City of Jacksonville
Historic Preservation Commission
SUMMER 2007 NEWSLETTER

Conserving Energy in Historic Buildings

The first segment in this series discussed inherent characteristics of many older buildings. In this installment, passive and retrofitting measures will be explored in an effort to assist property owners in saving energy and money… just in time for winter!

To reduce heating and cooling expenses, there are two courses of action: passive procedures help existing building components function as efficiently as possible without making alterations or adding new materials; and preservation retrofitting, which includes building alterations with appropriate weatherization measures to improve thermal performance. Using these methods could decrease energy costs in historic buildings by up to 50%.

Passive Measures

The first passive measures are operational controls; managing how and when a building is used. Scheduling and planning allows the owner to minimize energy consuming equipment usage. Calculate all aspects of energy usage, evaluate the amount spent on utilities for a year, then examine how and when rooms are used to spot ways to conserve energy with operational controls:

- lower the thermostat in the winter, raise it in the summer
- control the temperature in the rooms actually used
- reduce lighting levels/number of lights (use natural light)
- use operable windows, shutters, awnings and vents as originally intended for fresh air to control interior environs
- regularly service mechanical equipment to maximize efficiency
- replace filters/clean radiators and registers for proper function

These actions are the first energy conservation steps to take in any existing building and can reduce energy usage up to 30%. Since they require no alterations or new material introduction that may cause damage, they are ideal for historic buildings.

Preservation Retrofitting

Preservation retrofitting improves building thermal performance with 20%-30% energy reduction. Since today's retrofitting materials and techniques can only meet standards being applied today, and all will likely change in the future, there are no permanent solutions, so new retrofitting plans may be needed. Limit retrofitting measures to what achieves energy savings at reasonable levels and costs, with minimal impact/intrusion to building character. Overzealous retrofitting can damage historic materials.

Preservation retrofitting measures can prevent the three most common problems caused to historic structures. The first is retrofitting that requires inappropriate building alterations, like removing historic windows, adding vinyl siding, or dropping ceilings in significant interior spaces. Following the Secretary of the Interior's Standards will avoid damage and negative alterations.

The second problem area is retrofitting that creates moisture-related deterioration. Large amounts of moisture exist inside buildings. In northern climates, moisture can condense on cold surfaces, like windows, in the winter. It may condense within the walls and roof as it passes through these materials, creating potential for decay. In-facing vapor barriers can avoid this problem. In southern climates, moisture problems may occur in summer when moist outside air migrates inside. Install insulation with the vapor barrier facing out in these cases. Expert advice should always be sought to avoid problems.

The third problem is materials that are improperly installed or chemically/physically incompatible with existing materials. For example, cellulose insulation with aluminum sulfate fire retardant may react with air moisture to form sulfuric acid, which can damage metal, brick, and wood. Boric acid insulation fire retardant causes no damage. Consulting with local building inspectors or a consumer protection agency can help avoid these problems.

Before planning retrofitting measures, investigate existing physical conditions. Know the construction method of the roof, attic, walls, and foundation and check the presence and coverage of insulation and vapor barriers to help determine the need, type, location, and installation method for more insulation. Verify air infiltration sources at doors, windows, and wall joints at the ceiling and floor. Inspect exterior wall material and roof conditions to confirm weather tightness of the building. Rain and snow must be kept out before any money is spent on other improvements.

Retrofitting Measures

Below are common retrofitting measures. Easiest, most economical, and provide highest energy savings potential are listed first. Those with * are highly recommended for a preservation retrofitting plan. Other measures less beneficial or even harmful to a historic building, and those not generally recommended because of potential technical and preservation problems or costs outweighing anticipated energy savings are listed last. Get specific solutions based on facts and circumstances of the particular problem from professionals experienced in historic preservation:

- Air infiltration*
- Attic insulation*
- Storm windows*
- Basement and crawl space insulation*
- Duct and pipe insulation*
- Awnings and shading devices*
- Doors and storm doors*
- Vestibules
- Replacement windows
- Wall insulation
  - ⇒Wood frame
  - ⇒Masonry cavity walls
  - ⇒Installed on the inside
  - ⇒Installed on the outside
- Waterproof coatings for masonry

Air Infiltration: Reducing air infiltration is a top priority because of the low cost, minimal skill, and substantial benefits. Outside building shell cracks, loose doors and windows cause cold air infiltration and significant heat loss. Add weatherstripping to windows and doors to reduce infiltration. Some infiltration is

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needed to prevent condensation problems and allow moisture migration. Avoid materials of inappropriate colors, or that visually impair the building's architectural character.

Attic Insulation: Cutting heat lost by rising through the attic and roof is vital. Add insulation in accessible attic spaces for energy savings at reasonable costs with limited skill. The most common attic insulations are blanket fiberglass or mineral wool, blow-in cellulose, vermiculite, wool, or fiberglass. For uninhabited/ unheated attics, install vapor barriers facing down; for floored attics, place insulation between rafters with vapor barriers facing in; where insulation is present, add more to reach recommended depths for the climate area with no vapor barriers; follow manufacturers instructions in all cases. In areas not easily accepting of these applications, durable surface insulation may be applied to ceilings of rooms below, providing no permanent damage is done to historical materials. Attic vents at 1/300 of the attic floor area keep insulation dry and maintain its thermal effectiveness.

Storm Windows: Storm windows greatly improve the poor thermal barriers and air infiltration of windows. Keep existing wood or metal framed storms, ensuring tight fit and good operation. If no storms are present, install new metal framed windows outside without damage to historic window frames (paint to blend). This 1.79 R-factor historic-plus-storm-window assembly outperforms 1.72 R-factor double paned windows with air space up to 1/2". Readily available triple-track metal storms come in many sizes at reasonable prices. Pricey custom-made storms may not be cost-effective. Metal framed or rigid plastic sheet interior storm windows offer comparable thermal effectiveness, but must be carefully installed to avoid damage to historic frames, which require caulk/weatherstripping to reduce infiltration. To reduce potential moisture damage to historic windows and sills by condensation forming on cold exposed sashes in winter, open or remove interior storms during mild months to let windows dry thoroughly.

Basement and Crawl Space Insulation: Add insulation in cold basements/crawl spaces to greatly cut heat loss. If unheated, both often have excessive moisture, put insulation between first floor joists with vapor barriers facing up, using special anchors developed for moist areas (since staples rust), and provide adequate ventilation (perhaps install an exhaust fan). For basements with a furnace or exposed water/sewer pipes, install batt or rigid insulation on foundation walls from within first floor joists down to at least 3 feet below exterior grade with vapor barriers facing in.

Duct and Pipe Insulation: These measures are inexpensive and pose little risk of damage to an historic building. Use insulation designed for heating/cooling ducts and hot water pipes according to manufacturer's recommendations. Moisture will condense on air conditioning ducts in summer, so use insulation with vapor barriers facing out, away from the duct.

Awnings and Shading Devices: In the past, awnings and trees shaded buildings to keep them cooler in summer. If trees exist, maintain them well and enjoy their energy-saving contribution. Consider adding trees or awnings if summer cooling loads are substantial. Deciduous trees offer summertime shade and let the sun warm the building in winter. Plant trees at least 10 feet from the building to avoid foundation damage. Install awnings without damaging the building or visually impairing its architectural character. Awnings or shade trees may be expensive, but in hot climates, the benefits can justify the costs.

The final installment of this series will address the rest of these measures and review other energy saving tips.

What Style is Your House?

Cotswold Cottage (c.1890 - 1940)

The small, fanciful Cotswold Cottage is a popular subtype of the Tudor Revival house style. This quaint English country style is based on the cottages built since medieval times in the Cotswold region of southwestern England. The Cotswold Cottage style became especially popular in the United States during the 1920s and 1930s when a fascination for medieval styles inspired American architects to create modern versions of the rustic homes.

The picturesque Cotswold Cottage is usually asymmetrical with a steep, complex roof line. The floor plan tends to include small, irregularly-shaped rooms, and the upper rooms have sloping walls with dormers. The interior generally makes use of all space and gives a feeling of comfortable coziness rather than a spacious, rambling, or open sensation. The home may have a sloping slate or cedar roof that mimics the look of thatch. A massive chimney often dominates either the front or one side of the house.

The Cotswold Cottage style may also be known by several other names:

- Storybook Style
- Hansel and Gretel Cottage
- Tudor Cottage
- English Country Cottage
- Ann Hathaway Cottage

Over the years, these cottages are often modified with dormers or different siding applications. Cotswold Cottage houses often have many of these features:

- Sloping, uneven roof, sometimes made of pseudo-thatch
- Brick, stone, or stucco siding
- Very steep cross gables
- Prominent brick or stone chimney, often at the front near the door
- Low doors and arched doors or passageways
- Casement windows with small panes
- Small dormer windows
- Asymmetrical design
- Small, irregularly-shaped rooms
- Sloping walls in rooms on upper floor

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...more styles in the next edition!