



Integrating Renewable Energy into  
Federal Construction:  
**Overview**

RWG Meeting  
October 19, 2011



# Why Develop This Guide?

- Renewables are key to meeting Federal energy requirements for new construction and major renovations:
  - Renewables electricity requirements (EPA Act 2005, Section 203)
  - Energy reduction requirements (EISA 2007, Section 431 )
  - Fossil fuel energy consumption reductions (EISA 2007, Section 433)
  - Greenhouse gas reductions & net-zero requirements (E.O. 13514)
  - Solar hot water requirements (EISA 2007, Section 523)
- Federal agencies need help integrating RE into projects
  - Renewables are a new concept to many design/construction teams
  - Need upfront, reliable information for planning and budget requests
  - Integration of RE early is key to reducing costs and expanding options
  - **Agencies are eager for this product**

# Steering Committee



**US Army Corps  
of Engineers**



- Steering Committee formed in May 2010 for guidance throughout the process
- Charrette in July 2010 involved over 50 representatives from 21 Federal agencies.
- Charrette input used to direct Guide development
- Steering Committee used for review/decisions at each critical stage in development

- Project Managers
  - Understand how RE can help them meet energy goals/requirements
    - Evaluation criteria for selecting RE
    - How and when RE fits into planning/design
    - Key actions at each stage of project
    - Basics about technology options
- Budgeting Staff
  - Ability to put numbers to preliminary plan
- Facility Managers
  - Understand impacts of RE on other building systems
  - O&M issues and methods for ensuring RE integrated into building operation
- Executive Management
  - Not a primary target, but overview information could be accessed by them or passed along by staff



- **Web-based technical guide**
  - New concept for FEMP
  - Can stay current with changing requirements and data
- Provide a one-stop portal for federal agencies accessing info on renewable energy in construction projects
  - Used and Useful
- Links to useful resources
  - Highlights a variety of FEMP products and resources
  - Links between related topics within Guide
  - External links to useful/updated info:
    - Such as DSIRE, IREC training
  - Links to Whole Building Design Guide

- Primary focus on new construction
  - Notes in text where differences for Major Renovations
- Organized by phases of construction project
  - Using standard architect phases
- Key Actions for each phase
- Technology-specific information separate
  - 15 separate technology overviews for A&E audience
  - Present basic RE information in a consistent template
  - Housed on WBDG to expand audience, but clearly part of Guide

#### Key Actions for Commissioning

- Plan and budget for enhanced, independent commissioning to optimize renewable energy under seasonal variations.
- Identify a commissioning agent with demonstrated renewable energy expertise.
- Include the commissioning agent in design review processes to identify issues early.
- Ensure the commissioning agent has access to renewable energy installers and experts throughout the enhanced commissioning process.
- Have facility O&M staff shadow the commissioning agent to learn more about new systems.



## FEMP Website

- Introduction
- Assessing RE options
- Planning, Programming & Budgeting
- Building Design
- Construction
- Commissioning
- Operations & Maintenance
- Training & Outreach
- Case Studies & Resources

Project Phases

## Whole Building Design Guide Website

- Technology Resource Pages

# Sections of the Guide: Phases of Project

- Planning, Programming, and Budgeting
- Building Design
- Project Construction
- Commissioning
- Operations & Maintenance (O&M)

The screenshot shows the title page of the 'Integrating Renewable Energy Construction' guide. At the top is the U.S. Department of Energy logo. The title is in large green font. Below the title is a breadcrumb trail: 'EERE » Federal Energy Management Program » Integrating Renewable Energy Construction'. A navigation menu on the left lists various sections, with 'Planning, Programming, & Budgeting', 'Building Design', and 'Project Construction' grouped together by a large green bracket. To the right of the menu, there are three columns of introductory text. The first column explains the FEMP Guide's purpose. The second column discusses cost reduction and project stages. The third column describes the guide's structure as a roadmap. At the bottom right, there is a 'Technology Resource' link and a small diagram showing a flow from 'Introduction' to 'Assessing Renewable Energy Options'.

- Overview introduces renewable issues in that phase
- Provides key actions in project phase
- Links to deeper content with more detail

The screenshot shows the EERE website page for "Integrating Renewable Energy in Federal Construction". The page features a dark blue header with the EERE logo and navigation links. The main content area is white with a green accent bar. The title "Integrating Renewable Energy in Federal Construction" is prominently displayed in green. Below the title is a breadcrumb trail: "EERE » Federal Energy Management Program » Integrating Renewable Energy in Federal Construction » Commissioning". A search bar is located in the top right corner. On the left side, there is a navigation menu with a green arrow pointing to the "Commissioning" link. The main content area is titled "Commissioning" and contains three paragraphs of text. To the right of the text is a diagram showing a process flow from "Project Construction" to "Commissioning" to "Operations & Maintenance". Below the diagram is a text box explaining the guide's purpose. At the bottom right, there is a box titled "Key Actions for Commissioning" with a list of bullet points.

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

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## Integrating Renewable Energy in Federal Construction

EERE » [Federal Energy Management Program](#) » [Integrating Renewable Energy in Federal Construction](#) » Commissioning

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Home

- Introduction
- Assessing Renewable Energy Options
- Planning, Programming, & Budgeting
- Building Design
- Project Construction
- Commissioning**
- Team
- Specifications
- Process
- Measurement & Verification
- Operations & Maintenance

### Commissioning

Commissioning renewable energy for new construction projects and major renovations requires special consideration in selecting the commissioning agent and team, developing the specifications, conducting the full commissioning process, and integrating measurement and verification (M&V) systems.

Commissioning for new construction and major renovation projects can reduce overall costs related to construction deficiencies and ensure more efficient building and systems operation. For new construction projects or major renovations with renewable energy systems, commissioning is critical to the ultimate goal of operating all building systems as safely, optimally, and efficiently as their designers intended.

Enhanced commissioning, spanning seasonal variations for a year, is recommended for all projects with renewable energy systems and should be considered early in the project development. Basic commissioning ensures that the systems are operational, while enhanced commissioning takes additional steps to investigate and optimize system interactions. Enhanced commissioning not only optimizes energy performance, but it also qualifies for Leadership in Energy and Environmental Design (LEED®) credit.

Through an enhanced commissioning process, the renewable energy system performance

Integrating Renewable Energy in Federal Construction

Search Help > SEARCH

Project Construction Commissioning Operations & Maintenance

The Guide roadmap indicates the process step for this section of the website. The steps on either end show both the preceding step as well as the following step. Use this roadmap to route you through construction process.

#### Key Actions for Commissioning

- Plan and budget for enhanced, independent commissioning to optimize renewable energy under seasonal variations.
- Identify a commissioning agent with

# Guide Structure: Deeper Content

- Provides detailed content for decision making
- Explains key actions
- Introduces and links to specific resources and tools

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## Integrating Renewable Energy in Federal Construction

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- Home
- Introduction
- Assessing Renewable Energy Options
- Pre-Planning, Programming, & Budgeting
- Building Design
- Project Construction
- Commissioning
  - Team
  - Specifications
  - Process
  - Measurement & Verification
- Operations &

### Commissioning Team

Assembling a committed team is a critical part of the commissioning process for renewable energy projects. Members of the team vary based on the size, complexity, and funding mechanism used for the project at hand.

The commissioning team lead is a commissioning agent, an independent agent representing the agency's interests. In addition to the commissioning agent, participants in the commissioning process can include the agency, operations and management (O&M) personnel, contractors, subcontractors, and the architectural and engineering (A&E) firm. The project energy lead should also be an active member of the commissioning team and work closely with the commissioning agent.

Renewable energy projects often require a team of experts in specific renewable energy technologies. The commissioning agent, who oversees and verifies commissioning performed by the renewable energy installers on each individual system, plans, coordinates, and oversees the commissioning process and takes ownership of the overall energy performance for the facility.

Any construction contracts or subcontracts for renewable energy systems must include a provision that the installers are responsible for conducting commissioning testing and activities under the commissioning agent. It must also stipulate that they are available for seasonal testing required for enhanced commissioning for the first year of the project.

In cases when renewable energy projects are not owned by the agency but are financed through [renewable energy project funding](#), those agreements may stipulate additional or separate commissioning activities by an entity hired by the agency. In such cases, those entities should be on the project commissioning team and efforts coordinated with the project commissioning agent.

- Technology resource pages include:
  - Biogas
  - Biomass Heat
  - Biomass Power
  - Geothermal Direct Heat
  - Geothermal Electric
  - Geothermal Heat Pump
  - Hydroelectric
  - Hydrogen and Fuel Cells
  - Ocean
  - Daylighting
  - Passive Solar Heating
  - Photovoltaics
  - Solar Ventilation Preheat
  - Solar Water Heating
  - Wind

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DESIGN GUIDANCE | PROJECT MANAGEMENT | OPERATIONS & MAINTENANCE | DOCUMENTS & REFERENCES | TOOLS | CONTINUING EDUCATION

A-C | D-H | I-R | S-W

Indoor Air Quality and Mold Prevention of the Building Envelope

Landscape Architecture and the Site Security Design Process

The Lab Module - Basis for Laboratory Design

Life-Cycle Cost Analysis (LCCA)

Low Impact Development Technologies

Materials

Measuring Performance of Sustainable Buildings

Microturbines

Moisture Management

Mold and Moisture Dynamics

Mold Remediation Guidelines

Natural Ventilation

OmniClass

Home > Passive Solar Heating

## Passive Solar Heating

by Judy Fosdick  
Tierra Concrete Homes  
Last updated: 06-17-2010

### INTRODUCTION

Passive solar heating is just one strategy in a group of design approaches collectively called passive solar design. When combined properly, these strategies can contribute to the heating, cooling, and [daylighting](#) of nearly any building.

Passive solar heating in particular makes use of the building components to collect, store, and distribute solar heat gains to reduce the demand for space heating. It does not require the use of mechanical equipment because the heat flow is by natural means (radiation, convection, and conductance) and the thermal storage is in the structure itself. Also, passive solar heating strategies provide opportunities for [daylighting](#) and views to the outdoor through well-positioned [windows](#).

It is best to incorporate passive solar heating into a building during the initial design. The whole building approach evaluates it in the context of building envelope design (particularly for [windows](#)), daylighting, and heating and cooling systems. Window design, especially glazing choices, is a critical factor for determining the effectiveness of passive solar heating. Passive solar systems do

**Within This Page**

- [Introduction](#)
- [Description](#)
- [Application](#)
- [Relevant Codes and Standards](#)
- [Additional Resources](#)

- Guide available at:  
<http://www.eere.energy.gov/femp/reconstructionguide/>
- For more details, contact:

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