ENERGY EDGE BUILDINGS IN OREGON

John Perry
Oregon Department of Energy

JOHN PERRY

BACKGROUND AND PROGRAM GOALS

Energy Edge is a project of the Bonneville Power Administration (BPA). It is being administered by four Sponsors. ODOE is the sponsor for Oregon outside the Portland area. Energy Edge is one of a number of actions mandated by the Northwest Power Planning Council in their regional energy plan.

Thirty-four new commercial buildings will be built under the project within the BPA region -- Oregon, Washington, Idaho and western Montana. These buildings will be selected during 1986. Construction and energy monitoring will occur over the next three years. These buildings will be designed to use 30 percent less energy than similar buildings conforming to the Model Conservation Standards (MCS). The MCS, also a product of the Council's plan, were recommended to utilities and local governments in the BPA Region. The MCS for new commercial buildings is a slightly modified version of the ASHRAE 90A - 1980 model energy code. The most significant difference is in the area of lighting. The MCS requires lower lighting power densities.

The Council recognized the MCS fell short of their goals for energy conservation in commercial buildings. In the plan they expressed confidence that more savings could be achieved at prices that are cost-effective to BPA and economically feasible for customers.

Winners in the Energy Edge competition will receive media recognition plus incentive payments to cover all costs required to reach the higher level of energy efficiency. Incentive payments will cover design, construction and administrative costs.

Information from this project will serve several purposes:

1. It will assist BPA and the Council in accessing the costs and replicability of conservation savings in the commercial sector.

2. It will guide the development of improved standards and building codes.

3. It will raise awareness and skills among building designers and developers.

The Energy Edge Project is run as a competition. The buildings will be selected based on the merits of their design and the costs of their energy conservation measures. To date, two projects have preliminary approval from ODOE. These buildings are in a early stage of design and energy analysis. Detailed information and analysis of the buildings will be given at the presentation of this paper.

TECHNICAL STANDARDS

Extensive technical standards and methods were developed to demonstrate the 30 percent energy savings. The process calls for these two steps:

1. Establish the MCS, or basecase building. This is a fictional building similar in size, shape and use to the proposed building. However, it is designed to meet the minimum standards of the MCS, plus other standards that were developed to provide some important building descriptors not covered by the MCS, e.g. HVAC systems and window-to-wall ratios.

   Some factors are held constant between the MCS/basecase building and the proposed building -- occupancy schedules and temperature profiles.

2. Perform an annual energy simulation of the proposed building. If its predicted annual energy use is 70 percent or less of the MCS/basecase building, it meets the Energy Edge guidelines and qualifies as a potential Energy Edge building.

   Applicants provide detailed descriptions of the proposed building and estimated costs for the energy conservation measures (ECMs). Parametric computer modeling is used to estimate annual energy saved by the ECMs and to rank the ECMs by cost-effectiveness.

   The following process is used to rank the ECMs and to select the most cost-effective measures. Each ECM is individually added to the basecase and modeled. The most cost-effective ECM, i.e. the lowest initial cost to annual energy saved ($/kWh), is then added to the basecase. The process is repeated with the remaining ECMs and the second most cost-effective measure is selected. This process is repeated until the 70 percent level is reached. Additional ECMs are allowed under the project if their levelized cost is less than 45 mils.

   The energy simulation program ADM-2 is used for most of the early modeling. ADM-2 is an hourly program using standard ASHRAE algorithms.

EARLY FINDINGS AND PROBLEMS

Sponsors were surprised to find how easy it was in many cases to reach the energy saving goal. Often one or two very modest measures were enough. This was particularly true for smaller, more skin-dominated buildings. This finding supported the Council's belief that additional cost effective savings can be found beyond the MCS.

Describing the basecase/MCS building has been difficult. This is in part due to the variability of commercial building. No two are alike. The other problem is with the MCS envelope standards. Strictly applied to small buildings, these standards result in buildings insulated to levels below common practice.

CONTENTS OF PRESENTATION

The presentation will give information unavailable at this writing. It will look at the first buildings selected by ODOE in the project. Slides will be used to show design studies. Important design decisions will be discussed from the standpoint of:

1. Modeled energy use.

2. Construction cost.

3. The interaction of building program and energy use.

4. Strategies that use an integrated approach to saving energy.

JP:jf
2860J(d3,f4)
06/24/86