U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Whole Building Performance-Based Procurement Training

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Project Definition

Replicating NREL/DOE procurement process successes in reaching 50% building energy savings at typical construction costs, by:

- Creating a how-to guide that outlines the entire acquisition process, including: setting a building energy requirement, project team selection and management, and O&M best practices
- Describing RFP and contract language that can be used to define efficiency requirements at the whole building and system level
- Using the how-to guide to teach the pilot partners how to set up and execute the defined acquisition process
- Partnering with industry-recognized training organizations to expand the audience and address content gaps (e.g., design-build fundamentals)

Purpose & Objectives

Problem: Typically, energy efficiency requirements are not factored equally into the building acquisition process along with schedule, budget, and quality, resulting in underperforming buildings or expensive sustainable buildings.

Impact of Project: Ready access to performance-based procurement/acquisition training materials for federal and private building owners and operators. Market evidence of deep energy savings that can be achieved through process change.

Project Focus: Increase the speed and scope of achieving 50% energy savings in the commercial building sector by making training materials available through trusted industry training organizations.

Project Background

Procurement process for NREL pre-2007:

- Design-bid-build project delivery
- LEED-driven sustainability goals

Procurement process for NREL post-2007:

- Design-build project delivery with firm fixed price
- Specific energy performance requirements in the Request for Proposal (RFP, also referred to as the contract)
- Research Support Facility (RSF), office example: 35 kBtu/ft^2/yr
- Energy modeling required to substantiate energy use requirements
- Energy end-use metering requirement
- Voluntary incentive ($) program to ensure measurement and verification outcome can meet predicted performance

World Class Efficiency is Possible within Typical Construction Budgets!

Spend the time to get RFP right

- Include absolute energy use intensity (EUI) requirements, if possible

Set up acquisition process to “force” integrated design

- Energy modeling guides conceptual design decisions
- Architecture and envelope are also efficiency measures

Commit 100% to problem statement

- Unleash power of design/build team of experts to meet your needs—true value engineering
- Commit to your objectives and don’t adjust

Approach

Training Methods:

- Use the example of DOE/NREL's proven success in achieving over 50% energy savings on NREL campus construction as a basis for training materials
- Show examples of performance-based procurement implementation to demonstrate the efficacy of the training materials
- Incorporate the training content into industry partners' training/outreach formats for faster dissemination

Key Issues:

- Coordinate with existing training organizations to fit training materials to their curriculum
- Use multiple outreach platforms to make the content widely available

Distinctive Characteristics:

- Track projects currently implementing performance-based procurement while continuing information deployment on a larger scale
- Partner with the Design-Build Institute of America (DBIA) and the Federal Energy Management Program (FEMP) to reach more owners/teams

Accomplishments and Progress

Accomplishments and Progress

Accomplishments:

- More than 30 outreach/training activities using existing training materials have been conducted in the past year, reaching over 800 industry partners
- Organizations such as the DoD, NASA, the University of Chicago, and the Coast Guard have incorporated performance-based procurement concepts into their design and construction processes
- LEED v4 will require project energy performance goals

Progress on Goals:

- Verbal agreement and path forward with DBIA as a training partner
- EERE Web page and NTER module plans are complete as additional deployment paths

Accomplishments and Progress

National Renewable Energy Laboratory
Research Support Facilities Workshop

Energy-Performance-Based Procurement Background Materials

The following documents are available to help you learn how the U.S. Department of Energy and NREL used an Energy-Performance-Based Procurement process to expand its campus to include high performance office space, laboratories, and site infrastructure. The content is focused on the Research Support Facility, which is NREL's net zero energy office building completed in June, 2010.

Summary Documents

1.1 The Design-Build Process for the Research Support Facility

2.0 Foundational Documents

2.1 Integrated Design Team

- Zero Energy Buildings: A Critical Look at the Definition
  Conference Paper: NREL/CP-550-39833
- Net-Zero Energy Buildings: A Classification System Based on Renewable Energy Supply Options
  Technical Report: NREL/TP-550-44586
- DOE/NREL's Research Support Facility Energy Goals and Net-Zero Energy Calculations
  Reference Sheet
- Getting to Net Zero
  ASHRAE Journal Article: September 2009
- Zero and Net-Zero Energy Buildings + Homes
  Building Design+Construction White Paper: March 2011

3.0 How-To Documents

3.1 Integrated Design Team

- A Handbook for Planning and Conducting Charrettes for High-Performance Projects
  NREL/BK-550-44051
- Main Street Net-Zero Energy Buildings: The Zero Energy Method in Concept and Practice
  Conference Paper: NREL/CP-550-47870
- Reducing Plug and Process Loads for a Large Scale, Low Energy Office Building: NREL's Research Support Facility
  Conference Paper: NREL/CP-5500-49002
- Reducing Plug and Process Loads for a Large Scale, Low Energy Office Building: NREL's Research Support Facility
  Presentation
- Assessing and Reducing Plug and Process Loads for in Commercial Office and Retail Building
  Presentation
- The Role of Modeling When Designing for Absolute Energy Use Intensity Requirements in a Design-Build Framework
  Conference Paper: NREL/CP-5500-49067
- Controlling Capital Costs in High Performance Office Buildings: 15 Best Practices for Overcoming Cost Barriers in Project Acquisition, Design, and Construction
  How-To Guide

4.0 Results Documents

4.1 Integrated Design Team

- NREL's Research Support Facility: An Energy Performance Update
  Presentation
- RSF Workshop Session I: Energy Goals and Features of the RSF
  Workshop Presentation
- RSF Workshop Session II: Performance-Based Design-Build Process
  Workshop Presentation
- RSF Workshop Session III: Cost Considerations
  Workshop Presentation
- RSF Workshop Session IV: Occupant Behavior
  Workshop Presentation

4.2 Architects

- Energy and Architecture: The Sustainable Future The Research Support Facility Project
  Fact Sheet
- NREL Research Support Facility
  RNL Case Study

4.3 Owners

- Green Design-Build Model Crafted for Buildings To Achieve Net-Zero Energy Use
  ENR Article May 2010
- The Road to Net Zero
  Presentation
- National Renewable Energy Laboratory Sustainability Report FY 2009
  Fact Sheet: NREL/MP-3000-47450
- [illegible] inactive Request for Proposals (RFP) Number RFJ-8-77550
  - Appendix A: Request for Proposal and Conceptual Documents
    - Amendment 4
    - Amendment 5
    - Amendment 6
    - Amendment 7
    - Amendment 8
    - Subcontract

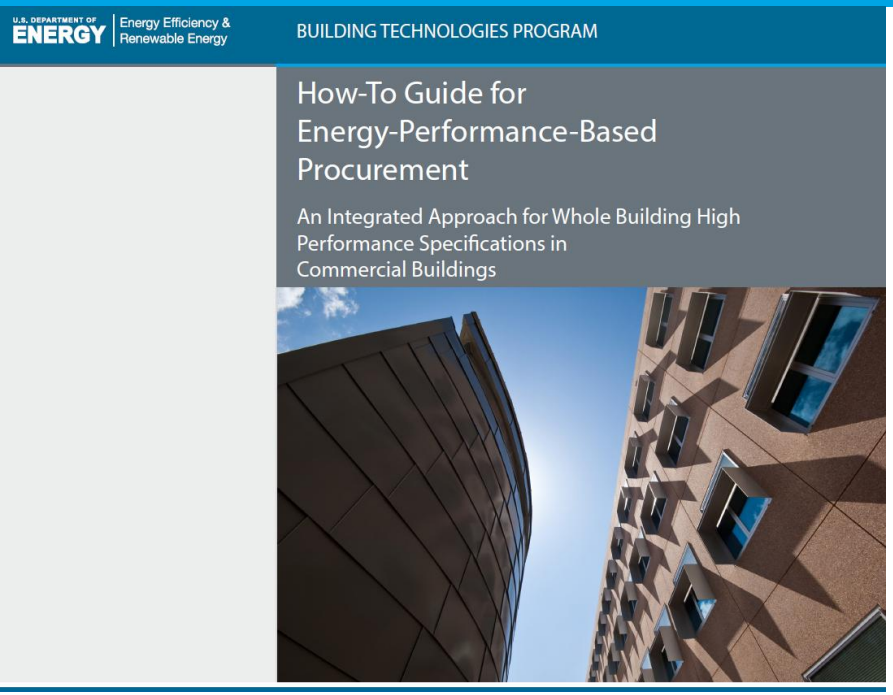
4.4 Building Occupants

- Labyrinth to Store Energy in Basement for Later Use
  NREL Now Article – May 29, 2009
- Recycled Natural Gas Pipes Shore Up Green Building
  NREL Now Article – July 17, 2009
- Building Panels Protect, Provide Comfort
  NREL Now Article – October 30, 2009
- NREL Sets the Bar for Office Building Energy Use
  NREL Now Article – December 7, 2009
- Light Inspires Energy Efficient Building Design
  NREL Now Article – March 1, 2010

Materials

- Summary Documents
- Foundational Documents
- Results Documents on Integrated Design Team, Architects, Owners, and Building Occupants

Accomplishments and Progress



Materials

- How-To Documents
- Results Documents on Integrated Design Team, Architects, Owners

Procurement Step	Project Phase	Roles and Responsibilities (page number)											
		Owner / Executive Management	Owners Representative	Owner / Contracts	Owner / Project Manager	Energy Modeler	Integrated Project Team	General Contractor	Architect	Design Engineer	Commissioning Agent	Owner / Facility Manager	Owner / Energy Champion
Select the project delivery method	Pre-design	p. 14	p. 16	p. 14		p.15							
Develop energy performance goals	Pre-design		p. 24			p. 25	p. 24						
Include energy performance goals in the contract	Pre-design		p. 27,28, 31	p. 32			p. 28,29	p. 32	p. 32	p. 32			
Manage the project to ensure energy performance specifications are met	Design through construction		p. 36, 41, 43	p. 43	p. 36, 43	p. 36	p. 36	p. 36, 41	p. 36, 41	p. 36, 41	p. 36	p. 36	
Verify building performance	Design through occupancy			p. 45	p. 45	p. 45					p.45	p. 45	p. 45

Testimonials

- "It may sound corny, but after seeing the RSF, it really was the first day of the second half of my career. I saw the integration at RSF, the total comprehensive thinking, and thought, 'I've got to get involved in a project that's going in this direction.'"

  — Kenner Kingston
  Director of Sustainability for ARCHITECTURAL NEXUS, INC.
  Designing an administrative office space in the area of Salt Lake City, Utah.

Credit: Dennis Schroeder, 19911

- "We've had quite a bit of input from NREL, and my visit to the RSF showed me the opportunities to be deeply energy efficient. The New York State Energy Research and Development Authority is partnering with us and contributing funding to the design effort."

  — Robert R. Bland
  Senior director for energy and sustainability with Cornell University

Courtesy of Kilograph 2012

- "It was very impressive, the degree to which NREL is monitoring the things that people are doing on their side of the plugs. We'd known that we could do dramatic things with efficient refrigerators, dishwashers, and lighting, but the fact that NREL was paying so much attention to the real work side of the house — the computers, monitors, printers, and task lights — caused us to go back and look at our IT really carefully."

  — Denis Hayes
  Bullitt Foundation President

Credit: Dennis Schroeder

Project Plan & Schedule

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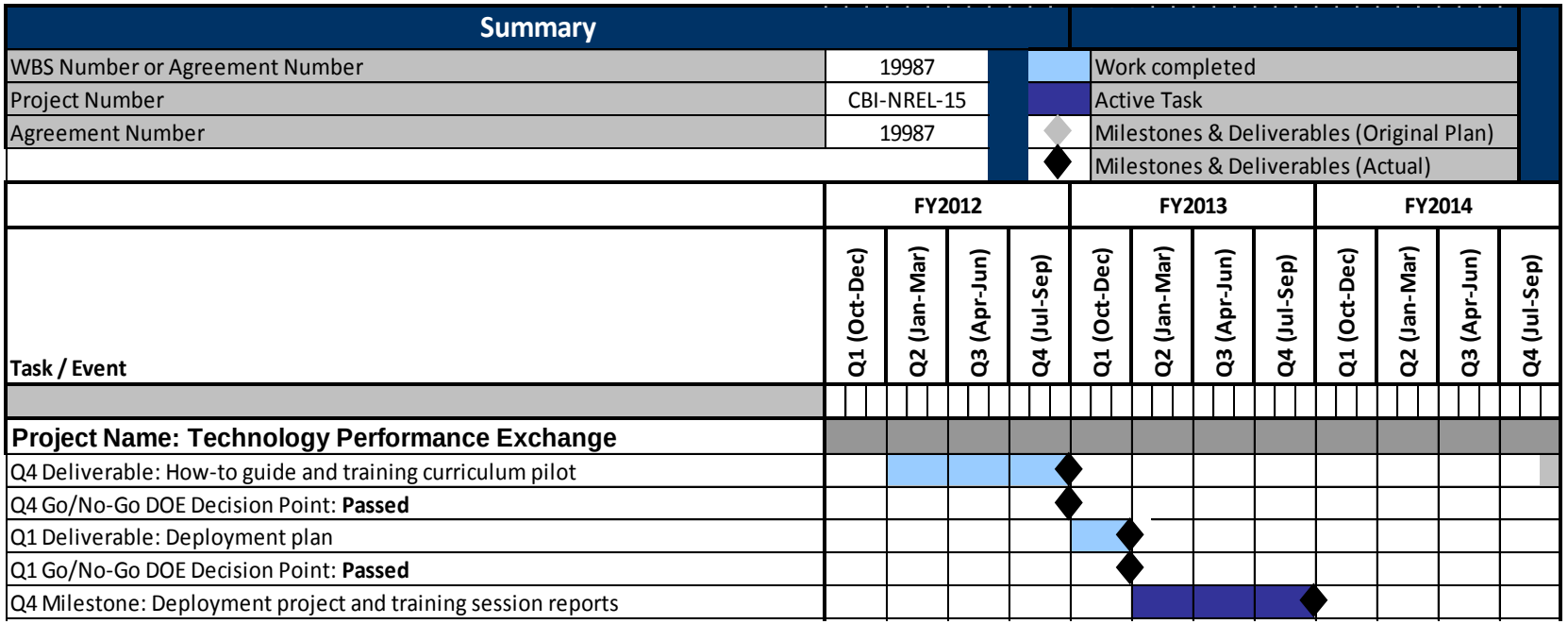
Project Start Date: January 1, 2012

Project Planned Completion Date: September 30, 2013

Schedule and Milestones: Deliverables/milestones on time and on budget

Go/No-Go Decision Points: Two passed



Project Budget

Project Budget:

- FY2012: $330,000 BTO; $10,000 FEMP; $340,000 total
- FY2013: $150,000 BTO; $10,000 US Coast Guard/DHS

Variances:

- No project plan modifications

Cost to Date:

- On schedule; $106,000 spent in FY2013
- $44,000 remaining

Budget History					
FY2010		FY2011		FY2012	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
N/A	N/A	N/A	N/A	$330,000	$10

Project Integration, Collaboration & Market Impact

Partners, Subcontractors, and Collaborators:

- Training Partners: DBIA, FEMP, GSA, Mindshift, Green Parking Council
- Deployment Partners: NASA, Army, Coast Guard, University of California, San Francisco, University of Chicago, California State University, Urban Land Institute

Technology Transfer, Deployment, Market Impact:

- Ongoing collaboration with deployment partners
- Performance-based procurement process implementation for projects such as:
  - Fort Carson New Command Air Battalion
  - SLAC National Accelerator Laboratory
  - University of California, San Francisco new office building
  - University of Chicago, new residence hall and cafeteria

These projects have all successfully included energy goals in the contracts

Project Integration, Collaboration & Market Impact

Communications:

- Ongoing outreach, workshops, NREL campus tours, and presentations, such as:
  - Existing materials landing page: https://www.nrel.gov/extranet/rsf_workshop/
    (User name: RSF_Workshop, Password: RSF_Workshop)
  - CBEA webinars:
    - Energy-Goal-Based Building Procurement: Achieving 90% Energy Savings in a Parking Structure http://www1.eere.energy.gov/buildings/commercial/pdfs/energy_goal_based_building_procurement_2012-08-08.pdf
    - Getting to Net Zero Energy Through a Performance-Based Design/Build Process http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/ns/webinar_rsf_03182010.pdf
  - Conference sessions: GreenGov, DBIA, Urban Land Institute, ACEEE

Next Steps and Future Plans:

- Complete transfer of information from NREL extranet site to EERE Web page
  - Web page will link to documents in the Commercial Buildings Resource Database
  - Traffic statistics and user information will be tracked
- Complete NTER module that introduces performance-based procurement
- Reformat existing materials to align with existing DBIA training modules and post content on DBIA website
- Continue tracking deployment partners for successes and lessons learned to incorporate in DBIA bi-weekly articles