with similar equipment categories; it will not look at complete system replacements or upgrades.
  - Example: FEDS will not replace a distributed air-conditioning system with a central HVAC system.
- FEDS can not evaluate large central energy plants. Central energy plants are currently evaluated manually.
  - A central energy plant module is scheduled to be developed for FEDS during 2003-2004. The development of this module is being funded by the Army (SERO).
- FEDS does not evaluate maintenance and operations-type measures, which are frequently seen at military facilities.
- FEDS does not evaluate energy management control system strategies (intelligent building controls).

Program Organization Chart

- Program Lead
  - ODUSD(I&E) - Office of the Deputy Under Secretary for Defense for Installations and Environment
- Contracting Officer Technical Representatives (COTR)
  - Air Force – AFCESA – Air Force Civil Engineer Support Agency
  - Army – ACSIM – Assistant Chief of Staff for Installation Management
  - Marine Corps – USMC-HQ – US Marine Corps Headquarters
  - Navy – NAVFAC – Naval Facilities Engineering Command
- Prime Contractor
  - IRTC – Intuitive Research and Technology Corporation
- Lead Subcontractors
  - Battelle—Pacific Northwest Division
  - BESL – Brooks Energy and Sustainability Laboratory
  - GTRI – Georgia Tech Research Institute
  - LBNL – Lawrence Berkeley National Laboratory
  - TEES – Texas Engineering Experiment Station
- Additional Subcontractors
  - AEPC Group
  - CE – Cape Environmental
  - F – Frontline Systems
  - HHS Enterprises
  - NA – Newcomb Anderson
  - UNL – University of Nebraska-Lincoln

Benefit to DoD and the Army

- Cost-effective approach to auditing large number of military facilities and developing a large number of cost-effective retrofit energy-saving projects
- See how well energy-efficiency tools work in their environment
- Identify new technology development areas
- Leverage off DOE programs
- Leverage use of DOE laboratory staff experience

Benefit to PNNL

- Helps the laboratory develop better products for DOE and other federal agencies
  - Gain additional insight to new types of facilities and military installations
  - Identify opportunities to expand capabilities of FEDS, WBD, ALERT, and other tools
  - Obtain additional, real-world, field experience with laboratory-developed and other tools
- Supports on-going DOE program activities
  - Supports the DOE-FEMP mission
  - Continues technology transfer of FEDS, WBD, and ALERT

Scope of Activities

Installations	Audited Facilities		Service		
	Buildings (Qty)	Total Area (gsf)	Initial Assessment	FEDS Assessment	HVAC re-tuning
Fort Carson, CO	773	8,666,234	X	X	X
Fort Drum, NY	1,348	7,348,358	X	X	
Fort Huachuca, AZ	713	5,475,392	X	X	X
Fort Shafter, HI	156	1,661,399	X	X	
Parks RFTA, CA	72	964,963	X	X	
Presidio of Monterey, CA	120	1,786,140	X	X	
Schofield Barracks, HI	631	6,897,047	X	X	
Sierra Army Depot, CA	721	4,572,231	X	X	
Total	**4,534**	**37,371,764**			