Energy Conservation and Older Housing

Since the beginning of this decade, we have been witnessing the end of an age of profligate energy use. Energy (especially oil, gas, and coal-generated electricity) is costing consumers more and more. Homeowners, in particular, have added concerns. While buyers of new homes may insist on more energy-efficient designs, owners of existing structures face increasing energy bills.

By retrofitting the existing housing stock with better insulation and more efficient mechanical equipment and appliances, a significant reduction in energy consumption (and energy costs) can be achieved. Retrofitting can save 10 to 40 percent of residential energy consumption in the United States, according to a Federal Energy Administration study (AIA Research Corp. 1976). Since the residential sector accounted for approximately 22 percent of the fuel and electricity consumed in this country in 1973 and since existing buildings will constitute more than 70 percent of the total floor space in 1985, (Hyatt 1977, pp. 284-85) residential retrofitting may be important in the nation's total energy picture.

At the same time that energy conservation has become a national objective, the preservation or conservation of the nation's built environment (commonly referred to as historic preservation) has become an objective of government at all levels. This second objective should be considered when attempts are made to improve the energy performance of existing homes, particularly those built prior to World War II, since many methods of retrofitting may be harmful to the design and fabric of existing buildings.

Historic preservation (the preservation or conservation of architectural, historic or cultural resources of local, state or national significance) has long been a national concern. The first major Congressional initiatives in the area of historic preservation were the Antiquities Act of 1906 and the Historic Sites Act of 1935. The National Historic Preservation Act, enacted in 1966, symbolized the evolution of the preservation movement from concern only with individual properties of undisputed national historic significance to concern with neighborhoods and properties of local importance as well as with nationally significant sites.

Significance for the preservationist no longer refers to an association with persons of paramount importance, such as senators, military heroes, or distinguished architects. According to the guidelines for the National Register of Historic Places, the quality of significance "is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association." Under these guidelines, significance may be present in an area even though the components of that area lack individual distinction (Advisory Council on Historic Preservation 1974). Thus, nearly every town in North Carolina probably contains at least one significant residential neighborhood as well as numerous significant individual residences.

Since energy and historic preservation are both concerns of declared national policy, the problem is one of improving energy efficiency without damaging the architectural or historic integrity of an older structure. The goals of energy efficiency and historic preservation are not necessarily conflicting; and yet, several means of increasing energy-efficiency have a potentially harmful impact on properties worth conserving for historic, architectural, or cultural reasons.

Two primary areas are causes for concern: energy improvements which have a damaging effect on the original materials with which they come in contact, and energy improvements which require the alteration of any historic materials or distinctive architectural features (Smith 1977).

Many materials and processes currently used to weatherize buildings have not been fully tested; it may not be known how long a product will last nor whether it will react with adjacent materials and cause irreversible damage. In spite of the immediate energy savings which may be available from the use of new products, it is advisable for

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owners of older properties to use only time-proven conservation devices until thorough performance testing and evaluation of the new products have been undertaken.

Energy Characteristics of Older Buildings

Although older homes are commonly maligned as excessive energy consumers, it is unclear whether well-maintained older homes do indeed consume more energy than their more recent counterparts.

Since many older buildings were built prior to the era of cheap and easily usable energy sources, these buildings were frequently built with relatively heavy building materials and tight-fitting window and door sashes to give them sufficient weather resistance (Harrison 1976). Traditional heavy construction had good insulating properties, and its high "thermal mass" acted to dampen out diurnal swings in temperature, a property especially beneficial during hot summer days (Steadman 1975).

Older homes were usually built with greater concern for proper siting than is found today in many developments. Like many antebellum Southern homes, late eighteenth and early nineteenth century houses in the coastal town of Beaufort, North Carolina were oriented toward the sun and prevailing winds so as to provide an adequate air flow of cool air during the hot summer months (Heritage Conservation and Recreation Service 1978). Full one and two-story porches and wide eaves which shaded living quarters and aided ventilation were common. In Beaufort, rather than ventilating attic spaces with dormer windows which would allow heat gain and glare from direct sunlight, a group of early houses had systems of openings in the porch ceilings to provide ventilation (Little-Stokes 1978). Elsewhere in North Carolina cupolas were commonly used for aiding air flow during summer months since the ceiling openings created updrafts within the interior spaces.

One device used during the Victorian era to keep houses comfortable was ceiling fans, which were used in conjunction with the characteristic high ceilings. High ceilings made for cooler rooms in summer, and fans provided cooling breezes. Since, on the other hand, high ceilings required more heat in the winter, the warmer air at ceiling level was recirculated downward by ceiling fans. Useful during both winter and summer, these fans fell into disuse during the cheap-energy era. Now they are being increasingly revived, for reasons of comfort and energy savings as well as nostalgia (Thompson 1977). Since a ceiling fan uses less than one-tenth the electricity of a single window air conditioner, they can provide great savings for owners of older homes (Royal Windyne Limited 1978).

Double gallery porch design provides summertime energy efficiency.
Photo by J. Myrick Howard

Studies of older office and commercial buildings indicate that the preservation of older structures and the conservation of energy are not conflicting policies. In a 1977 study of New York City office buildings, researchers found that when building age and energy use per square foot of space were compared, the *oldest* buildings used the *least* energy (Syska and Hennessy 1977). Buildings built before 1900 used only 95,000 Btus per square foot, whereas those built after 1941 consumed more. These results were attributed to two principal characteristics of the older buildings: they were heated and cooled by outdated mechanical equipment which probably provided a lower level of comfort than newer equipment; and they were characterized by greater wall mass, lower ratios of glass to wall, operable windows, and cavity wall construction (characteristics of older buildings which contribute to the lower use of energy in both heating and cooling cycles).

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The second study, compiled in 1976 (Hannon et al. 1976), surveyed all publicly advertised new construction and rehabilitation for 1967 in the United States to measure how many Btus of energy were required, on a square-foot basis, to extract, manufacture, deliver and install all building materials. The study concluded that it took 23 percent *less* energy to rehabilitate existing buildings than to build new ones. This lower level of energy consumption was attributed to the fact that most of the building materials and structural systems were already in place and were reusable.

Although these studies are not directly applicable to older homes, since they were studies of non-residential buildings, the underlying reasons for the findings are applicable. First, due in part to climate conscious design, older homes are usually more responsive to their environments and less dependent on mechanical equipment than many new homes; second, in calculating the energy efficiency of a building, one must consider the energy costs of the building's total life cycle. These costs include the energy costs of demolishing any existing buildings; preparing the site (for example, grading and installing utility hookups); and extracting, manufacturing and transporting building materials. With rehabilitation, many of these energy costs are avoided, so a rehabilitated building may actually require less energy usage in its full life cycle.

Insulation

Thermal insulation of ceilings, floors, and walls is "one of the simplest, cheapest, and most effective means of energy conservation available" (Dumas 1976 p. 45). Many houses constructed prior to World War II were built with little or no insulation. In North Carolina, it is estimated that energy savings of more than 21 percent for heating and air conditioning may be easily derived from improved home insulation. Bringing North Carolina properties up to 1971 FHA minimum standards for insulation would result in savings of 33 percent of the energy used within the state for residential heating and air conditioning (North Carolina Department of Administration 1974).

Three inches of insulation in walls and floor and six inches in ceilings can reduce heat loss/gain in residences by as much as 50 percent (Dumas 1976). Fiberglass ceiling and floor insulation, when installed with proper moisture barriers, can be added to nearly any house without damage. However, cellulose insulation with a sulfate fire retardant should be avoided because it will react with water to make sulfuric acid. Instead, cellulose with a borate treatment is preferable (Smith 1978).

Proper installation of wall insulation in an existing structure is much more difficult than installation of ceiling or floor insulation, at least where crawl space is available. The problem with wall insulation derives from the difficulty involved in installing a vapor barrier and providing a ventilation space for the insulation. A vapor barrier is necessary in the winter because the warm air within the heated quarters contains water vapor which will condense on the first cool surface it touches as the warm air works its way out of the house. If there is no vapor barrier, the water vapor will condense on the studs and facing surface of the outside wall. This condensation is no problem if there is no wall insulation because in older houses there is a ventilation space between the inside and outside walls which allows the condensation to evaporate when temperature climbs above the freezing point.

However, if insulation is added with no vapor barrier, the water vapor passing from the interior to the outside condenses on the studs and outside facing surface and is absorbed by the insulation which acts as a sponge. In the first place, the effectiveness of the insulation is greatly reduced. Second, since ventilation may well be inadequate for the insulation, the side wall insulation may contribute to the emergence of dry rot, a fungus which eats wood (Nielsen 1977).

Aluminum siding detracts from the architectural style of this older home.

Photo by Myrick Howard

Whether one is insulating the ceiling, floors or walls, a vapor barrier and ventilation of the insulation is an absolute necessity. The vapor barrier is always placed on the warm side of the insulation; otherwise it is counter-effective. The vapor barrier, commonly aluminum foil or polyethylene sheeting, should be continuous and unbroken (Nielsen 1977).

In an existing house, it is virtually impossible to install an adequate vapor barrier in the side walls without gutting the interior walls, removing the exterior siding and putting it back in place, or adding a new layer to the interior. All of these alternatives are costly and may damage the building fabric.

Fortunately, wall insulation is less important than ceiling insulation since heated air rises. In fact, wall insulation may not be a good energy investment for many older homes, especially masonry structures and one-story frame houses. More energy savings per dollar of improvement may be derived by other means. Most pre-World War II brick structures were built with cavity walls which are thermally efficient. One-story frame houses tend to lose much more heat through ceilings than through walls as their wall area is substantially less than that of a comparable two-story structure. Instead of insulation, the best energy investments for the walls of these houses may be selective brick repointing with a mortar containing no Portland cement, caulking, maintaining an unbroken paint surface on wooden building components, and weatherstripping windows and doors (Smith 1978).

In spite of its ease of application and initial effectiveness, wall insulation blown into existing wall cavities should not be undertaken on an older property without expert advice and carefully monitored installation. All forms of blown insulation are known to collect moisture and cause deterioration of wooden or masonry materials. Seldom is a vapor barrier installed when blown insulation is used, and, since the blown insulation fills the entire cavity between interior and exterior walls, there is no allowance for ventilation (Smith 1977). Besides damaging the structural materials, the accumulation of moisture in the insulation drastically reduces its insulating ability.

Another problem caused by the moisture accumulation in blown wall insulation is exterior paint deterioration. Examples have been reported where paint has peeled from wood siding within two years after insulating with blown fill (Labine 1977). A dilemma then arises: the houses becomes so expensive to maintain that either it goes unpainted or can be afforded only by the well-to-do; or the owner resorts to using an artificial siding.

Artificial Sidings

Artificial sidings, such as aluminum and vinyl, are marketed as energy-saving devices. Some sidings are applied in an insulated form. Yet, "as insulators, per se, both [vinyl and aluminum sidings] are virtually useless" (Nielsen 1977), and with these sidings the long-term damage may far outweigh any short-term energy savings.

When improperly applied, artificial siding is visually objectionable; indeed, it may have a "disastrous effect . . . on the character of visually significant neighborhoods" (Means 1975). Wide siding (with eight-inch laps) changes the visual character and texture of buildings formerly covered with narrow or beaded weatherboard or ornamental shingles. Although narrow siding ("double 4" or "Colonial width") is available, it is not favored by most homeowners because only the wider siding is available in an insulated form. Either type can add considerable depth to broad areas of wall and thus impair molding profiles (Means 1975). Both give a house an appearance of manufactured uniformity, which is inconsistent with its actual age.

Improper installation may also result in the removal or the covering of a building's trim. "If, as frequently happens, all trim is removed and the siding is run to window and door openings (jumping all casings), the architectural significance of the structure may be totally destroyed" (Downing 1977). Only with very careful installation can the visual impacts of artificial sidings be minimized.

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Artificial sidings create other problems, such as possible fire hazards and potential structural weakening of buildings. Providence and West Warwick, Rhode Island, firefighters have claimed that once a fire has started, aluminum siding contains and intensifies the heat, increasing the extent of damage; they also say that the siding acts as a barrier to firefighters, making control of a fire more difficult (Seapker 1977). These claims have not yet been adequately substantiated, and further research may prove them to be incorrect. Until they are clearly refuted, however, owners of older properties should be hesitant to take the risk of possibly damaging their homes, since older houses are frequently irreplaceable resources. On the other hand, vinyl siding presents a better documented fire hazard: vinyl siding releases toxic fumes after the heat of a fire has become intense (Seapker 1977).

Artificial sidings also trap moisture within the building walls and may cause structural rot. The moisture problem is frequently aggravated when artificial sidings are applied for the purpose of covering up decay or structural weakness. It is vitally important to a building's future that structural repairs be made before any artificial siding is installed. If artificial sidings are used at all, only those sidings which have "weep holes" for draining of condensation should be used. Also, owners should avoid placing siding on the eaves and cornice of a house, since those areas provide the first indication of roof or gutter problems which, if undetected, can cause serious structural damage.

A final disadvantage of aluminum siding as an energy saver should be noted. Since aluminum is manufactured by a highly energy intensive process (Dumas 1976), aluminum siding, even if insulating, probably results in net energy losses for society as a whole. Obviously, energy policy should be shaped around more factors than the simple thermal efficiency of each individual building.

Windows

Windows are another building component which require special consideration when thermal efficiency is to be improved. Window performance is important because of the relatively high thermal conductivity of glass (Dumas 1976) and the incidence of solar heat gain through windows. Since windows have a relatively poor performance level (with the exception of south-facing windows during sunny winter days), older buildings with tight-fitting and weatherstripped windows tend to have an advantage over much modern construction. Older buildings usually have a ratio of glass-to-wall of 20 percent or less, while the ratio for many modern buildings is much higher. Also, having operable windows is another energy advantage for older buildings, since no mechanical ventilation is necessary during many spring and autumn days (Smith 1977). Nevertheless, enhancing these thermal advantages in older buildings without harming their structure or appearance requires care.

Once again, visual interests may conflict with energy concerns. Storm windows reduce solar transmission by 10-15 percent (an advantage during the summer) and typically more than double a window's resistance to cold weather conduction heat losses (Dumas 1976). The visual problem arises because the only storm windows which are widely marketed are those with aluminum frames. Unfinished aluminum frames are incompatible with most visually significant properties; they introduce a color, texture, and material which are incongruous. But although aluminum sales representatives tell customers that the aluminum finish will not hold paint, some homeowners have been successful in painting their aluminum storm windows.[2]

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Aluminum frames with permanent baked-on colors are also available and are visually preferable to unfinished aluminum. The baked-on enamel finish is, however, available only with the highest grade of storm windows. In addition to the extra expense for the top grade, which is also highly recommended because of superior insulating qualities (Frasch 1976), another problem arises with the enameled frames because only a few colors are available.

Additionally, aluminum frames are difficult to adapt to windows of unusual shapes and proportions, a characteristic of many old houses. Unfortunately, some resulting adaptations of rectangular storm windows have been unsightly.

Storm windows with wooden frames, which once were commercially available (Frasch 1976), would have energy as well as aesthetic advantages. Aluminum frames transmit nearly twice as high a percentage of the total heat transmitted through the entire window as do wooden frames. in the winter (summer), aluminum frames are responsible for about 25 percent of the heat loss (gain) through the window (Dumas 1976). Moreover, as noted above, aluminum is manufactured by a highly energy intensive process. As a result, the use of aluminum for storm windows is unfortunate from an energy as well as visual standpoint, since both the poor thermal performance and the energy intensiveness of the aluminum production imply a significant offset to the overall energy conservation potential of such windows.

The shading of windows by awnings, blinds, shutters, and shades are energy improvements which property owners of older buildings should consider. External shading is significantly more effective in reducing solar heat gain than internal shading; it can block 20 to 30 percent more solar gain than high-quality internal shading (Dumas 1976). Obviously, exterior shading also has a greater impact on the visual environment.

Different varieties of external shading devices are appropriate for different architectural styles. Exterior blinds and shutters, generally used today only for visual enhancement, can be effectively and appropriately used with early styles for one of their original purposes: shading. Cloth awnings, popular during the Victorian period, are also effective since they can be used for shading in the summer to reduce heat gain and then rolled up in the winter when heat gain is desirable. Some available devices, however, are not appropriate for older buildings. Aluminum awnings, for example, present the problem of visual and historical incongruity, and their permanence reduces their effectiveness as an energy-saving device.

Interior shading devices, though less effective, offer the advantages of flexibility and less wear and tear from the elements. Roller shades, old fashioned devices which are regaining popularity, produce a reduction of solar heat gain inside single-pane plate glass windows of 61-75 percent. Venetian blinds, devices used in houses of the colonial period as well as more recently, reduce gains by 36-45 percent and have advantages as lighting control devices (Dumas 1976). Heavy draperies may be used for both reducing summer heat gain and providing extra insulation in winter. The energy-saving devices, exterior or interior, selected for an older building should be compatible with the building's architectural style as well as with the goals of energy conservation. The commercial availability of compatible shading devices makes it possible to attain both objectives without difficulty.

Lighting

Lighting accounts for about 5 percent of a building's energy consumption. Older buildings generally consume less lighting energy than new

Renovations to improve energy need not interfere with historical integrity.

Photo by Bruce Stiftel

Figure 1

Illumination Recommendations for Schools (In Footcandles)

Areas	IES*(USA)	IES*(Britain)	NYC Health Code	Tinker
Classroom	70-150	20-30	30	20-30
Library Reading	30-70	30	30	15-35
Office	70-150	30	—	15-25
Drafting/Sewing	100-150	70	50	40
Washroom/Locker	20-30	7-10	10	—
Laboratory	100	30	—	—

*Illuminating Engineering Society

Source: Dumas 1976, p. 91

The excessive nature of illumination levels used in the United States is highlighted by a comparison of American school standards with those of Britain, the New York City Health Code, and a study of illumination levels by Miles A. Tinker.

buildings because of the older buildings' lower levels of illumination (Smith 1977). By historical standards, contemporary interiors are overlit.

During the past four decades, the recommended illumination standards promulgated by the Illuminating Engineering Society have increased by more than 600 percent; since 1950, the recommended standards have increased by about 250 percent. These standards, which are widely adhered to as operational minima for design in the United States, reflect a philosophy of providing lighting sufficient for very delicate tasks throughout interior spaces (see Figure 1). Fifty footcandles is satisfactory illumination for most purposes except for very fine and delicate tasks, and a reduction in lighting levels from 150 to 50 footcandles results in a 90 percent reduction in energy consumption (Steadman 1975, p. 51).

Local lights, such as desk and floor lamps (as opposed to overhead lighting), are more economical for providing lighting for special tasks and also provide for better individual control of glare and shadows. Not only is energy saved, but studies also show that excessively uniform lighting has a harmful effect on human psychological health since it produces a visually monotonous and unstimulating environment (Dumas 1976). Additionally, rooms with a variety of lighting levels are usually more attractive and inviting.

Conservation of lighting energy can pose problems for owners of older homes. First, the contemporary standards for over-lit interiors provide constant pressure for increased illumination levels in older buildings. Second, the lighting sources most frequently associated with older buildings are the least efficient illuminators and the greatest heat producers. Incandescent bulbs, the lighting source generally thought to be the most compatible with historic properties because of their "superior" color rendering ability and deep historical roots, are by far the least efficient light source. They generate the most heat, thus contributing to the summer cooling load (Dumas 1976).

This conflict between visual interests and energy interests may be resolved in the future by technological improvements, such as the production of bulbs with more acceptable color rendering abilities at lower wattages, and by changes in aesthetic norms as people get used to different lighting sources. For example, the production of fluorescent bulbs which fit standard incandescent fixtures will undoubtedly gain greater use in older homes than fluorescent tubes, since a primary objection to the use of the tubes has been the unsightliness of the available fluorescent fixtures. Meanwhile, owners of older homes should guard against unnecessarily increasing illumination levels.

Areas of Compatibility

The foregoing discussion is not to imply that energy conservation and historic preservation are conflicting objectives. Rather, the point is that special consideration and care must be given to ensure that energy conservation measures do not reduce the architectural, historic, or aesthetic value of the building.

For every area of apparent conflict, there are numerous areas of compatibility. Many energy conservation measures in no way compromise historic or architectural integrity.

One factor, more than any other, determines the energy consumption of a building — how it is used. Common sense would tell one that an efficient light bulb which is always on uses more energy than an inefficient one which is seldom used; the difference depends on the user and not the equipment. The importance of the "occupant factor" in home energy consumption was highlighted by a Princeton University study which showed that during a given period of time a ratio of greater than two to one in energy usage existed between the highest and lowest users in "what would appear to be an identical dwelling" (Spielvogel 1976).

Probably the most effective means of conserving energy is through the utilization of operational controls — controlling how existing equipment is to be used and making plans for selective equipment replacement. First, activity patterns should be examined, and all facets of energy usage quantified. Then, operational steps, such as adjustment of temperature and illumination levels, should be undertaken, and plans for the selective replacement of inefficient equipment made. Operational changes alone may result in a 20 to 30 percent energy savings with no retrofitting and little or no cost (Smith 1977).

An example of an operational change which results in energy savings is a change in thermostat settings. In North Carolina, a universal thermostat reduction of 5°F during heating season would reduce the energy used for heating by 25 percent; a 5°F thermostat increase during cooling season would reduce the energy required for cooling by 35 percent (North Carolina Department of Adminstration 1974). Significant energy savings can also be realized by the downward adjustment of water heater thermostats as well.

Proper maintenance of heating systems is another energy saver. For example, a half millimeter of soot in an oil burner can reduce furnace efficiency by 50 percent (North Carolina Department of Administration 1974). Figure 2 shows that substantial differences exist between the rated and actual efficiencies of American residential heating systems, indicating that many systems are not operating as well as they could be. This is probably because of inadequate maintenance.

Technological advances requiring changes in equipment make further savings a possibility. Electric heat pumps are two and a half to six times more efficient than other electric heating methods (Steadman 1975). Since heat pumps tend to be highly efficient in areas such as piedmont and eastern North Carolina, which are not frequently subjected to temperatures below 20-25°F, the pump offers a conservation potential of saving 1.362 X 10^{14} Btus per year in North Carolina alone (North Carolina Department of Administration 1974). In homes heated by natural gas, the replacement of pilot lights in existing furnaces with electric ignition would save six percent of the energy used in them (Hyatt 77); conversion from a pilot light to electric ignition presently costs about $95. Air conditioners are now being designed which are 40 percent more efficient than the typical unit now in use (North Carolina Department of Administration 1974).

Figure 2

Comparison of Energy Efficiencies of Fossil Fuels and Electric Resistance Heating Systems

	Rated[1]	Actual[2] Residential
Space Heating		
Natural Gas	85%	75%
Petroleum Products	80	63
Coal	70	55
Electric[3]	38	31
(at heater)	(95)	(95)
Water Heating		
Natural Gas	70%	64%
Petroleum Products	55	50
Coal	70	15
Electric[3]	37	30
(at heater)	(92)	(92)

[1] Outer limits of efficiency of available units in substantial use. Electric generation is assumed to be 40 per cent.
[2] Estimated average experience.
[3] These data do not include transmission and distribution losses.
Source: Dumas 1976, p. 57.

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Future technological improvements will also aid owners of existing homes who make equipment replacements. An electrodeless fluorescent bulb which fits a standard incandescent fixture is presently being refined and prepared for marketing. Although costing about $7.50, this new bulb will pay for itself several times over during its lifetime because the energy needed for lighting is reduced by 70 percent and the bulb has an estimated 20,000-hour operating lifetime compared to 750 hours for a typical incandescent bulb (Energy Research and Development Administration 1976).

By the early 1980s, gas heat pumps should be on the market. Gas heat pumps are two and one half times more efficient than electric heat pumps since they use fuel burned at the site, rather than fuel burned at a central generating plant where energy losses through the expulsion of waste heat are great. Gas heat pumps will provide an even greater efficiency increase over existing gas furnaces (Energy Research and Development Administration 1977).

Conclusion

Planners in the Southeast can have a great impact on the fate of older houses within the region. Whether older properties survive depends in large part on how they are viewed by local governments. If an older neighborhood is zoned commercial or is expected to be the site of major thoroughfares, the housing in that area is doomed. On the other hand, if a city or county makes preservation a priority (in its capital expenditures, its zoning, or the management of its own property), its older housing is likely to be treated with respect by owners, and older neighborhoods will survive.

Local government can also have an impact on whether energy conservation measures are implemented in a way which is compatible with the architectural and historic fabric of a building. Planners who deal with housing should be familiar with the problems of trying to meet both preservation and energy priorities.[3] By being knowledgeable of the problems, the planner can influence and educate members of the public about how to work with older properties.

If a city or county has an historic district commission or historic properties commission, the commission can play an important role by becoming knowledgeable about energy conservation techniques and working with property owners. Since an historic district commission can disapprove inappropriate or incongruous exterior alteration, it can assure that energy measures do not conflict with appearance and historicity when exterior appearances are to be affected. A commission is also in a position of being able to educate property owners and encourage compatible measures, even where there is no effect on exterior appearance.

The owner of an historic property designated by a city or county must give the local historic properties commission ninety days notice prior to making any alteration to this property. During this period the commission can work with the owner to assure that appropriate energy conservation measures are to be taken.

With both an historic district commission and an historic properties commission, the key ingredient for the successful integration of energy and preservation objectives is knowledge. The likely source of knowledge will usually be the staff person for the commission — the planner. The planner who is conscious of the potential pitfalls can be an old house's best friend.

The Southeast has exciting cultural resources to conserve for future generations: buildings responsive to people, buildings designed to be in harmony with their environments, buildings reflecting earlier eras and mores. The challenge for advocates of preservation and for planners is to be cognizant of the future, as well as of the past. In the future, buildings must be more energy efficient than they are today if they are to remain responsive to people and their environment. Older buildings must come to reflect the needs of future eras, or else they will become lost relics of the past. Planners, homeowners, and preservationists should commit themselves to seeing that the adaptation of our cultural resources to meet future needs occurs as smoothly as possible.

Notes

1. It is interesting to note that many of the traditional means of adapting a building to its site are being revived now, especially as architects and builders try to take advantage of the sun's energy.
2. Frasch (1976) suggests several methods to enhance chances for aluminum painting success. One suggestion is to let the aluminum weather before painting it; others are to brush the surface with a wire brush or to wipe it down with an acid such as vinegar prior to painting.
3. Two excellent sources of information are: "Preservation Brief #3: Conserving Energy in Historic Buildings by Baird M. Smith (available free from the Technical Preservation Services Division, Office of Archeology and Historic Preservation, Heritage Conservation and Recreation Service, United States Department of the Interior, Washington, DC 20240) and *Insulating the Old House: A Handbook for the Owner* (available for $1.90 from Greater Portland Landmarks, Inc., 165 State Street, Portland, Maine 04101).

References

AIA Research Corporation. 1976. *Energy Conservation in Tract Housing.* Washington: American Institute of Architects.

Advisory Council on Historic Preservation. 1974. "Procedures for the Protection of Historic and Cultural Resources." *Federal Register* 39: 3366-70.

Downing, A. 1977. Letter to Janet K. Seapker, Administrator, Historic Preservation Section, (N.C.) Department of Cultural Resources, March 14, 1977.

Dumas, L.J. 1976. *The Conservation Response.* Lexington, Massachusetts: Lexington Books.

Energy Research and Development Administration. 1977. *Gas Heat Pumps.* Washington: Energy Research and Development Administration.

——— 1976. *New Energy Saving Light Bulb.* Washington: Energy Research and Development Administration.

Frasch, R.W. 1976. "Tips on Storm Windows." *The Old-house Journal* IV, 2:2.

Hannon, B.M., Stein, R.G., Segal, B.Z., Serber, D.; and Stein, C. 1976. *"Energy Use for Building Construction."* Washington: Energy Research and Development Administration. Unpublished paper.

Harrison, H.S. 1976. *Houses.* Chicago: Realtors National Marketing Institute.

Heritage Conservation and Recreation Service. 1978. "Conserving Energy in Historic Buildings." *Preservation Briefs* 3: 1-8.

Hyatt, S.V. 1977. "Thermal Efficiency and Taxes." *Harvard Journal on Legislation* 14: 281-327.

Labine, C. 1977. "The Energy-Efficient Old House." *The Old-house Journal* 5: 95-107.

Little-Stokes, R. 1978. "The North Carolina Porch." *Carolina Dwelling* 26: 104-112.

Means, M.C. 1975. Letter to Mrs. Arthur D. Chaffee, Chairman of the Woodbury (Conn.) Historic District Commission, October 31, 1975.

Nielsen, S., ed. 1977. *Insulating the Old House.* Portland, Maine: Greater Portland Landmarks, Inc.

North Carolina Department of Administration. 1974. *A State Energy Management Plan.* Raleigh: Department of Administration.

Royal Windyne Limited, 1978. "Cool Your Old House." *The Old-house Emporium* VI, 5: 1.

Seapker, J.K. 1973. *Aluminum and Other Artificial Sidings.* Memorandum. North Carolina Department of Cultural Resources, Spring 1977.

Smith, B. 1977. "Energy Conservation and Historic Preservation." *11593* II, 5: 1-3 (supplement).

——— 1978. "Energy Conservation and Historic Preservation." Talk given at North Carolina Historic Preservation Conference, April 21 1978, at Winston-Salem, North Carolina.

Spielvogel, L.G. 1976. "Exploding Some Myths About Building Energy Use." *Architectural Record* 159: 125-28.

Steadman, P. 1975. *Energy, Environment and Building.* New York: Cambridge University Press.

Syska, Hennessy, and Tishman Research Corporation. 1977. "Energy Conservation in Existing Buildings." Washington: Energy Research and Development Administration. Unpublished paper.

Thompson, W.M. "Architecture in America." *American Preservation* I, 2: 74-75.