AN INNOVATIVE APPROACH TO MANDATORY RESIDENTIAL ENERGY STANDARDS

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Early in 1986, the City of St. Louis implemented mandatory energy standards for all for-sale and rental projects which utilize seed monies from HUD Community Development Block Grant funds (CDBG). Developed as an alternative to revised building codes, the standards affect about 1,400 housing units built annually in the City. This presentation describes the process that led to the development of these standards, including computer modeling to select cost-effective energy options.

The City of St. Louis maintains an active housing support program within its Community Development Agency. HUD CDBG funds are used to offset a small portion of construction costs for market rate for-sale and new housing in marginal neighborhoods which are on the border of supporting market-rate housing. As these neighborhoods improve, subsidies decrease and then cease. Between 50-70% of all new residential units in the City of St. Louis are assisted by this program in a given year. Implementing energy standards within this program is a good target to impact energy savings in new construction and rehab, and is a viable alternative to changing building codes.

For an older city like St. Louis with limited boundaries, at least as many single family units are rehabbed each year as are built new, and the rehabilitation of units for the rental market is ten times larger still. Many of the rental units are still being rehabbed with no wall insulation and with electric resistance heat.

The City of St. Louis Energy Management Program has been working on demonstration projects with homebuilders and developers for the last three years. First a single family house was rehabbed with state-of-the-art concepts to demonstrate its feasibility and energy reduction. The next program created 25 superinsulated single family, townhouse, and apartment units. The program helped cover part of the costs for the builders in upgrading planned construction to a higher energy efficiency and in learning new construction techniques, demonstrated the value of energy conservation, and created confidence in working with the City.

Creating standards that would be acceptable to homebuilders had to be conservative. An approach was adopted in developing these standards which required the energy savings in the first year to pay the increase in mortgage costs of the energy package.

A computer model was developed to carry out the economic analysis to establish the standards. This model had standard heat loss, air-conditioning, and solar gain calculations. A table of energy conservation options and costs was created for each of seven construction components: walls, ceiling, floor, windows, air-infiltration, heating equipment and cooling equipment.

For each component, discrete steps in energy improvements were developed along with the associated cost for implementing each step. The model starts with a standard base case and iteratively processes each step, seeking the energy improvement that creates the most energy savings per dollar of investment. This energy conservation option is implemented in the base case. The computer program processes all the steps again, seeking the next best option. A table of options is constructed in order of the "best buys". This computer model was run on the five typical construction types in St. Louis. Proposed standards were developed based on the "no net cost in year one" criteria. Some cost effective, but unfamiliar, options such as low-e glazing were not included. Separate standards were developed for apartment and for-sale units. The resulting standards were then submitted for review and comment by the City to the local Homebuilders Association before they were finally implemented.

The mandatory energy standards adopted by the City represent a 20-25% reduction in heating and cooling costs over conventional construction practice in St. Louis. An upgraded package, promoted on a voluntary basis by the City, improves chances for project funding with the CDBG funds but is not mandatory. The second stage of measures, approaching "superinsulation", targets reductions of 50% over conventional energy costs.