

# Chapter 10: Sustainability



**In this chapter you will find:**

**Sustainability and Historic Preservation: Saving Money, Energy and Resources**

**Introducing New Technologies to Historic Buildings**

- Low-tech and High-tech Solutions
- Solar Panels
- Wind Turbines
- Skylights

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- Rain Barrels and Rain Gardens

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## Sustainability and Historic Preservation: Saving Money, Energy and Resources

- Sustainability can enhance the livability of a historic residence or business
- Sustainable practices help to save the environment by conserving resources
- There are many technologies (both low and high-tech) that can help improve the energy efficiency of a property and save money
- Implementing sustainable practices increases a building's market value

Today's historic property owners are conscientious about saving money while being sustainable, by introducing energy-efficient improvements to their homes and businesses. Historic preservation has all the components to address sustainability on all fronts – environmental, economical, and social. Historic buildings are inherently sustainable for they were often designed and built using sustainable principles. They were typically constructed with materials produced locally, and were positioned on a site to take advantage of natural light and passive heating and cooling methods, natural ventilation, and landscape plantings. These same design and construction principles are encouraged today for new construction to create sustainable or 'green' buildings and environments.

The preservation of existing buildings is environmentally friendly because it uses fewer new resources, and diverts waste from local landfills. When a historic property is demolished, aside from a social/cultural loss, the majority of the embodied energy of the building is also lost. According to an article found within a bulletin published by the Association for Preservation Technology (APT), embodied energy is defined by sustainability experts as "the sum of the energy required to extract raw materials, manufacture, transport and install building products" (Sedovic, Walter and Gotthelf, Jill H. "What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows," 2005).

Buildings rehabilitated or adapted to new uses, conserve this invested energy, and help to curb the need to build on undeveloped land. Materials that are salvaged and re-used also preserve their embodied energy. Through the use of a construction waste management plan, materials that are not reused are diverted from the landfill to recycling centers where they will be recycled into new products.

"It takes energy to construct a new building—it saves energy to preserve an old one." (Poster Caption)



Source: National Trust for Historic Preservation, Preservation Week Poster, 1980.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

“Report of the World Commission on Environment and Development,” United Nations General Assembly Resolution 42/187, ([http://en.wikipedia.org/wiki/Sustainable\\_development\\_-\\_cite\\_ref-0](http://en.wikipedia.org/wiki/Sustainable_development_-_cite_ref-0) (United Nations). 11 December 1987.

**The following definitions come from the U.S. Environmental Protection Agency:**

**Recycled-content products:** products made from materials that would otherwise have been discarded. Items in this category are made totally or partially from material destined for disposal. Recycled-content products can also be items that are rebuilt or remanufactured from used products.



**Post-consumer content products** refers to material from products that were used by consumers or businesses and would otherwise be discarded as waste. If a product is labeled “recycled content” the rest of the product material might have come from excess or damaged items generated during normal manufacturing processes—not collected through a local recycling program.

**Recyclable products** can be collected and remanufactured into new products after they have been used. These products do not necessarily contain recycled materials and only benefit the environment if people recycle them after use. Check with your local government to determine which items are recyclable in your community, and where the nearest recycling center is located.

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## SUSTAINABILITY

Preservation contributes to the local economy by: utilizing local labor, generating revenue from the purchase of materials from local businesses, and increasing property values. Sustainability and historic preservation positively impact our society through the protection of cultural resources and our identity within the community. It also encourages the retention of community connections through livable, walkable neighborhoods, and the retention of local schools and unique character defining architecture.

A walkable neighborhood is an area with a diverse mixture of parks and public spaces, schools, businesses, mixed income/mixed use properties, and pedestrian friendly streets and sidewalks. Walkable communities can also give the people who live and work in them many health benefits including: a healthier environment and healthier people due to the proximity of public amenities within walking distance and a healthier economy by increasing property values. This type of neighborhood thrives as a historic district because of these characteristics. The preservation of neighborhood character through historic districts also offers additional opportunities for heritage tourism and financial/business growth, which in turn will help community stability and prosperity.



Former President Harry S. Truman walking through the friendly streets of Independence. Harry S. Truman Library and Museum, 97-18, date unknown



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Historic neighborhoods and commercial centers in Independence display many characteristics inherent in their design that incorporate sustainable living concepts. Much of the city was designed before the invention of automobiles, making it a very walkable, pedestrian friendly community. The building stock was constructed from local materials in a manner that took advantage of sustainable principles. (For example, large wrap-around porches were designed and built to take advantage of natural light and ventilation. The design of the porches provided areas which blocked the harsh sun in the summer and permitted warming sun in the winter.) By learning about these features and recognizing all the advantages they offer, property owners can live sustainably while respecting and maintaining the unique, historic components of their property.

## Introducing New Technologies to Historic Buildings



Technologies are continually evolving and advancing to increase the energy efficiency of buildings. These ‘green’ products may help to solve the perceived inefficiency of historic buildings by helping owners to realize their building’s existing strengths and future potential. *Great care must be taken to ensure that the building and/or district’s historic integrity remains intact. New does not always mean better.* The long-term effects of these products on the historic building should be taken into consideration prior to the initiation of work, including: the product’s design, material, installation method, proposed location, and life-cycle cost. A product’s life-cycle cost refers to how it is manufactured, shipped, utilized, and later disposed of. It also can refer to the product’s initial investment, and if this money can be recovered by saving money/energy over a reasonable amount of time. (For example, the life-cycle cost of solar panels may seem to be a very ‘green’ improvement by helping to reduce the home owner’s fossil fuel use. However, if the solar panels traveled thousands of miles to get to the site, were installed by a

contractor from hundreds of miles away, and were installed in a part of the country that gets only minimal to average sunlight, then it could take over 30 years to recover the initial cost of the panels and the energy expended to manufacture, ship and install the panels. It would not be the most sustainable choice.) If the product addresses the issue at hand, has a reasonable life-cycle cost, and is sensitive to the historic nature of the property, it may be considered an appropriate, permanent solution. High-tech options are often the most expensive and invasive to a historic property, meaning that they have the greatest potential to impact the property either physically, visually or both. Whereas Low-tech options are often less expensive and their installation reversible.



***New eco-friendly products will be evaluated on a case-by-case / property-by-property basis by the City’s Preservation Division staff and the Heritage Commission.***



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# SUSTAINABILITY

## Low-tech Solutions

-  Historic window and door repair/restoration
  - Tighten wood sashes
  - Weatherstripping
  - Expanding foam around windows & doors
  - Caulking
  - New glazing compound
-  Re-glazing existing windows
-  Storm windows and doors
-  Clotheslines
-  Roof ridge vents
-  Rain barrels and water collection systems
-  Air sealing wall joints (sill plates), wiring, plumbing, chimney, and fixture penetration
-  Cotton batt or cellulose insulation for all easily-accessible, unconditioned spaces
-  Attic door blankets
-  Seal all air ducts with professional-grade duct tape or mastic
-  Foam gaskets behind outlets and switchplates
-  Compost bins

## High-tech Solutions

-  New mechanical systems such as high-efficiency furnaces, ground source systems, or solar air-heat panel systems
-  Solar light tubes/skylights
-  Solar-powered attic fans
-  Biomass pellet heating stoves
-  Dual flush toilets
-  Energy Star-rated appliances
-  Wind turbines
-  Solar panels
-  Retrofit existing windows with double pane glass
-  Composite siding (new construction and additions only)
-  Solar water heaters or tankless water heaters
-  White membrane roofing for flat roofs
-  Green roofs with native plant materials for flat roofs
-  Geothermal heating and cooling systems

## Solar Panels

### **Information about solar panels and historic properties from the National Trust for Historic Preservation:**

<http://www.preservationnation.org/issues/sustainability/solar-panels/design-guidelines.html>

**Locate solar panels on the site of a historic resource.** If possible, use a ground-mounted solar panel array. Consider solutions that respect the building's historic setting by locating arrays in an inconspicuous location, such as a rear or side yard, low to the ground, and sensitively screened to further limit visibility. Care should be taken to respect the historic landscape, including both its natural (i.e. topography) and designed (i.e. materials) features.

**Locate solar panels on new construction.** In cases where new buildings or new additions to historic buildings are proposed and approved, encourage the placement of solar panels on the new construction. To achieve overall compatibility with the historic building and its setting, consider solutions that integrate the solar panel system in less visible areas of the new design.

**Locate solar panels on non-historic buildings and additions.** If the site cannot accommodate solar panels and the project does not include new construction, consider placing solar panels on an existing, non-historic addition, or on an accessory structure. This will minimize the impact of solar installation on the significant features of the historic resource and protect the historic fabric against alteration.

**Place solar panels in areas that minimize their visibility from a public thoroughfare.** The primary façade of a historic building is often the most architecturally distinctive and publicly visible and thus, the most significant and character defining. To the greatest extent possible, avoid placing solar panels on street-facing walls or roofs, including those facing side streets. Installations below and behind parapet walls and dormers or on rear-facing roofs are often good choices.



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Example of an obtrusive installation of solar panels on a historic residence. ©iStockphoto.com/AlterYourReality

**Avoid installations that would result in the permanent loss of significant, character-defining features of historic resources.** Solar panels should not require alterations to significant or character-defining features of a historic resource, such as altering existing roof lines or dormers. Avoid installations that obstruct views of significant architectural features (such as overlaying windows or decorative detailing) or intrude on views of neighboring historic properties in an historic district.

**Avoid solutions that would require or result in the removal or permanent alteration of historic fabric.** Solar panel installations should be reversible. The use of solar roof tiles, laminates, glazing, and other technologies that require the removal of intact historic fabric or that permanently alter or damage such fabric, must be avoided. Consider the type and condition of the existing building fabric for which solar panels installation is proposed, as well as the method of attachment and future removal. Minimizing the number of points of attachment, including the use of brackets, will avoid damaging the historic fabric.

**Require low profiles.** Solar panels should be flush with – or mounted no higher than a few inches above – the existing roof surface. They should not be visible above the roofline of a primary façade.

On flat roofs, set solar panels back from the edge. Because they are generally hidden from view, flat roofs can provide an ideal surface for solar panel arrays. To ensure that a solar installation is minimally visible, set the solar panels back from the roof's edge and adjust the angle and height of the panels as necessary.

**Avoid disjointed and multi-roof solutions.** Solar panels should be set at angles consistent with the slope or pitch of the supporting roof. For example, avoid solutions that would set panels at a 70 degree angle when the roof pitch is 45 degrees. In addition, solar panels should be located on one roof plane (as opposed to scattered among several roofs) and arranged in a pattern that matches the general shape and configuration of the roof upon which they are mounted.

**Ensure that solar panels, support structures, and conduits blend into the surrounding features of the historic resource.** The overall visibility and reflectivity of solar panels and their support structures can be substantially reduced if elements of the solar installation match the surrounding building fabric in color.

 ***Solar panels require the Heritage Commission's review and approval. Applications will be evaluated on a case-by-case / property-by-property basis by City's Preservation staff and the Heritage Commission.***

## Wind Turbines

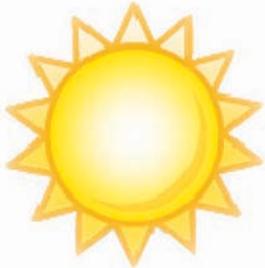
**Prior to the installation of a wind turbine, consider the following:**

- Prior to purchasing a wind turbine, check with the local planning and zoning department for any zoning restrictions.
- Have an energy audit performed to assess the energy inefficiencies of the building and address them.
- Research the average wind speed for the area where the turbine is proposed.
- Talk to your neighbors. Before moving ahead with a wind turbine purchase, discuss your plans with your neighbors and the City to assess the viability of a turbine.

 ***Wind Turbines require the Heritage Commission's review and approval. Applications will be evaluated on a case-by-case / property-by-property basis by the City's Preservation staff and the Heritage Commission.***



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## Skylights

Skylights are usually installed on the roof of a building and are used for day lighting the interior of a building. There are several types of skylights including: do-it-yourself skylight kits, sky tubes (which are smaller in surface area and reflect light from the sky down into the building through a highly reflective tube), acrylic 'bubble' type skylights, and of course, glass skylights.

Correct skylight design can help energy savings in residential, commercial, and industrial applications. They help to illuminate the interior of a building using natural day lighting by reducing the need for electric light. However, skylights that are poorly constructed and/or installed may cause leaking problems and single-paned skylights may weep with condensation. Care should be taken when choosing a skylight and locating it on the roof of the building.



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***Skylights/sky tubes require the Heritage Commission's review and approval. Applications will be evaluated on a case-by-case / property-by-property basis by the City's Preservation staff and the Heritage Commission.***



**For additional information regarding sustainable technologies and historic buildings please refer to these sources:**

National Park Service Weatherizing and Improving the Energy Efficiency of Historic Buildings:  
<http://www.nps.gov/history/hps/tps/weather/index.html>

Center for ReSource Conservation: <http://conservationcenter.org>

Sierra Club, Green Home Blog: <http://www.sierraclubgreenhome.com>

Whole Building Design Guide: [http://www.wbdg.org/resources/sustainable\\_hp.php](http://www.wbdg.org/resources/sustainable_hp.php)

Mid-America Regional Council: <http://www.marc.org>

Habitat for Humanity ReStore: <http://www.restorekc.org/portal/page/portal/ReStore>

## Sitework



Conservation-oriented sustainability site improvements range from the installation of rain barrels to compost bins to solar ground lighting. ***Improvements considered reversible, meaning that they could be installed or removed without affecting historic building materials on buildings or other structures (garages/outbuildings) are encouraged by the Heritage Commission and require no additional review or approval.***

## Composting

Composting allows for the recycling of organic matter from daily waste. Nature recycles everything from debris to waste and remains. Composting is a way of using and mimicking nature that can be a money saving measure, is beneficial for home gardening, and reduces the waste that would otherwise end up in a landfill or an incinerator. The organic matter in the soil produced from compost can improve plant growth by amending the soil, adding water and nutrient-holding ability, and supplying vital nutrients.

There are many things a typical homeowner can include in their home compost. Any organic yard waste has potential, including grass clippings, leaves, weeds, and dead garden plant remains. Woody plants should generally be left out of the compost but when chipped or shredded they can be used as mulch or pathway material. Kitchen scraps that can be used include wastes that do not contain meat, bones, or fatty foods. There are many variations on strategies for composting.

Research should be done for specific materials that can be composted and what strategy is best for individual homeowners.



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# SUSTAINABILITY



## Water Conservation

Methods of Reducing Potable Water Use:

- Use graywater from sinks, showers, flush toilets (*Check with the City of Independence for code requirements and city ordinances*)
- Harvest water from roof and site runoff for use in toilets
- Faucet Aerators
- Low-Flush Toilets
- Toilet Displacement Devices
- Low-Flow Showerheads
- Pressure Reduction
- Automatic Controls
- Dry Fixtures – like composting toilets  
(*Check with the City of Independence for code requirements and city ordinances*)
- Altering user habits and practices



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Pervious Surfaces are surfaces that allow stormwater runoff to infiltrate into the subsurface. Most pavements used in streets, sidewalks, and parking lots today are considered impervious. The following list of materials can create pervious surfaces for commonly encountered situations. Properties need to consider ADA requirements when choosing an appropriate pervious paving solution. *Review by the Heritage Commission does not connote compliance with ADA regulations.* For a complete list of requirements, consult the most current ADA Standards for Accessible Design and the current building code of the City of Independence.



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### Pervious Materials:

- Porous asphalt
- Porous concrete
- Grass and plastic grid system
- Concrete grids with gravel
- Pavers with airspace between modules
- Crushed stone
- Concrete grids with grass

## Rain Barrels and Rain Gardens



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temporarily collect and be absorbed by the soil. These gardens improve water quality in lakes, streams, and rivers by reducing top soil run off, chemical pollutants, and soil erosion. Rain gardens can help cities cut costs and save tax dollars by helping to manage storm-water run off, and reduce the need for additional infrastructure such as larger storm sewers and retention facilities. The gardens also can provide a beautiful, natural wildlife habitat when properly maintained on a regular basis.

### **Information about rain gardens from wikihow.com:**

A 1,000 square foot roof can produce more than 600 gallons of runoff for every 1" of rain that falls on it. If your downspouts are connected directly to a storm drain, disconnecting them is the single most important step you can take to reduce runoff. Instead of allowing water to go directly into the sewer or to run into the street, direct your downspouts toward a vegetated area, such as your garden or lawn. Use extensions to ensure the water comes out at least 5 feet away from your foundation.

Rain barrels are a new term for an old invention, also known as a cistern. Rain water is captured from a building's downspouts and gutters and collected in a large receptacle. These simple containers conserve water by reducing the amount of potable water used for irrigation purposes. Collected water is typically used for watering of exterior plantings, landscaping, and gardens. The barrels come in various shapes, sizes, and colors and can be attached to most downspouts with ease. Care should be taken about choosing an appropriate size/quality of rain barrel, and to place them around the building's site in a visually pleasing location.

One way which helps to alleviate excess water from being directed into storm sewers are small, well kept rain gardens which act as a temporary overflow retention pond and can be constructed on a building's site.

A rain garden slows down, captures, and absorbs water using native plant materials, rocks, and shallow depressions in the soil to let rain water

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Residential irrigation accounts for up to 40% of domestic water consumption in a given municipality. Rain barrels capture and store water for later use.

It only takes 1/4 inch of rainfall runoff from the average roof to completely fill a typical 55-gallon barrel. - *Information about rain gardens from 10,000 Rain Gardens:*  
<http://www.rainkc.com>



One inch of rain running off of an average 1,500 sq. ft. house equals 935 gallons of water and can fill up to sixteen 55 gallon rain barrels or more than 13 bathtubs! - *Information about rain gardens from University of Maryland University College:*  
<http://www.umuc.edu/gogreen/resources/rainbarrels.shtml>

### For additional information regarding sustainable site work:



U.S. EPA Water-Saving Tips: [www.epa.gov/OW/you/chap3.html](http://www.epa.gov/OW/you/chap3.html)

Missouri Department of Natural Resources and Grow Native\* sponsored brochure about rain gardens:  
[http://www.epa.gov/owow\\_keep/NPS/toolbox/other/KSMO\\_buildRainGarden.pdf](http://www.epa.gov/owow_keep/NPS/toolbox/other/KSMO_buildRainGarden.pdf)

\*Grow Native! is a joint program of the Missouri Department of Conservation (MDC) and the Missouri Department of Agriculture (MDA). The Grow Native! program helps protect and restore our state's biodiversity by increasing conservation awareness of native plants and their effective use.

Kansas City's Rain Garden Initiative: 10,000 Rain Gardens - [www.rainkc.com](http://www.rainkc.com)

"Discover Rain Gardens - A Kansas City, Missouri, initiative provides inspiration for cleaner, greener community landscapes" Lowes Creative Ideas for Home and Garden, (<http://www.lowescreativeideas.com/outdoorliving/0508/raingardens.asp>)

Center for ReSource Conservation: <http://conservationcenter.org>

## Certificate of Appropriateness Review Requirements

The Independence Heritage Commission encourages energy-efficiency and sustainability upgrades to historic houses with the understanding that retaining the historic integrity of the building is a priority. Many of the retrofits that can be made to existing houses can be completed without administrative or Heritage Commission review.

Those improvements that require any exterior alterations, ground disturbance, or changes to building materials, such as the installation of solar panels, wind turbines, ground source heating, and window/door replacement, requires Heritage Commission approval.



***The installation of all items listed in this chapter are encouraged in locations that cannot be viewed from the public right-of-way (streets and sidewalks), and are required to be reviewed by the Heritage Commission. All applications will be evaluated on a case-by-case / property-by-property basis by the City's Preservation staff and the Heritage Commission. The City's Preservation staff and Heritage Commission will review sustainability improvements based upon the Secretary of Interior's Standards for Rehabilitation and these Design Guidelines.***



**Please refer to the Sustainability COA Matrix for specific review requirements.**



If you have questions about a project, please contact the City's Preservation Division at (816) 325-7419 to learn more about application and review requirements prior to the start of any retrofit.

# SUSTAINABILITY

## SUSTAINABILITY COA APPROVAL MATRIX

ACTION	CONTRIBUTING			NON-CONTRIBUTING		
	No Approval	Administrative	Commission	No Approval	Administrative	Commission
Attic door blankets	X			X		
Awnings, new installation			X			X
Caulking	X			X		
Chimney flue balloons	X			X		
Clotheslines (rear of property)	X			X		
Compost bins	X			X		
Doors, visible from the street			X		X	
Doors, not visible from the street		X			X	
Ground source heating system			X			X
Insulation (batt or blown-in)	X			X		
Light tubes/skylights (rear of property)		X			X	
Light tubes/skylights (front of property)			X		X	
Planting (native trees and shrubs)	X			X		
Rain barrels	X			X		

ACTION	CONTRIBUTING			NON-CONTRIBUTING		
	No Approval	Administrative	Commission	No Approval	Administrative	Commission
Re-glazing windows	X			X		
Retrofit window glass to create double pane windows	X			X		
Roof, repair	X			X		
Roof replacement in-kind		X			X	
Roof replacement with new materials			X			X
Roof ridge vents			X		X	
Solar exterior lighting			X		X	
Solar panels			X			X
Solar-powered attic fan			X			X
Storm windows/doors, in-kind replacement	X			X		
Storm windows/doors, new		X		X		
Weatherstripping	X			X		
Windows, visible/not visible from the street, repair	X			X		
Windows, visible/not visible from the street, replacement in-kind		X			X	
Windows, visible/not visible from the street, new materials			X			X
Wind turbines			X			X

**Repairs** are defined as minimal replacement of original architectural feature in order to stabilize the materials. Examples include fixing cracks in concrete, replacing a portion of rotted wood on a soffit, addressing a broken window sash with wood putty or consolidator.

**In-kind replacement** is defined as any changing out of similar materials that consist of less than 50% of the overall architectural feature.

**New construction** consists of the replacement of 50% or more of the original architectural feature or the creation of a new feature.