Executive Summary
Testimony of Jean Carroon, FAIA
IMPROVING ENERGY EFFICIENCY, INCREASING THE USE OF RENEWABLE SOURCES OF ENERGY, AND REDUCING THE CARBON FOOTPRINT OF THE CAPITOL COMPLEX

In the United States, more than 40% of our carbon emissions are attributed to the construction and operation of buildings. While buildings represent a threat to the health of our planet, the reuse and greening of these structures also presents an enormous opportunity to reduce our nation's carbon emissions. Through improved energy efficiency and an increase in the use of renewable sources of energy at the Capitol Complex, the United States Senate has the opportunity to demonstrate to the American public the important role our older and historic buildings play in reducing carbon emissions.

Embodied Energy and Energy Use in Existing Buildings

Older and historic buildings are often not the energy hogs that many people assume. Data from the Department of Energy indicates that commercial buildings constructed before 1920 use less energy per square foot than buildings from any other decade up until 2000. A 1999 study by the General Services Administration found that utility costs in the GSA's inventory of historic buildings are about 27% less than in non-historic structures.

According to a formula produced for the Advisory Council on Historic Preservation, about 80 billion BTUs of energy are embodied in a typical 50,000-square-foot commercial building, the equivalent of about 640,000 gallons of gasoline. Tearing a building down, not only wastes this energy but more energy is required to construct a new building. The United Nations Energy Programme estimates that it takes 20 years of a building's 100 year operation to offset the expenditure of energy and materials in the construction.

The Carnegie Mellon Green Design Institute calculates the greenhouse gas emissions from renovation as 30 to 50 percent less than an equal investment in new construction at the same time 20 percent more jobs are created. The greenest building is one that already exists.

Holistic Evaluation, Implementation and Maintenance Plans are Key

Successful greening of existing buildings begins with the holistic evaluation of facilities through energy audits and "green teams" followed by a consistent strategy of implementation and maintenance. The most cost-effective energy use reduction is often achieved with many relatively small gestures such as efficient light bulbs, regular replacement of radiator steam traps, programmable controls, attic insulation and the standard repair of windows.

A holistic approach recognizes the interaction of multiple elements and addresses direct energy consumption within buildings in relationship to the larger environment. For example, reducing the heat islands in a campus or city and shading a building with trees and awnings lowers air conditioning requirements and may also limit glare and improve interior day-lighting.

The categories frequently used in evaluating the greening of buildings - sustainable sites, water efficiency, energy & atmosphere, materials & resources, and indoor environmental quality – are interwoven and have a far reaching impact on our carbon footprint. Reducing water use in a building decreases the energy needed elsewhere to process and transport water. Conversely, reducing energy use in buildings reduces the significant amounts of water used in energy plants and building chillers. The synergies of environmental stewardship are endless. As we create healthier places to live and work in walk-able communities rich in heritage we improve our quality of life and lower health care costs as an offshoot of reducing our carbon footprint.

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JEAN CARROON, FAIA
PRINCIPAL, GOODY CLANCY AND
NATIONAL TRUST FOR HISTORIC PRESERVATION SUSTAINABLE PRESERVATION COALITION MEMBER

Before the

COMMITTEE ON RULES AND ADMINISTRATION
UNITED STATES SENATE
HON. DIANNE FEINSTEIN, CHAIRMAN

Hearing on

IMPROVING ENERGY EFFICIENCY, INCREASING THE USE OF RENEWABLE SOURCES OF ENERGY, AND REDUCING THE CARBON FOOTPRINT OF THE CAPITOL COMPLEX

WEDNESDAY, JUNE 18, 2008
10:00 a.m.

Thank you for the opportunity to share the views and concerns of the National Trust for Historic Preservation regarding the potential for improving the energy efficiency and reducing the carbon footprint of the capitol complex. My name is Jean Carroon and I am the Principal for Historic Preservation with the design firm of Goody Clancy and a member of the National Trust for Historic Preservation's Sustainable Preservation Coalition.

Background of the National Trust

Congress chartered the National Trust in 1949 as a private nonprofit organization to "facilitate public participation" in historic preservation, and to further the historic preservation policies of the United States. 16 U.S.C. §§ 461,468. With the strong support of our 287,000 members around the country, the National Trust works to protect significant historic sites and to advocate for historic preservation as a fundamental value in programs and policies at all levels of government. In addition to our eight regional field offices throughout the country, and our Washington, DC headquarters, we have 29 diverse Historic Sites open to the public around the country.

Through improved energy efficiency and an increase in the use of renewable sources of energy at the Capitol Complex, the United States Senate has the opportunity to demonstrate to the American public the important role our older and historic buildings play in reducing carbon emissions. I would like to provide the Committee with some specific recommendations for accomplishing this.

Buildings and Climate Change

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In recent years, there has been much enthusiasm among architects, green building experts and environmentalists about reducing the environmental footprint of buildings – but the green building movement has been principally focused on greening *new* construction. While greening new buildings is undeniably an essential element of any effort to combat global warming, even construction of the greenest new building uses significant energy and other natural resources, thereby contributing to global warming.

We simply cannot build our way out of our environmental crisis, we must *conserve* our way out by making better, more efficient use of our existing buildings. The approximately 300 billion square feet of existing built space in the United State may well be our most significant renewable resource.

Embodied Energy and Energy Use in Older and Historic Buildings

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Possible Strategies for Reducing the Carbon Footprint of the Capitol Complex

Holistic evaluation and multiple interwoven actions as a strategy for energy reduction was recognized by the National Trust for Historic Preservation in 1981 with the publication of *New Energy from Old Buildings*[8] and is a central part of the education and holistic guidelines currently offered on the National Trust website and presented in the metric systems created by the U. S. Green Building Council. Strategies common to historic buildings include, but are not limited to:

- **Public Transportation:** The proximity of the Capitol Complex to a large Intermodal Transportation Hub and the incentive programs created for Senate employees to use public transportation, shared vehicles and bike racks sign can significantly reduce the impact of the Complex allowing for increased green space where cars might once have parked, a reduction in heat islands, a decrease in polluted storm run-off and increasing the potential shading of the buildings**.**
- **Green Roofs**: The flat roofs and even sloped roofs of many historic buildings often easily accept planted or green roofs which reduce storm water run-off, increase building insulation and lower the summer air temperature.
- **Solar Panels**: Historic buildings with metal and slate roofs can often accept solar panels without damaging the existing fabric. Placement can be discreet and the installations can be reversible.

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- **On Site Wind Generation**: Historic sites in Great Britain have taken advantage of new technologies in wind for an almost sculptural element carefully placed on sites with review of the supervising historic groups.
- **Awnings:** Once ever present on all buildings including the most historic, awnings, just like modern light shades, can be used to significantly reduce the solar gain. It is an application that is both reversible and renewable.
- **Interior storm windows:** Windows are a source of great tension between advocates of tight building envelopes and people that appreciate the durability, beauty and repairability of historic wood windows. Existing windows can be improved with good maintenance, interior storms windows and newly developed films that offer similar properties as low-e glass.
- **Lighting Strategies:** Evaluate existing lighting. Make sure it is appropriate to the space and task and only on when needed. Install occupancy sensors and daylighting sensors.
- **Office Equipment and other electronics:** Consider the efficiency of all electronics in the building and what the potentials for energy savings are – powering down and turning off computers, printers, copiers and vending machines.
- **Green Purchasing:** This includes Energy Star-qualified electronics and products used for cleaning, office supplies and in the kitchens and restrooms.
- **Water Conservation:** Modifying existing toilets and faucets to aerate water and limit the operating time of fixtures can reduce water use by 40 percent in existing facilities. Provide filtered water and NOT transported bottled water.
- **Improve Day-lighting:** Where retrofitting is possible, add skylights and movable glass partitions that bring light deep into a building and share it among spaces.
- **Increase Building Use Density:** Take advantage of unused and underutilized spaces by careful space planning and renovations. We calculate energy consumption by square foot without considering whether a building is fully and actively utilized.
- **Install Walkoff Mats and Clean Greening Plans**: Take advantage of new knowledge to decrease the amount of materials carried into a building and the utilization of green cleaning which by itself can significantly reduce the use of chemicals, paper and plastic trash bags.

The potential for greening an existing building and its operations is almost limitless and is an ongoing process of evaluation and change as new technologies, new tools and new information become available. Maintenance and the education and dedication of the facilities staff is absolutely essential, however the rewards for all are significant. The workplace is healthier and often more visually and physically comfortable. New documentation indicates significant increases in productivity and decreases in absenteeism. If implemented effectively, the multiple benefits of more environmentally sensitive O&M practices should also include reduced operating costs.

About the National Trust for Historic Preservation's Sustainability Initiative

The National Trust for Historic Preservation's Sustainability Initiative, which was launched in 2007, promotes the idea that existing buildings are the ultimate renewable resource, and are crucial to any effort to address climate change. Our work promotes the **reuse** of existing buildings, **reinvestment** in older and historic communities, and **retrofitting** older and historic

buildings to achieve energy efficiency. Finally, these principles of sustainable stewardship can be achieved with **respect** for historic fabric.

Building reuse

A sound older building that is abandoned, underused, or demolished is a wasted asset. Putting existing buildings to good use reduces demolition and construction waste and lessens the demand for energy and other resources for new building and materials. We are much too inclined to think of our buildings as disposable, rather than a renewable resource. A 2004 report from the Brookings Institution projects that by 2030 we will have demolished and replaced 82 billion square feet of our current building stock.

It will take as much energy to demolish and reconstruct 82 billion square feet of space (as predicted by the Brookings study) as it would to power the entire state of California – the 10th largest economy in the world with a population of about 36 million people – for 10 years. If we were to rehab even 10% of this 82 billion square feet, we would save enough energy to power the state of New York for well over a year. [9]

Construction debris accounts for 25% of the waste in the municipal waste stream each year. Demolishing 82 billion square feet of space will create enough debris to fill 2500 NFL stadiums.

Reinvestment in older and historic neighborhoods

Each year in the United States, we pave over or otherwise convert to human uses an area equal to the state of Delaware.[10] While sprawl is devouring our landscape, many neighborhoods in the inner city and the inner ring of suburbs are vastly underused. Revitalization of existing neighborhoods promotes efficient land-use patterns and focuses public and private reinvestments in areas where infrastructure is already in place, already paid for. Furthermore, older neighborhoods are typically compact, centrally located, walkable and mass-transit accessible – characteristics that are promoted by advocates of smart growth and the "new urbanism".

Nevertheless, many older buildings are badly in need of energy-efficiency upgrades. There are plenty of techniques and products on the market that make these upgrades much less challenging than they once were.

Respect for historic integrity

An increasing number of sensitive and successful rehabilitation projects demonstrate conclusively that historic buildings can go green without losing the distinctive character that makes them significant and appealing. Architects, developers and property owners do not have to choose between getting the energy-efficiency they want or keeping the character they love; they can have both.

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