Historic Preservation and Sustainability:
"The Greenest Building is the One That's Already Built"

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Often people do not think of historic preservation and sustainability together. But they are natural partners. Historic Preservation can and should play a central role in fighting climate change. A clue to this can be found in simple definition of historic preservation. Richard Moe, a former president of the National Trust for Historic Preservation put it like this, "When you strip away the rhetoric, preservation is simply having the good sense to hold on to things that are well designed, that link us with our past in a meaningful way, and that have plenty of good use left in them."

Downtown Public Library, St. Joseph, MO

The preservation and reuse of historic structures is inherently sustainable: it reduces the consumption of resources and materials, creates less waste to put into landfills, and consumes less energy than does demolishing structures and rebuilding new ones. Nearly half of the carbon in the atmosphere is created by the demolition, construction, and operation of buildings. There is a cliche in preservation circles: the greenest building is the one that is already built. There is a profound

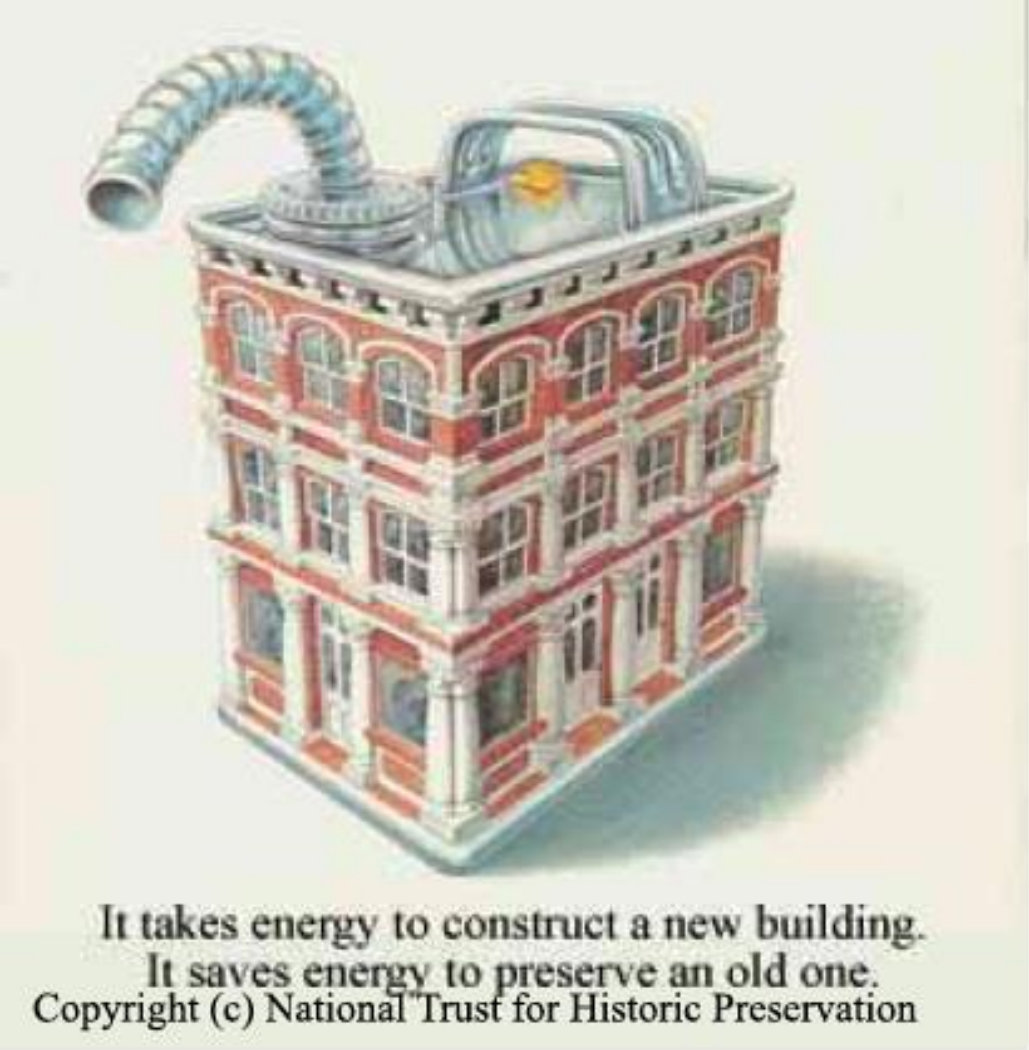
truth to that. Just think about it – there aren't many bigger recycling projects than the renovation of an historic structure. Saving what we already have instead of demolishing it and building new reduces the amount of material (some of it hazardous) that is placed in our landfills. We've all heard "Reduce, Reuse, Recycle" – that applies to historic preservation as well! As the well-known preservation economist, Donovan Rypkema says, "Historic preservation is the ultimate recycling strategy."

Demolitions in St. Joseph

In the mid-20th century, the concept of adaptive reuse came to the forefront of preservation thought – reuse what we have rather than demolish and rebuild. Preservation was seen to have a role in supporting social values. Today, one of those key values is sustainability. Again quoting Richard Moe, "Because it necessarily involves the conservation of energy and natural resources, historic preservation has always been the greenest of the building arts."

Examples of adaptive reuse of historic structures in St. Joseph

Preservationists began to think about the relationship between historic preservation and sustainability in about 1976 when the architect Harry Weese recognized the need for using energy considerations as one way to evaluate the inherent value of older buildings: "The residual value of energy built into old cities is enormous, packed into streets, utilities, and buildings: 1) time energy – manifold individual decisions over a period of development and use; 2) natural and human energy invested in materials and artisanship; 3) kinetic energy of construction and the fuel required. This is the energy of construction and the fuel required. This is energy content of a city. Energy is wasted when any old building is pulled down." In 1980, even before the word sustainability entered the common vocabulary, the National Trust issued a poster for Preservation Week featuring an old structure in the shape of a gas can – the point was that preserving an existing building was a good way of saving energy.



In 2007, Carl Elefante wrote an article in National Trust's *Forum Journal* where he articulated the quote above: "The greenest building is. . . one that is already built." This idea encapsulates the concept of "embodied energy," the investment of materials and energy in existing buildings. "The total energy required to demolish an old building, adding its waste stream to our landfills, in addition to the energy required for a new structure to be erected in its place – to obtain

raw materials, manufacture finished products, transport materials to the site, and erect the replacement structure – often results in a huge net addition in energy consumption. In comparison, retrofitting an existing building with energy-efficient components and installing energy-efficient system upgrades are realistic solutions that can result in significant efficiencies that reduce total energy costs. The energy expended many years ago to construct the building is referred to as its embodied energy." This energy is wasted if the structure is demolished.

Carl Elefante

A key phrase in thinking about embodied energy is "sustainable stewardship." The adaptive reuse of our existing older structures is an effective means of exercising responsible sustainable stewardship of our environmental resources. Our existing historic buildings represent a huge energy investment. At the height of the energy crisis in the mid-1970s, the consulting firm Booz Allen Hamilton determined that the amount of energy required to manufacture, transport, and install 8 bricks was equal to the amount of energy in 1 gallon of gasoline. So, the amount of embodied energy found in just the bricks of a typical 3-story, 20x100 ft commercial structure is the equivalent to that found in more than 3,700 gallons of gas – enough to keep the average American on the road for nearly 8.5 years. Think about all of the buildings in St. Joseph and their size and scale, and you can see that the embodied energy that they represent is enormous.

Every time a building is demolished, pollutants are released directly into the soil, water, and air. A demolition produces an enormous amount of debris that ends up in our landfills. Debris produced by demolition makes up 25 to 30% of all materials deposited in a typical landfill. Demolition and the subsequent hauling of the debris utilizes non-renewable energy and contributes to global warming.

According to the EPA, 48% of the greenhouse gas emissions in the U.S. come from our buildings. Clearly any real steps taken toward addressing our climate crisis must involve being more thoughtful about the use and design of our buildings.

In recent years, preservationists have taken a look at the "embodied energy" concept and modified it a bit. They are now talking about "embodied carbon" – According to Elefante embodied carbon is "everything it takes to make a building from extraction of raw materials to manufacture, transportation, construction, even design and commissioning. . . Every building represents an enormous carbon investment and investment by the community." The majority of the embodied carbon in a building is found in the foundation, structure, and envelope, thus it makes sense to preserve and reuse the building rather than demolish (which emits carbon and air pollution) and build new. Reuse of an existing building generally saves 50-75% of embodied carbon.

Think about all of the buildings in St. Joseph and their size and scale, and you can see that the embodied energy and embodied carbon that they represent is enormous.

To fully capture the value of the existing building stock requires merging two disciplines: historic preservation and green building. It requires an understanding of how to respect and renew what is already here, as well as a vision for where and how to transform the legacy of the past into the promise of tomorrow.

Because buildings are the largest consumers of energy in the United States, it is vital that we find ways of reducing energy consumption in our buildings, both existing and new.

The green movement tends to miss a truth: it is not possible for us to build our way to sustainability. It takes between 10 and 80 years for a new, energy-efficient building utilizing more efficient operations, to overcome the negative climate change impacts that were created during the construction process. Recent calculation indicated that it will take about 65 years for a new, energy efficient building to save the amount of energy lost in demolishing an existing building, even if 40% of the materials are recycled. "Even if, with the wave of green wand, every building constructed from this day forward has a vegetative roof, is powered only with renewable energy sources, and is built entirely of environmentally appropriate materials, sustainability would still be far from fully realized. Seeking salvation through green building fails to account for the overwhelming vastness of the existing building stock. The accumulated building stock is the elephant in the room. Ignoring it, we risk being trampled by it. We cannot build our way to sustainability; we must conserve our way to it."

Over the next 20-25 years – 4 out of 5 existing building will be renovated, while in the same period 2 new buildings will be built. Clearly the opportunity for sustainability is to be found more in the stock of existing structures than in new construction.

Myths:

There are a number of myths about old structures and sustainability. Among them:

1. **Historic Buildings are energy inefficient:** Nationally, approximately 6% of the building stock was constructed before 1920 – in St. Joseph that number is nearly 30% (8,127 out of 27,194). These buildings were constructed before the introduction of climate control and lighting systems powered by fossil fuels. These structures are relatively easy to make green because they have passive things like big windows, wide halls etc. Historic buildings are often inherently energy efficient due to their materials and construction. Many were designed with passive systems designed to take advantage of natural light and ventilation – larger windows, transoms. Building

shape and siting to maximize sun in the winter and minimize in the summer. That inherent efficiency can be augmented with new technologies that maximize energy performance. It is the structures built in the post-WWII period through the 1980s that are the bigger issue – that's when technology changed and energy consumption increased.

This is related to the belief that newer buildings are more energy efficient than historic structures. In fact, many buildings built prior to 1970 are more energy efficient and have lower utility costs. Solid thicker walls reduce the need for insulation and require less energy for heating and cooling. In 1999, the General Services Administration did a study of the energy usage of its building stock. It found that the utility costs for its historic structures were 27% less than those of more modern structures.

2. **It is a good idea to replace old windows**: Often when people are considering making their historic home more energy efficient, they look first to replacing the original windows. This is not necessary. The U.S. Department of Energy has found that on average only about 10% of energy loss in homes is caused by windows. Historic windows can easily be made to be more energy efficient with appropriate repair and upgrades. Historic windows, if properly maintained, will last indefinitely. By comparison, new replacement windows only last an average of 10-20 years. If more weatherization is needed, upgrades such as interior storm windows and insulated curtains are effective and economical. Most of the historic buildings were built to have exterior storms.

Vinyl replacement windows have a life span of about 20-25 years (at most). They are designed to be unfixable, so they and their toxins end up in the landfill.

3**. New is Better:** Most historic building do not need a total transformation in order to retain their usefulness. Rehabilitation is always a cost-competitive alternative to building new. You sometimes hear developers argue that it is cheaper to rebuild rather than rehabilitate, the truth is that there is a huge monetary and environmental cost to that approach.

New-build structures, even if they were constructed with sustainable methods and materials, do not recoup energy outlays decades, when measured against a renovated existing building.

Many people think that newer buildings are of higher quality than old: This is not at all true. Beginning in the mid-1950s, accelerated depreciation in the tax code and an emphasis on functionality in design resulted in buildings that tend to be less well made and less easily adaptable to new uses. Many historic buildings were constructed with much better materials and with more enduring construction techniques. Newer structures tend to have life expectancies of only 30-40 years. One has only to look around St. Joseph to see that historic structures were "built to last" and with maintenance have nearly unlimited life spans.

Opportunities:

1. Technologies: Preservationists should not be complacent about or resistant to the drive for green and sustainable – it is an important goal for preservationists to aspire to improve the energy performance of historic buildings. There are strategies and technologies that enable the preservation of the integrity of historic structures and give energy savings.
The Whole Building Design Guide has created a useful overview of ways in which a thoughtful preservation approach is green and sustainable. They address issues including the reduction of heat islands, water efficiency, energy and atmosphere, and renewable energy production.

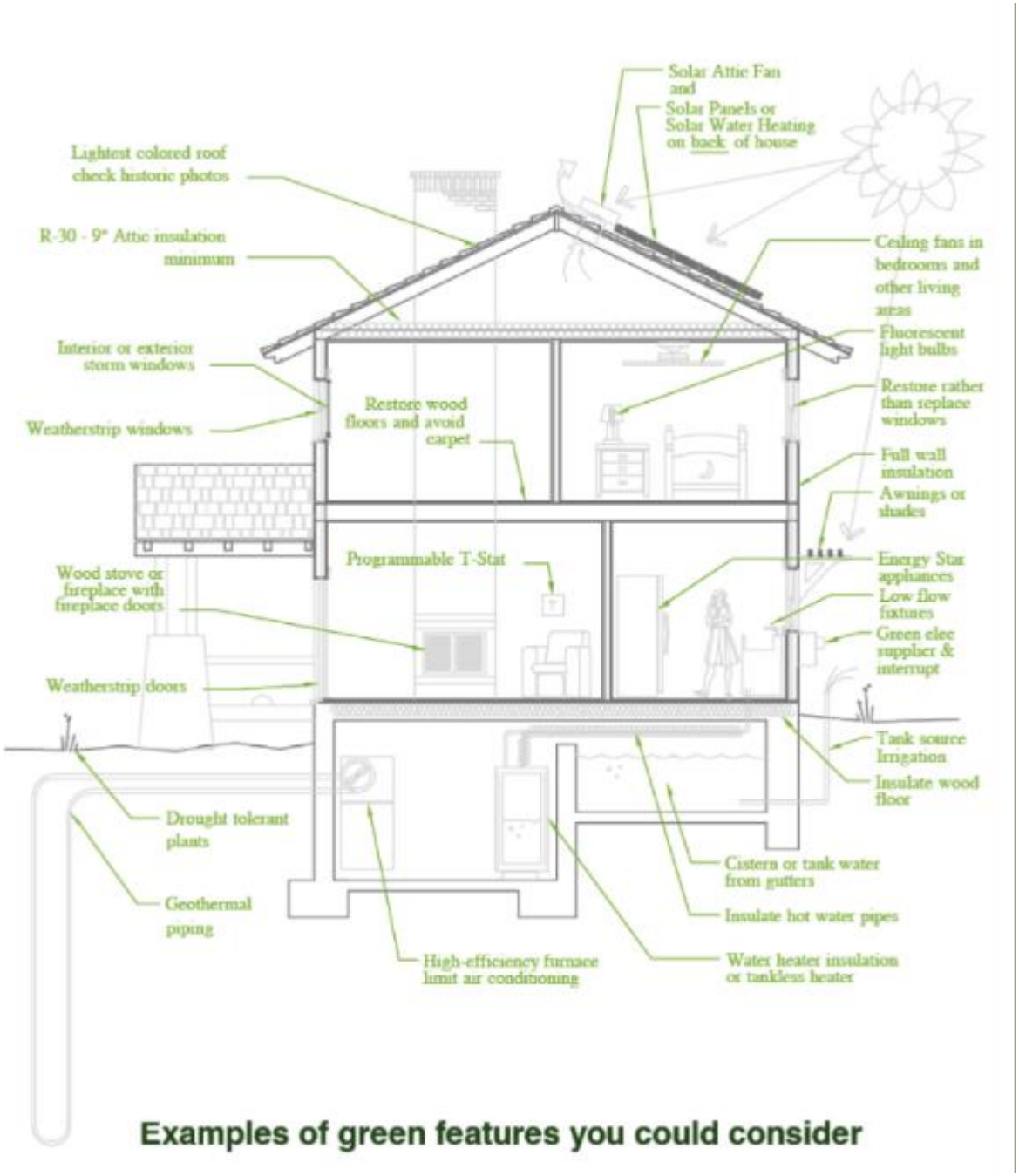
- Renewable Energy Systems: there are solar panels that look like slate shingles and could be used and not really change the character of the structure.

2. Revitalization of heritage neighborhoods: One of the ongoing issues in the effort to create a more sustainable community is urban sprawl. The design of the traditional suburb was based on the extensive use of the automobile – structures are widely spaced, the neighborhood is not particularly walkable, and there are large – water and energy consuming – lawns. Urban sprawl places an enormous strain on the environment by consuming acres and acres of farms, wetlands, and forests for commercial and residential use. New infrastructure such as schools, streets, and sewers have to be constructed.

Heritage neighborhoods tend to be much more dense in occupation, the yards are smaller, and they were designed to be walkable to amenities such as groceries. The preservation and revitalization of these neighborhoods with their historic streetscapes is an important step toward creating a more sustainable community. Preservation and adaptive reuse of individual buildings nearly always provides energy savings and environmental benefits over demolition and new construction. The preservation of our historic neighborhoods offer similar benefits as this promotes the reuse of already existing infrastructure and supports districts that tend to be walkable thus resulting in energy savings and improved community livability.

A street in Museum Hill

3. Your Own Historic House – The same strategies that can be implemented in more modern homes can help make your own historic house more energy efficient and green. It is important to remember that these structures were not designed be airtight – yanking out original windows and doors and replacing them with modern replacements that end the air flow will lead to substantial structural problems down the road.



Consider the following list of options that can actively reduce your energy costs and not harm the appearance of your home:

- **Solar Hot Water**
  Usually on the back of the house
- **Solar attic fan**
  Wall or rooftop units are small and reversible
- **Interior storm windows**
  Invisible from the outside
- **Water heater**
  Blanket and pipe insulation
- **Wood stove or fireplace**
- **Wind Generation**
  In a discreet or rural location
- **Window weather-stripping**
  New or upgraded

"The future of the preservation movement lies not in merely saving buildings and places as if they were museum artifacts placed in a climate-controlled environment, but in reaching outside the traditional parameters of keeping time. Building consensus, finding common ground, and working collaboratively are all requisite strategies that bring preservation to the forefront of actions necessary to ensure the survival of our planet's fragile heritage." [1]

It makes little sense to recycle newspaper and aluminum cans when we are literally throwing entire buildings and even neighborhoods into the landfills at a frightening rate.

[1] Norman Tyler, et. al., *Historic Preservation: An Introduction to its History, Principles, and Practice,* 3rd ed. (NY: W.W. Norton, 2018), pg. 348.