SUSTAINABILITY GUIDE FOR OLDER STRUCTURES

CITY OF SAN ANTONIO
OFFICE OF HISTORIC PRESERVATION

CITY OF SAN ANTONIO
HISTORIC DESIGN GUIDELINES
SUSTAINABILITY POLICY DOCUMENT

DRAFT
JANUARY 2020

Photo: Wood window repair workshop participants, June 2019.

PRESERVATION AS SUSTAINABILITY

The greenest building is the one that already exists.

It's true! Investing in the prolonged maintenance or rehabilitation of a historic home is a sustainable approach to housing because it facilitates the reuse of existing materials and infrastructure. Reusing and adapting historic buildings and neighborhoods reduces our consumption of raw land, new materials, and other finite resources.

Sustainability, or sustainable architecture, is a design practice that seeks to minimize negative impacts to the environment. The best sustainable or "green" homes are thoughtfully-designed, durable, and energy-efficient. Similarly, historic homes were constructed with permanence in mind and many have inherently sustainable features such as deep shaded porches lined with windows, deep roof eaves to shade and protect the house from moisture and integrated shutters and screens to deter solar heat gain. They were designed in response to their regional setting and constructed with high-quality, local materials by skilled tradesmen. Many homes in San Antonio have lasted for at least 100 years and can even outlast homes built today through routine maintenance and repair.

This guide will address several common sustainability questions and offer guidance on how to best integrate green practices with older properties. All recommendations are rooted in a whole-structure, long-term approach to sustainability.

Sustainability Guide Contents

The Importance of Existing Buildings

Whole-Structure Approach to Efficiency

Retrofit Strategies

When to Repair vs. Replace and Reclaimed Materials

Solar Panels and White Roofs

THE IMPORTANCE OF EXISTING BUILDINGS

It is estimated that cities consume more than 75% of the world's natural resources, produce more than 50% of global waste, and emit up to 80% of the world's greenhouse gases. The architecture, construction, and engineering (AEC) industry as a whole is moving towards practices and policies that prioritize reuse of existing structures and materials in order to minimize unnecessary waste, combat rampant consumerism, and reduce dependency on both renewable and non-renewable resources.

Embodied And Operational Energy

Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transportation, and product delivery. By repairing, restoring, or reusing historic materials and buildings, you are utilizing the inherent embodied energy in existing structures and limiting new energy expended on the generation of more products.

Operational energy is the energy consumed by a building to meet heating, cooling, ventilation, lighting, and appliance demands.

This Sustainability Guide offers ways to reduce operational energy without compromising the embodied energy of your historic building.

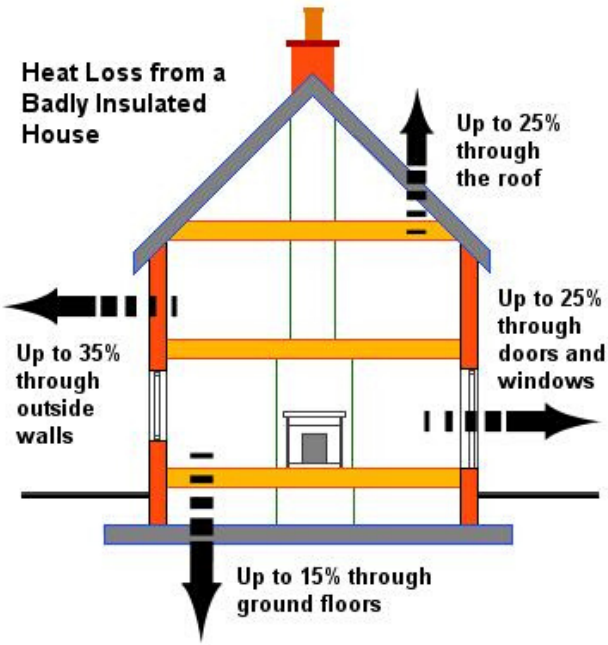
WHOLE-STRUCTURE APPROACH

Installing solar panels on a poorly-insulated house is like plugging one small hole in a sinking ship.

Remember, the existing materials in your building have a smaller carbon footprint than any new materials available on the market. The introduction of new products and materials to improve the operational efficiency of a building should only occur after careful consideration of all of the impacts associated with the creation of those materials. For smaller buildings, such as single-family dwellings, the environmental impact of retrofit products may be even greater than the impact of doing nothing at all!

The best way to ensure the efficacy of retrofits or upgrades -- and to maximize your return on investment -- is to minimize air infiltration and repair or restore existing elements of the structure first. **Energy audits** are a great way to begin the process of increasing your historic structure's efficiency. Pinpointing areas of heat gain and loss is vital.

- Employ a **blower test** or infrared sensor to identify points of air infiltration
- Utilize CPS Energy's free **Home Energy Assessment Program**
- Analyze a year's worth of energy bills to identify **usage patterns**
- Inspect crawl spaces, floors, openings, electrical and gas service entrances, and points where two different building materials meet to **identify and seal** gaps



Did you know? A gap of only 1/8 of an inch under a 36-inch wide door lets in as much air as having a 2 1/2 inch wide hole in your house's wall!

RETROFIT STRATEGIES

Roof

- Install **attic insulation**, such as batt insulation or blown cellulose, to limit impacts on historic framing or structural elements while increasing efficiency. For attics that utilize floor space, rigid board or a combination of insulation strategies is recommended.
- Install a **radiant barrier** on the underside of the roof. Radiant barrier is proven to be one of the most cost-efficient strategies for reducing solar heat gain in our climate.
- **Insulate and seal HVAC ducts** if they are located in the attic to limit operational energy.
- **Properly ventilate unoccupied attics** to reduce the likelihood of moisture problems or undetected decay of roof components. Historic gable vents should be kept operational.

Walls and Wall Openings

- **Install weatherstripping** around windows and doors to create an air-tight seal.
- **Repair historic windows**. Historic wood windows are constructed of old growth lumber, which is durable and more resistant to rot, decay, and insects. They can be repaired to be both operational and air tight which is by far the greenest strategy for windows.
- **Install interior storm windows**. Interior window products can be custom designed to fit your existing openings and create air-tight seals and a double-pane conditions that are commonly advertised with replacement products.
- **Install solar film** on the interior of the window panes to reduce heat gain and UV rays.
- **Install exterior window screens** where stylistically appropriate.

Operational

- **Install a smart or programmable thermostat** to monitor energy usage and limit overall energy consumption. CPS Energy offers a free smart thermostat program.
- **Utilize ceiling fans** in occupied rooms to generate air movement.
- **Replace incandescent light bulbs** with more efficient, cooler, and longer-lasting bulbs.
- **Utilize interior shading devices** to limit heat gain and reduce HVAC demands, including interior blinds, shades, or shutters. **Cellular shades** are proven to be very effective and allow for filtered light to enter your space.
- **Maintain and restore original interior historic features** that promoted air movement before the invention of HVAC, including interior transom windows and doors.

Not Recommended

- **Wall insulation** in our warm, humid climate offers limited financial benefit relative to installation costs and can create significant maintenance risks, including moisture accumulation and the rot and decay of framing.
- **Vapor barriers** are not recommended in our climate because the energy savings are often significantly overwhelmed by the installation costs.

REPAIR VS. REPLACE

Does It Need to Be New?

The very first question to ask for any project is whether a new product or new construction is absolutely necessary. Building and material reuse can greatly reduce embodied energy and, when elements are properly repaired and maintained, can reduce operational energy.

When assessing repair versus replacement, consider:

- The initial repair versus replacement costs
- Annual energy savings after conducting an energy audit (if applicable)
- The lifespan or advertised warranty of the replacement product
- The maintenance required for the replacement product
- Payback period or return on investment relative to the lifespan of the product

Hidden Costs of Buying New

- **Resource Extraction & Manufacturing**: The creation of new building products is extremely resource-intensive. For example, vinyl is a petroleum-based product. Consider the environmental impact of mining, extraction, and manufacturing of virgin resources when evaluating the overall sustainability of your choice.

- **Transportation**: From factory to showroom to installation, the transportation costs can be significant. Older materials were often sourced locally and the repair of existing materials by local businesses limits the environmental impacts of transportation.

- **Limited Warranties**: Most replacement products offer limited warranties that can be voided in multiple ways. For example, several replacement window warranties can be voided through painting, improper maintenance or repair techniques, or even just by selling the property (non-transferable clauses). Evaluate warranties carefully.

- **Replacement Cycle**: Historic building elements were constructed with repair in mind and can often be disassembled, spot-repaired, and reassembled using readily available tools. Modern products are sold as standalone elements and can be difficult to repair, or may require specialty components that are contingent upon the original company remaining in business. Consider the lifespan of your product and whether your investment will have to be fully replaced in 15-20 years, creating a continuous cycle of replacement.

- **End-of-Life Waste**: Plastic and composite materials can take up to 1,000 years to decompose in a landfill, making repair and reuse of existing materials and products the most sustainable option overall.

RECLAIMED MATERIALS

If existing elements cannot be repaired, salvaged or reclaimed materials is the recommended second option.

- **Reclaimed wood is more durable and higher quality** than off-the-shelf lumber found at big box stores. By incorporating salvaged lumber of a similar age as your historic building, materials will continue to age consistently. New virgin lumber siding, for example, often ages at an accelerated pace and can cause separation, cracking, water infiltration, or other long-term issues when spliced with historic wood siding.

- **Mass manufactured elements often come in stock sizes** that may differ from the dimensions of older building elements, like historic windows. This requires the siding, trim, and sometimes framing to be altered to accommodate dimensional differences, adding cost, time, and complexity to a project.

Reduce, Reuse, Restore

Identify reuse opportunities in your project with your designer or contractor.

Donate or sell your reclaimed materials on neighborhood email lists, on Facebook and/or Nextdoor groups, or to a local reuse center.

Incorporate salvaged building materials into your project to give them new life.

SOLAR PANELS

It's sunny in San Antonio, which makes solar array a viable alternative to non-renewable energy sources. Remember, solar panels do not make your home more efficient. Going solar should be the next step after a full energy audit and assessment of available retrofit strategies has already occurred.

Interested in solar for your historic property? Utilize the checklist below when developing an array plan with your solar service provider.

Solar Checklist for Historic Properties

- ◯ **Location**: Panels should be located on the side or rear roof lines of a primary structure; on any roof line of an accessory structure; or on a ground-mounted array in the rear yard; or a combination. If panels are **required** to be located on the front roof line of a primary structure for solar efficiency, the panels should maintain at least 18" distance from the roof eaves and be grouped in a rectangular or square configuration that responds to the existing roof forms.
- ◯ **Pitch**: Panels should be mounted flush with the roof pitch. If located on a flat roof with a parapet, panels should have the minimal pitch required for solar efficiency.
- ◯ **Mounting**: Panel mounting equipment features low-profile hardware that closely matches the color of the existing roofing material. Panels are not mounted in a manner that adversely affects or damages existing historic roofing materials.
- ◯ **Color**: Panels and hardware should closely match the existing roof color where possible.

Applications should include the following documents:

- Current color photos of all four sides of the existing structure(s)
- Roof plan indicating placement of solar arrays and distance from roof eaves and ridges
- Information on panel pitch and mounting, including hardware
- If the proposed solar plan falls into **Category C** below, a solar study demonstrating site limitations should be provided

A. Appropriate

Eligible for Administrative Approval

- Panels located on the rear portion of the roof
- Panels set back from the eaves by at least 18"
- Panels are flush with the roof pitch
- Panels do not overwhelm the roof and a strategically placed
- Panels are evenly clustered

This approach should be prioritized in solar planning.

B. Acceptable

Eligible for Administrative Approval

- Panels set back from the eaves, but placed closer to the front of the structure
- Panels are flush with the roof pitch
- Panels do not overwhelm the roof and are subordinate to the roof plane
- Panels are evenly clustered

This approach should be explored when there are site restrictions that limit solar access.

C. If Necessary

May require HDRC review

- Panels are more visible from the public right-of-way
- Panels become an integrated feature on the primary front and side facades
- Panels are evenly clustered

This approach should be considered only when there are extreme site restrictions or orientation factors that limit solar access.

Did you know? Big Sun Community Solar, a CPS Energy collaborative, offers the option to purchase off-site solar panels for energy savings in lieu of installing panels on your own property. Visit **www.bigsunsolar.com** for more information.

WHITE ROOFS

In addition to solar panels, the installation of a white roof on a historic structure can lower the amount of energy used in cooling by better reflecting the sun's rays. Additionally, white roofing materials can be installed beneath a roof's surface material to aid in reducing heat gain. Considering the installation of white roof components for your property? Utilize the guidelines below!

- **Roll-on white coatings** for metal roofs are eligible for administrative approval. Roll-on coatings for existing asphalt shingles will be reviewed on a case-by-case basis and may be referred to the Historic and Design Review Commission (HDRC).
- **White asphalt shingle roofing** is eligible for administrative approval, provided that 1) the existing roofing is asphalt shingles; or, if the existing roof is a different material 2) asphalt shingles are compatible with the architectural style of the historic structure.
- **Roof underlayments** that require the removal and re-installation of existing exterior roofing materials (barrel tile, metal, shingles, etc.) are eligible for administrative approval.

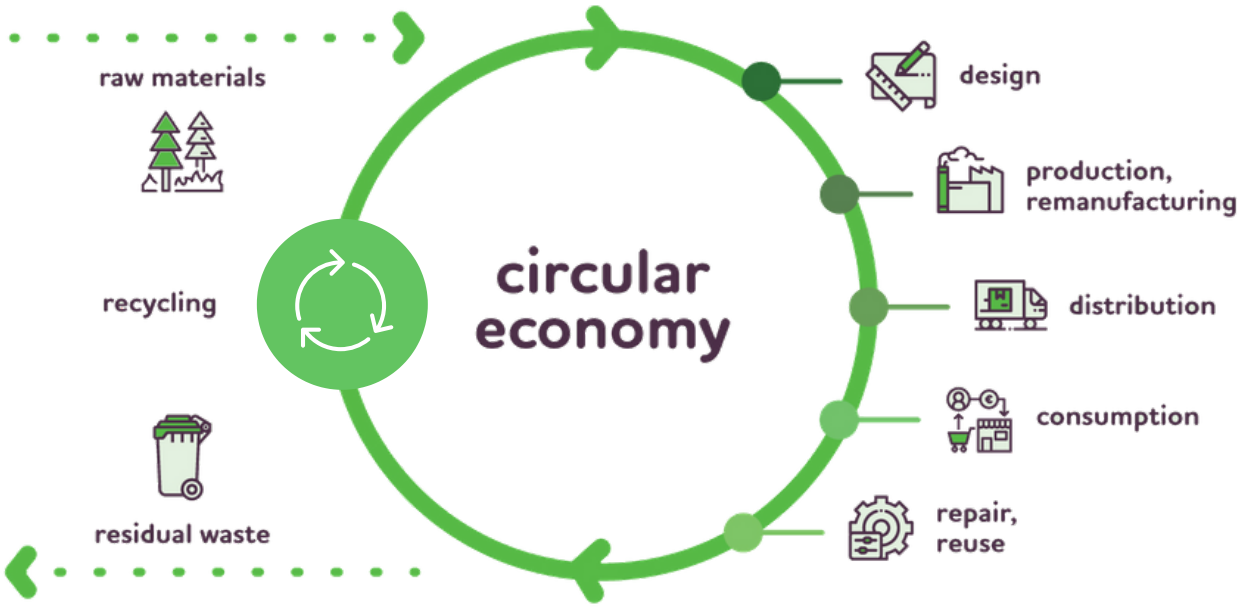
Under 1 Roof Program

The Under 1 Roof Program, administered by the City's Neighborhood and Housing Services Department (NHSD), fully replaces worn and damaged roofs with new, energy-efficient white asphalt roofs for qualified homeowners. This program is one of many designed to assist homeowners with the preservation, maintenance, and efficiency of older structures. For more information on available programs, visit **www.sanantonio.gov/nhsd/programs/repair**.

SUMMARY

Title

- **Repair existing elements** where feasible. If replacement is necessary, source compatible **salvaged or reclaimed materials**, or explore **reconstruction** with salvaged or reused materials. New replacement products should be considered as as last resort.
- Consider the **total life cycle costs** of new products, including their durability, repairability, and advertised lifespan. Consider their end-of-life, too: are they recyclable? Can they be dismantled and reused or upcycled in another way?
- Ensure that existing historic elements are repaired and air leaks fixed prior to exploring investing in additional sustainable infrastructure, such as solar panels, to maximize your return on investment.



RESOURCES

Office of Historic Preservation Staff. Consult with a historic preservation specialist to receive property-specific guidance on retrofitting strategies or reducing operational energy.

www.sapreservation.com | (210) 207-0035 | info@sapreservation.com

Rehabber Club Website. The Rehabber Club is a FREE network of homeowners, do-it-yourselfers, realtors, contractors, and anyone interested in the preservation of older structures. The website offers a list of certified contractors, resource guides, and a list of upcoming workshops and events centered around repair, restoration, and reuse of materials and buildings. **www.sarehabberclub.com**

CPS Energy. SAWS is an excellent resource for native and drought-tolerant plant advice. Their programming includes WaterSaver Rebate and Coupon Programs, Garden Style San Antonio, a comprehensive plant directory, consultations, and more.

www.gardenstylesanantonio.com | (210) 704-SAVE | (210) 704-SAWS

Neighborhood and Housing Services Department (NHSD). This City department administers several programs designed to assist homeowners with the preservation, maintenance, and efficiency of older structures, including the Under 1 Roof Program.

Build San Antonio Green.

www.sanantonio.gov/nhsd | (210) 207-6459 | Email inquiries via website contact page

The Conservation Society of San Antonio. This local nonprofit advocates for the reuse of historic structures and offers grants for preservation projects to owners of older properties, both large and small. The Conservation Society also has a comprehensive library and can assist in historic home research.

www.saconservation.org | (210) 224-6163 | conserve@saconservation.org

Your neighborhood association. Your registered neighborhood association can provide guidance on retrofit strategies that your neighbors have implemented, assist in contractor referrals, and more. To find your association, visit **www.sanantonio.gov/nhsd/neighborhoods** or, if you live in a historic district, ask Office of Historic Preservation staff to connect you with a neighborhood representative.