INTRODUCTION

In order to develop a basis for discussion of energy end-use efficiency in existing residential buildings, it is necessary to touch on a few major aspects of the property management industry. H.G. Smithy Property Company manages multi-family rental projects, including small multi-apartment mid-rise buildings, two- to four-story garden apartment complexes spread over large land areas, and both large high-rise and relatively compact apartment buildings, in the Washington, D.C. area, as well as a number of projects that have been constructed for or converted to cooperative or condominium ownership. Because of the different expectations of the two forms of ownership of residential buildings—individual ownership and cooperative/condominium ownership—there is a wide variance in the acceptance of the economic arguments for energy management programs and retrofitting to use more efficient machinery, fuels, and systems. Both forms of ownership scrutinize expenditures for energy conservation in terms of amortization for initial installation, as well as anticipated savings in operating costs. Cooperative and condominium owners are generally far more receptive to long-range energy management programs and machinery and system retrofits, primarily because they are not seriously hampered by a lack of available funds or local government rules and regulations (other than building, fire, and safety codes) that in many instances impede energy conservation measures. Condominium or cooperative ownership is usually in the form of an incorporated association of individual unit owners, governed by an elected board of officials, empowered through by-laws to levy special assessments on the owners to meet specific funding requirements. This is not the case with individual owners of rental projects. Historically
these people have invested in real property for various reasons—frequently the ability to produce a reasonable return on investment. There is a concomitant obligation to maintain the property in general repair and acceptable appearance. The rental project will probably prove to be the toughest area that the properties management industry is faced with in developing and implementing energy conservation measures. Based on this belief, further discussion focuses on energy conservation in rental projects.

EXISTING PROJECTS AND BUILDINGS

Most rental project buildings are of brick veneer construction and are reasonably well insulated. Most are centrally heated and air conditioned with heated and chilled water convection systems, using low-pressure steam boilers through heat exchangers, or hot water boilers and centrifugal, hermetic, and reciprocating water-cooled chillers. Electricity and gas are generally risered to individual apartments in multi-storey buildings.

The Occupants: Occupants of rental project dwellings are often not well educated about energy conservation. If utilities are included in monthly rent charges (as most are), most occupants are totally apathetic about any form of energy conservation. For example, tenants may leave an air conditioner operating throughout a work day, in an unoccupied unit, just to have the apartment cool when they return from work in the evening. Within the rental project, management has total control over common areas and central service machinery, where nominal conservation measures can be implemented. However, little or no control of the apartment units is possible, other than establishing house rules on energy use (which are by and large not enforceable). The most positive enforcement measure is to pass on the cost of excess energy to the individual occupant.

In the Maryland and Northern Virginia suburbs and the city of Washington, D.C., only Northern Virginia has approved legislation to meter individually, or "submeter," utilities in rental apartments and to pass
along energy costs to tenants, applying a formula for basic rent reduction. The city of Washington operates under very stringently enforced rent control laws that allow little or no latitude for landlords to pass on the rapidly escalating cost of utilities, resulting in little or no revenue to earmark for energy conservation efforts or retrofitting equipment. The individual county governments in Maryland allow some utility cost increases to be passed on to tenants.

**Energy End-Use Efficiency Technology:** The technology available to the property management industry in this area is adequate. Equipment and devices range from simple, reasonably-priced seven-day time clocks that control off and on times for building machinery to very elaborate, extremely expensive energy management module memory systems—essentially computerized operations—that measure energy use and begin load shedding automatically, to stay within a preplanned and programmed level of energy use.

Specific conservation measures that are either successfully in use or are available for use include the following:

- **Photoelectric cell control of outside and security lighting and the use of high-pressure sodium or mercury vapor fixtures to reduce energy use and increase equipment life expectancy.**

- **Time clocks to provide timed operation of energy-using machinery and to provide illumination that is required only during peak occupancy periods.**

- **Retrofit of continuous-burning interior passageway and stairwell illumination from 40- or 60-watt incandescent fixtures to 6- or 8-watt fluorescent fixtures, that provide equal or better illumination.**

- **Pneumatic, or pneumatic-electric, controllers that regulate the temperature of heating and cooling water in the convector system relative to outside air temperature.**
Total energy management systems using taped or module memory programs. These systems are electrical load shedders that can provide automatic control of energy consumption. This is a very expensive method of regulating building energy use.

Solar applications may never benefit existing residential buildings, except possibly in the two- to three-story garden apartment complexes that have adequate roof space to accommodate large collector systems and ground space to create storage facilities. This space, and the excessive cost of retrofit plumbing and piping, essentially rules out this application for mid- and high-rise buildings.

GOVERNMENTAL ROADBLOCKS TO ENERGY CONSERVATION

The average ventilation rate in the United States is 7 1/2 cubic feet per meter per person. This rate is not based on any strong physical evidence of its effectiveness. The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) is currently investigating the minimum ventilation rate necessary to maintain good health. The Association is trying to determine the minimum ventilation rate required to control air-borne contaminants in a variety of situations.

The codes do not permit the cycling of ventilation fans within a building, but some fans (such as kitchen exhausts) could be turned off from the hours of 11 p.m. until 6 a.m. California has such permissive legislation, and other states need to consider this approach.

Ventilation in a stack of toilets cannot be turned off, according to the code. It would be easy, however, to hook up a small signal wire in a stack so that turning on a bathroom light in any of the 12 apartments would close parallel electrical circuits and allow the fan to operate. The fan would be off at times when bathrooms are rarely in use, such as from 2 to 5 a.m.
New motion detectors may be useful in allowing corridor or stairway lighting to be turned off. This is now prohibited by laws in all three jurisdictions.

Garage ventilation is required by building codes, but we have found that sensors can identify the concentrations of carbon monoxide and nitrous oxides, indicating a need for ventilation. Therefore, if we could install a sensing system and activate the garage exhaust only when the garage atmosphere is contaminated, we would be able to save a great deal of money.

We are also required in the District of Columbia to provide tempered air to garages located below buildings. This is not necessary since the average temperature in an enclosed garage below a house will be approximately one-half of the mid-point of the temperature outdoors and indoors; thus, heating is not required.

A study should be done on the effects of lower humidity and higher temperatures in occupied areas, such as 80 degrees and possibly 40-percent relative humidity. This would be more comfortable than the Federally-mandated temperatures of 78°F (summer) and 68°F (winter) with a 60-percent relative humidity.

Warm and cold water are required in all or most office buildings. We suggest that cold water only be required, or that tempered water in the 90- to 95-degree range be the only water supplied to the building. This would reduce the required water distribution pipe by half and reduce the amount of insulation and the heat required to provide tempered water to the building.

Building codes generally require window areas of a minimum size in a residential building. In today's environment, passive solar systems with large southern glass exposures and little or no glass exposures on any of the other surfaces are wise. The government should review its demand for glass areas to allow less glass, more carefully placed, so that the choice of design to save energy would belong to the architect or engineer. Lighting that would be lost could be compensated for by daylighting techniques or by careful placement of the window areas, and
casting light into the interior spaces with passive design.

The government requires that a certain number of parking places be provided for each apartment. In urban settings with mass transportation, it is possible that this law could be changed to save space and ventilation.

On the other hand, the government should get into the picture, invade our privacy, and require that every major construction company perform combustion efficiency tests on their equipment on a regular basis, and report to the appropriate agency. It may be terrible to suggest that the government stands in the way, and then to say we wish them to get in the way, but, left to their own devices, landlords are passing on their own inefficiencies to their tenants. We believe, in this instance, the government should be in the picture—and not allow waste to result from inactivity.

Every utility district must make available to every apartment owner the right to submeter power to each tenant. In Virginia, this has reduced energy waste from 15 to 30 percent in the average apartment.

Many codes have not yet adopted to new lighting levels recommended by the Illuminating Engineering Society. It would be possible in many areas to permit less illumination without danger to the inhabitants.

Many codes do not permit cycling certain lights, such as outdoor illumination. This should be changed so that lower illumination levels are permitted at certain times. The use of photoelectric cells should be encouraged so that lights are turned on, not according to the clock but according to actual need.

SUMMARY

Property managers, resident managers, project engineers, and maintenance, personnel, the key personnel in successful property management operations, do recognize the need for energy conservation, and do, within their economic and technical abilities, implement energy
conservation measures to decrease project operating costs. Money saved increases the owner's profit margin, which is in fact the true test of good property management.

The property management industry recognizes that existing residential buildings consume a tremendous proportion of our available energy, and would welcome legislation and technical and (most important) financial assistance in implementing a national effort to preserve our natural resources.