Historic Preservation: Green When Green Wasn't Cool

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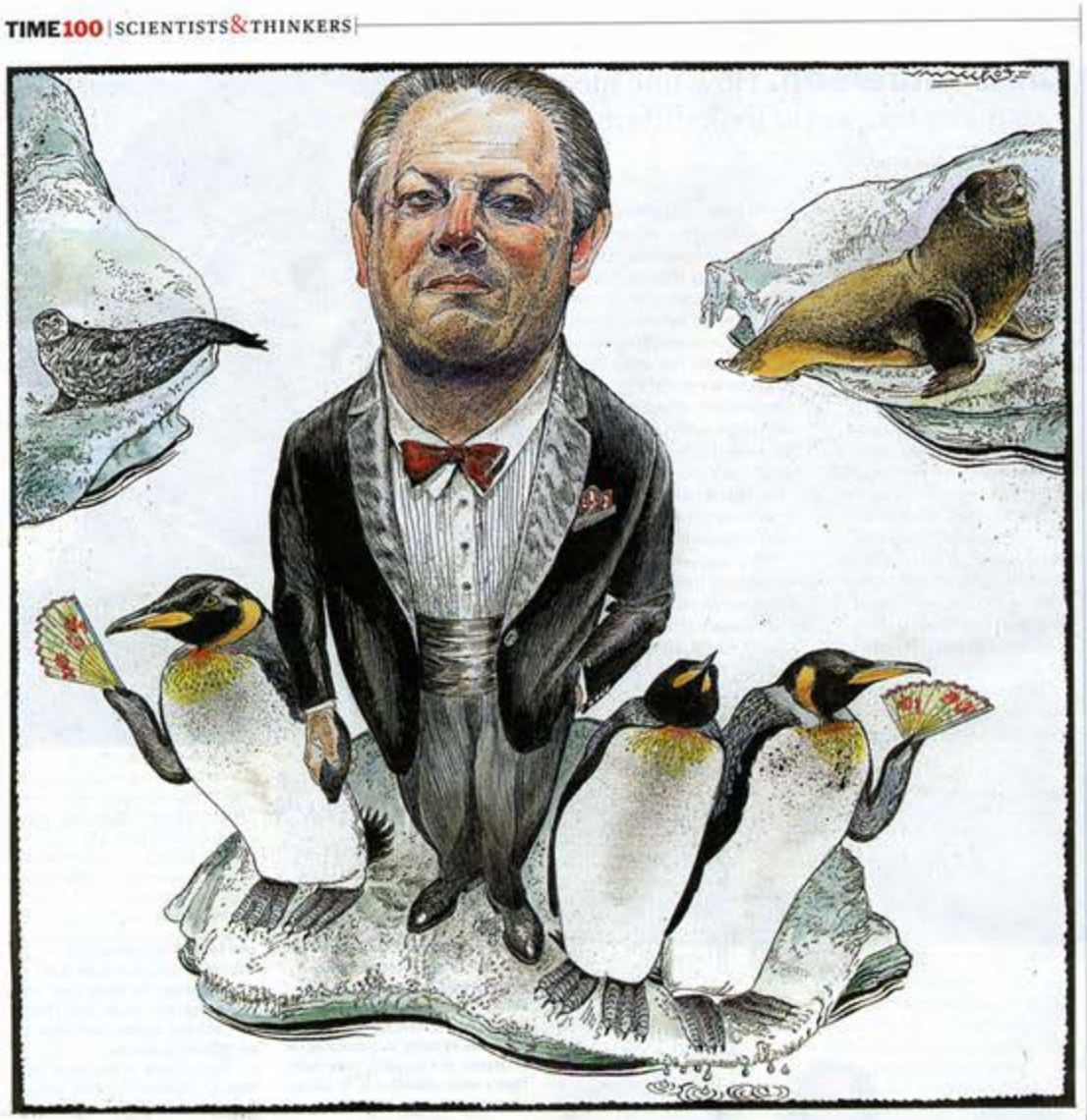
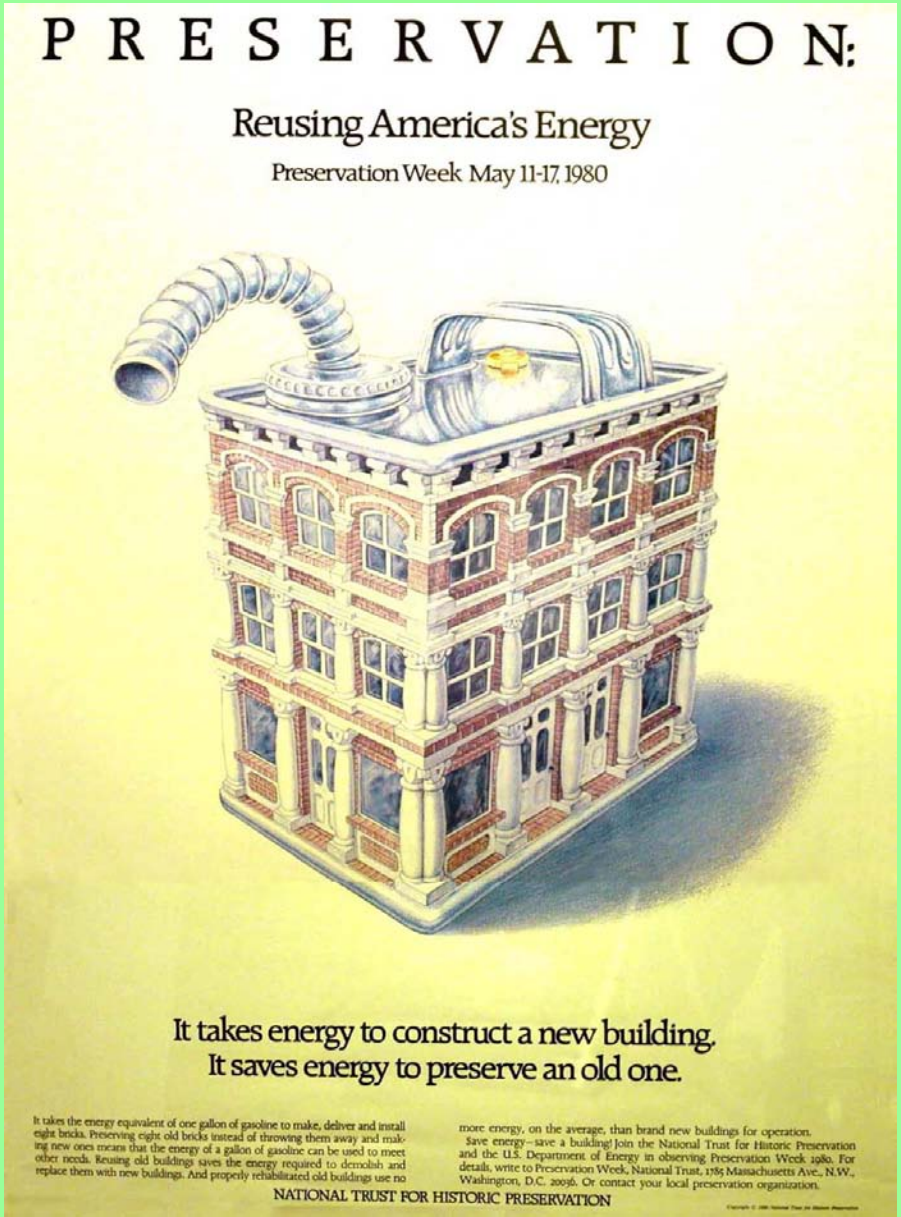
looku.com

Al Gore, An Inconvenient Truth



Al Gore, One of Time Magazine's 100 most influential people of 2007

Preservation as a Sustainability Tool



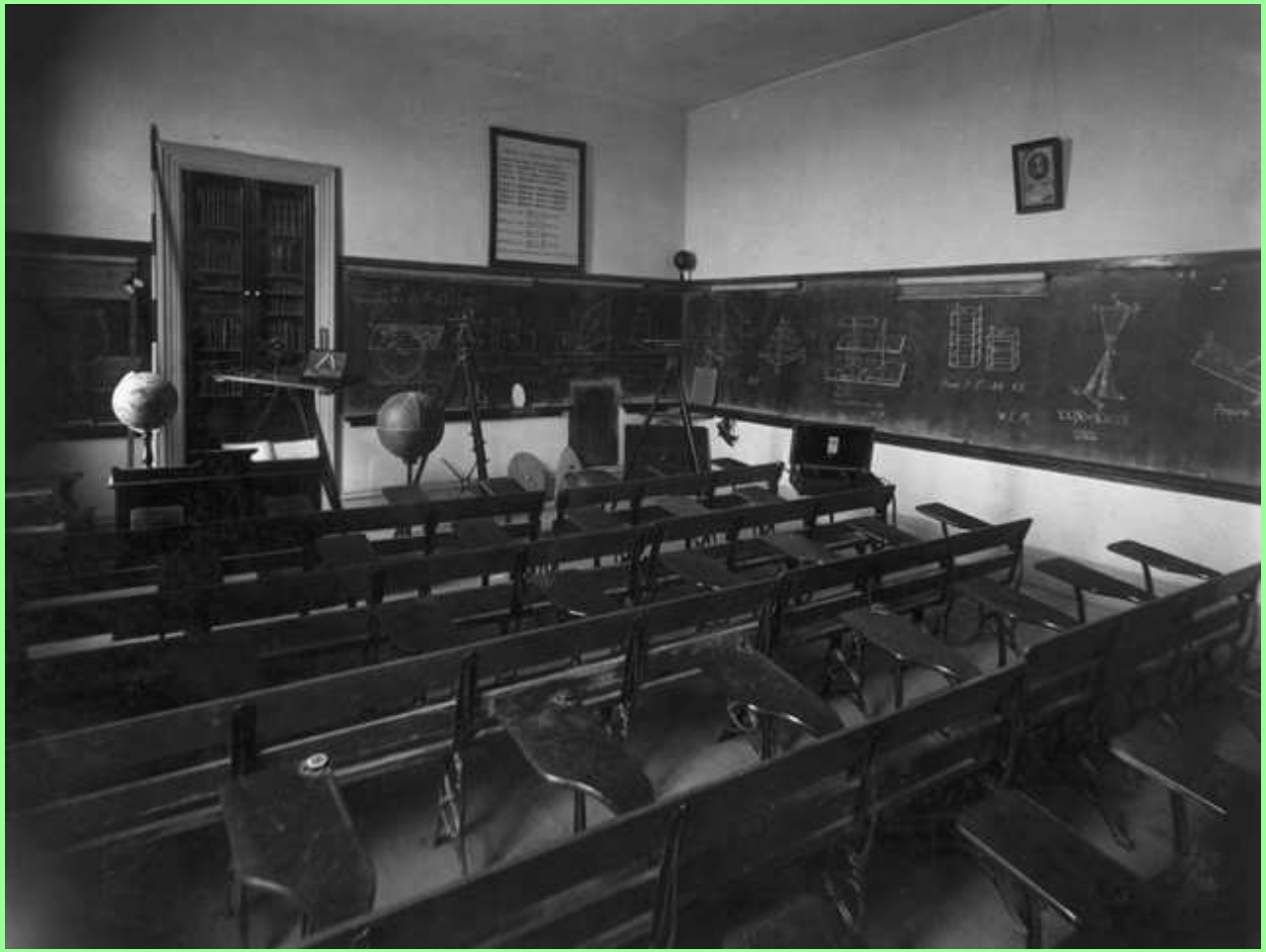
The greenest building is the one that's already built.

Carl Elefante, Quinn Evans Architects, Washington, D.C.
Past Chair, Association for Preservation Technology

- The greenest building is the one that's already built.
- The most environmentally responsible building material is the one that isn't used.

Center for Resource Conservation, Boulder, Colorado

Compute the Environmental Equation



Which is not necessarily the most obvious “green building” equation!

COMPARE:
Greenhouse gasses from preservation with greenhouse gasses from new green building

List the types of greenhouse gas emitting sources used in construction

Extraction

Manufacturing

Transportation

New Construction vs. Rehabilitation

1.5 times the effect on global warming

[British study reports 3.5 times!]

New Construction vs. Rehabilitation

20 to 30 percent of the energy used over a 100-year period comes from constructing the building!

As buildings are built more energy efficient, this percentage will increase!

But will new construction last 100+ years?

Embodied Energy

may be difficult to equate, but that doesn’t mean it doesn’t exist.

Embodied Energy

Life-cycle analysis comparing embodied energy and operating energy between reuse of an existing building and construction of a new building, illustrating the time it takes before a net energy savings is achieved

These three scenarios all point to the fact that reusing an existing building and making it more energy efficient results in an immediate savings of total energy use. If building new, no net savings of total energy are achieved until a future date that can be greater than the life expectancy of many new buildings.

Scenario 1: Do nothing to the existing building and build a new building. The existing building will remain and be used by a different user. The new building will be designed to meet Energy Star standards of operating efficiency.

- Embodied energy 1,200 MBtu/sq. ft. for the new building (mid-range value)
- Existing building operating energy at 70,000 Btu/sq. ft.
- New building operating energy at 35,000 Btu/sq. ft.

34.2 years before any life-cycle energy savings is achieved

Scenario 2: Demolish the existing building with partial salvage. Construct new office building to meet Energy Star standards.

- Embodied energy: 1,200 MBtu/sq. ft. (existing)
- Embodied energy: 1,200 MBtu/sq. ft. (new)
- Embodied energy: - 400 MBtu/sq. ft. (salvage)
- Total embodied energy: 2,000 MBtu/sq. ft.
- New-building operating energy at 35,000 Btu/sq. ft.

57 years before any life-cycle energy savings is achieved

Scenario 3: Renovate existing building, improving its efficiency by 30 percent, although not meeting Energy Star performance standards. Construct new building to meet Energy Star Standards.

- Embodied energy: 400 MBtu (rehab)
- Operating energy: 50,000 Btu (rehab)
- Embodied energy: 1,200 MBtu/sq. ft. (new)
- Operating energy: 35,000 Btu/sq. ft. (new)

53.3 years before any life-cycle energy savings is achieved

- as published in the Green Building Alliance

EMBODIED ENERGY

of a historic building

[that is, the energy it took to construct it pursuant to the environmental equation] is actually a lot less than the energy to construct a new building.

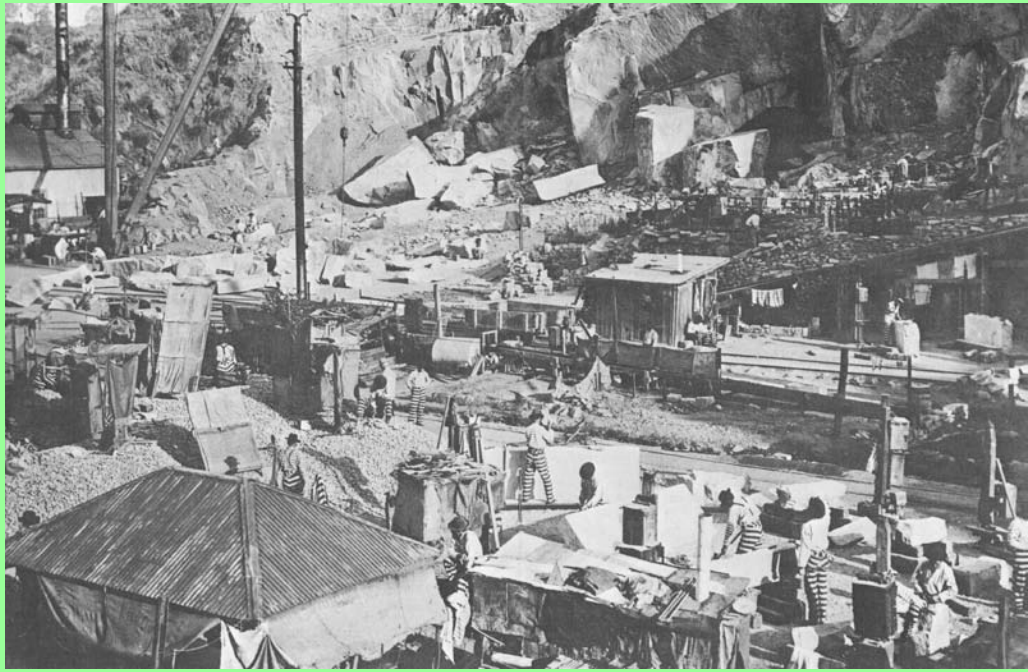
WHY?

- Historic buildings are derived from materials that were obtained locally [thus minimal transportation expense]

- Historic building are derived from natural materials not undergoing an energy-consumptive manufacturing process [unlike synthetic modern building materials some of which are derived from oil]

HISTORIC BUILDINGS MAY BE ENTIRELY DERIVED FROM LOCAL MATERIALS.

Most towns had a local brick yard, lumber mill, or quarry.



LOCAL IS DEFINED UNDER LEED CERTIFICATION AS WITHIN 500 MILES!

Fix it? Forget it!

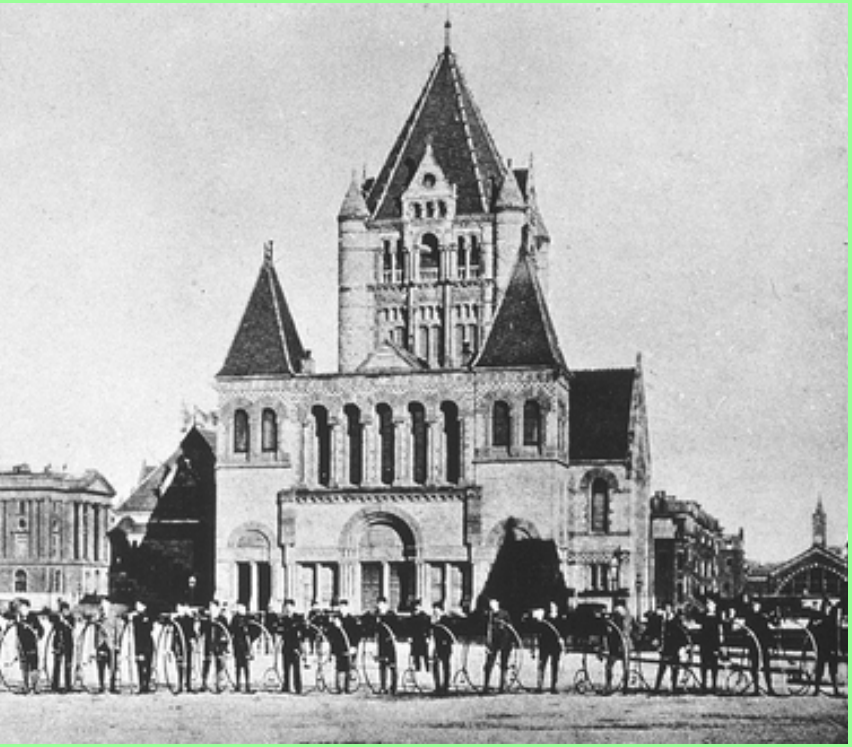
MODERN SOCIETY IS NO LONGER REPAIR-ORIENTED.

Watch this!

YOUR GRANDFATHER HAD ONE WATCH HIS ENTIRE LIFE.

WHAT ABOUT YOU?

Life Cycle Assessment and Durability



HISTORIC MATERIALS ARE BOTH DURABLE AND BEAUTIFUL.

Is purchasing a Prius the best environmental option?

Well, maybe not.

Life Cycle Assessment and Durability

Historic buildings have already exceeded their expected life cycle!

Maintenance IS preservation.

If properly maintained . . .

historic buildings will last for centuries.

Secretary of the Interior's Standards for Rehabilitation
Standard 6

- Deteriorated features repaired rather than replaced.
- If severe deterioration, replace to match design, color, texture, other visual qualities and, if possible, materials.
- Replacement of missing features substantiated by evidence.

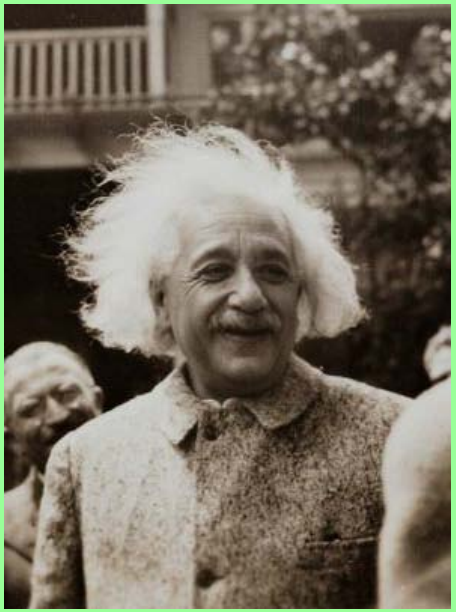
Use a Holistic Approach

Green building doesn’t ensure good design

Use the Three Es of Sustainability!!

Equitable

Economic



Environmental

The (new) Three Rs!

Reduce

Reuse

Recycle

Another Three Rs!

Repair

Rehabilitate

Replace

Aim for Zero Waste!

Berkeley, California

Berkeley City Council Resolution, March 22, 2005

- 75% reduction in waste by 2010
- Zero waste by 2020

“In the 1980's when Berkeley set a goal of reducing waste by 50%, everyone said it couldn't be done.”

- Tom Bates, Mayor

"If it can't be reused, rebuilt, refurbished, reconfigured, recycled, or composted, then it needs to be redesigned or removed from production altogether.”

- Dan Knapp, Urban Ore

Mount Trashmore… no more!

In the state of Massachusetts, construction waste cannot be dumped in landfills

Organic Materials

In a landfill, organic materials are 30 times more effective as a greenhouse gas than uncovered decay.

Tacoma, Washington

39. Adaptive reuse of historic or older buildings:

    Using older buildings for new purposes should be encouraged by City policy.

Tacoma Climate Action Plan
July 1, 2008

2007 Colorado Legislature

House Bill 1146

- Local governments must enact energy efficiency measures in their local building codes
- Does not apply to historic buildings!

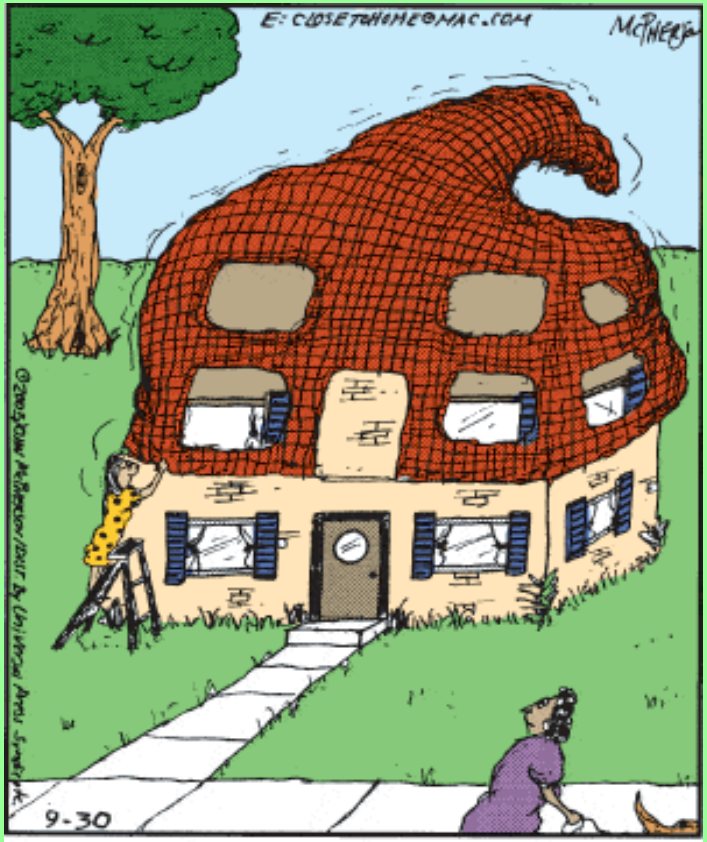
2007 Colorado Legislature

Senate Bill 51

High Performance Standard Certification Program

- New state buildings and major renovations must be energy-efficient.
- Abandoned LEED criteria; uses 15-year payback period
- “High performance” criteria includes Secretary of the Interior’s Standards!

INCORPORATING GREEN BUILDING INTO PRESERVATION STANDARDS [AND VICE VERSA]



Concerned about soaring energy costs, Connie embarks on her biggest craft project ever and knits a wool sweater for their house.

Your Pal, Low Tech

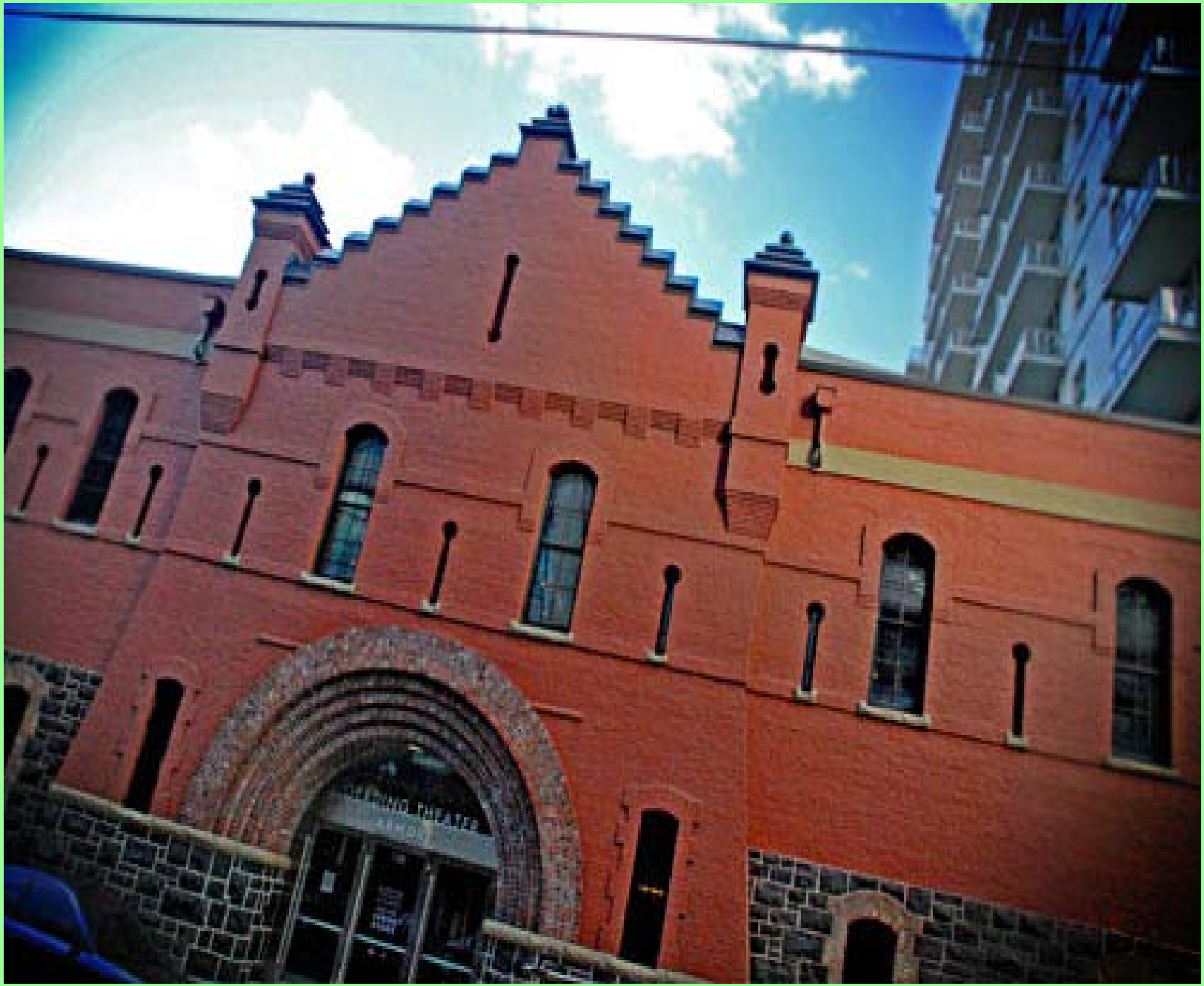
Your Pal, Low Tech

Often, low tech is the best preservation alternative:

- Re-pointing
- Painting
- Repairing
- (or maybe just some duct tape?)

“Close to Home” Tech

Tackling LEED



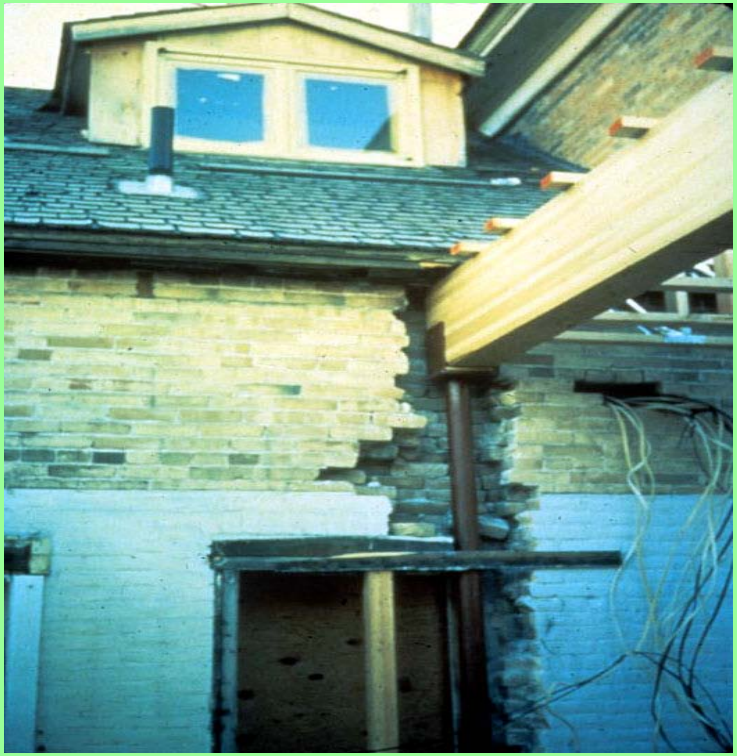
Technology is quickly changing!

What is true today may not be so true next year.

Ask: Will the device most likely be “temporary?”

REMOVABILITY

- Also ask will the energy efficiency device be installed and removed without damaging character-defining historic features?




06/14/2007

Preservation Brief #24

- DON’T place condensers, solar panels, chimney stacks, vents, or other equipment on visible portions of roofs or at significant locations on the site.


WESTERN
Western
303-444-2037

307 8th St. (street view)
Evacuated Tube array on front porch located in R2 Zone.

Breckenridge Solar Panel Preferences

- Detached
- Outbuilding
- Non-historic portion of main building
- Historic building

Test: Find the wind turbine.

We’ve dealt this this before!

Mrs. Mann as the Turbine goes up

The installed 45 foot tall turbine

Photos courtesy of CNN

Atlanta, Georgia

Photo Courtesy of CNN

Photos Courtesy of Paul Trudeau and NTHP

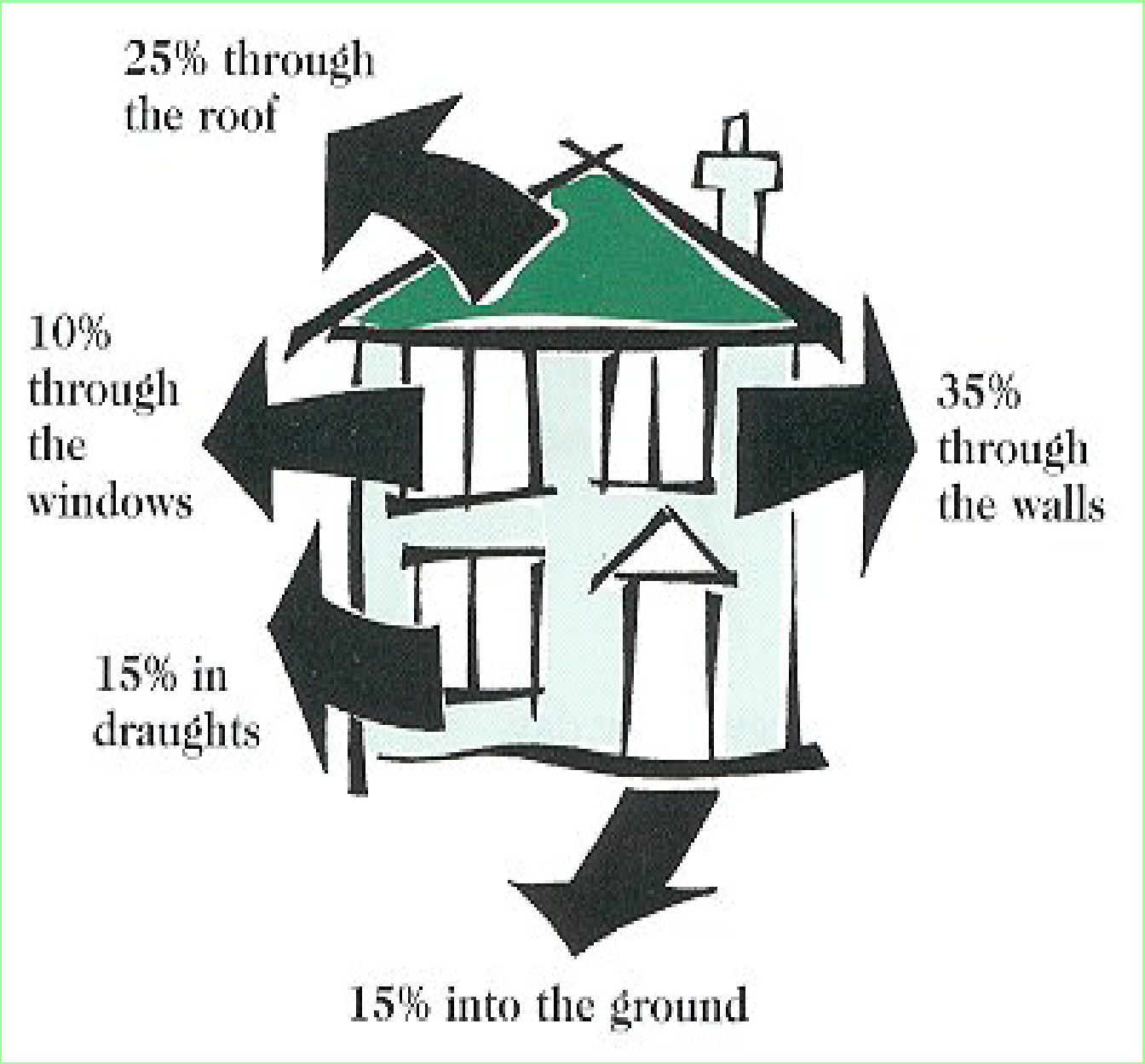
Cambridge, Massachusetts

Photo Courtesy of Paul Trudeau

Historic Wood Window Restoration: A Green Concept

American Institute of Architects, Winter 2007 Newsletter

"…when lifecycle costs and embodied energy is studied, window repair is often more cost-effective and sustainable than replacement windows. The sustainable benefits of waste reduction and the historic benefit of maintaining architectural integrity may balance the loss of increased energy efficiency of new replacement windows in the long run, especially since there often alternate methods of increasing energy efficiency without sacrificing the original window."


25% through the roof
10% through the windows
35% through the walls
15% in draughts
15% into the ground

- Restoring wood windows sustains original materials and fabric

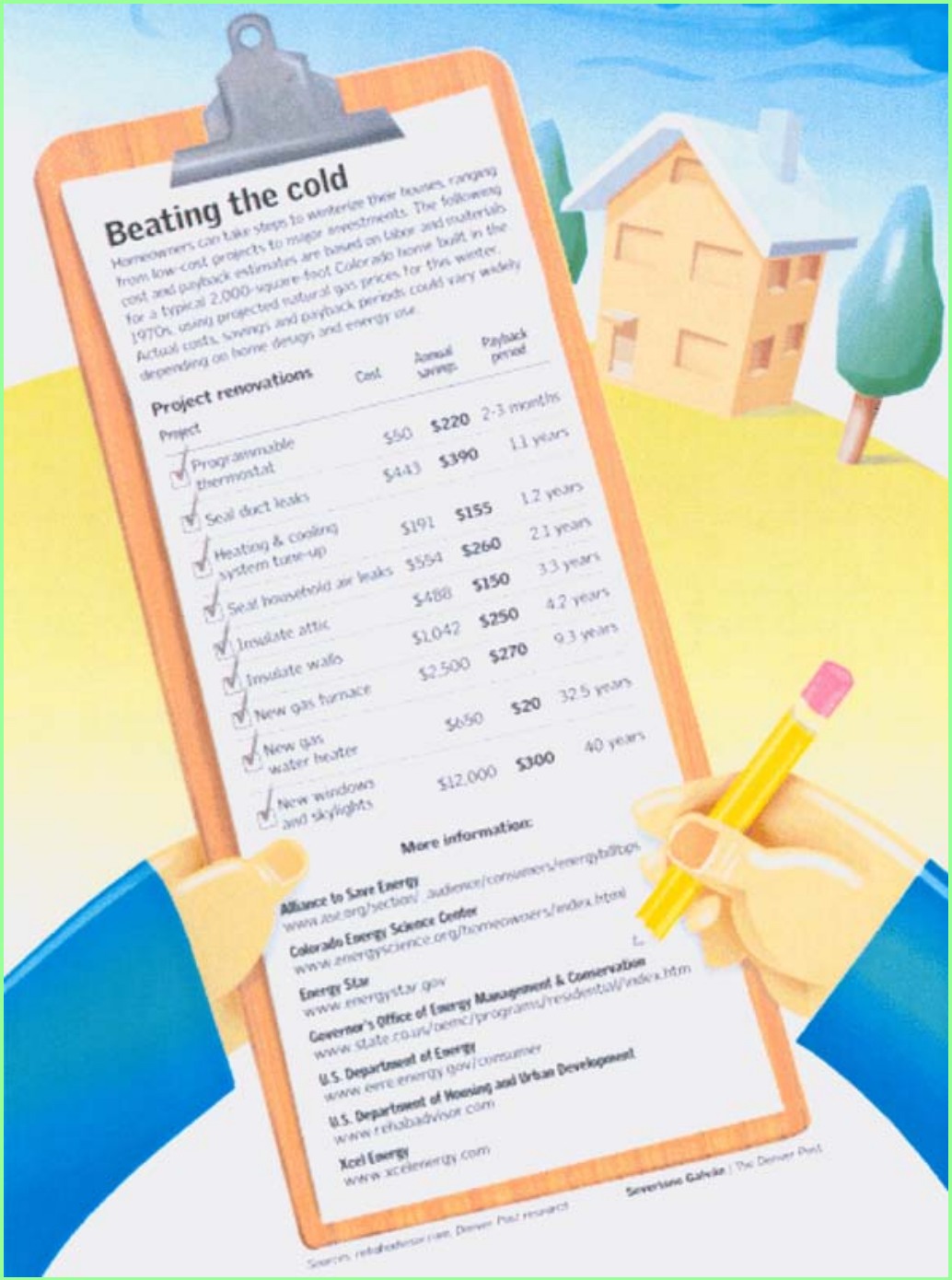
- Wood windows have endured the test of time

- Historic wood windows can be repaired; replacement windows can’t

- Remember: window replacement companies will often compare their product to an un-restored wood window with little or no weather-stripping and a poor (or no) storm window.

- A single pane window with a storm window will meet Energy Star ratings - if the rest of the house can offset the energy loss.

- It can take a homeowner decades to recoup payback from replacement windows with insulated glass


Beating the cold
Homeowners can take steps to winterize their houses, ranging from low-cost projects to major investments. The following cost and payback estimates are based on labor and materials for a typical 2,000-square-foot Colorado home built in the 1970s, using projected natural gas prices for this winter. Actual costs, savings and payback periods could vary widely depending on home design and energy use.
Project renovations
Project
Cost
Annual savings
Payback period
Programmable thermostat
$50
$220
2-3 months
Seal duct leaks
$443
$390
1.1 years
Heating & cooling system tune-up
$191
$155
1.2 years
Seal household air leaks
$554
$260
2.1 years
Insulate attic
$488
$150
3.3 years
Insulate walls
$1,042
$250
4.2 years
New gas furnace
$2,500
$270
9.3 years
New gas water heater
$650
$20
32.5 years
New windows and skylights
$12,000
$300
40 years
More information:
Alliance to Save Energy
www.ase.org/section/_audience/consumers/energytips
Colorado Energy Science Center
www.energyscience.org/homeowners/index.html
Energy Star
www.energystar.gov
Governor's Office of Energy Management & Conservation
www.state.co.us/oemc/programs/residential/index.htm
U.S. Department of Energy
www.eere.energy.gov/consumer
U.S. Department of Housing and Urban Development
www.rehabadvisor.com
Xcel Energy
www.xcelenergy.com
Severino Galvan | The Denver Post
Sources: rehabadvisor.com, Denver Post research

Economic Sustainability

- Restoration = $ put back into local economies
- Restoration is *labor* intensive, not *materials* intensive