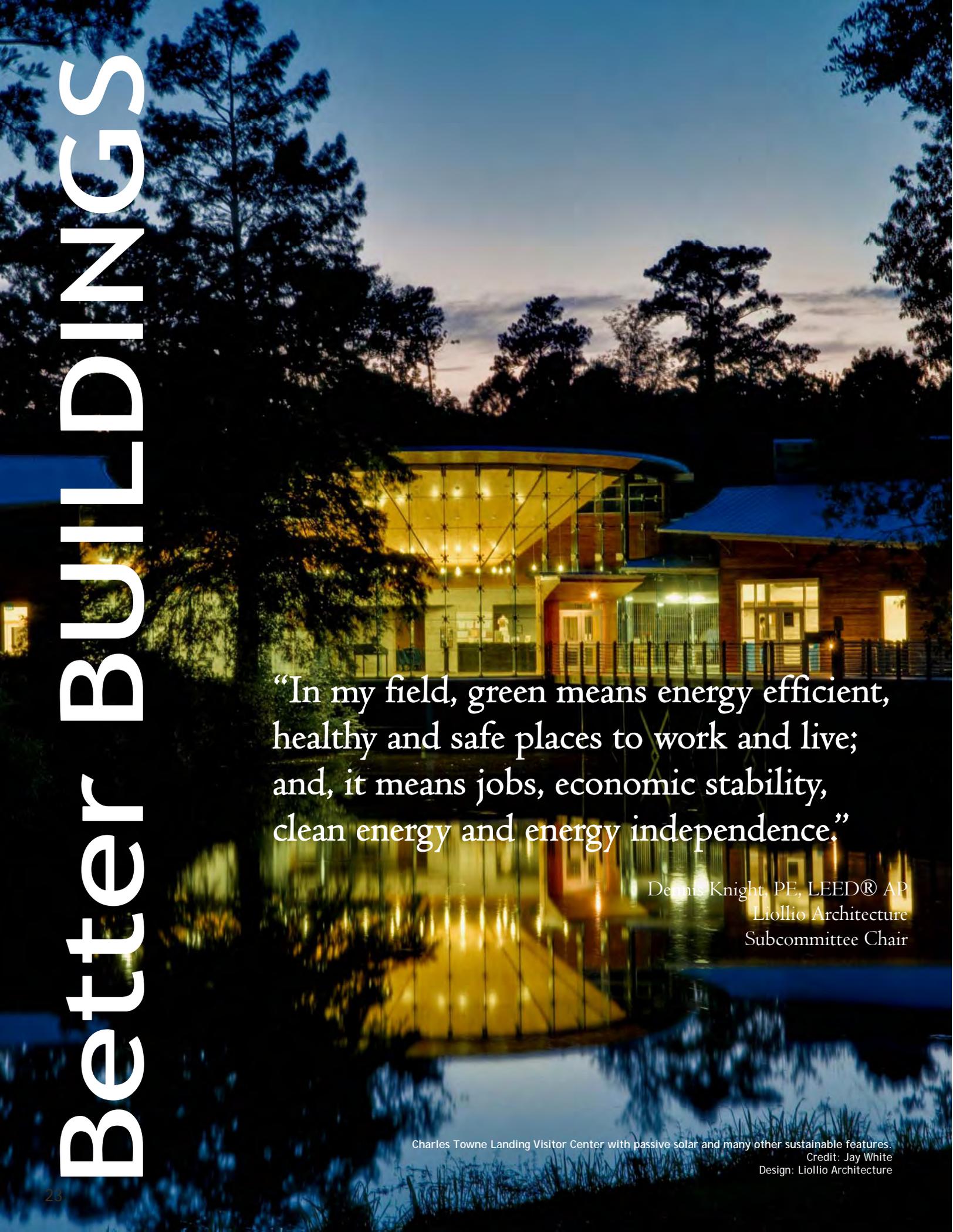


Better BUILDINGS



“In my field, green means energy efficient, healthy and safe places to work and live; and, it means jobs, economic stability, clean energy and energy independence.”

Dennis Knight, PE, LEED® AP
Liollo Architecture
Subcommittee Chair

Charles Towne Landing Visitor Center with passive solar and many other sustainable features.
Credit: Jay White
Design: Liollo Architecture

How we construct, preserve, renovate, adapt and use buildings has an enormous impact on our economy, our health, and the environment. The good news is that buildings offer many opportunities to meet our sustainability goals and create greener, healthier, more vibrant social, economic and environmental benefits for the citizens of Charleston.

Charleston is uniquely positioned to be, not only a local leader, but a national and international leader in sustainable building preservation, design, construction and operation. With more than 3000 existing historic structures in the City, historic buildings are a significant contributor to the City's cultural legacy and charm and celebrated throughout the nation and the world. Many of the construction practices used in the past to construct our historic buildings applied principles such as appropriate orientation on the property, the use of local and durable building materials, providing natural ventilation and achieving good day lighting to improve the health and comfort of the building's owners and users. These principles inherent in many of our historic structures, along with improved energy efficiency, are now considered sustainable or "green". Therefore it is fitting that Charleston take a leadership

role in developing the best practices that will integrate the best of historic preservation standards with the best of modern sustainable standards and practices to continue the legacy begun by our founders more than three hundred years ago.

Energy efficiency and sustainability in buildings are largely an untapped resource that can help solve many of the issues we face today with job creation, health care and environmental stewardship. In the US an achievable 23% reduction in energy consumption between now and 2020 could save the American public \$1.2 trillion.¹

In Charleston, buildings and related energy use account for 58% of our energy consumption and the resultant greenhouse gas emissions. Nationally, buildings account for:

- 72% of the electricity used;
- 39% of the energy used;
- 40% of the raw materials used;
- 14% of the potable water used; and
- 30% of the (total solid) waste output.²

As these figures show, choices made during a building's design, construction and operation can have a profound impact. These choices include, for example, the energy efficiency of the building, the environmental impact of the

BETTER BUILDINGS

ACTIONS

1. Require new City-owned buildings and renovations to non-historic existing City-owned buildings to be sustainable.
2. Require modifications to historic City-owned buildings to follow current best practices with regard to integrating historic preservation with modern sustainable practices.
3. Encourage private sector to adopt voluntary sustainable building practices.
4. Encourage disclosure of utility data and building performance.
5. Develop a weatherization program.
6. Help increase financing options.
7. Focus on public outreach.

BENEFITS

-  Reduce energy costs
-  Create jobs
-  Improve public health
-  Protect clean air
-  Protect clean water
-  Conserve natural resources
-  Enhance quality of life
-  Slow climate change
-  Protect cultural identity
-  Raise awareness

materials used, and the amount of water consumed.

Buildings, then, have a broad range of impacts as well as the greatest potential for reducing greenhouse gas emissions.

City Commitments

The City of Charleston has already made significant commitments in this area. The City owns, or operates long term, nearly 200 facilities totaling roughly 2.5 million square feet. In 2001, City officials decided to spend \$3.9 million improving the efficiency of lighting, plumbing, and HVAC systems in many of these buildings. Energy and water efficiency now saves the City nearly \$600,000 per year, and has reduced municipal energy and natural gas use by an impressive 17%.



Sustainability Institute Service Day weatherizing low income home

Recently, the City made two more major commitments in this area:

LEED Certification: On Earth Day 2008, City Council approved a resolution saying that all new construction on municipal buildings would achieve LEED™ (Leadership in Energy and Environmental Design) certification from the U.S. Green Building Council, beginning with construction planned in 2009. LEED certification is an international building performance rating system that covers every aspect of building design, construction, operation and maintenance.

The 2030 Challenge: Also, as a member of the U.S. Conference of Mayors, Mayor Riley adopted the principle of the “2030 Challenge.” The 2030 Challenge encourages that all new buildings, as well as matching amounts of our existing building stock, be constructed and renovated each year to gradually increasing energy performances standards. By 2030, all new buildings and renovated existing buildings should be carbon neutral. In other words, these facilities will use energy that is derived from renewable sources and results in zero emissions of

CARROTS AND STICKS



Nationally, communities are experimenting with various ways to make privately owned buildings more sustainable. Density bonuses and expedited permitting are the most popular.

Charlotte, North Carolina goes further, offering permit fee rebates of up to \$100,000 for sustainable buildings.

Portland, Oregon is getting ready to offer similar incentives to developers who build sustainably. Portland’s program is ingeniously self-sustaining in that it will cover the cost of these incentives by collecting extra fees from developers who just meet minimum building code requirements.⁴

Closer to home, Columbia intends to offer permit fee rebates for sustainable building using Energy Efficiency Block Grant funds.



One Cool Blow—environmentally friendly, mixed-use development on Charleston’s peninsula

greenhouse gases. The potential for nationwide energy savings through the 2030 Challenge is tremendous, since by 2035 three-quarters of U.S. buildings will either have been built or undergone major renovation since 2005.³

Next Steps

Recognizing that Charleston has taken many positive steps in this area, the plan lays out further steps necessary to meet the City's goals and commitments.

City Buildings: The City should commit to continuing to meet higher sustainability standards as they are developed with all municipal buildings. This includes development of separate sustainability guidelines for historic structures. All City facilities should become visible, accessible sources of inspiration and leadership on how to implement sustainable building practices for Charleston



Caulking helps to stem air infiltration and improve the efficiency of a home's heating and cooling systems

residents, visitors, and other government entities.

Private Property Owners: The City should actively encourage private property owners to meet the same high standards of sustainability. Expanding sustainable building in the private sector will require offering meaningful incentives, such as fast-track permit review and waivers of density and other requirements. It will also require effective public relations and community outreach.

Energy Efficiency Partnership: The City is currently helping to create a "one stop shop" public-private partnership that will help home and business owners increase energy efficiency through weatherization and conservation measures. Beginning in 2010, this partnership should raise the capital for a revolving loan fund, educate home and business owners, install and insure the improvements, and offer practical financing. This plan calls for the City to remain a key leader, partner, and facilitator in this undertaking.

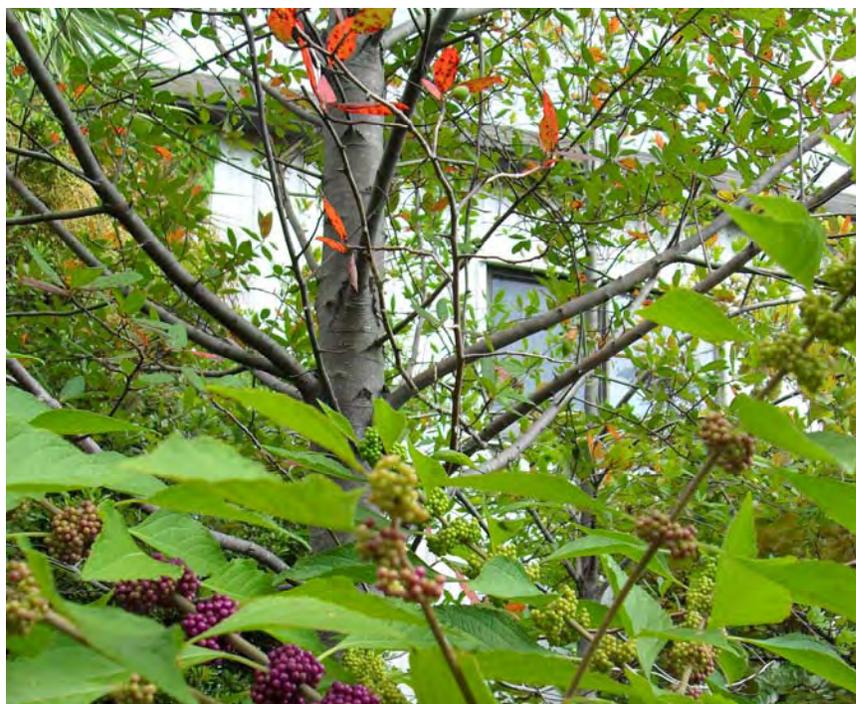
Funding for Sustainable Projects: Financial institutions are often not familiar with sustainable building practices. Nor do they know how to value sustainability over a building's life cycle. The City should work with lenders, appraisers, investors, and state

HALF MOON OUTFITTERS



“Green buildings are one of the most worthwhile investments a business can make.”

Beezer Molten is founder and CEO of Half-Moon Outfitters. Molten has integrated green building practices into all Half-Moon facilities, including two Charleston retail stores. The South Windermere store, in particular, is a great example of sustainable reuse and renovation. When an old movie theater was converted into modern retail space, Molten worked with the owner to integrate sustainable features, including advanced insulation and larger windows to capture more natural light. Also, the store's racks and shelving are made from reused, recycled, and rapidly renewable materials, as well as sustainably harvested woods. “At Half-Moon,” says Molten, “we aspire to be good stewards of the environment as well as good retailers. It's nice to be recognized for these efforts, but really it's just what we want to do.”



Native planting helps to reduce irrigation needs and use of chemical fertilizers.

and federal agencies to identify and increase financing opportunities, and advertise these opportunities on its website.

Historic Preservation and Sustainability: Recognizing the need to address green building practices in historic structures, the Historic Preservation work group of the Buildings Subcommittee developed guidelines for homeowners and businesses to help them make the most energy saving choices. See Appendix.

WHAT IS GREEN



Credit: Meadors Construction

Solar panels are an increasingly common installation to provide an alternate source of a building's energy, using a natural and renewable form of energy.

ENERGY

Green buildings use energy efficiently and often rely on renewable energy resources. They maximize the sun's warmth in winter and maximize shade in summer. They are airtight and well-insulated. They also use energy-efficient systems and appliances, and plenty of natural light. When buildings are designed in this way, energy consumption can be reduced by 50% or more at little or no extra cost.⁵

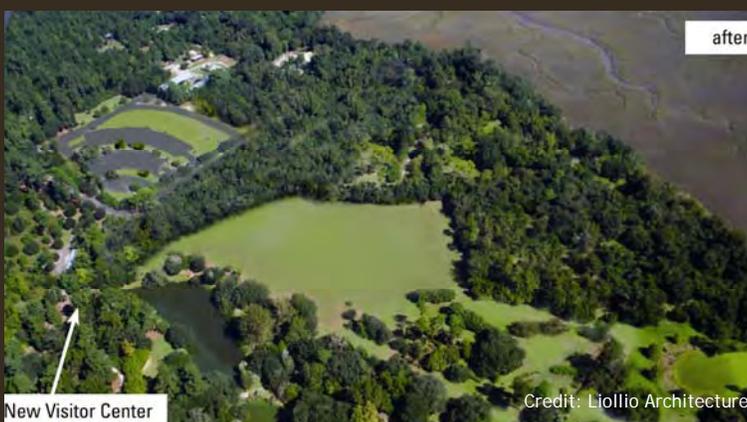
ENVIRONMENTAL IMPACT

Green buildings are made of materials that require less energy to harvest, manufacture, and transport. They often include permeable paving that lets stormwater drain naturally through the soil, rather than pouring it unfiltered into surrounding waterways. They also use landscaping that needs little extra water or maintenance, including native plants. Note: well-designed landscaping can help reduce air conditioning energy consumption by 75%, and can increase property value by as much as 15%.⁶



before

Credit: Liollio Architecture



after

Credit: Liollio Architecture

New Visitor Center

These before and after images of Charles Towne Landing depict the value of siting buildings to achieve their needed purpose and using natural drainage, lessening site disturbance and protecting natural habitat.

RESOURCE CONSERVATION

Green buildings often use recycled, reused, or rapidly renewable materials. They also minimize construction waste. Another important feature is efficient plumbing -- which, along with appropriate landscaping, can reduce water use by 30%.⁷ Sometimes these structures include a "green roof," which is covered with soil and plants. This reduces energy consumption and stormwater runoff, and can protect

BUILDING?



Credit: Richard Leo Johnson/Atlantic Archives, Inc.
Design: Whitney Powers, Studio A, Inc.

Green roofs help insulate and thus reduce energy use. They also reduce stormwater runoff and mitigate urban heat island effect.



The use of natural lighting reduces energy consumption and creates a healthier and more comfortable indoor environment.

ECONOMIC BENEFITS

1. Lower operating costs
2. Higher value per square foot
3. Increased employee productivity

Source: U.S. Green Building Council

clean air and provide wildlife habitat. Sometimes these buildings also include “grey water systems,” which recycle water from sinks and bathtubs into the landscaping.

INDOOR AIR QUALITY

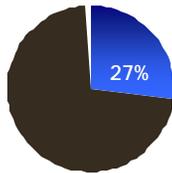
Green buildings are airtight to minimize the entry infiltration (leaking in) of unconditioned, unfiltered outside air that can cause health problems for building occupants and moisture - related problems for the buildings themselves in buildings and control natural ventilation.

When a building is airtight special care must be taken to make sure that the air inside is clean and well ventilated. This is accomplished by using nontoxic building materials and superior ventilation systems that control the amount and quality of outside air introduced into a building.

COMMUNITY IMPACT

Green buildings are often located within easy access of public transportation and/or in communities where it is easy to walk or bicycle to nearby stores and services. They link to existing roads and waterlines and connect people to readily accessible services such as shopping for food, banking, and health care providers rather than sprawling into the countryside, where there is little infrastructure to sustain them. Also, green buildings blend into the community, preserving natural and historic features.

Better Buildings Goals, Actions & Recommendations



Quantifiable measures could achieve 27% of 2030 reduction goal (equal to 289,861 mtCO₂e). See page 21 for details.

ACTIONS

1. Require new City-owned buildings and renovations to non-historic existing City-owned buildings to be sustainable.
 - A. Set specific performance targets for site selection, water conservation, energy and atmosphere, materials and resources, indoor environmental quality, and operations and maintenance.
 - B. Meet the energy reduction targets of Architecture 2030.
2. Historic buildings are inherently sustainable. Require modifications to historic City-owned buildings to follow current best practices with regard to integrating historic preservation with modern sustainable practices.
3. Encourage private sector to adopt voluntary sustainable building practices.
4. Encourage disclosure of utility data and building performance.
 - A. Disclose utility data for each City building annually, with comparisons to the previous year and to regional or national benchmarks.
 - B. Encourage sellers of private property to provide utility data for the previous twelve months.
5. Develop a weatherization program.
6. Help increase financing options.
7. Focus on public outreach.
 - A. Develop an aggressive, comprehensive, and multi-faceted communications and public education campaign.
 - B. Implement the campaign in collaboration with local partners, developing Sustainable Design Workshops and Green Building Seminars.

B1. REQUIRE NEW CITY-OWNED BUILDINGS AND RENOVATIONS TO NON-HISTORIC EXISTING CITY-OWNED BUILDINGS TO BE SUSTAINABLE

Summary of Specific Issues: On April 22, 2008, Mayor Riley signed into law Resolution 2008-05 supporting a variety of sustainability policies. These included the requirement that all new construction and major renovation of City-owned buildings achieve LEED certification beginning in 2009. By expanding this requirement to include

all non-historic City buildings, and by requiring additional third party certifications, this system can be used to greater effect.

Recommendation/Strategy/Action Plan:

- A. Expanded Standards:** The City should expand Resolution 2008-05 so that all new City buildings and renovations to non-historic existing City buildings are required to meet a new standard for sustainable building, to be called the “Charleston Sustainable Building Standard.” To minimize administrative effort and expense, the City should not attempt to create and audit a new standard. Instead, the City should use existing third-party certifications such as LEED, Green Globes, EarthCraft, or other suitable standards for all non-historic building construction, operations, and maintenance.
- B. The 2030 Challenge:** The City should develop the Charleston Sustainable Building Standards so that it can meet “The 2030 Challenge,” issued by an independent nonprofit group called Architecture 2030. Architecture 2030 has asked the global architecture and building community to adopt the following targets:
- All new buildings, developments and major renovations shall be designed to meet a fossil fuel, greenhouse gas, energy consumption performance standard of 50% of the regional (or national) average for that building type.
 - An equal amount of existing building area, at a minimum, shall be renovated annually to meet a fossil fuel, greenhouse gas, energy consumption performance standard of 50% of the regional (or country) average for that building type.

- The fossil fuel reduction standard for all new buildings shall be increased to: 60% in 2010, 70% in 2015, 80% in 2020, 90% in 2025. Carbon-neutral in 2030 (using no fossil-fuel, greenhouse-gas-emitting energy to operate).
- The 2030 challenge targets may be accomplished by implementing innovative sustainable design strategies, generating on-site renewable power and/or purchasing renewable energy and/or certified renewable energy credits (20% maximum). ¹

Inspired by the 2030 Challenge, and based on the currently existing LEED standard for New Construction, we recommend as an example that the following be adopted as the Charleston Sustainable Building Standard:

- LEED Gold certification.
- Earn 50% of the available points under the Sustainable Sites credit, including mandatory achievement of both stormwater quality and quantity control points. The Sustainability Director shall have discretion to relax this requirement where the project is developed in an existing dense urban area using high-density urban design criteria established by the City and building footprint occupies 80% of the total property acreage.
- Earn a minimum of 3 out of the 5 available points under the Water Efficiency Credits, including mandatory achievement of the 30% Water Use Reduction point.
- Earn the minimum number of Optimize Energy Performance points under the

Recommendations

Energy and Atmosphere Credit Category necessary to meet the 2030 Challenge target energy use reductions and fossil fuel use reductions.

- Earn an additional 3 points under the Energy and Atmosphere Credit Category, including mandatory achievement of the Measurement & Verification point.
- Earn 50% of the available points under the Materials and Resources Credit Category, including mandatory achievement of the 50% Diversion of Construction Waste from Disposal, 10% Recycled Content and 10% Regional Materials points.
- Earn 50% of the available points under the Indoor Environmental Quality Credit Category, including mandatory achievement of Construction IAQ Management Plan (During Construction and Before Occupancy) points and Low Emitting Materials points for adhesives, sealants, paints, coatings and carpets.
- Earn a minimum of 2 points under the Innovation and Design Credit Category.
- Noting the many sustainable and life safety benefits of automatic fire protection systems, require that all City owned new buildings and major renovations (commercial and residential) include them as part of their design and construction.
- Provide Owner's operations manual for City record. (Eighty-five percent of the cost of owning a building occurs after the building is constructed or renovated. Having a complete record

of each building's as-built drawings, operations and maintenance, and care instructions for all equipment, materials, and assemblies can help the City optimize energy efficiency. Maintaining these records permanently, in an electronic format, would benefit the City and any future owners, as well as city planners, building officials, and emergency responders.)

Similar criteria should be established for each LEED rating system and other comparable rating systems being considered or applied.

Implementation Responsibilities/Assignments

The City Sustainability Director, in conjunction with the Capitol Projects Division Sustainability Project Manager, will develop, update, and maintain the Charleston Sustainable Building Standard, including the establishment of minimum target performance goals under the sustainable sites, development density, public transportation, water efficiency, energy and atmosphere, materials and resources, renewable power, indoor environmental quality, operations, maintenance and procurement categories of those standards. The Charleston Green Committee can assist. All City departments responsible for initiating, developing, permitting, approving and managing existing buildings, new construction and major renovation projects shall meet the Charleston Sustainable Building Standard. Recognizing that the building performance rating systems proposed above can help achieve many recommendations proposed by other subcommittees, the Sustainability Director will coordinate and track these

complementary effects when evaluating and reporting on the status and success of this entire plan.

Cost to Implement/Net Savings from Implementation: Initial costs to the City should be minimal, including only City staff time. Later costs will depend on the specifics of each project.

Additional Benefits: Reduced environmental impact in construction, operation and maintenance of buildings; better indoor air quality; reduced construction waste; higher water efficiency; better use of new and existing materials and resources; economic stability through increased jobs in design, construction, manufacturing, demolition, recycling, waste management and renewable energy industries.

Timeline for Implementation: The Sustainability Director should begin developing and implementing the Charleston Sustainable Building Standard upon adoption of this recommendation by the City Council.

References: City of Charleston 2002 CO2e inventory.

B2. HISTORIC BUILDINGS ARE INHERENTLY SUSTAINABLE. REQUIRE MODIFICATIONS TO HISTORIC CITY-OWNED BUILDINGS TO FOLLOW CURRENT BEST PRACTICES WITH REGARD TO INTEGRATING HISTORIC PRESERVATION WITH MODERN SUSTAINABLE PRACTICES.

Summary of Specific Issues: Founded in 1670 and home to well over 3,000 historic structures, Charleston is one of the oldest and

best preserved and sustained cities in the country. The community's long-standing practice of historic preservation—not only of individual buildings, but including entire neighborhoods--has made it a national leader in preservation practices. The beauty, quality and character of the existing historic fabric has enabled the city to become one of the most desirable places to live and visit in the world.

Historic structures are inherently sustainable; it has often been said that "the greenest building is the one that is already built." What this refers to is the concept of embodied energy - that is, the total energy used in the building's lifecycle. The preservation of historic buildings (or any existing buildings) recognizes the value of the existing embodied energy and the resources that have already been expended versus the new consumption of energy and resources, and the waste generated, required to construct an entirely new structure.

In addition, because most were built prior to the advent of mechanical systems, many historic structures are excellent examples of sustainable design. They employ passive design features that reduce energy use, promote operator adaptability to changing environmental conditions, and employ quality materials that provide long life cycles.

For these reasons, the continued protection and preservation of Charleston's historic structures is a high priority. Fortunately, historic buildings can be both preserved and made more environmentally responsible and energy efficient.

Recommendation/Strategy/Action Plan: The Charleston Sustainable Building Standard discussed in Recommendations B1 and B3 will not be appropriate for many of Charleston's historic structures. For historic

Recommendations

structures, the City should adopt a “preservation first” approach. At the same time, the City should develop guidelines that suggest how to integrate modern sustainable design and construction practices into the preservation, restoration, and adaptation of historic buildings. The City should commit to following these guidelines, while for other property owners they will be voluntary.

The Historic Structures Subcommittee of the Charleston Green Committee has developed specific guidance on this subject. This information may be found in the appendix.

Implementation Responsibilities/Assignments: Developing sustainability guidelines for historic structures should be a collaborative effort among:

- The City Department of Planning, Preservation and Sustainability;
- Preservation Society of Charleston;
- Historic Charleston Foundation;
- The National Trust for Historic Preservation;
- Charleston Heritage Foundation; and
- Any other local groups with essential expertise on this subject.

The Charleston Green Committee can assist as well. For City-owned properties and facilities, responsibility for following the guidelines will lie with City departments responsible for initiating, developing, permitting, approving and managing existing buildings, new construction and major renovation. For privately owned properties and facilities, please see Recommendation B3.

Cost to Implement/Net Savings from Implementation: Initial costs to the City should be minimal, including only City staff time. Later costs will depend on the specifics of each project.

Additional Benefits: Reduced environmental impact in construction, operation and maintenance of buildings; better indoor air quality; reduced construction waste; higher water efficiency; better use of new and existing materials and resources; economic stability through increased jobs in design, construction, manufacturing, demolition, recycling, waste management and renewable energy industries.

Timeline for Implementation: The Sustainability Director should begin developing and implementing the guidelines upon adoption of this recommendation by the City Council.

References: 113 Calhoun St. Center for Sustainable Living

B3. ENCOURAGE PRIVATE SECTOR TO ADOPT VOLUNTARY SUSTAINABLE BUILDING PRACTICES

Summary of Specific Issues: Through Recommendations B1 and B2, the City will take a leadership role in sustainable design and construction. However, approximately 95% of all buildings in Charleston are privately owned. Therefore, the City must encourage owners of private buildings to participate as well. Nationwide, cities are offering such incentives as expedited permit review; density and other bonuses; financial incentives including tax credits and permit fee reductions; and technical and marketing assistance.

Recommendation/Strategy/Action Plan: The City should develop

incentives to encourage private developers and owners to build, renovate, operate and maintain to the Charleston Sustainable Building Standard (or, for historic structures, the guidelines described in Recommendation B2). Applicants for these incentives will be required to submit evidence of application for, or receipt of, the independent, third-party certifications that underlie the Charleston Sustainable Building Standard.

Developers will need to apply for these incentives prior to applying for the underlying third-party certification, during the design phase. Some incentives, then, may be awarded by the City conditional upon receipt of the underlying certification.

Owners that satisfy the Charleston Sustainable Building Standard should receive the following incentives:

- **Recognition:** Owners should receive an emblem which may be affixed to the exterior of the building and will be displayed on the City's Sustainability webpage in a list of recognized buildings, ideally with a link to the building's sales listings. Such recognition will not only assist consumers of commercial or residential real estate by providing a unified list of buildings that have satisfied stringent requirements, but will provide a unique marketing opportunity for the owner. The application shall simply be submission of proof that the building has achieved third party certification in accordance with the recommendations set forth in items B1 and/or B2.
- **Waivers:** The City should offer waivers of general density, minimum square footage, and parking requirements for such buildings. Such waivers will increase the profitability of such projects, while satisfying other City goals such as increased infill development, reduced

traffic, and increased reliance on public transportation.

- **Fast Track Review:** Developers of buildings seeking to satisfy the Charleston Sustainable Building Standard should have special access to a designated City liaison to respond to questions and streamline the City regulatory process. Details can be worked out by the Sustainability Director and City staff.
- **Public Transit Bonus:** Occupants of recognized private buildings should receive discounted or free passes for public transportation for 3 years. Such passes will have a minimal cost to the City, but will be a significant marketing advantage to developers. Also, the City should partner with CARTA to encourage "transit-oriented development" by coordinating this incentive with recommendations of the Communities and Transportation sections of this plan. Note that this incentive will help developers meet public transportation access requirements of many of the underlying third party certifications. Encouraging occupants of the recognized buildings to use public transportation will also minimize the effect of increased density and reduced parking.

Estimated Greenhouse Gas Reductions to be Achieved - In Metric Tons/Year: Will vary according to certification levels and other prerequisites required by the City.

Implementation Responsibilities/Assignments: The Green Committee will work with the City and the Sustainability Director to develop and implement incentives for private parties and ways to advertise them on the City's Sustainability webpage.

Recommendations

Cost to Implement/Net Savings from Implementation: The costs to the City should be minimal, as follows: City staff time to develop and advertise incentives program; discounted public transit passes; and plaques for sustainable buildings.

Additional Benefits: Benefits for individual buildings include better indoor air quality; better return on investment; reduced operating costs; increased building value and occupancy rate; and increased rent ratios. Benefits for the City include reduced environmental impact in construction, operation and maintenance of buildings; reduced construction waste; higher water efficiency; better use of new and existing materials and resources; economic stability through increased jobs in design, construction, manufacturing, demolition, recycling, waste management and renewable energy industries; decreased traffic through improved location and use of public transit; and enhanced marketing of Charleston buildings.

Timeline for Implementation
The Sustainability Director should commence to develop and implement the Charleston Sustainable Building Standard and system of incentives upon adoption of this recommendation by the City Council.

B4. ENCOURAGE DISCLOSURE OF UTILITY DATA AND BUILDING PERFORMANCE

Summary of Specific Issues: Electricity and natural gas produce most of the carbon dioxide emissions for a building. To reduce these emissions, building owners need to use less electricity and natural gas. It is also important to conserve water. Disclosing utility data

allows citizens, building users, and potential buyers to see and compare energy usage, which increases consumer demand for higher performance buildings. This will encourage property owners to improve efficiency and operate buildings conscientiously.

Recommendation/Strategy/Action Plan:

- A. **City Disclosure:** The City should commit to annual disclosure of utility data for all its properties. This information should be compared to the previous year's usage and regional or national databases of buildings with comparable use and occupancy. The format of the report should include the building's square footage, number of stories, use or occupancy (commercial, residential, mixed use, assembly, storage, etc.), number of occupants, total energy use by utility type (electricity, natural gas, water, and sewer, in the same units used by the utility company), energy use per square foot, total cost by utility type, and percent increase or decrease from the previous year.
- B. **Disclosure by Sellers:** The City should encourage all sellers of residential and commercial property to provide potential buyers with utility bills or reports for electricity, natural gas, water, and sewer. Seller should disclose this information for at least the previous twelve months before a sales contract becomes binding.

Implementation Responsibilities/Assignments: For City-owned buildings, the Sustainability Director shall develop or purchase an online database for

collecting and reporting this data. For privately-owned buildings, it will be the responsibility of the owner to disclose this information. Also, the Sustainability Director should work with state officials to investigate disclosure of utility data by sellers of real property. If this is impossible, the Director will explore other options such as cooperative efforts with sales agents or public education.

Cost to Implement/Net Savings from Implementation: There will be minimal cost to the City. Building improvements inspired by it will be up to the owner and funded by the owner.

Additional Benefits: Reduces energy use; reduces demand requirements for local power companies; and helps create market forces that encourage sustainable building construction, renovation, operation, and maintenance.

Timeline for Implementation: The program should begin for City buildings upon adoption of this recommendation by the City Council. The Sustainability Director should also immediately begin investigating implementation of the private portion, which may take one or two years to implement.

References: This recommendation complements Recommendation B3.

B5. DEVELOP A WEATHERIZATION PROGRAM

Summary of Specific Issues: More home and business owners would weatherize their buildings if it were easier to calculate the cost savings, access capital, and get the work done. Some qualify for federally-funded weatherization programs, but most do not.

Recommendation/Strategy/Action Plan: The City should develop a Home/Business Weatherization Program for those who do not

qualify for federal programs, identifying appropriate lenders, financing options, and service providers. Successful models of these programs exist in many cities, including Milwaukee, Wisconsin and Babylon, New York. Approached as a four-phase program, Phase 1 addresses the fundamentals, such as sealing air leaks, replacing high-energy lighting, and wrapping or upgrading the water heater. Phases 2 to 4 address system upgrades in appliances, HVAC, and windows, doors, and anything else necessary to weatherize the building envelope. Phase 1 of this strategy can be modeled on a similar federal initiative currently in development. Funding can be provided through partnerships with local lenders willing to offer low-cost loans. (See also Recommendation E-2E.)

Implementation Responsibilities/Assignments: Once the recommendation is adopted by City Council, it will be the responsibility of the Sustainability Director to develop and implement the program. Heirs' property circumstances require a partnership with the Center for Heirs' Property Preservation and similar organizations to overcome the hurdle of unclear title.

Energy and Gas Saved

Phase 1 saves approximately 10% on energy costs, up to Phase 4 that saves approximately 50%.

Cost to Implement/Net Savings from Implementation: The cost to weatherize a building will vary depending on the age, condition and number of weatherization-related energy-conservation measures undertaken by the building owner. The City Staff and/or an energy alliance would work with the owner to help evaluate and analyze energy conservation measures and recommend those that have the potential to provide enough savings over time to offset the monthly cost of installing and

maintaining the energy-conservation measure throughout its expected useful life. These costs are borne by the property owner, with access to financing options from conventional lenders and/or an energy efficiency revolving fund. The City of Charleston or an energy-efficiency partnership would bear the cost of staff time.

Timeline for Implementation: Phase 1 should begin within first year of the Sustainability Director's tenure. Phases 2 to 4, including development of funding partnerships to provide larger loans, should be developed and implemented sequentially beginning in the second year of the Director's tenure.

B6. HELP INCREASE FINANCING OPTIONS

Summary of Specific Issues: Due to current economic difficulties and a lack of familiarity among lenders with sustainable building, there are very limited financing options for these projects. There are even fewer options that appropriately value the improvements included in these projects. The City could be uniquely influential in helping to increase financing options for sustainable building projects.

Recommendation/Strategy/Action Plan: The Sustainability Director and the Green Committee should work with lenders, investors, and state and federal agencies to increase and publicize financing and funding opportunities for sustainable building projects. Successful models of this program exist elsewhere, including New York City, Kansas City, Cambridge, Massachusetts, and Austin, Texas.

Implementation Responsibilities/Assignments: The Sustainability Director

and the Green Committee should contact local lenders to explore available financing options. Available options could be publicized on the City's Sustainability webpage. The Sustainability Director should also explore and coordinate financing and funding options available at the state and federal levels.

Cost to Implement/Net Savings from Implementation: Beyond staff time, there should be no additional cost for this program.

Additional Benefits: In addition to the environmental benefits, helping local builders, developers, and owners find financing will have positive economic benefits for Charleston.

Timeline for Implementation: Noting the great increase in federal funds available for efficiency projects, the Sustainability Director should begin the process immediately upon adoption of this recommendation by the City Council. The goal should be to have a framework and initial database of available funding organizations and resources published within 6 months of adoption of this plan.

B7. FOCUS ON PUBLIC OUTREACH

Summary of Specific Issues: The success of this plan depends on whether a critical mass of City staff and Charleston residents understand and implement its recommendations. It is in everyone's best interest to increase our collective understanding of climate protection, sustainable living practices, and what each person can do to make a difference.

Recommendation/Strategy/Action Plan: The Sustainability Director and the Green Committee should develop and implement a professional public relations campaign and a community-wide public education initiative concerning climate protection, sustainability, energy efficiency, and renewable energy. This initiative should include the following:

A. Communications Plan: Develop a comprehensive, multi-faceted communications and public engagement plan. This plan should target business, faith communities, schools, and the general public.

B. Public Relations Campaign: Undertake an aggressive public relations and community education campaign in partnership with Chamber of Commerce, the Home Builders Association, the Charleston Green Builders Council, the Charleston AIA, historic preservation leaders, other trade and professional associations, foundations, non-profits, neighborhood organizations, home owners associations, and others that support sustainable building practices.

- **Design Workshops:** As part of this campaign, develop Sustainable Design Workshops that provide information for both professionals and home owners preparing to build, buy, or remodel a home with the intention of improving energy and water efficiency.
- **Green Building Seminar:** In addition, develop a monthly, lunch-time Green Building Seminar Series open to all building design and construction professionals and City personnel. Learning Unit and Continuing Education credits should be available for American Institute of Architects (AIA) and licensed professional engineers.

Implementation Responsibilities/

Assignments: The Sustainability Coordinator and the Green Committee should partner with local school districts, institutions of higher education and other local, regional and national organizations listed above to develop curricula for comprehensive lifelong learning opportunities in climate protection and sustainable living practices for all sectors of the local population.

Timeline for Implementation: The first phase of education will begin with the adoption of the plan and its publication for use by City staff and the public at large. Ongoing development of programs and curricula will be continuous from that date forward.

Historic Structures and Sustainability

1.0 DEFINITION

Historic Structures are those which are fifty-years or older and eligible for the National Register of Historic Places.

Within the rubric of sustainability, Historic Structures should be defined just as they are elsewhere by the City of Charleston.

Because of their unique cultural value, Historic Structures need a different level and kind of consideration than Existing Buildings, (which have been considered under the Buildings category of the Charleston Green Committee).

2.0 PRINCIPLES

The following principles should be adopted regarding sustainability in Historic Structures. They should find application at community as well as building scales.

2.1 Historic structures are inherently sustainable.

Due to their longevity and their ingrained values, Historic Structures are inherently sustainable. Most structures built prior to 1950 are sensitively tuned to the natural environment, employ higher quality and longer-lasting materials than currently available, utilize passive environmental systems, conserve open space, foster sustainable practices, and create a sense of place. Moreover, the “embodied energy” in historic structures represents a significant sustainable resource. Consequently, Historic Structures should be valued, not just culturally, but as highly sustainable.

Beyond the buildings themselves, historic settlements tend to embody sustainable practices through their density (conserving land and infrastructure while minimizing vehicular transport); support of mixed uses (minimizing vehicular transport while supporting community engagement); sponsoring pedestrian connections; orientation to natural topography and climate; and so on.

2.2 Rediscover and recover the ritual of sustainable habitation.

Historically, there was a ritual that developed with the sustainable occupation of buildings and sites, such as the seasonal closing of shutters or the daily opening of windows. The meaning, poetics, and value of such practices, at the scale of the community and the building, have been lost.

2.2.1 Awnings

New technologies can be added to old ones in supporting ritual habitation. For example, mechanically operated awnings, controlled by timers or sensors, can direct a building to responding to changing sun conditions.

2.2.2 Incentives

The City and preservation organizations should sponsor educational programs to encourage the rediscovery of sustainable features of historic structures; they should also raise awareness and popularize modified standards for interior conditioning that are more compatible with historic structures and take advantage of the natural climate. Directories of companies that provide passive and active systems should be made available.

2.3 Repair and Reuse (Instead of Replace)

Except in the case of mechanical and electrical systems, most of which are not original, historic building fabric should be repaired and reused (at all scales). Even when not visible, saving historic fabric preserves building culture for future generations; it also prevents materials from ending up in a landfill and precludes the need for new building materials that have to be processed and transported. Every material that is already in place represents a significant investment in embodied energy; historic structures add to this a cultural value. As a renovation culture is developed that repairs rather than replaces fabric, renovation practices that follow this ethic will be reduced in cost.

2.4 Make Alterations to Historic Structures Reversible

The overriding criterion in renovating Historic Structures for sustainability is to make alterations reversible. That is, sustainable renovations should have minimal impacts to existing historic fabric upon implementation and could, in the future, be removed so that the building could be restored to its historic configuration.

3.0 BEST PRACTICES

The following strategies should direct the sustainable treatment of Historic Structures.

3.1 Encourage the use and development of sustainable standards for Historic Structures.

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System, a program of the US Green Building Council (USGBC), encourages sustainable green building and development practices through standards and performance criteria. LEED is the emerging sustainability standard governing the built

environment in the United States.

The City should participate in the development of a LEED standard for historic buildings.

3.1.1 Applicable Standards

There is not currently a LEED standard specifically attuned to historic buildings. The most applicable existing standards are:

LEED-NC: LEED for New Construction and Major Renovations/Additions (for commercial and institutional buildings, released in 2000)

LEED-EB: LEED for Existing Buildings (released 2004)

LEED-ND: LEED for Neighborhood Development (in pilot)

Within the existing ratings, historic building projects are hampered by their historic fabric because, where sustainable efficiencies can be gained according to standards for new construction, historic integrity is often lost. USGBC is aware of this problem and discussions are in progress to give Historic Structures adequate credits. Just the embodied energy in Historic Structures is generally recognized as worth 30-50 years of energy use.

3.1.2 Information

For more information:

<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>

<http://209.85.165.104/search?q=cache:zaZGsyYwRxOJ:www.eere.energy.gov/femp/pdfs/>

[ee_historicbldgs_leed.pdf](http://www.eere.energy.gov/femp/pdfs/ee_historicbldgs_leed.pdf)+LEED+for+Historic+Structures&hl=en&ct=clnk&cd=4&gl=us&client=firefox-a

3.2 HAZARDOUS MATERIALS Create safe, not necessarily non-hazardous, environments.

The treatment or removal of hazardous materials is a significant aspect of sustainable renovation. Lead paint, asbestos, fuel oil tanks, and other materials present issues during and after removal. It is often more sustainable, as well as better for historic fabric, to abate by encapsulation rather than to remove hazardous materials. Abatement should not be cause for demolition.

The City should develop an information center for sustainable renovation with links to National Park Service guidelines and other credible sources. Regarding sources such as the Occupational Safety and Health Administration (OSHA), the City should provide simplified, user-friendly interpretations that will be followed by homeowners and small contractors.

Regulate the removal and disposal of lead paint.

The removal of lead paint, and its disposal, is a serious problem in historic areas and should be regulated by the City such as by requiring proof of training as mandated by EPA's Renovation, Repair and Painting (RRP) ruling.

3.3 WATER MANAGEMENT Utilize on-site water storage when gray water systems are installed.

Sustainable practices encourage the conservation and delayed release of precipitation. Although Historic Structures frequently had such systems, cisterns in the Charleston climate may fill up in a few months unless on-site uses for retained water (such as site watering and toilet flushing) are utilized. Consequently, cisterns should only be used when gray water uses are also employed.

3.4 PASSIVE SYSTEMS Always retain or provide passive systems.

The City should require workable passive systems in all historic buildings, even when they are redundant to mechanical ones. Daylighting and natural ventilation, with automated controls that reduce use of and dependence on mechanical systems, should become standard. Historic windows should be maintained in good operating condition (i.e., not painted shut and with counterweights in good operable condition); permanent storm windows should be discouraged.

3.5 BUILDING SYSTEMS Improve energy efficiency through high-performance technology.

Electrical and mechanical systems are the exception to the Repair and Reuse principle: *new* is often better than *old*. Recent technological developments in lighting, daylighting, HVAC systems, electrical controls, hot water heaters, automated and motion-sensitive control systems, and other new technologies can drastically improve energy efficiency with little or no impact to historic fabric. New technologies should be aesthetically and technically employed with sensitivity to the historic fabric.

Specific recommended practices:

3.5.1 Design Standards

Conditioning standards in historic structures should not be designed to maintain heating and cooling temperatures that have become standard in modern structures (typically year-round interior temperatures between 70-72 Degrees F). Designed to respond to local climate and not designed for extreme indoor-outdoor temperature differentials, historic structures bring with them the need for inhabitants to live in a less-artificial environment.

Consequently, more moderate design temperatures should become standard, such as:

- heating: 68 Degrees F

- cooling: 78-80 Degrees F

In the cooling mode especially, this minimizes the number of hours where the dew point is reached within the building envelope, thus reducing conducive environments for mold and moisture damage and greatly reducing energy consumption.

3.5.2 Pressurization

When mechanical conditioning is used, maintaining a positive interior air pressure insures that humid air is not drawn into the building through leaks in the building envelope. Warm moist air, coupled with low temperatures, results in condensation and subsequent mold and deterioration of historic fabric.

3.5.3 Exterior Systems

Exterior components should be carefully chosen and located, not only to be reversible, but to be concealed from the public view. New developments in solar panels, for example, allow panels to sit flush within the profile of historic roofs. Such technologies, which are less obtrusive than traditional HVAC systems, should be encouraged.

3.6 ENVELOPE Improve, but don't alter, the historic building envelope.

Historic buildings generally have tried-and-true profiles, sections, and material palettes attuned to the local climate. It is unwise to tamper with these systems to avoid unforeseen consequences.

According to this strategy, some specific practices:

3.6.1 Insulation

In most cases, Historic Structures that were not designed for wall insulation *should not have insulation added*. Properly designed walls require internal ventilation; it is difficult to add insulation to a completed wall while retaining space for internal air movement; moreover, its installation typically requires the removal of historic fabric.

At the same time, insulation changes the dew point within a wall. In humid coastal environments where air conditioning has been added to Historic Structures, altering the dew point can create condensation problems within the wall. Furthermore, historic plaster & lath are capable of accommodating and facilitating changes in humidity and are naturally resistant to mildew; contemporary drywall systems are not.

It is often best to install insulation in the floors and attic, rather than in the walls. This can be quite effective because significant thermal transfer occurs through the floors and attic.

3.6.2 Air infiltration

Air infiltration of the building envelope has been found to have a much greater impact on energy usage than insulation. Consequently, air barriers are now widely recognized as a primary sustainable strategy in new construction and air infiltration should be the primary strategy for upgrading historic structures.

SIDING: It is not advisable to remove historic siding in order to install building-wrap air barriers; rather, it is better to caulk, paint, or otherwise try to stop specific leakage. If, however, siding is removed in order to repair structure behind it or if a significant amount of siding is being replaced, building-wrap should be installed.

3.6.3 Windows

WEATHERSTRIPPING: The best way to minimize air infiltration in Historic Structures is to weatherstrip or otherwise improve the infiltration performance of historic doors and windows. Interior storm-doors and windows are not encouraged for, although they do not change the characteristics of the historic exterior, they alter the humidity and temperature properties of the exterior wall.

GLAZING: Most Historic Structures have single-pane glazing. New technologies, such as solar films and Low-E glass, can reduce energy use by reducing heat flow through glass. Historic Structures should make use of such technologies where the original glass is no longer extant and if the aesthetic properties of the new glazing is compatible with historic color and transparency.

ENVELOPE PERFORMANCE: Relative to new construction, historic structures tend to have a lower ratio of glazing to solid-wall than do modern structures. When historic doors and windows have been sealed against air infiltration, they perform perfectly adequately from a sustainability perspective. This means that, contrary to popular belief, historic structures are not inherently weak in terms of sustainability; in fact, the opposite is true.

3.7 EXTERIOR LIGHTING Reduce the nighttime level of artificial light.

Prior to the twentieth century, Charleston and its buildings would have had a much lower level of light at night than exists today. Both for sustainability as well as historical reasons, the City should reduce the nighttime level of exterior light.

Street light and building light levels should be lowered; light sources (bulbs) should be shielded to direct light where needed; night light should not be projected into the sky (with rare exceptions for places of civic importance).

3.8 SHUTTERS Develop shuttering systems that comply with historic profiles and contemporary standards.

New building-code and insurance requirements require shuttering standards that

exceed the capability of historic shutters. At the same time, shutters are one component of historic structures that require regular refinishing, rebuilding, or replacement. Consequently, shuttering is an area where significant strides need to be made in order to protect historic structures and make them more cost-effective.

Rather than rely on temporary emergency storm protection, such as pre-fabricated storm panels, the City should work with the private sector to develop innovation in shuttering systems that match historic profiles while meeting contemporary performance standards and offering improved material and finish longevity. It should also develop more sympathetic and cost-effective strategies that work with historic shutters, when original equipment is extant.

4.0 ACTION PLAN

In summary, the following actions are called for elsewhere in this report.

4.1 CITY OF CHARLESTON AND OTHERS As recommended at various places in this report, the City of Charleston in cooperation with non-profits, private sector, state and federal governments should provide education, incentives and regulations that will foster a sustainable preservation culture. These include:

4.1.1 INFORMATION

INCENTIVES: Provide a central information source (a physical office, published information, and/or a website) for local information on sustainable preservation (2.2, 3.2, 5.2).

4.1.2 STANDARDS

REGULATION: Set and popularize modified standards for interior conditioning and building performance (3.1.1, 3.4, 3.5.1).

4.1.3 EXTERIOR LIGHT

REGULATION: Work with SCE&G and building owners to reduce the nighttime level of exterior light. (3.7).

4.1.4 INNOVATION AND RESEARCH

REGULATION + INCENTIVES: Support the harmonious use of sustainable technologies (3.3, 3.5.3, 3.6.3) and nurture the development of improved building components in historic structures (3.8).

RESEARCH: Become a demonstration site for research programs such as the National Trust's Preservation Green Lab program.

5.0 RESOURCES

5.1 GENERAL INFORMATION

5.1.1 *PRESERVATION* MAGAZINE

The January/February 2008 edition of *Preservation* magazine addresses the merging cultures of preservation and sustainability:

<http://www.preservationnation.org/magazine/2008/january-february/>

5.1.2 DARK SKY MOVEMENT

Organizations which support the sensible and sustainable control of outdoor lighting:

<http://www.darksky.org/mc/page.do>

<http://www.darkskysociety.org/>

5.2 CITY OF CHARLESTON The City should update its current information for historic preservation guidelines to include information encouraging sustainability practices, tailored specifically to different interests and levels of expertise: property owners, contractors, architects, developers, home inspectors, and real estate brokers. By tailoring the technical content and subject matter to specific user groups, this information is more likely to be useful. (Although something like The National Trust's "10 Tips to Green Your Historic House" would be helpful, a concise guide that walked users through all the required approvals, issues (including design, safety, sustainability), and local preservation resources would be better.

5.3 CASE STUDIES The following Case Studies are relevant to the Charleston climate or context:

5.3.1 LINCOLN COTTAGE

Robert H. Smith Visitor Education Center (to the Lincoln Cottage), Washington, DC: a 1905 Beaux Arts style building, the first National Trust Historic site structure to qualify for LEED (Leadership in Environmental and Energy Design) certification.

Links: <http://www.lincolncottage.org/visit/vecinfo.htm>

<http://www.preservationnation.org/magazine/2008/january-february/lincoln-cottage.html>

5.4 TECHNICAL INFORMATION The following sources have design and technical information relevant to the Charleston climate or context:

5.4.1 NATIONAL TRUST

The National Trust for Historic Preservation has tips for historic preservation and sustainability: <http://www.preservationnation.org/issues/sustainability/>

<http://www.preservationnation.org/magazine/2008/january-february/green-home-tips.html>

28. The three to six degree difference is based on tabulation of local data by Green Committee members. The federal Environmental Protection Agency states that annual mean air temperature of a city with one million people or more can be 1.8 to 5.4 degrees Farenheit warmer than surrounding areas, with a much greater differential of 22 degrees Farenheit on clear calm nights. See "Heat Island Effect," U.S. Environmental Protection Agency (2009), <http://www.epa.gov/heatisland/>.
29. Under the agreement, participating cities agree to (1) meet or beat the Kyoto Protocol target of reducing greenhouse gas emissions by 7% from 1990 levels by 2012; (2) urge federal and state governments to do the same; and (3) urge the federal government to pass bipartisan greenhouse gas reduction legislation establishing a national emission trading system. See "U.S. Conference of Mayors Climate Protection Agreement," <http://www.usmayors.org/climateprotection/agreement.htm>.
30. Specifically, the Green Committee was charged with (1) Providing solutions to ensure a prosperous community that will sustain a healthy citizenry and a healthy planet; (2) Inspiring individuals and organizations to make Charleston a model of health and ecologically sustainability; and (3) Working with City government, businesses, nonprofits, and others to protect and enhance Charleston's environment and quality of life. See City of Charleston Earth Day Resolution, April 2008, <http://www.charlestoncity.info/shared/docs/0/42208greenresolution.pdf>; see also Charleston Green Committee website, <http://charlestongreencommittee.com/missionstatement.html>.

Better Buildings

1. See "Unlocking Energy Efficiency in the U.S. Economy," McKinsey & Company (2009), http://www.mckinsey.com/client-service/electricpower/naturalgas/us_energy_efficiency/.
2. See "Green Building Research," U.S. Green Building Council, <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1718>.
3. See summary of "Nation Under Siege: Sea Level Rise at our Doorstep," Architecture 2030 at 4 (2007), (http://www.architecture2030.org/pdfs/coastal_impact_summary.pdf).
4. See "Promotion of Green Building: Local Government Land Use and Building Code Incentives and Mandates," Institute of Green Professionals (3 August 2009), <http://www.consilienceblog.org/consilience-the-blog/2009/8/3/future-of-green-building-where-is-it-going.html>.
5. See "Case Studies," Architecture 2030, http://www.architecture2030.org/current_situation/case_studies.php.
6. See "Green Building Principles - Environmental Impact," Smart Communities Network (2004), <http://www.smartcommunities.ncat.org/buildings/envirimp.shtml>.
7. See "Green Building Principles - Resource Conservation, Smart Communities Network (2004), <http://www.smartcommunities.ncat.org/buildings/rescon.shtml>.

Better Buildings Recommendations

1. Guidance on achieving these goals along with a blueprint for implementation and numerous resources may be found at www.architecture2030.org.

