



OREGON OFFICE
OF ENERGY



State Energy Efficiency Design (SEED) Program

What is SEED?

- Adopted in 1990, ORS 276.900 requires that all new and renovated state buildings include cost-effective energy conservation measures (ECMs)
- Amended in 2001 (California Energy Crisis) to exceed the Oregon Energy Code by a minimum of 20%, add verification plan and post occupancy monitoring
- Just exceeded SEED project #206



Why was SEED established?

It is the policy of the State of Oregon that facilities to be constructed or purchased by authorized state agencies be designed, constructed, renovated and operated so as to minimize the use of nonrenewable energy resources and to serve as models of energy efficiency.

(ORS 276.900)

- Reduce long-term agency operating costs
- Savings used to fund essential services
- Reduce environmental impacts
- Serve as models of energy efficiency

Basic Requirements

- **Implement Cost-effective Energy Conservation Measures (ECMs)**
- **Savings 20% + better than state energy code (at a minimum)**
- **Metering plan**
- **Verification plan (Cxing)**
- **Post occupancy monitoring**

Determination of ECMs

- ECM exploration, concepts, research
- Define ECMs to analyze
- Analyze ECM energy savings
- Analyze ECM cost impact
- Perform life cycle cost analysis
 - ❖ Cost-effective = benefit/cost ratio > 1
- Develop package of cost effective ECMs
 - ❖ If $\geq 20\%$ better than code \rightarrow done
 - ❖ If $\leq 20\%$ than code \rightarrow do over, dig a little deeper



Metering Plan

You can't manage what you can't see

- Requires one meter per building for each utility used
- Buildings served by campus master meters, must be sub-metered at the building level
- Building sub-metering encouraged by end use: heat, cooling, fans, pumps, lights, plug
- Included in energy analysis report

Verification Plan / Cxing

- Details how the building's energy systems and ECMs are to be tested during the construction phase
- Defines how the building's performance is to be verified with long-term monitoring
- Submitted with construction documents, no later than 90% completion
- Seasonal testing often performed during warranty period

Post-occupancy Monitoring

- Building energy use monitored for 18 months after occupancy
- Compare metered data to modeling results
- Significant differences must be addressed by agency
- If non-compliant, (ECMs not functional or not 20% better than code”) need to rectify

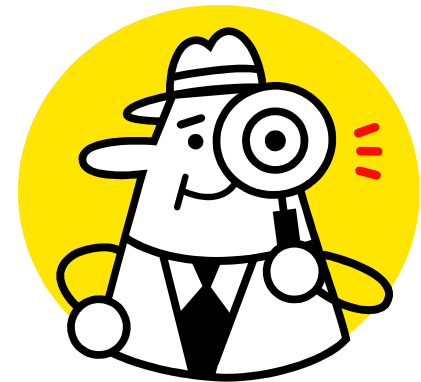
Who is Involved?

- **State Agency representative**
- **Department of Energy**
- **The Energy Analyst**
- **The Design Team**
- **The Contractor**
- **Commissioning Agent**
- **Other Partners** (Energy Trust, Utilities, BPA, Specialists, etc.)



Roles --- ODOE

- **Provide guidance on efficient programming assumptions**
- **Recommend energy saving technologies and strategies**
- **Review design documents and reports**
- **Provide construction & post occupancy inspections**
- **Assist in finding BETC pass-through partner**
- **Provide Biennial Report to the legislature**



Roles — Owner/Agency

- **Is responsible for SEED compliance**
- **Spearheads the effort - Sets the tone**
 - Emphasize energy efficiency
 - Want-to vs. have-to
- **Overcomes budget limitations**
- **Plays active quality control role**
- **Educates occupants**

Roles — Design Team

- **Possesses knowledge of building program**
- **Develops creative ideas**
- **Provides data to the energy analyst**
- **Coordinates ECM design effort**
- **Ensures ECMs are successfully designed/ fully documented**
- **Ensures ECMs are successfully implemented**

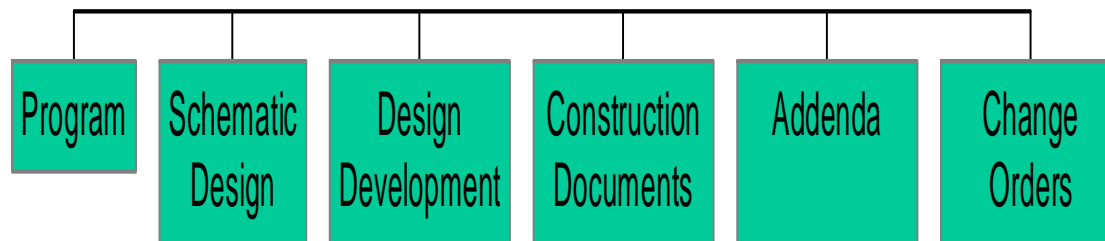
Roles — Energy Analyst

- **Interprets building program requirements**
- **Helps in directing early design decisions**
- **Broad experience base to identify ECMs**
- **Provides expertise in analyzing energy savings and ECM costs**
- **Prepares the building energy analysis and the energy analysis report**

Typical Development Steps & SEED

1. Pre-design or Programming
2. Schematic Design
3. Design Development
4. Construction Document Phase
5. Construction Phase
6. Occupancy Phase

Early Involvement Creates Greatest Opportunity



1. Pre-Design and Programming

- Early notification
 - ❖ *Project Notification Form* to ODOE
- Project kick - off meeting
 - ❖ Project scope and schedule
 - ❖ Project energy and sustainability goals
 - ❖ Project constraints and challenges
- Complete SEED programming and design intent forms
- Establish Energy Code compliance strategy
- Submit programming documents



2. Schematic Design

- Define proposed project design
 - ❖ ODOE reviews documents
- Preliminary ECM investigation
 - ❖ Design team submits proposed ECM list
 - ❖ ODOE independently generates ideas
- ECM scoping meeting held
 - ❖ March through ECM checklist
 - ❖ Baseline ECMs defined
 - ❖ Analyzed ECMs defined
- Modeling approach
 - ❖ Interaction with BETC / ETO



3. Design Development

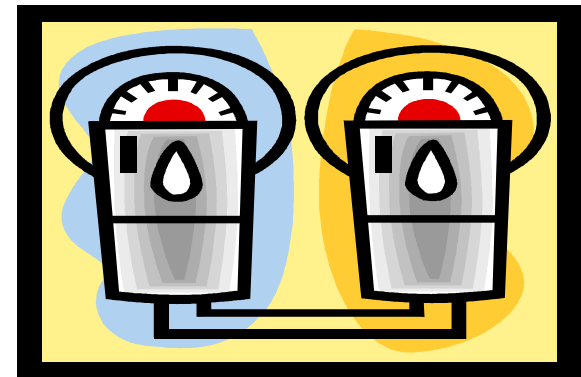
- Energy model generated & ECM analysis
- Preliminary energy analysis report submitted
- ODOE reviews (QAs) model and report & issues comments
- Model and report amended - Final Report issued
- Metering plan developed



4. Construction Documents

- Review of final construction documents to verify ECMs are implemented
 - ❖ Code Compliance forms submitted
- If needed - Addenda issued
- If needed - Change Order issued

- Energy systems performance verification plan developed



5. Construction Phase

- If bids are over budget, owner includes ODOE in VE process.
- Design Team and Cxing Agent assure contractor submittals and substitutions don't trade away ECMs
- Performance verification (Cxing) performed to assure ECMs are incorporated
- Owner's O&M staff trained



6. Occupancy Phase

- **Monitoring:** the first 18 months into occupancy
 - ❖ ODOE performs field inspection
 - ❖ Energy data is compiled
- **Non-Compliance:** an *Energy Conservation Plan* is required to outline the modifications to be made so that ECMs are fully functional and the goal of 20% or better is met



Key Factors to Achieve Successes

- **Owner's vision exceeds SEED**
- **ODOE is involved early and integrated with project team**
- **Design team embraces SEED process, is innovative and is open to new concepts**
- **An experienced energy analyst: modeling tool, accurate model - calibration EUI, SEED report familiarity, timely**
- **ECMs clearly defined in construction documents and not through addenda**
- **Commissioning to make sure ECMs are implemented**

