Making the Case:
Historic Preservation as Sustainable Development

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Executive Summary:

In light of increasing concern about climate change, there is considerable interest in constructing new "green" buildings. These buildings are designed to be more energy efficient, make use of recycled materials, and incorporate other green technologies. Far less attention is given to the essential role of historic and other existing buildings in helping conserve energy and other natural resources. This paper examines the benefits of reusing existing building, and specifically how preservation promotes environmentally, economically, and socially sustainable development.

This paper is presented to facilitate discussion regarding the existing state of research in the intersecting fields of preservation and sustainable development. The National Trust for Historic Preservation, as the national nonprofit organization for preservation in the United States, is leading a national effort to develop both the research and the policies required to support the integration of historic preservation principles into the larger discussion of sustainability.

To advance this goal, in October 2007 the National Trust is convening national experts at a research retreat that will focus on the relationship between sustainability and preservation. The goals of the meeting are to identify major research questions regarding the preservation-sustainability link; pinpoint existing research and research gaps on this subject; develop a prioritized research agenda; and identify potential research partners and funders.

To this end, this paper discusses preservation within the context of sustainable development. After introducing the issue of sustainability in Section I, the subsequent three sections present arguments to make the case for the environmental, economic, and social benefits of preservation.

Section II: Environmental Sustainability:

This section explores the energy savings associated with preservation (projected using embodied energy calculations), the avoidance of additional environmental impacts (calculated using life-cycle analysis), the avoidance of generating waste through demolition, and the ability of preservation to curb sprawl. This portion of the paper also looks at two perceived environmental weaknesses of historic buildings – general operational efficiency, and heat loss through windows.

Section III: Economic Sustainability:

This section discusses the concept of economic sustainability. It argues that economic development and *sustainable* economic development are not synonymous, and that indicators for sustainable economic development are lacking. In the absence of reliable indicator, Section III identifies the general economic impacts of preservation, such as the "multiplier" effect of preservation and its ability to generate more jobs than new construction. The second half of this section looks at the economic impacts of preservation that potentially may be viewed as sustainable, such as increased economic growth with the reduced use of natural resources.

Section IV: Social Sustainability:

Section IV examines the idea of social sustainability, including social capital, equity, and cultural enrichment. This section argues that preservation is very successful in promoting some aspects of socially sustainable development, but that there are important limitations that must be addressed. For example, neighborhood revitalization can sometimes lead to the displacement of long-time residents, an anathema to sustainable communities.

The final section of this paper outlines the National Trust's plans to move forward with research, including efforts to develop research partnerships, obtain funding, and develop an infrastructure for disseminating findings.

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> "The perspective on stewardship of built heritage needs to shift to a presumption in favour of reuse. As it stands, the burden to demonstrate the case for preservation rests with groups of interested citizens, often seen as an elite. Currently, the challenge is to prove that an old building is so valuable that it ought to be saved; rather the owner/developer should be required to prove that an old building cannot be adapted to new use."
>
> *Exploring the Connection between Built and Natural Heritage. Heritage Canada Foundation.*[1]

I. Introduction:

With global climate change upon us, we are challenged to find a way of living that will ensure the longevity and health of our environmental, economic, and social resources. Since buildings are responsible for approximately 40% of carbon dioxide emissions each year in the United States, considerable focus has been placed on the construction of new green buildings.[2] Discussion about the importance of improving and re-using our existing building stock – and especially our historic buildings – is largely absent from conversations about climate change.

The National Trust for Historic Preservation initiated its Sustainability Initiative to help preservationists, environmentalists, policy makers, and the public understand preservation's value in fostering sustainable development. The concept of sustainability (defined and discussed more below) provides a holistic lens through which to evaluate the environmental, economic and social costs and benefits of changes to the built environment.

As part of its work under the Sustainability Initiative, the National Trust joined with several national organizations in 2006 to develop a national policy for the integration of sustainability and preservation. The National Trust for Historic Preservation is coordinating the activities of a coalition to develop a joint strategy for integrating the practices and principles of preservation into the green building movement. The organizations currently involved are the American Institute of Architects (AIA), the Association for Preservation Technology International (APT), the National Park Service (NPS), the National Trust for Historic Preservation (NTHP), the General Services Administration (GSA), and the National Conference of State Historic Preservation Officers (NCSHPO).

This paper was prepared in advance of a research retreat on preservation and sustainability hosted by the National Trust in October 2007. The retreat includes members of the aforementioned coalition, as well as academics, architects, representatives of government agencies, and others with expertise in the area of preservation and sustainability. This paper is intended to outline arguments that support the case that preservation is sustainable development, and to identify data and literature to substantiate these claims. While every effort has been made to identify major arguments and locate the most relevant sources, the subject of sustainability and historic preservation is vast, and the research and arguments presented here are by no means exhaustive. It is intended that this paper and the retreat will advance the conversation about what type of additional research is most needed, provide the groundwork for a prioritized research agenda that the National Trust will coordinate and implement, and help identify potential funders and research partners.

The paper is divided into five sections. Section I discusses the concept of sustainability, and ways of measuring progress towards meeting the goal of sustainable development. The very strength of sustainability as a concept is that it facilitates a holistic evaluation of the environmental, economic, and

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[1] Heritage Canada Foundation, *Exploring the Connection between Built and Natural Heritage.* Heritage Canada Foundation,[2006]), http://www.heritagecanada.org/eng/GreenReport2Eng-Read.pd (accessed June 4, 2007).

[2] Pew Center on Global Climate Change, *Building Solutions to Climate Change*, [2006]), http://www.pewclimate.org/docUploads/Buildings%2DInBrief%2Epdf (accessed April 21, 2007).

social costs and benefits of development. It may therefore strike some readers as odd that the issues of environmental, economic and social sustainability of historic preservation are examined separately in this paper. For the task at hand, however – identifying <u>specific</u> arguments and supporting research that makes the case that preservation is sustainable development – it seemed best to approach separately each of the three aspects of sustainability.

As such, Section II addresses environmental sustainability, Section III addresses economic sustainability, and Section IV addresses social sustainability. Arguments in support of the preservation-sustainability link are presented in each section, and followed with supporting data or narrative. Each of these three sections concludes with suggestions for further discussion and/or research. Conclusions are offered in Section V.

I. Defining Sustainability

The most widely accepted definition of sustainability is that offered by the U.N. Bruntland Commission's 1987 report, *Our Common Future*, which defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[3] Increasingly, three separate but interrelated tenets of sustainability are recognized, including environmental, economic, and social sustainability.

While the Bruntland definition is widely used, there is little agreement about what constitutes development that supports "ability of future generations to meet their own needs." Since the UN report's release in the late 1980s, a number of industrialized countries have made progress in developing goals and indicators to measure efforts to achieve sustainable development. While progress in this area in the United States has lagged behind other industrialized nations in recent years, a national effort to develop a framework for describing and measuring sustainability in this country was undertaken during the Clinton Administration.

The President's Council established 10 goals for achieving more sustainable development and developed indicators to help measure progress toward achieving sustainability.[4] Of the 10 goals, seven are especially relevant to the discussion about preservation as a driver for sustainable development. These goals are listed in Appendix 1, and will be relied upon in this paper to serve as a framework for discussion about the relationship between sustainable development and historic preservation.

II. Preservation and Environmental Sustainability

In order to confirm that preservation promotes sustainable development vis-à-vis the environment, it must be demonstrated that the reuse of buildings successfully reduces pollution and promotes the conservation of nature. (See goals 1 and 4 of the President's Council on Sustainable Development.) Wayne Trusty, President of the Athena Institute in Canada, notes "while it may seem intuitively obvious that retaining and renovating older buildings has environmental merit, the case is difficult to prove without access to the appropriate data and tools."[5] This section surveys the data and tools that have been used to support the claim that historic preservation is environmentally friendly.

This section looks at the energy savings associated with preservation (projected using embodied energy calculations), the avoidance of additional environmental impacts (calculated using life-cycle analysis), the avoidance of generating waste through demolition, and the ability of preservation to curb

3 Brundtland, Gro Harlem and World Commission on Environment and Development, *Report of the World Commission on Environment and Development: "Our Common Future."* [1987]).

4 President's Council on Sustainable Development, *Sustainable America: A New Consensus for the Prosperity, Opportunity and Healthy Environment for the Future* (Washington, DC: [1996]), http://clinton4.nara.gov/PCSD/Publications/TF_Reports/amer-top.html (accessed October 12, 2007).

5 Wayne Trusty, *Renovating vs. Building New: The Environmental Merits*, [200?]), http://athenasmi.ca/publications/docs/OECD_paper.pdf (accessed October 12, 2007), pg. 5.

sprawl. The section also looks at two perceived environmental weaknesses of historic buildings– general operational efficiency, and heat loss through windows.

A. The Environmental Benefits of Building Rehabilitation

1. Embodied Energy

Conserving buildings preserves embodied energy, and reduces the need for new materials. In the 1970s, the National Trust and the Advisory Council on Historic Preservation developed calculations for measuring the embodied energy in buildings based on square footage and building types. While embodied energy have not been updated, they remain a useful tool for calculating the considerable energy embodied in existing buildings.

Embodied energy is defined as the amount of energy associated with extracting, processing, manufacturing, transporting and assembling building materials. During the energy crisis of the late 1970s and early 1980s, preservationists promoted the idea that preserving buildings is inherently energy efficient, because it reduces demand for new resources, reduces waste from demolition and construction, and preserves the energy embodied in an existing building. To aid in this effort, the Advisory Council on Historic Preservation commissioned a study on the subject of energy conservation and historic preservation. The Council commissioned a study of the following:

1. Energy already existing in structures to be rehabilitated;
2. Energy needed for construction and rehabilitation;
3. Energy needed for demolition and preparation of a construction site; and
4. Energy needed to operate a rehabilitated or newly constructed buildings.[6]

The goal of the study was to produce formulas for each of the four requirements outlined above so that these calculations could be applied to any project to quantify the energy saved by building conservation and rehabilitation. The Consulting firm of Booz, Allen & Hamilton was selected to perform the research.[7]

Three case studies were included in the final report, including Grand Central Arcade in Seattle's Pioneer Square. The report concluded that that the Arcade embodied 17 billion BTUs (British Thermal Units of energy), and that a new building of equivalent size would require 109 billion BTUs to construct. Preserving the Arcade would result in an energy savings of 92 billion BTUs, or 730,000 gallons of gasoline – "enough to power 250 automobiles for 60,000 miles." [8]

Current usefulness of Booz, Allen & Hamilton Research

Booz, Allen & Hamilton conclude that in all of the selected case studies, preservation is more energy efficient than demolition and reconstruction. The calculations presented in this study were based on embodied energy data produced by Richard Stein in the 1970s. While these numbers have not been updated, Mike Jackson, Chief Architect of the Preservation Services Division of the Illinois Historic Preservation Agency, calls Stein's work "still the most thorough evaluation of the embodied energy of building materials that has been produced in the U.S." [9]

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[6] Calvin W. Carter, "Assessing Energy Conservation Benefits: A Study" In *New Energy from Old Buildings* (Washington, D.C.: National Trust for Historic Preservation, 1981).pg. 103-104

[7] The final report from Booz, Allen & Hamilton was: Advisory Council on Historic Preservation, *Assessing the Energy Conservation Benefits of Historic Preservation: Methods and Examples* (Washington, DC: 1979).

[8] Ibid., pg. 106

[9] Mike Jackson, "Embodied Energy and Historic Preservation: A Needed Reassessment," *APT* 38, no. 4 (2005), 45-52.

Yet in his recent research, Jackson notes that the energy embodied in buildings is often viewed as insignificant by green building advocates. Over a typical building's life time, embodied energy amounts for approximately 16% of a building's total life cycle energy consumption; in contrast, 74% of energy use is attributed to building operations (see Figure 1). Thus, there is the common misperception that energy wasted in building demolition and reconstruction is quickly recovered in building operations.[10]

However, through a series of calculations, Jackson demonstrates that new buildings' life span must reach 26 years to save more energy than the continued use of an existing building. As building energy efficiency increases, embodied energy consumes an even larger proportion of life cycle energy consumption. Jackson finds that **if a building were demolished and partially salvaged and replaced with a new energy efficient building, it would take 65 years to recover the energy lost in demolishing a building and reconstructing a new structure in its place.** That is longer than many modern buildings survive. [11]

Current Embodied Energy Calculations

The Athena Institute is a leader in developing software for life cycle assessment in buildings. The tools developed by the Athena Institute will be discussed in further detail under the life cycle assessment section below. Relevant to this discussion, current embodied energy data for North America is incorporated into the models developed by Athena. However, this data is embedded in software, and is not easily used to measure the embodied energy of historic buildings.

Research efforts have not yielded new calculations by the square foot, and the numbers developed by Booz, Allen & Hamilton in the 1970s still provide the simplest means of calculating embodied energy per square foot. Given the sophistication of life cycle assessment tools that are now available, embodied energy may be an outmoded method for capturing the environmental benefits of historic preservation. The following section will examine how Life Cycle Assessment has been used to measure the merits of rehabilitation versus new construction, and provides a much more comprehensive means of understanding the environmental impacts of building renovation and construction.

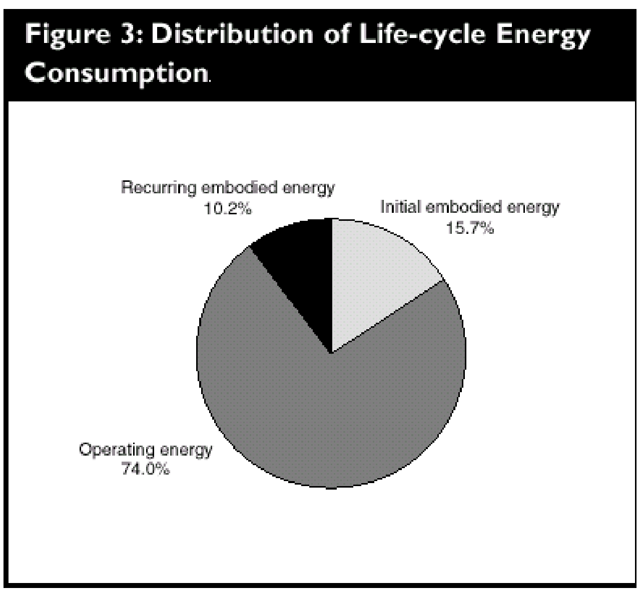

Figure 1: Life Cycle Energy Consumption
Source: The Athena Institute

[10] Mike Jackson, "Embodied and Operating Energy: Balancing the Eco Equation - Presentation " (St. Paul, MN, October 5, 2007.
[11] Ibid.

2. Life Cycle Assessment

Life Cycle Assessment: Life cycle assessment reveals that retaining and rehabilitating buildings is more environmentally friendly than new construction. The Canada based Athena Institute has developed a life cycle assessment tool that helps illustrate the numerous environmental merits of building conservation

According to Canadian Architect, "the internationally accepted method for evaluating the environmental effects of buildings and their materials is life cycle assessment (LCA)."[12] This process evaluates the direct and indirect environmental impacts associated with a building. Life cycle assessment quantifies energy and material usage and environmental releases at each stage of a product's life cycle, including extraction of resources, manufacturing of goods, construction, use, and disposal.

LCA is considered superior to other forms of environmental assessment because it examines impacts during a building's entire life, rather than focusing on environmental impacts at a particular stage. And unlike embodied energy calculations, LCA provides an assessment of environmental impacts such as carbon emissions and air pollution, thereby providing a more comprehensive understanding of a building's impacts. Table 1 is taken directly from the EPA's report "Life Cycle Assessment: Principles and Practice", and provides a list of environmental impacts, such as global warming potential, land use, and water use.[13] While not listed on the EPA's chart, life cycle assessments sometimes also include the energy embodied in materials used to construct buildings.

Most LCA methods do not take into account each of the categories outlined by the EPA, but instead make evaluations based on several of these indicators. Indeed, part of the challenge of LCA is that there is little consensus on which indicators should be used in LCA models. There also can be difficulty in interpreting the results of life cycle assessments because of the lack of benchmarks. For example, there are no established standards for the limits of acceptable green house emissions for the construction of a single family home.[14] The current utility of LCA is in the comparison of one building design to another – as would be the case in comparing the environmental impacts of rehabilitating an existing building to constructing a new building.

Table 1: Commonly Used Life Cycle Impact Categories

Impact Category	**Scale**	**Examples of LCI Data (i.e. classification)**	**Common Characterization Factor**	**Description of Characterization Factor**
Global Warming	Global	Carbon Dioxide (CO2) Nitrogen Dioxide (NO2) Methane (CH4) Chlorofluorocarbons (CFCs) Hydrochlorofluorocarbons (HCFCs) Methyl Bromide (CH3Br)	Global Warming Potential	Converts LCI data to carbon dioxide (CO2) equivalents Note: global warming potentials can be 50, 100, or 500 year potentials.

[12] Canadian Architect, "Measures of Sustainability," http://www.canadianarchitect.com/asf/perspectives_sustainibility/measures_of_sustainablity/measures_of_sustainablity_intro.htm (accessed June 7, 2007).

[13] Scientific Application International Corporation, *Life Cycle Assessment: Principles and Practice* (Cincinnati, Ohio: U.S. Environmental Protection Agency, [2006]), http://www.epa.gov/ORD/NRMRL/lcaccess/pdfs/600r06060.pdf (accessed October 12, 2007), pg. 49.

[14] See Joyce Smith Cooper, "Life-Cycle Assessment and Sustainable Development Indicators," *Journal of Industrial Ecology* 7, no. 1 (2003), 12-15. and Wim Dewulf and Joost Duflou, "Simplifying LCA using Indicator Approaches - A Framework," *CIRP Seminar on Life Cycle Engineering* (May, 2003).

Table 1: Commonly Used Life Cycle Impact Categories - Continued

Stratospheric Ozone Depletion	Global	Chlorofluorocarbons (CFCs) Hydrochlorofluorocarbons (HCFCs) Halons Methyl Bromide (CH3Br)	Ozone Depleting Potential	Converts LCI data to trichlorofluoromethane (CFC-11) equivalents.
Acidification	Regional Local	Sulfur Oxides (SOx) Nitrogen Oxides (NOx) Hydrochloric Acid (HCL) Hydroflouric Acid (HF) Ammonia (NH4)	Acidification Potential	Converts LCI data to hydrogen (H+) ion equivalents.
Eutrophication	Local	Phosphate (PO4) Nitrogen Oxide (NO) Nitrogen Dioxide (NO2) Nitrates Ammonia (NH4)	Eutrophication Potential	Converts LCI data to phosphate (PO4) equivalents.
Photochemical Smog	Local	Non-methane hydrocarbon (NMHC)	Photochemical Oxident Creation Potential	Converts LCI data to ethane (C2H6) equivalents.
Terrestrial Toxicity	Local	Toxic chemicals with a reported lethal concentration to rodents	LC50	Converts LC50 data to equivalents; uses multi-media modeling, exposure pathways.
Aquatic Toxicity	Local	Toxic chemicals with a reported lethal concentration to fish	LC50	Converts LC50 data to equivalents; uses multi-media modeling, exposure pathways.
Human Health	Global Regional Local	Total releases to air, water, and soil.	LC50	Converts LC50 data to equivalents; uses multi-media modeling, exposure pathways.
Resource Depletion	Global Regional Local	Quantity of minerals used Quantity of fossil fuels used	Resource Depletion Potential	Converts LCI data to a ratio of quantity of resource used versus quantity of resource left in reserve.
Land Use	Global Regional Local	Quantity disposed of in a landfill or other land modifications	Land Availability	Converts mass of solid waste into volume using an estimated density.
Water Use	Regional Local	Water used or consumed	Water Shortage Potential	Converts LCI data to a ratio of quantity of water used versus quantity of resource left in reserve.

The Athena Institute's Environmental Impact Estimator

The Athena Institute is one of the leading developers of LCA software in North America. The Athena software measures the following environmental impacts associated with building construction and demolition:

- Embodied primary energy use
- Global warming potential
- Solid waste emissions
- Pollutants to air
- Pollutants to water
- Natural resource use

In *Renovating vs. Building New: The Environmental Merits*, Wayne Trusty, President of the Athena Institute, discusses the application of Athena's Environmental Impact Estimator software to compare the environmental costs of renovation versus new construction. He explains the importance of looking at a variety of indicators to understand a building's environmental impact.

> "In the case of buildings, the energy required to operate a building over its life greatly overshadows the energy attributed to the products used in its construction. *However, for other embodied effects such as toxic releases to water, effects during the resource extraction and manufacturing stages greatly outweigh any release associated with building operations***.** The essence of LCA is to cast a wide net and capture all of the relevant effects associated with a product or process over its full life cycle."[15] (italics added)

According to Athena, the software is capable of modeling the structure and envelope systems for approximately 95% of the building stock in North America. It simulates more than 1000 different assemblies, and allows the user to choose from 90 structural and envelope materials. The Athena software also accounts for the energy expended and waste generated during building demolition, as well as transportation costs for disposing of materials.[16]

Trusty suggests two approaches to modeling rehabilitation using the Environmental Impact Estimator: "Benchmarking" and "Impact Avoidance."

<u>Benchmarking:</u> Under this technique, the user develops a profile of effects associated with partial demolition of an existing structure, replacement materials, and new construction of specific building elements. This would then be compared to the construction of an entirely new structure. The new building serves as a benchmark for renovation, and allows users to determine the environmental impact of building re-use relative to new construction.[17]

<u>Impact Avoidance:</u> The second approach estimates the environmental effects that are avoided by rehabilitating a building. In most rehabilitations, a structural system is retained, while parts of the building envelope are replaced. "To assess the environmental benefits or costs of a decision to renovate," Trusty explains, "we can define "environmental impact avoidance scenarios" by focusing on the environmental effects of replacing those structural and envelope systems that are actually saved."[18]

Applying Athena's Environmental Impact Estimator to Heritage Buildings

A recent study by Dian Ross with the University of Victoria uses the Athena software to perform three separate life cycle analysis for the Emily Carr House in Victoria, British Columbia, a publicly owned heritage building.[19] The house was constructed in 1867, and is one of the oldest homes in Victoria. Three different scenarios were run using the Athena Environmental Impact Assessment Tool. Scenario 1

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[15] Trusty, *Renovating Vs. Building New: The Environmental Merits, pg. 3.*
[16] Ibid.
[17] Ibid., pg. 3-4.
[18] Ibid., pg. 3-4.
[19] Dian Ross, "Life Cycle Assessment in Heritage Buildings" (Work Term Report, Victoria, British Columbia, 2007).

is an evaluation of the embodied energy in the Carr House and in a hypothetical replacement house. Scenario 2 is a comparison of the life cycles of the two buildings, and Scenario 3 assesses the environmental impacts associated with demolition of the Carr House and replacement with a new home.

Scenario 1 compares the materials that would have been required to construct the Emily Carr home in the mid 19th century with the materials that used in conventional home construction today. The study concluded that the carbon dioxide emissions for the new house were approximately double the emissions original Carr House**.** Ross notes that the results "are likely due to the fact that modern building materials in general require more energy to refine and process." .[20] It should be noted that the estimation of the energy required to build the original Carr home is based on the energy the materials would require today. It is difficult to account for the energy required to manufacture building materials a century or more ago

Scenario 2 compares the life cycles of the original Carr House with a hypothetical new home. Ross estimates that the life span of the original home is 300 years, but the life span of the new home is set to 50 years, "reflecting the more frequent tearing down and rebuilding of modern residential sites."[21] The purpose of this assessment is to compare the energy consumption and emissions for the two buildings. Lifetime operating energy accounts for approximately 83% of energy use over the original home's 300 year life span. Total air emissions for the life cycle of the original building are 602,125 kg of carbon dioxide. The hypothetical new home emits about 89,907 kg of carbon over its life span of 50 years – about 15.3% of the total emissions of the original Emily Carr home. However, annual emissions for the hypothetical new house are 1,938 kg per year, while the original Carr house is about 1,672 kg per year. "Therefore, in terms of years of service, the original Emily Carr House has a smaller carbon dioxide footprint than the hypothetical house."[22]

Scenario 3 assumes that the original Carr House is demolished today and replaced with a new home. It concludes that the "Hypothetical House consumes more energy in its construction, and at a substantially higher environmental costs than the Original house. These results demonstrate that embodied energy has a significant and important role in the analysis of energy consumption and emissions. Operating cost comparisons alone do not fully consider the environmental impact of demolition and new construction."[23]

The report offers the following recommendations:

- More traditional building materials should be available in the Athena software.. Users should be able to select materials common to historic buildings, such as marble and plaster.
- Building code values should not be pre-supposed for building elements such as joists, since most historic buildings do not conform to modern codes.
- The model should incorporate alternatives to window replacement, such as the use of storm windows.[24]

Ross' research is one of the most comprehensive studies available to date that uses LCA software to compare the environmental costs of rehabilitation and new construction. While the findings are favorable for preservation, there are some crucial assumptions made in the research that call its conclusions into question. Most significantly, the study assumes a 50 year life span for new buildings and 300 year life span for historic buildings. Even a slightly longer life span for the new building, or a slightly shorter life span for the older building, could yield substantially different findings.

[20] Ibid., pg. 20
[21] Ibid., pg. 56
[22] Ibid.
[23] Ibid., pg. 85
[24] Ibid., pg. 86

Ross' work demonstrates the need for additional research in this area, including the potential refinement of LCA tools for modeling rehabilitation. Research is also needed across a variety of different building types, including commercial and institutional buildings.

3. Waste Generation

Waste Generation: Preserving buildings reduces waste in landfills. Demolition of housing produces an average of 115 lbs of waste per square foot, while demolition of commercial buildings generates approximately 155 lbs of waste per square foot.

Tremendous waste is generated as a result of building demolition. The EPA estimates that 136 million tons of building-related construction and demolition (C & D) debris was generated in the United States in 1996. By 2003, C & D waste was estimated to be 325 million tons – almost a 250% increase in just seven years. Annual construction and demolition debris accounts for roughly 24% of the municipal solid waste stream.[25]

The EPA estimates that 115 lbs of waste is generated per square foot for residential demolition, and the demolition of non-residential buildings results in approximately 155 lbs of waste per square foot. Thus, the demolition of a 2000 square foot home would result in 230,000 lbs of waste. Since approximately 245,000 homes are demolished each year, it is estimated that 19.7 million tons of waste is generated by the demolition of these homes. The EPA estimates that the demolition of commercial buildings generated 45.1 million tons of waste in 1994.[26]

4. Sprawl

Preservation reduces sprawl. In encouraging the continued use and revitalization of our existing community, preservation reduces pressure for development on the urban fringe, and thereby reduce accompanying environmental impacts of sprawl, such as loss of natural habitat, increased reliance on automobiles, and development of environmentally and economically costly infrastructure.

The means of quantifying the environmental merits identified above – such as through embodied energy calculations and life cycle assessment – help to illustrate the environmental impacts of destroying existing buildings and rebuilding. Yet one of the single most important arguments for the environmental sustainability of preservation is not captured in any of these calculations. In advocating the reuse of buildings and revitalizing communities, historic preservation discourages sprawl and reduces the associated negative environmental impacts.

By encouraging the revitalization of existing neighborhoods, historic preservation promotes efficient land use patterns that focus public and private infrastructure investments in established urban areas where substantial past investments have already been made. Because historic neighborhoods are typically walkable and mass transit-accessible, they also decrease dependence on automobiles, which thereby reduces pollution and our dependence on fossil fuels.

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[25] Franklin Associates, *Characterization of Building-Related Construction and Demolition Debris in the United States* (Washington, D.C: U.S. Environmental Protection Agency,[1998]), http://www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf (accessed October 12, 2007), pg. 2-6 and 2-7.

[26] Ibid.

B. Perceived Environmental Weaknesses of Historic Buildings

5. General Operating Efficiency

It is often alleged that historic building are energy hogs, and therefore should be demolished rather than rehabilitated. **In fact, some historic buildings are more energy efficient than more recently constructed buildings.** While some historic buildings may indeed perform poorly, data suggests that many outperform modern buildings. Numerous green rehabilitations of historic buildings also prove that where building energy performance is lacking, it can be improved in a way that is sensitive to historic fabric.

Operations are estimated to account for about 85% of a building's total energy use over time. There is widespread perception that historic buildings are "energy-hogs," and are far less efficient than more recently constructed buildings. It has been argued that since embodied energy represents a relatively small proportion of a building's total energy use – around 15% – the demolition of a historic building and replacement with a new and greener building is justified because of the improved operational performance of new buildings.

Despite conventional thinking that older buildings are inefficient, there is at least some evidence that calls that belief into question. 2003 data from the U.S. Energy Information Agency suggests that buildings constructed before 1920 are actually more energy efficient than buildings built at any time afterwards – except for those built after 2000. Even then, the improved performance of new construction is marginal.[27]

Average annual energy consumption Btu/sq. ft
Commercial Buildings (non malls)

Before 1920	80,127
1920 – 1945	90,234
1946 – 1959	80,198
1960 – 1969	90,976
1970 – 1979	94,968
1980 – 1989	100,077
1990 – 1999	88,834
2000 – 2003	79,703

As Mike Jackson with the Illinois Historic Preservation Agency notes, this data suggests that only in the last ten years have we constructed buildings that are more efficient than those constructed prior to 1920. Unfortunately, comparable data for the residential sector is not readily available.[28]

Despite the 2003 data suggesting the overall efficiency of pre-1920 buildings, there are undoubtedly instances in which historic buildings do not use energy efficiently. Elaine Adams with the General Service Administration has noted that alterations made to many historic buildings, particularly commercial buildings, actually have made them energy inefficient.[29] Appendix 2 provides a flow chart that demonstrates the typical destructive changes to commercial buildings over time.

Based on a survey of the literature, however, the extent of energy efficiency in historic housing and commercial buildings is not well quantified. Different climates, construction methods, and renovations make it difficult to generalize about the performance of historic buildings compared to more recent construction. Because of the absence of a more comprehensive analysis of historic building

[27] U.S. Energy Information Agency, 2003.
[28] Mike Jackson, Personal e-mail communication, August 15, 2007.
[29] This chart was created by Elaine Gallagher Adams, AIA LEED APN, formerly wit the GSA's Denver office.

performance, an analysis of case studies is likely more useful in assessing the performance of historic buildings, and their potential for improved energy efficiency.

6. Windows

There is a common perception that windows are a major source of heat loss and gain. **Yet retaining historic windows is often more environmentally friendly than replacement with new thermally resistant windows.** Government data suggests that windows are responsible for only 10% of air infiltration in the average home. Furthermore, a 1996 study finds that the performance of updated historic windows is in fact comparable to new windows. Window retention also preserves embodied energy, and reduces demand for environmentally costly new windows, typically constructed of vinyl or aluminum.

There are few issues as contentious as windows in the preservation realm – preservationist tend to want to keep them, while green building advocates typically favor replacement with modern thermally insulated units. There is the widespread perception that air leakage through windows is responsible for the majority of heat gain or loss in historic buildings. Yet information from the U.S. Department of Energy indicates that windows are responsible for only 10% of air escape in the average American home. Floors, ceiling and walls are responsible for 31% of heat loss and gain, while ducts and fireplaces are each responsible for about 15% of heat loss and gain. [30] See Figure 2.

A 1996 study by the State of Vermont indicates that repairing and insulating historic windows is nearly as effective in reducing energy costs as the installation replacement windows. The Vermont study field tested the performance of 151 windows in northern and central Vermont in multifamily and single family residences. Sixty-four of these windows were in original condition, while 87 were upgraded in some way.[31] The findings of the report are as follows:

> • Window upgrades using existing sash can achieve performance indistinguishable from replacement sash but economics of the upgrade depend on the leakiness of the original window.
>
> • If the existing window is loose, it can often be cost-effective to address this leakage, including air leakage between the window and rough opening as well as between an exterior storm window and trim. If the window is already in typical or tight condition, an upgrade is unlikely to be cost-effective regardless of the cost-benefit test used.
>
> • If the windows have single glass, it is worthwhile considering installing a second layer, including the options of storm windows, replacement insulated glass units, energy panels and use of Iow-emissivity glass (Iow-E).[32]

While the Vermont study is one of the most comprehensive in its approach to understanding the energy savings related to window replacement, the study was limited to one geographic area. Replication of the study in more temperate and hot climates would be useful to determine whether research findings hold in all climate types.

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[30] US Department of Energy, "Energy Savers: Tips on Saving Energy and Money at Home," http://www1.eere.energy.gov/consumer/tips/air_leaks.html (accessed Oct 12, 2007).

[31] Brad James and others, *Testing the Energy Performance of Wood Windows in Cold Climates: A Report to the State of Vermont Division for Historic Preservation and the Agency of Commerce and Community Development* (Burlington, VT: ,[1996]), pg. iv.

[32] Ibid.

Further research is also needed to study the performance of historic windows in commercial buildings, as well as in mid-century buildings

Mid Century Modern Buildings

The findings about the relatively low levels of thermal loss through windows and the comparability of wood windows to new windows are especially true about traditional historic windows in buildings constructed prior to 1920. But these findings do not typically hold for mid-century buildings. Many of these windows and/or curtain wall systems were experimental, and *most* of the energy loss in these buildings is attributed to the curtain wall system.[33]

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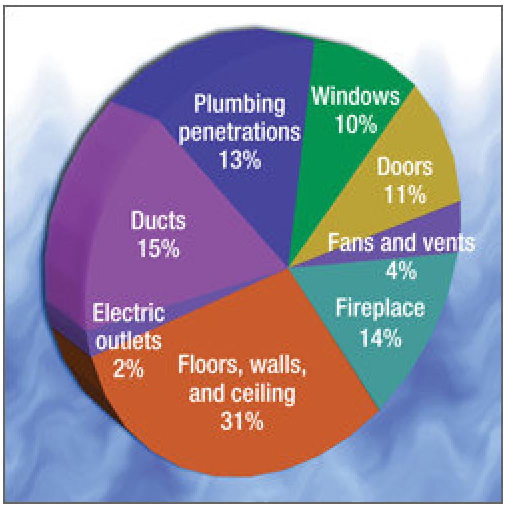

Figure 2: Energy Loss in the Average Home
Source: U.S. Department of Energy

Life Cycle Costs of Window Replacement

The Vermont study does not address life cycle costs associated with window replacement, and looks only at energy performance of original windows and various upgrades. Yet the life cycle cost of replacement windows – in particular vinyl and aluminum windows – is an important consideration. In their 2005 piece *What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows*, Architects Walter Sedovic and Jill Gotthelf highlight their LCA related concerns. Sedovic and Gotthelf question the validity of claims that replacement windows are more energy efficient, arguing that this represents a very limited approach to understanding the total energy cost of a particular element of a building.[34]

While Sedovic and Gotthelf do not speak to the issue of LCA specifically, they point out that the promotion of replacement windows over the retention of existing fabric ignores the following important environmental factors:

• Maintaining an existing window preserves the embodied energy in the building element. It further eliminates the need to expend energy on replacement windows, which are typically made

[33] Architect Carl Elefante of Quinn Evans Architects in Washington D.C. has done modeling to demonstrate the energy use of the AIA's Headquarters in Washington D.C. This modeling is an example of the energy inefficiency of a mid-century building.

[34] Sedovic, Walter and Jill Gotthelf, "What Replacement Windows can't Replace: The Real Cost of Removing Historic Windows," *APT* 36, no. 4 (2005).

of aluminum and vinyl – two materials that have some of the highest embodied energy values of any building material.
• Preserving windows reduces landfill waste.
• Manufacturing new windows that are made of vinyl or aluminum is energy intensive, and toxic for the environment.
• Replacement windows are not easily maintained or conserved. Manufacturing processes for these products makes them difficult to repair, and often necessitate their complete replacement.
• Vinyl, fiberglass, sealants, desiccants, and coating systems all degrade , and are not easily recycled or repaired.
• Manufacture's warranties for replacement windows are typically two to ten years, and have far shorter expected service lives than historic windows.[35]

Life cycle assessment of replacement and historic windows is likely to yield a convincing case for the preservation of existing windows. To date, a study performing a LCA for windows has not been found.

Preliminary Recommendations – Environmental Research

- Develop a new easy-to-use LCA tool: Given that LCA presents a much more comprehensive means of evaluating the merits of rehabilitation than embodied energy calculations, we should pursue development of an easy-to-use LCA tool that would allow comparison of rehabilitation to new construction Embodied energy could be a component of this tool, as it is in the Athena software.
- Conduct window studies in a variety of climates: The Vermont Study is one of the most comprehensive in its approach to understanding the energy savings related to window replacement. Nonetheless, the research is limited to one geographic area. Replication of the study in more temperate and hot climates would be useful to determine whether research findings hold in all climate types.
- .Conduct a life cycle assessment comparison of window repair vs. use of new vinyl or aluminum replacements: Sedovic and Gotthelf's 2005 article raise important question regarding the life cycle costs of window replacement. The energy costs and environmental impacts associated with manufacturing vinyl and aluminum replacement windows likely far outweigh an energy savings gained through improvements in a building's energy efficiency. A life cycle assessment study should be undertaken to demonstrate these benefits.
- Case studies should be gathered and synthesized to demonstrate the most effective means of improving energy performance. Case studies from a variety of building types should be considered, including residential and commercial, and buildings constructed pre and post World War II.

III. Preservation and Economic Sustainability

There is extensive evidence that historic preservation supports economic development, as best documented in *Economics and Historic Preservation: A Guide and Review of the Literature* by Randall Mason, Associate Professor of Architecture at the University of Pennsylvania. Mason outlines the various types of economic studies that have been undertaken, including basic cost studies, economic impact studies, and case studies. He concludes that these studies "present convincing evidence that 'preservation pays' (or can pay) when viewed simply in economic terms."[36]

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[35] Ibid., pg. 27.
[36] Randall Mason, *Economics and Historic Preservation: A Guide and Review of the Literature* (Washington, DC: The Brookings Institution,[2005]), http://www.brookings.edu/reports/2005/09metropolitanpolicy_mason.aspx (accessed October 10, 2007), pg. 10.

But there are two challenges central to the discussion about preservation as a driver for economically sustainable growth. First, as Mason notes, "the economics of preservation is an embryonic field compared with research in other economic disciplines, and the research is currently weighted heavily toward advocacy." The research infrastructure that exists for other elements of the field, including material conservation, is extensive. There is comparatively little research infrastructure to support research on the economic or social value of historic preservation.[37]

The second challenge is that while we can say that existing research suggests that historic preservation generates economic development, it does not necessarily follow that preservation promotes *sustainable* economic development. There is little clarity with regard to what constitutes sustainable economic growth. For example, the President's Council on Sustainable Development does not articulate the difference between sustainable and unsustainable growth; the indicators outlined by the group do not differ from any that would be used to measure economic development. When these economic indicators are considered with those provided for environmental and social goals, however, economic goals are clearly designed to promote development that respects the limits of the ecosystems on which it depends. But what are the limits of the ecosystem?

This is a question that is not easily answered – and one that will not be attempted in this paper. Instead, this review of existing literature will focus on preservation as a driver of general economic development and its ability to promote local jobs. The second half of this review articulates preservation's role in promoting development that can be viewed as sustainable. Arguments in this section require further research and development.

A. Preservation as a Driver of General Economic Growth

7. Economic Development:

Historic Preservation spurs economic development. Numerous studies indicate that preservation serves as a catalyst for additional investment in communities.

In their 1998 research on the economic impacts of historic preservation, David Listokin, Barbara Listokin, and Michael Lahr note that "the direct benefits associated with historic preservation, such as enhanced rehabilitation and heritage tourism spending, have advantageous multiplier effects." [38] These multiplier effects are divided into two categories: indirect and induced economic benefits. Indirect benefits are attributed to spending on goods and services by industries that produce the items purchased for a historic preservation activity. The induced impacts are created by the workers who are involved with a rehabilitation project (either directly or indirectly) and spend money on goods and services. As an example of this multiplier effect, the National Historic Rehabilitation Tax Credit certified investment was $688 million in fiscal year 1997. The authors' research finds that this $688 million investment generated $762 million in income and $319 million in taxes.[39]

The multiplier effect is documented extensively in other impact studies, such as those for Florida, New Jersey and Colorado. As an example, a study of the economic impacts of preservation in Georgia concludes that "in the final analysis, the economic impacts of preservation…are greater and more far-reaching than first imagined. Preservation does not operate within its own isolated sphere, but touches many areas of the local economy, and affects different sectors of community life. It touches finance, real estate and government. It affects retailing, employment and tourism. It impacts the mayor, the merchant and the homeowner."[40]

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[37] Ibid., pg 1-2.
[38] David Listokin, Barbara Listokin and Michael Lahr, "the Contributions of Historic Preservation to Housing and Economic Development," *Housing Policy Debate* 9, no. 3 (1998), pg. 456.
[39] Ibid.
[40] Donovan Rypkema, *The Economics of Historic Preservation: A Community Leader's Guide* (Washington, D.C.: National Trust for Historic Preservation,[2005]), pg. 23.

The success of the National Trust for Historic Preservation's Main Street program supports the idea that preservation is a powerful economic tool. The Main Street Program is built on four points that promote community revitalization: community participation and organization; promotion of a designated area through advertising, retail promotional activity, special events, and marketing campaigns; design to enhance the community's strong features such as historic buildings and pedestrian friendly streets; and strengthening and diversifying the area's existing commercial base.

In the 25 years since the program began, the collective economic impact of local Main Street programs to date has yielded $18.3 billion in total reinvestment, 244,545 net gain in jobs, created 60,500 businesses, and rehabilitated 96,283 buildings. [41]

8. Job Creation

Dollar for dollar, preservation creates more jobs than new construction. Several studies and an economic input-output model developed by Carnegie Mellon University demonstrate that preservation activities create more jobs than new construction.

Research indicates that dollar for dollar, the rehabilitation of historic buildings generates more employment than new construction. 1998 research found that $1 million in historic preservation activity creates about 38 jobs, while $1 million in new construction of non-residential structures creates 36 jobs. The same investment yields $1.7 million in GDP for preservation, and $1.6 million for new construction.[42] The claim that rehabilitation activities create more jobs than new construction is also supported by data from Carnegie Mellon's Economic Input-Output Life Cycle Analysis tool – but this model finds that overall job generation (for either rehabilitation or new construction) is much more modest. The CMU model finds that $1 million of new commercial construction is expected to generate 10 jobs and $2 million of economic development, while $1 million of rehabilitation work on creates nearly 12 jobs and the same amount of economic development. Similarly, while new home construction creates 13 jobs and $2.23 million in general economic development, home rehabilitation creates 15 jobs and creates $2.6 million in economic development.[43]

One study indicates that the potential for preservation to generate more jobs than new construction is far more significant; it concludes that an investment of $1 million in a rehabilitation project would create on average *9 to 13* more jobs than the same funds spent on new construction.[44] The explanation for the significant difference in projected job generation is not clear.

[41] National Trust for Historic Preservation, "Main Street Celebrates 25th Anniversary in 2005," http://www.mainstreet.org/content.aspx?page=8706&section=1 (accessed October 1, 2007, 2007).
[42] Listokin, Barbara Listokin and Michael Lahr, T*he Contributions of Historic Preservation to Housing and Economic Development*
[43] Carnegie Mellon Green Design Institute, "Economic Input-Out Life Cycle Analysis Model," Carnegie Mellong University, http://www.eiolca.net/
[44] Rypkema, *The Economics of Historic Preservation: A Community Leader's Guide,* pg. 14.

9. Economic Competitiveness

Historic resources can increase economic competitiveness by helping create a dynamic environment that draws highly skilled workers. Quality of place is a draw for an increasingly mobile, talented, and sought after class of workers. Historic buildings contribute to the richness and diversity of the built environment, and help to create dynamic places that attract talent.

The importance of place in recruiting highly skilled laborers is increasingly recognized. The idea has been most thoroughly explored by Carnegie Mellon University Professor Richard Florida, whose 2002 book. The Rise of the Creative Class discusses the importance of culture and the arts in attracting an increasingly mobile and sophisticated workforce.[45] Historic buildings help to create visually rich and diverse cities, and help create the qualities that attract a "creative" workforce.

10. Small Business-Friendly

Historic buildings are friendly to small-businesses. Older buildings often offer more affordable rents, and are a good match for the space needs of small businesses**.**

In the United States, small businesses are responsible for between 75% and 85% of employment and are a crucial driver of economic growth. Donovan Rypkema has argued convincingly that historic buildings provide the ideal space for new small businesses that are likely unable to afford the high rents in newly constructed buildings.[46] Rypkema also notes that the configuration of historic buildings (often 2500-3500 square feet per floor) are a good match for the space needs of small businesses, which typically employ 12-20 people.

B. Preservation as a Driver of *Sustainable* Economic Development

As noted above, the distinction between sustainable and unsustainable economic development is not well defined. Since well developed indicators of sustainable economic development could not be located prior to completion of this paper, several assumptions are made about the qualities of sustainable economic growth:

- It uses fewer natural resources than conventional economic growth requires
- It produces higher wage jobs
- It is equitable – provides access to housing and other goods for a greater number of people

To some extent, the preservation economics literature suggests that preservation activities either directly or indirectly advance these goals, as will be explored below. Nonetheless, more research is needed in this area.

11. Serviced Based Economic Growth

Preservation promotes service-based economic development. As noted in argument 8, preservation is more labor intensive than new construction. Dollar for dollar, preservation creates more growth than new construction, while using fewer natural resources.

Much of our current climate troubles are attributed to an over-use of natural resources. As described above, dollar for dollar, preservation activities create more jobs than new construction activities. At the same time, by its very nature, preservation uses fewer new resources than new

[45] Richard Florida, *The Rise of the Creative Class* (New York, NY: Basic Books, 2002).

[46] Donovan Rypkema, *The Economics of Historic Preservation: A Community Leader's Guide* (Washington, D.C.: National Trust for Historic Preservation,[2005]), pg. 25.

construction activities – in preserving a building and making use of existing infrastructure such as roads, telecommunications networks, and water and sewer services.

12. Affordable Housing

Preservation is a powerful generator of affordable housing. Equity is a core tenet of sustainable development, and affordable housing is key to achieving equity. Historic buildings have served as a valuable source of affordable housing.

Between the late 1970s and the late 1990s, 40,000 units of affordable housing were created using Historic Tax Credits.[47] These tax credits are often combined with the low income house tax credit (LIHTC) to make projects financially feasible. The goals of the President's Council on Sustainable Development make clear that sustainable economic development must be equitable development, and expand the opportunities for low and moderate income persons. Historic buildings are often well suited for affordable rehabs, and therefore help advance the goal of more equitable economic development.

13. Enhanced Building Efficiency

Improving the energy efficiency of historic buildings makes them more economically sustainable to operate. An increasing number of case studies demonstrate that the energy performance of historic buildings can be improved in a way that is sensitive to historic fabric.

Any accounting of the economic sustainability of historic preservation must take into account the economics of building operations. As is discussed above, there are an increasing number of examples of green rehabilitations of existing buildings, which can dramatically reduce building operating costs. As energy costs continue to rise, energy efficient historic buildings will be more economical to operate. For example, Ben Logue, a developer of energy efficient affordable housing in historic buildings in Salt Lake City, reports that in one of his buildings, electric bills have dropped from $55 per apartment unit per month to $5 per apartment per month – a substantial savings.[48]

14. High Wage Jobs

Generator of High Quality Employment. Preservation requires more specialized skills, generating higher wage employment.

The President's Council on Sustainable Development identifies increasing wages as essential to sustainable development. Because preservation requires more specialized skills – such as those needed for repairing wood windows or masonry restoration – jobs generated by preservation activities are likely to be higher wage jobs than created by new construction. Studies confirming the extent to which this may be true could not be located.

Preliminary Recommendations – Economic Research

- Update (or locate updated) research on how preservation affects local economies. Given profound changes in the global economy in recent years, more recent studies about the economic impacts of preservation are needed. Such studies might address how globalization has changed supply and labor issues, and examine whether preservation dollars still tend to stay local (local labor, local materials), as was in the case in the past.
- Update (or locate updated) data about job generation. Findings about job generation vary

[47] Listokin, Barbara Listokin and Michael Lahr, *The Contributions of Historic Preservation to Housing and Economic Development,* pg.449.
[48] Benjamin Logue, "Presentation at the 2007 Conference of the National Trust for Historic Preservation" (St. Paul, MN).

considerably, and data used in these studies is outdated.

- Pursue scholarly economics research. Mason points out that much of the existing economics literature is weighted heavily towards advocacy, and fails to take into consideration the opportunity costs of preservation. Arguments that preservation promotes economic growth will be bolstered by careful and academically rigorous research.

Questions:

- Does preservation promote higher paying, higher quality jobs than new construction?
- What is "sustainable" economic development? Is it important to preservationist's conversations about sustainability?

IV. Preservation and Social Sustainability

Finally, a review of the literature on social sustainability and the social benefits of historic preservation was undertaken. The concept of social sustainability is perhaps even more challenging to define and to measure than environmental and economic sustainability. According to one source, "social sustainability is focused on the development of programs and processes that promote social interaction and cultural enrichment. It emphasizes protecting the vulnerable, respecting social diversity and ensuring that we all put priority on social capital."[49]

There are at least two important points about the relationship between preservation and social sustainability that must be addressed here. First, there are some inherent qualities of preservation that advance the goals of social sustainability. As noted in the working definition of social sustainability used here, "cultural enrichment" is an important component of socially sustainable development. The core purpose of preservation is to protect these cultural resources and ensure their survival for future generations.

Preservation also advances the goals of socially sustainable development in other ways. For example, the revitalization of historic neighborhoods reinforces traditionally planned communities that include mixed uses and green spaces, are "walkable" and well connected to public transportation. In reinvigorating these neighborhoods, preservation promotes strong and healthy communities with high quality of life factors. The use of historic buildings for affordable housing can also promotes equitable access to quality neighborhoods.

Unfortunately, the byproducts of historic preservation are not always positive – this is the second important point about the relationship between preservation and social goals. For example, the revitalization of neighborhoods sometimes leads to the displacement of long-time neighborhood residents, and erodes long standing communities. Any discussion about the social benefits of preservation must therefore take into consideration the sometimes destructive consequences of neighborhood change.

Avoiding these consequences requires a thoughtful and thorough planning process and political will that places concerns about potentially displaced communities at the center of community discussions and planning. Because of time limitations in preparing this paper, examples of the use such planning are not offered and require further investigation. The following section focuses on the strengths of preservation as a catalyst for social sustainability, with the important caveat that a more thorough discussion is needed about the potentially negative consequences of revitalization.

15. Cultural Ecosystems

Preservation maintains cultural resources and cultural diversity, and thereby our "cultural ecosystems." These cultural ecosystems "support and maintain cultural life and human civilization in the same way that natural ecosystems support an maintain the natural world" – David Throsby

[49] Interface Sustainability, "Social Sustainability," http://www.interfacesustainability.com/social.html

The literature on preservation and sustainability features extensive analogies between heritage conservation and environmental conservation. Professor of Economics David Throsby argues that "cultural ecosystems support and maintain cultural life and human civilization in the same way that natural ecosystems support and maintain the natural world."[50] So too, Professor of City and Regional Planning John Keene sees cultural conservation as "maintaining cultural diversity in much the same way that environmentalists seek to maintain biological diversity."[51] Keene explains further, "to demolish the distinctive neighborhoods that characterize the world's cities and replace them with uniform twenty-first-century settlements in analogous to cutting down a rain forest and replacing it with pasture or monocrop tillage. It reduces cultural diversity and increases entropy."[52] Maintaining cultural diversity inherently requires preservation of place. "Cultural ecosystems are located in time and space; for a cultural ecosystem to be maintained or conserved, its place(s) must be preserved."[53]

Nationally recognized standards and criteria for recognizing cultural significance have been established by the National Register of Historic Places and the Secretary of the Interior's Standards for the Treatment of Historic Properties.[54] These standards for historic buildings exist as a result of the National Historic Preservation Act of 1966 and should be acknowledged as a way to help identify culturally (and therefore socially) important resources.

16. Well Being

Preservation of place promotes psychological well being. The built environment provides us with a sense of place that helps shape our individual and collective identities. This sense of identity is particularly threatened in an increasingly globalized world.

Culture, as it is expressed in the built environment, is essential to well-being. Professor Setha Low, a Professor of Environmental Psychology and Anthropology, argues that maintaining the built environment is essential to identity. She explains that "…physical reminders provide a sense of place attachment, continuity and connectedness that we are rarely aware of but that play a significant role in our psychological development as individuals and in our "place identity" or "cultural identity" as families or ethnic and cultural groups."[55] This sense of identity has been particularly threatened during the recent period of rapid globalization.

John Keen explains the important role of preservation in preventing this erosion of identity. He notes that "conservationists seek to resist the homogenization of style and culture that results from the overpowering technology of the Internet, communications, television, and other mass media, the cell phone, "big box" commercialism, and the globalization of so many aspects of our twenty-first century lives."[56]

In his work, Donovan Rypkema also explores the idea of preservation in the context of a globalized world. He argues that there is not one globalization, but two: economic globalization and cultural globalization. While economic globalization can produce many positive benefits, cultural

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[50] David Throsby, "Sustainability in the Conservation of the Built Environment: An Economists' Perspective" The Getty Conservation Institute, 2003, pg. 7.
[51] John Keene, "The Link between Historic Preservation and Sustainability: An Urbanist's Perspective" The Getty Conservation Institute, 2003, pg. 13.
[52] Ibid., pg. 15.
[53] Setha Low, "Social Sustainability: People, History and Values" (Philadelphia, PA, The Getty Conservation Institute, April 2001, 2003), pg. 47.
[54] Morton W. Brown and Gary L. Hume, eds., *The Secretary of the Interior's Standards for Historic Preservation Projects: With Guidelines for Applying the Standards* U.S. Dept. of the Interior, Heritage Conservation and Recreation Services, Technical Preservation Services Division, 1979).
[55] Setha Low, "Social Sustainability: People, History and Values" (Philadelphia, PA, The Getty Conservation Institute, April 2001, 2003)., pg 47.
[56] John Keene, "The Link between Historic Preservation and Sustainability: An Urbanist's Perspective" (Philadelphia, PA, The Getty Conservation Institute, April 2001, 2003)., pg. 13.

globalization "has few if any benefits, but has significant adverse social and political consequences in the short term and negative economic consequences in the long term."[57] According to Rypkema, cities' success in the era of globalization will be determined not just by how well they harness the benefits of the new economic order, but in their ability to curb the homogenizing effects of globalization on cultural heritage.

17. Social Equity

Preservation promotes social equity. Increasingly, recent preservation efforts seek to build and strengthen communities by including all stakeholders in the planning process.

Professor Low maintains that it is not sufficient to merely *preserve* a cultural ecosystem. Social sustainability "implies a moral a and political stance vis-à-vis socio-cultural systems – maintaining them, supporting them, and in some cases improving them."[58] Indeed, the definition of sustainability used in this paper provides that social sustainability "emphasizes protecting the vulnerable, respecting social diversity" – suggesting that social equity is of paramount importance. The President's Council on Sustainability also emphasizes the importance of "ensuring that all Americans are afforded justice and have the opportunity to achieve economic, environmental, and social well-being."

As noted at the beginning of this section, there are instances in which revitalization efforts result in inequitable outcomes that exclude and/or displace existing populations. Yet increasingly, historic preservation strives to be a participatory process that includes a range of people and organizations in the planning process. In many instances, this open and inclusive process is mandated by the government –as is the case with Section 106 of the National Historic Preservation Act, which requires extensive consultation on preservation issues involving government actions or funds, and many local ordinances which create the framework for public involvement in preservation efforts.

Community participation increasingly extends beyond government mandated processes. Professor Randall Mason of the University of Pennsylvania has explained the importance of community participation – by all stakeholders – in the context of values-centered preservation. Values-centered preservation acknowledges that values – and therefore ideas of cultural significance – are not fixed, but evolve over time. "Acknowledging and embracing the changeability of values and significance brings historic preservation in line with the dominant contemporary understanding of culture as a *process* not a set of things with fixed meaning."[59] (emphasis added) This process requires wide consultation with and inclusion of all stakeholders. Mason argues that this participation is "acknowledged widely as one of the urgent needs in contemporary preservation practice" and "is part and parcel of the values-centered model of preservation."[60]

More research is needed to evaluate the success of various approaches to preservation planning that promote more equitable outcomes.

18. Social Capital

Preservation encourages social interaction and civic engagement. The development and maintenance of social capital through this engagement is central to social sustainability.

Social interaction and civic engagement are a key part of social sustainability, and are embedded both in the working definition of social sustainability used in this paper and in the indicators of social sustainability developed by the President's Council on Sustainable Development. This enrichment of

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[57] Donovan Rypkema, "Historic, Green and Profitable," (March 8, 2007) (Speech delivered at Traditional Buildings Conference in Boston, MA), pg. 12.
[58] Low, *Social Sustainability: People, History and Values*, 47-64
[59] Randall Mason, "Theoretical and Practical Arguments for Values-Centered Preservation," *CRM* 3, no. 2 (2006), pg. 32.
[60] Ibid., pg. 31.

civic engagement can also be thought of as building social capital, a concept that can be defined as "collective value of all 'social networks' [who people know] and the inclinations that arise from these networks to do things for each other ['norms of reciprocity']." [61] (brackets original.) Improvements in social capital can lead to improved health, higher educational attainment, better employment opportunities, and lower crime rates."[62]

As noted above, civic engagement is at the core of preservation practice. Preservation projects can help instill a sense of belonging, trust, and civic engagement. As English Heritage has noted "historic places are a powerful focus for community action."[63] Research by the British Urban Regeneration Association found that "historic buildings can act as focal points around which communities will rally and renew their sense of civic pride."

19. Quality of Life

Historic communities are valued for their quality of life. Traditional communities typically are walkable, provide access to mass transit, have green space, and provide easy access to schools and other local facilities and services.

In recent years, "New Urbanism" – or neo-traditional planning – has gained popularity as an alternative to the post 1950s model of sprawling development. The concept was developed in recognition that the model of indiscriminate development on the urban fringe – which require the use of cars, features little or no connectivity to places nearby, and often segregates housing (by size and income) – is both socially and environmentally unsustainable. New Urbanism emphasizes walkability, connectivity to infrastructure, mixed use, mixed housing, quality architectural and urban design, and mass transit. Proponents of New Urbanism conclude that "taken together, these [qualities] add up to a high quality of life well worth living, and create places that enrich, uplift, and inspire the human spirit."[64]

New Urbanism is in fact *old* Urbanism. The qualities of neighborhood and architectural design advocated by New Urbanists are embedded in historic communities across the country. In reinvesting and revitalizing these communities, we value the natural resources that are embedded in these communities and promote conservation of new resources. But we also value and promote a high *quality of life*.

Preliminary Recommendations – Social Research

- Survey indicators of social sustainability, and identify those that are most relevant to preservation.
- Undertake comparison of traditional and new urbanist neighborhoods and evaluate these communities based on aforementioned indicator. What are historic communities' strengths? Weaknesses?

Questions:

- Who are the leading "thinkers" on the concept social sustainability? What are the best sources on the subject?
- What aspects of social sustainability can we measure in a meaningful way? Which organizations/governments have developed indicators that may be most useful to us?
- Are there case studies that demonstrate how preservation can be used to promote equity?

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[61] The Saguaro Seminar, "Social Capital Primer," Harvard University, http://www.ksg.harvard.edu/saguaro/primer.htm (accessed October 1, 2007).
[62] English Heritage, *The Heritage Dividend Methodology: Measuring the Impact of Heritage Projects*, [2005]), http://www.helm.org.uk/upload/pdf/Heritage-Dividend-Methodology.pdf (accessed October 13, 2007), pg. 9.
[63] English Heritage, *Regeneration and the Historic Environment: Heritage as a Catalyst for Better Social and Economic Regeneration*, [2005]), http://www.helm.org.uk/server/show/nav.005001004003 (accessed October 13, 2007)., pg. 4.
[64] New Urbanism, "Principles of New Urbanism," http://www.newurbanism.org/ (accessed October 13, 2007).

V. Conclusion

As we learn more about the limitations and tolerance of our ecosystem, the drivers of economic growth, and our need as humans for quality communities that facilitate individual and group well-being, the very meaning of sustainable development evolves. In its breadth, vagueness, and evolving nature, the concept of sustainability can easily lose meaning when it is applied to choices made about our buildings and communities. But given the urgency of climate change, there is an acute need to reform the way we develop and redevelop our communities within the framework of “sustainability" so that we can meet our present needs, *and* leave behind a system that will support future generations.

It is hoped that this paper will help further the conversation about how the improvement and re-use of existing buildings supports this goal. With the input of more than 30 experts at the October 2007 Research Retreat, the National Trust will be able to develop a prioritized research agenda that supports the case that historic preservation *is* sustainable development. This agenda will identify the most critical research questions and research needs, and establish the order in which the Trust should pursue this work. The prioritized research agenda will also identify potential research partners and funders.

In the coming months, the National Trust will pursue partnerships with researchers, academic institutions, consultants, government agencies, non profit organizations, and other groups to develop the intellectual capacity needed to execute research. During this time, the National Trust will also work closely with potential funders to obtain the financial support needed to complete this work.

A detailed dissemination work plan will be developed. This plan will identify means of disseminating research findings as widely as possible, such as by making publications available online, and providing user friendly online tools (such as a life cycle assessment model). This dissemination plan will also include a strategy for engaging with key organizations outside of the traditional preservation audience, such as environmental organizations.

Throughout this process, the National Trust will provide opportunities for research retreat attendees to participate in refinement of research goals and the review of research reports. Participants will also have a key role in providing insight into about the best ways of disseminating research within the preservation community and reaching new audiences in the environmental movement.

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